3350G Series
High power
Electronic Load
Operation manual

S/N:9003350G02 REV:D

PRODIGIT
INSTRUMENT PROFESSIONAL

Material Contents Declaration

(材料含量宣称)

(Part Name) 零件名称	Hazardous Substance (有毒有害物质或元素)					
	铅(Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6+)	多溴联苯(PBB)	多溴二苯醚 (PBDE)
PCBA (印刷电路装配件)	X	○	X	○	○	○
Electrical part not on PCBA's 未在PCBA上的电子零件	X	○	X	○	○	○
Metal parts **金属零件**	○	○	○	X	○	○
Plastic parts 塑料零件	○	○	○	○	X	X
Wiring 电线	X	○	○	○	○	○
Package **封装**	X	○	○	○	○	○

对销售之日的所售产品,本表显示, PRODIGIT 供应链的电子信息产品可能包含这些物质。注意:在所售产品中可能会也可能不会含有所有所列的部件。This table shows where these substances may be found in the supply chain of Prodigit electronic information products, as of the date of sale of the enclosed product. Note that some of the component types listed above may or may not be a part of the enclosed product. ○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006 标准规定的限量要求以下。○：Indicates that the concentration of the hazardous substance in all homogeneous materials in the parts is below the relevant threshold of the SJ/T 11363-2006 standard. ×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006 标准规定的限量要求。×： Indicates that the concentration of the hazardous substance of at least one of all homogeneous materials in the parts is above the relevant threshold of the SJ/T 11363-2006 standard.

Note(注释):

1.Prodigit has not fully transitioned to lead-free solder assembly at this moment；However, most of the components used are RoHS compliant.
(此刻，Prodigit 并非完全过渡到无铅焊料组装；但是大部份的元器件一至于RoHS的规定。)

2. The product is labeled with an environment-friendly usage period in years.

The marked period is assumed under the operating environment specified in the product specifications.
(产品标注了环境友好的使用期限制(年)。所标注的环境使用期限假定是在此产品定义的使用环境之下。)

Example of a marking for a 10 year period:

(例如此标制环境使用期限为10年)

SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. PRODIGIT assumes no liability for the *customer's failure to comply with these requirements.*

GENERAL

This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

ENVIRONMENTAL CONDITIONS

This instrument is intended for indoor use in an installation category I, pollution degree 2 environments. It is designed to operate at a maximum relative humidity of 80% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

BEFORE APPLYING POWER

Verify that the product is set to match the available line voltage and the correct fuse is installed.

GROUND THE INSTRUMENT

This product is a Safety Class 1 instrument (provided with a protective earth terminal). To minimize Shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The Instrument must be connected to the ac power supply mains through a three conductor power cable, With the third wire firmly connected to an electrical ground (safety ground) at the power outlet. Any Interruption of the protective (grounding) conductor or disconnection of the protective earth terminal Will cause a potential shock hazard that could result in personal injury.

FUSES

Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired

Fuses or short circuited fuse holder. To do so could cause a shock or fire hazard.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE.

Do not operate the instrument in the presence of flammable gases or fumes.

KEEP AWAY FROM LIVE CIRCUITS.

Operating personnel must not remove instrument covers. Component replacement and internal Adjustments must be made by qualified service personnel. Do not replace components with power Cable connected. Under certain conditions, dangerous voltages may exist even with the power cable Removed. To avoid injuries, always disconnect power, discharge circuits and remove external voltage Sources before touching components.

DO NOT SERVICE OR ADJUST ALONE.

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT EXCEED INPUT RATINGS.

This instrument may be equipped with a line filter to reduce electromagnetic interference and must be connected to a properly grounded receptacle to minimize electric shock hazard. Operation at line Voltages or frequencies in excess of those stated on the data plate may cause leakage currents in excess of 5.0 mA peak.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT.

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a PRODIGIT ELECTRONICS Sales and Service Office for service and repair to ensure that safety features are maintained.

Instruments which appear damaged or defective should be made inoperative and secured against Unintended operation until they can be repaired by qualified service personnel.

EC DECLARATION OF CONFORMITY

We Prodigit Electronics Co., Ltd. declares under our own responsibility that the product Programmable Electronic Load

(Model No.: 3351G/3352G/3353G/3354G/3355G/3356G/3361G/3362G/3363G/3364G/3365G/3366G/3371G/3372G/3373G/3374G/3375G/3376G) satisfies all the technical relations application to the product within the scope of council:

Directive: 2014/30/EU; 2014/35/EU; 2015/863/EU; 2012/19/EU

The above product is in conformity with the following standards or other normative documents

Harmonized Standard：

EN 61010-1: 2010+A1:2019
EN IEC 61010-2-030:2021+A11:2021
EN 61326-1:2013
EN 61326-2-1:2013

Reference Basic Standards：

Emission:

EN 55011: 2016+A1: 2020 Class A
EN 55032: 2015+A1:2020
EN 61000-3-2: 2014
EN 61000-3-3: 2013

Immunity:

EN 61000-4-2: 2009
EN 61000-4-3: 2006+A2:2010
EN 61000-4-4: 2012
EN 61000-4-5: 2014+A1:2017
EN 61000-4-6: 2014
EN 61000-4-8: 2010
EN 61000-4-11: 2020

Company Name : Prodigit Electronics Co., Ltd.

Company Address : 8F, No.88, Baojhong Rd., Sindian District, New Taipei City,Taiwan.

Person is responsible for marking this declaration:

PRODIGIT INSTRUMENT PROFESSIONAL

Manufacturer/Importer
Signature: Dean Wang
Date: 2022/10/20
Name: Dean Wang
R&D Assistant Manager

UK Declaration of Conformity

We Prodigit Electronics Co., Ltd. declares under our own responsibility that the product Programmable Electronic Load

(Model No.:

3351G/3352G/3353G/3354G/3355G/3356G/3361G/3362G/3363G/3364G/3365G/3366G/3371G/3372G/3373G/3374G/3375G/3376G)) Satisfies all the technical relations application to the product within the scope of council:

Directive: Electromagnetic Compatibility Regulations 2016; Electrical Equipment (Safety) Regulations 2016; the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

The above product is in conformity with the following standards or other normative documents

Harmonized Standard：

BS EN 61010-1:2010+A1:2019 ;BS EN IEC 61010-2-030:2021+A11:2021

BS EN 61326-1: 2013 ; BS EN 61326-2-1: 2013

Reference Basic Standards：

Emission:		**Immunity:**
BS EN 55011: 2016+A1: 2020	Class A	BS EN 61000-4-2: 2009
BS EN 55032: 2015+A1:2020		BS EN 61000-4-3: 2006+A2:2010
BS EN 61000-3-2: 2014		BS EN 61000-4-4: 2012
BS EN 61000-3-3: 2013		BS EN 61000-4-5: 2014+A1:2017
		BS EN 61000-4-6: 2014
		BS EN 61000-4-8: 2010
		BS EN 61000-4-11: 2020

Company Name : Prodigit Electronics Co., Ltd

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Person is responsible for marking this declaration:

PRODIGIT INSTRUMENT PROFESSIONAL

Manufacturer/Importer

Signature: Dean Wang

Date: 2022/10/20 Name: Dean Wang R&D Assistant Manager

SAFETY SYMBOLS

Direct current (DC)

Alternating current (AC)

Both direct and alternating

Three-phase alternating current

Protective earth (ground)

On (Supply)

Off (Supply)

Fuse

Caution ! Refer to this manual before using the meter.

Caution, risk of electric shock

CAT IV – Is for measurements performed at the source of the low-voltage installation.

CAT III – Is for measurements performed in the building installation.

CAT II – Is for measurements performed on circuits directly connected to the low-voltage installation.

CAT I – Is for measurements performed on circuits not directly connected to Mains.

3350G series module load operation manual Table of Contents

Figures

Tables

Chapter 1 Introduction

1-1 General description

The 3350G series Electronic Load is designed to test, evaluation and burn-in of DC power supplies and batteries.

	Normal mode	Turbo mode
3351G	150V / 100A / 1200W	150V / 150A / 1800W
3352G	150V / 200A / 2400W	150V / 300A / 3600W
3353G	150V / 300A / 3600W	150V / 450A / 5400W
3361G	600V / 70A / 1200W	600V / 150A / 1800W
3362G	600V / 140A / 2400W	600V / 210A / 3600W
3363G	600V / 210A / 3600W	600V / 315A / 5400W
3371G	1200V / 40A / 1200W	1200V / 60A / 1800W
3372G	1200V / 80A / 2400W	1200V / 120A / 3600W
3373G	1200V / 120A / 3600W	1200V / 180A / 5400W

	Normal mode	Turbo mode
3354G	150V / 400A / 4000W	150V / 600A / 6000W
3355G	150V / 500A / 5000W	150V / 750A / 7500W
3356G	150V / 600A / 6000W	150V / 900A / 9000W
3364G	600V / 280A / 4000W	600V / 420A / 6000W
3365G	600V / 350A / 5000W	600V / 525A / 7500W
3366G	600V / 420A / 6000W	600V / 630A / 9000W
3374G	1200V / 160A / 4000W	1200V / 240A / 6000W
3375G	1200V / 200A / 5000W	1200V / 300A / 7500W
3376G	1200V / 240A / 6000W	1200V / 360A / 9000W

The 3350G series electronic load can be operated for manual and GPIB operation. The power contour of 3350G series Electronic Load is shown in Fig 1-1.1~1-1.18.
The PRODIGIT 3350G series high power electronic Load can be controlled locally at the front panel or remotely via computer over the GPIB/RS232/USB/LAN. Constant Current (CC) mode, Constant Resistance (CR) mode, and Constant Voltage (CV) mode. and Constant Power (CP) mode. The wide range dynamic load with independent rise and fall current slew rate and analog programming input with arbitrary wave-form input is available in Constant Current mode.

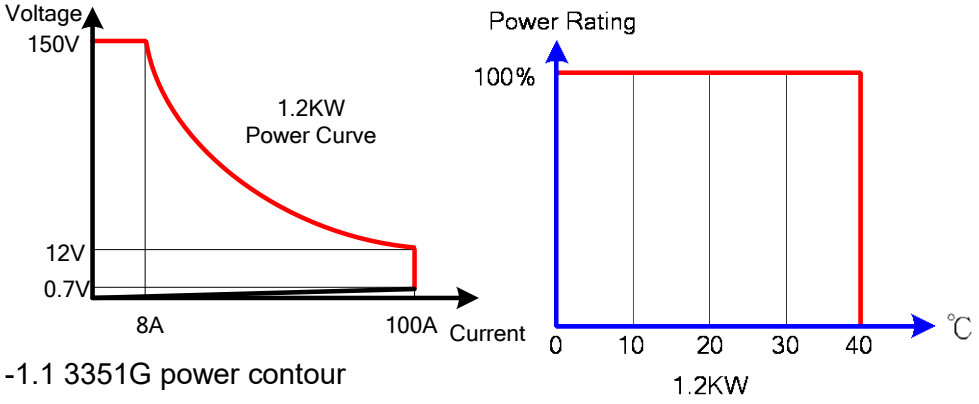


Fig 1-1.1 3351G power contour

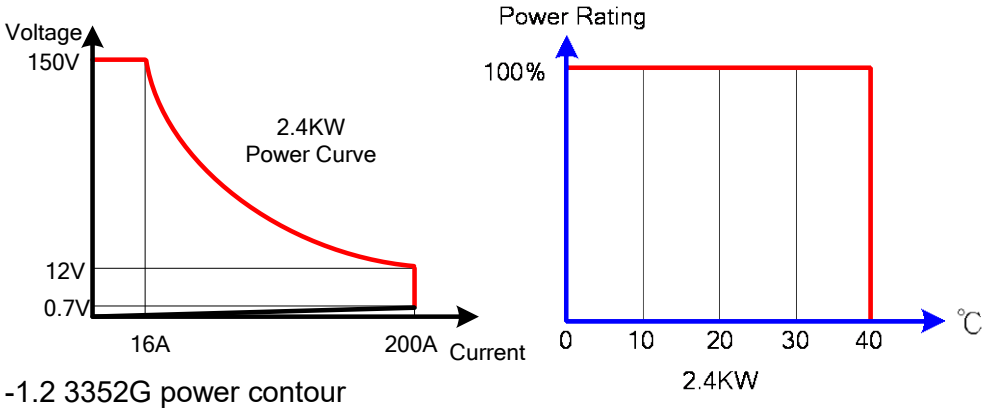


Fig 1-1.2 3352G power contour

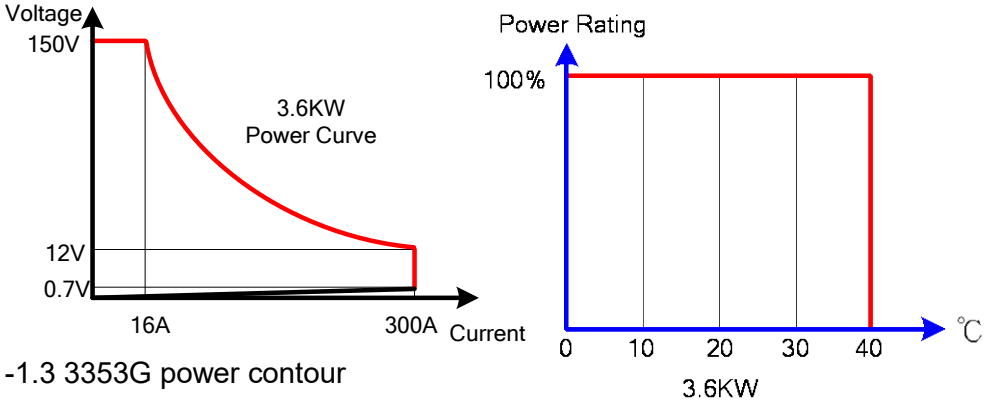


Fig 1-1.3 3353G power contour

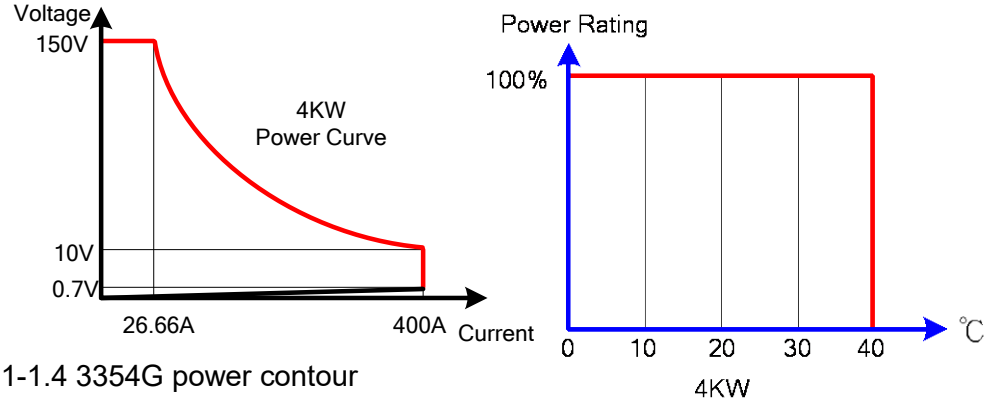


Fig 1-1.4 3354G power contour

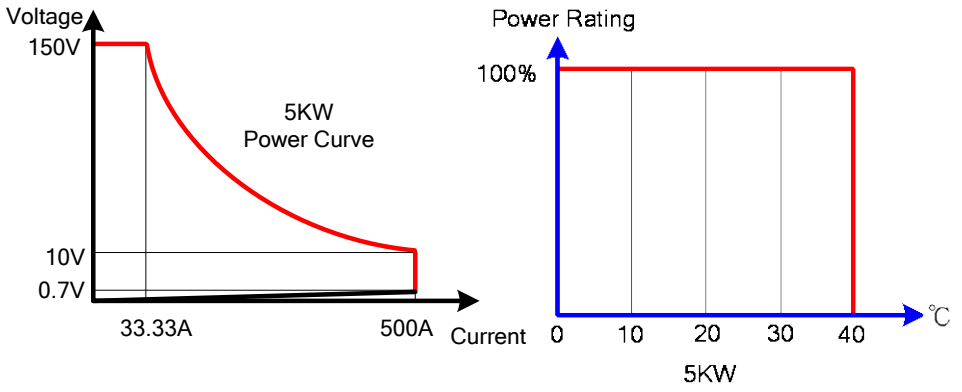


Fig 1-1.5 3355G power contour

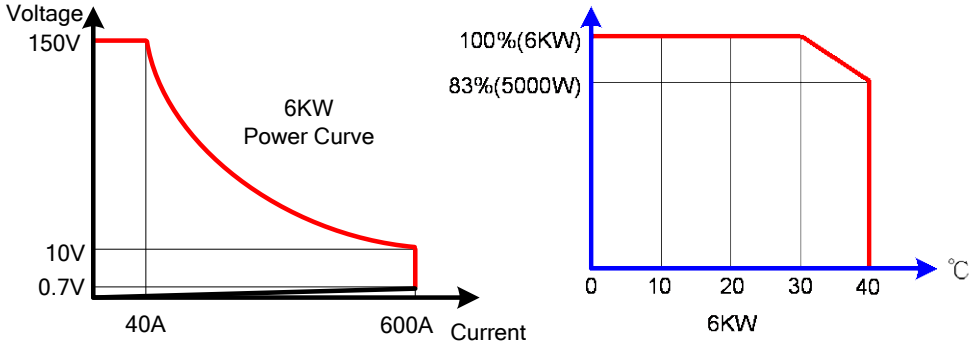


Fig 1-1.6 3356G power contour

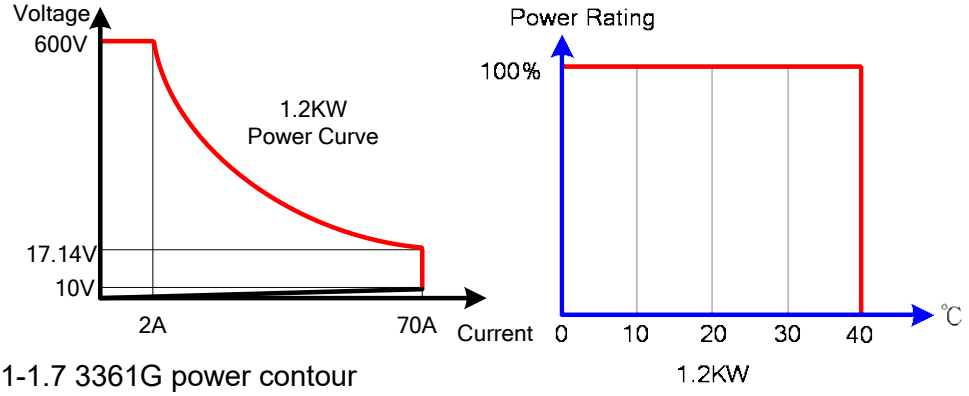


Fig 1-1.7 3361G power contour

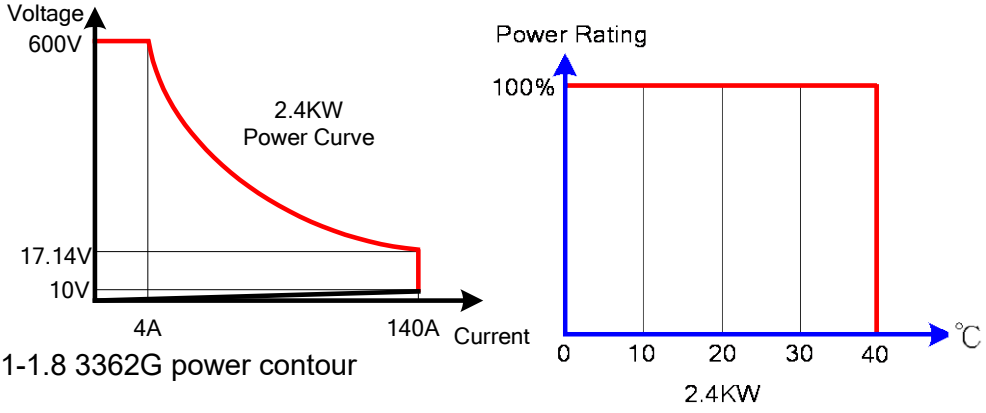


Fig 1-1.8 3362G power contour

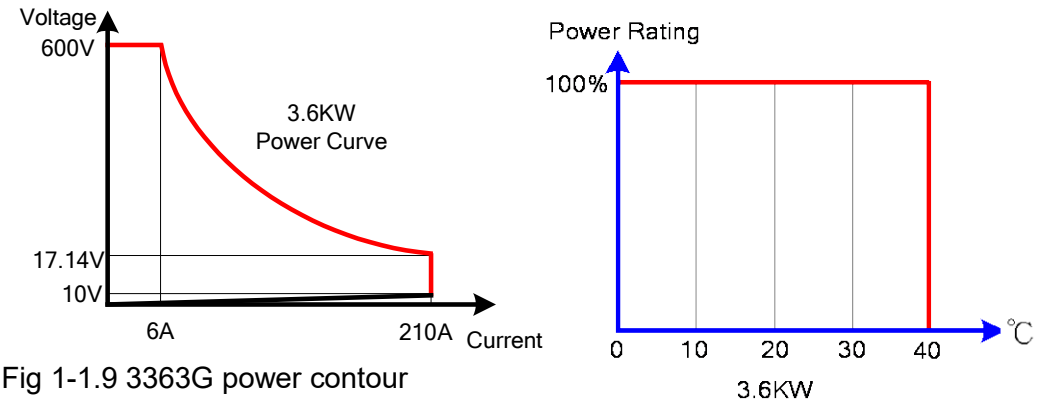


Fig 1-1.9 3363G power contour

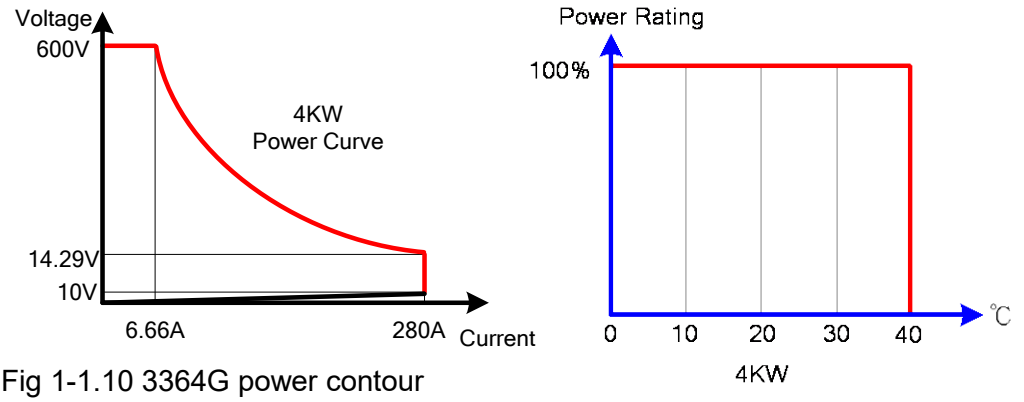


Fig 1-1.10 3364G power contour

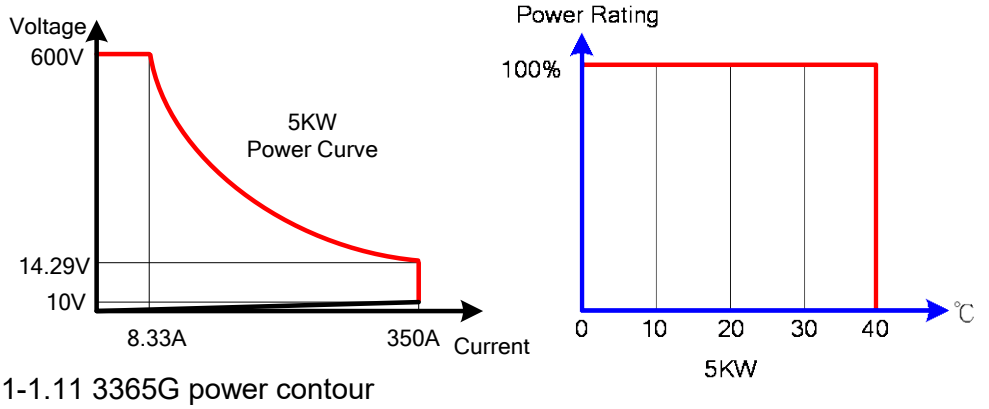


Fig 1-1.11 3365G power contour

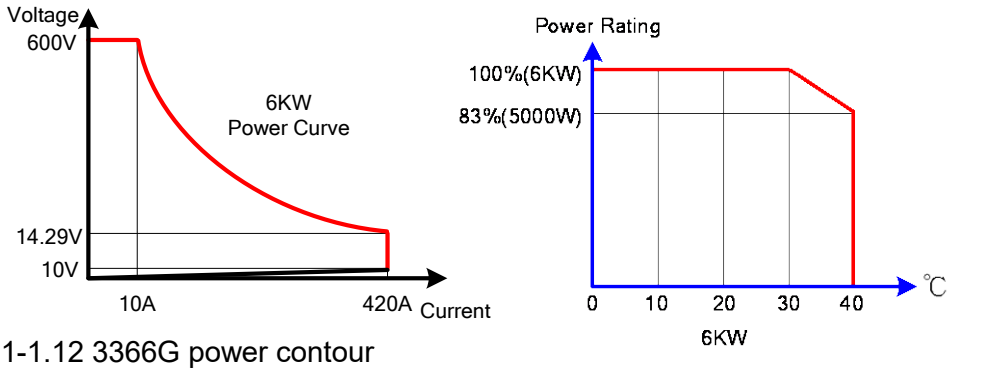


Fig 1-1.12 3366G power contour

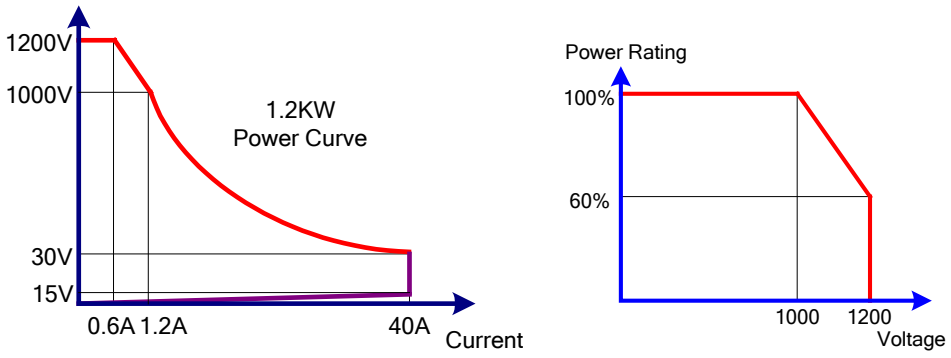


Fig 1-1.13 3371G power contour

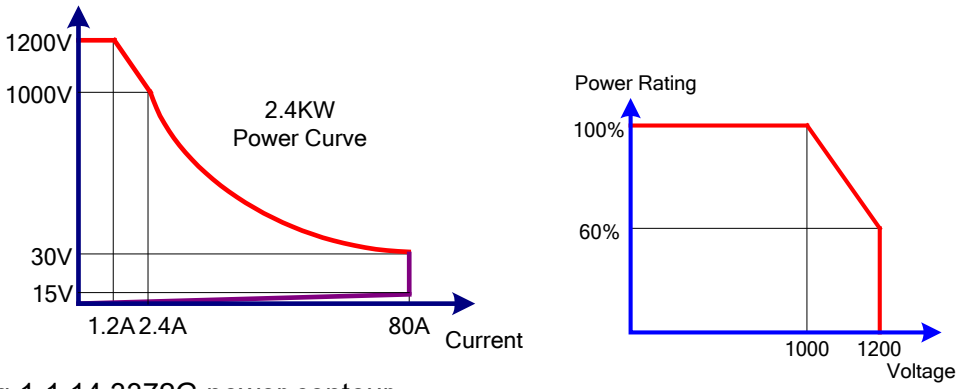


Fig 1-1.14 3372G power contour

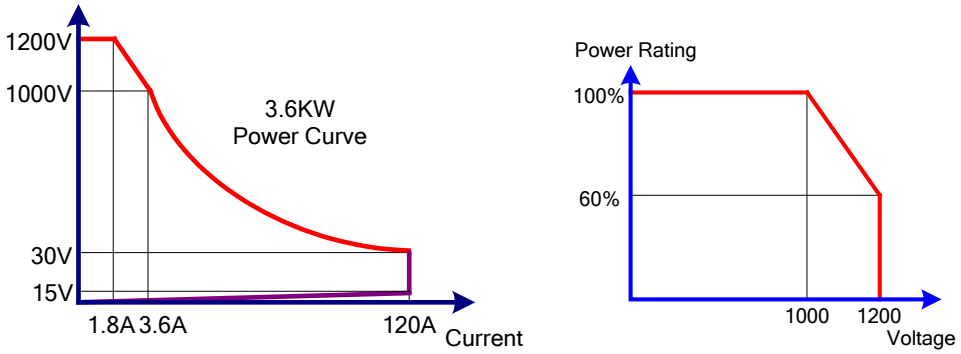


Fig 1-1.15 3373G power contour

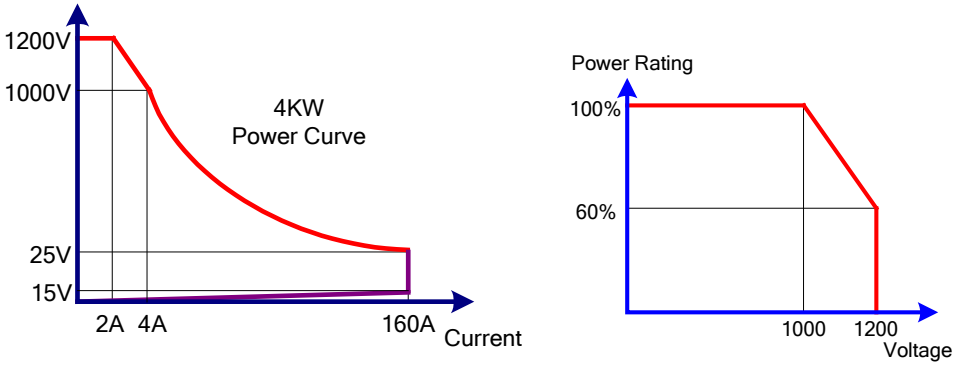


Fig 1-1.16 3374G power contour

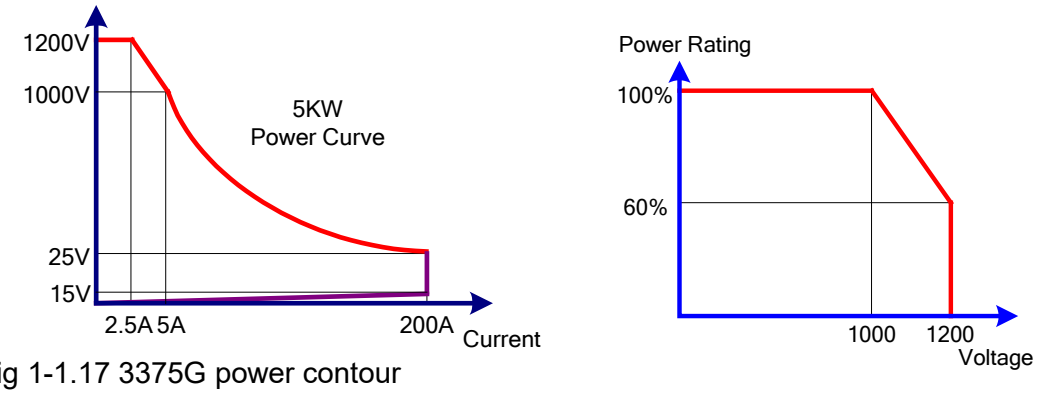


Fig 1-1.17 3375G power contour

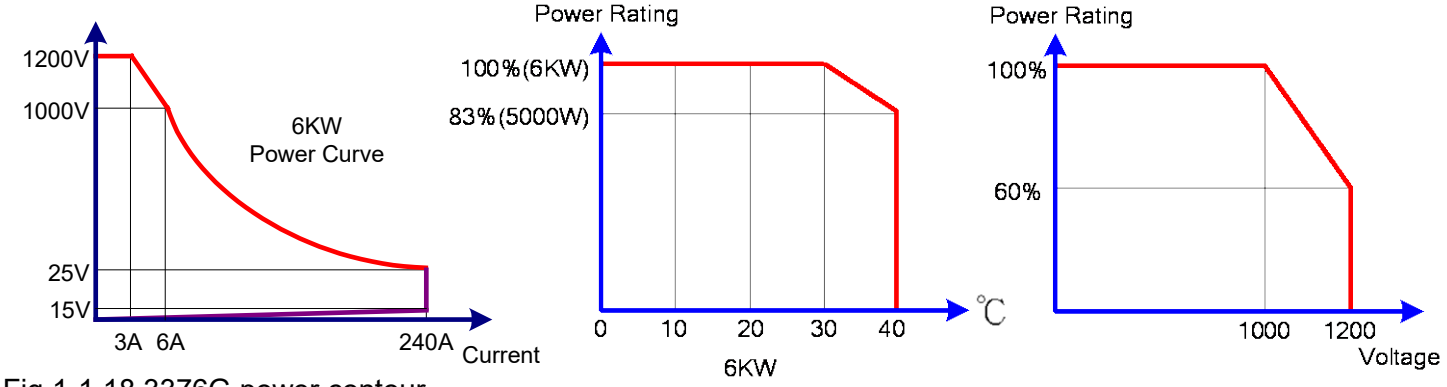


Fig 1-1.18 3376G power contour

1.1.1. CC Mode

With the operating mode of Constant Current, the 3350G series electronic load will sink a current in accordance with the programmed value regardless of the input voltage (see Fig.1-2).

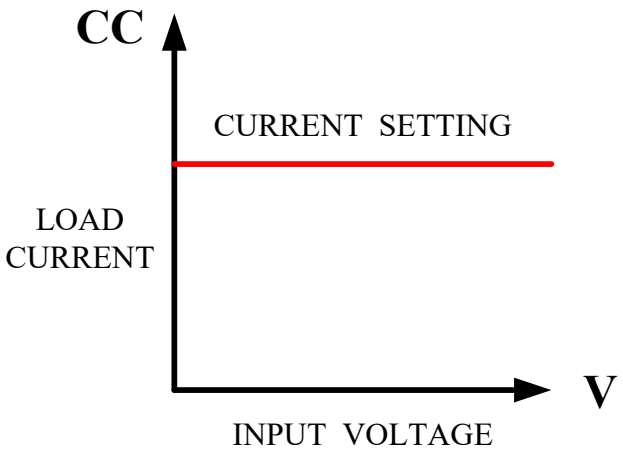


Fig 1-2 Constant Current mode

1.1.2. CR Mode:

At Constant Resistance mode, the 3350G series Electronic Load will sink a current linearly proportional to the load input voltage in accordance with the programmed resistance setting (see Fig 1-3).

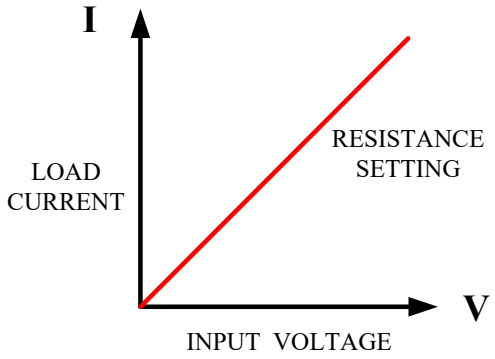


Fig 1-3 Constant Resistance mode

1.1.3. CV Mode:

At Constant Voltage mode, the 3350G series Electronic Load will attempt to sink enough current until the load input voltage reaches the programmed value (see Fig 1-4).

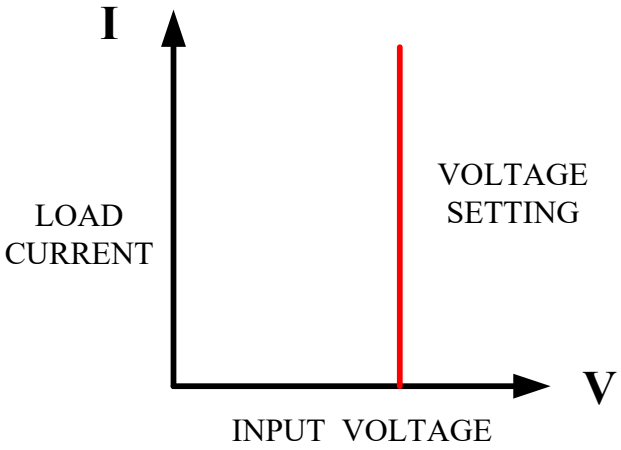


Fig 1-4 Constant Voltage mode

1.1.4. CP Mode:

At Constant Power mode, the 3350G series Electronic Load will attempt to sink load power (load voltage * load current) in accordance with the programmed power. (see Fig 1-5).

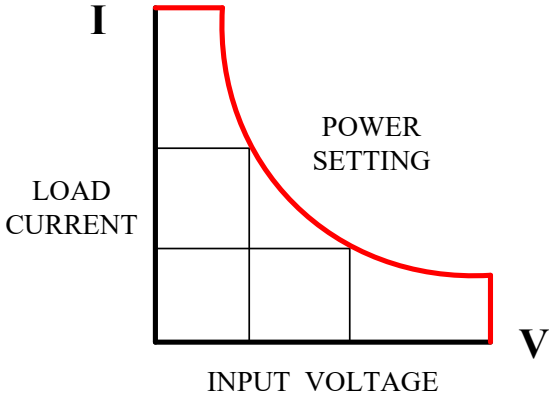


Fig 1-5 Constant Power mode

1.1.5. Dynamic Waveform Definition

Along with static operation the 3350G series Electronic Load are built with a Dynamic mode for operation in Constant Current (CC), Constant Resistance (CR) or Constant Power (CP). This allows the test engineer to simulate real world pulsing loads or implement a load profile that varies with time.

A dynamic waveform can be programmed from the front panel of the 3350G series Electronic Load. The user would first set a High and low value of load current using the Level button. The Dynamic Setting then allows for the rise and fall time between these 2 current values to be adjusted. The time period that the waveform is high (Thigh) along with the time period that the waveform is low (Tlow) can also be set.

The dynamic waveform is illustrated below in Fig 1-6.

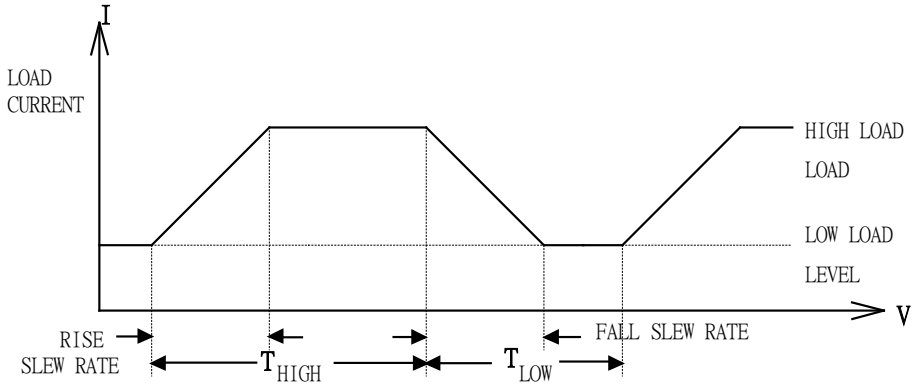


Fig 1-6 Dynamic Wave form

The dynamic waveform can also be set up via the optional computer interface. Dynamic waveform settings made from the front panel of the load module can also be saved in the memory of the 3350G series Electronic Load. For the store/recall procedure and the computer command set please refer to the relevant operating manual for the 3350G series Electronic Load.

Further dynamic waveform definitions are:

- The period of dynamic waveform is Thigh + Tlow
- The dynamic frequency = 1 /(Thigh + Tlow)
- The duty cycle = Thigh / (Thigh + Tlow)

  Example1:
  3350G Series, Dynamic up to 50 KHz frequency
  Dynamic highest frequency 50 KHz = 0.02ms=20us
  Setting THIGH=10 uS, TLOW=10uS, THIGH+TLOW=20uS
  CCH-CCL/SR≦10uS
  Setting CCH=30A, CCL=10A
  (30-10)/2.5A/uS≦10 uS
  8 uS≦10 uS ,Compliance with frequency 50KHz

  Example2:
  Setting THIGH=10 uS, TLOW=10uS, THIGH+TLOW=20uS
  CCH-CCL/SR≦10uS
  Setting CCH=50A, CCL=0A
  (50-0)/2.5A/uS=20uS, 20uS>10uS, It's not compliance the frequency 50 KHz

The analogue programming input also provides a convenient method of implementing a dynamic waveform. Please see the section 3.1.26 titled ‘Analog Programming Input’ for further information.

1.1.6. Slew Rate

Slew rate is defined as the change in current or voltage over time. A programmable slew rate allows for a controlled transition from one load setting to another. It can be used to minimize induced voltage drops on inductive power wiring, or to control induced transients on a test device (such as would occur during power supply transient response testing).

In cases where the transition from one setting to another is large, the actual transition time can be calculated by dividing the voltage or current transition by the slew rate. The actual transition time is defined as the time required for the input to change from 10% to 90% or from 90% to 10% of the programmed excursion.

In cases where the transition from one setting to another is small, the small signal bandwidth (of the load) limits the minimum transition time for all programmable slew rates. Because of this limitation, the actual transition time is longer than the expected time based on the slew rate, as shown in Figure 1-7

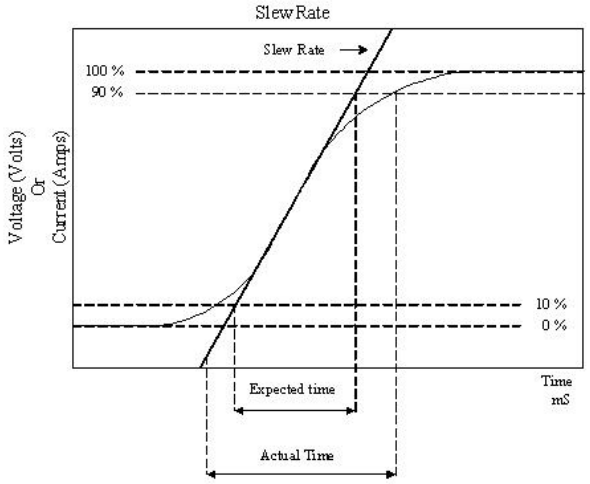


Fig 1-7 Rise Time Transition Limitation

Therefore, both minimum transition time and slew rate must be considered when determining the actual transition time.
Following detail description is excluding in specification sheet.
The minimum transition time for a given slew rate as about a 30% or greater load change, The slew rate increases from the minimum transition time to the Maximum transition time at a 100% load change. The actual transition time will be either the minimum transition time, or the total slew time (transition divided by slew rate), whichever is longer.
EX: 3356G 150V/600A/6000W (CCH - CCL >600Ax 30%)

Use the following formula to calculate the minimum transition time for a given slew rate min transition time=180A/slew rate (in amps/second).
7.5uS (180A/24) x 0.8(10%~90%) =6uS
Use the following formula to calculate the maximum transition time for a given slew rate max transition time=600/slew rate (in amps/second).
25uS (600A/24) x 0.8(10~90%) = 20uS
EX. CCH=168A, CCL=0A Slew Rate =24A, the expected time is 5.6uS but the actual Transition Time will be limited to 4.8Us.
7uS (168/24 x 0.8(10%~90%) = 5.6uS

Note: When CC mode rang1 slew rate, CCL setting at least 0.1% larger than the specification.

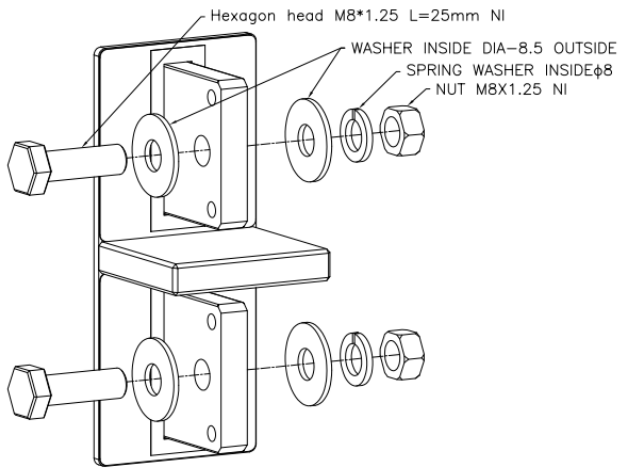
1-2 Features

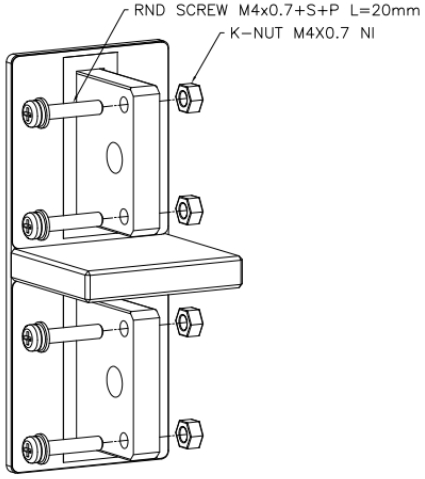
The main features of the 3350G series of load are highlighted below.

- 5 digital V / A / W Meter can be displayed on Large LCD display simultaneously.
- Flexible CC, CR, CV, CP, CV + Current Limit, CV + Power Limit, Dynamic and short circuit operation modes.
- Not only CC, CR, and CP mode have parallel operation functions, but CV mode also has parallel operation functions.
- Can set the power-on status value.
- Short circuit duration can be set within short circuit test.
- Voltage meter display can be configured as polarity positive（"＋")or negative ("－")．
- Master-slave control is up to 1 Master and 7 Slaves.
- Optional Interface: GPIB, RS232, USB, LAN.
- Provide battery BMS protection test function.
- Optional 9923 load current waveform generator to provide the battery actual discharge current waveform simulation.
- Built-in test modes include Battery Discharge, BMS, Short circuit, OCP, OPP test modes.
- Turbo mode can withstand up to 1.5 times the current and power electronic load within 2 sec. period, most fit BMS, Short circuit, OCP, OPP test.
- Protection against V, I, W, and ℃.

1-3 Standard Accessories

1.3.1. 3350G series operation manual.....1PCs
1.3.2. SLS10B RED; PLUG CONN 20A RED T.....1PCs
1.3.3. SLS10B BLK; PLUG CONN 20A BLK T..... .1PCs
1.3.4. PTV1-12；PIN TRML.....4PCs
1.3.5. HD-DSUB 15pin MALE to MALE 150cm.....1PCs
1.3.6. RND SCREW M4x0.7+S+P L=20mm.....4 PCs
1.3.7. Hexagon head M8*1.25 L=25mm NI.....2 PCs
1.3.8. K-NUT M4X0.7 NI…….....4 PCs
1.3.9. NUT M8X1.25 NI.....2 PCs
1.3.10. WASHER INSIDE DIA-8.5 OUTSIDE.....4 PCs
1.3.11. SPRING WASHER INSIDE φ8.....2 PCs
1.3.12. Power Cord.....1 PCs





1-4 Option

1.4.1. GPIB+RS232 interface
1.4.2. RS232 interface
1.4.3. GPIB interface
1.4.4. USB interface
1.4.5. LAN interface
1.4.6. GPIB cable 1 M
1.4.7. GPIB cable 2 M
1.4.8. USB TYPE A TO TYPE B cable 1.8 M.

1-5 Specifications 1

AC INPUT	LINE	100Vac~240Vac ± 10%
	FREQUENCY	50/60 Hz ± 3Hz
	PROTECT	FUSE T5A
	MAX.POWER CONSUMPTION	550VA

Table 1-1 3350G series Specifications

1-6 Specifications

Model	3351G		3352G		3353G	
Power[*1]	0 ~ 1.2kW	0 ~ 1.8kW max.[*1]	0 ~ 2.4kW	0 ~ 3.6kW max.[*1]	0 ~ 3.6kW	0 ~ 5.4kW max.[*1]
Current	0 ~ 100A	0 ~ 150A max.[*1]	0 ~ 200A	0 ~ 300A max.[*1]	0 ~ 300A	0 ~ 450A max.[*1]
Voltage	0 ~ 150V		0 ~ 150V		0 ~ 150V	
Min. Operating Voltage	0.7V@100A		0.7V@200A		0.7V@300A	
Protections						
Over Power Protection(OPP)	105%					
Over Current Protection(OCP)	104%					
Over Voltage Protection(OVP)	105%					
Over Temp Protection(OTP)	90°C±5°C					
Constant Current Mode						
Range[*2]	0 ~ 10A	0 ~ 100A	0 ~ 20A	0 ~ 200A	0 ~ 60A	0 ~ 300A
Resolution	0.16mA	1.6mA	0.32mA	3.2mA	0.48mA	4.8mA
Accuracy[*3]	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	90kΩ ~ 1.5Ω	1.5Ω ~ 0.007Ω	45kΩ ~ 0.75Ω	0.75Ω ~ 0.0035Ω	30kΩ ~ 0.5Ω	0.5Ω ~ 0.0023Ω
Resolution	11.111μS	25μΩ	22.222μS	12.5μΩ	33.333μS	8.334μΩ
Accuracy	± 0.1%(Vin / Setting)±0.1% IF.S.	± 0.1% of (Setting + Rrange)±0.1% IF.S	± 0.1%(Vin / Setting)±0.1% IF.S.	± 0.1% of (Setting + Rrange)±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S
Constant Voltage Mode						
Range	0 ~ 150V					
Resolution	2.5mV					
Accuracy	± 0.05% of (Setting + Range)					
Constant Power Mode						
Range	0 ~ 120W	120 ~ 1.2kW	0 ~ 240W	240 ~ 2.4kW	0 ~ 360W	360 ~ 3.6kW
Resolution	2mW	20mW	4mW	40mW	6mW	60mW
Accuracy[*4]	± 0.2% of (Setting + Range)					
Constant Voltage Mode + Current Limit Mode						
Range	150V	100A	150V	200A	150V	300A
Resolution	2.5mV	1.6mA	2.5mV	3.2mA	2.5mV	4.8mA
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Constant Voltage Mode + Power Limit Mode						
Range	150V	1.2kW	150V	2.4kW	150V	3.6kW
Resolution	2.5mV	20mW	2.5mV	40mW	2.5mV	60mW
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Turbo mode[*5]	OFF	ON	OFF	ON	OFF	ON
Short / OCP / OPP test function						
Max. Current	100A	150A	200A	300A	300A	450A
Max. Power	1200W	1800W	2400W	3600W	3600W	5400W
Test Accuracy[*6]	± 1.0% of (Reading + Range)					
Short Time	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000ms Continuous	100 ~ 2000ms
Setting. Accuracy	±5mS					
Short V Hi	Setting range : 0.00V - 150.00V / Resolution : 0.0025V					
Short V Lo	Setting range : 0.00V - 150.00V / Resolution : 0.0025V					
OCP Time(Tstep)	100ms	20ms	100ms	20ms	100ms	20ms
Setting. Accuracy	±5mS					
OCP ISTAR / ISTEP / ISTOP	Setting range : 0.00A - 100.00A / Resolution : 1.6mA	Setting range : 0.00A - 150.00A / Resolution : 2.4mA	Setting range : 0.00A - 200.00A / Resolution : 3.2mA	Setting range : 0.00A - 300.00A / Resolution : 4.8mA	Setting range : 0.00A - 300.00A / Resolution : 4.8mA	Setting range : 0.00A - 450.00A / Resolution : 7.2mA
OCP VTH	Setting range : 0.00V - 150.00V / Resolution : 0.0025 V					
OPP Time(Tstep)	100ms	20ms	100ms	20ms	100ms	20ms
Setting. Accuracy	±5mS					
OPP PSTAR / PSTEP / PSTOP	Setting range : 0.00W - 1200.0W / Resolution : 20mW	Setting range : 0.00W - 1800.0W / Resolution : 30mW	Setting range : 0.00W - 2400.0W / Resolution : 40mW	Setting range : 0.00W - 3600.0W / Resolution : 60mW	Setting range : 0.00W - 3600.0W / Resolution : 60mW	Setting range : 0.00W - 5400.0W / Resolution : 90mW
OPP VTH	Setting range : 0.00V - 150.00V / Resolution : 0.0025V					
BMS Test Mode[*7]						
Max. Current	100A	150A	200A	300A	300A	450A
Meas. Accuracy[*6]	±3.0% of (Reading + Range)					
Short test Time	0.05ms~10ms / Resolution : 0.01ms					
Meas. Accuracy	±0.02mS					
Setting Accuracy	±0.05mS					
Short ITH	Setting range : 0.04A - 50.00A / Resolution : 1.6mA	Setting range : 0.07A - 75.00A / Resolution : 2.4mA	Setting range : 0.09A - 100.00A / Resolution : 3.2mA	Setting range : 0.14A - 150.00A / Resolution : 4.8mA	Setting range : 0.14A - 150.00A /Resolution : 4.8mA	Setting range : 0.21A - 225.00A /Resolution : 7.2mA
OCP ISTAR	Setting range : 0.16A - 100.00A / Resolution : 1.6mA	Setting range : 0.24A - 150.00A / Resolution : 2.4mA	Setting range : 0.32A - 200.00A / Resolution : 3.2mA	Setting range : 0.48A - 300.00A / Resolution : 4.8mA	Setting range : 0.48A - 300.00A / Resolution : 4.8mA	Setting range : 0.72A - 450.00A /Resolution : 7.2mA
OCP TSTEP	0.05 ~ 10ms 11 ~ 1000ms	0.05 ~ 10ms	0.05 ~ 10ms 11 ~ 1000ms	0.05 ~ 10ms	0.05 ~ 10ms 11 ~ 1000ms	0.05 ~ 10ms
Meas. Accuracy	±0.1ms / ±0.5ms	±0.5ms	±0.1ms / ±0.5ms	±0.5ms	±0.1ms / ±0.5ms	±0.5ms
OCP ISTEP	Setting range : 0.00A - 100.00A / Resolution : 1.6mA	Setting range : 1.50A - 150.00A / Resolution : 2.4mA	Setting range : 0.00A - 200.00A / Resolution : 3.2mA	Setting range : 3.00A - 300.00A / Resolution : 4.8mA	Setting range : 0.00A - 300.00A / Resolution : 4.8mA	Setting range : 4.50A - 450.00A / Resolution : 7.2mA
OCP ISTOP	Setting range : 0.16A - 100.00A / Resolution : 1.6mA	Setting range : 0.24A - 150.00A / Resolution : 2.4mA	Setting range : 0.32A - 200.00A / Resolution : 3.2mA	Setting range : 0.48A - 300.00A / Resolution : 4.8mA	Setting range : 0.48A - 300.00A / Resolution : 4.8mA	Setting range : 0.72A - 450.00A / Resolution : 7.2mA
OCP ITH	Setting range : 0.04A - 50.00A / Resolution : 1.6mA	Setting range : 0.07A - 75.00A / Resolution : 2.4mA	Setting range : 0.09A - 100.00A / Resolution : 3.2mA	Setting range : 0.14A - 150.00A / Resolution : 4.8mA	Setting range : 0.14A - 150.00A / Resolution : 4.8mA	Setting range : 0.21A - 225.00A / Resolution : 7.2mA

Surge Test Mode						
Surge current	0 ~ 150A		0 ~ 300A		0 ~ 450A	
Normal current	0 ~ 75A		0 ~ 150A		0 ~ 225A	
Surge time	10 ~ 2000ms		10 ~ 2000ms		10 ~ 2000ms	
Surge step	1 ~ 5		1 ~ 5		1 ~ 5	
Batt test Mode						
Mode CC	Setting range : 0.00A - 100.00A / Resolution : 1.6mA		Setting range : 0.00A - 200.00A / Resolution : 3.2mA		Setting range : 0.00A - 300.00A / Resolution : 4.8mA	
Mode CP	Setting range : 0.00W - 1200.0W / Resolution : 20.0mW		Setting range : 0.00W - 2400.0W / Resolution : 40.0mW		Setting range : 0.00W - 3600.0W / Resolution : 60mW	
STOP Voltage(UVP)	Setting range : 0.00V - 150.00V / Resolution : 0.0025V					
STOP TIME	Setting range : OFF 1 - 99999s / Resolution : 1s					
STOP CAP.AH	Setting range : OFF 0.1 - 19999AH / Resolution : 0.1AH					
STOP CAP.WH	Setting range : OFF 0.1 - 19999WH / Resolution : 0.1WH					
SEQ Load Mode (remode only)						
Load mode	CC / CP					
Setting STEP	2 ~ 16					
Timing	20 ~ 1000us / 2~ 65535ms / 66 ~ 999Sec					
Resolution	10us / 1ms / 1Sec					
Dynamic Mode						
Timing						
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999mS					
Resolution	0.001 / 0.01 / 0.1 / 1mS					
Accuracy	1μS / 10μS / 100μS / 1mS + 50ppm					
Slew rate	0.0064~0.400A / μS	0.064~4.000A / μS	0.0128~0.800A / μS	0.1280~8.000A / μS	0.0192~1.200A / μS	0.1920~12.000A / μS
Resolution	0.0016A / μS	0.016A / μS	0.003A / μS	0.03A / μS	0.0048A / μS	0.048A / μS
Min. Rise Time	25μS(typical)					
Accuracy	±(5% of Setting)±10us					
Current						
Range	0 ~ 10A	10 ~ 100A	0 ~ 20A	20 ~ 200A	0 ~ 30A	30 ~ 300A
Resolution	0.16mA	1.6mA	0.32mA	3.2mA	0.48mA	4.8mA
Conf key parameter						
LDon voltage	Setting range : 0.25V - 62.50V / Resolution : 0.25V					
LDoFF voltage	Setting range : 0.000V - 62.250V / Resolution : 0.0025V					
Average time	0 ~ 64					
CV res. speed	1 ~ 4 (Fastest)					
Measurement						
Voltage Read Back						
Range (5 Digital)	0 ~ 15V	15 ~ 150V	0 ~ 15V	15 ~ 150V	0 ~ 15V	15 ~ 150V
Resolution	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV
Accuracy	± 0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digital)	0 ~ 10A	10 ~ 100A	0 ~ 20A	20 ~ 200A	0 ~ 30A	30 ~ 300A
Resolution	0.16mA	1.6mA	0.32mA	3.2mA	0.48mA	4.8mA
Accuracy	± 0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digital)	1.2W		2.4kW		3.6kW	
Resolution	0.01W					
Accuracy*4	± 0.06% of (Reading + Range)					
General						
Typical Short Resistance	7mΩ		3.5mΩ		2.3mΩ	
Maximum Short Current	100A		200A		300A	
Load ON Voltage	0.25 ~ 62.5V					
Load OFF Voltage	0 ~ 62.25V					
Power Consumption	550VA					
Dimension(H x W x D)	177mm x 440mm x 745mm					
Weight	28kg					
Temperature*8	0 ~ 40°C					
Safety & EMC	CE					

Note *1 : The power rating specifications at ambient temperature = 25˚C

Note *2 : The range is automatically or forcing to range II only in CC mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

Note *4 : Power range = Vrange x Irange

Note *5 : Turbo mode for up to 1.5X Current rating & Power rating support Surge, BMS, Short/OCP/OPP test function

Note *6 : The best accuracy of OCP/OPP test is Istep/Pstep=1%FS

Note *7 : BMS Test function for Battery Management System Board SHORT, OCCP and OCDP Test

Note *8 : Operating temperature range is 0~40℃, All specifications apply for 25℃±5℃, Except as noted

Model	3354G		3355G		3356G	
Power[*1]	0 ~ 4kW	0 ~ 6kW max.[*1]	0 ~ 5kW	0 ~ 7.5kW max.[*1]	0 ~ 6kW	0 ~ 9kW max.[*1]
Current	0 ~ 400A	0 ~ 600A max.[*1]	0 ~ 500A	0 ~ 750A max.[*1]	0 ~ 600A	0 ~ 900A max.[*1]
Voltage	0 ~ 150V		0 ~ 150V		0 ~ 150V	
Min. Operating Voltage	0.7V@400A		0.7V@500A		0.7V@600A	
Protections						
Over Power Protection(OPP)	105%					
Over Current Protection(OCP)	104%					
Over Voltage Protection(OVP)	105%					
Over Temp Protection(OTP)	90°C±5°C					
Constant Current Mode						
Range[2]	0 ~ 40A	0 ~ 400A	0 ~ 50A	0 ~ 500A	0 ~ 60A	0 ~ 600A
Resolution	0.64mA	6.4mA	0.80mA	8.0mA	0.96mA	9.6mA
Accuracy[*3]	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	22.5kΩ ~ 0.375Ω	0.375Ω ~ 0.0018Ω	18kΩ ~ 0.3Ω	0.3Ω ~ 0.0015Ω	15kΩ ~ 0.25Ω	0.25Ω ~ 0.0012Ω
Resolution	44μS	6.25μΩ	56μS	5μΩ	67μS	4.167μΩ
Accuracy	± 0.1%(Vin / Setting)±0.1% IF.S.	± 0.1% of (Setting + Rrange)±0.1% IF.S	± 0.1%(Vin / Setting)±0.1% IF.S.	± 0.1% of (Setting + Rrange)±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S
Constant Voltage Mode						
Range	0 ~ 150V					
Resolution	2.5mV					
Accuracy	± 0.05% of (Setting + Range)					
Constant Power Mode						
Range	0 ~ 400W	400 ~ 4kW	0 ~ 500W	500 ~ 5kW	0 ~ 600W	600 ~ 6kW
Resolution	6.4mW	64mW	8mW	80mW	9.6mW	96mW
Accuracy[*4]	± 0.2% of (Setting + Range)					
Constant Voltage Mode + Current Limit Mode						
Range	150V	400A	150V	500A	150V	600A
Resolution	2.5mV	6.4mA	2.5mV	8mA	2.5mV	9.6mA
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Constant Voltage Mode + Power Limit Mode						
Range	150V	4kW	150V	5kW	150V	6kW
Resolution	2.5mV	64mW	2.5mV	80mW	2.5mV	96mW
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Turbo mode[*5]	OFF	ON	OFF	ON	OFF	ON
Short / OCP / OPP test function						
Max. Current	400A	600A	500A	750A	600A	900A
Max. Power	4000W	6000W	5000W	7500W	6000W	9000W
Test Accuracy[*6]	± 1.0% of (Reading + Range)					
Short Time	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000ms Continuous	100 ~ 2000ms
Setting. Accuracy	±5mS					
Short V Hi	Setting range : 0.00V - 150.00V / Resolution : 0.0025V					
Short V Lo	Setting range : 0.00V - 150.00V / Resolution : 0.0025V					
OCP Time(Tstep)	100ms	20ms	100ms	20ms	100ms	20ms
Setting. Accuracy	±5mS					
OCP ISTAR / ISTEP / ISTOP	Setting range : 0.00A - 400.00A / Resolution : 6.4mA	Setting range : 0.00A - 600.00A / Resolution : 9.6mA	Setting range : 0.00A - 500.00A / Resolution : 8.0mA	Setting range : 0.00A - 750.00A / Resolution : 12mA	Setting range : 0.00A - 600.00A / Resolution : 9.60mA	Setting range : 0.00A - 900.00A / Resolution : 14.4mA
OCP VTH	Setting range : 0.00V - 150.00V / Resolution : 0.0025 V					
OPP Time(Tstep)	100ms	20ms	100ms	20ms	100ms	20ms
Setting. Accuracy	±5mS					
OPP PSTAR / PSTEP / PSTOP	Setting range : 0.00W - 4000.0W / Resolution : 64.0mW	Setting range : 0.00W - 6000.0W / Resolution : 96.0mW	Setting range : 0.00W - 5000.0W / Resolution : 80.0mW	Setting range : 0.00W - 7500.0W / Resolution : 120mW	Setting range : 0.00W - 6000.0W / Resolution : 96mW	Setting range : 0.00W - 9000.0W / Resolution : 144mW
OPP VTH	Setting range : 0.00V - 150.00V / Resolution : 0.0025V					
BMS Test Mode[*7]						
Max. Current	400A	600A	500A	750A	600A	900A
Meas. Accuracy[*6]	±3.0% of (Reading + Range)					
Short test Time	0.05ms~10ms / Resolution : 0.01ms					
Meas. Accuracy	±0.02mS					
Setting Accuracy	±0.05mS					
Short ITH	Setting range : 0.19A - 200.00A / Resolution : 6.4mA	Setting range : 0.28A - 300.00A / Resolution : 9.6mA	Setting range : 0.24A - 250.00A / Resolution : 8.0mA	Setting range : 0.36A - 375.00A / Resolution : 12mA	Setting range : 0.28A - 300.00A /Resolution : 9.6mA	Setting range : 0.43A - 450.00A /Resolution : 14.4mA
OCP ISTAR	Setting range : 0.64A - 400.00A / Resolution : 6.4mA	Setting range : 0.96A - 600.00A / Resolution : 9.6mA	Setting range : 0.80A - 500.00A / Resolution : 8.0mA	Setting range : 1.20A - 750.00A / Resolution : 12mA	Setting range : 0.96A - 600.00A / Resolution : 9.6mA	Setting range : 1.44A - 900.00A /Resolution : 14.4mA
OCP TSTEP	0.05 ~ 10ms 11 ~ 1000ms	0.05 ~ 10ms	0.05 ~ 10ms 11 ~ 1000ms	0.05 ~ 10ms	0.05 ~ 10ms 11 ~ 1000ms	0.05 ~ 10ms
Meas. Accuracy	±0.1ms / ±0.5ms	±0.5ms	±0.1ms / ±0.5ms	±0.5ms	±0.1ms / ±0.5ms	±0.5ms
OCP ISTEP	Setting range : 0.00A - 400.00A / Resolution : 6.4mA	Setting range : 6.00A - 600.00A / Resolution : 9.6mA	Setting range : 0.00A - 500.00A / Resolution : 8.0mA	Setting range : 7.50A - 750.00A / Resolution : 12mA	Setting range : 0.00A - 600.00A / Resolution : 9.6mA	Setting range : 9.00A - 900.00A / Resolution : 14.4mA
OCP ISTOP	Setting range : 0.64A - 400.00A / Resolution : 6.4mA	Setting range : 0.96A - 600.00A / Resolution : 9.6mA	Setting range : 0.80A - 500.00A / Resolution : 8.0mA	Setting range : 1.20A - 750.00A / Resolution : 12mA	Setting range : 0.96A - 600.00A / Resolution : 9.6mA	Setting range : 1.44A - 900.00A / Resolution : 14.4mA
OCP ITH	Setting range : 0.19A - 200.00A / Resolution : 6.4mA	Setting range : 0.28A - 300.00A / Resolution : 9.6mA	Setting range : 0.24A - 250.00A / Resolution : 8.0mA	Setting range : 0.36A - 375.00A / Resolution : 12mA	Setting range : 0.28A - 300.00A / Resolution : 9.6mA	Setting range : 0.43A - 450.00A / Resolution : 14.4mA
Surge Test Mode						
Surge current	0 ~ 600A		0 ~ 750A		0 ~ 900A	
Normal current	0 ~ 300A		0 ~ 375A		0 ~ 450A	
Surge time	10 ~ 2000ms		10 ~ 2000ms		10 ~ 2000ms	
Surge step	1 ~ 5		1 ~ 5		1 ~ 5	

Batt test Mode						
Mode CC	Setting range : 0.00A - 400.00A / Resolution :6.4mA		Setting range : 0.00A - 500.00A / Resolution :8.0mA		Setting range : 0.00A - 600.00A / Resolution : 9.6mA	
Mode CP	Setting range : 0.00W - 4000.0W / Resolution :64.0mW		Setting range : 0.00W - 5000.0W / Resolution :80.0mW		Setting range : 0.00W - 6000.0W / Resolution : 96mW	
STOP Voltage(UVP)	Setting range : 0.00V - 150.00V / Resolution : 0.0025V					
STOP TIME	Setting range : OFF 1 - 99999s / Resolution : 1s					
STOP CAP.AH	Setting range : OFF 0.1 - 19999AH / Resolution : 0.1AH					
STOP CAP.WH	Setting range : OFF 0.1 - 19999WH / Resolution : 0.1WH					
SEQ Load Mode (remode only)						
Load mode	CC / CP					
Setting STEP	2 ~ 16					
Timing	20 ~ 1000us / 2~ 65535ms / 66 ~ 999Sec					
Resolution	10us / 1ms / 1Sec					
Dynamic Mode						
Timing						
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999mS					
Resolution	0.001 / 0.01 / 0.1 / 1mS					
Accuracy	1μS / 10μS / 100μS / 1mS + 50ppm					
Slew rate	0.0256~1.600A / μS	0.2560~16.000A / μS	0.0320~2.000A / μS	0.3200~20.000A / μS	0.0384~2.400A / μS	0.3840~24.000A / μS
Resolution	0.0064A / μS	0.064A / μS	0.008A / μS	0.08A / μS	0.0096A / μS	0.096A / μS
Min. Rise Time	25μS(typical)					
Accuracy	±(5% of Setting)±10us					
Current						
Range	0 ~ 40A	40 ~ 400A	0 ~ 50A	50 ~ 500A	0 ~ 60A	60 ~ 600A
Resolution	0.64mA	6.4mA	0.8mA	8mA	0.96mA	9.6mA
Conf key parameter						
LDon voltage	Setting range : 0.25V - 62.50V / Resolution : 0.25V					
LDoFF voltage	Setting range : 0.000V - 62.250V / Resolution : 0.0025V					
Average time	0 ~ 64					
CV res. speed	1 ~ 4 (Fastest)					
Measurement						
Voltage Read Back						
Range (5 Digital)	0 ~ 15V	15 ~ 150V	0 ~ 15V	15 ~ 150V	0 ~ 15V	15 ~ 150V
Resolution	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV
Accuracy	± 0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digital)	0 ~ 40A	40 ~ 400A	0 ~ 50A	50 ~ 500A	0 ~ 60A	60 ~ 600A
Resolution	0.64mA	6.4mA	0.8mA	8mA	0.96mA	9.6mA
Accuracy	± 0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digital)	4kW		5kW		6kW	
Resolution	0.01W					
Accuracy *4	± 0.06% of (Reading + Range)					
General						
Typical Short Resistance	1.8mΩ		1.5mΩ		1.2mΩ	
Maximum Short Current	400A		500A		600A	
Load ON Voltage	0.25 ~ 62.5V					
Load OFF Voltage	0 ~ 62.25V					
Power Consumption	550VA					
Dimension(H x W x D)	177mm x 440mm x 745mm					
Weight	32.5kg		32.5kg		32.5kg	
Temperature *8	0 ~ 40°C					
Safety & EMC	CE					

Note *1: The power rating specifications at ambient temperature = 25˚C

Note *2: The range is automatically or forcing to range II only in CC mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

Note *4 : Power range = Vrange x Irange

Note *5 : Turbo mode for up to 1.5X Current rating & Power rating support Surge, BMS, Short/OCP/OPP test function

Note *6 : The best accuracy of OCP/OPP test is Istep/Pstep=1%FS

Note *7 : BMS Test function for Battery Management System Board SHORT, OCCP and OCDP Test

Note *8 : Operating temperature range is 0~40℃, All specifications apply for 25℃±5℃, Except as noted

Model	3361G		3362G		3363G	
Power[*1]	0 ~ 1.2kW	0 ~ 1.8kW max.[*1]	0 ~ 2.4kW	0 ~ 3.6kW max.[*1]	0 ~ 3.6kW	0 ~ 5.4kW max.[*1]
Current	0 ~ 70A	0 ~ 105A max.[*1]	0 ~ 140A	0 ~ 210A max.[*1]	0 ~ 210A	0 ~ 315A max.[*1]
Voltage	0 ~ 600V		0 ~ 600V		0 ~ 600V	
Min. Operating Voltage	10V@70A		10V@140A		10V@210A	
Protections						
Over Power Protection(OPP)	105%					
Over Current Protection(OCP)	104%					
Over Voltage Protection(OVP)	105%					
Over Temp Protection(OTP)	90°C±5°C					
Constant Current Mode						
Range[*2]	0 ~ 7A	0 ~ 70A	0 ~ 14A	0 ~ 140A	0 ~ 21A	0 ~ 210A
Resolution	0.112mA	1.12mA	0.224mA	2.24mA	0.336mA	3.36mA
Accuracy[*3]	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	514440Ω ~ 8.574Ω	8.574Ω ~ 0.143Ω	257220Ω ~ 4.287Ω	4.287Ω ~ 0.0714Ω	171480Ω ~ 2.858Ω	2.858Ω ~ 0.0476Ω
Resolution	1.944μS	142.92μΩ	3.888μS	71.46μΩ	5.832μS	47.64μΩ
Accuracy	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting +Range) ±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S
Constant Voltage Mode						
Range	0 ~ 600V					
Resolution	10mV					
Accuracy	± 0.05% of (Setting + Range)					
Constant Power Mode						
Range	0 ~ 120W	120 ~ 1.2kW	0 ~ 240W	240 ~ 2.4kW	0 ~ 360W	360 ~ 3.6kW
Resolution	2mW	20mW	4mW	40mW	6mW	60mW
Accuracy[*4]	± 0.1% of (Setting + Range)					
Constant Voltage Mode + Current Limit Mode						
Range	600V	70A	600V	140A	600V	210A
Resolution	10mV	1.12mA	10mV	2.24mA	10mV	3.36mA
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Constant Voltage Mode + Power Limit Mode						
Range	600V	1.2KW	600V	2.4kW	600V	3.6kW
Resolution	10mV	20mW	10mV	40mW	10mV	60mW
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Turbo mode[*5]	OFF	ON	OFF	ON	OFF	ON
Short / OCP / OPP test function						
Max. Current	70A	105A	140A	210A	210A	315A
Max. Power	1200W	1800W	2400W	3600W	3600W	5400W
Test Accuracy[*6]	± 1.0% of (Reading + Range)					
Short Time	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS
Setting. Accuracy	±5mS					
Short V Hi	Setting range : 0.00V - 600.00V / Resolution : 0.01V					
Short V Lo	Setting range : 0.00V - 600.00V / Resolution : 0.01V					
OCP Time(Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting. Accuracy	±5mS					
OCP ISTAR / ISTEP / ISTOP	Setting range : 0.00A - 70.00A / Resolution : 1.12mA	Setting range : 0.00A - 105.00A / Resolution : 1.68mA	Setting range : 0.00A - 140.00A / Resolution : 2.24mA	Setting range : 0.00A - 210.00A / Resolution : 3.36mA	Setting range : 0.00A - 210.00A / Resolution : 3.36mA	Setting range : 0.00A - 315.00A / Resolution : 5.04mA
OCP VTH	Setting range : 0.00V - 600.00V / Resolution : 0.01 V					
OPP Time(Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting. Accuracy	±5mS					
OPP PSTAR / PSTEP / PSTOP	Setting range : 0.00W - 1200.0W / Resolution : 20mW	Setting range : 0.00W - 1800.0W / Resolution : 30mW	Setting range : 0.00W - 2400.0W / Resolution : 40mW	Setting range : 0.00W - 3600.0W / Resolution : 60mW	Setting range : 0.00W - 3600.0W / Resolution : 60mW	Setting range : 0.00W - 5400.0W / Resolution : 90mW
OPP VTH	Setting range : 0.00V - 600.00V / Resolution : 0.01V					
BMS Test Mode[*7]						
Max. Current	70A	105A	140A	210A	210A	315A
Meas. Accuracy[*6]	±3.0% of (Reading + Range)					
Short test Time	0.05mS~10mS / Resolution : 0.01mS					
Meas. Accuracy	±0.02mS					
Setting Accuracy	±0.05mS					
Short ITH	Setting range : 0.033A - 35.00A / Resolution : 1.12mA	Setting range : 0.050A - 52.50A / Resolution : 1.68mA	Setting range : 0.06A - 70. 00A / Resolution : 2.24mA	Setting range : 0.10A - 105.00A / Resolution : 3.36mA	Setting range : 0.10A - 105.00A / Resolution : 3.36mA	Setting range : 0.15A - 157.50 A / Resolution : 5.04mA
OCP ISTAR	Setting range : 0.112A - 70.00A / Resolution : 1.12mA	Setting range : 0.168A - 105.00A / Resolution : 1.68mA	Setting range : 0.22A - 140.00A / Resolution : 2.24mA	Setting range : 0.33A - 210.00A / Resolution : 3.36mA	Setting range : 0.33A - 210.00A / Resolution : 3.36mA	Setting range : 0.50A - 315.00A / Resolution : 5.04mA
OCP TSTEP	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS
Meas. Accuracy	±0.1mS / ±0.5mS	±0.5mS	±0.1mS / ±0.5mS	±0.5mS	±0.1mS / ±0.5mS	±0.5mS
OCP ISTEP	Setting range : 0.000A - 70.00A / Resolution : 1.12mA	Setting range : 1.05A - 105.00A / Resolution : 1.68mA	Setting range : 0.00A - 140.00A / Resolution : 2.24mA	Setting range : 2.10A - 210.00A / Resolution : 3.36mA	Setting range : 0.00A - 210.00A / Resolution : 3.36mA	Setting range : 3.15A - 315.00A / Resolution : 5.04mA
OCP ISTOP	Setting range : 0.112A - 70.00A / Resolution : 1.12mA	Setting range : 0.168A - 105.00A / Resolution : 1.68mA	Setting range : 0.22A - 140.00A / Resolution : 2.24mA	Setting range : 0.33A - 210.00A / Resolution : 3.36mA	Setting range : 0.33A - 210.00A / Resolution : 3.36mA	Setting range : 0.50A - 315.00A / Resolution : 5.04mA
OCP ITH	Setting range : 0.033A - 35.00A / Resolution : 1.12mA	Setting range : 0.050A - 52.50A / Resolution : 1.68mA	Setting range : 0.06A - 70. 00A / Resolution : 2.24mA	Setting range : 0.10A - 105.00A / Resolution : 3.36mA	Setting range : 0.10A - 105.00A / Resolution : 3.36mA	Setting range : 0.15A - 157.50 A / Resolution : 5.04mA
Surge Test Mode						
Surge current	0 ~ 105A		0 ~ 105A		0 ~ 157.5A	
Normal current	0 ~ 52A		0 ~210A		0 ~ 315.0A	
Surge time	10 ~ 2000mS					
Surge step	1 ~ 5					

Batt test Mode						
Mode CC	Setting range : 0.00A - 280.00A / Resolution : 4.48mA		Setting range : 0.00A - 350.00A / Resolution : 5.6mA		Setting range : 0.00A - 420.00A / Resolution : 6.72mA	
Mode CP	Setting range : 0.00W - 1200.0W / Resolution : 20.0mW		Setting range : 0.00W - 2400.0W / Resolution : 40.0mW		Setting range : 0.00W - 3600.0W / Resolution : 60mW	
STOP Voltage(UVP)	Setting range : 0.00V - 600.00V / Resolution : 0.01V					
STOP TIME	Setting range : OFF 1 - 99999s / Resolution : 1s					
STOP CAP.AH	Setting range : OFF 0.1 - 19999AH / Resolution : 0.1AH					
STOP CAP.WH	Setting range : OFF 0.1 - 19999WH / Resolution : 0.1WH					
SEQ Load Mode (remode only)						
Load mode	CC / CP					
Setting STEP	2 ~ 16					
Timing	20 ~ 1000us / 2~ 65535mS / 66 ~ 999Sec					
Resolution	10us / 1mS / 1Sec					
Dynamic Mode						
Timing						
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999mS					
Resolution	0.001 / 0.01 / 0.1 / 1mS					
Accuracy	1µS / 10µS / 100µS / 1mS + 50ppm					
Slew rate	0.00448~0.280A / µS	0.0448~2.800A / µS	0.00896~0.560A / µS	0.0896~5.600A / µS	0.01344~0.840A / µS	0.1344~8.400A / µS
Resolution	0.00112A / µS	0.0112A / µS	0.00224A / µS	0.0224A / µS	0.00336A / µS	0.0336A / µS
Min. Rise Time	25µS(typical)					
Accuracy	±(5% of Setting)±10u					
Current						
Range	0 ~ 7A	7 ~ 70A	0 ~ 14A	14~ 140A	0 ~ 21A	21 ~ 210A
Resolution	0.112mA	1.12mA	0.224mA	2.24mA	0.336mA	3.36mA
Conf key parameter						
LDon voltage	Setting range : 0.4V - 100.0V / Resolution : 0.4V					
LDoFF voltage	Setting range : 0.000V - 99.60V / Resolution : 0. 01V					
Average time	0 ~ 64					
CV res. speed	1 ~ 4 (Fastest)					
Measurement						
Voltage Read Back						
Range (5 Digital)	0 ~ 60V	60~ 600V	0 ~ 60V	60 ~ 600V	0 ~ 60V	60 ~ 600V
Resolution	1.00mV	10.0mV	1.00mV	10.0mV	1.00mV	10.0mV
Accuracy	± 0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digital)	0 ~ 7A	7 ~ 70A	0 ~ 14A	14~ 140A	0 ~ 21A	21 ~ 210A
Resolution	0.112mA	1.12mA	0.224mA	2.24mA	0.336mA	3.36mA
Accuracy	± 0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digital)	1.2kW		2.4kW		3.6W	
Resolution	0.01W					
Accuracy *4	± 0.06% of (Reading + Range)					
General						
Typical Short Resistance	142.86mΩ		71.429mΩ		47.62mΩ	
Maximum Short Current	70A		140A		210A	
Load ON Voltage	0.4 ~ 100V					
Load OFF Voltage	0 ~ 99.6V					
Power Consumption	550VA					
Dimension(H x W x D)	177mm x 440mm x 745mm					
Weight	29kg					
Temperature *8	0 ~ 40°C					
Safety & EMC	CE					

Note *1 : The power rating specifications at ambient temperature = 25˚C

Note *2 : The range is automatically or forcing to range II only in CC mode

Note *3 : If the operating current is below range 0.3%, the accuracy specification is 0.1% F.S.

Note *4 : Power range = Vrange x Irange and the specification is valid only for loading current > 0.03% F.S.

Note *5 : Turbo mode for up to 1.5X Current rating & Power rating support Surge, BMS, Short/OCP/OPP test function

Note *6 : The best accuracy of OCP/OPP test is Istep/Pstep=1%FS

Note *7 : BMS Test function for Battery Management System Board SHORT, OCCP and OCDP Test

Note *8 : Operating temperature range is 0~40℃, All specifications apply for 25℃±5℃, Except as noted

Model	3364G		3365G		3366G	
Power[*1]	0 ~ 4kW	0 ~ 6kW max.[*1]	0 ~ 5kW	0 ~ 7.5kW max.[*1]	0 ~ 6kW	0 ~ 9kW max.[*1]
Current	0 ~ 280A	0 ~ 420A max.[*1]	0 ~ 350A	0 ~ 525A max.[*1]	0 ~ 420A	0 ~ 630A max.[*1]
Voltage	0 ~ 600V		0 ~ 600V		0 ~ 600V	
Min. Operating Voltage	10V@280A		10V@350A		10V@420A	
Protections						
Over Power Protection(OPP)	105%					
Over Current Protection(OCP)	104%					
Over Voltage Protection(OVP)	105%					
Over Temp Protection(OTP)	90°C±5°C					
Constant Current Mode						
Range[*2]	0 ~ 28A	0 ~ 280A	0 ~ 35A	0 ~ 350A	0 ~ 42A	0 ~ 420A
Resolution	0.448mA	4.48mA	0.56mA	5.6mA	0.672mA	6.72mA
Accuracy[*3]	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	128610Ω ~ 2.1435Ω	2.1435Ω ~ 0.0357Ω	102888Ω ~ 1.7148Ω	1.7148Ω ~ 0.0285Ω	85740Ω ~ 1.4290Ω	1.4290Ω ~ 0.0238Ω
Resolution	8μS	35.73μΩ	10μS	28.584μΩ	12μS	23.82μΩ
Accuracy	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting +Range) ±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S
Constant Voltage Mode						
Range	0 ~ 600V					
Resolution	10mV					
Accuracy	± 0.05% of (Setting + Range)					
Constant Power Mode						
Range	0 ~ 400W	400 ~ 4kW	0~500W	500~5kW	0~600W	600~6kW
Resolution	6.4mW	64mW	8mW	80mW	9.6mW	96mW
Accuracy[*4]	± 0.1% of (Setting + Range)					
Constant Voltage Mode + Current Limit Mode						
Range	600V	280A	600V	350A	600V	420A
Resolution	10mV	4.48mA	10mV	5.6mA	10mV	6.72mA
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Constant Voltage Mode + Power Limit Mode						
Range	600V	4KW	600V	5kW	600V	6kW
Resolution	10mV	64mW	10mV	80mW	10mV	96mW
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Turbo mode[*5]	OFF	ON	OFF	ON	OFF	ON
Short / OCP / OPP test function						
Max. Current	280A	420A	350A	525A	420A	630A
Max. Power	4000W	6000W	5000W	7500W	6000W	9000W
Test Accuracy[*6]	± 1.0% of (Reading + Range)					
Short Time	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS
Setting. Accuracy	±5mS					
Short V Hi	Setting range : 0.00V - 600.00V / Resolution : 0.01V					
Short V Lo	Setting range : 0.00V - 600.00V / Resolution : 0.01V					
OCP Time(Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting. Accuracy	±5mS					
OCP ISTAR / ISTEP / ISTOP	Setting range : 0.00A - 280.00A / Resolution : 4.48mA	Setting range : 0.00A - 420.00A / Resolution : 6.72mA	Setting range : 0.00A - 350.00A / Resolution : 5.6mA	Setting range : 0.00A - 525.00A / Resolution : 8.4mA	Setting range : 0.00A - 420.00A / Resolution : 6.72mA	Setting range : 0.00A - 630.00A / Resolution : 10.08mA
OCP VTH	Setting range : 0.00V - 600.00V / Resolution : 0.01 V					
OPP Time(Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting. Accuracy	±5mS					
OPP PSTAR / PSTEP / PSTOP	Setting range : 0.00W - 4000.0W / Resolution : 64.0mW	Setting range : 0.00W - 6000.0W / Resolution : 96.0mW	Setting range : 0.00W - 5000.0W / Resolution : 80.0mW	Setting range : 0.00W - 7500.0W / Resolution : 120mW	Setting range : 0.00W - 6000.0W / Resolution : 96mW	Setting range : 0.00W - 9000.0W / Resolution : 144mW
OPP VTH	Setting range : 0.00V - 600.00V / Resolution : 0.01V					
BMS Test Mode[*7]						
Max. Current	280A	420A	350A	525A	420A	630A
Meas. Accuracy[*6]	±3.0% of (Reading + Range)					
Short test Time	0.05mS~10mS / Resolution : 0.01mS					
Meas. Accuracy	±0.02mS					
Setting Accuracy	±0.05mS					
Short ITH	Setting range : 0.13A - 140.00A / Resolution : 4.48mA	Setting range : 0.20A - 210.00A / Resolution : 6.72mA	Setting range : 0.16A - 175. 0A / Resolution : 5.6mA	Setting range : 0.25A - 262.50A / Resolution : 8.4mA	Setting range : 0.20A - 210.00A / Resolution : 6.72mA	Setting range : 0.30A - 315.0 A / Resolution : 10.08mA
OCP ISTAR	Setting range : 0.44A - 280.00A / Resolution : 4.48mA	Setting range : 0.67A - 420.00A / Resolution : 6.72mA	Setting range : 0.56A - 350.00A / Resolution : 5.6mA	Setting range : 0.84A - 525.00A / Resolution : 8.4mA	Setting range : 0.67A - 420.00A / Resolution : 6.72mA	Setting range : 1.00A - 630.00A / Resolution : 10.08mA
OCP TSTEP	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS
Meas. Accuracy	±0.1mS / ±0.5mS	±0.5mS	±0.1mS / ±0.5mS	±0.5mS	±0.1mS / ±0.5mS	±0.5mS
OCP ISTEP	Setting range : 0.00A - 280.00A / Resolution : 4.48mA	Setting range : 4.20A - 420.00A / Resolution : 6.72mA	Setting range : 0.00A - 350.00A / Resolution : 5.6mA	Setting range : 5.25A - 525.00A / Resolution : 8.4mA	Setting range : 0.00A - 420.00A / Resolution : 6.72mA	Setting range : 6.30A - 630.00A / Resolution : 10.08mA
OCP ISTOP	Setting range : 0.44A - 280.00A / Resolution : 4.48mA	Setting range : 0.67A - 420.00A / Resolution : 6.72mA	Setting range : 0.56A - 350.00A / Resolution : 5.6mA	Setting range : 0.84A - 525.00A / Resolution : 8.4mA	Setting range : 0.67A - 420.00A / Resolution : 6.72mA	Setting range : 1.00A - 630.00A / Resolution : 10.08mA
OCP ITH	Setting range : 0.13A - 140.00A / Resolution : 4.48mA	Setting range : 0.20A - 210.00A / Resolution : 6.72mA	Setting range : 0.16A - 175.00A / Resolution : 5.6mA	Setting range : 0.25A - 262.50A / Resolution : 8.4mA	Setting range : 0.20A - 210.00A / Resolution : 6.72mA	Setting range : 0.30A - 315.00A / Resolution : 10.08mA
Surge Test Mode						
Surge current	0 ~ 420A		0 ~ 525A		0 ~ 630A	
Normal current	0 ~ 210A		0 ~ 262.5A		0 ~ 315A	
Surge time	10 ~ 2000mS					
Surge step	1 ~ 5					

Batt test Mode						
Mode CC	Setting range : 0.00A - 280.00A / Resolution : 4.48mA		Setting range : 0.00A - 350.00A / Resolution : 5.6mA		Setting range : 0.00A - 420.00A / Resolution : 6.72mA	
Mode CP	Setting range : 0.00W - 4000.0W / Resolution : 64mW		Setting range : 0.00W - 5000.0W / Resolution : 80mW		Setting range : 0.00W - 6000.0W / Resolution : 96mW	
STOP Voltage(UVP)	Setting range : 0.00V - 600.00V / Resolution : 0.01V					
STOP TIME	Setting range : OFF 1 - 99999s / Resolution : 1s					
STOP CAP.AH	Setting range : OFF 0.1 - 19999AH / Resolution : 0.1AH					
STOP CAP.WH	Setting range : OFF 0.1 - 19999WH / Resolution : 0.1WH					
SEQ Load Mode (remode only)						
Load mode	CC / CP					
Setting STEP	2 ~ 16					
Timing	20 ~ 1000us / 2~ 65535mS / 66 ~ 999Sec					
Resolution	10us / 1mS / 1Sec					
Dynamic Mode						
Timing						
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999mS					
Resolution	0.001 / 0.01 / 0.1 / 1mS					
Accuracy	1µS / 10µS / 100µS / 1mS + 50ppm					
Slew rate	0.01792~1.120A / µS	0.1792~11.200A / µS	0.0224~1.400A / µS	0.2240~14.00A / µS	0.02688~1.680A / µS	0.2688~16.800A / µS
Resolution	0.00448A / µS	0.0448A / µS	0.0056A / µS	0.056A / µS	0.00672A / µS	0.0672A / µS
Min. Rise Time	25µS(typical)					
Accuracy	±(5% of Setting)±10u					
Current						
Range	0 ~ 28A	28 ~ 280A	0 ~ 35A	35 ~ 350A	0 ~ 42A	42 ~ 420A
Resolution	0.45mA	4.48mA	0.56mA	5.6mA	0.67mA	6.72mA
Conf key parameter						
LDon voltage	Setting range : 0.4V - 100.0V / Resolution : 0.4V					
LDoFF voltage	Setting range : 0.000V - 99.60V / Resolution : 0. 01V					
Average time	0 ~ 64					
CV res. speed	1 ~ 4 (Fastest)					
Measurement						
Voltage Read Back						
Range (5 Digital)	0 ~ 60V	60~ 600V	0 ~ 60V	60 ~ 600V	0 ~ 60V	60 ~ 600V
Resolution	1.00mV	10.0mV	1.00mV	10.0mV	1.00mV	10.0mV
Accuracy	± 0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digital)	0 ~ 28A	28 ~ 280A	0 ~ 35A	35 ~ 350A	0 ~ 42A	42 ~ 420A
Resolution	0.448mA	4.48mA	0.56mA	5.6mA	0.672mA	6.72mA
Accuracy	± 0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digital)	4kW		5kW		6kW	
Resolution	0.01W					
Accuracy*4	± 0.06% of (Reading + Range)					
General						
Typical Short Resistance	35.73mΩ		28.584mΩ		23.82mΩ	
Maximum Short Current	280A		350A		420A	
Load ON Voltage	0.4 ~ 100V					
Load OFF Voltage	0 ~ 99.6V					
Power Consumption	550VA					
Dimension(H x W x D)	177mm x 440mm x 745mm					
Weight	32.5kg		33kg		33kg	
Temperature*8	0 ~ 40°C					
Safety & EMC	CE					

Note *1 : The power rating specifications at ambient temperature = 25˚C

Note *2 : The range is automatically or forcing to range II only in CC mode

Note *3 : If the operating current is below range 0.3%, the accuracy specification is 0.1% F.S.

Note *4 : Power range = Vrange x Irange and the specification is valid only for loading current > 0.03% F.S.

Note *5 : Turbo mode for up to 1.5X Current rating & Power rating support Surge, BMS, Short/OCP/OPP test function

Note *6 : The best accuracy of OCP/OPP test is Istep/Pstep=1%FS

Note *7 : BMS Test function for Battery Management System Board SHORT, OCCP and OCDP Test

Note *8 : Operating temperature range is 0~40℃, All specifications apply for 25℃±5℃, Except as noted

Model	3371G		3372G		3373G	
Power[*1]	0 ~ 1.2kW	0 ~ 1.8kW max.[*1]	0 ~ 2.4kW	0 ~ 3.6kW max.[*1]	0 ~ 3.6kW	0 ~ 5.4kW max.[*1]
Current	0 ~ 40A	0 ~ 60A max.[*1]	0 ~ 80A	0 ~ 120A max.[*1]	0 ~ 120A	0 ~ 180A max.[*1]
Voltage	0 ~ 1200V		0 ~ 1200V		0 ~ 1200V	
Min. Operating Voltage	15V@40A		15V@80A		15V@120A	
Protections						
Over Power Protection(OPP)	105%					
Over Current Protection(OCP)	104%					
Over Voltage Protection(OVP)	105%					
Over Temp Protection(OTP)	90°C±5°C					
Constant Current Mode						
Range[*2]	0 ~ 4A	0 ~ 40A	0 ~ 8A	0 ~ 80A	0 ~ 12A	0 ~ 120A
Resolution	0.064mA	0.64mA	0.128mA	1.28mA	0.192mA	1.92mA
Accuracy[*3]	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	1800kΩ ~ 30Ω	30Ω ~ 0.375Ω	900kΩ ~ 15Ω	15Ω ~ 0.187Ω	600kΩ ~ 10Ω	10Ω ~ 0.125Ω
Resolution	0.556μS	500μΩ	1.111μS	250μΩ	1.667μS	166.67μΩ
Accuracy	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S
Constant Voltage Mode						
Range	0~1200V					
Resolution	20mV					
Accuracy	± 0.05% of (Setting + Range)					
Constant Power Mode						
Range	0 ~ 120W	120 ~ 1.2kW	0 ~ 240W	240 ~ 2.4kW	0 ~ 360W	360 ~ 3.6kW
Resolution	2mW	20mW	4mW	40mW	6mW	60mW
Accuracy[*4]	± 0.2% of (Setting + Range)					
Constant Voltage Mode + Current Limit Mode						
Range	1200V	40A	1200V	80A	1200V	120A
Resolution	20mV	0.64mA	20mV	1.28mA	20mV	1.92mA
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Constant Voltage Mode + Power Limit Mode						
Range	1200V	1.2kW	1200V	2.4kW	1200V	3.6kW
Resolution	20mV	20mW	20mV	40mW	20mV	60mW
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Turbo mode[*5]	OFF	ON	OFF	ON	OFF	ON
Short / OCP / OPP test function						
Max. Current	40A	60A	80A	120A	120A	180A
Max. Power	1200W	1800W	2400W	3600W	3600W	5400W
Test Accuracy[*6]	± 1.0% of (Reading + Range)					
Short Time	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS
Setting. Accuracy	±5mS					
Short V Hi	Setting range : 0.25V - 1200.0V / Resolution : 0.02V					
Short V Lo	Setting range : 0.000V - 1200.0V / Resolution : 0.02V					
OCP Time(Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting. Accuracy	±5mS					
OCP ISTAR / ISTEP / ISTOP	Setting range : 0.00A - 40.00A / Resolution : 0.64mA	Setting range : 0.00A - 60.00A / Resolution : 0.96mA	Setting range : 0.00A - 80.00A / Resolution : 1.28mA	Setting range : 0.00A - 120.00A / Resolution : 1.92mA	Setting range : 0.00A - 120.00A / Resolution : 1.92mA	Setting range : 0.00A - 180.00A / Resolution : 2.88mA
OCP VTH	Setting range : 0.00V - 1200.00V / Resolution : 0.02V					
OPP Time(Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting. Accuracy	±5mS					
OPP PSTAR / PSTEP / PSTOP	Setting range : 0.00W - 1200.0W / Resolution : 20mW	Setting range : 0.00W - 1800.0W / Resolution : 30mW	Setting range : 0.00W - 2400.0W / Resolution : 40mW	Setting range : 0.00W - 3600.0W / Resolution : 60mW	Setting range : 0.00W - 3600.0W / Resolution : 60mW	Setting range : 0.00W - 5400.0W / Resolution : 90mW
OPP VTH	Setting range : 0.00V - 1200.00V / Resolution : 0.02V					
BMS Test Mode[*7]						
Max. Current	40A	60A	80A	120A	120A	180A
Meas. Accuracy[*6]	±3.0% of (Reading + Range)					
Short test Time	0.05mS~10mS / Resolution : 0.01mS					
Meas. Accuracy	±0.02mS					
Setting Accuracy	±0.05mS					
Short ITH	Setting range : 0.019A - 20.00A / Resolution : 0.64mA	Setting range : 0.028A - 30.00A / Resolution : 0.96mA	Setting range : 0.038A - 40.00A / Resolution : 1.28mA	Setting range : 0.057A - 60.00A / Resolution : 1.92mA	Setting range : 0.057A - 60.00A / Resolution : 1.92mA	Setting range : 0.086A - 90.00A / Resolution : 2.88mA
OCP ISTAR	Setting range : 0.064A - 40.00A~/ Resolution : 0.64mA	Setting range : 0.096A - 60.00A / Resolution : 0.96mA	Setting range : 0.128A - 80.00A~/ Resolution : 1.28mA	Setting range : 0.192A - 120.00A / Resolution : 1.92mA	Setting range : 0.192A - 120.00A~/ Resolution : 1.92mA	Setting range : 0.288A - 180.00A / Resolution : 2.88mA
OCP TSTEP	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS
Meas. Accuracy	±0.1mS / ±0.5mS	±0.5mS	±0.1mS / ±0.5mS	±0.5mS	±0.1mS / ±0.5mS	±0.5mS
OCP ISTEP	Setting range : 0.000A - 40.00A~/ Resolution : 0.64mA	Setting range : 0.600A - 60.00A / Resolution : 0.96mA	Setting range : 0.000A - 80.00A~/ Resolution : 1.28mA	Setting range : 1.200A - 120.00A / Resolution : 1.92mA	Setting range : 0.000A - 120.00A~/ Resolution : 1.92mA	Setting range : 1.80A - 180.00A / Resolution : 2.88mA
OCP ISTOP	Setting range : 0.064A - 40.00A~/ Resolution : 0.64mA	Setting range : 0.096A - 60.00A / Resolution : 0.96mA	Setting range : 0.128A - 80.00A~/ Resolution : 1.28mA	Setting range : 0.192A - 120.00A / Resolution : 1.92mA	Setting range : 0.192A - 120.00A~/ Resolution : 1.92mA	Setting range : 0.288A - 180.00A / Resolution : 2.88mA
OCP ITH	Setting range : 0.019A - 20.00A / Resolution : 0.64mA	Setting range : 0.028A - 30.00A / Resolution : 0.96mA	Setting range : 0.038A - 40.00A / Resolution : 1.28mA	Setting range : 0.057A - 60.00A / Resolution : 1.92mA	Setting range : 0.057A - 60.00A / Resolution : 1.92mA	Setting range : 0.086A - 90.00A / Resolution : 2.88mA
Surge Test Mode						
Surge current	0 ~ 60A		0 ~ 120A		0 ~ 180A	
Normal current	0 ~ 30A		0 ~ 60A		0 ~ 90A	
Surge time	10 ~ 2000mS		10 ~ 2000mS			
Surge step	1 ~ 5		1 ~ 5			

Batt test Mode						
Mode CC	Setting range : 0.00A - 40.00A / Resolution : 0.64mA		Setting range : 0.00A -80.00A / Resolution : 1.28mA		Setting range : 0.00A - 120.00A / Resolution : 1.92mA	
Mode CP	Setting range : 0.00W - 1200.0W / Resolution : 20.0mW		Setting range : 0.00W - 2400.0W / Resolution : 40.0mW		Setting range : 0.00W - 3600.0W / Resolution : 60mW	
STOP Voltage(UVP)	Setting range : 0.00V - 1200.00V / Resolution : 0.02V					
	Setting range : OFF 1 - 99999s / Resolution : 1s					
STOP CAP.AH	Setting range : OFF 0.1 - 19999AH / Resolution : 0.1AH					
STOP CAP.WH	Setting range : OFF 0.1 - 19999WH / Resolution : 0.1WH					
SEQ Load Mode (remode only)						
Load mode	CC / CP					
Setting STEP	2 ~ 16					
Timing	20 ~ 1000us / 2~ 65535mS / 66 ~ 999Sec					
Resolution	10us / 1mS / 1Sec					
Dynamic Mode						
Timing						
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999mS					
Resolution	0.001 / 0.01 / 0.1 / 1mS					
Accuracy	1µS / 10µS / 100µS / 1mS + 50ppm					
Slew rate	0.00256 ~ 0.160A / µS	0.0256 ~ 1.600A / µS	0.00512 ~ 0.320A / µS	0.0512 ~ 3.200A / µS	0.00768 ~ 0.480A / µS	0.0768 ~ 4.800A / µS
Resolution	0.00064A / µS	0.0064A / µS	0.00128A / µS	0.0128A / µS	0.00192A / µS	0.0192A / µS
Min. Rise Time	25µS(typical)					
Accuracy	±(5% of Setting)±10u					
Current						
Range	0 ~ 4A	4 ~ 40A	0 ~ 8A	8 ~ 80A	0 ~ 12A	12 ~ 120A
Resolution	0.064mA	0.64mA	0.128mA	1.28mA	0.192mA	1.92mA
Conf key parameter						
LDon voltage	Setting range : 1V - 250.0V / Resolution : 1V					
LDoFF voltage	Setting range : 0.000V - 249.0V / Resolution : 0.02V					
Average time	0 ~ 64					
CV res. speed	1 ~ 4 (Fastest)					
Measurement						
Voltage Read Back						
Range (5 Digital)	0 ~ 120V	120 ~ 1200V	0 ~ 120V	120 ~ 1200V	0 ~ 120V	120 ~ 1200V
Resolution	2.00mV	20.0mV	2.00mV	20.0mV	2.00mV	20.0mV
Accuracy	± 0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digital)	0 ~ 4A	4 ~ 40A	0 ~ 8A	8 ~ 80A	0 ~ 12A	12 ~ 120A
Resolution	0.064mA	0.64mA	0.128mA	1.28mA	0.192mA	1.92mA
Accuracy	± 0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digital)	1.2kW		2.4kW		3.6W	
Resolution	0.01W					
Accuracy*4	± 0.06% of (Reading + Range)					
General						
Typical Short Resistance	375mΩ		187.5mΩ		125mΩ	
Maximum Short Current	40A		80A		120A	
Load ON Voltage	1 ~ 250V					
Load OFF Voltage	0 ~ 249V					
Power Consumption	550VA					
Dimension(H x W x D)	177mm x 440mm x 745mm					
Weight	29kg					
Temperature*8	0 ~ 40°C					
Safety & EMC	CE					

Note *1 : The power rating specifications at ambient temperature = 25˚C

Note *2 : The range is automatically or forcing to range II only in CC mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

Note *4 : Power range = Vrange x Irange

Note *5 : Turbo mode for up to 1.5X Current rating & Power rating support Surge, BMS, Short/OCP/OPP test function

Note *6 : The best accuracy of OCP/OPP test is Istep/Pstep=1%FS

Note *7 : BMS Test function for Battery Management System Board SHORT, OCCP and OCDP Test

Note *8 : Operating temperature range is 0~40℃, All specifications apply for 25℃±5℃, Except as noted

Model	3374G		3375G		3376G	
Power[*1]	0 ~ 4kW	0 ~ 6kW max.[*1]	0 ~ 5kW	0 ~ 7.5kW max.[*1]	0 ~ 6kW	0 ~ 9kW max.[*1]
Current	0 ~ 160A	0 ~ 240A max.[*1]	0 ~ 200A	0 ~ 300A max.[*1]	0 ~ 240A	0 ~ 360A max.[*1]
Voltage	0 ~ 1200V		0 ~ 1200V		0 ~ 1200V	
Min. Operating Voltage	15V@100A		15V@200A		15V@240A	
Protections						
Over Power Protection(OPP)	105%					
Over Current Protection(OCP)	104%					
Over Voltage Protection(OVP)	105%					
Over Temp Protection(OTP)	90°C±5°C					
Constant Current Mode						
Range[*2]	0 ~ 16A	0 ~ 160A	0 ~ 20A	0 ~ 200A	0 ~ 24A	0 ~ 240A
Resolution	0.256mA	2.56mA	0.32mA	3.2mA	0.384mA	3.84mA
Accuracy[*3]	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	450kΩ ~ 7.5Ω	7.5Ω ~ 0.0937Ω	360kΩ ~ 6Ω	6Ω ~ 0.075Ω	300kΩ ~ 5Ω	5Ω ~ 0.0625Ω
Resolution	2.2μS	125μΩ	2.8μS	100μΩ	3.3μS	83.34μΩ
Accuracy	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S	± 0.1%(Vin / Setting) ±0.1% IF.S	± 0.1% of (Setting + Range) ±0.1% IF.S
Constant Voltage Mode						
Range	0~1200V					
Resolution	20mV					
Accuracy	± 0.05% of (Setting + Range)					
Constant Power Mode						
Range	0 ~ 400W	400 ~ 4kW	0~500W	500~5kW	0~600W	600~6kW
Resolution	6.4mW	64mW	8mW	80mW	9.6mW	96mW
Accuracy[*4]	± 0.2% of (Setting + Range)					
Constant Voltage Mode + Current Limit Mode						
Range	1200V	160A	1200V	200A	1200V	240A
Resolution	20mV	2.56mA	20mV	3.2mA	20mV	3.84mA
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Constant Voltage Mode + Power Limit Mode						
Range	1200V	4kW	1200V	5kW	1200V	6kW
Resolution	20mV	64mW	20mV	80mW	20mV	96mW
Accuracy[*4]	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)	± 0.05% of (Setting + Range)	± 1.0% of (Setting + Range)
Turbo mode[*5]	OFF	ON	OFF	ON	OFF	ON
Short / OCP / OPP test function						
Max. Current	160A	240A	200A	300A	240A	360A
Max. Power	4000W	6000W	5000W	7500W	6000W	9000W
Test Accuracy[*6]	± 1.0% of (Reading + Range)					
Short Time	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS	100 ~ 10000mS Continuous	100 ~ 2000mS
Setting. Accuracy	±5mS					
Short V Hi	Setting range : 0.25V - 1200.0V / Resolution : 0.02V					
Short V Lo	Setting range : 0.000V - 1200.0V / Resolution : 0.02V					
OCP Time(Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting. Accuracy	±5mS					
OCP ISTAR / ISTEP / ISTOP	Setting range : 0.00A - 160.00A / Resolution : 2.56mA	Setting range : 0.00A - 240.00A / Resolution : 3.84mA	Setting range : 0.00A - 200.00A / Resolution : 3.2mA	Setting range : 0.00A - 300.00A / Resolution : 4.8mA	Setting range : 0.00A - 240.00A / Resolution : 3.84mA	Setting range : 0.00A - 360.00A / Resolution : 5.76mA
OCP VTH	Setting range : 0.00V - 1200.00V / Resolution : 0.02V					
OPP Time(Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting. Accuracy	±5mS					
OPP PSTAR / PSTEP / PSTOP	Setting range : 0.00W - 4000.0W / Resolution : 64.0mW	Setting range : 0.00W - 6000.0W / Resolution : 96.0mW	Setting range : 0.00W - 5000.0W / Resolution : 80.0mW	Setting range : 0.00W - 7500.0W / Resolution : 120mW	Setting range : 0.00W - 6000.0W / Resolution : 96mW	Setting range : 0.00W - 9000.0W / Resolution : 144mW
OPP VTH	Setting range : 0.00V - 1200.00V / Resolution : 0.02V					
BMS Test Mode[*7]						
Max. Current	160A	240A	200A	300A	240A	360A
Meas. Accuracy[*6]	±3.0% of (Reading + Range)					
Short test Time	0.05mS~10mS / Resolution : 0.01mS					
Meas. Accuracy	±0.02mS					
Setting Accuracy	±0.05mS					
Short ITH	Setting range : 0.07A - 80.00A / Resolution : 2.56mA	Setting range : 0.11A - 120.00A / Resolution : 3.84mA	Setting range : 0.09A - 100.00A / Resolution : 3.2mA	Setting range : 0.14A - 150.00A / Resolution : 4.8mA	Setting range : 0.11A - 120.00A / Resolution : 3.84mA	Setting range : 0.17A - 180.00A / Resolution : 5.76mA
OCP ISTAR	Setting range : 0.25A - 160.00A~/ Resolution : 2.56mA	Setting range : 0.38A - 240.00A / Resolution : 3.84mA	Setting range : 0.32A - 200.00A~/ Resolution : 3.2mA	Setting range : 0.48A - 300.00A / Resolution : 4.8mA	Setting range : 0.38A - 240.00A~/ Resolution : 3.84mA	Setting range : 0.57A - 360.00A / Resolution : 5.76mA
OCP TSTEP	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS	0.05 ~ 10mS 11 ~ 1000mS	0.05 ~ 10mS
Meas. Accuracy	±0.1mS / ±0.5mS	±0.5mS	±0.1mS / ±0.5mS	±0.5mS	±0.1mS / ±0.5mS	±0.5mS
OCP ISTEP	Setting range : 0.00A - 160.00A~/ Resolution : 2.56mA	Setting range : 2.40A - 240.00A~/ Resolution : 3.84mA	Setting range : 0.00A - 200.00A / Resolution : 3.2mA	Setting range : 3.00A - 300.00A / Resolution : 4.8mA	Setting range : 0.00A - 240.00A / Resolution : 3.84mA	Setting range : 3.60A - 360.00A / Resolution : 5.76mA
OCP ISTOP	Setting range : 0.25A - 160.00A~/ Resolution : 2.56mA	Setting range : 0.38A - 240.00A~/ Resolution : 3.84mA	Setting range : 0.32A - 200.00A / Resolution : 3.2mA	Setting range : 0.48A - 300.00A / Resolution : 4.8mA	Setting range : 0.38A - 240.00A / Resolution : 3.84mA	Setting range : 0.57A - 360.00A / Resolution : 5.76mA
OCP ITH	Setting range : 0.07A - 80.00A~/ Resolution : 2.56mA	Setting range : 0.11A - 120.00A~/ Resolution : 3.84mA	Setting range : 0.09A - 100.00A / Resolution : 3.2mA	Setting range : 0.14A - 150.00A / Resolution : 4.8mA	Setting range : 0.11A - 120.00A / Resolution : 3.84mA	Setting range : 0.17A - 180.00A / Resolution : 5.76mA
Surge Test Mode						
Surge current	0 ~ 240A		0 ~ 300A		0 ~ 360A	
Normal current	0 ~ 120A		0 ~ 150A		0 ~ 180A	
Surge time	10 ~ 2000mS		10 ~ 2000mS			
Surge step	1 ~ 5		1 ~ 5			

Batt test Mode						
Mode CC	Setting range : 0.00A - 160.00A/ Resolution : 2.56mA		Setting range : 0.00A -200.00A / Resolution : 3.2mA		Setting range : 0.00A - 240.00A / Resolution : 3.84mA	
Mode CP	Setting range : 0.00W - 4000.0W/ Resolution : 64mW		Setting range : 0.00W - 5000.0W / Resolution : 80mW		Setting range : 0.00W - 6000.0W / Resolution : 96mW	
STOP Voltage(UVP)	Setting range : 0.00V - 1200.00V / Resolution : 0.02V					
	Setting range : OFF 1 - 99999s / Resolution : 1s					
STOP CAP.AH	Setting range : OFF 0.1 - 19999AH / Resolution : 0.1AH					
STOP CAP.WH	Setting range : OFF 0.1 - 19999WH / Resolution : 0.1WH					
SEQ Load Mode (remode only)						
Load mode	CC / CP					
Setting STEP	2 ~ 16					
Timing	20 ~ 1000us / 2~ 65535mS / 66 ~ 999Sec					
Resolution	10us / 1mS / 1Sec					
Dynamic Mode						
Timing						
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999mS					
Resolution	0.001 / 0.01 / 0.1 / 1mS					
Accuracy	1µS / 10µS / 100µS / 1mS + 50ppm					
Slew rate	0.01024 ~ 0.640A / µS	0.1024 ~ 6.400A / µS	0.0128~0.800A / µS	0.1280~8.000A / µS	0.01536~0.960A / µS	0.1536~9.600A / µS
Resolution	0.00256A / µS	0.0256A / µS	0.0032A / µS	0.032A / µS	0.00384A / µS	0.0384A / µS
Min. Rise Time	25µS(typical)					
Accuracy	±(5% of Setting)±10u					
Current						
Range	0 ~ 16A	16 ~ 160A	0 ~ 20A	20 ~ 200A	0 ~ 24A	42 ~ 240A
Resolution	0.26mA	2.56mA	0.32mA	3.2mA	0.38mA	3.84mA
Conf key parameter						
LDon voltage	Setting range : 1V - 250.0V / Resolution : 1V					
LDoFF voltage	Setting range : 0.000V - 249.0V / Resolution : 0.02V					
Average time	0 ~ 64					
CV res. speed	1 ~ 4 (Fastest)					
Measurement						
Voltage Read Back						
Range (5 Digital)	0 ~ 120V	120 ~ 1200V	0 ~ 120V	120 ~ 1200V	0 ~ 120V	120 ~ 1200V
Resolution	2.00mV	20.0mV	2.00mV	20.0mV	2.00mV	20.0mV
Accuracy	± 0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digital)	0 ~ 16A	16 ~ 160A	0 ~ 20A	20 ~ 200A	0 ~ 24A	24 ~ 240A
Resolution	0.256mA	2.56mA	0.32mA	3.2mA	0.384mA	3.84mA
Accuracy	± 0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digital)	4kW		5kW		6kW	
Resolution	0.01W					
Accuracy*4	± 0.06% of (Reading + Range)					
General						
Typical Short Resistance	93.75mΩ		75mΩ		62.505mΩ	
Maximum Short Current	160A		200A		240A	
Load ON Voltage	1 ~ 250V					
Load OFF Voltage	0 ~ 249V					
Power Consumption	550VA					
Dimension(H x W x D)	177mm x 440mm x 745mm					
Weight	31kg		32kg		32kg	
Temperature*8	0 ~ 40°C					
Safety & EMC	CE					

Note *1 : The power rating specifications at ambient temperature = 25˚C

Note *2 : The range is automatically or forcing to range II only in CC mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

Note *4 : Power range = Vrange x Irange

Note *5 : Turbo mode for up to 1.5X Current rating & Power rating support Surge, BMS, Short/OCP/OPP test function

Note *6 : The best accuracy of OCP/OPP test is Istep/Pstep=1%FS

Note *7 : BMS Test function for Battery Management System Board SHORT, OCCP and OCDP Test

Note *8 : Operating temperature range is 0~40℃, All specifications apply for 25℃±5℃, Except as noted

Table 1-2 3350G series Specification

Chapter 2 Installation

2-1 Inspection

The 3350G series high power load was carefully inspected before shipment. If instrument damage has occurred during transport, please inform Prodigit's sales and service office or representative.

Your 3350G series high power load was shipped with a power cord for the type of Terminal blocks used at your location. If the appropriated cord was not included, please contact your nearest Prodigit sales office to obtain the correct cord. Refer to “check line voltage “to check the line voltage is 100V~240Vac.

2-2 Check line voltage

The 3350G series high power load can operation with 100 Vac ~240Vac input as indicated on the label on the rear panel.

Make sure that the factory check mark corresponds to your nominal line voltage. Skip this procedure if the label is corrected marked.

2.2.1. With the 3350G series load power OFF, disconnect the power cord.

2.2.2. Refer the drawing on the rear panel of 3350G series high power load in Fig 2-1.

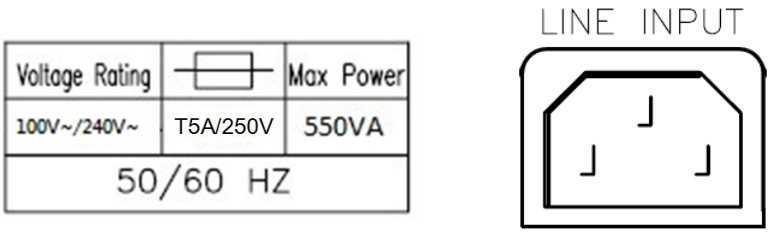


Fig 2-1 3350G series AC Input Connection

2-3 Fuse Exchange

This product has the power fuse, and exchanges it according to the following procedure.

Never fail to turn off the power of this product, and disconnect the plug of the AC Power cable.

WARNING

To avoid the fire or electronic shock, the Fuse that will be used in the product should have the safety standard in the area of the region you use. Any use of improper Fuse or shorting the Fuse holder would be extremely dangerous and would be strictly prohibited.

- Before exchanging the Fuse, if there are abnormal odor or abnormal noise,
- Please stop using immediately and ask for the repair.

2.3.1.Check the rating of the line fuse and replace it with the correct fuse if necessary.

100V~240V, 3350GSeries use T5A/250V (5*20mm), The AC line fuse is located Left, The AC line receptacles see Fig 2-2. Change an appropriate Specifications fuse Which indicated In Table 1-1.

2.3.2.Reinstall fuse holder and connect the power cord.

T5A/250V (5*20mm)

Fig 2-2 3350G Series fuse holder

2-4 Grounding requirements

WARNING

SHOCK HAZARD

1. It is requested to use the 3Pin plug connector only for 3350G series mainframe to out of danger when electric leakage. And the complete and proper grounded is necessary.

2. The 3350G series high power load is equipped with three conductor cable which plugs in an appropriate receptacle to ground the instrument's cover.

2-5 Environmental requirements

- Indoor use.
- Measurement Category II.
- Pollution Degree 2.
- Relative Humidity 80% Max.
- Ambient Temperature 0 ~40°C
- Altitude up to 2000m.
- The equipment is not for measurements performed for CAT II, III and IV.
- Transient Overvoltage on the mains supply can be 2500V.
- Shipping Storage Conditions: Temperature: 0 ~60 °C, Relative Humidity: 80% Max.

2-6 Repair

If the instrument is damaged, please attach a tag to the instrument to identify the owner and indicated the require service or repairing. And inform the Prodigit sales and service office or representative.
Address: No.7-1, Jhongsing Road., Tucheng Dist., New Taipei City 236, Taiwan
Tel: +886-2-2918-2620

2-7 Cleaning Maintenance and cleaning methods

The dust on the load can be removed with a brush, and the dust on the vent below the front panel can be removed with a vacuum cleaner.
You can use a soft or damp cloth to clean the outer casing of the product. The inside of the product must be cleaned with a low-pressure air gun, or sent to the original factory or agent for cleaning.

* Please clean regularly every year

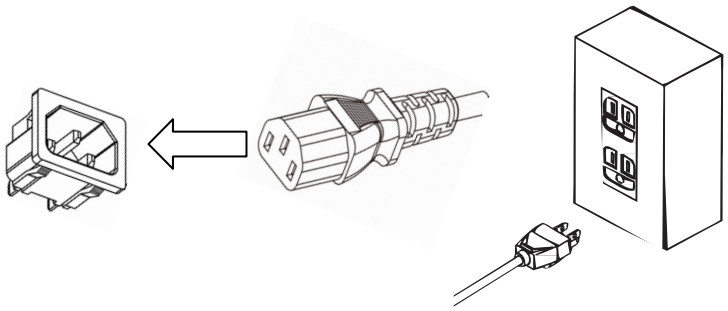
Use a soft or slightly damp cloth to clean this product.

BEFORE you clean the unit, switch the mains power off and disconnect the input lead.

- Please do NOT use any organic solvent capable of changing the nature of the plastic such as benzene or acetone.
- Please ensure that no liquid is allowed to penetrate this product.

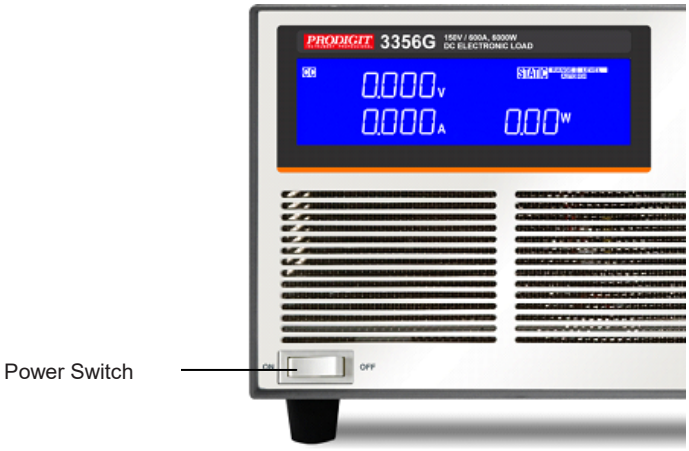
2-8 Installation and Preparation

- Turn the Power switch off
- Check that the AC power line meets the nominal input rating of the DC LOAD.
- Connect the power cord to the AC INPUT.
- Check that the power cord is connected correctly.
- Connect the power cord plug to a properly grounded outlet.



Connect to a properly grounded outlet.

2-9 Checking Whether the Power Is On or Off



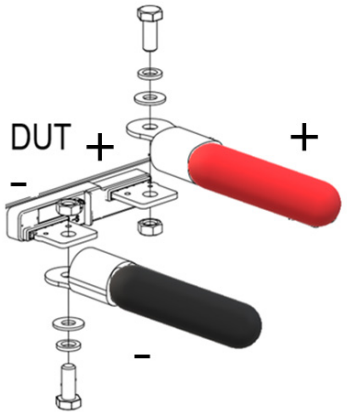
- Check that the power cord is connected correctly.
- Check that nothing is connected to the DC INPUT (load input) terminals on the rear panels.
- Turn the POWER switch on .
- If you notice strange sounds, unusual odors, fire, or smoke around or from inside the DC Load, turn the POWER switch off, or remove the power cord plug from the outlet.
- Press the side of the POWER switch to turn the power off.

2-10 Connecting to the DUT

CAUTION

Risk of damage.

- Do not connect the DUT to the load input terminals while the product's load is turned on.
- Do not invert the polarity when connecting. An overcurrent might flow when the load is Turned on.
- To avoid overheating, observe the following precaution.
- Use the supplied screws to connect the cables with crimping terminals.



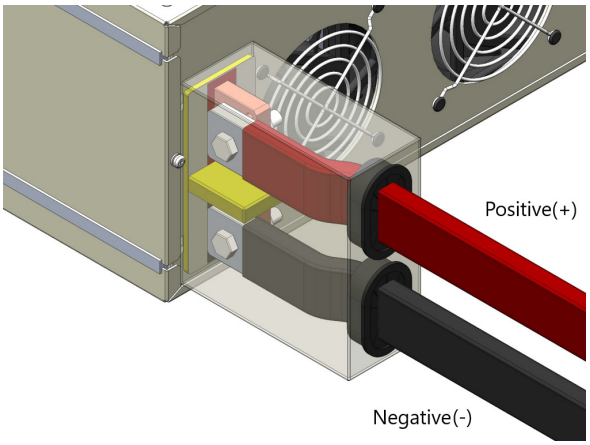
2-11 Connecting to the load input terminals on the rear panel

WARNING

Risk of electric shock.

- Be sure to attach the cover for the load input terminals on the rear panel.
- Turn the load off.
- Turn off the output of the DUT.
- Connect the DUT to the load input terminals on the rear panel.
- Do not invert the polarity when connecting.
- Connect the positive (+) input terminal on the load generator to the high Potential Output of the DUT & Load unit, and connect the negative (-) polarity input terminal on The load generator to the low Potential output of the DUT & Load unit.
- This completes the connections.

Note: Avoid equipment damaged, don't input the DC voltage standard output to the DC Load input terminal, if calibration voltage meter required, please input the DC voltage standard to the Vsense input.



2-12 Wire/Cable Guide

The following table provides a guide to the current carrying capability (ampacity) of Both Metric and AWG sizes. Metric sizes are expressed as a cross sectional areas (CSA). If in any doubt of a cables ampacity it is recommended that you ask your Cable supplier.

Wire Size AWG	Ampacity (A)	CSA (mm^2)	Notes: Ratings for AWG-sized wires derived from MIL-W-5088B. Ratings for metric-sized wires derived from IEC Publication
22	5.0	-----	Ampacity of aluminium wire is approximately 84% of that listed for copper wire.
20	8.33	-----	
---	10	0.75	When two or more wires are bundled together, ampacity for each wire must be reduced to the following percentages:
18	15.4	-----	
---	13.5	1	
16		------	
---	16	1.5	2 conductors 94%
14	31.2	-------	3 conductors 89%
---	25	2.5	4 conductors 83%
12	40	-------	5 conductors 76%
---	32	4	
10	55	------	
---	40	6	4. Maximum temperatures:
8	75	------	Ambient = 50° C
---	63	10	Conductor = 105° C
6	100	------	
4	135	------	

2-13 Power ON / Off the Load and DUT

Power ON Sequence

1. Turn the POWER switch on the Load.
2. Turn the POWER switch on the DUT.

Power OFF Sequence

1. Turn the POWER switch off the DUT.
2. Turn the POWER switch off the Load.

2-14 GPIB & RS232 interface option

2.14.1. GPIB + RS232 connector is on the rear panel of 3350G series Mainframe for application GPIB or RS232, The default is GPIB interface.

2.14.2. GPIB and RS232 interface can only be used at the same time, to Change the interface must reboot unit.

2.14.3. GPIB connection with three important limitations as Described below:

2.14.3.1 The maximum number of devices including the controller is no More than 15.

2.14.3.2 The maximum length of all cable is no more than 2 meters times The Number of devices connected together, up to 20 meters Maximum.

2.14.3.3 RS232 Female Block connections on the back panel, the Connecting Device and the computer RS232 port to one-way Connection.
(Note: Not 2-wire connection, the detail as 4-2).

2.14.4. Fig 2-3 shows the RS232 connector (Female) on the rear panel Connects 3350G series Mainframe to RS232 port of computer in one by one Configuration. The RS232 BAUD-RATE can be set in the front Panel, it Will be lit the GPIB Address when press the “SYSTEM” button. Press it again, it will be lit the BAUD-RATE.

2.14.5. When using the GPIB+RS232 interface card to connect the RS232 cable, you must first issue a command to switch to RS232 mode before SYSTEM can set the baud rate.

Fig 2-3 3350G series GPIB & RS232 interface

2-15 RS232 interface option

Fig 2-4 shows the RS232 connector (Female) on the rear panel connects 3350G series mainframe to RS232 port of computer in one by one configuration. The RS232 BAUD-RATE can be set in the front panel, it will be lit the GPIB address when press the “SYSTEM” button. Press it again, it will be lit the BAUD-RATE.

Fig 2-4 3350G series RS232 interface

2-16 GPIB interface option

2.16.1 The maximum number of devices including the controller is no more than 15.

2.16.2 The maximum length of all cable is no more than 2 meters times the Number of Devices connected together, up to 20 meters maximum.

Fig 2-5 3350G series GPIB interface

2-17 USB interface option

Fig 2-6 shows the USB connector in the rear panel of 3350G series mainframe.
Please refer Appendix B.
The USB card chip PL2303TA only supports operating systems below Win10 (Including).

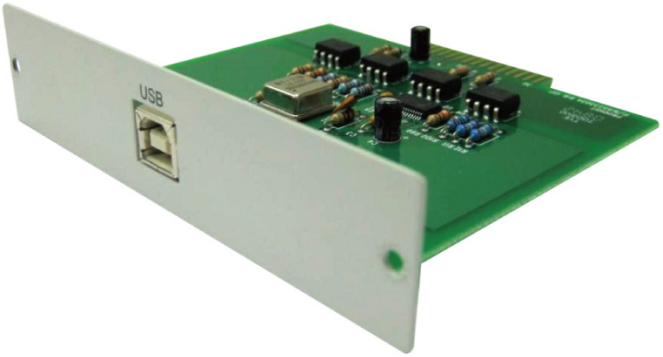


Fig 2-6 3350G series USB interface

2-18 LAN interface option

Fig 2-7 shows the LAN connector in the rear panel of 3350G series mainframe. Please Refer Appendix C.

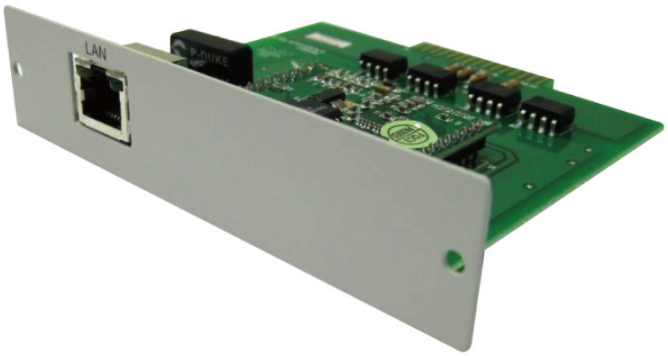


Fig 2-7 3350G series LAN interface

2-19 9923 interface option

Fig 2-8 shows the 9923 connector in the rear panel of 3350G series mainframe. Please Refer 5-20.

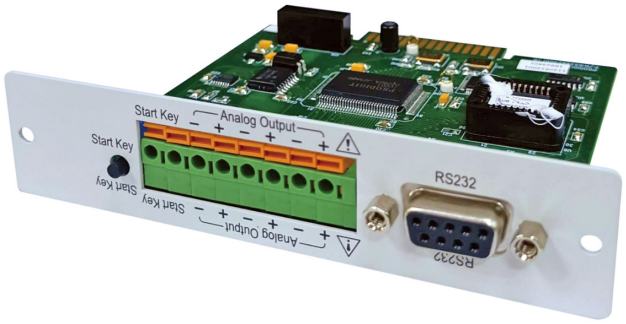


Fig 2-8 3350G series 9923 interface

2-20 I/O connection

3350G series I/O Interface with Vsense, Analog Programming Input, Imonitor, Instructions please refer to Chapter 3.2.25 - 3.2.27.

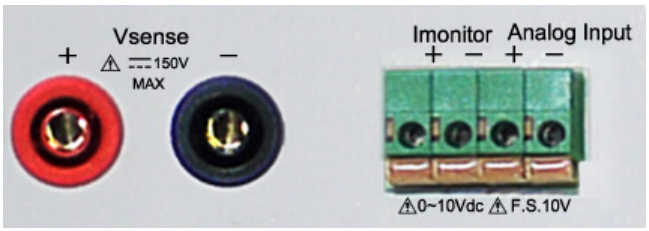


Fig 2-9 3350G series I/O interface

2-21 Load current slew rate setting

What is the load current slew rate during load current level change, power supply turn ON/OFF switch between ON, and OFF? The 3350G series Electronic load provides all of the above load current slew rate in controllable condition, the rise and fall current slew rate can be set independently from front panel operation or remote programming.

The slew rate determines a rate at which the current changes to a new programmed value. The slew rate can be set at the front panel or via GPIB on the rear panel of 3350G series high power load.

The rise and fall slew rate can be independently programmed from 384mA/usec to 24A/usec (3356G Load) in the 600A current range and from 38.4mA/usec to 2.4A/usec in the 60A current range. This allows a independent controlled transition from Low load current level to High load current level (Rise current slew rate) or from High load current level to Low load current level(Fall current slew rate) to minimize induced voltage drops on the inductive wiring, or to control induced transients on the est. device (power supply transient response testing).

This controllable load current slew rate feature also can eliminate the overload current Phenomenon and emulate the actual load current slew rate at turn ON the power supply

Under test.Fig 2-10 shows the load current slew rate is according to the power supply's Output Voltage,Load level setting and Load ON/OFF switch. So, you could do all items of Power Supply testingTask by using Constant current mode only, it can significantly improve The Testing quality and Process as well as efficiency.

There are two load current range in 3350G series Load, Range I and Range II, the slew rate of range I, range II, RISE/FALL slew rate are listed in chapter 1-4 specifications.

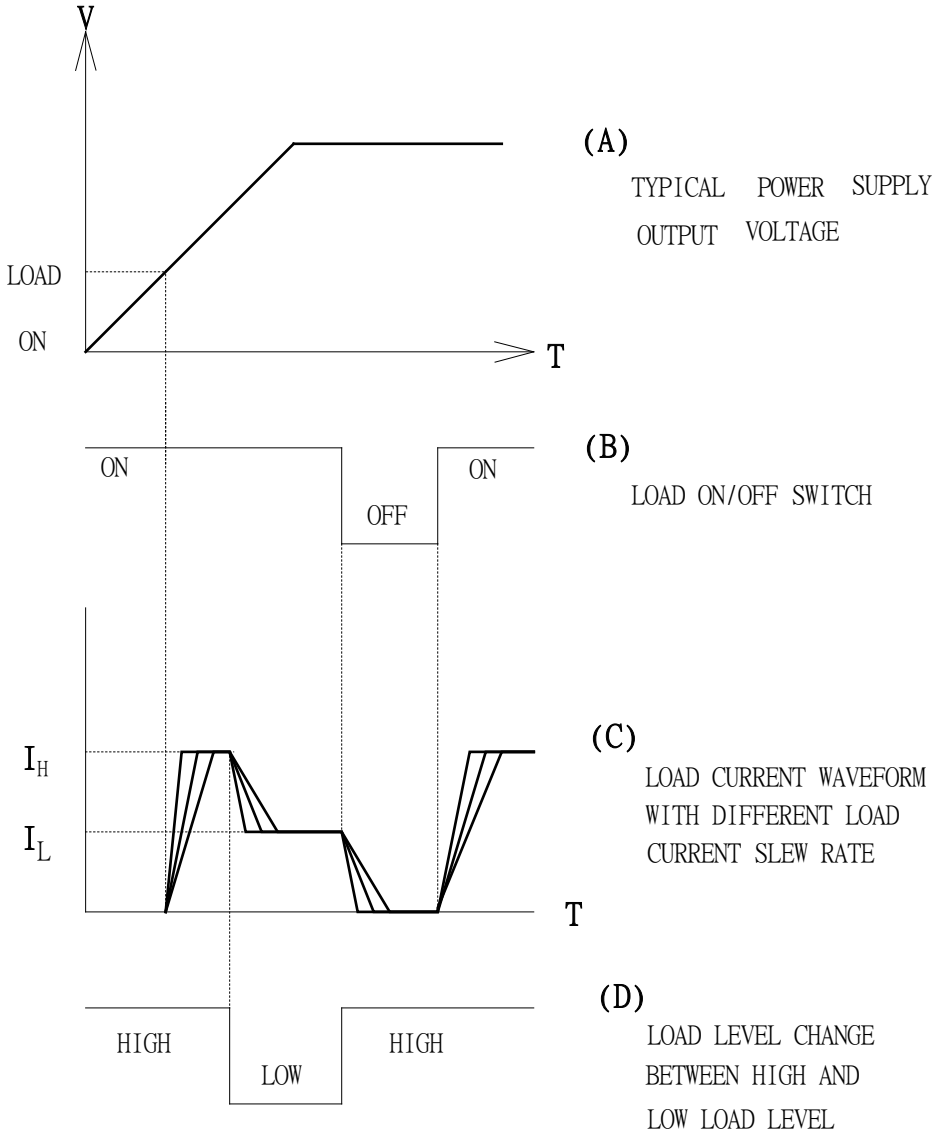
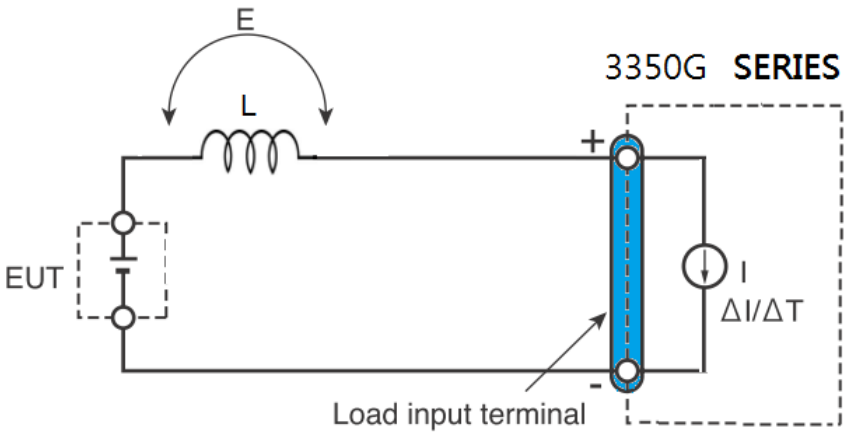


Fig 2-10 The relationship of load current load ON/OFF, load level and output voltage of DC power supply at turn ON

2-22 Load wire inductance

The load wiring has an inductance (L). When the current (I) varies in short time period, It generates a large voltage at both ends of the wiring cable. This voltage applies to all of the load input terminals of the 3350G series when the impedance of the EUT is relatively small. The voltage generated by the load wire inductance (L) and the current variation (I) is expressed using the following equation.



$E = L \times (\Delta I / \Delta T)$

E: Voltage generated by the wire inductance
L: Load wire inductance
ΔI: Amount of Current variation
ΔT: Variation period of current

In general, the wire inductance can be measured approximately 1 μH per 1 meter. If the 10 Meters of Load wires is connected between the EUT and the electronic load (3350G series) With the current Variation of 2 A/μs, the voltage generated by the wire inductance will be 20 V.

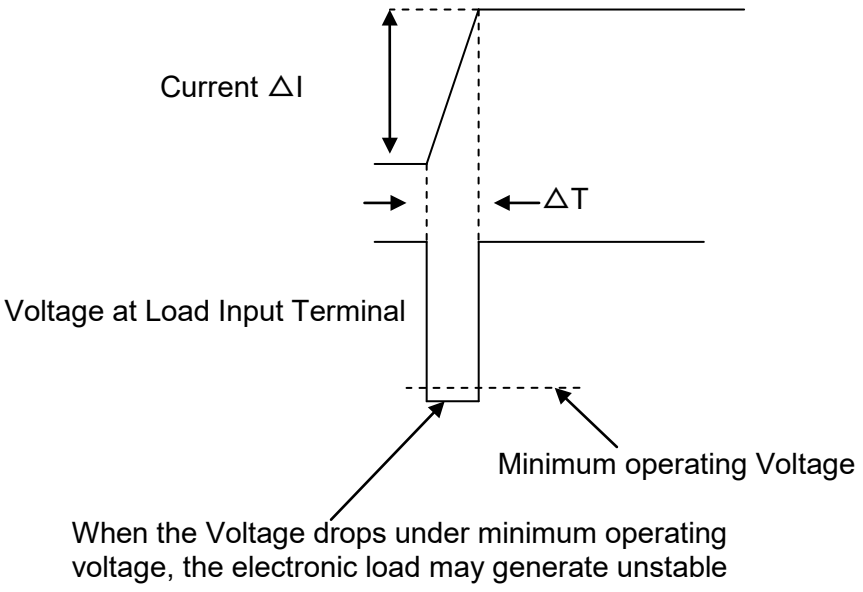
The negative polarity of the load input terminal is the reference potential of the external control Signal, Therefore, the device connected to the external control terminal may get malfunctioned.

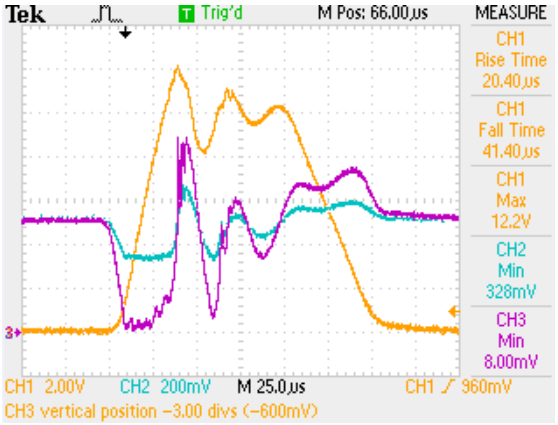
When operating under the constant voltage (CV) mode or constant resistance (CR) mode or Constant power (CP), the load current is varied by the voltage at the load input terminal, so the Operation can be affected easily by the generated voltage.

The wiring to the EUT should be twisted and the shortest as possible.
If the load wire is long or has a large loop, the wire inductance is increased. Consequently, the Current variation that results when switching occurs will cause a large voltage drop.

When the value of instantaneous voltage drops under the minimum operating voltage depends On The generated voltage at the load input terminal, the response of recovery will be Extensively Delayed.

In such event, the electronic load (3350G Series) may generate unstable oscillation.
In such condition, the input voltage may exceed the maximum input voltage and Cause Damage to the 3350G series.





CH1=Idisplay
CH2=Power Supply output Voltage (x10)
CH3= LOAD Input Voltage (x10)

Fig 2-11 Waveform example: Generate unstable oscillation

You must be careful especially when the slew rate setting is high or switching is performed using Large currents through parallel operation.

To prevent problems, connect the 3350G series and the equipment under test using the shortest Twisted Wire possible to keep the voltage caused by inductance between the minimum operating Voltage and the maximum input voltage range or set a low slew rate.

If the high-speed response operation is not required, decrease the slew rate setting.

In such settings, the value of DI /DT will be decreased, accordingly the generated voltage will be Reduced even the inductance of load wiring can not be reduced.

In the case of DC operation also, the phase delay of the current may cause instability in the 3350G series Control inducing oscillation. In this case also, connect the 3350G series and the Equipment Under test using the shortest twisted wire possible.

If only DC operation is required, a capacitor and a resistor may be connected to the load input Terminal as shown in Fig. 2-12 to alleviate oscillation. In this case, use the capacitor within its Allowable ripple current.

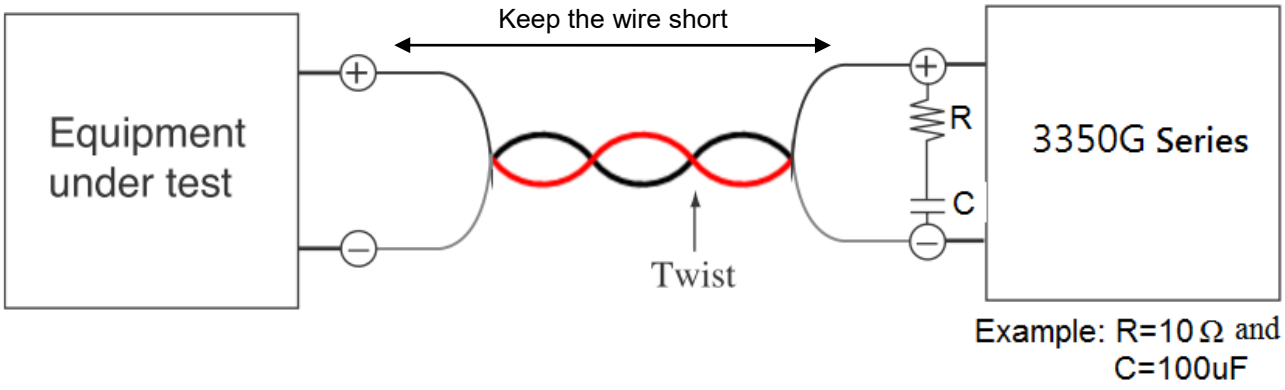


Fig 2-12 Length of wiring

Chapter 3 Operation

This chapter describes the front panel function and operation of each 3350G series load, the memory Store/Recall; please refer to the mainframe's operation manual for mainframe store/recall and GPIB/RS232/LAN/USB programming.

3-1. 3350G series dimension description

3351G/3352G/3353G SERIES

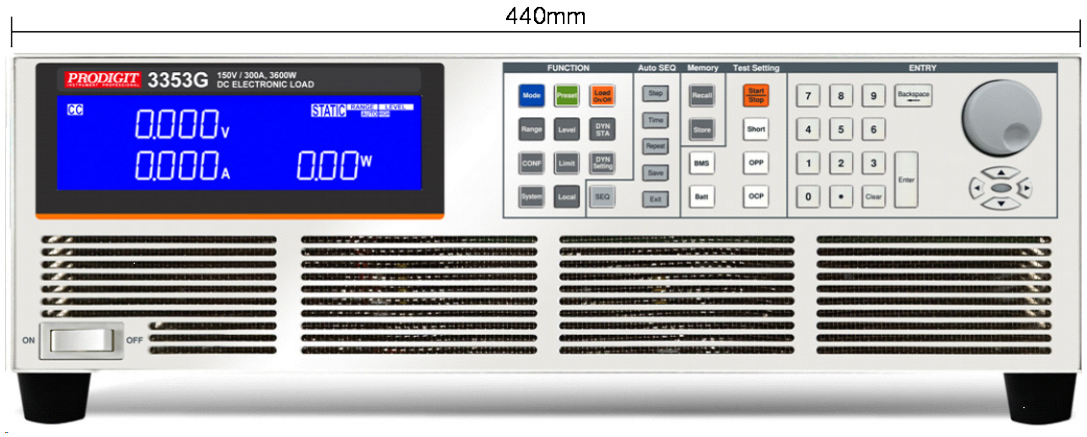


Figure 3-1 3350G Series High Power Electronic Load Diagram-1
(Handle is optional)

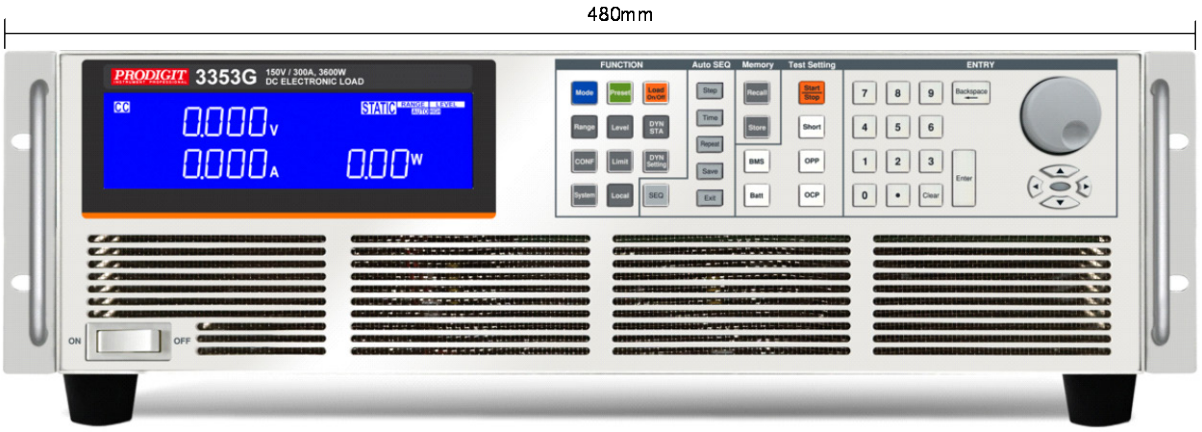


Figure 3-2 3350G Series High Power Electronic Load Diagram-2

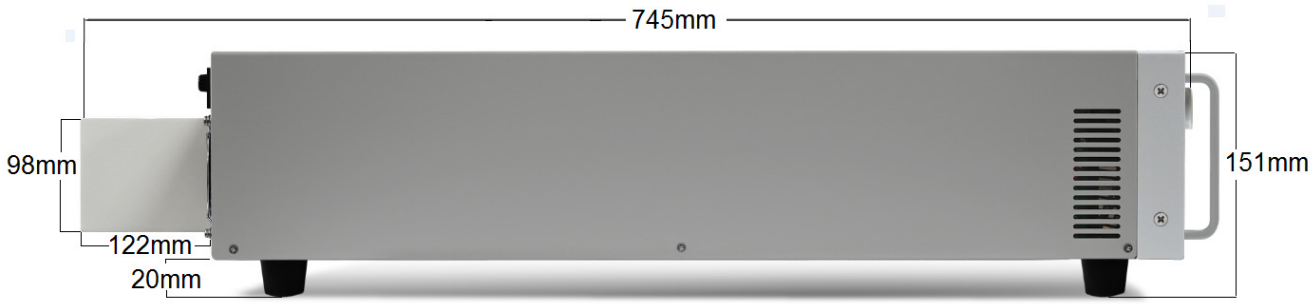


Figure 3-3 Side view of 3350G 3U series high power electronic load-1

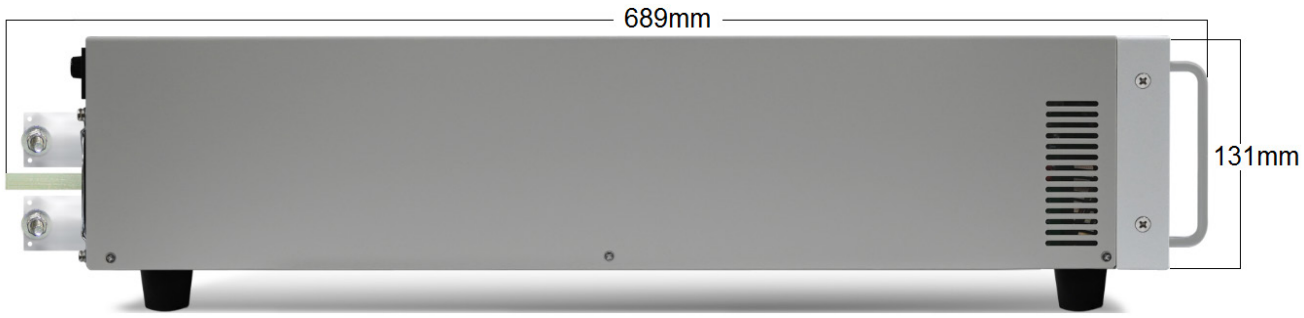


Figure 3-4 Side view of 3350G 3U series high power electronic load-2

Figure 3-5 Backplane of 3350G 3U Series High Power Electronic Load-1

Figure 3-6 Backplane of 3350G 3U Series High Power Electronic Load-2

Figure 3-7 3350G 4U series high power electronic load panel diagram-1

(Handle is optional)

Figure 3-8 3350G 4U series high power electronic load panel diagram-2

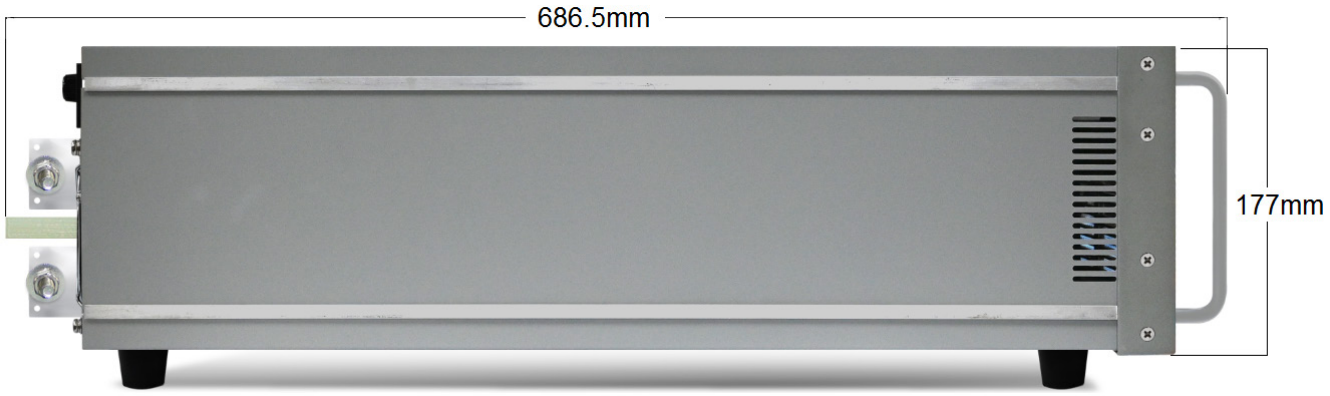


Figure 3-9 Side view of 3350G 4U series high power electronic load-1

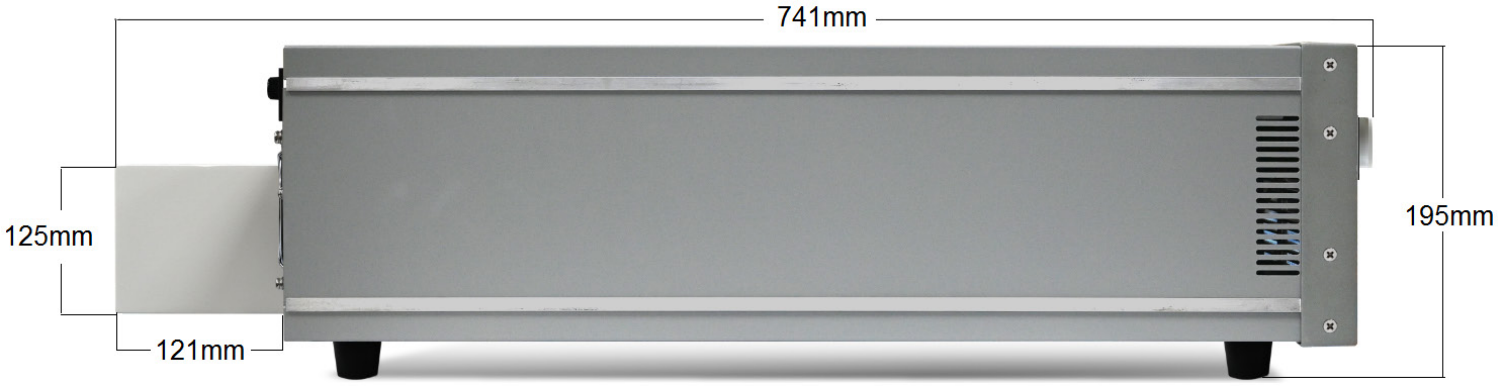
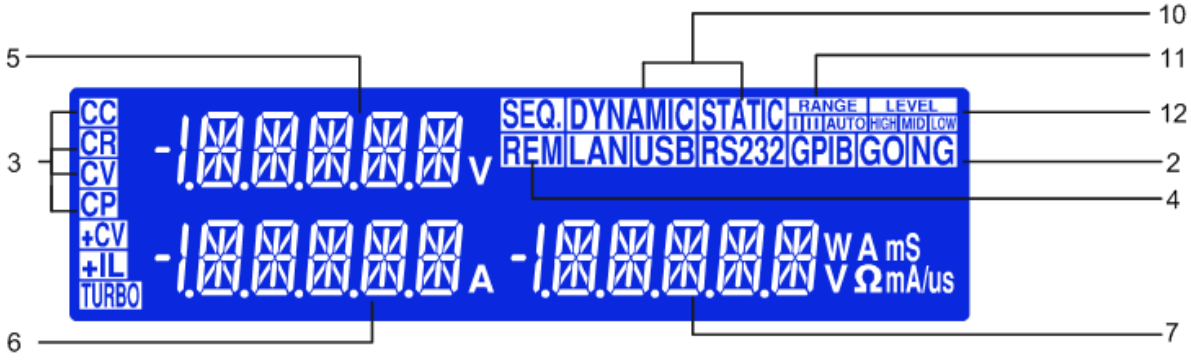


Figure 3-10 Side view of 3350G 4U series high power electronic load-2

Figure 3-11 Backplane of 3350G 4U Series High Power Electronic Load-1

Figure 3-12 Backplane of 3350G 4U Series High Power Electronic Load-2



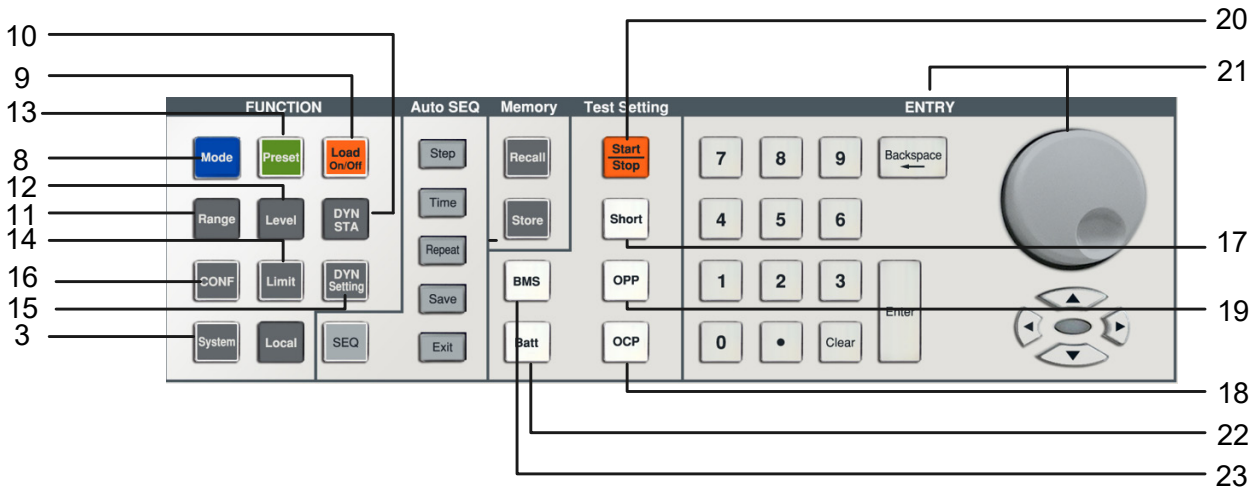


Fig 3-13 3350G series dimension description

3-2. Instructions

3.2.1. Model number and sink ranges

The model number along with maximum voltage, current and power values are Detailed in this position at the top of the load front panel.

It indicates the model number and specifications of 3356G electronic loads.

3.2.2. NG Indicator

The user can adjust upper and lower limits for voltage, current and power within the CONFIG menu and turn the NG Indicator ON. If a Voltmeter, Ammeter or Wattmeter measurement is outside these set limits then the NG indicator will illuminate.

3.2.3. MODE and CC, CR, CV, CP mode, LCD Indicator

There are four operating modes that can be selected by pressing the "MODE" key on the 3350G series Electronic Load module.

The sequence is Constant Current (CC), Constant Resistance (CR), Constant Voltage (CV), and Constant Power (CP). Each time the "MODE" key is pressed the operating mode is changed. The actual operating mode selected is indicated on the left hand side of the LCD.

The operating theorem of CC, CR, CV and CP modes are described in Section 1-1. Common application examples for the different operating modes are described in Section 5-3 to 5-6 respectively.

3.2.4. REM LCD Indicator

If the REMOTE LCD Indicator is illuminated this means that the unit is operating remotely via one of the optional interfaces. While REMOTE is lit it is not possible to make settings manually at the front panel. The LOCAL button on the mainframe can

be used to revert back to front panel control. When the unit is operating from the front panel the REMOTE LCD will not be illuminated.

3.2.5. Upper Left 5 digit LCD display

The 5 digit LCD display is a multi-function display. The function of the display changes depending whether the user is in NORMAL mode or in a SHORT, OPP or OCP test modes:

Normal mode:
The left 5 digit display displays the voltage present at the load's input terminals.
The value displayed will include the automatic voltage compensation if the sense Terminals are also connected to the device under test (DUT).

Please note that if V-sense is set to 'AUTO' and the sense leads are connected to The DUT the losses need to be approx.700mV (335XG), The DUT the losses need To be approx.10V (336XG,), the DUT the losses need to be approx.15V (337XG,) Before the Display Compensates for the Voltage loss.

If V-sense is set to 'ON' and the sense terminals are connected to the DUT the Load will check and compensate for all voltage drops.

Test Mode:
If the SHORT, OPP or OCP buttons are pressed the left display will show a text Message that correlates with the selected test function.

SHORT test selected: left display will show "Short".
OPP test selected: left display will show "OPP".
OCP test selected: left display will show "OCP".

During the test the left display will show the load Input voltage.

3.2.6. Lower left 5 digit LCD display
The middle 5 digit displays also changes function depending if the user is in Normal Mode or has entered a setting menu

Normal mode:
In normal mode the middle LCD display functions as a 5 digit ammeter. The 5 digit DAM shows the load current flowing into the DC load when the Load is ON.

Setting Mode:
If CONFIG, LIMIT, DYN, SHORT, OPP or OCP buttons are pressed the middle LCD show a text message according to the setting function it is in. Each subsequent press of the button moves the display to the next available function. The sequence of each setting menu is detailed below

- **CONFIG**: Sequence is "SENSE" → "LDon" → "LDoff" → "POLAR" →"AVG" → "TURBO" →" EXTIN" →" CV_bW" .
- **LIMIT**: Sequence is "AddCV"→"V_Hi" → "V_Lo" → "I_Hi" → "I_Lo" → "W_Hi" → "W_Lo" → "NG".
- **DYN setting**: Sequence is "T-Hi" → "T-Lo" → "RISE" → "FALL" → "SUR. I" → "NOR. I" → "S.TIME" →" S.STEP"
- **SHORT**: Sequence is "PRESS" → "TIME" → "V_Hi" → "V_Lo"
- **OPP**: Sequence is "PSTAR" → "PSTEP" → "PSTOP" → "Vth".
- **OCP**: Sequence is "ISTAR" → "ISTEP" → "ISTOP" → "Vth".

3.2.7. Lower Right 5 digit LCD display

The right 5 digit displays also changes function depending if the unit is in normal mode or one of the setting menus has been activated.

Normal mode:

In normal mode the lower right 5 digit displays shows the power consumption in Watts (W).

Setting Mode:

The right display together with the rotary adjustment knob is used to set values. The value changes according to the setting function that is active. The lower right LCD provides a text message to tell the user which part of the setting menu is active.

3.2.7.1. **PRESET** mode. The value of the setting entered on the lower right Display Changes depending on the operating MODE that has been Selected .

- If CC mode is selected the right display provides setting in amps "A".
- If CR mode is selected the right display provides setting in ohms “Ω”
- If CV mode is selected the right display provides setting in volts “V”.
- If CP mode is selected the right display provides setting in watts “W”.

3.2.7.2. **LIMIT.** Each press of the LIMIT button changes the lower left LCD text. The Sequence and the corresponding setting value shown on the bottom Display is as follows:

➔ Setting CC + CV or CP + CV upper left limit voltage, the lower left of the Display Show " AddCV”, the lower right display set value, the unit is V.
➔ V_Hi (left limit voltage) displays the set value in volts “V”
➔ V_Lo (right limit voltage) displays the set value in volts “V”
➔ I_Hi (left limit current) displays the set value in amps “A”
➔ I_Lo (right limit current) displays the set value in amps “A”
➔ W_Hi (left limit power) displays the set value in watts “A”
➔ W_Lo (right limit power) displays the set value in watts “A”
➔ NG displays whether the NG flag is set to「ON」or「OFF」

3.2.7.3. DYN setting. Each press of the DYN setting button changes the text on The lower left LCD. The sequence and the corresponding setting value Shown on the bottom display are as follows:

➔ T-Hi (time high) displays the set value in milliseconds “ms”
➔ T-Lo (time low) displays the set value in milliseconds “ms”
➔ Rise (current rise time/slew rate) displays the set value in “A/us”.
➔ Fall (current fall time/slew rate) displays the set value in “A/us”.
➔ SUR.I displays the set value in “A”.
➔ NOR.I displays the set value in “A”.
➔ S.TIME displays the set value in “ms”.
➔ S.STEP displays the set value 1-5.

3.2.7.4. CONFIG. Each press of the CONFIG button changes the lower left LCD Text.

The sequence and the corresponding setting value shown on the bottom Displays are as follows:

➔ SENSE can be set to「AUTO」or 「ON」
➔ LDon (load ON voltage) displays the set value in volts “V”

- ➔ LDoff (load OFF voltage) displays the set value in volts “V”
- ➔ POLAR (load polarity) can be set to「＋LOAD」or「－LOAD」
- ➔ AVG
- ➔ TURBO
- ➔ EXTIN
- ➔ CV_bW

3.2.7.5. SHORT test. This allows the parameters of the short test to be set up. Each press of the SHORT button moves the setting function. The Sequence of the short test along with the setting value is as follows:

- ➔ Short Press Start (pressing the red START/STOP button starts the test)
- ➔ TIME shows the duration of the SHORT test. “CONTI”, on the bottom display indicates continuous. Time can be adjusted in “ms”.
- ➔ V-Hi (voltage high threshold) displays the set value in volts “V”
- ➔ V-Lo (voltage low threshold) displays the set value in volts “V”

When the test is started the right display will show RUN. When the test Has finished the lower right display will show END.

3.2.7.6. OPP test. This allows the parameters of the over power protection test to Be Set up. Each press of the OPP button moves the setting function. The Sequence of the OPP test along with the setting value is as follows:

- ➔ OPP Press Start (pressing the red START/STOP button starts the test)
- ➔ PSTAR (power start point) right display provides setting in watts “W”
- ➔ PSTEP (power steps) right display provides setting in watts “W”
- ➔ PSTOP (power stop point) right display provides setting in watts “W”
- ➔ VTH (voltage threshold) right display provides setting in volts “V”

When the test is started the right display will show the power value Being taken by the load. If the Device under Test is able to supply the Load according to the values set then the middle display will show PASS And the right display will show the maximum power taken during the OPP Test. If, during the test, OTP is displayed the over temperature Protection Has been engaged. Similarly if OPP is shown on the display The over Power protection has been activated.

3.2.7.7. OCP test. This allows the parameters of the over current protection test To be set up. Each press of the OCP button moves the setting function. The sequence of the OCP test along with the setting value is as follows:

- ➔ OCP Press Start (pressing the red START/STOP button starts the test)
- ➔ ISTAR (current start point) right display provides setting in amps “A”
- ➔ ISTEP (current steps) right display provides setting in amps “A”
- ➔ ISTOP (current stop point) right display provides setting in amps “A”
- ➔ VTH (voltage threshold) right display provides setting in volts “V”

When the test is started the right display will show the current value being Taken by the load. If the Device under Test is able to supply the load According to the values set then the middle display will show PASS and The Right display will show the maximum current taken during the OCP Test. If, during the test, OTP is displayed the over temperature protection Has been Engaged. Similarly if OPP is shown on the display the over Power protection has been activated.

3.2.8. Mode and CC , CR , CV , CP Indicator

There are four operating modes. These can be selected in turn by pressing the "MODE" key on the 3350G series Electronic Load module. The sequence is:

➔ (CC) Constant Current
➔ (CR) Constant Resistance
➔ (CV) Constant Voltage
➔ (CP) Constant Power

The appropriate LCD will illuminate according to the operating mode is selected.

3.2.9. Load On/Off key and LED

The input to the 3350G series Electronic Load can be switched ON/OFF by using The “LOAD” button. Indication of the ON/OFF state is provided by illumination of the Button.

LOAD button lit	= LOAD ON	(load sinks according to the preset values)
LOAD button unlit	= LOAD OFF	(the load does not sink current)

Turning the LOAD OFF does not affect the preset values. When the LOAD ON state Is enabled the unit will revert to sinking according to the preset values.

3.2.9.1. When the Load ON/OFF key is operated the current taken by load will follow The RISE or FALL with time according to the preset rate. The current RISE And FALL times can be adjusted in the DYN Setting button of the front panel.

3.2.9.2. In addition to the LOAD ON/OFF function the user can also adjust the Voltage level at which the unit will automatically start or stop sinking energy. The adjustable LDon and LDoff voltage levels are found within the CONFIG Menu. Please note that the LDoff level cannot be set higher than the LDon Level.

Please refer to table 1-4 for adjustment ranges.

3.2.10. DYN STA key and LED

In the Dynamic mode, the LCD display DYNAMIC is in the ON state. Press it Again to switch to the Static mode. At this time, the LCD display STATIC is in the ON state, and the 3350G series electronic load is automatically adjusted to the Static mode.

Note 1: In the Static mode, the Low level gear changes with the High level gear.
Note 2: The Rise / Fall gear also changes with the high level gear.
Note 3: Only Low/High level changes are provided in CP mode.

3.2.11. 

Key and LED

Range This button can only be operated in CC mode and is used to control the Range switch. If it is Range Auto, the LCD display RANGE AUTO is ON, it will Automatically switch between range1 or range2 according to the value set by the User; otherwise, if it is Range II, the LCD display RANGE II is ON.
Please note that it is only possible to force RANGE II in CC mode.

3.2.12. 

Key and LED

The function of the LEVEL key is to switch the High / Low level of CC, CR, CV, CP in The Static mode, or switch the setting of High / Low when Preset ON, when the LEVEL key is switched to the High level, the LCD display HIGH is ON; otherwise, The LCD display LOW is ON when it is switched to Low level.

3.2.13. 

Key and LED

If the PRESET key is pressed the button will become lit indicating that the PRESET mode has been accessed. The lowest 5 digit display will change from showing the power consumption in watts to displaying the value to be preset. The value that can be programmed changes according to the operating mode that has been selected.

3.2.13.1. Constant Current (CC) mode:
The High and Low levels of load current can be preset at right 5 digit LCD. the "A" LED will be lit indicating the setting value is amps.

3.2.13.2. Constant Resistance (CR) mode:
The High and Low levels of load resistance can be preset on the right 5 Digit LCD. The "Ω" LED will be lit indicating the setting value is ohms.

3.2.13.3. Constant Voltage (CV) mode:
The High and Low levels of load voltage can be preset on the right 5 Digit LCD. The “V" LED will be lit indicating the setting value is volts.

3.2.13.4. Constant Power (CP) mode:
The High and Low levels of load power can be preset on the right 5 digit LCD. The "W" LED will be lit indicating the setting value is watts.

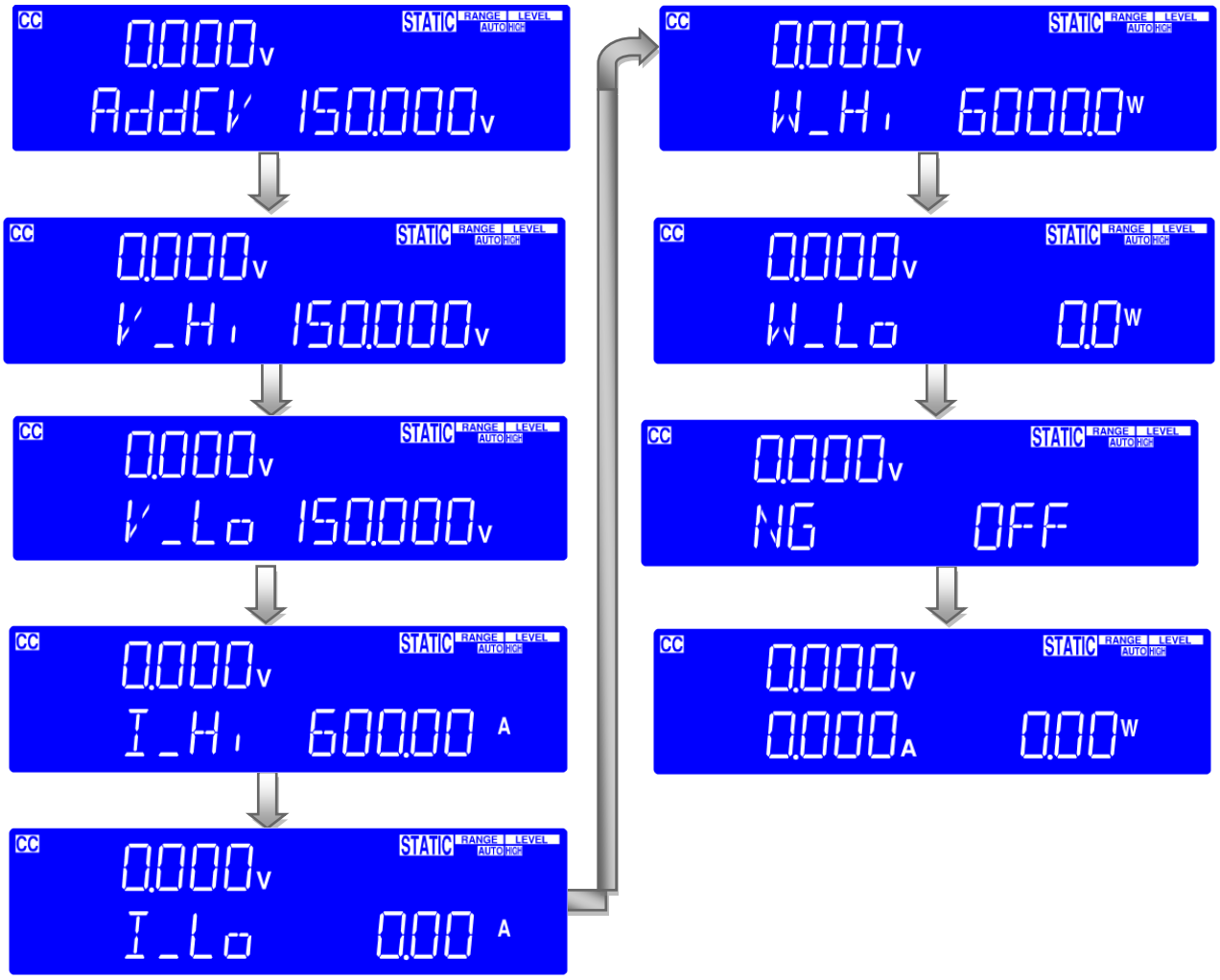
3.2.13.5. Dynamic mode (CC, CR or CP modes only):
Each press of the DYN button cycles through the dynamic load settings. The DYN settings are used in conjunction with the High and Low levels Of load current to define the dynamic waveform. Each press of the DYN Button switches from T_Hi (time high), to T_Lo (time low), to Rise time And then to fall time. The middle LCD shows the section of the dynamic Waveform which is programmed with the rotary knob and read from the Right display. The “ms” LED shows that the settings are programmed in Milliseconds.

3.2.14. Limit Key

The LIMIT button allows the user to set left and right thresholds for voltage, Current or power. These threshold settings are used in conjunction with the NG function to flag when the load is operating outside the desired limits

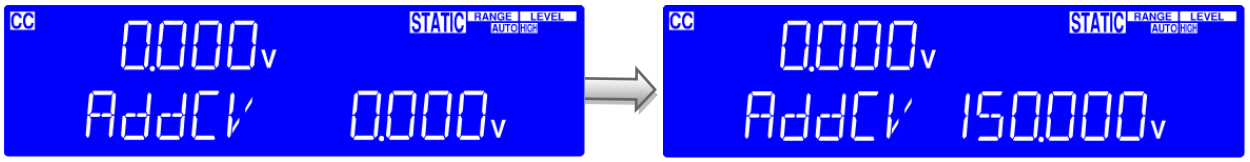
Each press of the LIMIT key enables a different value to be entered. On first press of the LIMIT key the button will illuminate and AddCV will be displayed on the middle LCD. The setting is made with the rotary knob and can be read from the right LCD during setting. The setting sequence is shown below:

AddCV (CC+CV or CP+CV upper limit) →
V_Hi (DVM upper limit) →
V_Lo (DVM lower limit) →
I_Hi (DAM upper limit) →
I_Lo (DAM lower limit) →
W_Hi (DWM upper limit) →
W_Lo (DWM lower limit) →
NG OFF/ON (No Good Flag) →
LIMIT setting function OFF

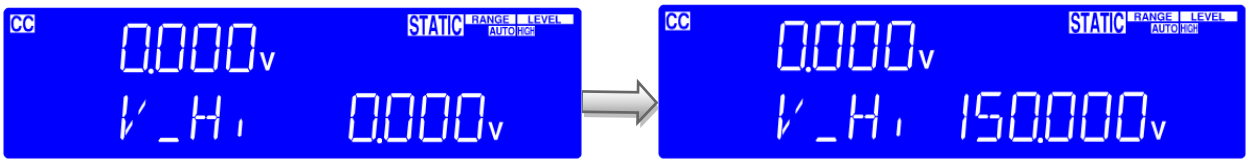


The engineering unit is “V”, “A” or “W” depending on the threshold LIMIT being set.

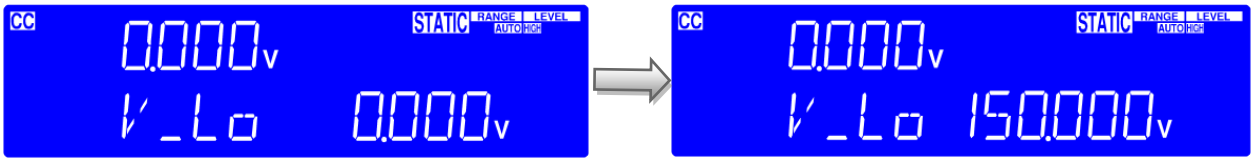
- Setting CC+CV or CP+CV upper limit voltage, lower left 5 digit LCD display 「AddCV」, lower right 5 digit LCD display the unit is "V" ,The Add.CV set range from 0.00 V to 150.000V step 0.0025V by rotating the Setting knob.



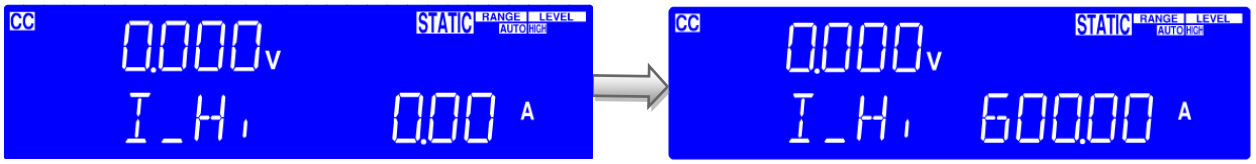
- Setting upper limit voltage VH , lower left 5 digit LCD display 「V-Hi」, lower right 5 digit LCD display the unit is "V" ,The V-Hi set range from 0.000 V to 150.000V step 0.0025V by rotating the Setting knob.



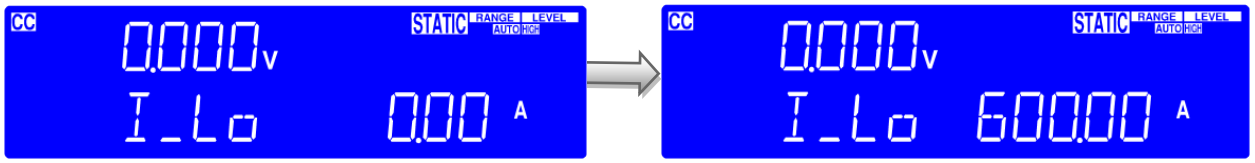
- Setting lower limit voltage VL, lower left 5 digit LCD display 「V-Lo」, lower right 5 digit LCD display the unit is "V", The V-Lo set range from 0.000 V to 150.000V step 0.0025V by rotating the Setting knob.



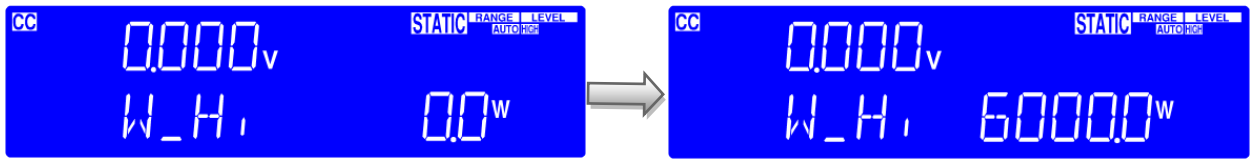
- Setting Upper limit current IH , lower left 5 digit LCD display 「I-Hi」, lower right 5 digit LCD display the unit is "A", The I-Hi set range from 0.00 A to 600.00A step 9.6mA by rotating the Setting knob.



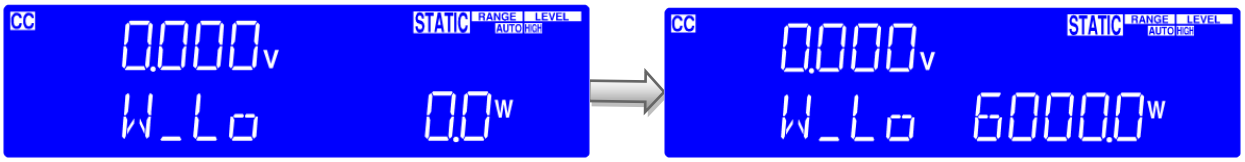
- Setting lower limit current IL , lower left 5 digit LCD display 「I-Lo」, lower right 5 digit LCD display the unit is "A" ,The I-Lo set range from 0.000 A to 600.00A step 9.6mA by rotating the Setting knob.



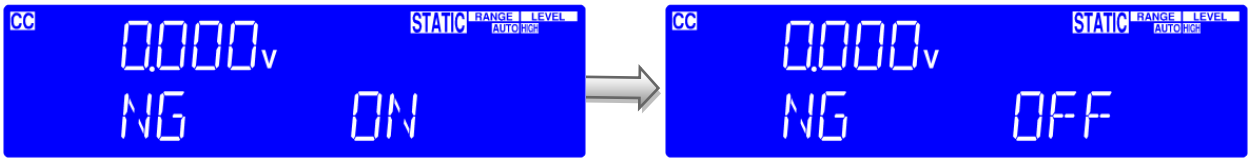
- Setting Upper limit power WH, lower left 5 digit LCD display 「W-Hi」lower right 5 digit LCD display the unit is "W", The W-Hi set range from 0 W to 6000W step 96mW by rotating the Setting knob.



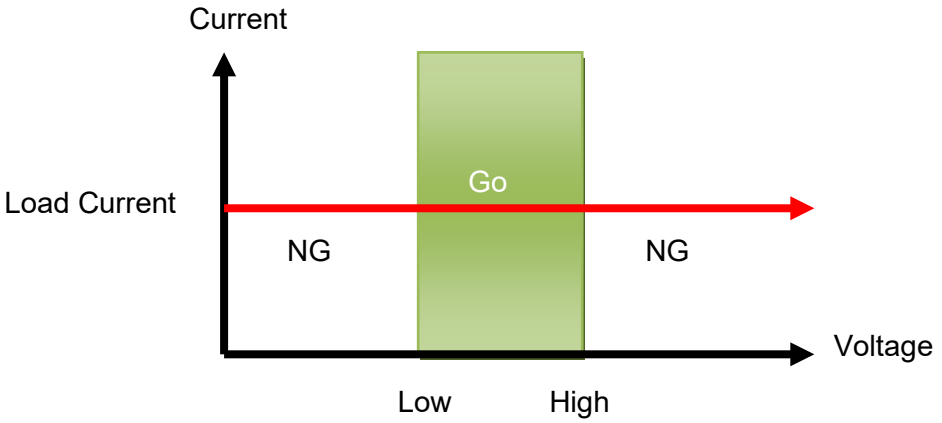
- Setting lower limit power WL, lower left 5 digit LCD display「W-Lo」lower right 5 digit LCD display the unit is "W", The W-Lo set range from 0 W to 6000W step 96mW by rotating the Setting knob.



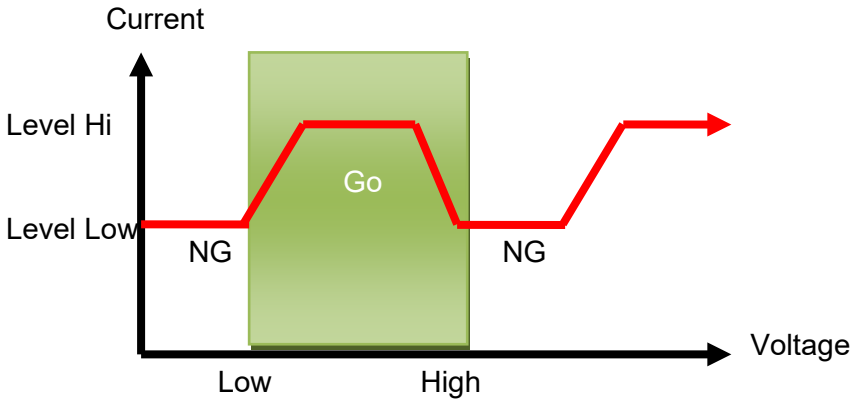
- Setting NG ON/OFF, When exceed VH、VL、IH、IL、WH、WL One of these Whether NG on LCD display.



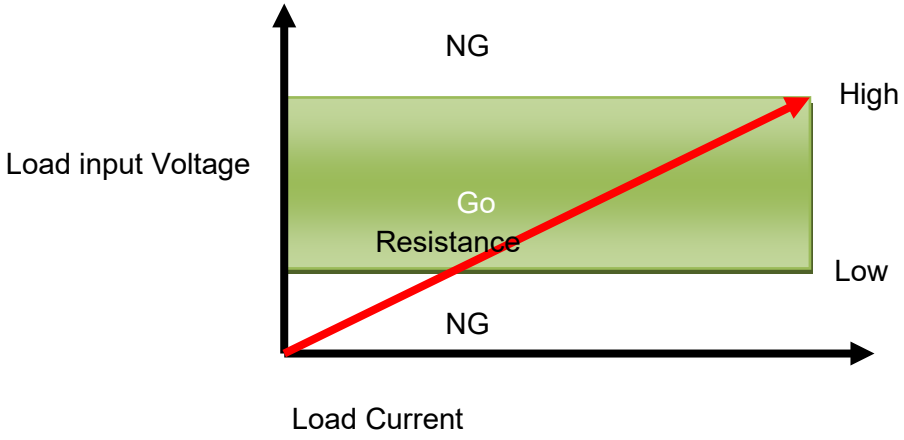
- CC mode, press limits key to set the V-Hi and V-Lo voltage upper and lower limits of the GO / NG.



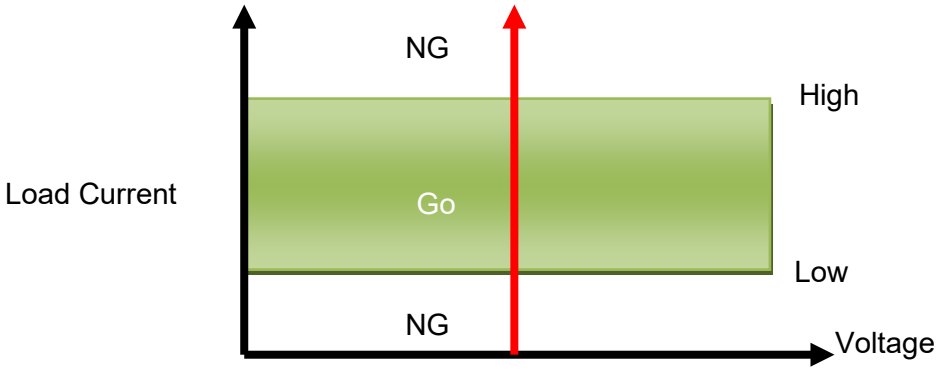
- CC Dynamic Mode, press key to set the Level Hi and Level Low voltage upper and lower limits of the GO / NG.



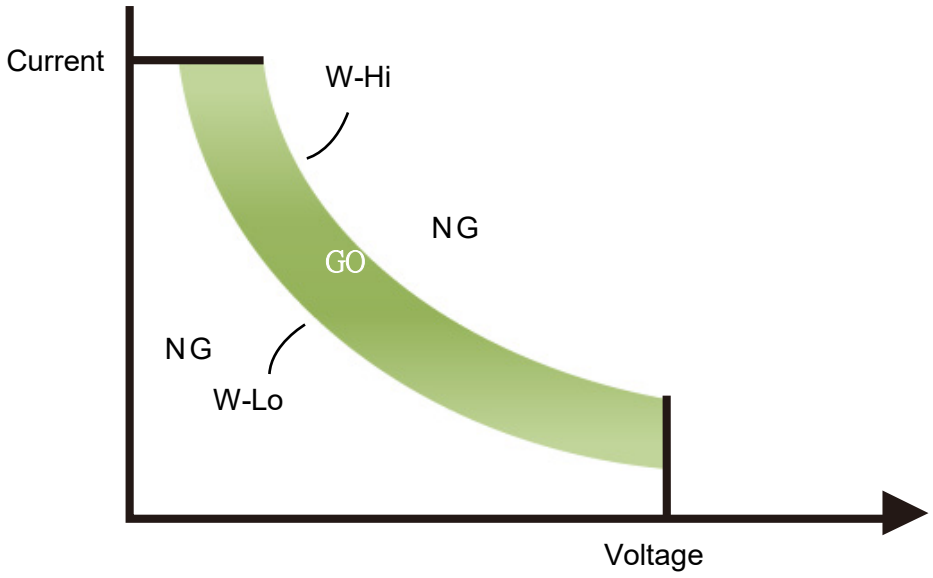
- CR mode, press limits key to set the V-Hi and V-Lo voltage upper and lower limits of the GO / NG.



- CV mode, press limits key to set the I-Hi and I-Lo Current upper and lower limits of the GO / NG.



- CP mode, press limits key to set the W-Hi and W-Lo power upper and lower limits of the GO / NG.

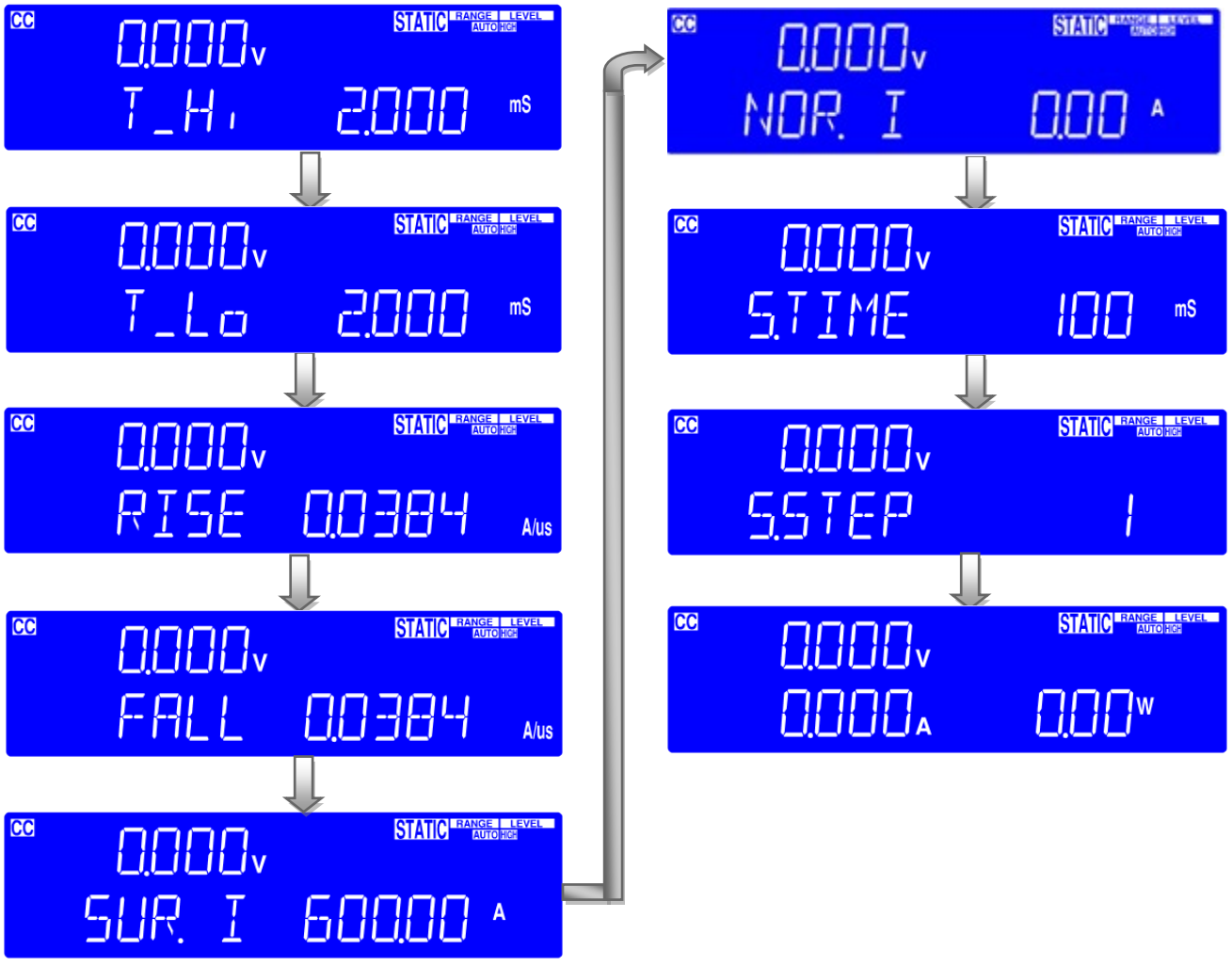


3.2.15. DYN Setting Key

The DYN button allows the user to define the timings of the dynamic load Waveform Firstly the high and low levels of load current will need to be set via the LEVEL Switch. The RISE and FALL times between the low load current and the high Load current along with the TIME the waveform is HIGH and the TIME LOW Can is Set via the DYN menu.

Each press of the DYN key enables a section of the DYNAMIC waveform to be set. On first press of the DYN key the button will illuminate and T-Hi will be displayed On the middle LCD. The value is adjusted with the rotary knob and can be read From the right LCD during setting. The setting sequence is shown below:

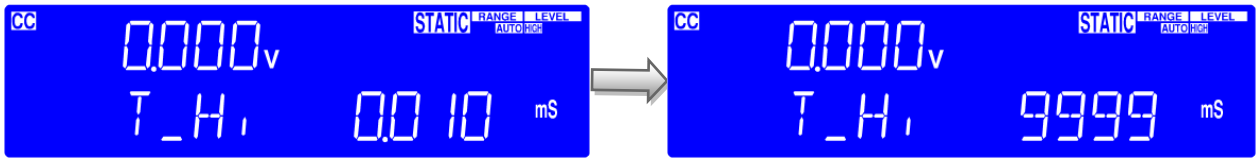
T_Hi (time the waveform is high) →
T_Lo (time the waveform is low) →
RISE (rise time) →
FALL (fall time) →
SUR. I →
NOR. I →
S.TIME →
S.STEP →
DYN setting function OFF



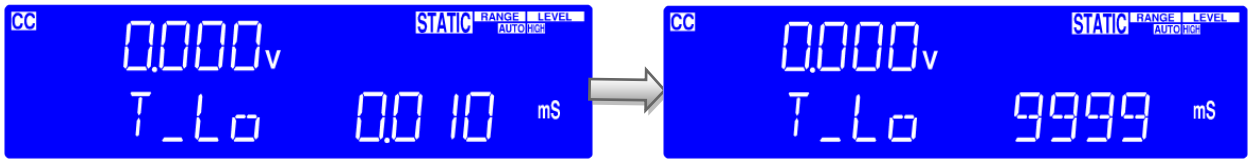
The time that the waveform is high includes the rise time and is set in “ms”
The time that the waveform is low includes the fall time and is set in “ms”
The RISE and FALL time is set in “A/μs”. The actual engineering unit is shown on The right of the Right 5 digit display

- Press DYN setting key, LED will ON
  Setting level High Period, the lower left 5 digit LCD display will show 「T-Hi」
  The Lower Right 5 digit LCD display will show setting value, the unit is “ms”,
  The T-Hi set range from 0.010 ms to 9999 ms .

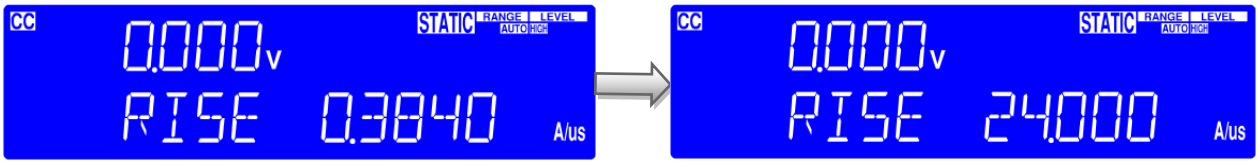
  There are four ranges from 0.010 ms to 9999 ms, the ranges are below:
  - Range 1:0.010ms~9.999ms
  - Range 2:10.00ms~99.99ms
  - Range 3:100.0ms~999.9ms
  - Range 4:10000ms~9999ms



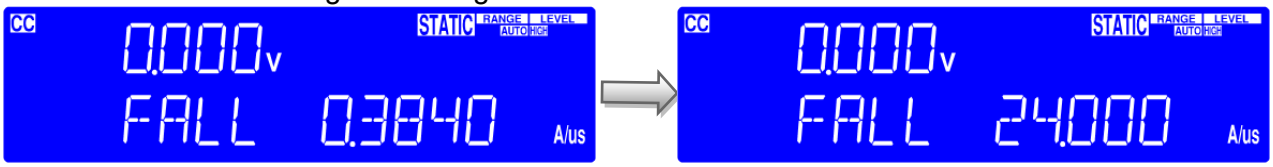
- Setting level Low period, the lower left 5 digit LCD display will show「T-Lo」, the lower right 5 digit LCD display will show setting value, the unit is “ms” , The T-Lo set range from 0.010 ms to 9999 ms .



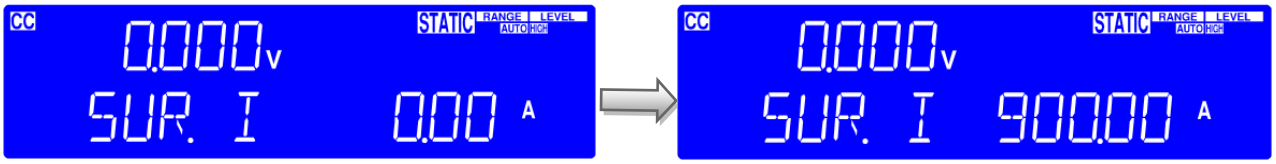
- Setting rise time, the lower left 5 digit LCD display will show「RISE」, the lower right 5 digit LCD display will show setting value, the unit is “A/μs”, The RISE time set rangeII from 0.3840/us to 24.000 A/us step 0.096A/us by rotating the Setting knob.



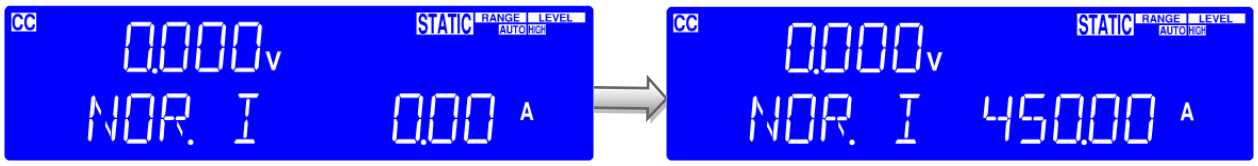
- Setting fall time, the lower left 5 digit LCD display will show「FALL」, the lower right 5 digit LCD display will show setting value, the unit is “A/μs” , The FALL time set rangeII from 0.3840A/us to 24.000A/us step 0.096A/us by rotating the Setting knob.



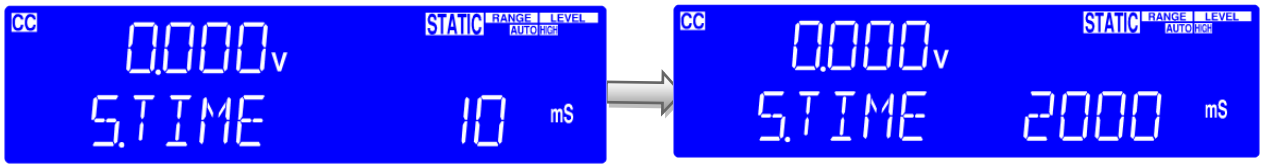
- Setting Surge current, the lower left 5 digit LCD display will show「SUR. I」, the lower right 5 digit LCD display will show setting value, the unit is “A” , The Surge current set range from 0.00A to 900.00A step 14.4mA by rotating the Setting knob.



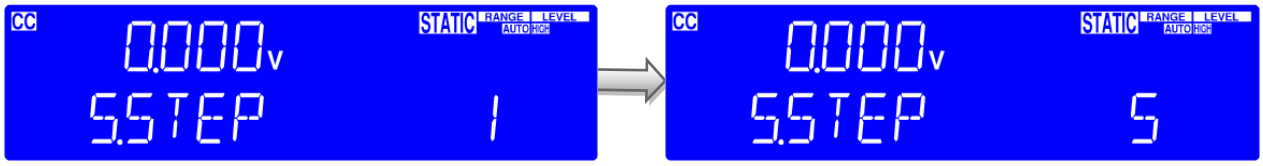
- Setting NOR current, the lower left 5 digit LCD display will show「NOR. I」, the lower right 5 digit LCD display will show setting value, the unit is “A” , The NOR current set range from 0.00A to 450.00A step 14.4mA by rotating the Setting knob.



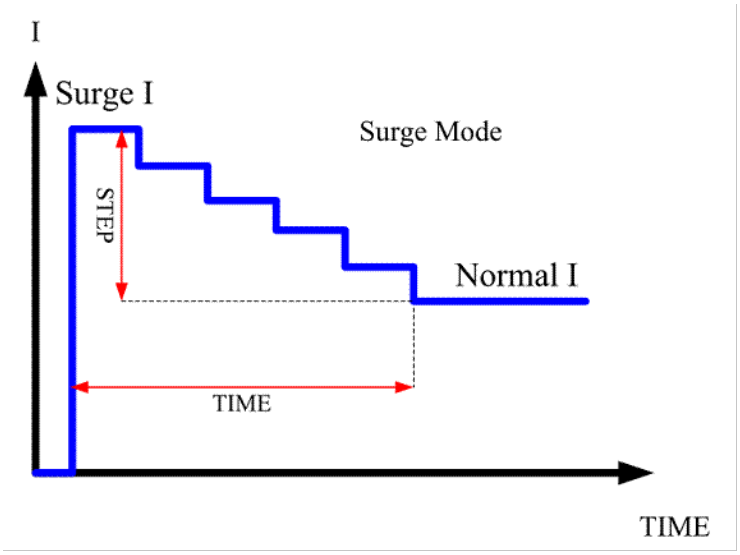
- Setting S.TIME, the lower left 5 digit LCD display will show「S.TIME」, the lower right 5 digit LCD display will show setting value, the unit is “ms” , The S.TIME set range from 10 to 2000ms step 10ms by rotating the Setting knob.



- Setting S.STEP, the lower left 5 digit LCD display will show「S.STEP」, the lower right 5 digit LCD display will show setting value” , The S.STEP set range from 1 to 5 steps 1 by rotating the Setting knob, Press the START button to start the test.



Set the number of SURGE as shown in the figure.

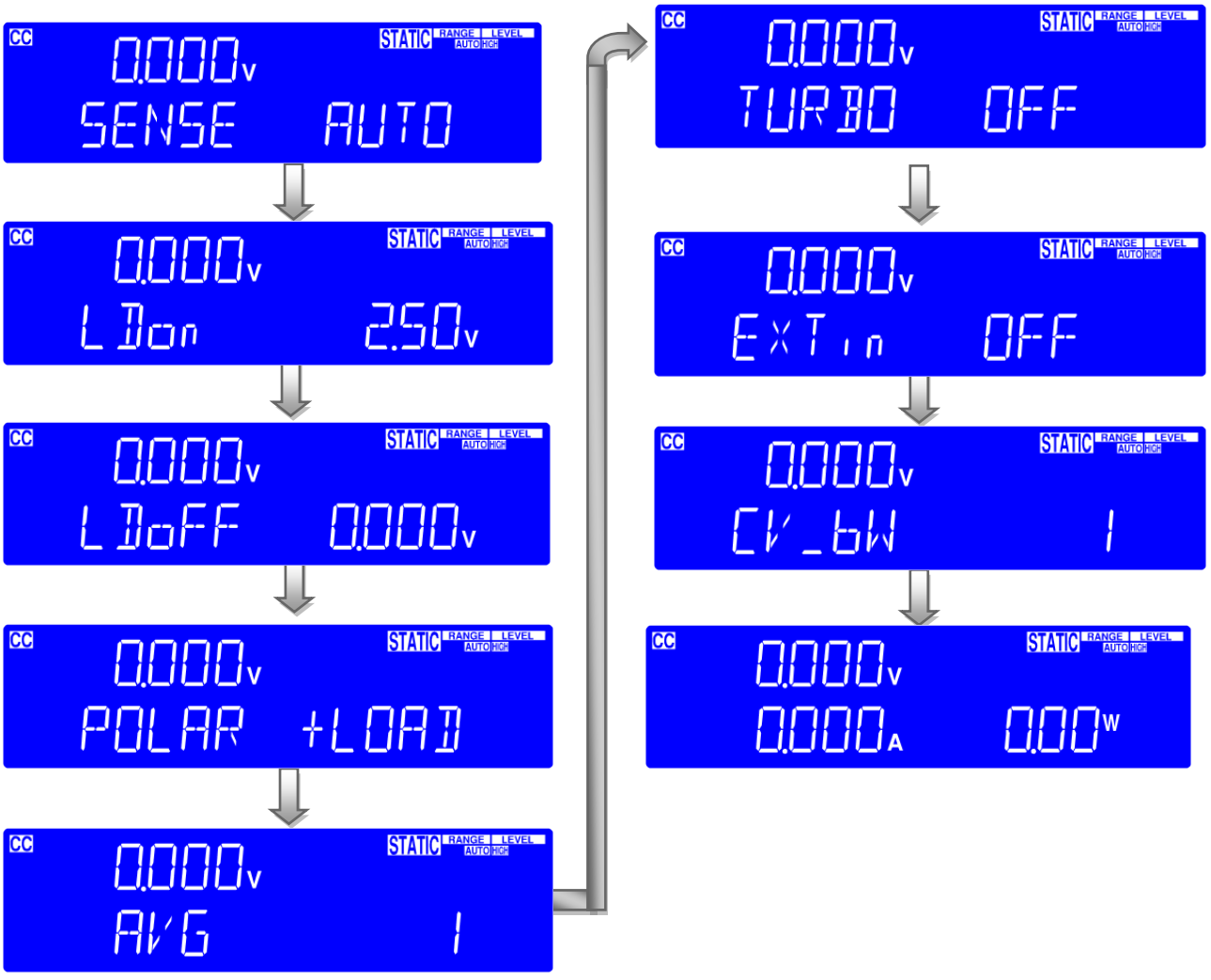


3.2.16. CONF Key

The CONFIG key allows the sense function to engage automatically or switched ON. The CONFIG key also enables the LOAD to automatically turn ON/OFF When a voltage level is reached. The polarity symbol can also be switched via the CONFIG menu.

Each press of the CONFIG key moves the menu on one step. On first press of the CONFIG key the button will illuminate and SENSE will be displayed on the middle LCD. The value is adjusted with the rotary knob and can be read from the right LCD during setting. The setting sequence is shown below:

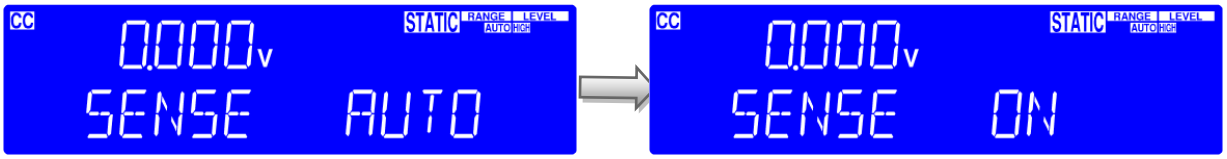
SENSE (AUTO or ON) →
LDon (Voltage at which LOAD turns ON) →
LDoff (Voltage at which LOAD turns OFF) →
POLAR (change polarity symbol) →
AVG →
TURBO →
EXTIN →
CV_bW →
Exit CONFIG options



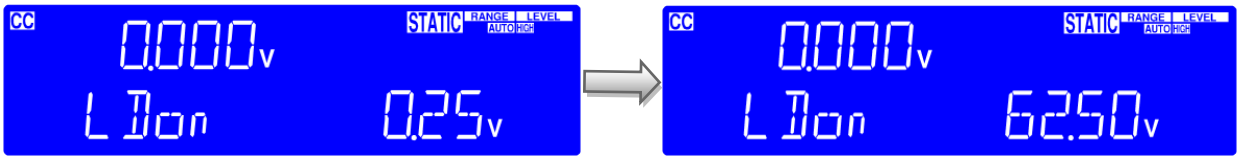
Note 1: The adjustable LDon (LOAD ON) voltage is valid for CC, CR & CP operating Modes. The adjusted LDon voltage will not operate in CV mode.

Note 2: The LDon (LOAD ON) voltage setting cannot be lower than the LDoff (LOAD OFF) voltage. If 0V is required for both LOAD ON and LOAD OFF make the LOAD OFF adjustment first.

- Setting Vsense and load input switching methods, the lower left of the 5 digit LCD display will show "SENSE", the lower right 5 digit LCD display will show "AUTO" or "ON".

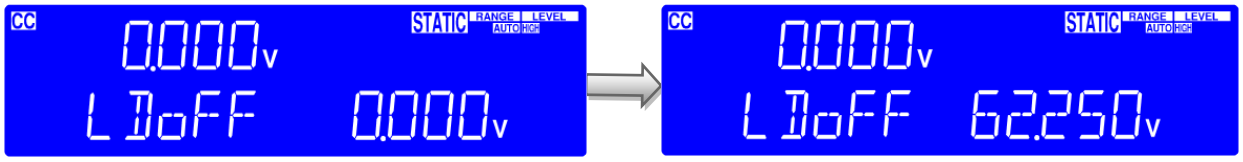


- Set Load ON voltage, the lower left of the 5 digit LCD display will show "LDon", the lower Right 5 digit LCD display will show setting value, the units is V, The Load ON Voltage set range from 0.25V to 62.5V. If the load is greater than the input voltage Load ON voltage setting, the Electronic load current begin to load on.

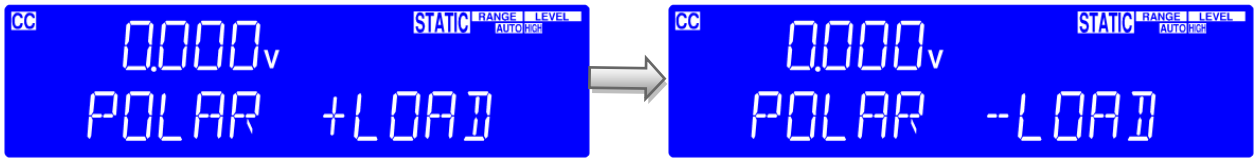


NOTE1: CC/CR/CP MODE is controlled by Load ON voltage, CV MODE is not Controlled by Load ON voltage.

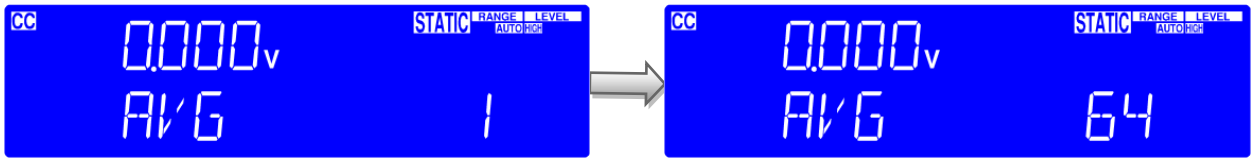
- Setting Load OFF voltage, the lower left of the 5 digit LCD display will show "LDoFF", the lower right the 5 digit LCD display will show settings value, the units is V, The Load OFF Voltage set range from 0.0V to 62.250V.
  If the load input voltage is less than Load OFF setting voltage, the electronic Load to load off.



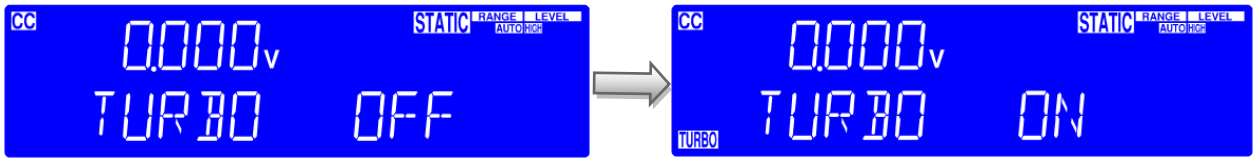
- Setting Load polarity, the lower left of the 5 digit LCD display will show "POLAR", the lower right 5 digit LCD display "will show + LOAD" or "-LOAD", use the knobs and key settings "+ LOAD" or "-LOAD".



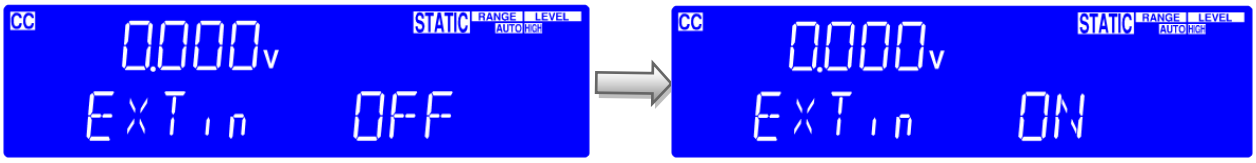
- Setting AVG, the lower left of the 5 digit LCD display will show "AVG", the lower Right the 5 digit LCD display "1", the AVG setting range from 1 to 64 steps 1 by rotating the setting knob.



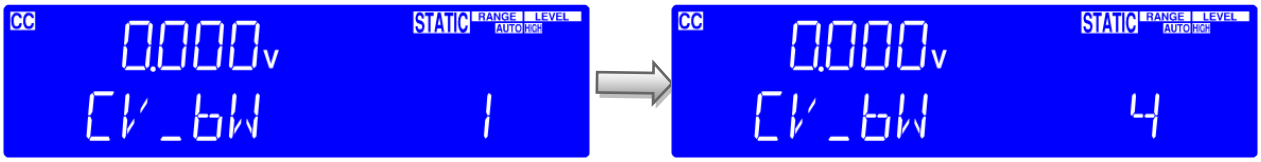
- Setting TURBO, the lower left of the 5 digit LCD display will show "TURBO", the lower Right the 5 digit LCD display "OFF or ON", and the TURBO setting by rotating the setting knob To ON or OFF.



- Setting EXTIN , the lower left of the 5 digit LCD display will show " EXTIN", the lower right 5 digit LCD display "OFF or ON", the EXTIN setting by rotating the setting knob To EXTIN ON or EXTIN OFF.



- Setting CV_bW ,the lower left of the 5 digit LCD display will show " CV_bW", the lower right 5 digit LCD display "1", the CV_bW setting range from 1 to 4 ,4 is the fastest ,steps 1 by rotating the setting knob,the initial value is 1.



3.2.17. Short Key

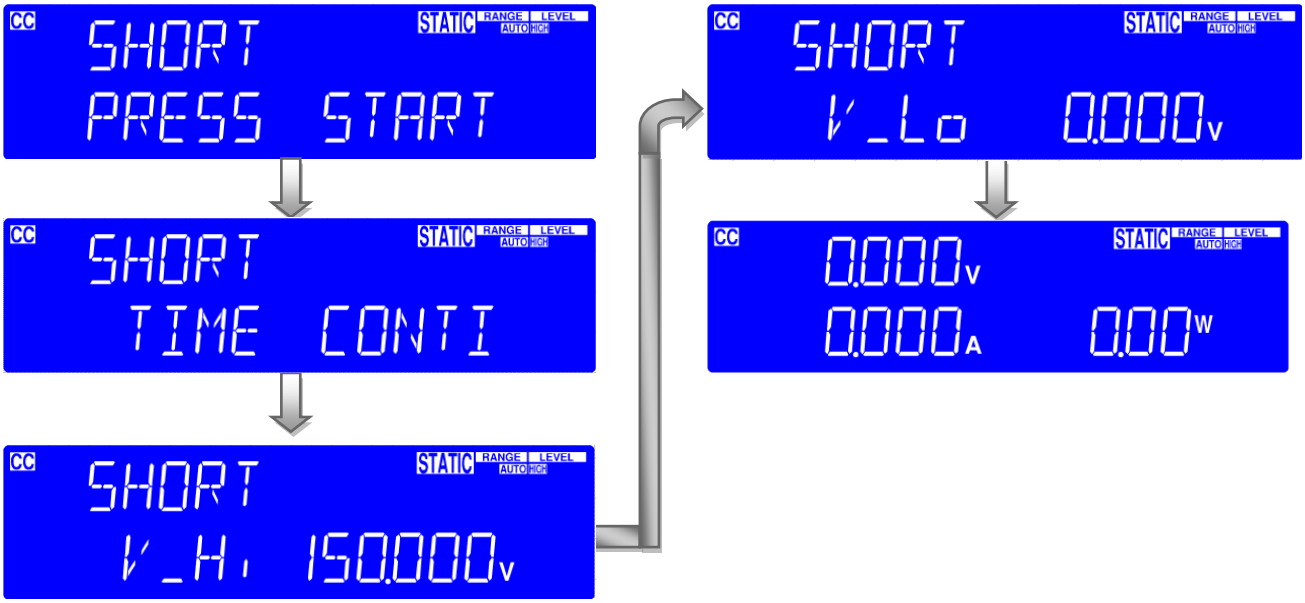
- Setting Short mode
  The Setting key allows the parameters of a SHORT circuit test to be entered. The SHORT test will attempt to sink high current up to the 3350G series load maximum current in order to check the power source's protection and behavior. The test time can be adjusted and threshold values for the High and low voltage limits set.

- Pressing the Setting key once will cause the button to illuminate. The Message "SHORT PRESS START" will be shown across the 3 displays.

- Each press of the SHORT key moves the menu on one step. The left and Middle LCDs show the currently selected test parameter as text. The value is adjusted by the rotary knob and can be read from the right display during Setting.

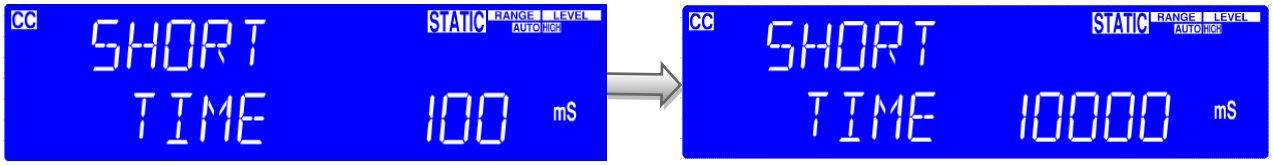
The setting sequence is shown below:

SHORT PRESS START (pressing the red start/stop key starts test) →
SHORT TIME (CONTI = Continuous or 100ms to 10,000ms possible) →
SHORT V_Hi (High voltage threshold setting) →
SHORT V_Lo (Low voltage threshold setting →
Exit SHORT test set-up

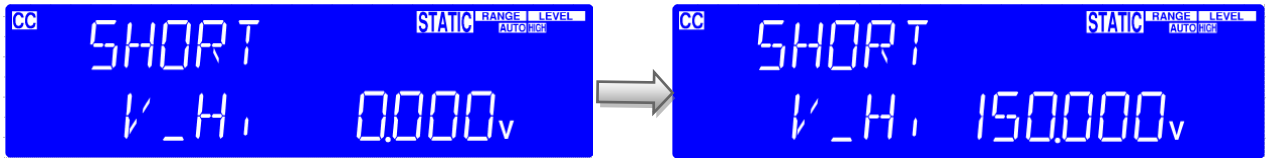


- Setting the short test time,The upper left LCD display show 「SHORT」 on Left 5 Digits LCD display, the lower left shows 「TIME」on 5 digits LCD display, the lower right 5 digit LCD display「CONTI」, the unit is "ms".

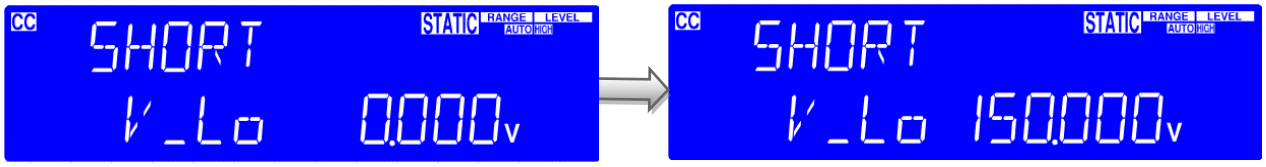
- TIME: setting the short test time, The upper left LCD display show 「SHORT」 on Left 5 digits LCD display, shows 「TIME」on lower left 5 Digits LCD display the unit is “ms” ,and shows 「CONTI」 on lower right 5 Digits LCD display, the setting range is “CONTI” means continue, 100mS To 10000mS step 100ms by clockwise rotate the setting knob.
  The short test will be no time limitation when setting to CONTI until press “START/STOP” key to stop the short test.



- V-Hi : Short test voltage check upper limitation setting, The upper left LCD display shows 「SHORT」on Left 5 digit LCD display, the lower left 5 digit LCD display「V-Hi」,the lower right 5 digit LCD display setting value, the unit is "V", The V-Hi setting range from 0.000V to 150.000V step 0.0025V by rotating the setting knob.



- V-Lo : Short test voltage check lower limitation setting, The upper left LCD display shows 「SHORT」on Left 5 digit LCD display, the lower left 5 digit LCD display「V-Lo」, the lower right 5 digit LCD display setting value, the unit is "V", the V-Hi setting range from 0.000V to 150.000V step 0.0025V by rotating the setting knob.



Once the test parameters have been entered the test is started by pressing The red START/STOP button while the SHORT PRESS START text is Displayed. During the test the bottom LCD will show run and the actual short Current will be displayed on the middle LCD.

Note 1: The message PASS END will be displayed if the measured voltage Levels stay within the V_Hi and V_Lo threshold levels during the test.

Note 2: The message FAIL END will be displayed if the measured voltage level falls outside the V_Hi and V_Lo threshold levels during the test. The NG flag will also illuminate.

Note 3: If continuous short time is selected the test is ended by pressing the red START/STOP button.

3.2.18. OCP Setting OCP mode

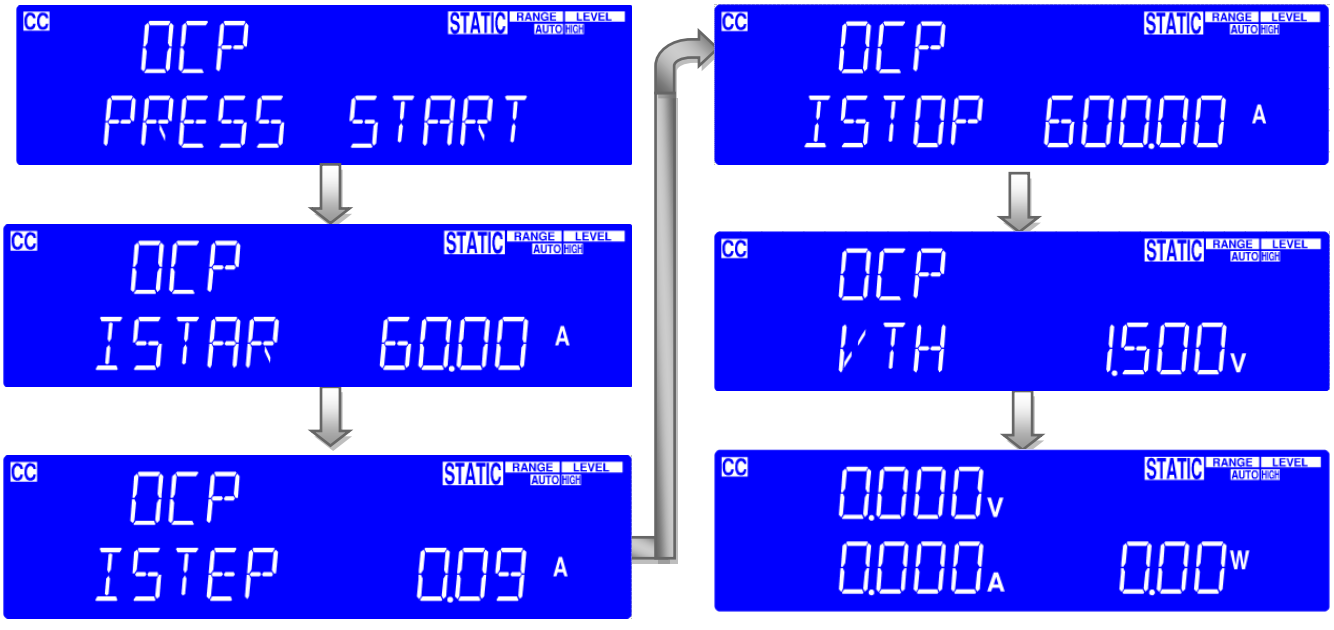
The OCP key allows the parameters of an Over Current Protection test to be entered. The OCP test will ramp up the load current in steps to validate the Device Under test's (DUT) protection and behavior. A voltage threshold level can be set. If the voltage measured during the test is lower than the set Threshold voltage then the test will fail and the display will signal OCP ERROR. Similarly a current Threshold (I STOP) can be set. If the measured Current reaches the I STOP Threshold the test will be discontinued and the OCP ERROR message will be displayed.

- Pressing the Setting key once will cause the button to illuminate. The Message "OCP PRESS START" will be shown across the 3 displays.

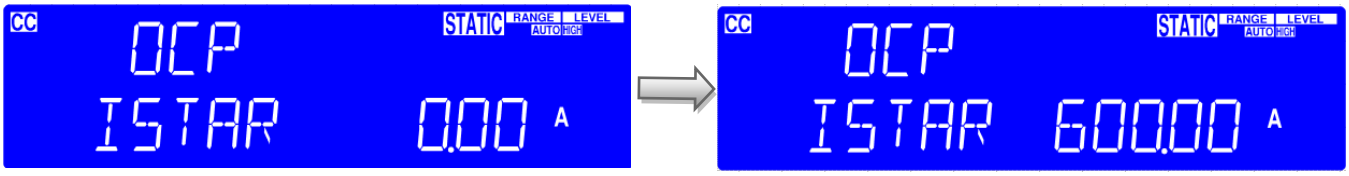
  Each press of the OCP button moves the menu on one step. The Left and Middle LCDs show the currently selected test parameter as text. The value is Adjusted by the rotary knob and can be read from the Right display during Setting.

The setting sequence is shown below:

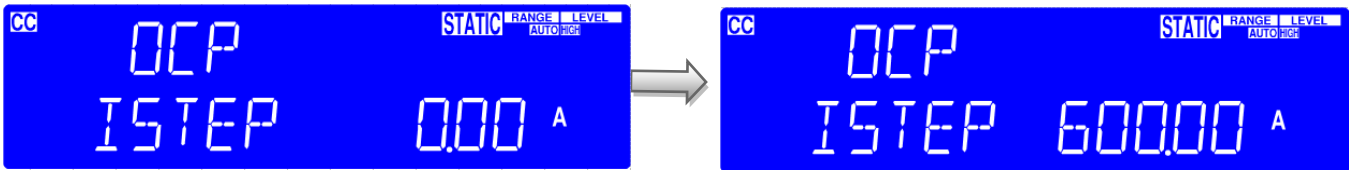
OCP PRESS START (pressing the red start/stop key starts test) →
OCP I STAR (current starting point of the OCP test) →
OCP I STEP (value of incremental current steps from I START) →
OCP I STOP (the OCP test's upper current threshold →
OCP Vth (the voltage threshold setting) →
Exit OCP test set-up



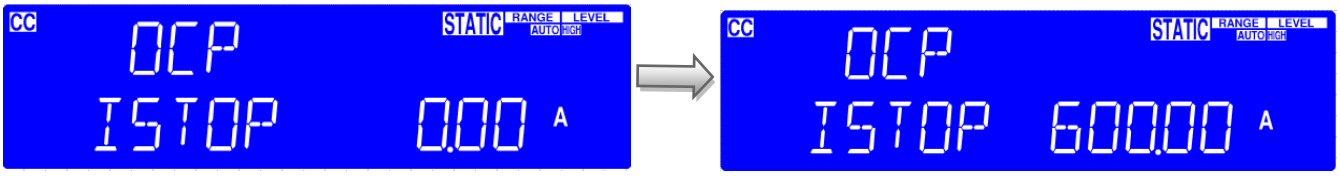
- ISTAR: setting the start current point, The upper left LCD display shows 「OCP」on Left 5 digit LCD display, the lower left 5 digit LCD display 「ISTAR」, the lower right 5 digit LCD display setting value, the unit is "A". The setting range is 0.00A to the full scale of the CC mode specification. The setting is by rotating the setting knob, resolution: 9.6mA.



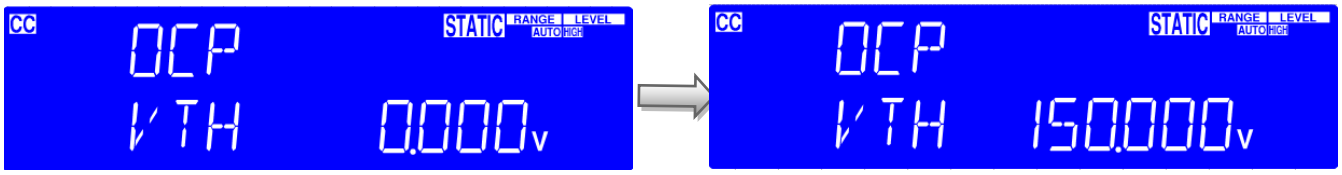
- ISTEP: setting the increment step current point, The upper left LCD display shows 「OCP」on Left 5 digit LCD display, the lower left 5 digit LCD display 「ISTEP」, the lower right 5 digit LCD display setting value, the unit is "A". The setting range is 0.00A to the full scale of the CC mode specification. The Setting is by rotating the setting knob, resolution: 9.6mA.



- ISTOP: setting the stop current point, The upper left LCD display shows 「OCP」on Left 5 digit LCD display, the lower left 5 digit LCD display 「ISTOP」, the lower right 5 digit LCD display setting value, the unit is "A", the setting range is 0.000A to the full scale of the CC mode specification. The setting is by rotating the setting knob, resolution: 9.6mA.



- Vth: Setting threshold voltage; The upper left LCD display shows 「OCP」on Left 5 Digit LCD display, the left down 5 digit LCD display「Vth」, the lower right 5 digit LCD display setting value, the unit is "V", the setting range is 0.000V to the full Scale of the Voltage specification. The setting is by rotating the setting knob, resolution: 0.0025V.



Once the test parameters have been entered the test is started by pressing the red START/STOP button while the OCP PRESS START text is displayed. During the Test the middle LCD will show run and the actual current being Taken will be displayed on the Right LCD

Note 1: The message OCP ERROR will be displayed if the DUT fails the test. The reasons for failure are due to one of the following conditions:

(a) the voltage level of the DUT falls below the set voltage threshold (OCP Vth) During the test
(b) The current taken from the DUT reaches the OCP I STOP setting.

Note 2: The message PASS will be displayed if the DUTs voltage stays above the set Threshold. Also to PASS the OCP test the current taken from the DUT cannot Equal the I STOP setting.

Note 3: If the DUT passes the OCP test the maximum current taken during the Test is Displayed on the right LCD.

Upon PASS or OCP ERROR the test will automatically stop. The red START /STOP button can be used during the test to immediately cease operation.

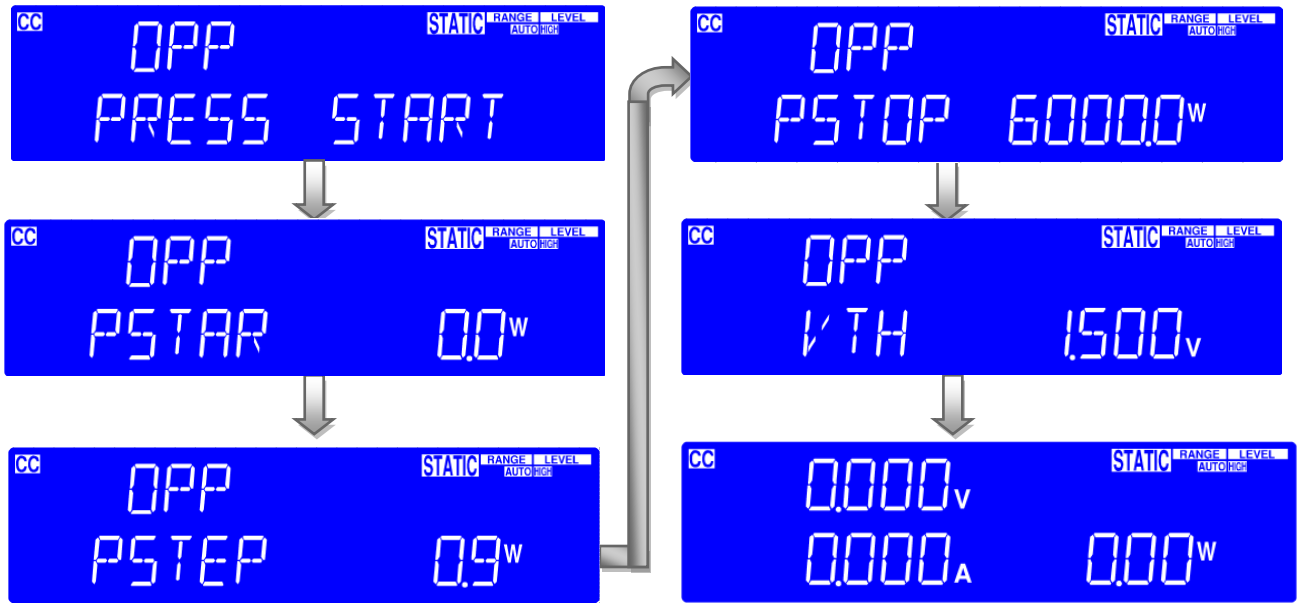
3.2.19. OPP Setting OPP mode

The Setting key allows the parameters of an Over Power Protection test to be entered. The OPP test will ramp up the load power in steps to validate the Device under Test's (DUT) protection and behavior. A voltage threshold level can be set. If the voltage measured during the test is lower than the set Threshold voltage then the test will fail and the display will signal OPP ERROR. Similarly a power threshold (P STOP) can be set. If the measured power reaches the P STOP threshold the test will be discontinued and the OPP ERROR message will be displayed.

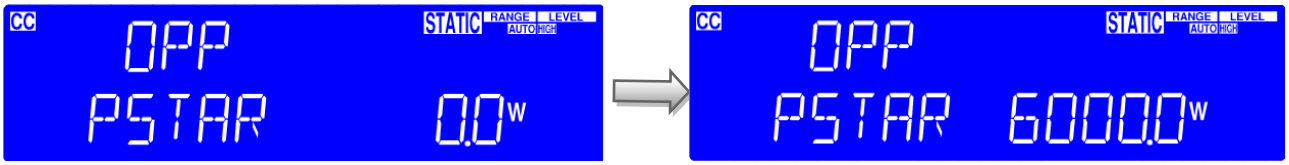
- Pressing the Setting key once will cause the button to illuminate. The message "OPP PRESS START" will be shown across the 3 displays.

- Each press of the OPP button moves the menu on one step. The Left and Middle LCDs show the currently selected test parameter as text. The value is adjusted by the rotary knob and can be read from the Right display during Setting.

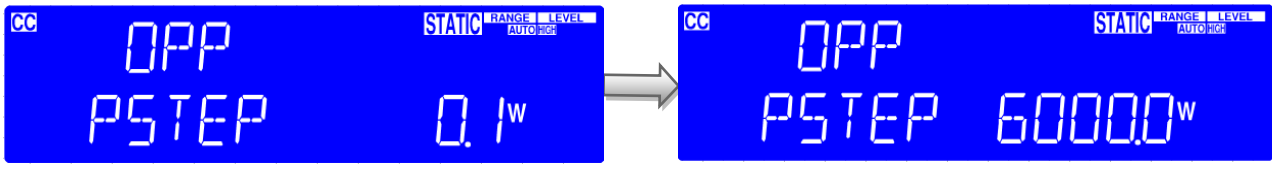
The setting sequence is shown below:
OPP PRESS START (pressing the red start/stop key starts test) →
OPP P STAR (power starting point of the OPP test) →
OPP P STEP (value of incremental current steps from P START) →
OPP P STOP (the OPP test's upper threshold power limit) →
OPP Vth (the voltage threshold setting) →
Exit OPP test set-up



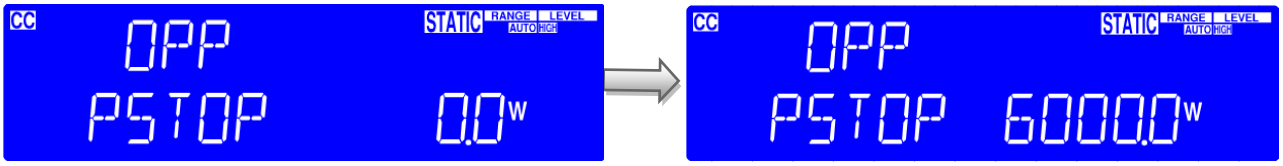
- PSTAR: setting the start power, The upper left LCD display shows 「OPP」 on 5 digit LCD display, the lower left 5 digit LCD display「PSTAR」, the lower right 5 digit LCD display setting value, the unit is "W", the setting range is 0.0W to the full scale of the CP mode specification. The setting is by rotating the setting knob, resolution: 96mW.



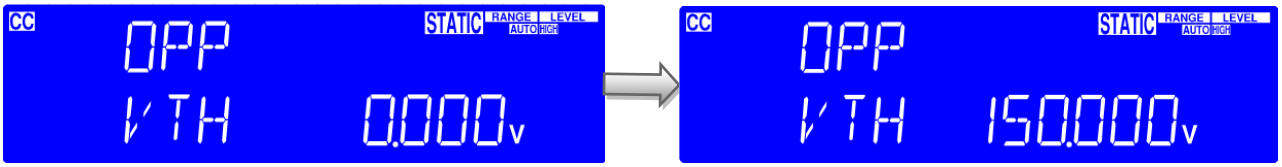
- PSTEP: setting the increment step power, The upper left LCD display shows 「OPP」 on 5 digit LCD display, the lower left 5 digit LCD display 「PSTEP」, the lower right 5 digit LCD display setting value, the unit is "W", the setting range is 0.0W to the full scale of the CP mode specification. The setting is by rotating the setting knob, resolution: 96mW.



- PSTOP: setting the stop power, The upper left LCD display shows 「OPP」 on Left 5 digit LCD display, the lower left 5 digit LCD display「PSTOP」, the lower right 5 digit LCD display setting value, the unit is "W", the setting range is 0.0W to the full scale of the CP mode specification. The setting is by rotating the setting knob, resolution: 96mW.



- Vth : Setting threshold voltage; The upper left LCD display shows 「OPP」 on Left 5 digit LCD display, the lower left 5 digit LCD display「Vth」, the lower right 5 digit LCD display setting value, the unit is "V", the setting range is 0.000V to the full scale of the Voltage specification. The setting is by rotating the setting knob, resolution: 0.0025V.



Once the test parameters have been entered the test is started by pressing the red START/STOP button while the OPP PRESS START text is displayed. During the test the middle LCD will show run and the actual power being taken will be displayed on the right LCD.

Note 1: The message OPP ERROR will be displayed if the DUT fails the test. The reasons for failure are due to one of the following conditions:

(a) The voltage level of the DUT falls below the set voltage threshold (OPP Vth) During the test
(b) The current taken from the DUT reaches the OPP P STOP setting.

Note 2: The message PASS will be displayed if the DUTs voltage stays above the set threshold. Also to PASS the OPP test the current taken from the DUT cannot equal the P STOP setting.

Note 3: If the DUT passes the OPP test the maximum power taken during the test is displayed on the right LCD.

Upon PASS or OPP ERROR the test will automatically stop. The red START/STOP button can be used during the test to immediately cease operation.

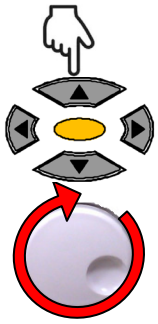
3.2.20. Start/Stop Key

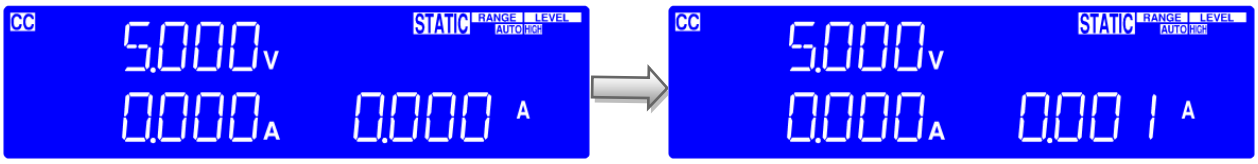
The red START/STOP key is used in conjunction with the SHORT, OCP or OPP test functions. It is used to START a test according to the set parameters or to STOP a test before PASS or FAIL is signaled. Please refer to the preceding sections for more information on the SHORT, OCP & OPP tests.

3.2.21. ROTARY Knob and ARROW Keys

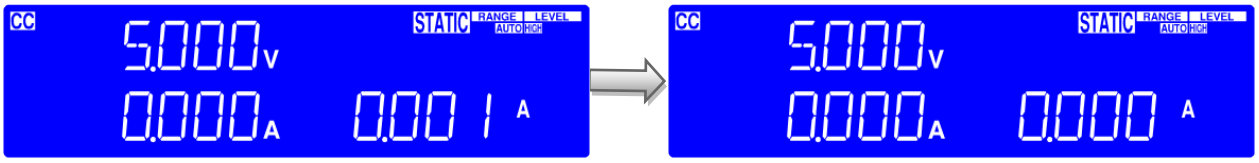
The ROTARY knob and ARROW keys are used to increase or decrease the set values.

- CLOCKWISE and UP ARROW key operation of the ROTARY Knob increases the setting value.

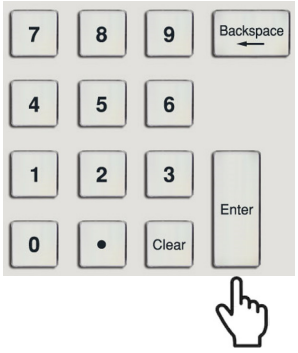


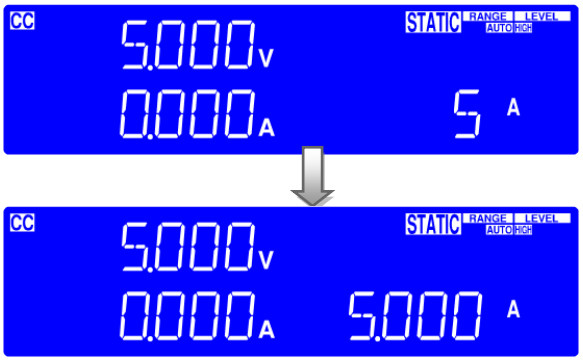


- ANTI-CLOCKWISE and down ARROW key operation of the ROTARY Knob decreases the setting value.

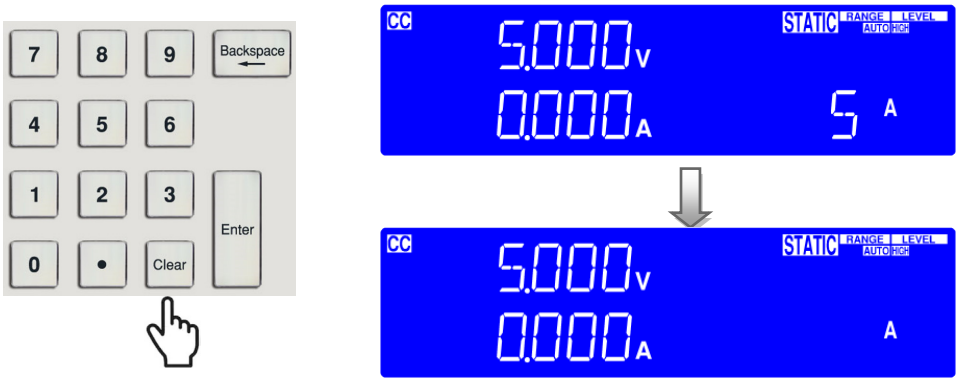


- Keypad KEY: When using the Keypad, please enter the number, press the Enter key.





- Clear KEY: Setting, press the Clear key to clear the input value.



Note 1: In CR MODE the UP ARROW key and CLOCKWISE operation of The ROTARY Knob reduces the resistance.

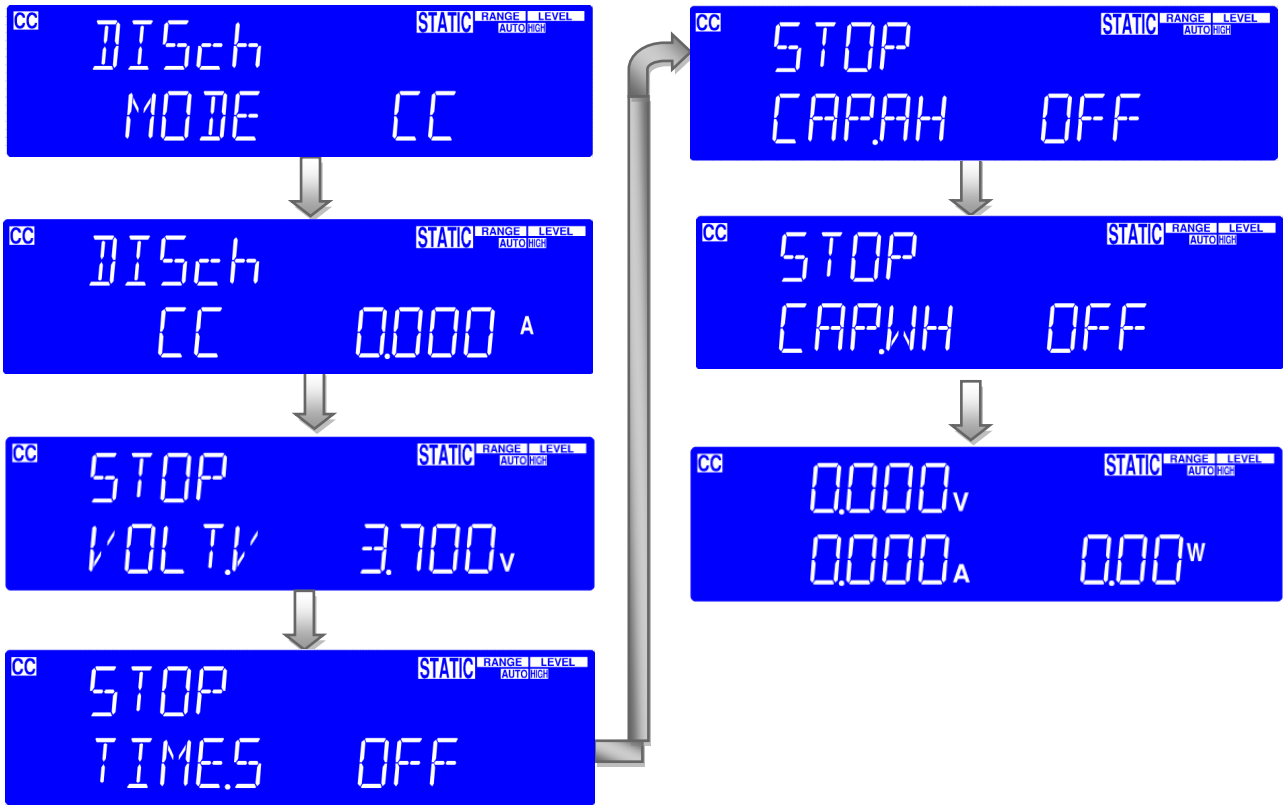
Note 2: In CR MODE the DOWN ARROW key & ANTI-CLOCKWISE Operation Of the ROTARY Knob increases the resistance.

3.2.22. Batt And LED display

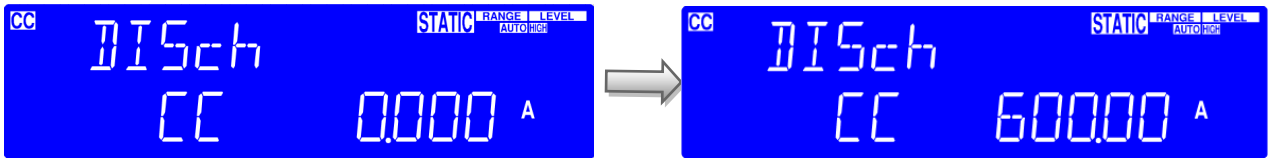
The sequence of Batt DISch CC setting is as follows:

There are 5 parameters for the DISch test function, as the parameters of CC, VOLT.V, TIME.S, CAP.AH and CAP.WH.

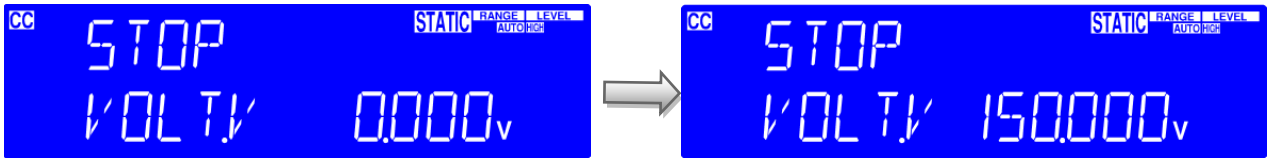
Press the Batt button again to set stop discharge voltage VOLT.V (=UVP:Under Voltage Protect), set stop Discharge time TIMES.S, set stop discharge capacity CAP.AH, set stop discharge Capacity CAP.wH,:



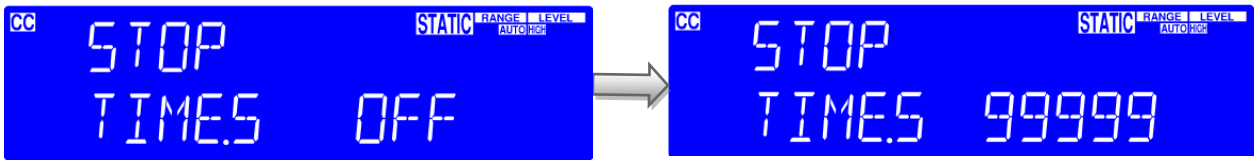
- Set the battery discharge CC mode, DISCH CC, The upper left LCD display "DISCH", the lower left 5-digit display on the display "CC", the setting range is from 0.000A to full scale, resolution: 9.6mA.



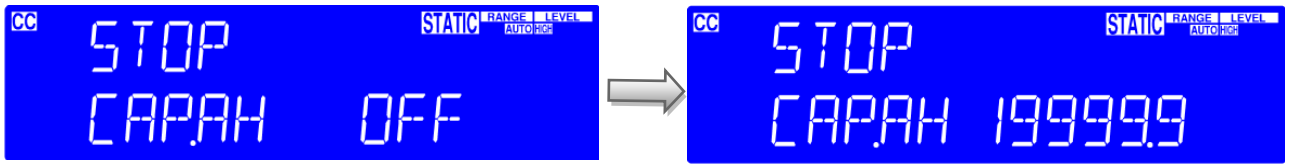
- Set the stop discharge voltage STOP VOLT.V, the 5-digit display the lower left display "VOLT.V", and the 5-digit display below displays the setting value in V. The setting range of STOP VOLT.V is from 0.00V to full scale resolution: 0.0025V.



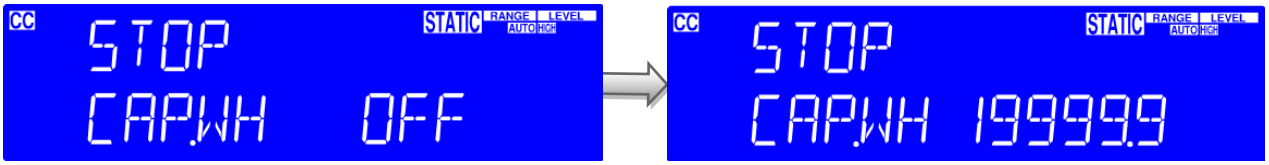
- Set stop discharge time, set STOP TIME.S, the lower left 5-digit display shows "TIME.S", the bottom 5-digit display shows the setting value, the setting range of STOP TIME.S is from OFF to 99999, and setting is by rotating the setting knob is 1S.



- Set stop CAP.AH, set STOPCAP.AH, the lower left 5-digit display show "CAP.AH", the lower right 5-digit display shows the setting value, the setting Range of STOP CAP.AH is from OFF to 19999.9, and setting is by rotating the Setting knob is 0.1AH.



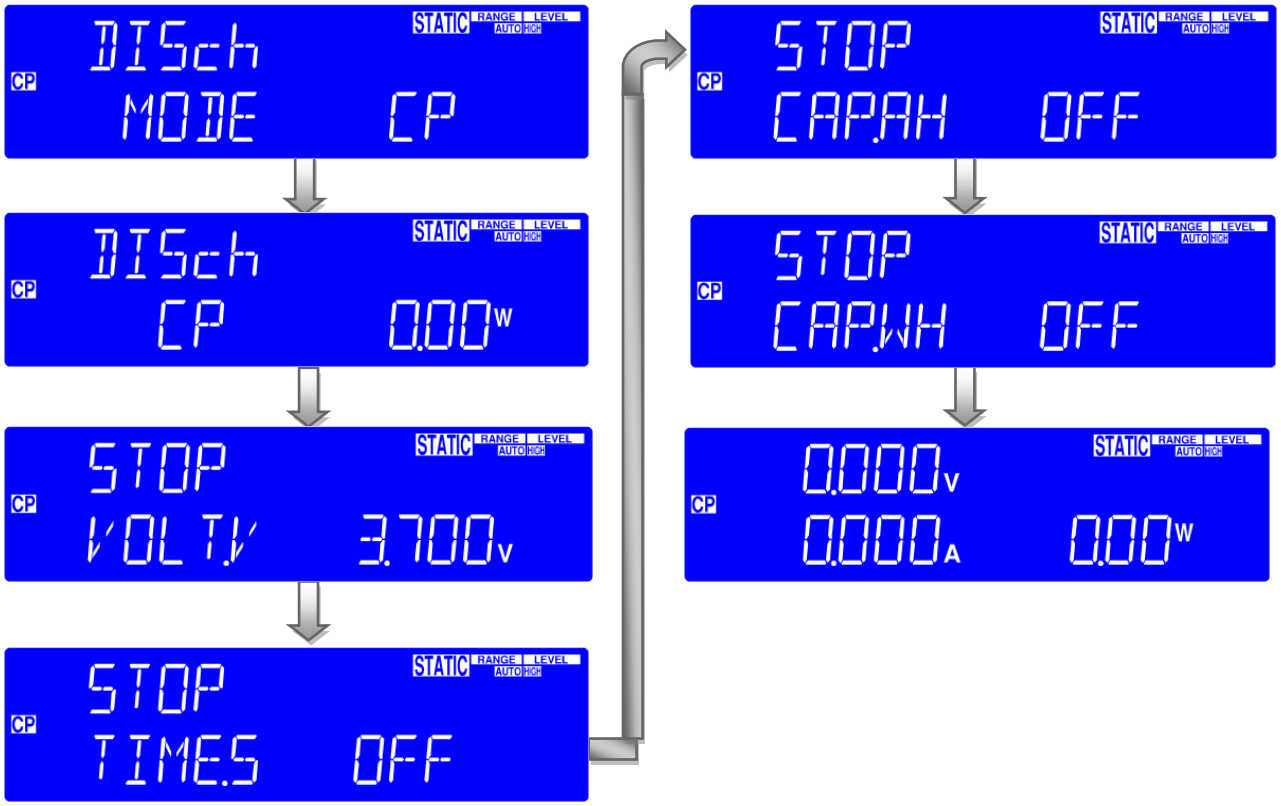
- Set stop CAP.WH, set STOP CAP.WH, the lower left 5-digit display show "CAP.WH", the lower right 5-digit display shows the setting value, the setting Range of STOP CAP.WH is from OFF to 19999.9, and setting is by rotating the Setting knob is 0.1WH.



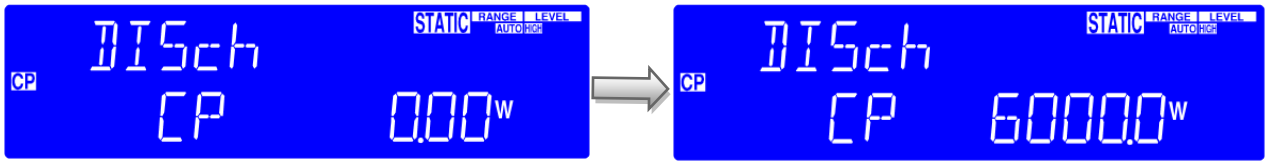
The sequence of Batt DISch CP setting is as follows:

There are 5 parameters for the DISch test function, as the parameters of CP, VOLT.V, TIME.S, CAP.AH and CAP.WH.

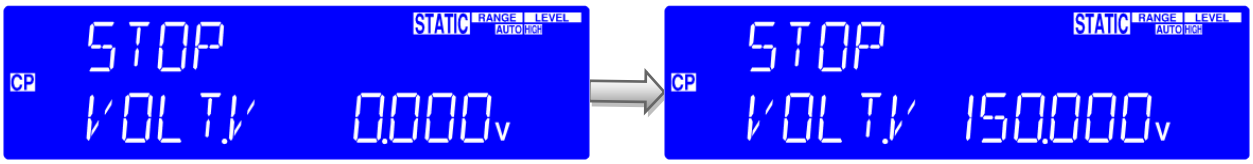
Press the Batt button again to set stop discharge voltage VOLT.V (=UVP:Under Voltage Protect), set stop Discharge time TIMES.S, set stop discharge capacity CAP.AH, set stop discharge Capacity CAP.wH,:



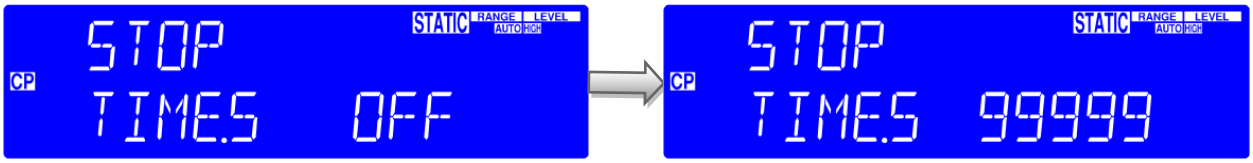
- Set the battery discharge CP mode, DISCH CP, The upper left LCD display "DISCH", the lower left 5-digit display on the display "CP", the setting range is from 0.00W to full scale, resolution: 96mW.



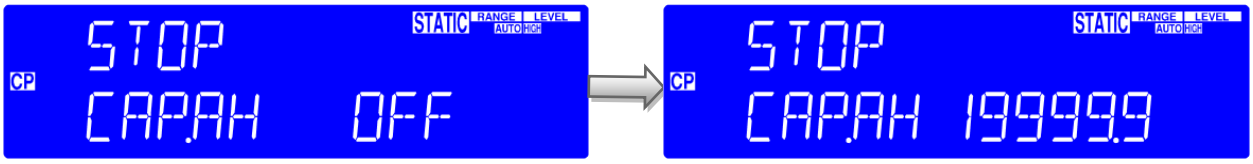
- Set the stop discharge voltage STOP VOLT.V, the 5-digit display the lower left display "VOLT.V", and the 5-digit display below displays the setting value in V. The setting range of STOP VOLT.V is from 0.000V to full scale resolution: 0.0025V.



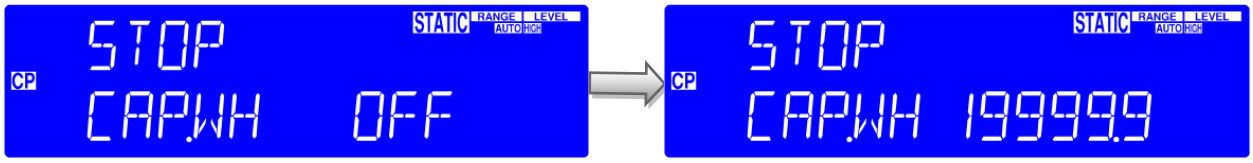
- Set stop discharge time, set STOP TIME.S, the lower left 5-digit display shows "TIME.S", the bottom 5-digit display shows the setting value, the setting range of STOP TIME.S is from OFF to 99999, and setting is by rotating the setting knob is 1S.



- Set stop CAP.AH, set STOPCAP.AH, the lower left 5-digit display show "CAP.AH", the lower right 5-digit display shows the setting value, the setting Range of STOP CAP.AH is from OFF to 19999.9, and setting is by rotating the Setting knob is 0.1AH.



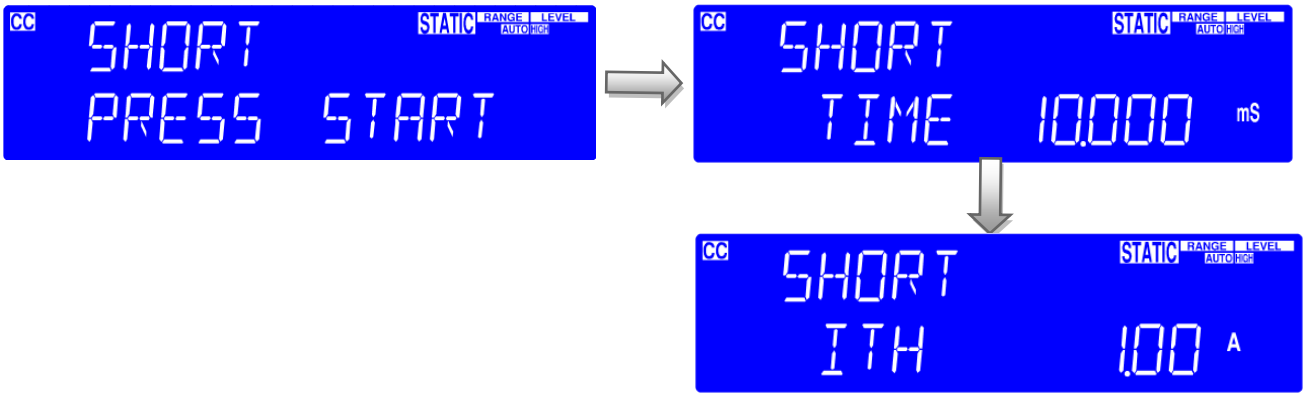
- Set stop CAP.WH, set STOP CAP.WH, the lower left 5-digit display show "CAP.WH", the lower right 5-digit display shows the setting value, the setting Range of STOP CAP.WH is from OFF to 19999.9, and setting is by rotating the Setting knob is 0.1WH.



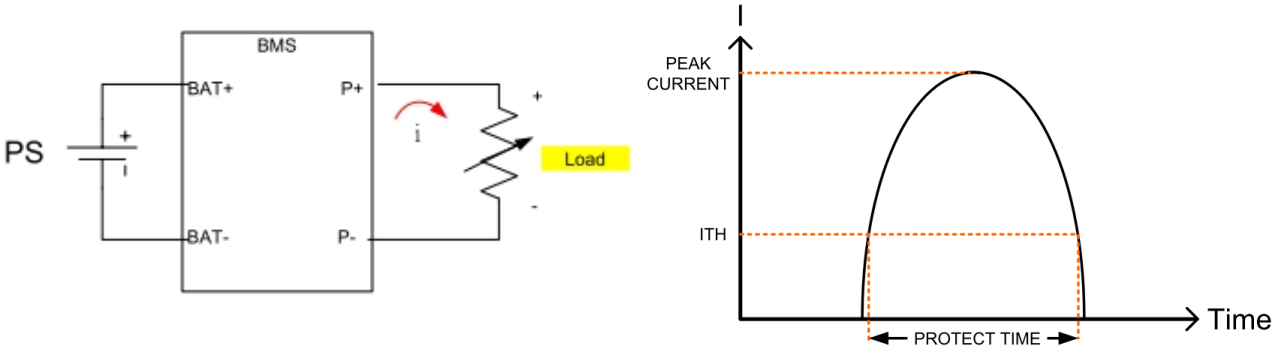
3.2.23. BMS key

BMS SHORT Test setting parameters, the setting Sequence is shown below:

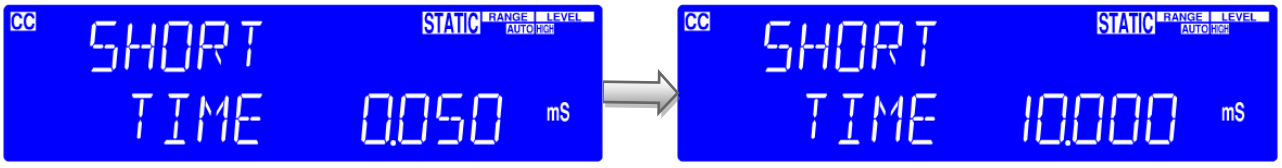
- ➔ SHORT PRESS START
- ➔ SHORT TIME
- ➔ SHORT ITH



To test the protection status of BMS P+, P- terminal short circuit, 3350G series will measure the peak current, protection time, short circuit test sequence as shown in the figure below, setting method: Press the Short key to set the Short time (0.010~10.000ms, default 10ms),Ith(0.01~300A), then return to the "SHORT PRESS START" screen, press the Start key to start the test, Load will Automatically load the maximum specification current (3356G=600A), the DISPLAY will display "SHORT TEST" during the test, and the LCD will display When the test is over. Peak current (Peak current), and display protection time (Protect time).

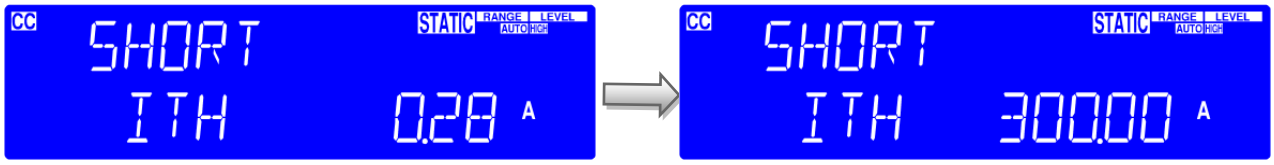


- Setting the BMS SHORT TIME, the upper left 5 digit display the “SHORT”, the lower left 5 digit display the “TIME”, and lower right display setting value, the unit is "ms". The range is 0.05ms to the 10.000ms, Step 0.01ms by rotating the setting knob.



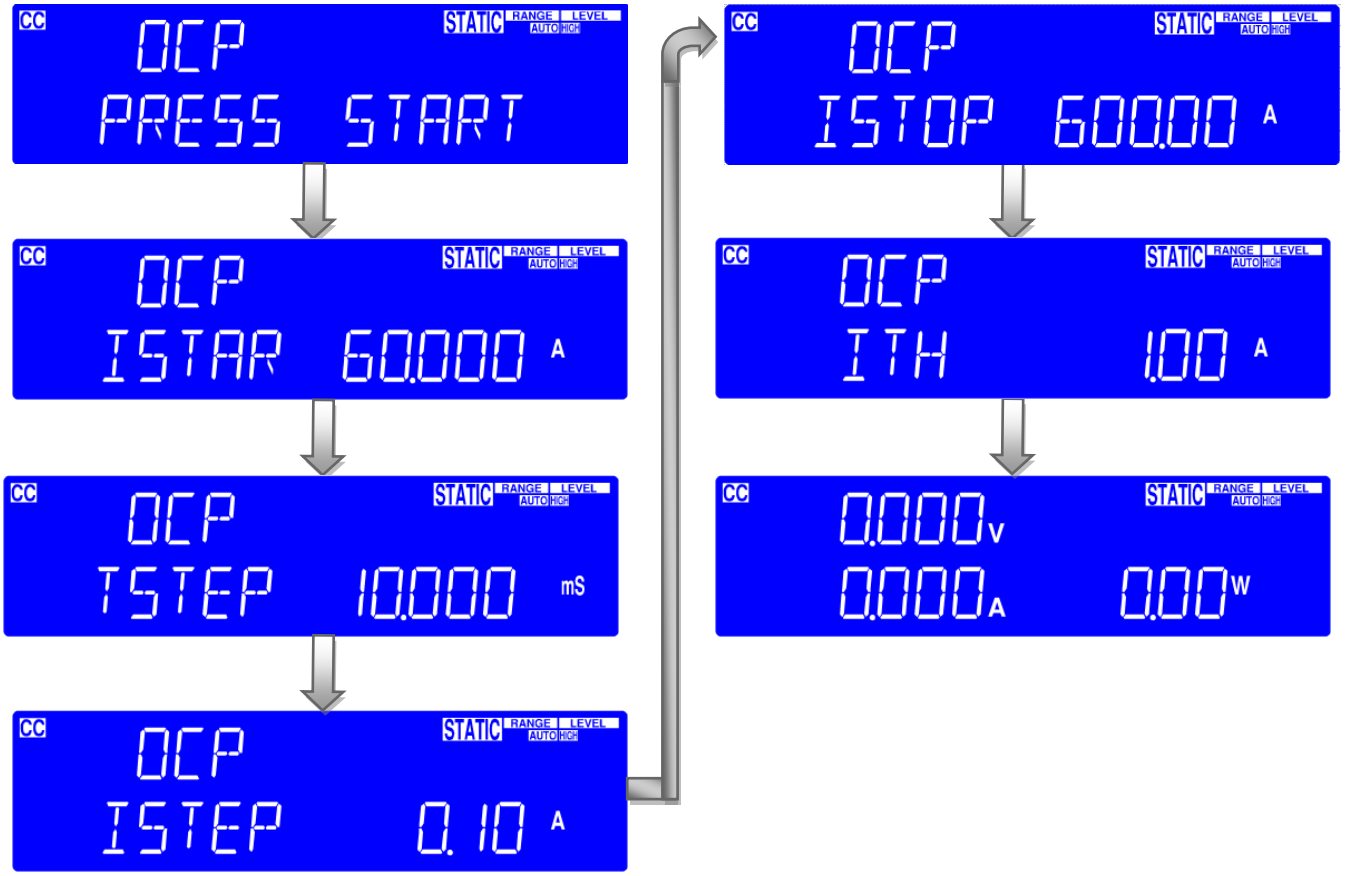
- Setting the BMS SHORT ITH current, the upper left 5 digit display the “SHORT”, the lower left 5 digit display the “ITH”, and lower right display Display Setting value, the unit is "A". The range is 0.28A to the 300.00A, Step 9.6mA by rotating the setting knob.
  All models of SHORT ITH

Model	SHORT ITH	Model	SHORT ITH	Model	SHORT ITH
3351G	50A	3361G	35A	3371G	20A
3352G	100A	3362G	70A	3372G	40A
3353G	150A	3363G	105A	3373G	60A
3354G	200A	3364G	140A	3374G	80A
3355G	250A	3365G	175A	3375G	100A
3356G	300A	3366G	210A	3376G	120A

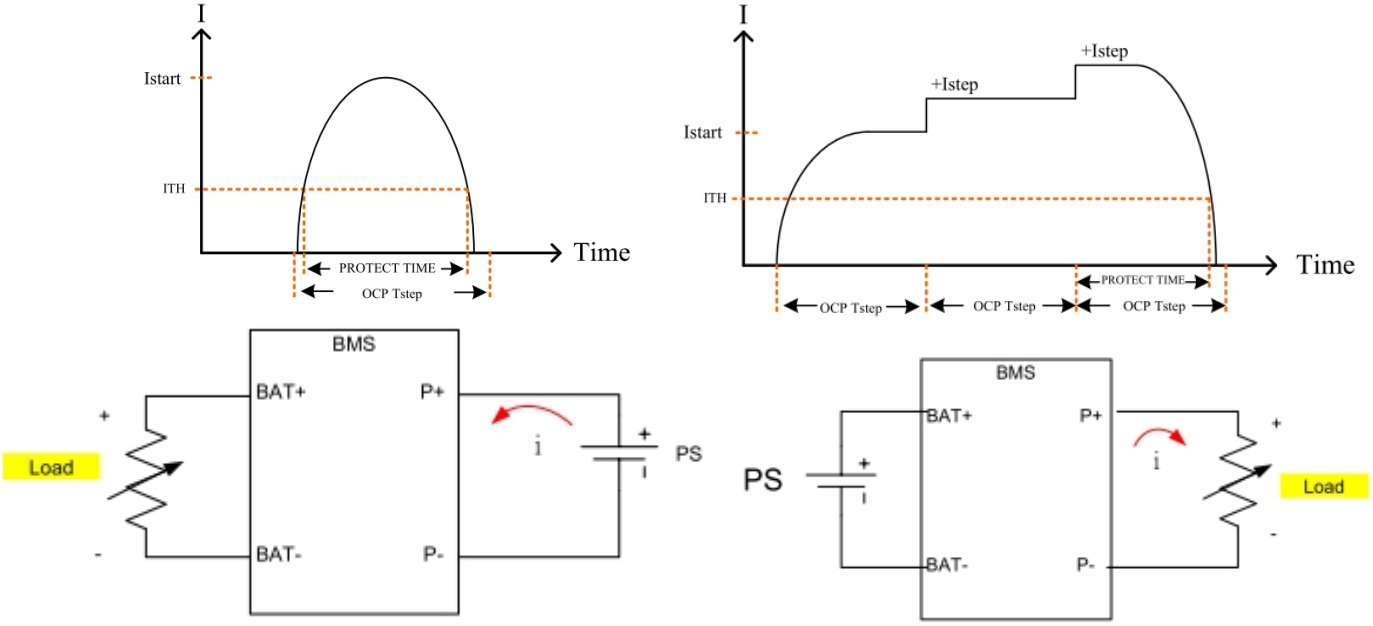


BMS OCP TEST:
BMS OCP Test setting parameters, the Setting Sequence is shown below:

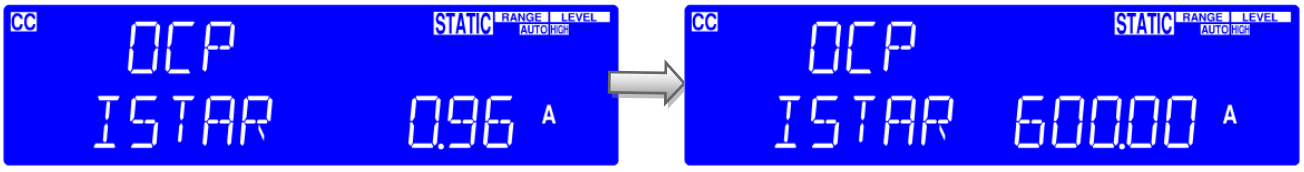
- ➔ OCP PRESS START
- ➔ OCP ISTAR
- ➔ OCP TSTEP
- ➔ OCP ISTEP
- ➔ OCP ISTOP
- ➔ OCP ITH



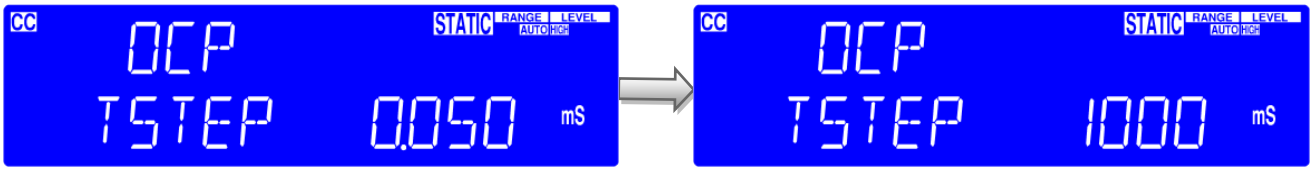
To test the protection state of overcharge or overdischarge of BMS, 3350G series will measure the current of overcharge or overdischarge, protection time, OCCP/OCDP (Over Current Charge/Discharge Protection) are all tested by OCP, and the difference is in POWER & LOAD Different from the BMS connection method, the setting method: Press the OCP key to set Istart, Tstep, Istep, Istop, Ith (0.01A~<Istart), press the Start key to start the test Load Load from Istart and set the time out (Tstep) , if the protection does not occur within this time, increase the current Istep (if Istep is set to 0, it will end directly), until the protection occurs or Istop is reached, the DISPLAY displays "OCP TEST" during the test, and the second line of the LCD when the test ends Displays the OCP current, and the third row displays the protection time. When the test method is a PULSE, you only need to set Istart&Tstep, and then press the Start key to start the test (Istep is preset to 0)



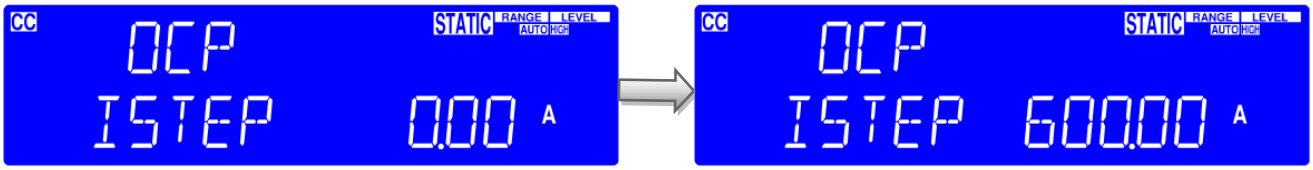
- Setting the BMS OCP ISTAR current, the upper left 5 digit display the "OCP", the lower left 5 digit display the "ISTAR" and lower right display Display setting value, the unit is "A". The range is 0.96A to the 600.00A, Step 9.6mA by rotating the setting knob.



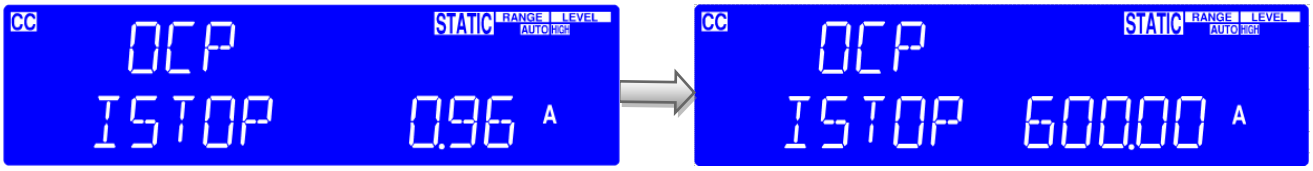
- Setting the BMS OCP TSTEP, the upper left 5 digit display the "OCP", the lower left 5 digit display the "TSTEP", and lower right display Setting Value, the unit is "ms". The range is 0.05ms to the 1000ms, Step 0.01ms by rotating the setting knob.



- Setting the BMS OCP ISTEP current, the upper left 5 digit display the “OCP”, the lower left 5 digit display the “ISTEP”, and I lower right display setting value, the unit is "A". The range is 0.00A to the 600.00A, Step 9.6mA by rotating the setting knob.



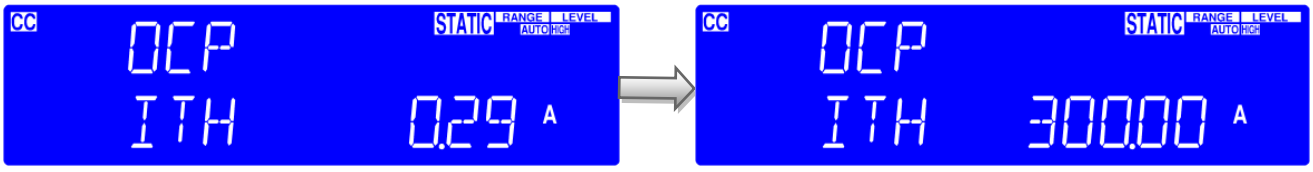
- Setting the BMS OCP ISTOP current, the upper left 5 digit display the “OCP”, the lower left 5 digit display the “ISTOP”, and lower right display setting value, the unit is "A". The range is 0.96A to the 600.00A, Step 9.6mA by rotating the setting knob.



- Setting the BMS OCP ITH current, the upper left 5 digit display the “OCP”, the lower left 5 digit display the “ITH”, and lower right display setting value, the unit is "A". The range is 0.29A to the 300.00A, Step 9.6mA by rotating the setting knob.

All models of OCP ITH

Model	OCP ITH	Model	OCP ITH	Model	OCP ITH
3351G	50A	3361G	35A	3371G	20A
3352G	100A	3362G	70A	3372G	40A
3353G	150A	3363G	105A	3373G	60A
3354G	200A	3364G	140A	3374G	80A
3355G	250A	3365G	175A	3375G	100A
3356G	300A	3366G	210A	3376G	120A



3.2.24. DC INPUT Terminal.

The positive (LOAD +) and negative (LOAD -) power input terminals are clearly marked. DO NOT confuse them with the smaller SENSE terminals.

Please ensure that the voltage and current rating of the DUT do not exceed the maximum rating of the 3350G series load module being used. Please also check the output polarity of the DUT prior to connection and testing.

The negative load terminal should be connected to ground if testing a positive output power supply. This is normally achieved when the negative output of the power supply is grounded.

Similarly if a power supply with a negative output is to be tested then the positive Load terminal should be grounded. This is normally achieved when the positive Output of the power supply under test is grounded.

3.2.25. V-sense input terminal

The V-sense terminals can be used to compensate for a voltage drop in the load lines between the power supply and the 3350G series Electronic Load. This is a useful feature useful when the load current is relatively high.

If remote sense is required the V-sense terminals are connected to the appropriate positive and negative terminals of the power supply as shown in Fig 3-14.In the CONFIG menu the V-sense function can be set to AUTO or ON.

Please note that if V-sense is set to AUTO and the sense leads are connected to the DUT the losses need to be approx. before the display compensates for the voltage loss.

If V-sense is set to 'ON' and the sense terminals are connected to the DUT the load will check and compensate for all voltage drops.

The maximum voltage sense compensation is the same as the rating of the 3356G electronic load. For example the 3356G is capable of sinking current at up to 150Vdc. Therefore the maximum V-sense is also 150Vdc.

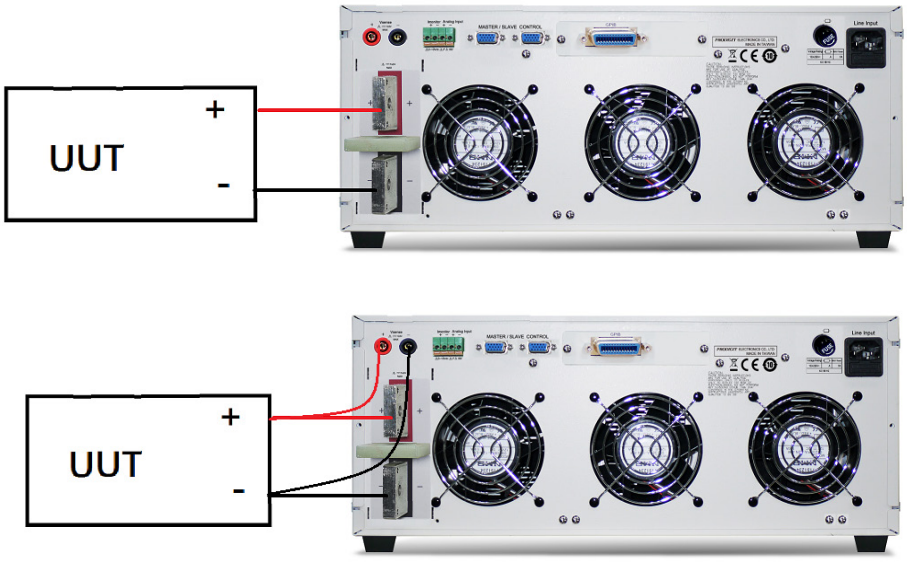


Fig 3-14 typical connection of 3350G series load module

3.2.26. I-monitor

The I- monitor is provided as a terminal. It is designed to enable the user to Display the Electronic Load's input current or short current. The I- monitor signal Is 0V to 10V. This signal is proportional to the full scale current that the particular Electronic Load is capable of.

Turbo mode OFF:

For example. 3356G: Imax = 600A therefore I- monitor 10V = 600A so 1V = 60A

Turbo mode ON:

For example. 3356G: Imax = 900A therefore I- monitor 10V = 900A so 1V = 90A

Please refer to the specification Fig 1-1.1 to Fig1-1.18 for the maximum current that each 3350G series Load is capable of.

CAUTION

The current monitor of this unit is NOT isolated. Please be careful when you connect an oscilloscope. Improper connections are likely to cause damage. Please follow the connection rule on the following page.

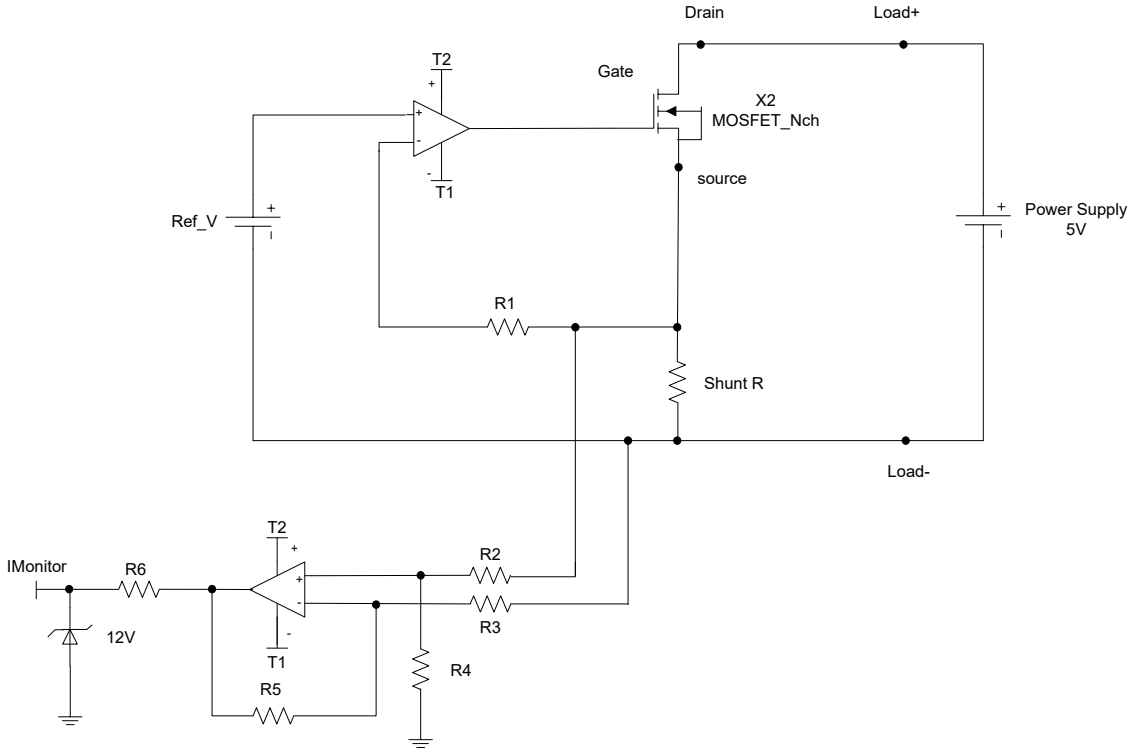


Fig 3-15 An equivalent circuit in terms of the current monitor

Connecting the I- monitor to an oscilloscope

When you connect this product to an oscilloscope, please ensure the correct polarities of the connecting probes as shown in Fig. 3-16.

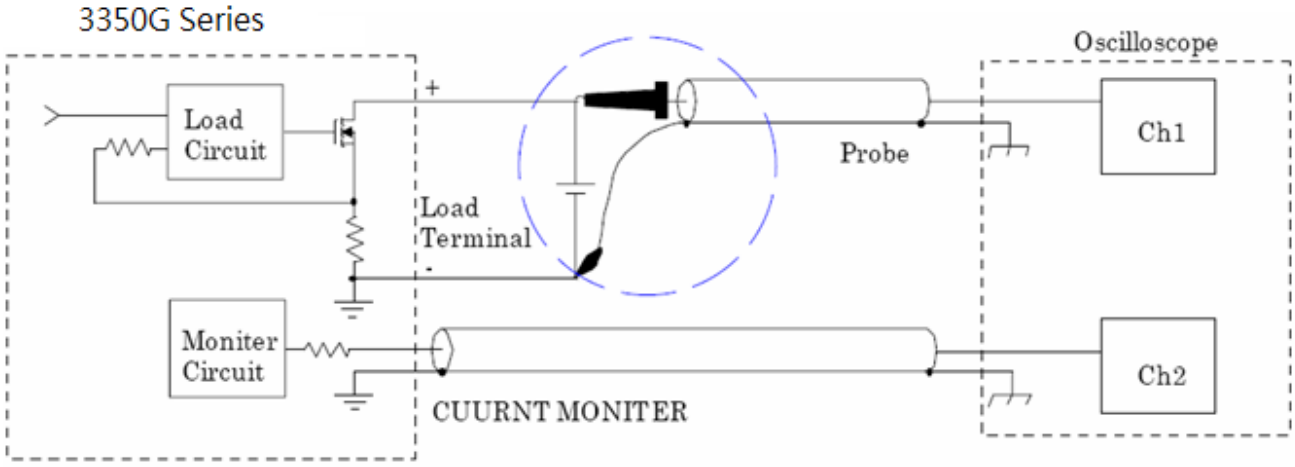


Fig 3-16 (Correct) Connections to an oscilloscope

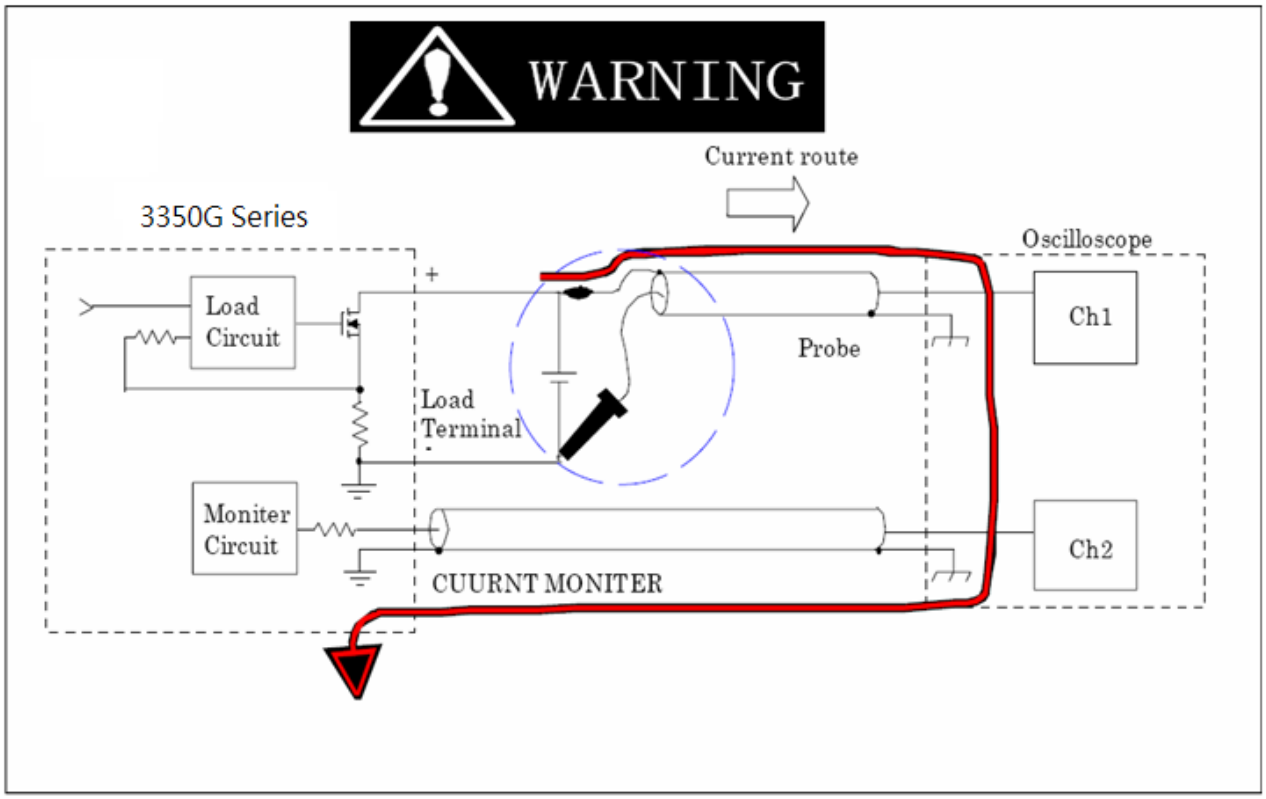


Fig 3-17 (Wrong) Connections to an oscilloscope

If the probes connection is reversed as shown in Fig 3-17, a large current would flow through the probe and the internal circuitry of the oscilloscope is likely to be damaged.

3.2.27. Analog programming input

The Electronic Load has an analog programming input on the rear panel of the mainframe. The analogue programming input enables the load module to track and load according to an external 0-10V signal.

The analog programming input is configured as a Terminal on the mainframe's rear panel.

The analogue programming input operates in CC or CP modes only. The 3350G series Load will attempt to load proportionally according to the signal and the load module's maximum current or power range. For example: 3356G: Imax = 600A and Pmax = 6000W

So in CC mode if analogue programming input is 5V = 300A load setting (Range II)
Or in CP mode if analogue programming input is 1V = 600W load setting (Range II)

Even if the 3350G series is in the LOAD off state, if a voltage is applied to this terminal, the 3350G series will operate to pass the load current. When turning off the LOAD of the 3350G series, set the applied voltage of this terminal to 0V.

The analog programming signal can act alone or it can be summed with the programmed value set via the front panel or the optional computer interface (GPIB, RS-232, USB, or LAN) or the front panel.

Example:

Fig 3-18 shows the result of an analog programming signal at 4 Vac, 500Hz when it is summed with a 240A programmed setting in CC mode of 3356G Load.

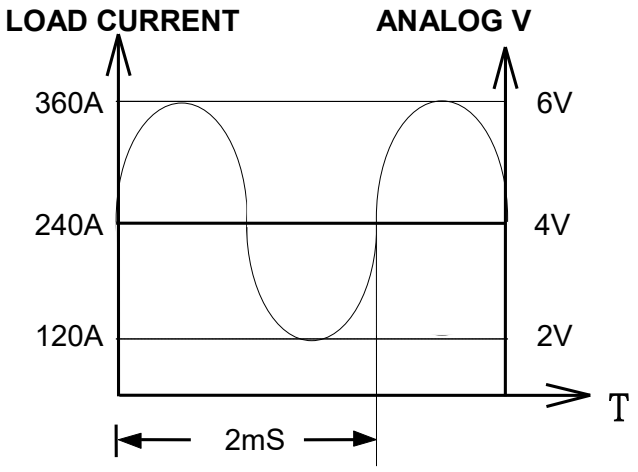
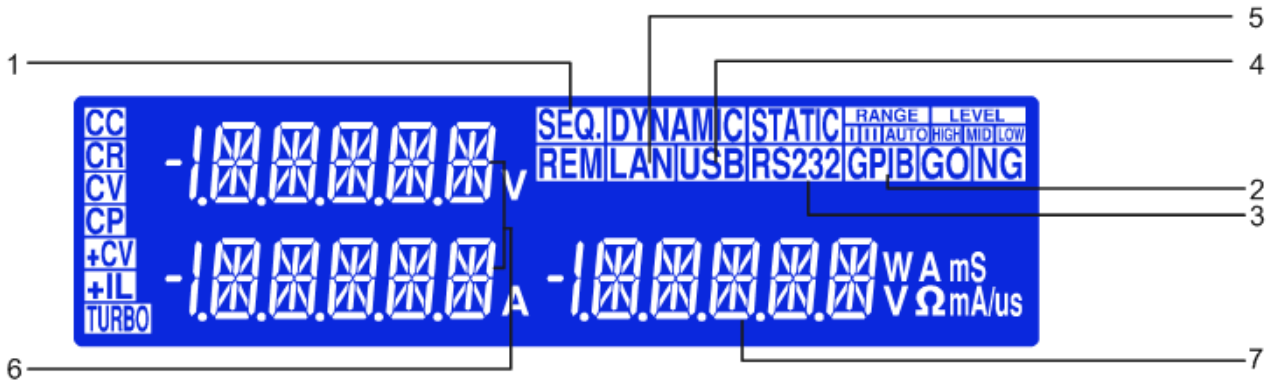


Fig 3-18 Analog programming example

3-3. 3350G series Operating Instructions (1)

3350G series of LCD displays status, details are as follows:



3.3.1. SEQ. indicator when entering AUTO SEQUENCE mode, LCD indicator will light up.

3.3.2. In GPIB mode:
It is GPIB inside. The LCD will be lit GPIB when Power ON. If 3350G series is controlled by GPIB through PC, the GPIB will be lit.

3.3.3. In RS232 mode:
It is RS232 inside. The LCD will be lit RS232 when Power ON. If 3350G series is controlled by RS232 through PC, the RS232 will be lit.

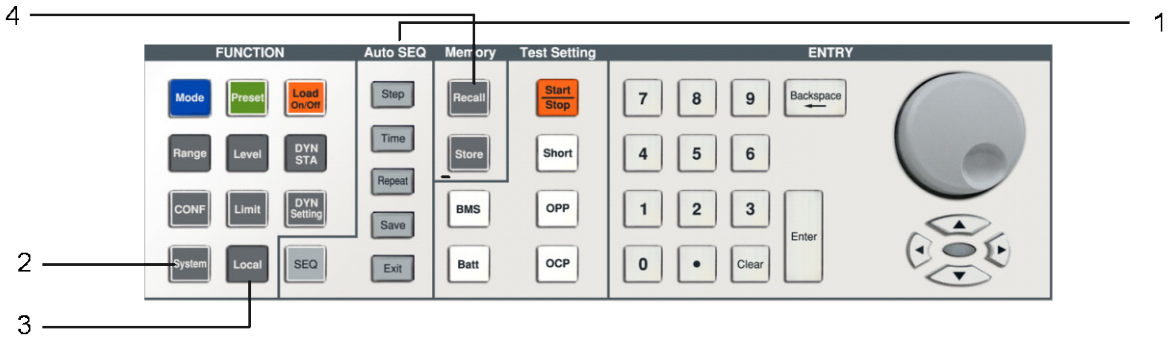
3.3.4. USB mode Lit :
It is USB interface inside.

3.3.5. LAN mode Lit :
It is LAN interface inside.

3.3.6. Status display:
When enter System Setting or AUTO SEQUENCE, the display setting item.

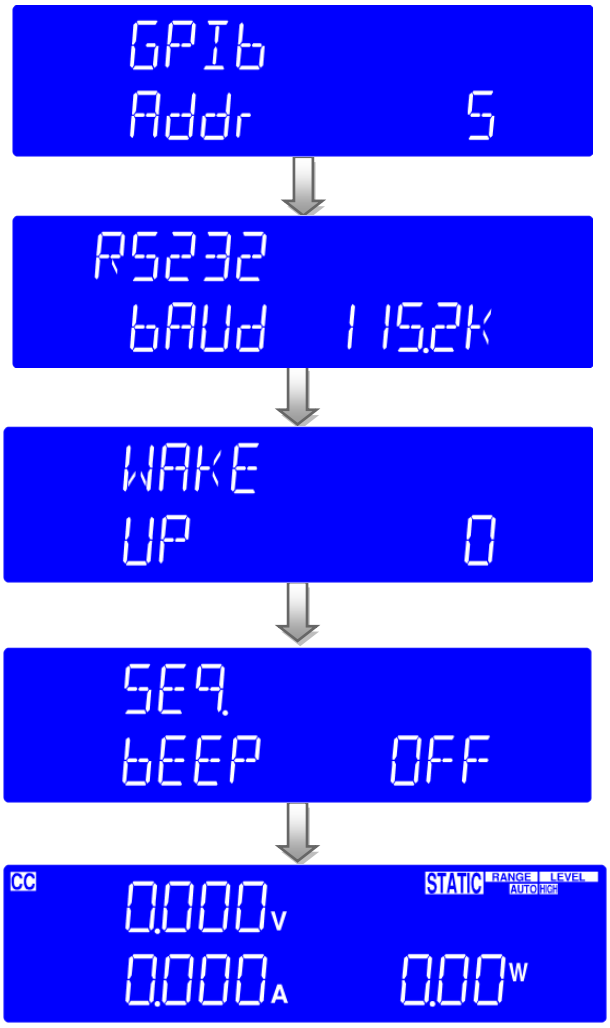
3.3.7. Setting display:
Display System Setting state or AUTO SEQUENCE setting value.

3-4. 3350G series System Operating Instructions (2)



3.4.1. KEYPAD KEY: AUTO SEQUENCE edits the settings, test and RECALL / STORE key.

3.4.2. System : Press SYSTEM to set the argument ,GPIB address,RS232 BAUD- RATE, WAKE UP, buzzer Alarm power ON/OFF and Master /Slave Parallel control.



3.4.3. Local : Press LOCAL to exit REMOTE mode.

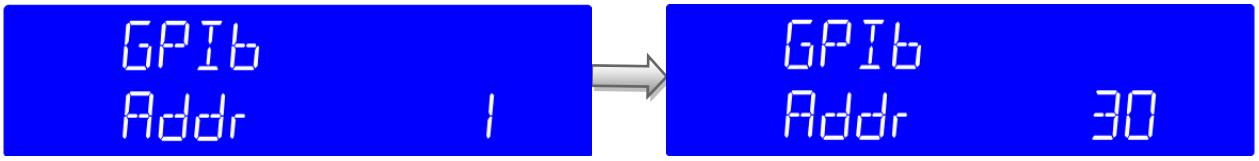
3.4.4. Recall Store : Recall / Store LOAD state settings.

3-5. 3350G series System Operating Instructions (3)

3.5.1. Setting system parameters

Set GPIB address, RS232 BAUD RATE, WAKE UP, Buzzer ON/OFF.

3.5.1.1 Set GPIB address First Press SYSTEM key, The LCD display shows GPIB on upper left 5 digit LCD display, lower left 5 digit LCD display Addr, lower right 5 digit LCD display setting GPIB address of the representative, Press UP, DOWN buttons to adjust the GPIB address 1~30, Key and then press ENTER, 3350G series GPIB Address value is saved, Press system key four times to leave the GPIB address configuration State.

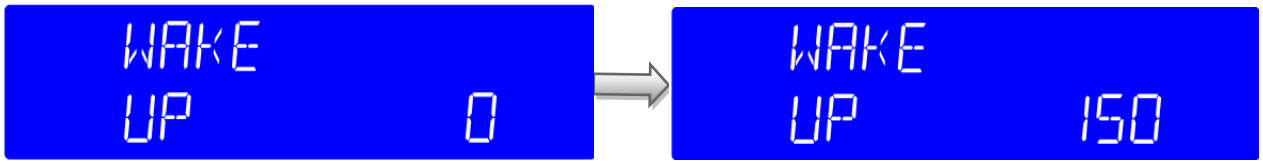


3.5.1.2 Set RS232 BAUD RATE SYSTEM key first by the second, The LCD display shows RS232 on upper left 5 digit LCD display, lower left 5 digit LCD display baud, lower right 5 digit LCD display setting BAUD-RATE, Press UP, DOWN buttons to adjust the value of BAUD RATE, Key and then press ENTER, 3350G series is saved setting BAUD RATE, press system key three times to leave the BAUD-RATE setting state.

3.5.1.3 WAKE-UP function:

This function is designed for auto setting the load status and load level in turning on the 3350G series every time. SYSTEM key first by the three, The LCD display shows WAKE on upper left 5 digit LCD display, lower left 5 digit LCD display UP, lower right 5 digit LCD display setting, Press UP, DOWN buttons to adjust the 0~150.

Press ENTER key to be stored, press system key two times to leave the The WAKE-UP setting state, If set to "0" means do not call.

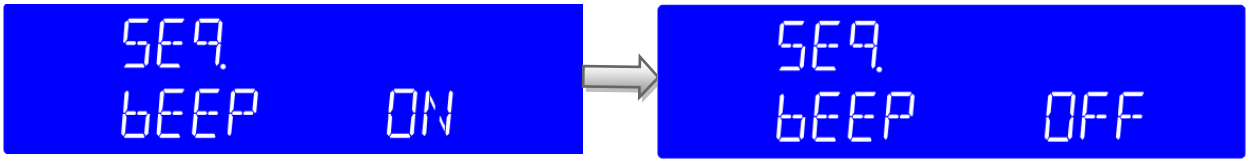


3.5.1.4 Buzzer ON / OFF:

This is the test set automatically (AUTO SEQUENCE) at the end, if it Increases buzzer function, if set to ON, Then when the test result is PASS Automatically when the buzzer will call out, if the test result is FAIL when The buzzer will call the second tone.

Setting method:

first by 4 Times SYSTEM key and the LCD display shows SEQ on upper left 5 digit LCD display, lower left 5 digit LCD display bEEP, lower right 5 digit LCD display Setting ON or OFF, press UP DOWN key to adjust.



Note:setting system parameters, if the input is required to use the KEYPAD ENTER button to confirm, otherwise 3350G series will not save the changes the settings.

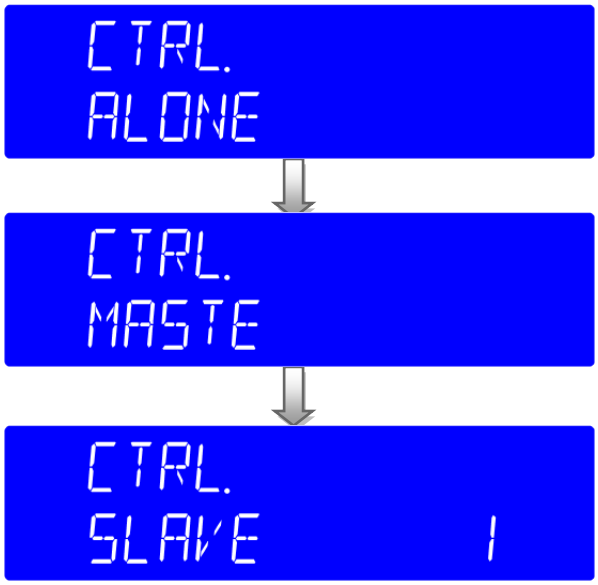
Note:Pass: Automatic test mode, no NG state, is the PASS.

Fail: Automatic test mode, any test if the NG then is the FAIL.

3.5.1.5 3350G series Master/Slave Instructions

3350G series “MASTER / SLAVE “Parallel function, 1 Master, 7 SLAVE, Setting method Press the System key to set the CONTROL MODE to select ALONE, MASTER or SLAVE1~7, Press the ENTER key to set, when Power off Data will not be lost, this parameter is saved.Master will Automatically detect whether there is Slave machine, if there is no Slave Machine will run “ALONE Mode”, if the Slave machine will run “MASTER Mode”.

Master machine measuring current and power meter is to show the total Current and total power (Master + Slave), the voltage meter is displayed by The Master Machine, the Slave machine voltage meter position will display "SL1" ~ "SL7”.

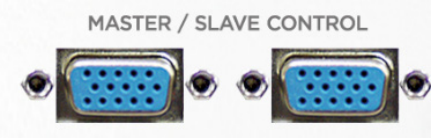


3.5.1.6 The following procedure should be followed before applying power on Master/Slave mains:
Step1. Turn on (O) the Slave POWER switch.
Step2. Turn on (O) the Master POWER switch.

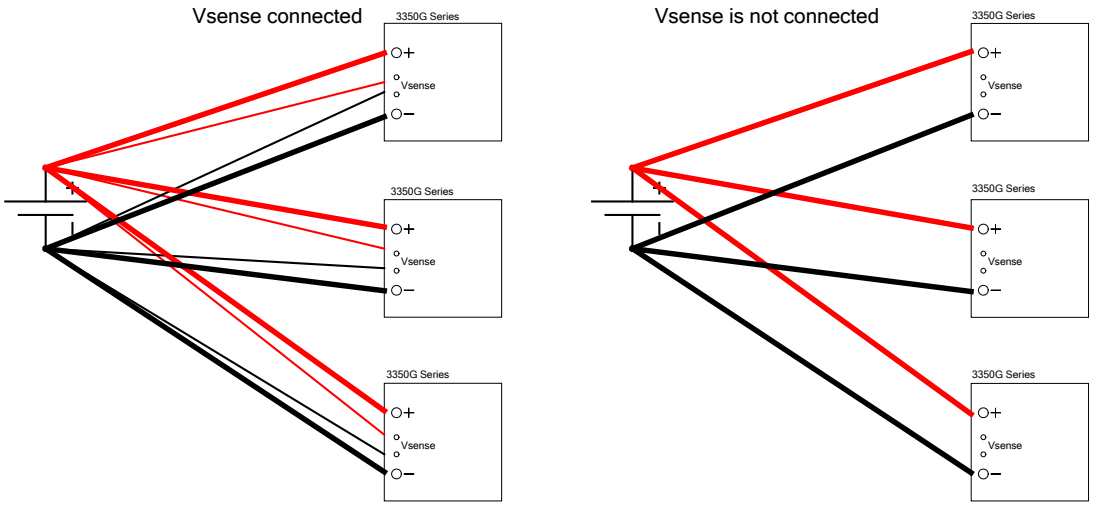
3.5.1.7 The following procedure should be followed before applying power off Master/Slave mains:
Step1. Turn off (I) the Master POWER switch.
Step2. Turn off (I) the Slave POWER switch.

3.5.1.8 Parallel method:
Use HD-DSUB 15pin 1: 1 Cable to connect the MASTER and SLAVE Rear Panel, HD-DSUB 15pin connector (connect the upper and lower Connectors).

Caution: Do not use VGA Cable, because of internal pin4 ~ 8, 11 and Chassis short Circuit.



3.5.1.9 Wiring requirements: Master/Slave, It requires wiring as follows:



3.5.1.10 Manual operation：

(3356G MASTER/SLAVE model the following is example)PRESET setting:CC/CR/CV/CP Mode as Figure，CC setting 64A=Master 32A + Slave 32A，CR:7500Ω=Master//Slave=15000Ω//15000Ω, CV: 100V=Master 100V=Slave=100V，CP:1000W=Master 500W + Slave 500W.

Master Display

Slave Display

Figure CC Set 30A

Master Display

Slave Display

Figure CR Set 7500.0Ω

Master Display

Slave Display

Figure CV Set 100V

Master Display

Slave Display

Figure CP Set 1000W

3.5.1.11 Master Mode operation except CC / CR / CV / CP MODE, The following functions will be disable.

- Config function BATT type 1~N Disable
- CC+CV, CP+CV Disable.
- Recall/Store Disable.
- Auto Seq. Disable.
- Short, OCP, OPP Disable.
- External I/O Disable

3.5.1.12 REMOTE operating : Master Mode can use the command as follows

SETTING PRESET NUMERIC COMMAND	REMARK
MODE {SP} {CC|CR|CV|CP} {;|NL}	
RISE{SP} {NR2} { ;|NL}	A/us
FALL{SP} {NR2} {;|NL}	A/us
PERD : {HIGH|LOW} {SP} {NR2} {;|NL}	ms
LDONV{SP} {NR2} {;|NL}	
LDOFFV{SP} {NR2} {;|NL}	
CC|CURR:{HIGH|LOW} {SP} {NR2}{;|NL}	
CP : {HIGH|LOW} {SP} {NR2}{;|NL}	
CR|RES : {HIGH|LOW} {SP} {NR2}{;|NL}	
CV|VOLT : {HIGH|LOW} {SP} {NR2}{;|NL}	
LIM : ADDCV:VOLTage{SP} {NR2}{;|NL}	
LIM : ADDCV:CURR{SP} {NR2}{;|NL}	
LIM : ADDCV:POW{SP} {NR2}{;|NL}	
LIM : ADDCV{SP} {ON|OFF} {;|NL}	
SENS {SP} {ON|OFF|AUTO|1|0} { ;|NL}	0 : OFF/AUTO, 1: ON
LEV {SP} { LOW|HIGH|0|1} { ;|NL}	
DYN {SP} {ON|OFF|1|0} { ;|NL}	
LOAD {SP}{ON|OFF|1|0} { ;|NL}	
MEAS: CURR {?}{;|NL}	
MEAS: VOLT {?}{;|NL}	
MEAS: POW {?}{;|NL}	
REMOTE { ;|NL}	RS232/USB/LAN command
LOCAL{ ;| NL}	RS232/USB/LAN command

Parallel control condition	3351G	3352G	3353G
The same power specification	Yes	Yes	Yes
Different power specification	Yes	Yes	Yes

Parallel control condition	3361G	3362G	3363G
The same power specification	Yes	Yes	Yes
Different power specification	Yes	Yes	Yes

Parallel control condition	3371G	3372G	3373G
The same power specification	Yes	Yes	Yes
Different power specification	Yes	Yes	Yes

Parallel control condition	3354G	3355G	3356G
The same power specification	Yes	Yes	Yes
Different power specification	Yes	Yes	Yes

Parallel control condition	3364G	3365G	3366G
The same power specification	Yes	Yes	Yes
Different power specification	Yes	Yes	Yes

Parallel control condition	3374G	3375G	3376G
The same power specification	Yes	Yes	Yes
Different power specification	Yes	Yes	Yes

3.5.2. The function keys on the front panel of 3350G series mainframe are designed For high testing throughput purpose. There are 150 operation states or testing Steps can be store in the EEPROM memory of 3350G series electronic load Respectively, each state can store or recall the load status and level for Electronic load simultaneously.

	3350G SERIES
STATE	150

3.5.3.1. STORE process:

- Set the load status and load level.
- Press the STORE key to enter the storage state.
- Press UP, DOWN key or KEYPAD to adjust, press the ENTER OK to Save the STATE.

3.5.3.2. RECALL operation:

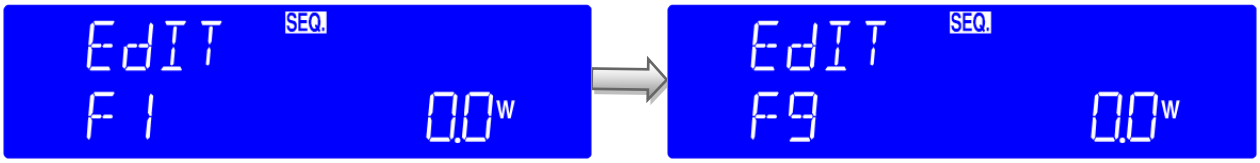
- Press RECALL to enter the call state.
- Press UP, DOWN key or KEYPAD to adjust.
- Finally, Press the ENTER key to confirm, In the electronic load front Panel, set the value that would call out the information in accordance With re-setting.

3.5.3. AUTO SEQUENCE instructions

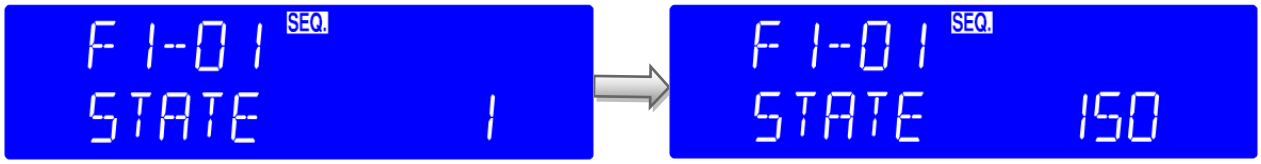
3350G series has AUTO SEQUENCE function, 3350G series to select the State F1~F9 Automatic testing can be edited, 16 steps each group can be set to Select 150 group of the STATE, within each step can be set TEST TIME Units Of 100 ms range (0.1s ~ 9.9s).

3.5.3.1. EDIT MODE

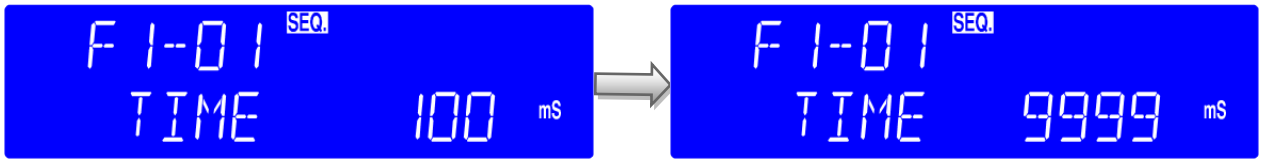
- Press the SEQ. key to enter the AUTO SEQUENCE Mode, Press UP, DOWN key to select EDIT, the LCD display shows EDIT on upper left 5 digit LCD display, lower left 5 digit LCD display FX, “FX” Means to Select the State F1-F9,Press keypad key 1 ~ 9 choose F1 ~ F9.



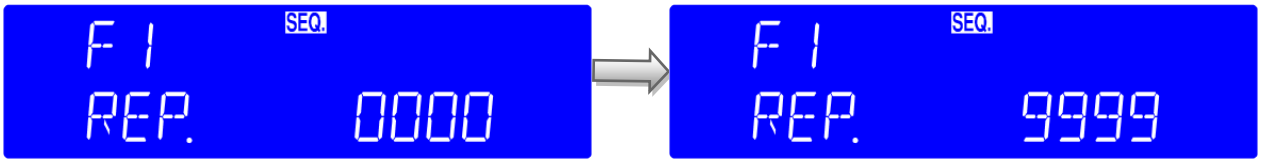
- Press ENTER key, the LCD display shows FX-XX on upper left 5 digit LCD display, lower left 5 digit LCD display STATE, lower right 5 digit LCD Display setting 1~150, “FX” means to select the state F1-F9. “XX” Means the test STEP01-16, setting state value, press UP and down Key Or keypad to adjust setting.



- Test time setting:
  Press ENTER to set TIME value, press UP, DOWN keys or KEYPAD to Adjust settings, range from 100 ms~9999ms.
  Press ENTER key or SAVE key to finish editing the action is set to REPEAT, if you do not save the settings, press the EXIT key to leave edit Mode.



- Setting REPEAT(REPEAT TEST) ,Press UP and DOWN key or Keypad To adjust setting 0~9999, Press ENTER SAVE REPEAT Value, or press EXIT key Exit EDIT MODE.



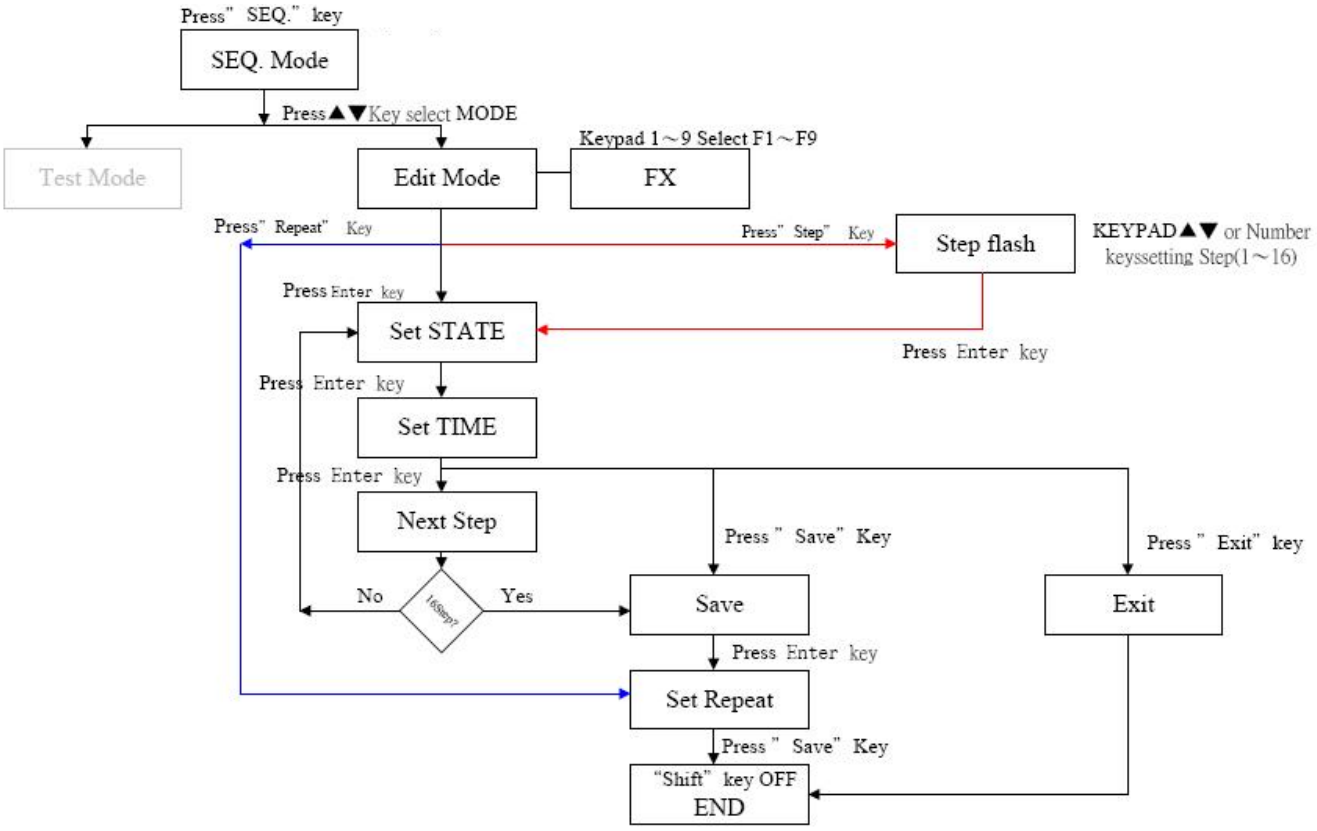


Fig 3-19 STORE (EDIT) MODE OPERATIONO FLOW-CHART

3.5.3.2. TEST MODE

- Press the SEQ. key to enter the AUTO SEQUENCE Mode, Press UP, DOWN key to select TEST, the LCD display shows TEST on upper left 5 digit LCD display, the lower left 5 digit LCD display FX, “FX” Means To select the state F1-F9, Press keypad key 1 ~ 9 choose F1 ~ F9. When the press ENTER to enter. The next automatic test Mode.

- Test LCD will display "SXX", "XX" on behalf of the test of STEP, if the test result is NG, the LCD will show "NG" (flashing) and suspension of the test, this time users can test or ENTER key to continue Press EXIT key to leave the test mode, test mode by the (STEP01 - TIME) then (SETP02 - TIME) until all the steps done or press EXIT to leave the test mode.

- If all the test steps are OK, the test result is PASS, LCD displays "PASS"; test procedure if any of the NG, the test result is FAIL, LCD Displays "FAIL", if the buzzer is set to ON, when the test result is PASS automatically when the buzzer will call out, if the test result is FAIL Buzzer will sound when the second call.

- When the test is completed, the user can press the ENTER key again To test or EXIT key to leave the test mode.

Example 1: Edit the 16 step test is completed, press the TEST key, according to the order of S01 ~ S16 test is complete LCD display PASS.

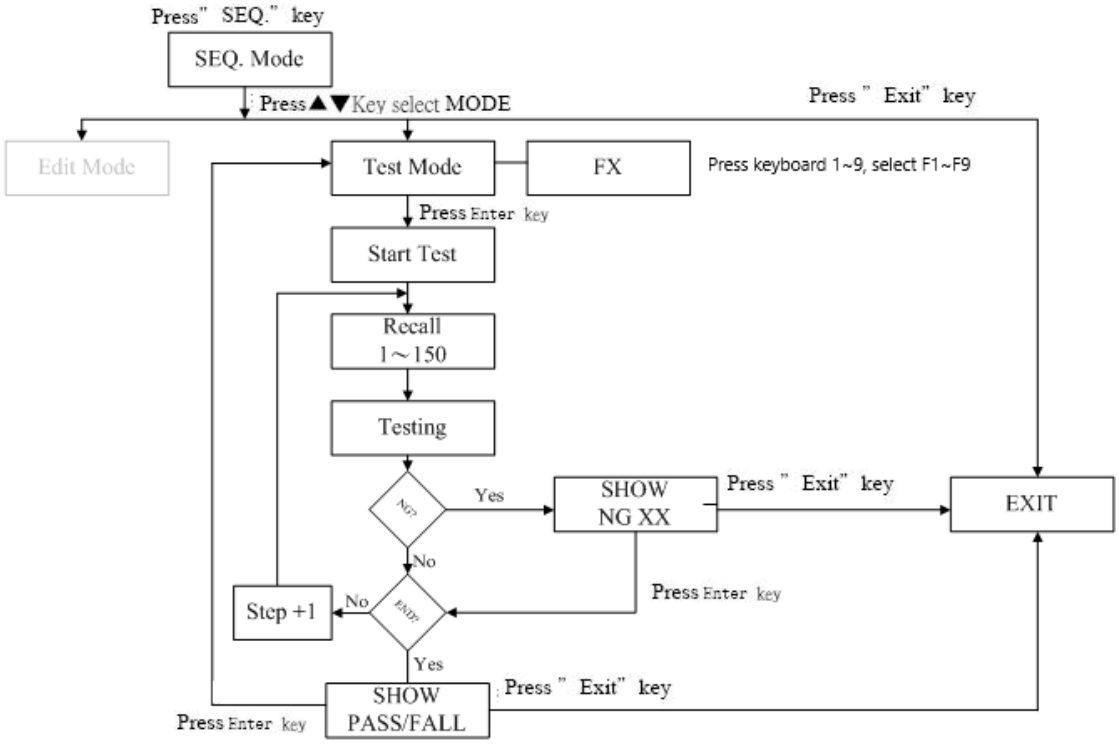


Fig 3-20 TEST MODE OPERATION FLOW-CHA

3-6. Initial setting of 3350G series load

The following tables detail the initial settings of the 3350G series of Load when Shipped from the factory.

Item		Initial value	Item		Initial value
CC L+Preset		0.000 A	LIMIT	V_Hi	150.00 V
CC H+Preset		0.000 A		V_Lo	0.00 V
CR H+Preset		90000 Ω		I_Hi	100.0 A
CR L+Preset		90000 Ω		I_Lo	0.00 A
CV H+Preset		150.00 V		W_Hi	1200.0 W
CV L+Preset		150.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	2.50 V
DYN	T HI	2.000 mS		LD-OFF	1.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.0640A/uS	SHORT		Disable
	FALL	0.0640A/uS	OPP		Disable
			OCP		Disable

Table 3-1 3351G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.000 A	LIMIT	V_Hi	150.00 V
CC H+Preset		0.000 A		V_Lo	0.00 V
CR H+Preset		45000 Ω		I_Hi	200.0 A
CR L+Preset		45000 Ω		I_Lo	0.00 A
CV H+Preset		150.00 V		W_Hi	2400.0 W
CV L+Preset		150.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	2.50 V
DYN	T HI	2.000 mS		LD-OFF	1.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.0128A/uS	SHORT		Disable
	FALL	0.0128A/uS	OPP		Disable
			OCP		Disable

Table 3-2 3352G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.000 A	LIMIT	V_Hi	150.00 V
CC H+Preset		0.000 A		V_Lo	0.00 V
CR H+Preset		30000 Ω		I_Hi	300.0 A
CR L+Preset		30000 Ω		I_Lo	0.00 A
CV H+Preset		150.00 V		W_Hi	3600.0 W
CV L+Preset		150.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	2.50 V
DYN	T HI	2.000 mS		LD-OFF	1.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.0192A/uS	SHORT		Disable
	FALL	0.0192A/uS	OPP		Disable
			OCP		Disable

Table 3-3 3353G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.000 A	LIMIT	V_Hi	150.00 V
CC H+Preset		0.000 A		V_Lo	0.00 V
CR H+Preset		22500 Ω		I_Hi	400.0 A
CR L+Preset		22500 Ω		I_Lo	0.00 A
CV H+Preset		150.00 V		W_Hi	4000.0 W
CV L+Preset		150.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	2.50 V
DYN	T HI	2.000 mS		LD-OFF	1.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.2560A/uS	SHORT		Disable
	FALL	0.2560A/uS	OPP		Disable
			OCP		Disable

Table 3-4 3354G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.000 A	LIMIT	V_Hi	150.00 V
CC H+Preset		0.000 A		V_Lo	0.00 V
CR H+Preset		18000 Ω		I_Hi	500.0 A
CR L+Preset		18000 Ω		I_Lo	0.00 A
CV H+Preset		150.00 V		W_Hi	5000.0 W
CV L+Preset		150.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	2.50 V
DYN	T HI	2.000 mS		LD-OFF	1.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.320A/uS	SHORT		Disable
	FALL	0.320A/uS	OPP		Disable
			OCP		Disable

Table 3-5 3355G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	150.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		15000 Ω		I_Hi	600.0 A
CR L+Preset		15000 Ω		I_Lo	0.00 A
CV H+Preset		150.00 V		W_Hi	6000.0 W
CV L+Preset		150.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	2.50 V
DYN	T HI	2.000 mS		LD-OFF	1.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.3840A/uS	SHORT		Disable
	FALL	0.3840A/uS	OPP		Disable
			OCP		Disable

Table 3-6 3356G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	600.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		51440 Ω		I_Hi	70.00 A
CR L+Preset		51440 Ω		I_Lo	0.00 A
CV H+Preset		600.00 V		W_Hi	1200.0 W
CV L+Preset		600.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	4.0 V
DYN	T HI	2.000 mS		LD-OFF	0.5 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.0448A/uS	SHORT		Disable
	FALL	0.0448A/uS	OPP		Disable
			OCP		Disable

Table 3-7 3361G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	600.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		257E3 Ω		I_Hi	140.00 A
CR L+Preset		257E3 Ω		I_Lo	0.00 A
CV H+Preset		600.00 V		W_Hi	2400.0 W
CV L+Preset		600.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	4.0 V
DYN	T HI	2.000 mS		LD-OFF	0.5 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.0090A/uS	SHORT		Disable
	FALL	0.0090A/uS	OPP		Disable
			OCP		Disable

Table 3-8 3362G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	600.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		171E3 Ω		I_Hi	210.00 A
CR L+Preset		171E3 Ω		I_Lo	0.00 A
CV H+Preset		600.00 V		W_Hi	3600.0 W
CV L+Preset		600.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	4.0 V
DYN	T HI	2.000 mS		LD-OFF	0.5 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.0134A/uS	SHORT		Disable
	FALL	0.0134A/uS	OPP		Disable
			OCP		Disable

Table 3-9 3363G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	600.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		128E3 Ω		I_Hi	280.00 A
CR L+Preset		128E3 Ω		I_Lo	0.00 A
CV H+Preset		600.00 V		W_Hi	4000.0 W
CV L+Preset		600.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	4.0 V
DYN	T HI	2.000 mS		LD-OFF	0.5 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.1792A/uS	SHORT		Disable
	FALL	0.1792A/uS	OPP		Disable
			OCP		Disable

Table 3-10 3364G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	600.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		102E3 Ω		I_Hi	350.00 A
CR L+Preset		102E3 Ω		I_Lo	0.00 A
CV H+Preset		600.00 V		W_Hi	5000.0 W
CV L+Preset		600.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	4.0 V
DYN	T HI	2.000 mS		LD-OFF	0.5 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.2240A/uS	SHORT		Disable
	FALL	0.2240A/uS	OPP		Disable
			OCP		Disable

Table 3-11 3365G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	600.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		85712 Ω		I_Hi	420.00 A
CR L+Preset		85712 Ω		I_Lo	0.00 A
CV H+Preset		600.00 V		W_Hi	6000.0 W
CV L+Preset		600.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	4.0 V
DYN	T HI	2.000 mS		LD-OFF	0.5 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.2688A/uS	SHORT		Disable
	FALL	0.2688A/uS	OPP		Disable
			OCP		Disable

Table 3-12 3366G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	1200.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		180E4 Ω		I_Hi	40.00 A
CR L+Preset		180E4 Ω		I_Lo	0.00 A
CV H+Preset		1200.00 V		W_Hi	1200 W
CV L+Preset		1200.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	10.0 V
DYN	T HI	2.000 mS		LD-OFF	5.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.0256A/uS	SHORT		Disable
	FALL	0.0256A/uS	OPP		Disable
			OCP		Disable

Table 3-13 3371G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	1200.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		900E3 Ω		I_Hi	80.00 A
CR L+Preset		900E3 Ω		I_Lo	0.00 A
CV H+Preset		1200.00 V		W_Hi	2400 W
CV L+Preset		1200.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	10.0 V
DYN	T HI	2.000 mS		LD-OFF	5.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.1024A/uS	SHORT		Disable
	FALL	0.1024A/uS	OPP		Disable
			OCP		Disable

Table 3-14 3372G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	1200.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		600E3 Ω		I_Hi	120.00 A
CR L+Preset		600E3 Ω		I_Lo	0.00 A
CV H+Preset		1200.00 V		W_Hi	3600 W
CV L+Preset		1200.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	10.0 V
DYN	T HI	2.000 mS		LD-OFF	5.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.0768A/uS	SHORT		Disable
	FALL	0.0768A/uS	OPP		Disable
			OCP		Disable

Table 3-15 3373G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.00 A	LIMIT	V_Hi	1200.00 V
CC H+Preset		0.00 A		V_Lo	0.00 V
CR H+Preset		450E3 Ω		I_Hi	160.00 A
CR L+Preset		450E3 Ω		I_Lo	0.00 A
CV H+Preset		1200.00 V		W_Hi	4000 W
CV L+Preset		1200.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	10.0 V
DYN	T HI	2.000 mS		LD-OFF	5.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.1024A/uS	SHORT		Disable
	FALL	0.1024A/uS	OPP		Disable
			OCP		Disable

Table 3-16 3374G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.000 A	LIMIT	V_Hi	1200.0 V
CC H+Preset		0.000 A		V_Lo	0.00 V
CR H+Preset		360E3 Ω		I_Hi	200.00 A
CR L+Preset		360E3 Ω		I_Lo	0.00 A
CV H+Preset		1200.0 V		W_Hi	5000.0 W
CV L+Preset		1200.0 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	10.0 V
DYN	T HI	2.000 mS		LD-OFF	5.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.1280A/uS	SHORT		Disable
	FALL	0.1280A/uS	OPP		Disable
			OCP		Disable

Table 3-17 3375G initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.000 A	LIMIT	V_Hi	1200.0 V
CC H+Preset		0.000 A		V_Lo	0.00 V
CR H+Preset		300E3 Ω		I_Hi	240.00 A
CR L+Preset		300E3 Ω		I_Lo	0.00 A
CV H+Preset		1200.0V		W_Hi	6000.0 W
CV L+Preset		1200.0V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	10.0 V
DYN	T HI	2.000 mS		LD-OFF	5.00 V
	T L0	2.000 mS		POLAR	+LOAD
	RISE	0.1536A/uS	SHORT		Disable
	FALL	0.1536A/uS	OPP		Disable
			OCP		Disable

Table 3-18 3376G initialize

3-7. Protection features

The protection features of the 3350G series Electronic load modules are as follows:

3.7.1. **Overvoltage protection:** The Electronic Load will turn OFF Load OFF if the overvoltage circuit is tripped. The message OVP will be displayed on the LCD. When the OVP fault has been removed the load can be set to sink power again. While the unit will attempt to protect itself given an OVP state it is strongly advised to guard against any potential OVP fault state by using external protection and the correctly rated electronic load.

The Overvoltage protection circuit is set at a predetermined voltage and cannot be adjusted. The OVP level is 105% of the Series nominal voltage rating.

CAUTION: Never apply an AC voltage to the input of the 3350G series Load. Do not apply a DC voltage that is higher than 3350G series Load rating. If this advice is ignored it is likely that damage will be caused to the electronic load module. This damage will not be covered by the warranty.

3.7.2. Over current protection (OCP): The 3350G series Electronic Load displays the power dissipation level. The input to the load is automatically switched to LOAD OFF if the power dissipation is greater than 104% of the rated power input. If an over power condition occurs the display will show OCP.

3.7.3. Over power protection (OPP): The 3350G series Electronic Load displays the power dissipation level. The input to the load is automatically switched to LOAD OFF if the power dissipation is greater than 105% of the rated power input. If an over power condition occurs the display will show OPP.

3.7.4. Over temperature protection (OTP): The load internal temperature at the heat sink is displayed. If the temperature reaches approximately 90°C ± 5°C the OTP message will be displayed and the unit will automatically switch to the LOAD OFF state. If an OTP error occurs please check the ambient temperature is between 0 to 40°C. Also ensure that the front and rear air vents of the mainframe are not obstructed. The air flow is taken from the front of the mainframe and exhausted from the rear. Therefore a suitable gap needs to be left at the rear of the mainframe. A minimum of 15cm is recommended. After a suitable cooling period the load can be switched.

If a reverse polarity situation occurs the load will sink power even if the LOAD button is OFF. No current will be displayed on the 3350G series load module. Current up to the load's maximum current rating will be tolerated in reverse polarity. However there is no OVP OCP and OPP protection. It is strongly recommended that the load lines be fused if it is likely that the load could be subject to reverse polarity. These fuses should be fast acting and rated at the maximum current of the load module +5%.

Chapter 4 COMMUNICATION INTERFACE PROGRAMMING OPERATION

4-1. Introduction

The rear panel Communication Interface programming of 3350G series mainframe is designed to connect PC or NOTEBOOK PC with remote control interface, the NOTEBOOK PC acts as a Communication Interface programming of 3350G series Electronic Load.

This feature can be used as an automatic load/cross load regulation and centering voltage testing for a switching power supply or a rechargeable battery charge/discharge characteristic testing. The function capability of rear panel communication Interface programming not only can set the load level and load status, but also can read back the load voltage and load current.

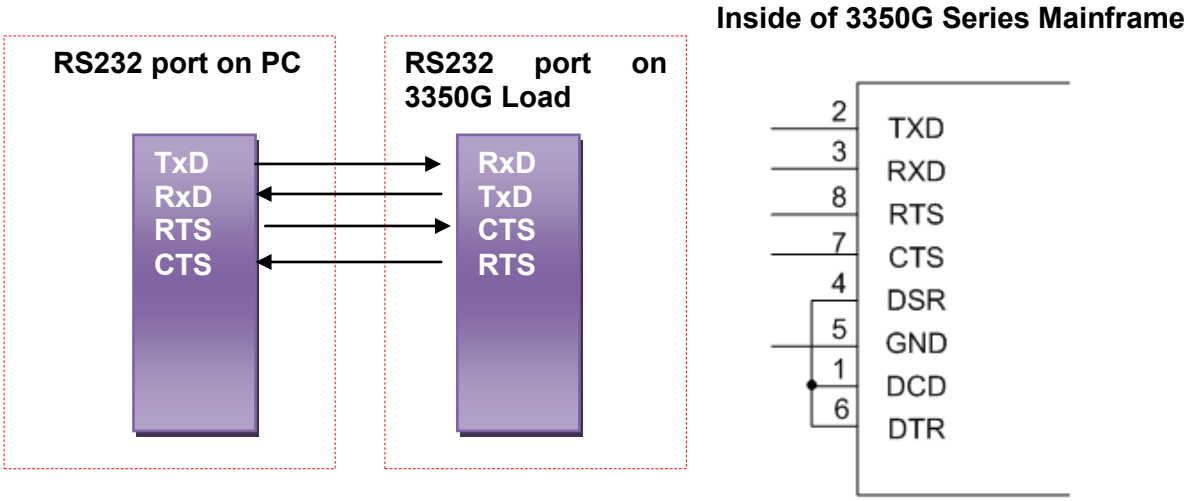
NOTE: When use USB/LAN interface controls the 3350G series, the 3350G series will convert the USB/LAN interface to RS232 interface.

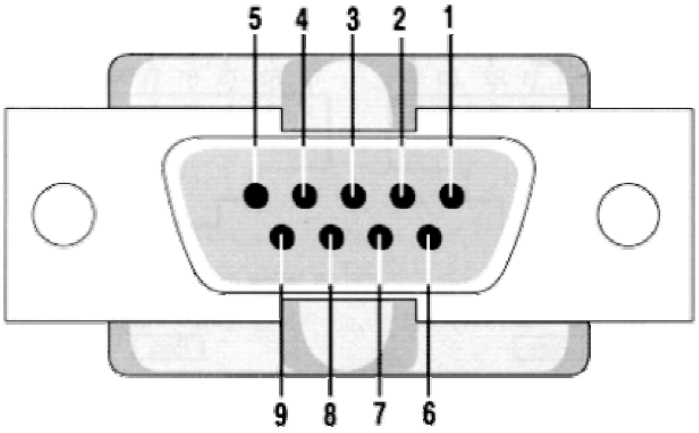
4-2. The summary of RS232 Interface and command

The following RS232 commands are same as GPIB commands. The RS232 protocol in 3350G series mainframe is listing below:

Baud-rate : 9600~115200bps
Parity : None
Data bit : 8 bits
Stop bit : 1 bit
Handshaking : Hardware (RTS/CTS)

The RS232 Interface connector of 3350G series rear panel, RS232 is shown in Fig4-1.





PIN	Abbreviation	Description
Pin1	CD	Carrier Detect
Pin2	RXD	Receive
Pin3	TXD	Transmit
Pin4	DTR	Data Terminal Ready
Pin5	GND	Ground
Pin6	DSR	Data Set Ready
Pin7	RTS	Request To Send
Pin8	CTS	Clear To Send
Pin9	RI	Ring Indicator

Fig 4-1 RS232 INTERFACE CONNECTION OF REAR PANEL

4-3. 3350G SERIES COMMUNICATION INTERFACE PROGRAMMING COMMAND LIST 1

SIMPLE TYPE FORMAT

SETTING PRESET NUMERIC COMMAND	MODEL	REMARK
	33XXG	
RISE{SP} {NR2} {;| NL}	V	A/us
FALL{SP} {;| NL}	V	A/us
PERD:{HIGH | LOW} {SP} {NR2} {;| NL}	V	
LDONV{SP} {NR2} {;| NL}	V	
LDOFFV{SP} {NR2} {;| NL}	V	
CC | CURR:{HIGH | LOW} {SP} {NR2}{;| NL}	V	
CP:{HIGH | LOW} {SP} {NR2}{;| NL}	V	
CR | RES:{HIGH | LOW} {SP} {NR2}{;| NL}	V	
CV | VOLT:{HIGH | LOW} {SP} {NR2}{;| NL}	V	
TCONFIG{SP}{NORMAL|OCP|OPP | SHORT }{;|NL}	V	
OCP:START {SP} {NR2}{;|NL}	V	SET OCP START CURRENT(Istart), UNIT: A
OCP:STEP {SP} {NR2}{;|NL}	V	SET OCP STEP CURRENT(Istep), UNIT: A
OCP:STOP {SP} {NR2}{;|NL}	V	SET OCP STOP CURRENT(Istop), UNIT: A
VTH {SP} {NR2}{;|NL}	V	
OPP:START {SP} {NR2}{;|NL}	V	
OPP:STEP {SP} {NR2}{;|NL}	V	
OPP:STOP {SP} {NR2}{;|NL}	V	
STIME {SP} {NR2}{;|NL}	V	
BATT:UVP{SP}{NR2}{;|NL}	V	unit:V
BATT:TIME{SP}{n}{;|NL}	V	n=0~99999 , 0=OFF means unlimited time battery discharge mode
BATT:AH{SP}{NR2}{;|NL}	V	0,0.1~19999.9 ,0=OFF
BATT:WH{SP}{NR2}{;|NL}	V	0,0.1~19999.9 ,0=OFF
BATT:TEST{SP}{ON|OFF}{;|NL}	V	TEST ON/OFF
BATT:CURR{SP}{NR2}{;|NL}	V	
SURGE: SURI {NR2}{;|NL}	V	
SURGE: NORI {NR2}{;|NL}	V	
SURGE: TIME {NR2}{;|NL}	V	SURGE TIME:10~1000ms
SURGE: STEP {SP}{n} {;|NL}	V	n=1~5
SURGE {ON|OFF}{;|NL}	V	:ON:RUN SURGE,OFF:STOP
BMS{SP}{ON|OFF|1|0} {;|NL}	V	ENABLE/DISABLE BMS TEST FUNCTION ON:ENABLE，OFF:DIABLE
BMS:STIME{SP}{NR2}{;|NL}	V	SET BMS SHORT TIME, UNIT: ms, 0.05~10ms
SHORT:ITH{SP}{NR2}{;|NL}	V	SET BMS SHORT ITH, UNIT: A
OCP:ITH{SP}{NR2}{;|NL}	V	SET BMS OCP ITH, UNIT: A

OCP:TSTEP{SP}{NR2}{; |NL}	V	SET BMS OCP Tstep, UNIT: ms, 0.05~10ms/11~1000ms
AVG{SP}{n}{;|NL}	V	
TURBO{SP}{ON|OFF}{;|NL}	V	
EXT:AIN{SP}{ON|OFF}{;|NL}	V	
SEQLD:TOTSTEP{SP}{n}{; |NL}	V	SET STEP，n=2~16
SEQLD:TIME{n}{SP}{NR1}{; |NL}	V	SETΔ TIME=0.02~999000ms，UNIT:ms，n=0~15
SEQLD:CC{n}{SP}{NR2}{; |NL}	V	SET CURRENT, UNIT:A， n=0~15
SEQLD:CP{n}{SP}{NR2}{; |NL}	V	SET POWER, UNIT:W，n=0~15

Table 4-1 COMMUNICATION INTERFACE PROGRAMMING SETTING COMMAND SUMMARY

QUERY PRESET NUMERIC COMMAND	MODEL	RETURN
	33XXG	
RISE{?} {;|NL}	V	###.####
FALL{?} {;|NL}	V	###.####
PERD:{HIGH|LOW}{?} {;|NL}	V	###.####
LDONV{?}{;|NL}	V	###.####
LDOFFV{?}{;|NL}	V	###.####
CC|CURR:{HIGH|LOW} {?} {;|NL}	V	###.####
CP:{HIGH|LOW} {?} {;|NL}	V	###.####
CR|RES:{HIGH|LOW} {?} {;|NL}	V	###.####
CV|VOLT:{HIGH|LOW} {?} {;|NL}	V	###.####
TCONFIG {?}{;|NL}	V	1:NORMAL 2:OCP 3:OPP 4:SHORT
OCP: START {?} {;|NL}	V	###.####
OCP: STEP {?}{;|NL}	V	###.####
OCP: STOP {?}{;|NL}	V	###.####
VTH {?}{;|NL}	V	###.####
OPP: START {?} {;|NL}	V	###.####
OPP: STEP {?}{;|NL}	V	###.####
OPP: STOP {?}{;|NL}	V	###.####
STIME {?}{;|NL}	V	###.####
OCP {?}{;|NL}	V	###.####
OPP {?}{;|NL}	V	###.####
BATT:RAH{?}{ ;|NL}	V	READ BATT TEST RESULT AH
BATT:RWH{?}{ ;|NL}	V	READ BATT TEST RESULT WH
BATT: RTIME{?}{ ;|NL}	V	READ BATT TEST RESULT TIME
BATT:RVOLT{?}{ ;|NL}	V	READ BATT TEST RESULT VOLTAGE
BATT: CURR{?}{;|NL}	V	

PROT:TIME{?}{;|NL}	V	READ BMS SHORT/OCP PROTECT TIME, UNIT: ms
AVG {?} {;|NL}	V	
SEQLD:TOTSTEP{?}{;|NL}	V	
SEQLD:TIME{n}{?}{;|NL}	V	n=0~15
SEQLD:CC{n}{?}{;|NL}	V	n=0~15
SEQLD:CP{n}{?}{;|NL}	V	n=0~15

Table 4-2 COMMUNICATION INTERFACE PROGRAMMING QUERY COMMAND SUMMARY

LIMIT COMMAND	MODEL	REMARK
	33XXG	
IH|IL{SP}{NR2}{;| NL}	V	
IH|IL{?}{;| NL}	V	
WH|WL{SP}{NR2}{;| NL}	V	
WH|WL{?}{;| NL}	V	###.####
VH|VL{SP}{NR2}{;| NL}	V	
VH|VL{?}{;| NL}	V	###.####
SVH|SVL{SP}{NR2}{;| NL}	V	
SVH|SVL{?}{;| NL}	V	###.####
LIM : ADDCV: VOLTage{SP}{NR2}{;| NL}	V	
LIM: ADDCV: VOLTage {?}{ ;| NL}	V	###.####
LIM : ADDCV: CURR{SP}{NR2}{ ;| NL}	V	
LIM : ADDCV: CURR {?}{ ;| NL}	V	###.####
LIM : ADDCV: POW{SP}{NR2}{;| NL}	V	
LIM: ADDCV: POW {?}{;| NL}	V	###.####
LIM : ADDCV{SP}{ON| OFF} { ;| NL}	V	

Table 4-3 COMMUNICATION INTERFACE PROGRAMMING LIMIT COMMAND SUMMARY

STAGE COMMAND	MODEL	REMARK
	33XXG	
LOAD {SP}{ON| OFF| 1| 0} {;| NL}	V	
LOAD {?} {;| NL}	V	0:OFF 1:ON
MODE {SP} {CC| CR| CV| CP} {;| NL}	V	
MODE {?} {;| NL}	V	0:CC 1:CR 2:CV 3:CP
SHOR {SP} {ON| OFF| 1| 0} {;| NL}	V	
SHOR {?} {;| NL}	V	0:OFF 1:ON
PRES {SP} {ON| OFF| 1| 0} {;| NL}	V	
PRES {?} {;| NL}	V	0:OFF 1:ON
SENSe {SP} {ON| OFF| AUTO| 1| 0} {;| NL}	V	
SENSe {?} {;| NL}	V	0:OFF/AUTO 1:ON

LEV {SP} { LOW| HIGH| 0| 1} {;| NL}	V	
LEV {?} {;| NL}	V	0:LOW 1:HIGH
DYN {SP} {ON| OFF| 1| 0} {;| NL}	V	
DYN {?} {;| NL}	V	0:OFF 1:ON
CLR{;| NL}	V	
NG {?}{;| NL}	V	0:GO 1:NG
PROT {?}{;| NL}	V	
CC{SP}{AUTO| R2}{;| NL}	V	
NGENABLE{SP}{ON| OFF}{;| NL}	V	
POLAR{SP}{POS| NEG}{;| NL}	V	
START{;| NL}	V	
STOP{;| NL}	V	
TESTING {?}{;| NL}	V	0:TEST END,1:TESTING
BATT:TEST {SP} {ON|OFF}{;|NL}	V	ON:START TEST,OFF:STOP TEST
SEQLD:TYPE{SP} {CC|CP}{;|NL}	V	SET CC or CP MODE
SEQLD:TRIG{SP} {ON}{;|NL}	V	TRIGGER CHANGE CC/CP VALUE
SEQLD:TEST{SP} {ON|OFF}{;|NL}	V	SET START or STOP TEST

Table 4-4 STAGE COMMAND SUMMARY

System command:

COMMAND	NOTE	RETURN
RECALL {SP} {m}{;| NL}	m=1~150 m:STATE ,	
STORE {SP} {m}{;| NL}	m=1~150 m:STATE ,	
REMOTE {;| NL}	RS232/USB/LAN command	
LOCAL{;| NL}	RS232/USB/LAN command	
NAME {?} {;| NL}		" XXXXX"
*RST{;| NL}		

Table 4-5 SYSTEM COMMAND SUMMARY

Measure command

COMMAND	33XXG	RETURN
MEAS: CURR {?}{;| NL}	V	###.####
MEAS: VOLT {?}{;| NL}	V	###.####
MEAS: POW {?}{;| NL}	V	###.####
MEAS: VC {?}{;| NL}	V	###.####,###.####

Table 4-6 MEASURE COMMAND SUMMARY

REMARK:
1. Current engineering unit: A
2. Voltage engineering unit: V
3. Resistance engineering unit: Ω
4. Period engineering unit: mS
5. Slew-rate engineering unit: A/uS
6. Power engineering unit: W

AUTO SEQUENCE:

AUTO SEQUENCE SET COMMAND	NOTE	RETURN
FILE {SP} {n}{;| NL}	n=1~9	
FILE{?} {;| NL}		1~9
STEP {SP} {n} {;| NL}	n=1~16	
STEP {?}{;| NL}		1~16
TOTSTEP {SP} {n}{;| NL}	Total step n=1~16	
TOTSTEP {?}{;| NL}		1~16
SB {SP} {n} {;| NL}	n=1~150	
SB{?}{;| NL}		
TIME {SP} {NR2} {;| NL}	100~9999(ms)	100~9999(ms)
SAVE {;| NL}	Save " File n" data	
REPEAT {SP} {n} {;| NL}	n=0~9999	
REPEAT{?} {;| NL}		0~9999
RUN {SP} {F} {n} {;| NL}	n=1~9	AUTO REPLY " PASS" or " FAIL:XX" (XX=NG STEP)

Table 4-7 AUTO SEQUENCE COMMAND LIST

4-4. 3350G SERIES COMMUNICATION INTERFACE PROGRAMMING COMMAND LIST 2

COMPLEX TYPE FORMAT

SETTING COMMAND SUMMARY	MODEL	REMARK
	33XXG	
[PRESet:]RISE{SP} {NR2} {;| NL}	V	A/us
[PRESet:]FALL{SP}{NR2} {;| NL}	V	A/us
[PRESet:]PERD:{HIGH | LOW} {SP} {NR2} {;| NL}	V	
[PRESet:]LDONV{SP} {NR2} {;| NL}	V	
[PRESet:]LDOFFV{SP} {NR2} {;| NL}	V	
[PRESet:]CC | CURR:{HIGH | LOW} {SP} {NR2}{;| NL}	V	
[PRESet:]CP:{HIGH | LOW} {SP} {NR2}{;| NL}	V	
[PRESet:]CR | RES:{HIGH | LOW} {SP} {NR2}{;| NL}	V	
[PRESet:]CV | VOLT:{HIGH | LOW} {SP}{NR2}{;| NL}	V	
[PRESet:]TCONFIG{SP}{NORMAL|OCP|OPP | SHORT }{;|NL}	V	
[PRESet:]OCP:START {SP} {NR2}{;|NL}	V	SET OCP START CURRENT(Istart), UNIT: A
[PRESet:]OCP:STEP {SP} {NR2}{;|NL}	V	SET OCP STEP CURRENT(Istep), UNIT: A
[PRESet:]OCP:STOP {SP} {NR2}{;|NL}	V	SET OCP STOP CURRENT(Istop), UNIT: A
[PRESet:]VTH {SP} {NR2}{;|NL}	V	
[PRESet:]OPP:START {SP} {NR2}{;|NL}	V	
[PRESet:]OPP:STEP {SP} {NR2}{;|NL}	V	
[PRESet:]OPP:STOP {SP} {NR2}{;|NL}	V	
[PRESet:]STIME {SP} {NR2}{;|NL}	V	
[PRESet:]BATT:UVP{SP}{NR2}{;| NL}	V	unit:V
[PRESet:]BATT:TIME{SP}{n}{;| NL }	V	N=0~99999 , 0=OFF means unlimited time battery discharge mode
[PRESet:]BATT:AH{SP}{NR2}{;| NL}	V	0,0.1~19999.9 ,0=OFF
[PRESet:]BATT:WH{SP}{NR2}{;| NL}	V	0,0.1~19999.9 ,0=OFF
[PRESet:]BATT:TEST{SP}{ON|OFF}{;|NL}	V	TEST ON/OFF
[PRESet:]BATT:CURRent{SP}{NR2}{;|NL}	V	
[PRESet:]SURGE: SURI {NR2}{;|NL}	V	
[PRESet:]SURGE: NORI {NR2}{;|NL}	V	
[PRESet:]SURGE: TIME {NR2}{;|NL}	V	SURGE TIME:10~1000ms
[PRESet:]SURGE: STEP {SP}{n} {;|NL}	V	n=1~5
[PRESet:]SURGE {ON|OFF}{;|NL}	V	:ON:RUN SURGE,OFF:STOP
[PRESet:]BMS{SP}{ON|OFF|1|0} {;|NL}	V	ENABLE/DISABLE BMS TEST FUNCTION ON:ENABLE , OFF:DIABLE

[PRESet:]BMS:STIME{SP}{NR2}{;|NL}	V	SET BMS SHORT TIME, UNIT: ms, 0.05~10ms
[PRESet:]SHORT:ITH{SP}{NR2}{;|NL}	V	SET BMS SHORT ITH, UNIT: A
[PRESet:]OCP:ITH{SP}{NR2}{;|NL}	V	SET BMS OCP ITH, UNIT: A
[PRESet:]OCP:TSTEP{SP}{NR2}{;|NL}	V	SET BMS OCP Tstep, UNIT: ms, 0.05~10ms/11~1000ms
[PRESet:]LIMit:ADDCV:VOLT{SP}{NR2}{;|NL}	V	
[PRESet:]LIMit:ADDCV{SP}{ON | OFF}{;|NL}	V	
[PRESet:]AVG{SP}{n}{;|NL}	V	
[PRESet:]TURBO{SP}{ON|OFF}{;|NL}	V	
PRESet :] EXT:AIN{SP}{ON|OFF}{;|NL}	V	
[PRESet:]SEQLD:TOTSTEP{SP}{n}{; |NL}	V	SET STEP，n=2~16
[PRESet:]SEQLD:TIME{n}{SP}{NR1}{; |NL}	V	SET Δ TIME=0.02~999000ms ， UNIT:ms ，n=0~15
[PRESet:]SEQLD:CC{n}{SP}{NR2}{; |NL}	V	SET CURRENT, UNIT:A， n=0~15
[PRESet:]SEQLD:CP{n}{SP}{NR2}{; |NL}	V	SET POWER, UNIT:W，n=0~15

Table 4-1B COMMUNICATION INTERFACE PROGRAMMING SETTING COMMAND SUMMARY

QUERY COMMAND SUMMARY	MODEL	RETURN
	33XXG	
[PRESet:]RISE{?} {;|NL}	V	###.####
[PRESet:]FALL{?} {;|NL}	V	###.####
[PRESet:]PERD:{HIGH|LOW}{?} {;|NL}	V	###.####
[PRESet:]LDONV{?}{;|NL}	V	###.####
[PRESet:]LDOFFV{?}{;|NL}	V	###.####
[PRESet:]CC|CURR:{HIGH|LOW} {?} {;|NL}	V	###.####
[PRESet:]CP:{HIGH|LOW} {?} {;|NL}	V	###.####
[PRESet:]CR|RES:{HIGH|LOW} {?} {;|NL}	V	###.####
[PRESet:]CV|VOLT:{HIGH|LOW} {?} {;|NL}	V	###.####
[PRESet:]TCONFIG {?}{;|NL}	V	1:NORMAL 3:OPP 2:OCP 4:SHORT
[PRESet:]OCP: START {?} {;|NL}	V	###.####
[PRESet:]OCP: STEP {?}{;|NL}	V	###.####
[PRESet:]OCP: STOP {?}{;|NL}	V	###.####
[PRESet:]VTH {?}{;|NL}	V	###.####
[PRESet:]OPP: START {?} {;|NL}	V	###.####
[PRESet:]OPP: STEP {?}{;|NL}	V	###.####
[PRESet:]OPP: STOP {?}{;|NL}	V	###.####
[PRESet:]STIME {?}{;|NL}	V	###.####
[PRESet:]OCP {?}{;|NL}	V	###.####
[PRESet:]OPP {?}{;|NL}	V	###.####
[PRESet:]BATT:RAH{?} {;|NL}	V	READ BATT TEST RESULT AH

[PRESet:]BATT:RWH{?}{ ; | NL}	V	READ BATT TEST RESULT WH
[PRESet:]BATT:RTIME{?}{ ; | NL}	V	READ BATT TEST RESULT TIME
[PRESet:]BATT:RVOLT{?}{ ; | NL}	V	READ BATT TEST RESULT VOLTAGE
[PRESet:]BATT:CURRent{?}{;|NL}	V	
[PRESet:]PROT:TIME{?}{;|NL}	V	READ BMS SHORT/OCP PROTECT TIME, UNIT: ms
[PRESet:]AVG {?} {; | NL}	V	
[PRESet:]SEQLD:TOTSTEP{?}{;|NL}	V	
[PRESet:]SEQLD:TIME{n}{?}{;|NL}	V	n=0~15
[PRESet:]SEQLD:CC{n}{?}{;|NL}	V	n=0~15
[PRESet:]SEQLD:CP{n}{?}{;|NL}	V	n=0~15

Table 4-2B COMMUNICATION INTERFACE PROGRAMMING SETTING QUERY COMMAND SUMMARY

LIMIT	MODEL	RETURN
	33XXG	
[LIMit:] IH | IL{SP}{NR2}{;| NL}	V	
[LIMit:] IH | IL {?}{;| NL}	V	
[LIMit:] WH | WL{SP}{NR2}{;| NL}	V	
[LIMit:] WH | WL {?}{;| NL}	V	###.####
[LIMit:] VH | VL{SP}{NR2}{;| NL}	V	
[LIMit:] VH | VL {?}{;| NL}	V	###.####
[LIMit:] SVH | SVL{SP}{NR2}{;| NL}	V	
[LIMit:] SVH | SVL {?}{;| NL}	V	###.####
[LIMit:] ADDCV:VOLTage{SP}{NR2}{; | NL}	V	
[LIMit:] ADDCV: VOLTage {?}{; | NL}	V	###.####
[LIMit:] ADDCV:CURR{SP}{NR2}{; | NL}	V	
[LIMit:] ADDCV: CURR {?}{; | NL}	V	###.####
[LIMit:] ADDCV:POW{SP}{NR2}{; | NL}	V	
[LIMit:] ADDCV: POW {?}{; | NL}	V	###.####
[LIMit:] ADDCV{SP}{ON| OFF} {; | NL}	V	

Table 4-3B COMMUNICATION INTERFACE PROGRAMMING LIMIT COMMAND SUMMARY

STAGE COMMAND	MODEL	REMARK
	33XXG	
[STATe:]LOAD {SP}{ON| OFF| 1| 0} {;| NL}	V	
[STATe:]LOAD {?} {;| NL}	V	0:OFF 1:ON
[STATe:]MODE {SP} {CC| CR| CV| CP} {;| NL}	V	
[STATe:]MODE {?} {;| NL}	V	0:CC 1:CR 2:CV 3:CP
[STATe:]SHOR {SP} {ON| OFF| 1| 0} {;| NL}	V	
[STATe:]SHOR {?} {;| NL}	V	0:OFF 1:ON
[STATe:]PRES {SP} {ON| OFF| 1| 0} {;| NL}	V	
[STATe:]PRES {?} {;| NL}	V	0:OFF 1:ON
[STATe:]SENSe {SP} {ON| OFF| AUTO| 1| 0} {;| NL}	V	
[STATe:]SENSe {?} {;| NL}	V	0:OFF/AUTO 1:ON
[STATe:]LEV {SP} { LOW| HIGH| 0| 1} {;| NL}	V	
[STATe:]LEV {?} {;| NL}	V	0:LOW 1:HIGH
[STATe:]DYN {SP} {ON| OFF| 1| 0} {;| NL}	V	
[STATe:]DYN {?} {;| NL}	V	0:OFF 1:ON
[STATe:]CLR{;| NL}	V	
[STATe:]NG {?}{;| NL}	V	0:GO 1:NG
[STATe:]PROT {?}{;| NL}	V	
[STATe:]CC{SP}{AUTO| R2}{;| NL}	V	
[STATe:]NGENABLE{SP}{ON| OFF}{;| NL}	V	
[STATe:]POLAR{SP}{POS| NEG}{;| NL}	V	
[STATe:]START{;| NL}	V	
[STATe:]STOP{;| NL}	V	
[STATe:]TESTING {?}{;| NL}	V	0:TEST END,1:TESTING
[STATe:]BATT:TEST {SP} {ON|OFF}{;|NL}	V	ON:START TEST,OFF:STOP TEST

Table 4-4B STAGE COMMAND SUMMARY

SYSTEM COMMAND:

COMMAND	NOTE	RETURN
[SYStem:] RECALL {SP} {m}{;| NL}	m=1~150 m:STATE ,	
[SYStem:] STORE {SP} {m}{;| NL}	m=1~150 m:STATE ,	
[SYStem:] REMOTE {;| NL}	RS232/USB/LAN command	
[SYStem:] LOCAL{;| NL}	RS232/USB/LAN command	
[SYStem:] NAME {?} {;| NL}		" XXXXX"
[SYStem:] *RST{;| NL}		

Table 4-5B SYSTEM COMMAND SUMMARY

Measure command:

COMMAND	33XXG	RETURN
MEASure: CURRent {?}{;| NL}	V	###.####
MEASure: VOLTage {?}{;| NL}	V	###.####
MEASure: POWer {?}{;| NL}	V	###.####
MEASure: VC {?}{;| NL}	V	###.####,###.####

Table 4-6B MEASURE COMMAND SUMMARY

REMARK:
1. Current engineering unit: A
2. Voltage engineering unit: V
3. Resistance engineering unit: Ω
4. Period engineering unit: mS
5. Slew-rate engineering unit: A/uS
6. Power engineering unit: W

Auto sequence:

AUTO SEQUENCE SET COMMAND	NOTE	RETURN
FILE {SP} {n}{;| NL}	n=1~9	
FILE{?}{;| NL}		1~9
STEP {SP} {n} {;| NL}	n=1~16	
STEP{?}{;| NL}		1~16
TOTSTEP {SP} {n}{;| NL}	Total step n=1~16	
TOTSTEP{?}{;| NL}		1~16
SB {SP} {n} {;| NL}	n=1~150	
SB{?}{;| NL}		1-150
TIME {SP} {NR2} {;| NL}	100~9999(ms)	100~9999(ms)
SAVE {;| NL}	Save " File n" data	
REPEAT {SP} {n} {;| NL}	n=0~9999	
REPEAT{?} {;| NL}		0~9999
RUN {SP} {F} {n} {;| NL}	n=1~9	AUTO REPLY " PASS" or " FAIL:XX" (XX=NG STEP)

Table 4-7B AUTO SEQUENCE COMMAND LIST

4-5. The description of abbreviation

SP：Space, the ASCII code is 20 Hexadecimal.

；：Semicolon, Program line terminator, the ASCII code is OA Hexadecimal.

NL：New line, Program line terminator, the ASCII code is OA Hexadecimal.

NR2：Digits with decimal point. It can be accepted in the range and format of ###.#####.

For Example：

30.12345, 5.0

The description of GPIB programming command syntax.

4-6. COMMUNICATION INTERFACE PROGRAMMING COMMAND SYNTAX DESCRIPTION

{ } ：The contents of the { } symbol must be used as a part or data of the GPIB command, it cannot be omitted.

[ ] ：The contents of the [ ] symbol indicts the command can be used or not. It depends on the testing application.

| ：This symbol means option. For example〝LOW|HIGH〞means it can only use LOW or HIGH as the command, it can choose only one as the setting command.

Terminator：You have to send the program line terminator character after send the GPIB command, the available command terminator characters which can be accepted in 3350G series mainframe is listed in Table 4-9.

LF
LF WITH EOI
CR，LF
CR，LF WITH EOI

Table 4-8 GPIB COMMAND TERMINATOR

Semicolon〝;〞：The semicolon〝;〞is a back-up command, the semicolon allows you to combine command statement on one line to create command message.

4-7. COMMUNICATION INTERFACE PROGRAMMING COMMAND DESCRIPTION

4.7.1. PRESET Set and Read the Default of Load

RISE

Syntax: [PRESet:] RISE {SP}{NR2}{;|NL}
[PRESet:] RISE{?} {;|NL}

Purpose: Set and read the RISE SLEW-RATE

Description:

1. The definition of RISE SLEW-RATE is load level change or dynamic load can be Programmed of RISE and FALL are completely independent.
2. The value of RISE has to be included the number of the decimal point, otherwise The command will not be available.
3. The least significant number is the 3th behind the decimal point.
4. 3350G series will set to the maximum value of the model automatically when The set RISE is over the specification of Load.
5. The unit is A/uS.

FALL

Syntax : [PRESet:] FALL {SP}{NR2}{;|NL}
[PRESet:] FALL{?} {;|NL}

Purpose: Set and read the FALL SLEW-RATE

Description:

1. The definition of FALL SLEW-RATE is load level change or dynamic load can be Programmed of RISE and FALL are completely independent.
2. 3350G series will set to the maximum value of the model automatically when the FALL which has been set is over the specification of Load.
3. The unit is A/uS.

PERI or PERD

Syntax : [PRESet:] PERI|PERD : HIGH|LOW{SP}{ NR2}{;|NL}
[PRESet:] PERI|PERD : HIGH|LOW{?}{;|NL}

Purpose: Set and read the TLOW and Thigh of DYNAMIC when loading

Description:

1. A period of loading waveform of DYNAMIC is combined by TLOW and THIGH.
2. The value of TLOW and THIGH have to be included the number of the decimal Point, otherwise the command will not be available.
3. The least significant number is the 5th behind the decimal point.
4. 3350G series will set the value of TLOW or THIGH automatically when the Value which has been set is over the maximum of the Load.
5. The unit is mS.

LDONv

Syntax: [PRESet:] LDONv {SP}{NR2}{;|NL}
[PRESet:] LDONv{?}{;|NL}

Purpose: Set and Read the voltage of LOAD ON

Description: This command is for setting the Load voltage value of LOAD ON.

LDOFfv

Syntax : [PRESet :] LDOFfv{SP}{ NR2}{;|NL}
[PRESet :] LDOFfv {?}{ ; |NL}
Purpose: Set and read the voltage of LOAD OFF
Description: This command is for setting the Load voltage value of LOAD OFF.

CURR: HIGH|LOW

Syntax : [PRESet :] CC|CURR: HIGH|LOW {SP}{ NR2}{ ;|NL}
[PRESet :] CC|CURR: HIGH|LOW{?}{ ; |NL}
Purpose: Set and read the current of HIGH|LOW
Description: This command is for setting the required Load current. And this Command must be followed the next notices:

1. The required value of current must be included the number of the decimal point, otherwise the command will not be available.
2. The least significant number is the 5th behind the decimal point.
3. 3350G series will set the maximum value of current of the Load Automatically when the value which has been set is over the maximum of The load.
4. The value of LOW has to be smaller than HIGH.
5. The unit is A

CP: {HIGH|LOW}

Syntax : [PRESet :] CP : { HIGH|LOW}{SP}{ NR2}{ ; |NL}
[PRESet :] CP: {HIGH|LOW}{?} { ; |NL}
Purpose: Set and read the value of Watt
Description: This command is for setting the required value of Watt, and the unit is W.

{CR|RES}:{HIGH|LOW}

Syntax: [PRESet :] CR|RES : { HIGH|LOW}{SP}{ NR2}{ ; |NL}
[PRESet :] CR|RES : { HIGH|LOW}{?} { ;|NL}
Purpose: Set and read the value of Resistance
Description: This command is used for setting the required value of Load Resistance. And this command must be followed the next notices:

1. The required value of resistance must be included the number of the decimal point, otherwise the command will not be available.
2. The least significant number is the 3rd behind the decimal point.
3. 3350G series will set to the maximum value of the model automatically when the value of Resistance which has been set is over the specification of Load.
4. The Resistance value which has been set of LOW has to be smaller than HIGH.
5. The unit is Ω.

CV: {HIGH|LOW}

Syntax: [PRESet :] CV : { HIGH|LOW}{SP}{ NR2}{ ; |NL}
[PRESet :] CV: {HIGH|LOW}{?} { ; |NL}
Purpose：Set and Read the value of Load Voltage
Description: This command is used for setting the required Load Voltage. And this command must be followed the next notices:

1. The required value of resistance must be included the number of the decimal point, otherwise the command will not be available.
2. The least significant number is the 5th behind the decimal point.
3. 3350G series will set to the maximum value of the model automatically

when the value of Voltage which has been set is over the specification of Load.

4. The Voltage value which has been set of LOW has to be smaller than HIGH.
5. The unit is Voltage (V)

TCONFIG

Syntax: [PRESet:] TONFIG {NORMAL|OCP |OPP|SHORT}{ ; |NL}
[PRESet:] TONFIG{?} {; |NL}
Purpose: Set and read the function of Dynamic test
Description: There are four options of this command. Those are NORMAL mode, OCP Test, OPP test and SHORT test.

OCP: START

Syntax: [PRESet:] OCP: START {SP}{NR2}{ ; |NL}
[PRESet:] OCP: START{?} {; |NL}
Purpose: Set and read the initial value of OCP test
Description: This command is used for setting the required initial value (I-START) of OCP test

OCP: STEP

Syntax: [PRESet:] OCP: STEP {SP}{NR2}{ ; |NL}
[PRESet:] OCP: STEP{?} { ; |NL}
Purpose: Set and read the increasing value of OCP test
Description: This command is used for setting the increasing value (I-STEP) of OCP test

OCP: STOP

Syntax: [PRESet:] OCP: STOP {SP}{NR2}{ ; |NL}
[PRESet:] OCP: STOP{?} {; |NL}
Purpose: Set and read the maximum value of OCP test
Description: This command is used for setting the maximum value (I-STOP) of OCP Test.

VTH

Syntax: [PRESet:] VTH {SP}{NR2}{ ; |NL}
[PRESet:] VTH{?} {; |NL}
Purpose: Set and read the value of the Threshold Voltage
Description: This command is used for setting the Threshold Voltage. That is the OCP/OPP of this Load model when the output voltage of appliance is lower or equaled to the VTH

OPP: START

Syntax: [PRESet:] OPP: START {SP}{NR2}{ ; |NL}
[PRESet:] OPP: START{?} {; |NL}
Purpose: Set and read the initial value of OPP test
Description: This command is used for setting the initial value (P-START) of OPP Test

OPP: STEP

Syntax: [PRESet:] OPP: STEP {SP}{NR2}{ ; |NL}
[PRESet:] OPP: STEP{?} {; |NL}
Purpose: Set and read the increasing value of OPP test
Description: This command is used for setting the increasing value (P-STEP) of OPP Test.

OPP: STOP

Syntax: [PRESet:] OPP: STOP {SP}{NR2}{; |NL}
[PRESet:] OPP: STOP {?} { ; |NL}

Purpose: Set and read the maximum value of OPP test

Description: This command is used for setting the maximum value (P-STOP) of OPP test

STIME

Syntax: [PRESet:] STIME {SP}{NR2}{ ; |NL}
[PRESet:] STIME{?} {; |NL}

Purpose: Set and read time of the short-circuit test

Description: This command is used for setting time of the short-circuit test. If time set to 0, it means that have no the time limit and continue to be short –circuited. The unit is Milli-second (ms).

OCP

Syntax: OCP {?} {; |NL}

Purpose: read OCP testing current.

Description: This command is used for read OCP current.

OPP

Syntax: OPP {?} {; |NL}

Purpose: read OPP testing watt.

Description : This command is used for read OPP watt.

BATT: UVP

Syntax: [PRESet:] BATT: UVP {SP}{NR2}{; |NL}

Purpose: Set UVP, low voltage protection function.

Description: This command is setting batty discharge test mode Disch CC or Disch CP Under Voltage Protect voltage; unit is voltage (V).

BATT: TIME

Syntax: [PRESet:] BATT: TIME {SP}{n}{; |NL}

Purpose: Setting batty discharge test mode time.

Description: This command is setting batty discharge test mode Disch CC or Disch CP Discharge test time, n=1~99999, unit is second (S).

BATT: AH

Syntax: [PRESet:] BATT: AH {SP} {NR2} {;|NL}
[PRESet:] BATT: AH{?} {;|NL}

Purpose: Set and read BATT STOP AH.

Description: This command is to set and read BATT STOP AH, 0=OFF and setting Range 0.1-19999.9.

BATT: WH

Syntax: [PRESet:] BATT: WH {SP} {NR2} {;|NL}
[PRESet:] BATT: WH{?} {;|NL}

Purpose: Set and read BATT STOP WH.

Description: This command is to set and read BATT STOP WH, 0=OFF and setting Range 0.1-19999.9.

BATT: TEST
Syntax: [PRESet:] BATT: TEST {SP} {ON|OFF} {; |NL}
Purpose: Set BATT TEST.
Description: Set BATT TEST, ON: start the test, OFF: stop the test.

BATT: RTIME
Syntax: [PRESet:] BATT: RTIME {?} {; |NL}
Purpose: Read BATT RTIME.
Description: This command is to read BATT RESULT TIME.

BATT: RAH
Syntax: [PRESet:] BATT: RAH {?} {; |NL}
Purpose: Read BATT RAH.
Description: This command is to read BATT RESULT AH.

BATT: RWH
Syntax: [PRESet:] BATT: RWH {?} {; |NL}
Purpose: Read BATT RWH.
Description: This command is to read BATT RESULT WH.

BATT: RVOLT
Syntax: [PRESet:] BATT: RVOLT {?} {; |NL}
Purpose: Read BATT RVOLT.
Description: This command is to read BATT RESULT VOLT.

BATT: CC
Syntax: [PRESet:] BATT: CC {SP}{NR2}{;|NL}
Purpose: Set or read the current for the Batt test.
Description: Set and read the current for the Batt test. The unit is "A".

BATT: CP
Syntax: [PRESet:] BATT: CP {SP}{NR2}{;|NL}
Purpose: Set or read the Watt for the Batt test.
Description: Set and read the Watt for the Batt test. The unit is "W".

SURGE: SURI
Syntax: [PRESet :] SURGE: SURI{SP} {NR2}{; | NL}
[PRESet:] SURGE: SURI {?}{; | NL}
Purpose: Setting and reading surge current mode loading current value.
Description: This command is setting and reading surge current mode testing loading Value XXX.XXX (A) SURGE CURRENT.

SURGE: NORI
Syntax: [PRESet:] SURGE: NORI{SP}{NR2}{; | NL}
[PRESet:] SURGE: NORI {?}{; | NL}
Purpose: Setting and reading surge mode normal current test loading current value.
Description: This command is setting and reading normal current testing mode loading Current value XXX.XXX (A) NORMAL CURRENT.

SURGE: TIME
Syntax: [PRESet:] SURGE: TIME{SP}{NR2}{; | NL}
[PRESet:] SURGE: TIME {?}{; | NL}
Purpose: Setting and reading surge mode current testing time.
Description: This command is setting and reading surge mode testing time, SURGE TIME:10~1000ms.

SURGE: STEP
Syntax: [PRESet:] SURGE: STEP{SP}{NR2}{;| NL}
[PRESet:] SURGE: STEP{?}{; | NL}
Purpose: Setting and reading surge mode is Diminishing current is setting value.
Description: This command is setting and reading surge mode Diminishing current Setting value, n=1~5.

SURGE: ON | OFF
Syntax: [PRESet:] SURGE: ON| OFF {; | NL}
Purpose: Setting and reading surge mode ON or OFF.
Description: This command is setting and reading surge mode ON or OFF, ON: RUN SURGE, OFF: STOP。

BMS: ON|OFF|1|0
Syntax: [PRESet:] BMS{SP} {ON|OFF|1|0} {; |NL}
Purpose: Set BMS ON or OFF.
Description: Set BMS ON or OFF, ENABLE / DISABLE BMS TEST FUNCTION ON: ENABLE, OFF: DISABLE.

BMS: STIME
Syntax: [PRESet:] BMS: STIME{SP} {NR2}{; |NL}
Purpose: Set BMS STIME.
Description: Set BMS SHORT TIME, range 0.05~10ms, unit: ms.

SHORT: ITH
Syntax: [PRESet:] SHORT: ITH {SP} {NR2}{; |NL}
Purpose: set BMS SHORT ITH.
Description: Set BMS SHORT ITH, unit: A.

OCP: ITH
Syntax: [PRESet:] OCP: ITH {SP} {NR2}{; |NL}
Purpose: Set BMS OCP ITH.
Description: Set BMS OCP ITH, unit: A.

OCP: TSTEP
Syntax: [PRESet:] OCP: TSTEP {SP} {NR2} {; |NL}
Purpose: Set BMS OCP TSTEP。
Description: Set the range of BMS OCP TSTEP 0.05~10ms / 11~1000ms, unit: ms.

AVG
Syntax: [PRESet :] AVG{SP}{n}{;|NL}
[PRESet :] AVG{?}{;|NL}
Purpose: Setting and reading voltage value/current value/watt vaqlue average times.
Description: This command is Vmeter/Ameter/Wmeter Setting measure average times , MEAS AvG 1~64 setting, initial value 1.

TURBO {ON|OFF}
Syntax: [PRESet :] TURBO {SP} {ON | OFF} {; | NL}
Purpose: Set TURBO ON or OFF.
Description: Set TURBO ON or OFF.

EXT: AIN ON | OFF
Command Syntax:
[PRESet:] EXT: AIN {SP} {ON | OFF} {; | NL}
Purpose: External Analog input ON or OFF.
Description: External Analog input ON or OFF.

SEQLD:TYPE
Syntax: SEQLD: TYPE {SP} {CC | CP} {;|NL}
SEQLD: TYPE? {;|NL}
Purpose: Set and read SEQ MODE status.
Description: This command is to set and read the status of SEQ MODE.

SEQLD: TRIG
Syntax: SEQLD: TRIG {SP} {ON} {;|NL}
Purpose: Trigger to change the SEQ CC/CP MODE setting value.
Description: During the SEQ MODE test, you can reset the load current or power value, and then use this command to trigger the change of the set value. It should be noted that after receiving the TRIG ON command, it will not change until the next set start time.

SEQLD: TEST
Syntax: SEQLD: TEST {SP} {ON | OFF} {;|NL}
Purpose: Starts or ends SEQ MODE.
Description: SEQLD: TYPE selection, start or end SEQ MODE test.

SEQLD: TOTSTEP
Syntax: SEQLD: TOTSTEP {SP} {n} {;|NL}
SEQLD: TOTSTEP{?} {;|NL}
Purpose: Set and read the total test levels of SEQ MODE.
Description: Set and read the SEQ MODE, n=2~16

SEQLD: TIME
Syntax: SEQLD: TIME{n} {SP} {NR2} {;|NL}
SEQLD: TIME{?} {;|NL}
Purpose: Set and read the test time of all levels of SEQ MODE
Description: This command is to set and read the test time of each level of SEQ MODE, n=0~15, time input range is 0.02~999000, the unit is ms. There Are 3 time range: r0=0.02~1ms, resolution is 10us. Timing r0 cannot be Set in the first Step (ΔT0), r1=2~65535ms resolution is 1ms, r2=66~999s Resolution is 1Sec.

SEQLD: CC
Syntax: SEQLD: CC{n} {SP} {NR2} {;|NL}
SEQLD: CC{n}{?} {;|NL}
Purpose: Set and read the test current value of each level of SEQ CC MODE
Description: This command is to set and read the test current of each level of SEQ CC MODE, n=0~15, the unit is ampere (A)

SEQLD: CP

Syntax: SEQLD: CP {n} {SP} {NR2} {;|NL}
SEQLD: CP {n}{?} {;|NL}

Purpose: Set and read the test power value of each level of SEQ CP MODE

Description: This command is to set and read the test power of each level of SEQ CP MODE, n=0~15, the unit is watts (W), if it be set to Range 1, all CP values Cannot exceed the power value of Range 1.

4.7.2. LIMIT Set and read the top and bottom of the Load judgment NG limit

[LIMit:] CURRent: {HIGH｜LOW} or IH｜IL

Syntax: [LIMit]: CURRent: {HIGH｜LOW}{SP}{ NR2 }{ ; ｜NL}
[LIMit]: CURRent: {HIGH｜LOW}{?} {; ｜NL}
[IH｜IL]{SP}{NR2}{; ｜NL}
[IH｜IL}{?} { ; ｜NL}

Purpose: To set the upper/lower limit value of threshold current.

Description: This command is to set the lower limit value of threshold current. When load sink current is lower than this lower limit value or higher than the upper limit value, NG indicating light will come on to indicate 〝NO GOOD〞.

[LIMit:]POWer: {HIGH｜LOW} or WH｜WL

Syntax: [LIMit] : POWer : { HIGH｜LOW}{SP}{ NR2 }{ ; ｜NL}
[LIMit] : POWer : { HIGH｜LOW} {?}{ ; ｜NL}
[WH｜WL]{SP}{ NR2 }{ ; ｜NL}
[WH｜WL] {?}{ ; ｜NL}

Purpose: To set the upper/lower limit value of threshold power (W).

Description: This command is to set the upper/lower limit value of threshold power (WATT). When power (WATT) is lower than this lower limit value or higher than the upper limit value, NG indicating light will come on to indicate 〝NO GOOD〞.

[LIMit:] VOLtage :{ HIGH｜LOW} or VH｜VL

Syntax: [LIMit] VOLtage :{ HIGH｜LOW}{SP}{ NR2 }{ ; ｜NL}
[LIMit] VOLtage :{ HIGH｜LOW}{?} { ; ｜NL}
[VH｜VL]{SP}{ NR2 }{ ; ｜NL}
[VH｜VL}{?}{ ; ｜NL}

Purpose: To set the upper/lower limit value of threshold voltage.

Description: This command is to set the upper/lower limit value of threshold voltage. When input voltage is lower than the lower limit value or higher than the upper limit value, NG indicating light will come on to indicate 〝NO GOOD〞.

[LIMit:] SVH｜SVL

Syntax: [LIMit:] {SVH｜SVL}{SP}{ NR2 }{ ; ｜NL}
[LIMit:] {SVH｜SVL}{?}{;｜NL}

Purpose: To set the upper/lower limit value of short current.

Description: This command is to set the upper/lower limit value of short current. When short current is lower than the lower limit value or higher than the upper limit value, NG indicating light will come on to indicate 〝NO GOOD〞.

[LIMit:]ADDCV: VOlTage

Syntax: [LIMit:] ADDCV:VOLTage{SP}{ NR2 }{;|NL}
[LIMit:] ADDCV:VOLTage{SP}{?}{;|NL}

Purpose: Set and read CV + Current Limit or CV + Power Limit mode of Constant Voltage setting.

Description: Set and read CV + Current Limit or CV + Power Limit mode of constant Voltage setting. This command is used for set and read constant voltage setting.
When set to CV + Current Limit, the of load like constant current status, until EUT Voltage equal setting constant voltage, into a constant voltage mode.
This command is used for setting and read constant voltage setting. When set to CV + Power Limit, the of load like constant power status, until EUT Voltage equal setting Constant voltage, into a constant voltage mode.

[LIMit:]ADDCV: CURR

Syntax: LIMit : ADDCV : CURR {SP}{ NR2 }{ ;|NL}
LIMit : ADDCV : CURR{SP}{?}{ ;|NL}

Purpose: Set and read the Constant current value of CV + Current Limit mode.

Description: When in CV + Current Limit mode, the load will be loaded with a Constant current until the voltage of the object under test is equal to the set Constant voltage Value, then it will switch to the Constant voltage mode. This command is Used to set and read its Constant current setting value.

*Note: This command can only be executed during testing.

[LIMit:]ADDCV: POW

Syntax: LIMit:ADDCV: POW {SP}{ NR2 }{ ; |NL}
LIMit: ADDCV: POW {SP}{?}{ ;|NL}

Purpose: Set and read the Constant current value of CV + Power Limit mode.

Description: When in CV + Power Limit mode, the load will be loaded in a Constant power mode until the voltage of the object under test is equal to the set Constant Voltage value, then it will switch to the Constant voltage mode. This Command is used to set and read its Constant power setting value.

*Note: This command can only be executed during testing.

[LIMit:]ADDCV:VOLtage{SP}{ON |OFF}

Syntax: [LIMit:] ADDCV:VOLtage{SP}{ON| OFF}{;|NL}

Purpose: Start and stop CV + Current Limit or CV + Power Limit test mode.

Description: At that time in Constant current mode or constant power mode to perform CV + Current Limit or CV + Power Limit mode.

4.7.3. STAGE Set and read the status of Load

[STATe:] LOAD {SP}{ON|OFF}

Syntax: [STATe:] LOAD {SP}{ON|OFF{ ; |NL}
[STATe:] LOAD{?}{ ; |NL}

Purpose: Set and read the status of Sink Current or not

Description: This command is used for setting the status of Sink Current. When setting it To ON, the Load is going to sink current from appliance. When setting it to OFF, the Load would not act.

[STATe:] MODE {SP} {CC｜CR｜CV｜CP}
Syntax: [STATe:] MODE {SP}{CC｜CR｜CV｜CP}{ ; ｜NL}
[STATe:] MODE {?}{ ; ｜NL}
Purpose: Set and read the mode of LOAD
Description: Load is acting under these four modes as the following TABLE 4-9. When reading the Loading Operation mode, the return value 0｜1｜2｜3 are meant to be CC｜CR｜CV｜CP

Mode (value)	CC (0)	CR (1)	CV (2)	CP (3)
3350G SERIES	V	V	V	V

Table 4-9 module for each series

[STATe:] SHORt {SP} {ON｜OFF}
Syntax: [STATe:] SHORt {SP}{ON｜OFF}{ ; ｜NL}
[STATe:] SHORt {?} { ; ｜NL}
Purpose: Set and read the short-circuit test of Load
Description: This command is for setting the Load to make a short-circuit test. While setting for the ON, the V+, V- pin of Load like short-circuit status.

[STATe:] PRESet {SP}{ON｜OFF}
Syntax: [STATe:] PRESet {SP}{ON｜OFF}{ ; ｜NL}
[STATe:] PRESet{?} { ; ｜NL}
Purpose: Set the left or right digit multi-function meter to display the programming load level.
Description: This command is for select the left 5 digit LCD display to show current setting or DWM.
Pres ON: To select the LCD display to shows current setting.
Pres OFF : To select the LCD Display is 〝DWM〞.

[STATe:] SENSe {SP} {ON｜OFF｜AUTO}
Syntax: [STATe:] SENSe {SP}{ON｜OFF｜AUTO }{ ; ｜NL}
[STATe:] SENSe{?} { ; ｜NL}
Purpose: Set and read the Load voltage to read whether is carried by the VSENSE or not.
Description: This command is for setting the Load voltage to read whether is carried by VSENSE or INPUT Connector. When setting for ON, the voltage is got from VSENSE, and setting for OFF, the voltage is got from INPUT Connector. In 3350G series, the optional are ON and AUTO. So, if setting for AUTO, it means the voltage is got and read from VSENSE. But if no voltage is inputted from VSENSE, the voltage will be inputted from INPUT Connector.

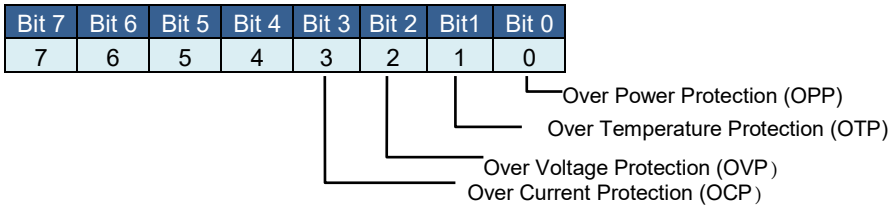
[STATe:] LEVel {SP} {HIGH｜LOW} or LEV {SP}{HIGH｜LOW}
Syntax: [STATe:] LEVel {SP}{HIGH｜LOW }{ ; ｜NL}
[STATe:] LEVel{?} { ; ｜NL}
[STATe:] LEV {SP}{HIGH｜LOW}{ ; ｜NL}
[STATe:] LEV{?} { ; ｜NL}
Purpose: Set and read the LOW and HIGH of Load
Description: LEV LOW is a low level value of current on CC mode. It is a low level value of resistance on CR mode. It is a low level value of voltage on CV mode. It is a low level value of power on CP mode.

[STATe:] DYNamic {SP} {ON|OFF}
Syntax: [STATe:] DYNamic {SP}{ON | OFF}{ ; |NL}
[STATe:] DYNamic{?} {; |NL}
Purpose: Set and read whether the status is Dynamic or Static of Load
Description:
1. DYN ON , set for a DYNAMIC Load
2. DYN OFF, set for a STATIC Load

[STATe:] CLR
Syntax: [STATe:] CLR {; |NL}
Purpose: Clear the error flag of 3350G series which during the period of working.
Description: This command is for clearing the contents in the register of PROT and ERR. After implementation, the contents of these two registers will be “0”.

[STATe:] NG?
Syntax: [STATe:] NG{?} {; |NL}
Purpose：Query if there have NG flag in this 3350G series
Description: Set command NG?to show the NG status. Set for “0” the LCD of NG (NO GOOD) will be put out .Set for”1” the LCD will be lit.

[STATe:] PROTect?
Syntax: [STATe:] PROTect{?}{ ; |NL}
Purpose: Query if there have protection flag which had been set in this 3350G series.
Description:
1. PROT? Means the status of Protection of 3350G Series. “1” means OPP occurred.”4”means OVP. “8” means OCP. Table 4-10 shows the corresponding number of protection status
2. Use command CLR to clear the register of PROT status to be “0”



BIT ID	BIT VALUE	REMARK
bit 0	0 = Off, 1 = Triggered	Over Power Protection (OPP)
bit 1	0 = Off, 1 = Triggered	Over Temperature Protection (OTP)
bit 2	0 = Off, 1 = Triggered	Over Voltage Protection (OVP)
bit 3	0 = Off, 1 = Triggered	Over Current Protection (OCP)

Table 4-10 register of PROT status

[STATe:] CCR {AUTO|R2}
Syntax: [STATe:] CCR {AUTO|R2}{;|NL}
Purpose: Set the CC MODE RANGE to be forced to switch to RANGE II
Description: It will switch the RANGE position automatically when setting for AUTO Set R2 when implementing RANGE II.

[STATe:] NGEABLE {ON|OFF}
Syntax: [STATe:] NGEABLE {ON|OFF} {;|NL}
Purpose: To set the GO/NG check function enable or disable.
Description: To set the function of NG judgment opens when POWER ON. When setting for POWER OFF, the function of NG judgment will not be implemented.

[STATe:] POLAR {POS|NEG}
Syntax: [STATe:] POLAR {POS|NEG} { ; |NL}
Purpose: Set for the display of the voltage meter shows the pole is contrary or not.
Description: Set the display of the voltage meter shows the pole. If it shows POS that means the pole is not contrary. If the pole is contrary, it will show NEG.

[STATe:] START
Syntax: [STATe:] START {; |NL}
Purpose: Set for Load to implement the test.
Description: Set for Load to implement the test, and according to TEST CONFIG (TCONFIG), the Load will start to test the items and parameters which are Required.

[STATe:] STOP
Syntax: [STATe:] STOP {; |NL}
Purpose: Set for Load to stop the test.

[STATe:] TESTING?
Syntax: [STATe:] TESTING{?} {;|NL}
Purpose: Query to whether the 3350G series is in the test execution state.
(0: Test end, 1: During testing)

4.7.4. SYSTEM Set and Read the Status of 3350G series.

[SYStem:] RECall {SP} m {, n}
Syntax: [SYStem:] RECall {SP} m {; |NL}
Purpose: Recall the status of Loading which had been saved in the Memory
Description: This command is for recalling the status of Load which had been saved in The memory.
m (STATE)=1~150.
For Example
RECALL 2 → Recall the status of Loading which had been saved in the 2nd of the Memory.

[SYStem:] STORe {SP} m {, n}
Syntax: [SYStem:] STORe {SP} m {; |NL}
Purpose: Save the status of Loading to the memory.
Description: This command is for saving the status of Loading to the memory.

m (STATE)=1~150
For Example
STORE 2 → Save the status of loading which had been saved in the 2nd of memory.

	3350G SERIES
STATE(m)	150

[SYStem:] NAME?
Syntax: [SYStem:] NAME{?} { ; |NL}
Purpose: Read the model number of Load
Description: This command is for reading the model number of Load. If no module is Operating, the display will be lit “NULL”, or it will be lit the model number as Table 4-11:

Model		
3351G	3361G	3371G
3352G	3362G	3372G
3353G	3363G	3373G
3354G	3364G	3374G
3355G	3365G	3375G
3356G	3366G	3376G

Table 4-11 MODEL NUMBER

[SYStem:] REMOTE
Syntax: [SYStem:] REMOTE { ; |NL}
Purpose: Command to enter the REMOTE status (only for RS232)
Description：This command is for controlling the RS232

[SYStem:] LOCAL
Syntax: [SYStem:] LOCAL {; |NL}
Purpose: Command to exit the REMOTE status (only for RS232)
Description: This command is for finishing the RS232

4.7.5. MEASURE Measure the actual current and voltage value of Load

MEASure: CURRent?
Syntax: MEASure : CURRent{?}{ ; |NL}
Purpose: Read the current which is loading of Load
Description: Read the five numbers of current meters, and the unit is Ampere (A).

MEASure: VOLTage?
Syntax: MEASure: VOLTage{?} {; |NL}
Purpose: Read the voltage which is loading of Load
Description: Read the five numbers of current meters, and the unit is Voltage (V).

MEASure: POWer?
Syntax: MEASure: POWer {?}{ ; |NL}
Purpose: Read the power which is loading of Load
Description: Read the five numbers of current meters, and the unit is Watt (W).

4.7.6. Auto Sequence

FILE {SP} {n}{;| NL}
Syntax: FILE {SP} {n}{; | NL}
FILE{?} { ;| NL}
Purpose: Setting file numbers of Auto Sequence.
Description: Reads the automatic test number setting of the AUTO Sequence function And the set automatic test number.
The setting range is 1-9, and the number is the automatic test number.

STEP {SP} {n}{;| NL}
Syntax: STEP {SP} {n} {;| NL}
STEP {?} {; | NL}
Purpose: Setting step numbers of sequence step.
Description: To setting step numbers of sequence step. The n is 1~16

TOTSTEP {SP} {n}{;| NL}
Syntax: TOTSTEP {SP} {n}{ ;| NL}
TOTSTEP{?} {;| NL}
Purpose: Setting total step numbers of sequence step.
Description: To setting total step numbers of sequence step the n is 1~16.

SB {SP} {n} {;| NL}
Syntax: SB {SP} {n} { ;| NL}
SB{?} {; | NL}
Purpose: Setting and Reads the memory bank.
Description: Set the step execution content to the step with the automatic test number Set by the "STEP" command.
The step execution contents are various setting states (up to 150 types) Saved in the 3350G series memory. The setting range is 1: Various setting States 1 – 150: Various setting states 150.

TIME {SP} {NR2} {;| NL}
Syntax: TIME {SP} {NR2} {;| NL}
Purpose: The setting range is 100-9999, and the unit is "ms".
Description: Set the step execution time of the automatic test number set by the "STEP" command, and read the set step execution time.

SAVE {; | NL}
Syntax: SAVE {;| NL}
Purpose: Save auto sequence edit data.
Description: Saves the settings of the automatic test number set by the "FILE" command.

REPEAT {SP} {n} {;| NL}
Syntax: REPEAT {SP} {n} { ;| NL}
REPEAT{?} {;| NL}
Purpose: Setting repeat time for the sequence step.
Description: Reads the execution repeat count setting of the automatic test number set By the "FILE" command and the set repeat count.
Setting range: 0-9999

RUN {SP} {F} {n} {;|NL}

Syntax: RUN {SP} {F} {n} {;|NL}

Purpose: To “Run” the sequence file number.

Description: Specify an automatic test number and run the automatic test against that Number. Specified range: 1 to 9.

When the automatic test is finished, you will receive an auto reply.

Chapter 5 Applications

This chapter details the basic operating modes along with some common applications in which the 3350G series Electronic Load are used.

5-1. Local sense connections

Local sensing is used in applications where the lead lengths are relatively short, or where load regulation is not critical. When connected in local sense mode the 5 digit voltage meter of the 3350G series Electronic load measures the voltage at its DC input terminals. The connecting leads between the DUT and the Electronic Load should be bundled or tie wrapped together to minimize inductance.

Fig 5-1 illustrates a typical set up with the electronic load connected to the DC power supply.

Fig 5-1 Local voltage sense connections

5-2. Remote sense connections

Remote sensing compensates for the voltage drop in applications that require long lead lengths. It is useful under low voltage high current conditions. The remote voltage sense terminals (Vs+) and (Vs-) of the load are connected to (+) and (-) output of the DC Source. Be sure to observe the correct polarity or damage may occur. The power and sense cables should be bundled or tie wrapped together to minimize inductance.

Fig 5-2 illustrates a typical set up with the electronic load connected for remote sense operation.

If V-sense is set to 'ON' and the sense terminals are connected to the DUT the load will check and compensate for all voltage drops. The maximum voltage sense compensation is the same as the rating of the 3350G series.

For example Vmax of 335XG is 150Vdc so maximum Vsense is also 150Vdc.

For example Vmax of 336XG is 600Vdc so maximum Vsense is also 600Vdc.

For example Vmax of 337XG is 1200Vdc so maximum Vsense is also 1200Vdc.

Fig 5-2 Remote voltage sense connections

5-3. Constant Current mode application

The Constant Current (CC) mode is ideal for testing the Load Regulation, Cross Regulation, Output Voltage and Dynamic Regulation of the power supply under test. The CC mode can also be used to test the Discharge Characteristics and the Life Cycle of cells and battery packs. In CC operation the 3350G series can operate as a static load with switchable high and low current levels. It is also possible to operate the load dynamically enabling the user to adjust sink current with time.

5.3.1 Static mode: (Fig 5-3)
Major application areas include:

- Voltage source testing
- Power supply load regulation testing
- Battery discharge testing

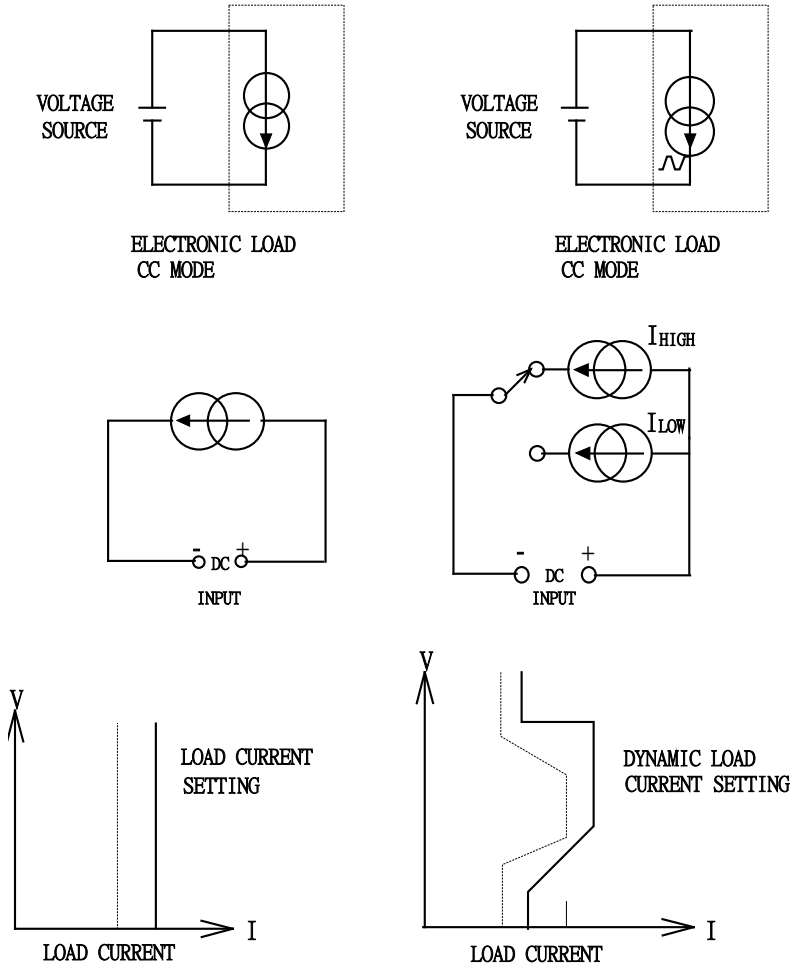


Fig 5-3 constant CURRENT mode application

5.3.2 Dynamic mode:

The built-in pulse generators allow the user to recreate real world loads that vary With time.

Major application areas for dynamic operation in CC mode include:

- Power supply load transient response testing
- Power recovery time testing
- Battery Pulse load simulation
- Power component testing
- Two levels of current can be set and the rate of change between the 2 current Levels can be adjusted in relation to time. The current rise (slew) rate and the current fall (slew) rate can be adjusted independently from each other and are further defined below

- Rise slew rate = | Ilow - Ihigh | / Ta (A/us)
- Fall slew rate = (Ihigh - Ilow) / Tb (A/us)
- Rise time(Ta) = (Ilow - Ihigh) / Rise slew rate
- Fall time(Tb) = (Ihigh - Ilow) / Fall slew rate

- Please see Fig 1-7 for more information on slew rates.
- The time the waveform is high (Thigh) and the time the waveform is low (Tlow) can also be adjusted. The diagram below shows the 6 adjustable parameters that define the dynamic waveform.

5.3.3 Analogue programming input

The analogue programming input can also be used in CC mode. The analogue Programming input allows a complex dynamic waveform to be set up on an external Oscillator. The 3350G series load will track and load according to the external Signal as long as it is within its dynamic capability. The input signal can be the range Of 0~10V. The 10V is proportional to the full current capability of the load.

More information on the analogue programming input can be seen in section 3.2.

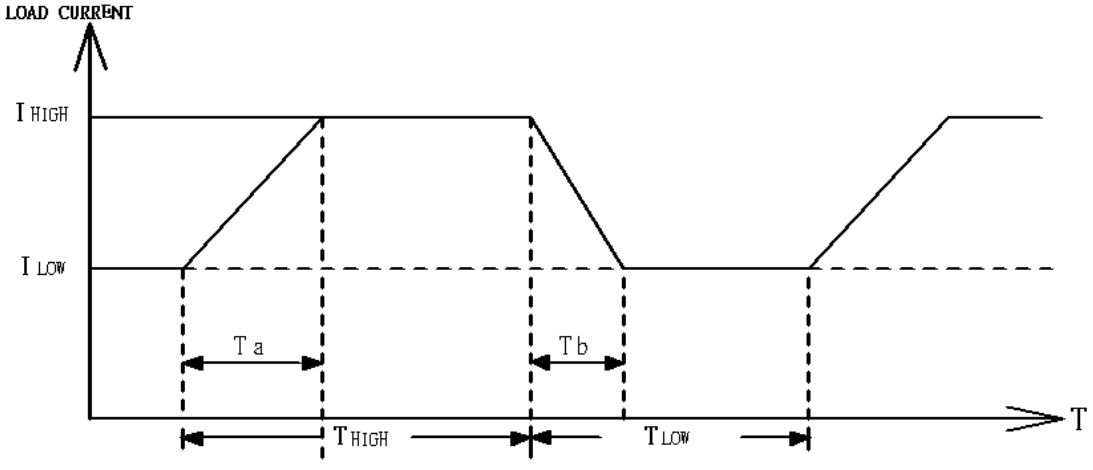


Fig 5-4 Dynamic load current with independent programmed Rise/Fall slew rate

5-4. Constant Voltage mode application

In Constant Voltage (CV) operation the load will attempt to sink as much current as required in order to reach the set voltage value. CV operation is useful in checking the load regulation of dc current sources. The CV mode is also ideal for characterizing the current limit of dc power supplies. These application areas are explained a little more below.

5.4.1 Current source testing.

A common application for a dc current source is as a battery charger. Most battery chargers are designed to automatically adjust their charging current according to the battery voltage. In CV mode the electronic load will sink the current that is needed to reach the desired voltage. The CV mode is therefore ideal for checking the charge current at a particular voltage level.

If the battery charger is tested at a number of different voltage levels in CV mode a current curve can be recorded. Thus the battery charger's load regulation can be checked during development, production and batch testing.

5.4.2 Power supply current limit characterization

The current limit is a necessary function for power supplies. The fold back current limit curve is very common for fixed output switching power supplies. The constant current limit curve is more popular for adjustable laboratory power supplies.

It is very difficult or impossible to find the current limit curve by CC or CR mode. However it becomes simple by using CV mode. The user sets the CV voltage and Records the output current. Plotting the current measurements against the voltage Settings result in the output current limit curve of a power supply (Figure 5-5).

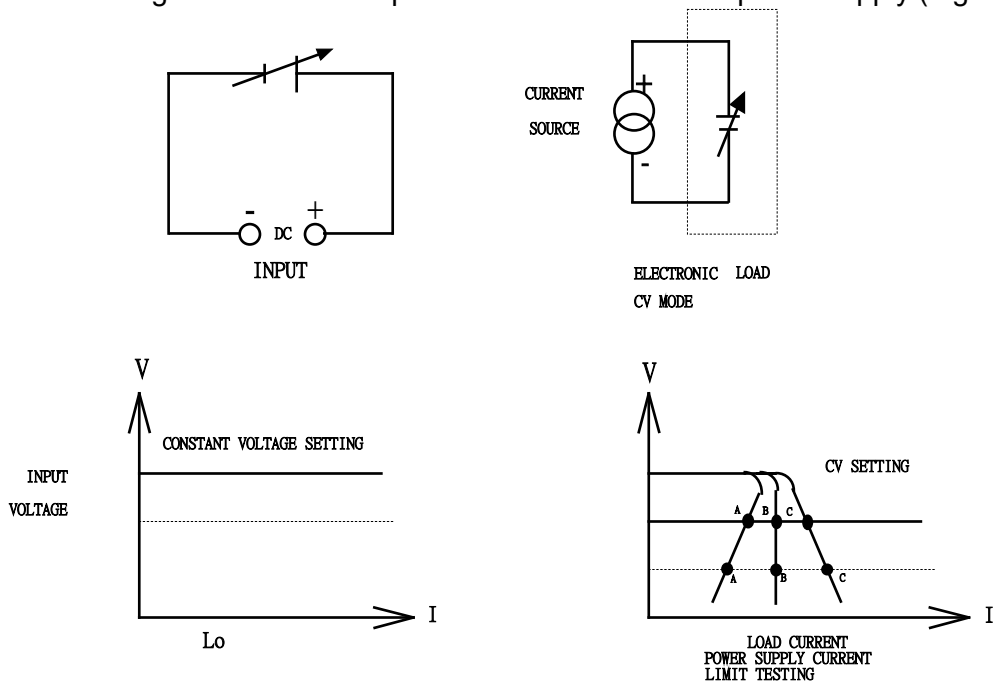


Fig 5-5 Constant Voltage mode application

5-5. Constant Resistance mode application

Operating in Constant Resistance mode is useful for testing both voltage and current sources. The CR mode is particularly suited for the 'soft start' of power supplies. This is explained in more detail below.

5.5.1 Power supply power up sequence

In constant current mode the demand at initial 'Load ON' of the preset current value is almost instantaneous. This might cause the Device under Test (DUT) problems meeting the relatively high current demand at initial switch on.

For example: A 5V/50A output power supply may not be able to deliver 50A over its entire start-up range of 0-5 volts. In many cases the power supply's short circuit or over current protection circuit cause the power supply to shut down. This is because the power supply is trying to deliver the 50A at a voltage level that is too low.

The answer to this problem is not to use CC mode but to use CR mode instead. This is because in CR mode the current and voltage ramp up together providing a 'soft start' when compared to standard CC mode.

However please note that with the 3350G series of Electronic Loads allow an adjustable current ramp can be set. This feature is found within the dynamic settings as RISE slew rate. Even in static mode the 3350G series load will regulate its current demand at 'Load ON' in line with the adjusted RISE slew rate. The FALL slew rate also in the dynamic settings allows the current ramp down to be controlled at 'Load OFF'.

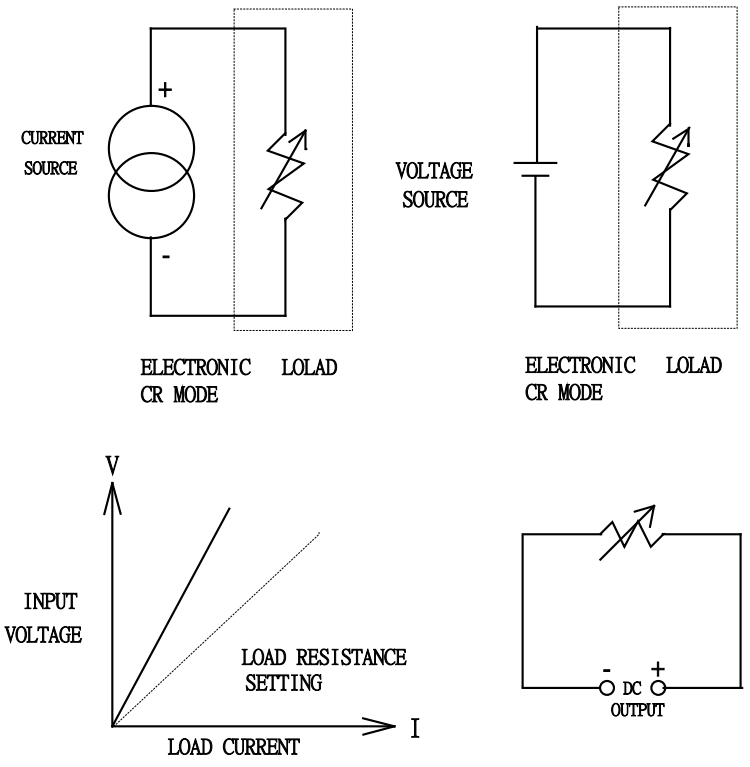


Fig 5-6 Constant Resistance mode Application

5-6. Constant Power mode application

5.6.1. Battery Evaluation

Primary or secondary batteries are the power source for a wide range of portable electronics products, such as notebook computers, video cameras and mobile phones. To ensure long usage times and customer satisfaction the battery pack should be able to provide a constant power for the longest time possible.

It can be measured that the output voltage of a battery will drop over time (Fig 5-7a). The rate of voltage decay depends on a number of factors including duty cycle, chemistry type, battery age and ambient temperature.

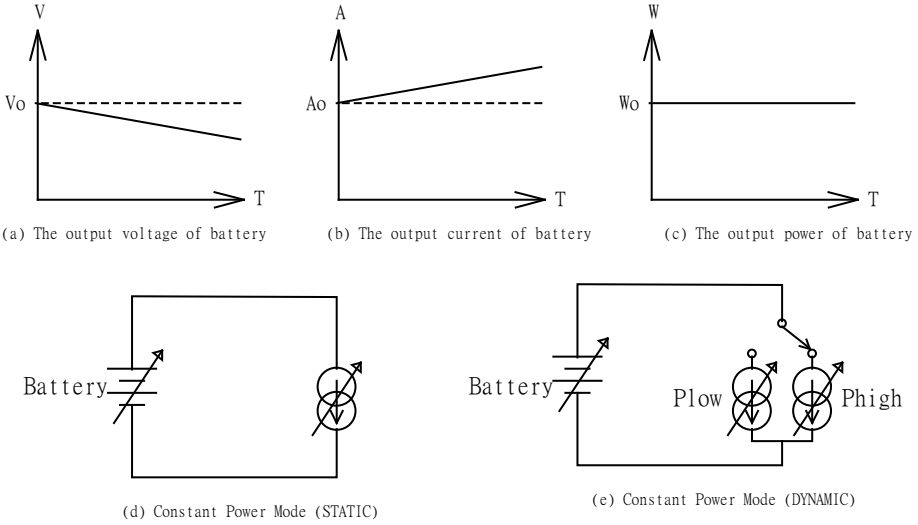
So to keep the device powered for the longest possible time the battery must be able to provide a stable power output regardless of output voltage (Fig 5-7c). In order to maintain a constant power the output current will need to increase over time to compensate for the reducing voltage (Fig 5-7b).

Note: During CP operation, please connect Vsense to the output terminal of the object under test to avoid the CP operation failure caused by the voltage drop of the wire.

Operating the 3350G series electronic load in CP mode is ideal for testing the characteristics of a battery. This is because as the battery voltage drops the load current will automatically increase in order to keep the CP setting. By logging sink values against time the test engineer can also measure the battery's energy capacity at various discharge rates.

The 3350G series also features an adjustable Load OFF setting. This allows a voltage level to be set so that the electronic load automatically stops sinking power upon reaching this preset voltage. This can be used to ensure the battery is not subjected to a damaging deep discharge.

Along with static operation the load can also be operated dynamically in CP mode. The dynamic functions allow the ramp, fall and plateau times to be adjusted between 2 levels of power. This capability means that 'real world' loads can be more accurately simulated. For example the dynamic mode could be used to test the performance of a battery that is required to provide power pulses to transmit data from a radio frequency terminal.



(a) The output voltage of battery (b) The output current of battery (c) The output power of battery

(d) Constant Power Mode (STATIC) (e) Constant Power Mode (DYNAMIC)

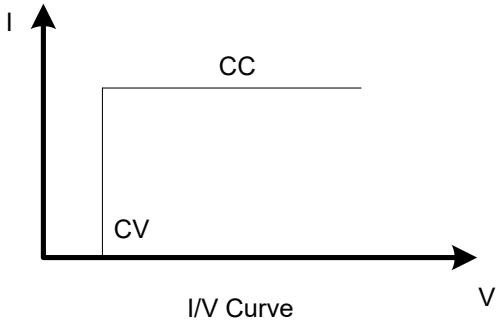
Fig 5-7 CONSTANT POWER MODE APPLICATION

5-7. Applications with current limiting or power limiting function CV mode operation (charging device)

Operating in the current-limiting CV mode, the 3350G series can limit current or power when operating at a Constant voltage load. It is especially suitable for charging piles, Constant current sources and other power product testing applications.

Operation method:

- Connect the DUT to the LOAD INPUT terminal
- Switch the electronic load to CC Mode or CP Mode first, and press the Preset key to set the current limit point or power limit point.
- Press the Limit key, and "Add.CV" will appear on the LCD display. At this time, after setting the CV value to be set, press START KEY to start the test.
- If you need to modify the current limit or power limit during the test, you can change the current limit or power limit after pressing the Preset button again.
- If you need to change the CV test point during the test, press the Limit button again, and “Add.CV” will appear on the LCD screen again. At this time, the CV setting value can be changed.
- Finally, press STOP KEY to stop the test.



I/V Curve

Remote control CV + current limit or power limit

for example

- REMOTE (Set up remote control)
- MODE CC or CP (Set to CC or CP mode)
- CC:HIGH 20 or CP:HIGH 2000 (Set current limit to 20A or limit power 2000W)
- LIM:ADDCV:VOLT 50 (Set the Constant voltage to 50V)
- LIM:ADDCV ON (Start testing CV + current limit or power limit mode)
- LIM: MEAS: CURR? (Read the current value of the electronic load)
- LIM: MEAS: VOLT? (Read the voltage value of the electronic load)
- LIM:ADDCV:CURR 25 (Modify the current limit to 25A during the test)
- LIM:ADDCV:POW 2500 (Modify the power limit point to 2500W during the test)
- LIM:ADDCV:VOLT 40 (Modify the Constant voltage to 40V)
- LIM:ADDCV OFF (Stop testing CV + current limit or power limit mode)

5-8. Applications with current limiting or power limiting function CV mode operation (charging device)

Operate in CC mode to CV mode, 3350G series at the same time as a Constant Current and Constant Voltage Load, as shown in Fig 5-8.

When Operating at Constant Current (CC) load, 3350G series electronic load to Voltage source (VBatt) Constant Current load (I) and keep Constant Voltage.

When Operating at Constant Voltage Load on, the VBatt is greater than V, Input current changes its input voltage is keep fixed.

When the VBatt voltage is less than equal to the set voltage CV, the load does not sink current.
Operation Way:

- Load input terminals are connected to the DUT
- Change to CC mode and setting CC current setting.
- Press Limit key to setting the CV voltage and the display will show “+Add.CV”.
- Press START key to start up the CC+CV test, and press “STOP “key to stop CC+CV Test.

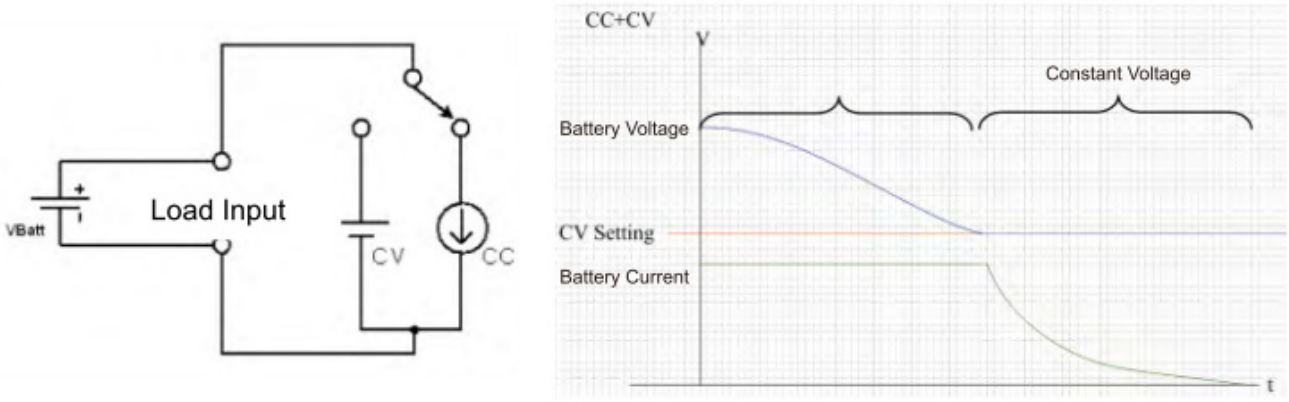


Fig 5-8 CC+CV mode operation application

Remote Control CC+CV
for example：

REMOTE	（Setting Remote Control）
MODE CC	（Setting CC mode）
CC：HIGH 20	（Setting load on current 20A）
LIM:ADDCV:VOLT 50	（Setting Constant Voltage is 50V）
LIM : ADDCV ON	（Start testing CC to CV mode ）
LIM: MEAS: CURR?	（Read current value）
LIM: MEAS: VOLT?	（Read Voltage value）
LIM: ADDCV: CURR 25	(Modify the current limit to 25A during the test)
LIM : ADDCV OFF	（Stop testing CC switch to CV mode ）

5-9. Application with switching from CP mode to CV mode operation (battery discharge)

Operating in CP to CV mode, 3350G series at the same time as a Constant Power and Constant Voltage Load, as shown in Fig 5-9.

When Operating at Constant Power (CP) load, 3350G series electronic load provides Specified power, independent Constant Voltage source (VBatt) is output voltage.
When Operating at Constant Voltage Load on, the VBatt is greater than V, Input power Changes its input voltage is keep fixed.

When the VBatt voltage is less than equal to the set voltage CV, the load does not sink Current.
Operation Way:

- Load input terminals are connected to the DUT
- Change to CP mode and setting CP power setting.
- Press Limit key to setting the CV voltage and the display will show “Add.CV”.
- Press START key to start up the CP to CV test, and press “STOP “key to stop CP to CV Test.

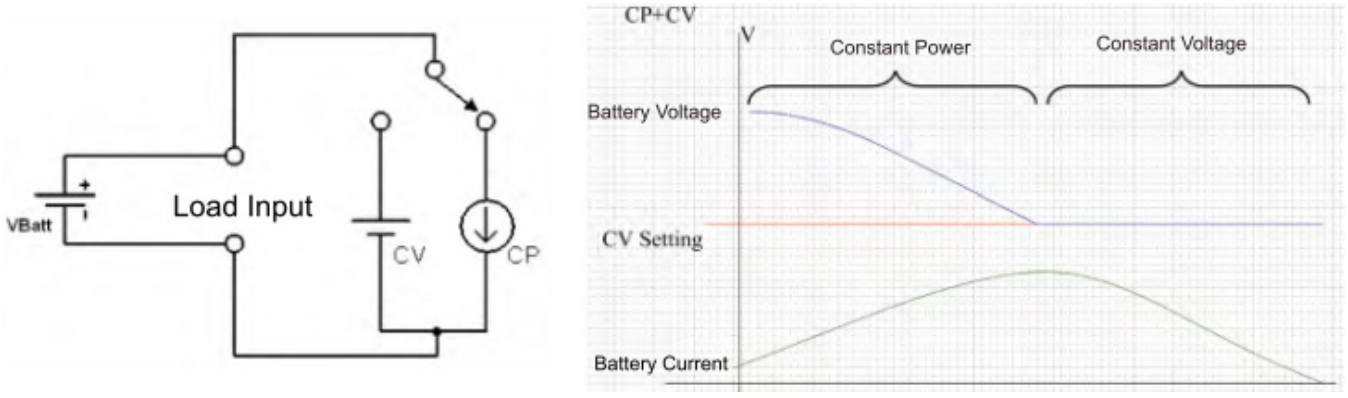


Fig 5-9 Application of CP to CV operation mode

Remote control CP to CV mode
for example：

REMOTE	(Setting Remote Control)
MODE CP	(Setting CP mode)
CP: HIGH 100	(Setting Constant power is 100W)
LIM: ADDCV: VOLT 50	(Setting Constant Voltage is 50V)
LIM: ADDCV ON	(start test CP to CV mode)
LIM: MEAS: POW?	(Read Power value)
LIM: MEAS: VOLT?	(Read Voltage value)
LIM: ADDCV: POW 2500	(Modify the power limit point to 2500W during the test)
LIM: ADDCV OFF	(stop test CP to CV mode)

5-10. Constant current source operating

3350G Series High-power electronic load can be used as a Constant current source when used in series with a constant voltage source for charging the battery or other applications, as shown in Fig 5-10.

Fig 5-10 constant current source connection

5-11. Zero-Volt loading application

As shown in Fig 5-11, the electronic load can be connected in series with a DC voltage source which output voltage greater than 10V. so that the device under test that are connected to the electronic load can be operated down to a Zero- Volt condition, the DC voltage source provides the minimum 10V operating voltage required by the electronic load. This application is suitable for low voltage Battery cell with high discharge current testing.

Fig 5-11 Zero-Volt loading connection

5-12. Parallel operation

It is possible to operate load in parallel if the power and/or current capability of a single 3350G series load is not sufficient.

The positive and negative outputs of the power supply are connected individually to each load module as shown in the Fig 5-12 below. The setting is made at each individual load module. The total load current is the sum of the load currents being taken by each load.

While in static mode the load modules can be set to operate in CC, CR or CP. When using multiple loads to sink power from a single DC Source it is not permissible to operate in dynamic mode.

Note: 1. the electronic load only may carry on the parallel operation under the fixed electric current Pattern.
2. The electronic load do not use under series connection.

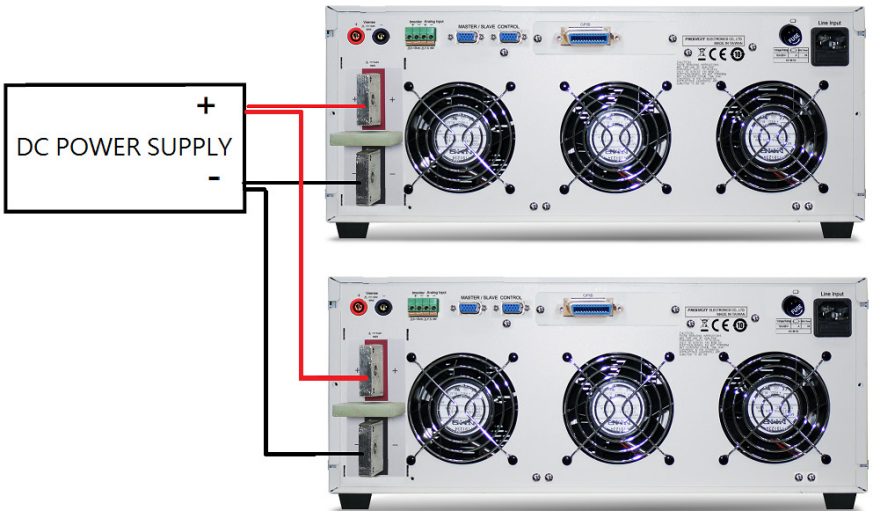


Fig 5-12 3350G series load parallel operation

5-13. Power Supply OCP testing

5.13.1 OCP Manual control

Example:

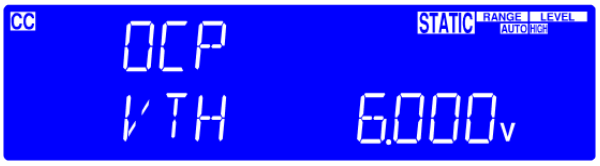
5.13.1.1. First, press Limit Key function to setting I_Hi & I_Lo.
5.13.1.2. Setting OCP test, press OCP key to the next step.

5.13.1.3. Setting start load current 0A, press OCP key to the next step.

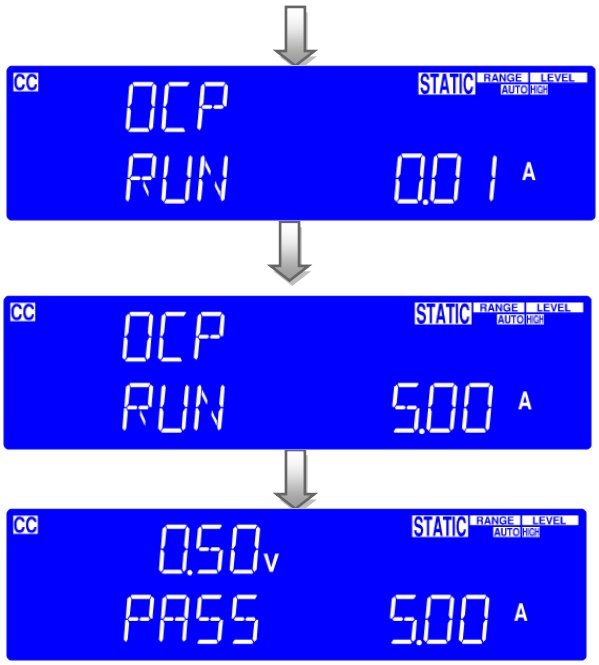
5.13.1.4. Setting step load current 0.05A, press OCP key to the next step.

5.13.1.5. Setting stop load current 5A, press OCP key to the next step.

5.13.1.6. Setting OCP VTH 6.000V, press OCP key to the next step.



5.13.1.7. Press START/STOP test key.



5.13.1.8. the UUT's output voltage drop-out lower than the threshold voltage(V-th Setting), and the OCP trip point is between I_Hi and I_Lo limitation, then Middle 5 digits LCD display will shows "PASS", otherwise shows "FAIL".

5.13.2 Remote control OCP

EX:

REMOTE	(Set Remote)
TCONFIG OCP	(Set OCP test)
OCP:START 0.1	(Set start load current 0.1A)
OCP:STEP 0.01	(Set step load current 0.01A)
OCP:STOP 2	(Set stop load current 2A)
VTH 3.0	(Set OCP VTH 3.0V)
IL 0	(Set current low limit 0A)
IH 2	(Set current high limit 2A)
NGENABLE ON	(Set NG Enable ON)
START	(Start OCP testing)
TESTING?	(Ask Testing? 1 : Testing,0 : Testing End)
NG?	(Ask PASS/FAIL?, 0 : PASS,1 : FAIL)
OCP?	(Ask OCP current value)
STOP	(Stop OCP testing)

5-14. Power Supply OPP testing

5.14.1. OPP Manual control

Example:

5.14.1.1. First, press Limit Key function to setting W_Hi & W_Lo.

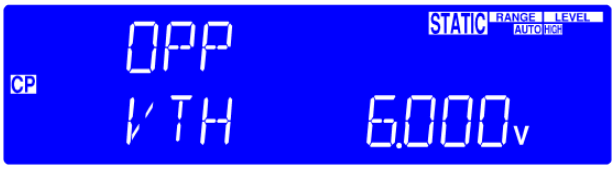
5.14.1.2. Setting OPP test, press OPP key to the next step.

5.14.1.3. Setting start load watt 0W, press OPP key to the next step.

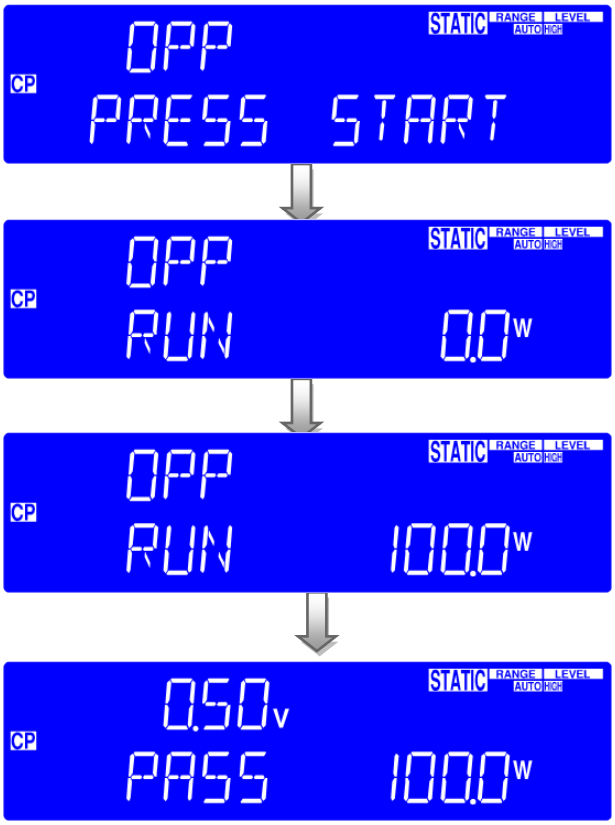
5.14.1.4. Press up key, set step load watt 0.5W, press OPP key to the next step.

5.14.1.5. Press up key, set stop load watt 100W, press OPP key to the next step.

5.14.1.6. Setting OPP VTH 6.000V，press OPP key to the next step.



5.14.1.7. Press START/STOP Test key.



5.14.1.8. the UUT's output voltage drop-out lower than the threshold voltage (V-th setting), and the OPP trip point is between W_Hi and W_Lo limitation, then Right 5 digits LCD display will shows "PASS", otherwise shows "FAIL".

5.14.2. Remote control OPP

EX:

REMOTE	(Set Remote)
TCONFIG OPP	(Set OCP test)
OPP:START 3	(Set start load watt 3W)
OPP:STEP 1	(Set step load watt 1W)
OPP:STOP 5	(Set stop load watt 5W)
VTH 3.0	(Set OPP VTH 3.0V)
WL 0	(Set watt low limit 0W)
WH 5	(Set watt high limit 5W)
NGENABLE ON	(Set NG Enable ON)
START	(Start OPP testing)
TESTING?	(Ask Testing? 1:Testing,0:Testing End)
NG?	(Ask PASS/FAIL?,0:PASS,1:FAIL)
OPP?	(Ask OPP watt value)
STOP	(Stop OPP testing)

5-15.SHORT testing

5.15.1. SHORT Manual control

Example:

5.15.1.1. Setting SHORT test, press Short key to the next step.

5.15.1.2. Press UP key, setting Short time to 10000ms, press Short key to The next Step.

5.15.1.3. Press down key, setting V-Hi voltage to 1.00V, press Short key To the next Step.

5.15.1.4. Press down key, setting V-Lo voltage to 0V, press Short key to the Next Step.

5.15.1.5. Press START/STOP test key.

5.15.1.6. Short test finish, the UUT's drop voltage is between V_Hi and V_Lo limitation, then middle 5 digits LCD display will shows "PASS"

5.15.1.7. The UUT's not drop voltage is between V_Hi and V_Lo limitation, LCD display will shows fail.

5.15.2. Remote control SHORT

EX:

REMOTE	(Set Remote)
TCONFIG SHORT	(Set SHORT test)
STIME 1	(Set short time 1ms)
START	(Start SHORT testing)
TESTING?	(Ask Testing? 1:Testing,0:Testing End)
STOP	(Stop SHORT testing)

5-16. Battery discharge test

There are 4 types battery discharge for the battery discharge application.

5.16.1. Disch CC / Disch CP measure discharge capacity, Fig 5-13, user option mode CC or CP mode, firstly, Setting UVP(under voltage protect = stop discharge voltage), testing LOAD ON, when battery voltage less than UVP LOAD OFF Display total discharge capacity AH/WH. Please refer to the section 3.2.18 for discharge test item operating.

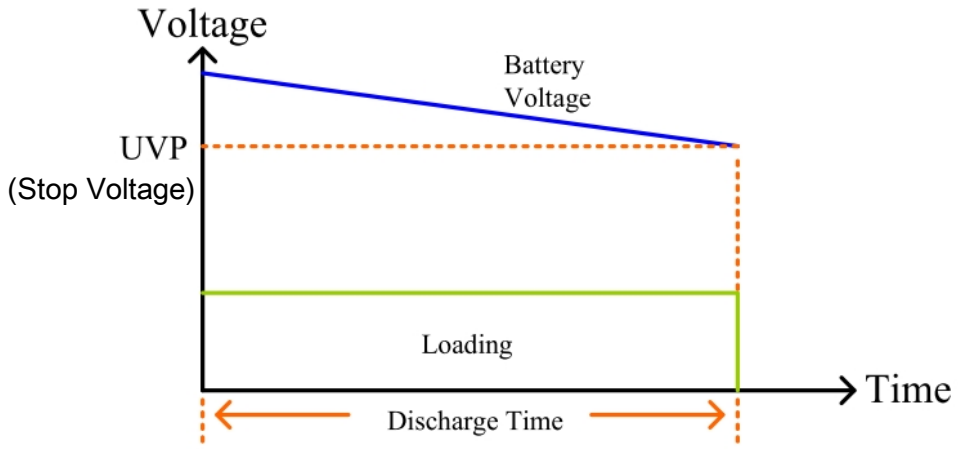


Fig 5-13 Battery Discharge Figure

5.16.2. CV+Current Limit: Refer to Chapter 5-8 for the operation mode.

5.16.3. CV+Power Limit: Refer to Chapter 5-9 for the operation mode

5.16.4. Operation method: Disch CC / Disch CP can be operated manually and REMOTE, manual operation instructions:

5.16.4.1. Disch CC / Disch CP: Setting BATT: CC or BATT: CP, Setting BATT: UVP, setting stop discharge time BATT: TIME, Setting stop discharge capacity BATT: AH or BATT: AH, then"BATT: TEST ON" command start testing, when batty voltage less than UVP value then LOAD OFF, on behalf of the end of the test, When it ends LOAD remote will show"OK, XXXXX", XXXXX representative total discharge capacity: AH / WH.

Example:

When Disch CC	When Disch CP
BATT: CC 2.34	BATT: CP 2.34
BATT: UVP 12.0	BATT: UVP 12.0
BATT: TIME 6000	BATT: TIME 6000
BATT: AH 999	BATT: WH 999
BATT: TEST ON	BATT: TEST ON

5-17.Abnormal testing of power supply

Including AC / DC, DC / DC power supply, Adapter / Charger these products are not only to supply a stable voltage or current, but also need to be able to protect the abnormal situation in order to ensure safety, there will not be overheating or high temperature due to high current, and even cause a fire and other hazards.

Short, Over Current, Over Power are abnormal condition, and these anomalies are typically 125% to 150% of the normal rating, or even 200%, therefore, in the test to test these abnormal conditions, you must choose to meet the maximum current value and the maximum power value of the electronic load to perform the test.




Model	**3351G**		**3352G**		**3353G**	
Turbo Mode *5	**OFF**	**ON**	**OFF**	**ON**	**OFF**	**ON**
Short/OCP/OPP Test Function						
Maximum Current	100 A	150 A	200 A	300 A	300 A	450 A
Test Accuracy *6	± 1.0% of (Reading + Range)					
Short time	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS
OCP/OPP Time (Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS

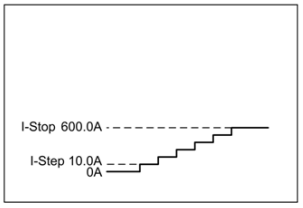
Model	**3354G**		**3355G**		**3356G**	
Turbo Mode *5	**OFF**	**ON**	**OFF**	**ON**	**OFF**	**ON**
Short/OCP/OPP Test Function						
Maximum Current	400 A	600 A	500 A	750 A	600 A	900 A
Test Accuracy *6	± 1.0% of (Reading + Range)					
Short time	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS
OCP/OPP Time (Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS

Model	3361G		3362G		3363G	
Turbo Mode *5	OFF	ON	OFF	ON	OFF	ON
Short/OCP/OPP Test Function						
Maximum Current	70 A	105 A	140 A	210 A	210 A	315 A
Test Accuracy *6	± 1.0% of (Reading + Range)					
Short time	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS
OCP/OPP Time (Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS

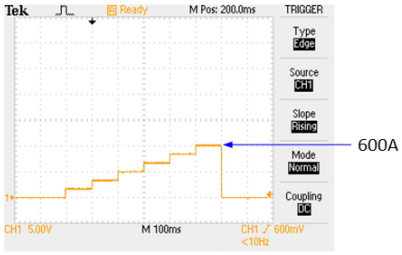
Model	3364G		3365G		3366G	
Turbo Mode *5	OFF	ON	OFF	ON	OFF	ON
Short/OCP/OPP Test Function						
Maximum Current	280 A	420 A	350 A	525 A	420 A	630 A
Test Accuracy *6	± 1.0% of (Reading + Range)					
Short time	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS
OCP/OPP Time (Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS

Model	3371G		3372G		3373G	
Turbo Mode *5	OFF	ON	OFF	ON	OFF	ON
Short/OCP/OPP Test Function						
Maximum Current	40 A	60 A	80 A	120 A	120 A	180 A
Test Accuracy *6	± 1.0% of (Reading + Range)					
Short time	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS
OCP/OPP Time (Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS

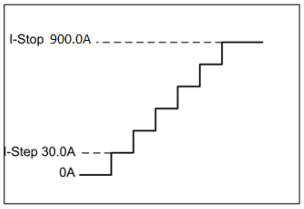
Model	3374G		3375G		3376G	
Turbo Mode *5	OFF	ON	OFF	ON	OFF	ON
Short/OCP/OPP Test Function						
Maximum Current	160 A	240 A	200 A	300 A	240 A	360 A
Test Accuracy *6	± 1.0% of (Reading + Range)					
Short time	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS	100~10000mS Continus	100~2000mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS
OCP/OPP Time (Tstep)	100mS	20mS	100mS	20mS	100mS	20mS
Setting Accuracy	±5mS	±5mS	±5mS	±5mS	±5mS	±5mS



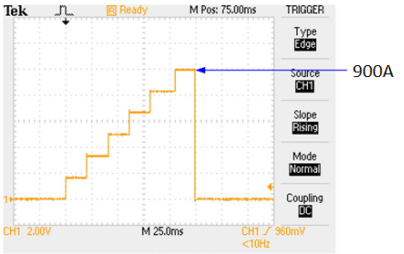
3356G Turbo mode OFF
Setting OCP Istep 10A, Istop 600A



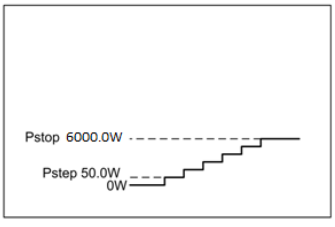
3356G Turbo mode OFF
OCP Istep 10A, Istop 600A real test waveform波形



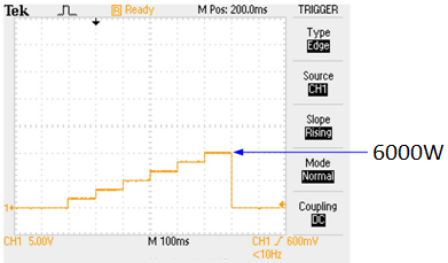
3356G Turbo mode ON
Setting OCP Istep 30A, Istop 900.0A



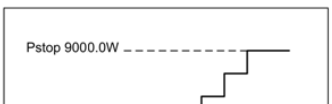
3356G Turbo mode ON
OCP Istep 30A, Istop 900.0A real test waveform

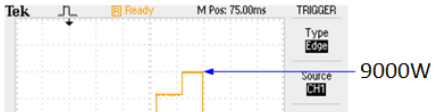


3356G Turbo mode OFF
Setting OPP Pstep 50W, Pstop 6000.0W



3356G Turbo mode OFF
OPP Pstep 50W, Pstop 6000.0W real test waveform





The power supply products must respond to the corresponding protection function, however, the abnormal situation is quite short time, for the test of these abnormal conditions, Prodigit's 3350G series electronic load can raise the electronic load current and power in the new Turbo mode For example, 3356G 150V / 600A / 6000W in the new Turbo mode, can increase to 900A and 9000W electronic load within 2 sec., so that when verifying the power products in the abnormal test conditions, 3350G series electronic load are with greater test verification Capability, besides, 3350G series built-in measurement circuit can also measure the actual trip current value and protection response time in the short-circuit abnormal conditions.

5-18. BMS Protective device

Lithium batteries are widely used in a variety of electronic products and electric vehicles and other devices. In order to protect the lithium battery from catching fire, exploding or any other dangerous condition, the lithium battery must be designed with a Battery Management System (BMS) protection circuit.

The BMS ensures the charging voltage does not exceed the maximum safe value of the lithium battery (Over Voltage Protection or OVP) during charge cycles. It also displays Discharge to ensure battery does short-circuit or exceed its rated current (Over Current Protection or OCP). Finally, internal battery and cell temperatures are displayed for over or under temperature protection (OTP/UTP).

Battery BMS Board

Turbo mode ON
BMS ON
Short 功能測試

Model	3351G					3352G					3353G				
Power *1	0 ~ 1200	W	0 ~ 1800	W max. *1		0 ~ 2400	W	0 ~ 3600	W max. *1		0 ~ 3600	W	0 ~ 5400	W max. *1	
Current	0 ~ 100	A	0 ~ 150	A max. *1		0 ~ 200	A	0 ~ 300	A max. *1		0 ~ 300	A	0 ~ 450	A max. *1	
Voltage	0	~	150	V		0	~	150	V		0	~	150	V	
Min.Operatting Voltage	0.7	V	@	100	A	0.7	V	@	200	A	0.7	V	@	300	A
BMS Test Mode *7															
Maximum Current	100 A		150 A			200 A		300 A			300 A		450 A		
Meas. Accuracy *6	± 3.0% of (Reading + Range)														
Short time	0.05mS~10ms		0.05mS~10ms			0.05mS~10ms		0.05mS~10ms			0.05mS~10ms		0.05mS~10ms		
Meas. Accuracy	±0.02mS														
Setting Accuracy	±0.05mS														
OCP Time (Tstep)	0.05mS~10mS 11mS~1000mS		0.05mS~10mS			0.05mS~10mS 11mS~1000mS		0.05mS~10mS			0.05mS~10mS 11mS~1000mS		0.05mS~10mS		
Meas. Accuracy	±0.1mS ±0.5mS		±0.5mS			±0.1mS ±0.5mS		±0.5mS			±0.1mS ±0.5mS		±0.5mS		
Setting Accuracy	±0.05mS of L Range / ±5mS of H Range														

Model	3354G					3355G					3356G				
Power *1	0 ~ 4000	W	0 ~ 6000	W max. *1		0 ~ 5000	W	0 ~ 7500	W max. *1		0 ~ 6000	W	0 ~ 9000	W max. *1	
Current	0 ~ 400	A	0 ~ 600	A max. *1		0 ~ 500	A	0 ~ 750	A max. *1		0 ~ 600	A	0 ~ 900	A max. *1	
Voltage	0	~	150	V		0	~	150	V		0	~	150	V	
Min.Operatting Voltage	0.7	V	@	400	A	0.7	V	@	500	A	0.7	V	@	600	A
BMS Test Mode *7															
Maximum Current	400 A		600 A			500 A		750 A			600 A		900 A		
Meas. Accuracy *6	± 3.0% of (Reading + Range)														
Short time	0.05mS~10ms		0.05mS~10ms			0.05mS~10ms		0.05mS~10ms			0.05mS~10ms		0.05mS~10ms		
Meas. Accuracy	±0.02mS														
Setting Accuracy	±0.05mS														
OCP Time (Tstep)	0.05mS~10mS 11mS~1000mS		0.05mS~10mS			0.05mS~10mS 11mS~1000mS		0.05mS~10mS			0.05mS~10mS 11mS~1000mS		0.05mS~10mS		
Meas. Accuracy	±0.1mS ±0.5mS		±0.5mS			±0.1mS ±0.5mS		±0.5mS			±0.1mS ±0.5mS		±0.5mS		
Setting Accuracy	±0.05mS of L Range / ±5mS of H Range														

Model	3361G					3362G					3363G				
Power *1	0 ~ 1200	W	0 ~ 1800	W max. *1		0 ~ 2400	W	0 ~ 3600	W max. *1		0 ~ 3600	W	0 ~ 5400	W max. *1	
Current	0 ~ 70	A	0 ~ 105	A max. *1		0 ~ 140	A	0 ~ 210	A max. *1		0 ~ 210	A	0 ~ 315	A max. *1	
Voltage	0	~	600	V		0	~	600	V		0	~	600	V	
Min.Operatting Voltage	10	V	@	70	A	10	V	@	140	A	10	V	@	210	A
BMS Test Mode *7															
Maximum Current	70 A		105 A			140 A		210 A			210 A		315 A		
Meas. Accuracy *6	± 3.0% of (Reading + Range)														
Short time	0.05mS~10ms		0.05mS~10ms			0.05mS~10ms		0.05mS~10ms			0.05mS~10ms		0.05mS~10ms		
Meas. Accuracy	±0.02mS														
Setting Accuracy	±0.05mS														
OCP Time (Tstep)	0.05mS~10mS 11mS~1000mS		0.05mS~10mS			0.05mS~10mS 11mS~1000mS		0.05mS~10mS			0.05mS~10mS 11mS~1000mS		0.05mS~10mS		
Meas. Accuracy	±0.1mS ±0.5mS		±0.5mS			±0.1mS ±0.5mS		±0.5mS			±0.1mS ±0.5mS		±0.5mS		
Setting Accuracy	±0.05mS of L Range / ±5mS of H Range														

Model	3364G					3365G					3366G				
Power *1	0 ~ 4000	W	0 ~ 6000	W max. *1		0 ~ 5000	W	0 ~ 7500	W max. *1		0 ~ 6000	W	0 ~ 9000	W max. *1	
Current	0 ~ 280	A	0 ~ 420	A max. *1		0 ~ 350	A	0 ~ 525	A max. *1		0 ~ 420	A	0 ~ 630	A max. *1	
Voltage	0	~	600	V		0	~	600	V		0	~	600	V	
Min.Operatting Voltage	10	V	@	280	A	10	V	@	350	A	10	V	@	420	A
BMS Test Mode *7															
Maximum Current	280 A		420 A			350 A		525 A			420 A		630 A		
Meas. Accuracy *6	± 3.0% of (Reading + Range)														
Short time	0.05mS~10ms		0.05mS~10ms			0.05mS~10ms		0.05mS~10ms			0.05mS~10ms		0.05mS~10ms		
Meas. Accuracy	±0.02mS														
Setting Accuracy	±0.05mS														
OCP Time (Tstep)	0.05mS~10mS 11mS~1000mS		0.05mS~10mS			0.05mS~10mS 11mS~1000mS		0.05mS~10mS			0.05mS~10mS 11mS~1000mS		0.05mS~10mS		
Meas. Accuracy	±0.1mS ±0.5mS		±0.5mS			±0.1mS ±0.5mS		±0.5mS			±0.1mS ±0.5mS		±0.5mS		
Setting Accuracy	±0.05mS of L Range / ±5mS of H Range														

Model	3371G				3372G				3373G			
Power *1	0 ~ 1200	W	0 ~ 1800	W max. *1	0 ~ 2400	W	0 ~ 3600	W max. *1	0 ~ 3600	W	0 ~ 5400	W max. *1
Current	0 ~ 40	A	0 ~ 60	A max. *1	0 ~ 80	A	0 ~ 120	A max. *1	0 ~ 120	A	0 ~ 180	A max. *1
Voltage	0	~	1200	V	0	~	1200	V	0	~	1200	V
Min.Operatting Voltage	15 V	@	40	A	15 V	@	80	A	15 V	@	120	A
BMS Test Mode *7												
Maximum Current	40 A		60 A		80 A		120 A		120 A		180 A	
Meas. Accuracy *6	± 3.0% of (Reading + Range)											
Short time	0.05mS~10ms		0.05mS~10ms		0.05mS~10ms		0.05mS~10ms		0.05mS~10ms		0.05mS~10ms	
Meas. Accuracy	±0.02mS											
Setting Accuracy	±0.05mS											
OCP Time (Tstep)	0.05mS~10mS 11mS~1000mS		0.05mS~10mS		0.05mS~10mS 11mS~1000mS		0.05mS~10mS		0.05mS~10mS 11mS~1000mS		0.05mS~10mS	
Meas. Accuracy	±0.1mS ±0.5mS		±0.5mS		±0.1mS ±0.5mS		±0.5mS		±0.1mS ±0.5mS		±0.5mS	
Setting Accuracy	±0.05mS of L Range / ±5mS of H Range											

Model	3374G				3375G				3376G			
Power *1	0 ~ 4000	W	0 ~ 6000	W max. *1	0 ~ 5000	W	0 ~ 7500	W max. *1	0 ~ 6000	W	0 ~ 9000	W max. *1
Current	0 ~ 160	A	0 ~ 240	A max. *1	0 ~ 200	A	0 ~ 300	A max. *1	0 ~ 240	A	0 ~ 360	A max. *1
Voltage	0	~	1200	V	0	~	1200	V	0	~	1200	V
Min.Operatting Voltage	15 V	@	160	A	15 V	@	200	A	15 V	@	240	A
BMS Test Mode *7												
Maximum Current	160 A		240 A		200 A		300 A		240 A		360 A	
Meas. Accuracy *6	± 3.0% of (Reading + Range)											
Short time	0.05mS~10ms		0.05mS~10ms		0.05mS~10ms		0.05mS~10ms		0.05mS~10ms		0.05mS~10ms	
Meas. Accuracy	±0.02mS											
Setting Accuracy	±0.05mS											
OCP Time (Tstep)	0.05mS~10mS 11mS~1000mS		0.05mS~10mS		0.05mS~10mS 11mS~1000mS		0.05mS~10mS		0.05mS~10mS 11mS~1000mS		0.05mS~10mS	
Meas. Accuracy	±0.1mS ±0.5mS		±0.5mS		±0.1mS ±0.5mS		±0.5mS		±0.1mS ±0.5mS		±0.5mS	
Setting Accuracy	±0.05mS of L Range / ±5mS of H Range											

The 3350G Series BMS test function for lithium batteries includes short circuit and over current protection modes, which provide a quick, easy and accurate test solution. For BMS short-circuit protection, there is about 1.5 times more current available for OCP current testing that needs immediate (uS level) protection action function, use 3356G up to 900A current load, in the process of high current pull to BMS rated short circuit current, it can verify BMS short circuit protection can do correct action.

In addition, the 3350G series electronic load can also detect the actual operating current value and operating time of the BMS short circuit protection action, that is, the actual operating current value and operating time when the BMS internal MOSFET switch is turned off.

For BMS overcurrent protection, it is between normal operating current and short-circuit current protection, generally higher than 125% of OCP current, it needs fast (about several hundred mS level) protection action.

3350G series BMS overcurrent (overcurrent during charging and overcurrent during discharge) protection test system with electronic load pull, then confirm whether BMS overcurrent protection is active, when BMS overcurrent protection is not active, increase load current (I Step). Then, confirm whether the OCP of the BMS is active, and continue the process until the BMS OCP action occurs. Therefore, the BMS OCP test can be scanned by gradually increasing the load current to obtain the current point and action reaction time of the BMS overcurrent protection.

- BMS short circuit, overcharge current, over discharge current protection principle
  The BMS circuit protection principle is as shown in the figure below. It is to protect the battery by turning off the MOSFET (loop current = 0A).

  In the BMS, the MOSFET switch is bidirectional. In the normal status, the two switches are ON. Since the two MOSEFT switches have the Rds ON resistance, current flow will cause a Voltage drop. Battery BMS is used this feature to detect charge and discharge currents.

  The MOSFET switching status shown in the figure below is the over-discharge current status. The IC's 3rd pin control MOSFET is ON, this time the discharge switch is OFF (controlled by IC pin 1).

  When the BMS detects a short circuit, over discharge current or low battery voltage, it will turn off the discharge switch to protect the battery.
  When the BMS detects an overcharge current or a battery overvoltage, it will turn off the charge switch to protect the battery.

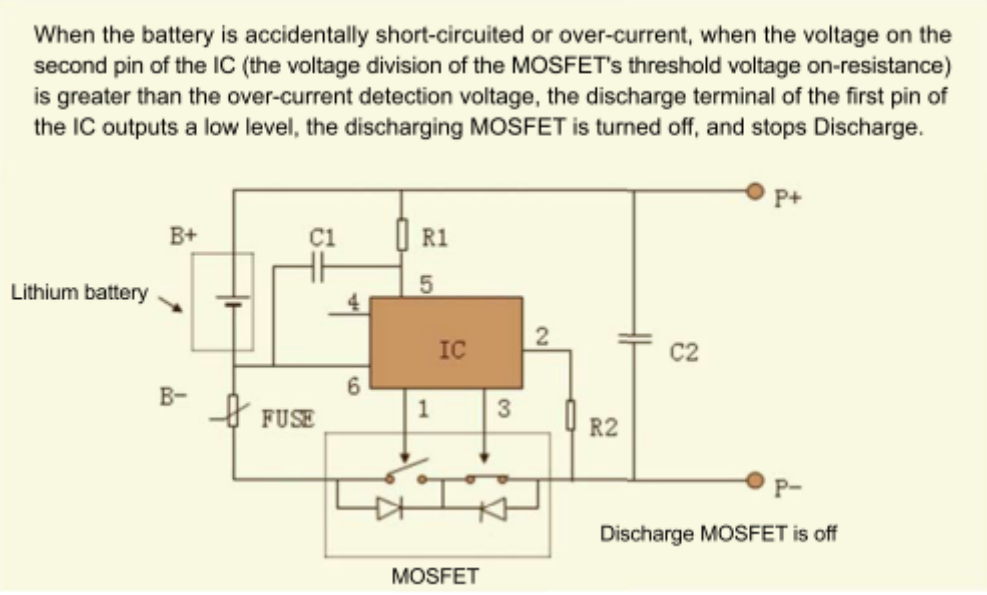


Figure 5-14 BMS internal architecture

- Short-circuit protection (SHORT) test method: Power supply (PS) & LOAD connection is shown in Figure 5-14, LOAD test procedure is shown in Figure 5-16.

In the short-circuit protection test mode, the electronic load will load the maximum current value of the model (for example, 600A for 3356G or 900A for Turbo ON). At the same time, the timer is started to calculate the actual time flowing through the BMS (Note: This time refers to the time between the set threshold current Ith to the BMS action MOSEFT switch OFF, that is, the time lower than the set threshold current Ith.

in addition, the electronic load will measure the actual maximum short circuit current value, Figure 5-17 is 4000 mAh mobile power uses the 3356G BMS test oscilloscope current waveform (left figure) and the electronic load power meter to show the short circuit maximum actual current and short circuit protection reaction time (right figure).

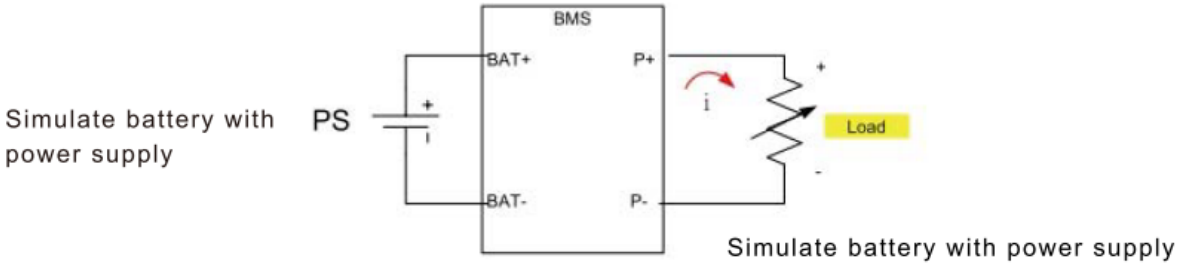


Figure 5-15

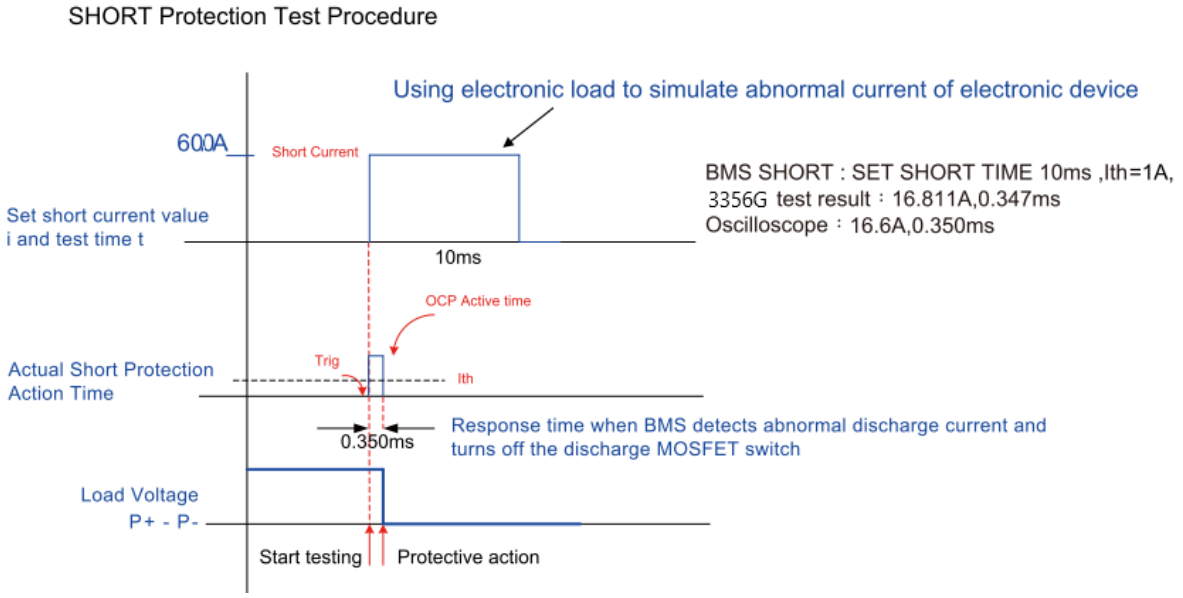
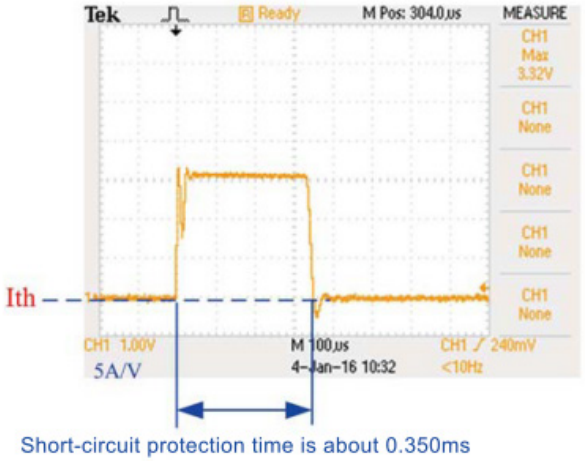


Figure 5-16 3356G short-circuit current test procedure diagram



BMS SHORT : SET SHORT TIME 10ms ,Ith=1A,
3356G test result：16.811A,0.347ms
Oscilloscope：16.6A,0.350ms

Figure 5-17 4000mAh Power Bank Actual Short Circuit Test Waveform

- Overcharge Current Protection (OCCP) test method: The test method is divided into single pulse and continuous step pulse. Single pulse can be used for rapid test. It can be used for a large number of fast tests suitable for the production line. Continuous step pulse can be used to scan the actual over current protection point. Suitable for research and development that needs accurate point.
  The power supply (PS) & LOAD connection and test procedures are shown in Figure 5-18.

  In the single-pulse overcurrent protection test mode, the electronic load will be pulled to the set current value (for example, 3356G is the current value between 0~600A or 900A when Turbo is ON), at this time, the electronic load measures the actual maximum overcurrent protection value and the overcurrent response time value. Figure 5-19 is the 3356G single pulse current BMS overcharge current test program diagram, Figure 5-20 is the actual test result, the left picture is the oscilloscope Current waveform when BMS overcharge current protection. The figure on the right shows the actual test overcharge current value and protection reaction time of the 3356G BMS.

- The overcurrent protection test mode of continuous STEP pulse is similar to the single pulse mode. In addition to the initial current setting, the continuous STEP pulse mode increases the time of each STEP, the current increased by each STEP and the current value of the final STEP. Figure 5-21 is the 3356G single pulse current BMS overcharge current test program diagram. Figure 5-22 is the actual test result, the left picture is the oscilloscope current waveform diagram when BMS overcharge current protection, the right picture is the actual test overcharge current value of 3356G BMS and Protect the reaction time.

- In continuous STEP pulse mode, the maximum overcurrent protection value and overcurrent action reaction time value measured by the electronic load are the Measurement results under each STEP. For example, if ISTART is set to 1.000A, OCT TSTEP is 500ms, OCP ISTEP is 0.1A, OCP ISTOP is 5.000A, the measurement process is The electronic load sinks current 1.000A and test whether the battery BMS operates at 500ms. If it is, it will measure the action current value and the action reaction time. If the Battery BMS is no action under 1.000A; the electronic load will increase to 1.100A According to ISTEP setting and test whether it operates at 500ms. If it is, it will measure the Operating voltage value and action time at 1.100A, if the battery BMS is no action at 1.100A. The load Current is increased to 1.200A in the above manner until the final test voltage

Value of the battery BMS test is 5.000A.
Refer to the actual operation example of 3350G series

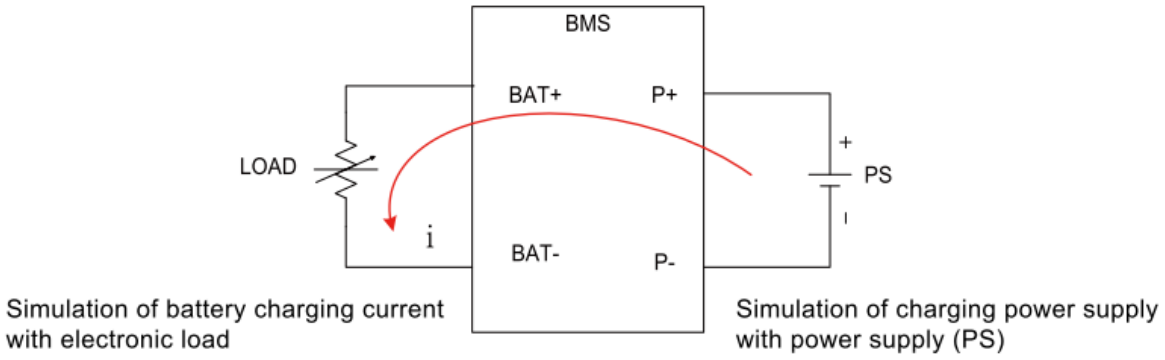


Figure 5-18 Equivalent simulations of BMS charging

- Single Pulse: Used during quick test

OCCP(Over Current Charge Protection) Test Procedure

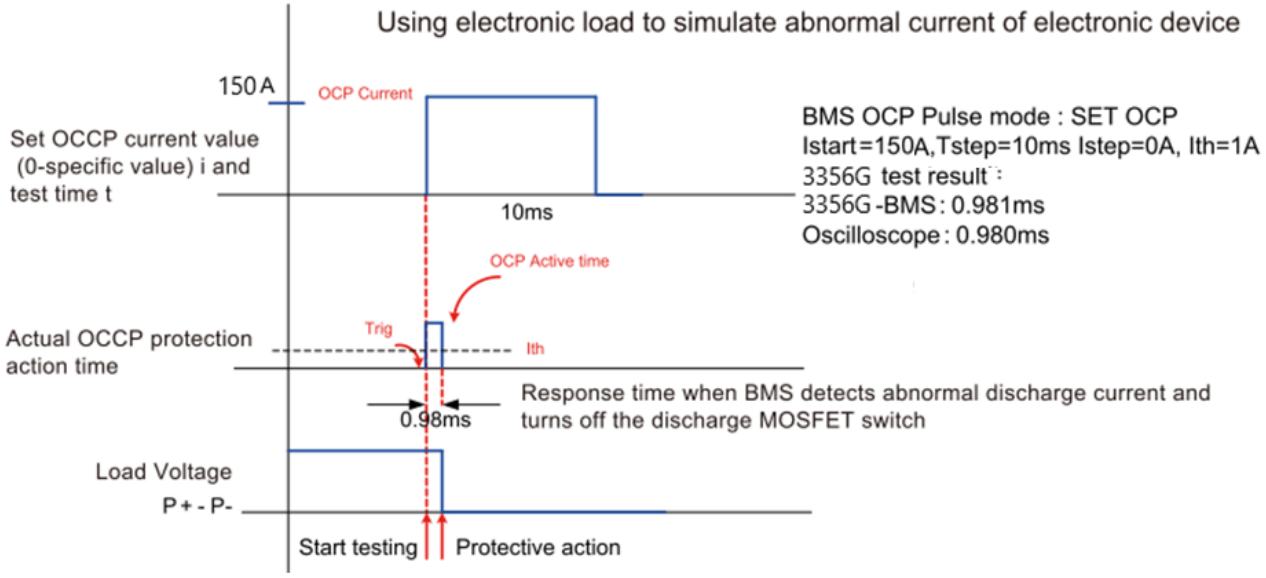
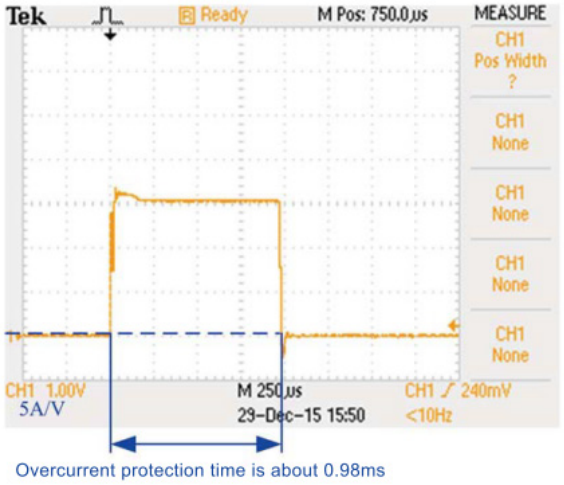


Figure 5-19 3356G BMS overcharge flow test program diagram (single pulse)

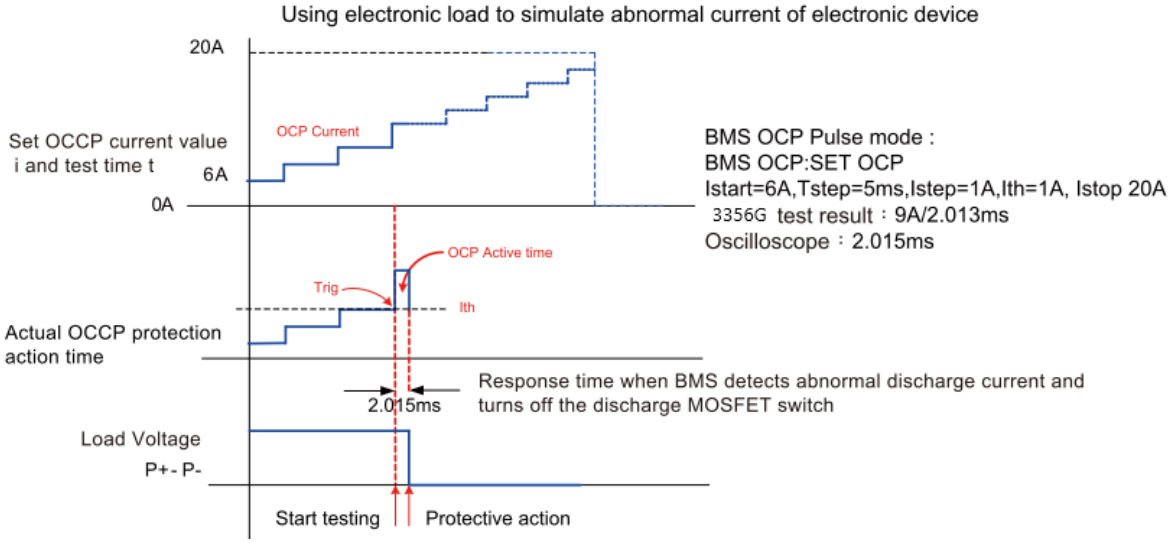


BMS OCP Pulse mode : SET OCP
Istart=15A,Tstep=10ms Istep=0A, Ith=1A
3356G test result：
3356G BMS: 0.981ms
Oscilloscope: 0.980ms

Figure 5-20 3356G BMS overcharge flow test results (single pulse)

- Continuous Step Pulse: Use when scanning the actual overcurrent protection point during charging

OCCP (Over Current Charge Protection) Test Procedure



BMS OCP Pulse mode :
BMS OCP:SET OCP
Istart=6A,Tstep=5ms,Istep=1A,Ith=1A, Istop 20A
3356G test result：9A/2.013ms
Oscilloscope：2.015ms

Figure 5-21 3356G BMS overcharge flow test program diagram (continuous STEP pulse)

BMS OCP Pulse mode :
BMS OCP : SET OCP
Istart=6A,Tstep=5ms,Istep=1A,Ith=1A,Istop=20A
3356G test result：9A/2.013ms
Oscilloscope: 2.015ms

Figure 5-22 3356G BMS Overcharge flow Test Results (Continuous STEP Pulse)

- Over current discharge protection (OCDP) test method: Power supply (PS) & LOAD connection and test procedures are shown in Figure 5-23.

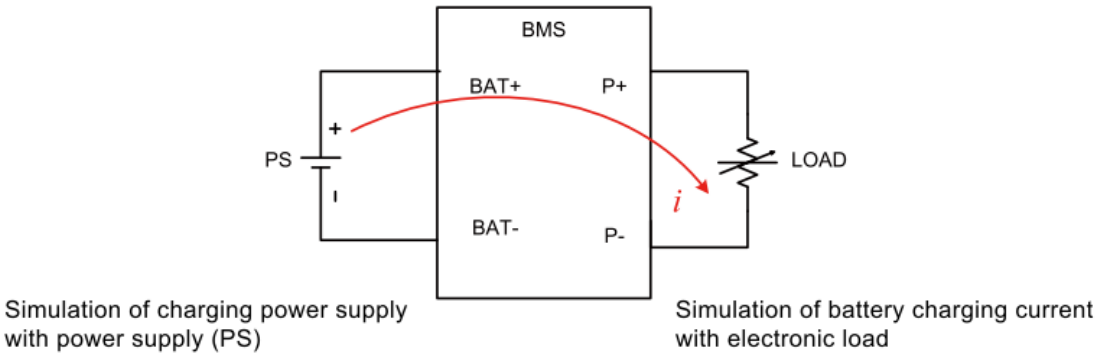


Figure 5-23 Equivalent simulation of BMS discharge

- Single Pulse: Used during quick test
  OCDP(Over Current Discharge Protection) Test Procedure
  The 3356G single pulse current BMS over discharge current test procedure is similar to the BMS overcharge current test. The 3356G BMS function can actually test the overcharge current value and the protection reaction time.

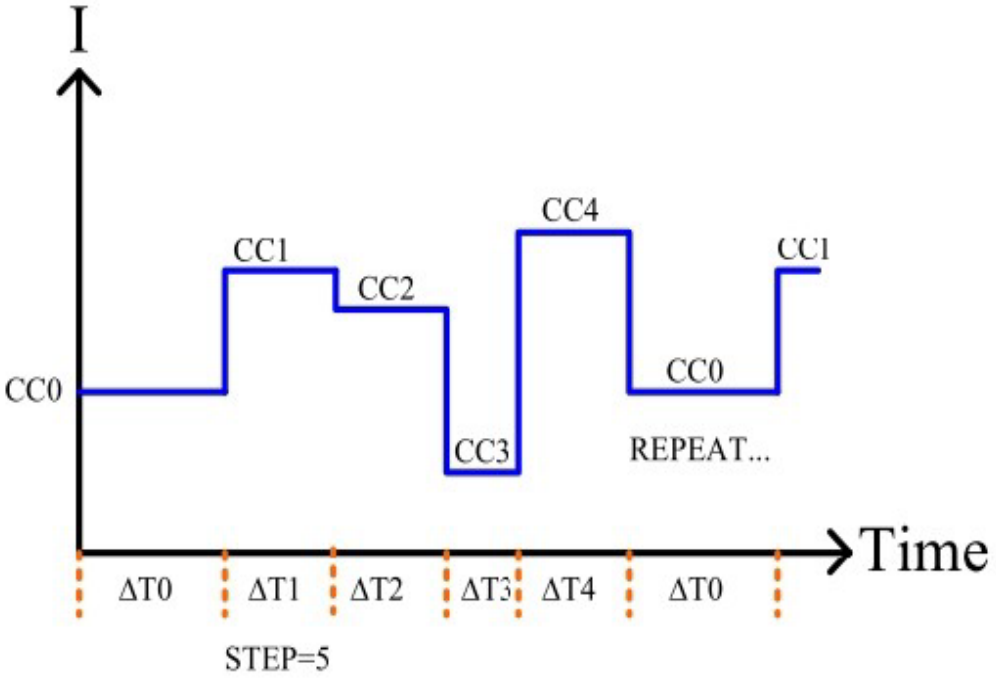
- Continuous Step Pulse: Used when the actual overcurrent protection point during scan discharge OCDP(Over Current Discharge Protection) Test Procedure
  The 3356G continuous pulse current BMS over discharge current test procedure is similar to the BMS overcharge current test. The 3356G BMS function can actually test the overcharge current value and reaction time.

- The function and actual action response of the battery BMS have been explained in detail. The battery BMS can immediately provide protection and disconnection measures for the abnormal voltage, current, temperature and other conditions of the battery to avoid the occurrence of danger, because the battery BMS is a safety measure that must be 100% full-featured test verification that security can be ensure, although the test and verification for the battery BMS can use the oscilloscope to measure the current value and action response time of the BMS action, it is undoubted that the oscilloscope can be tested in detail during the development stage, but in a mass production stage, there is a need for rapid and complete testing that there is a limit on capacity production . For this difficulty, Prodigit integrates the BMS test into the 3350G series electronic load. In addition to the functions of the normal 3350G series, the set test current required for battery BMS testing is increased. Both the current action value and the action response timer are integrated into the 3356G BMS function, allowing a large number of quick tests to verify that the battery BMS becomes a reliable, accurate and fast method.

  To test BMS over-current protection, the 3356G load starts to sink current (I start), then checks whether the BMS over-current protection is active. If the BMS over-current protection is not active, the load starts to increase the load current (I Step) and checks whether the BMS OCP is responds. This process continues until the BMS OCP activates. Thus, the BMS OCP test can determine both OCP function current trip level and response time.

5-19.SEQUENCE LOAD (remote only)

SEQUENCE LOAD function, the time sequence can be 2~16 STEP, each STEP must set the load value and time, after starting the test, it will be executed repeatedly according to the set value until the voltage is less than VTH (threshold voltage) value, or received Stop the command to stop the test. During the test, the load value can be modified, and the time is fixed. Apply the TRIG command to trigger and change of the load value. The SEQUENCE LOAD function is only for REMOTE operation. The action mode is shown in Figure 1, the parameters are STEP n=2~16, CC0/CP0, ΔT0, CC1/CP1, ΔT1, …CC15/CV15, ΔT15, VTH, Time=10us~999000ms
(Time r0: 20us~1000us resolution=10us, this range cannot be set in the first Step, r1: 2~65535ms, resolution=1ms, r2:66~999Sec resolution=1Sec).



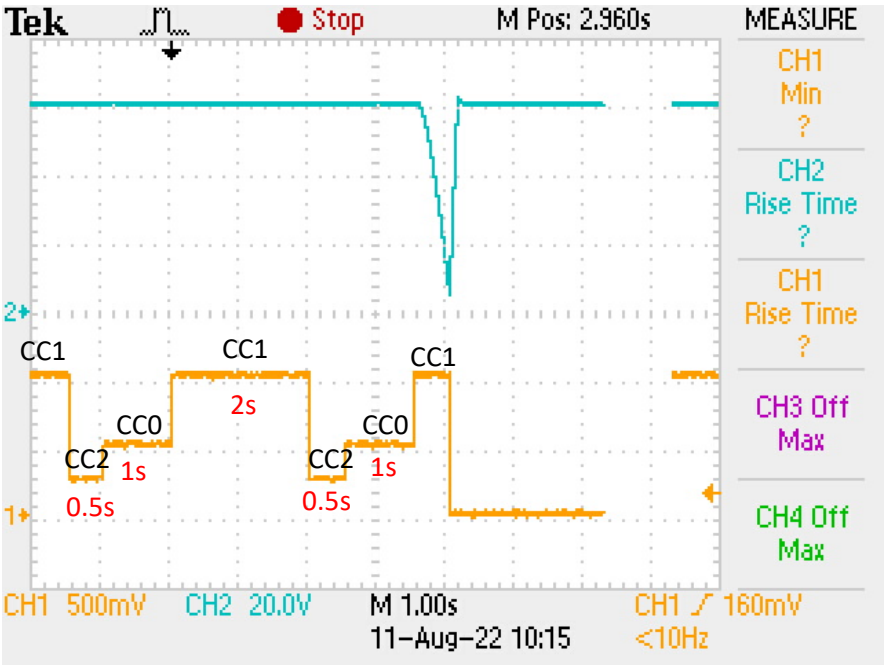
REMOTE SEQUENCE LOAD TEST command

SEQUENCE LOAD TEST SET COMMAND	NOTE
SEQLD:TYPE{SP}{CC|CP}{ ; | NL}	SET CC or CP MODE
SEQLD:TOTSTEP{SP}{n}{ ; | NL}	SET STEP，n=2~16
SEQLD:TIME{n}{SP}{NR1}{ ; | NL}	SET ΔTIME= 0.02~999000ms， n=0~15
SEQLD:CC{n}{SP}{NR2}{ ; | NL}	SET CURRENT, UNIT:A， n=0~15
SEQLD:CP{n}{SP}{NR2}{ ; | NL}	SET POWER, UNIT:W，n=0~15
SEQLD:TRIG{SP}{ON}{ ; | NL}	TRIGGER CHANGE CC/CP VALUE
SEQLD:TEST{SP}{ON|OFF}{ ; | NL}	SET START or STOP TEST
VTH{SP}{NR2}{ ; | NL}	SET THRESHOLD VOLTAGE，UNIT:V

3356G (150V/600A,6KW) Operation example：

REMOTE	（Set remote control）
RISE 24	（Set rise slope24A/uS）
FALL 24	（Set fall slope24A/uS）
SEQLD:TYPE CC	（Set CC SEQ MODE）
SEQLD:CC0 30	（Set CC0=30A）
SEQLD:CC?	（Read CC0 value）
SEQLD:TIME0 1000	（Set TIME0=1000mS）
SEQLD:TIME0?	（Read TIME0 value）
SEQLD:CC1 60	（Set CC1=60A）
SEQLD:TIME1 2000	（Set TIME1=2000mS）
SEQLD:CC2 15	（Set CC2=15A）
SEQLD:TIME2 500	（Set TIME2=500mS）
SEQLD:TOTSTEP 3	（Set 3 STEP）
SEQLD:TOTSTEP?	（Read STEP setting）
VTH 1	（Set VTH=1V）
SEQLD:TEST ON	（execute SEQ MODE test）

Actual waveform：(CH1=Imonitor 60A/V、CH2=Vin)



5-20. Model 9923 current waveform generator

The Model 9923 programmable DC load current waveform generator is designed to Simulate the actual discharge current waveforms that occur when discharging batteries.
The use of batteries to power a multitude of portable devices such as mobile phones, tablets, laptops, etc. as well as mobility products like electric bicycles, scooters and cars has become widespread.
During actual operation in these applications, the battery output current changes dynamically with the operation of the product. In order to assess battery life, capacity and any time related characteristics that may occur during use, it is important to test the batteries using actual battery load current waveforms under both general and worst case conditions.

To implement these irregular load current waveforms on an electronic DC load, there are two methods that can be used:

The first method relies on the use of a digital storage oscilloscope and a current measuring device such as a current probe or shunt to capture the actual battery discharge current waveform under real world conditions. Once captured, the next step is to take this waveform data and transfer it to an arbitrary waveform generator.

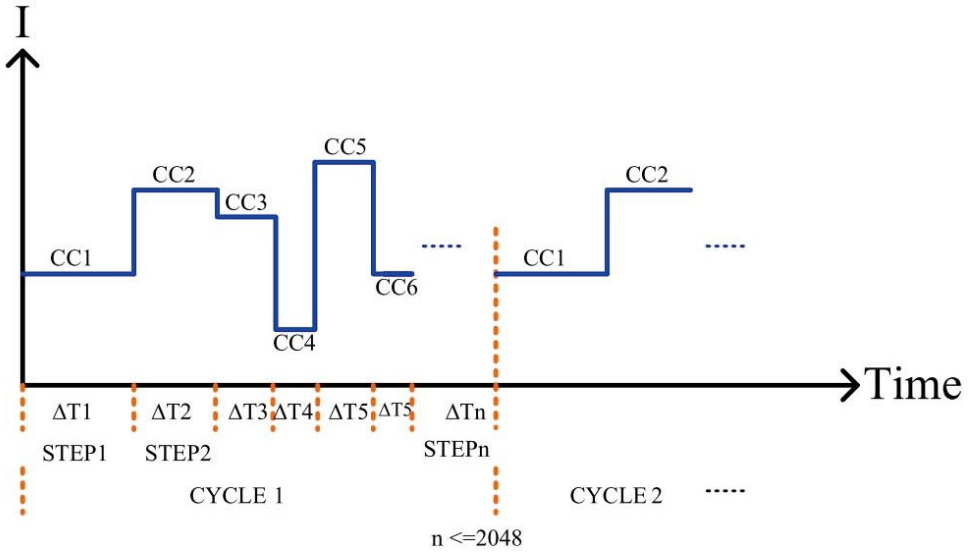
1. Use the arbitrary waveform generator to edit the load current waveforms manually as needed.

2. The output of the arbitrary waveform generator is then sent to the analog input of the DC load.

The second method is to use the new 9923 load current generator which can be installed on a wide range of Prodigit's DC electronic loads. The generator output is connected to the DC load's analog input using the provided BNC cable and eliminates the need for a separate arbitrary generator. Use either manual waveform data editing or import and oscilloscope waveform to generate simulated load current waveform on the DC load.

The 9923 Load current waveform plug-in generator can be installed on a wide selection of DC loads, including high power electronic loads such as the 3350G series.
PC application software is provided with the 9923 generator to allow waveform editing, oscilloscope waveform download and other programming functions.

The DC Load Current Waveform Generator supports up to 2048 steps per timing sequence output voltage and the ability to cycle this waveform up to 9999 times. With the included 9923 application software, the user can generate the desired load current waveform. The output of the Generator is connected to the ANALOG INPUT terminal of the electronic load cause it to sink the specified current waveform. Refer to the he current sink example shown in Figure 1. The 9923 technical specification is as shown below. A generator output voltage of 10V is equal to the maximum current value of the electronic load used. An output of 5V is equal to 1/2 the maximum current specification of the load, and so on.



9923 Current Waveform Generator Application Software

The included 9923 Load Current Waveform Generator Application Software may be used to edit waveforms that provide the user with a variety of real load conditions on his electronic load. Up to 2048 steps in each timing sequence can be edited.

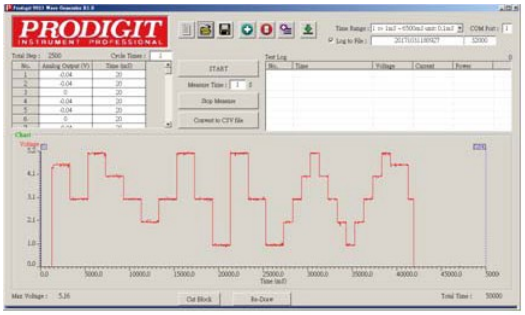
The timing sequence programmed can be cycled up to 9999 times. The minimum available time for each timing step is 50us and the maximum length of a sequence is about 130,000 seconds or about 36 hours. Using the electronic load's measurement function, the voltage, current and power status when sinking current can be monitored.

In addition to manually editing the required current waveform, the user can also use an oscilloscope to capture and store the actual current waveform using a comma separated value file (*.csv). The 9923 application software can read this current waveform file and then download it to the 9923 Load Current Waveform Generator for Electronic load simulation use.

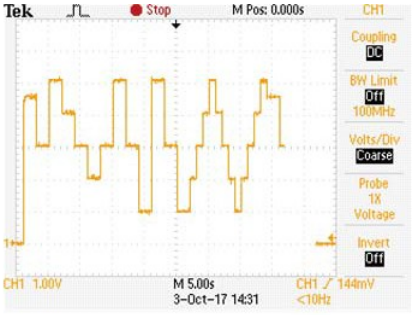
Typical applications

1. Simulation of Battery discharge in real-world applications (Loads may be notebook computers, electric vehicles, electric scooter etc.) to simulate a variety of dynamic load sink current waveforms and to provide a number of dynamic current load level simulations.
2. Testing of power supply load modulation.
3. Simulation of fuel cell life cycle testing.

a. Use the self-editing load current waveform to simulate the method of reproduction :

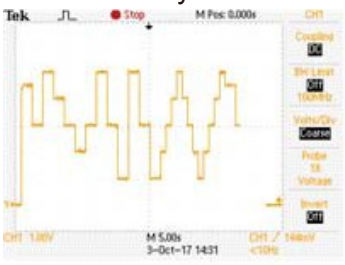


Edit by 9923 application software

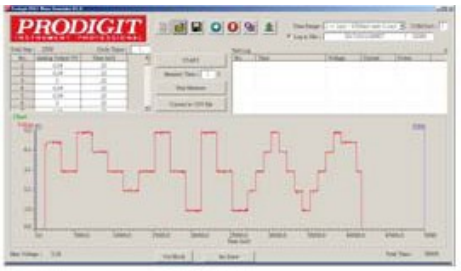


Regeneration the load current waveform

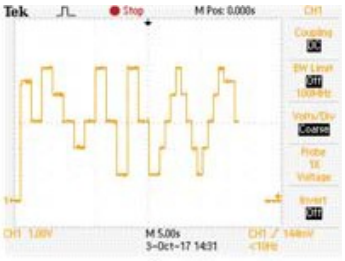
b. Use the oscilloscope's load current waveform (*.csv), after it has been processed By the 9923 application software, then download to the 9923 to simulate current:



Actual load current waveform



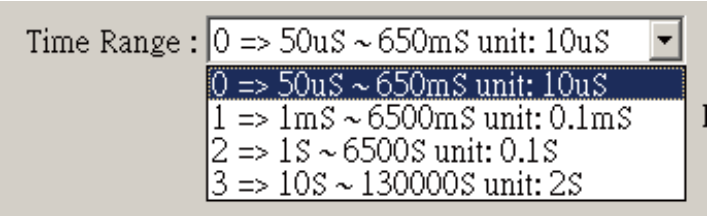
Edit by 9923 application software



Regeneration the load current waveform

c. Time Range : Select to use the time specification

User can set Time Range 0~3 or use the oscilloscope to store the actual current waveform (* .CSV), by means of the 9923 application software to read the actual current waveform file (*. CSV) and then download to 9923 Current Waveform Generator to proceed with Electronic load simulation.

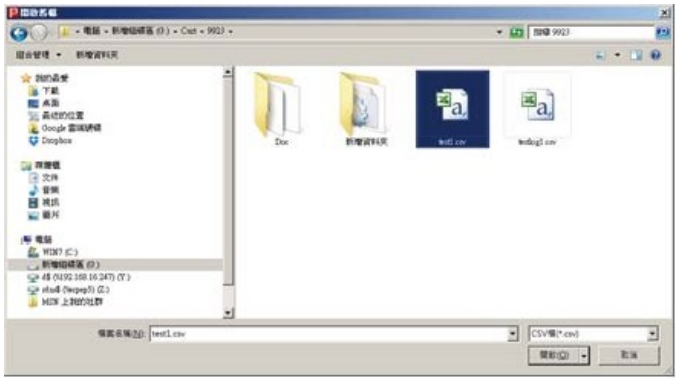


d. COM Port : Set RS-232 connection COM Port

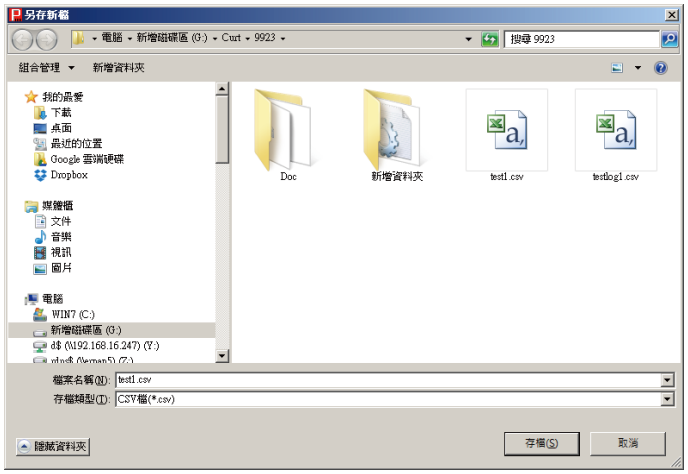
e.  New File：Open a new file

f.  Open old File：

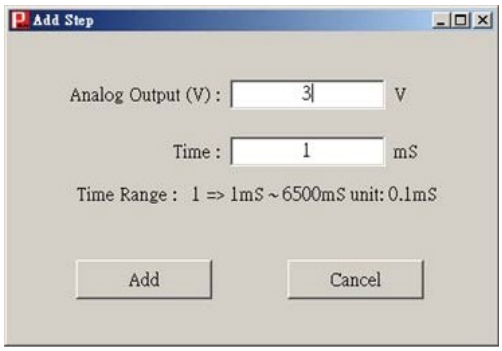
Load the existing test step file, or load the oscilloscope CSV format file using the 9923 application software to read the actual current waveform file (*.csv) and then download it to 9923 Current Waveform Generator to proceed Electronic load simulation.



g.  Save to File：Save the test step setting values to the specified file.



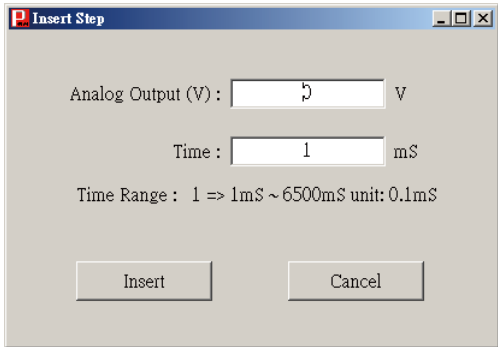
h.  Addition：Add a test step after the last test step, maximum up to 2048 test steps. The program will display and error message if there are more than 2048.



1. Analog Output (V): Set the Analog Output Voltage.
2. Time : Set the output voltage time, the unit changes according to Time Range.
3. Add : Make sure to add a new one.
4. Cancel : Cancel setting.

i.  Delete：Delete a test step.

j. Insert：Insert a test step after the currently selected test step, maximum up to 2048 test steps. If there are more than 2048, the program will display an error message.



1. Analog Output (V) : Set the analog output voltage.
2. Time : Set the load time, the unit changes according to Time Range.
3. Insert : Make sure to insert a new one.
4. Cancel : Cancel setting.

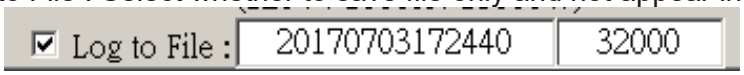
k.  Download to Load：Download test step to 9923

l. Test Step List：Show all test step setting data.

- Double-click to edit the column, press [Enter] to set. If [Enter] is not pressed, the program will Not make changes.
- When the modification is complete, the timing diagram will change and will automatically move To the next step to provide the changes.
- When pressing [Enter] in the last step, the program will automatically go to the next channel to Allow more changes.

m. Cycle Times：Set the number of cycles, maximum up to 9999 times.

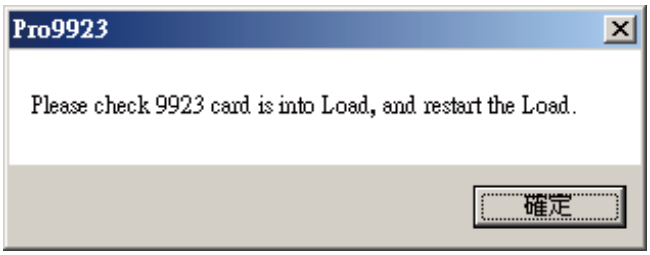
n. Log to File : Select whether to save file only and not appear in the list



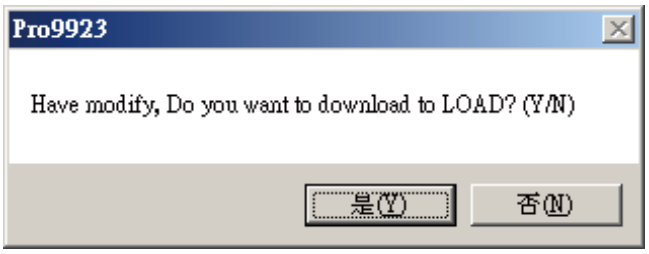
Check the Log to file box and the program will automatically generate the serial number YYYYMMDDhhmmss. The user can also change this field manually. This field will be used to create a log to file name, followed by a 0001 count number. The test log file will be stored in the TestLog folder.

o. Test Step List：Show all test steps setting data.
- Double-click to edit the column, press [Enter] to set. If [Enter] is not pressed, the program will not make changes.
- When the modification is complete, the timing diagram will change and will automatically move to the next step.
- When pressing [Enter] in the last step, the program will automatically go to the next channel to allow more changes.

p. Start: Start the test.
First, the PC must be connected to the 9923 to perform an interface connection detection. If the system does not use the 9923 card or has already started and has not restarted LOAD, the system will prompt alert [Please check 9923 card is installed in the Load, then restart the Load.], Press OK to exit the start function, as shown below.



The next step will compare the test steps. The 9923 software will not download to the 9923 EEROM if the test steps are the same. The 9923 software will prompt the user whether to download to 9923 if the test steps are not the same. In that case, the system will show a prompt [Have modify. Do you want to download LOAD?], as shown below.



After starting the test, if you set the Measure Time to a value greater than 0, the program measure the voltage, current, power and other information, and recorded in the Test Log according to the time interval set.

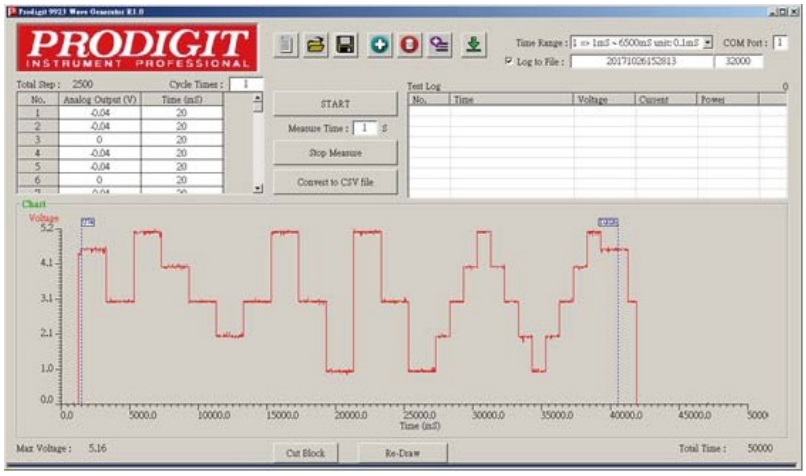
q. Stop：Stop measuring

r. Chart: Display timing diagram.

s. ReDraw：Redraw timing diagram.

t. Cut Block：Delete the data outside the block.

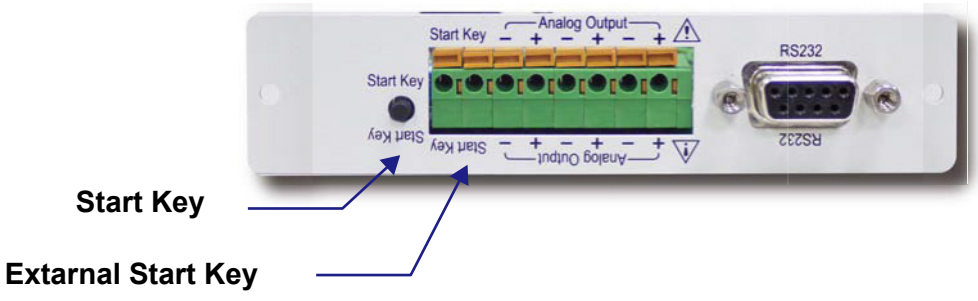
u. Users can adjust the position of Ux and Dx to reduce the amount of data.



Specification				
Voltage LevelRange				
Range	0~10V (=full scale current spec.)			
Resolution	16bit			
Accuracy	±0.05%(reading + range)			
Time Range				
Range	0	1	2	3
	50 ~ 6500us	1 ~ 6500ms	1 ~ 6500sec	10~130000sec
Resolution	10us	1ms	1sec	2sec
Accuracy	±15us	±0.15ms	±0.15sec	±0.5sec
STEP	1 ~ 2048			
CYCLE	1 ~ 9999			

Stand-alone application (no need for a computer connection)

The 9923 supports stand-alone operation as well. In this case, the user need only download the Waveform data to the 9923 EEPROM. If there is no need for the application software to record The voltage, current and other information, the computer connection can be removed. The user only has to Press the Start button on the 9923 rear panel itself. The analog output will begin to Load according to the edited voltage level and feed the analog input of the timing output voltage Signal to the electronic load. Users can also use the Start key terminal connection (External Start key) to connect an appropriate length remote external button if more convenient .



9923 panel diagram

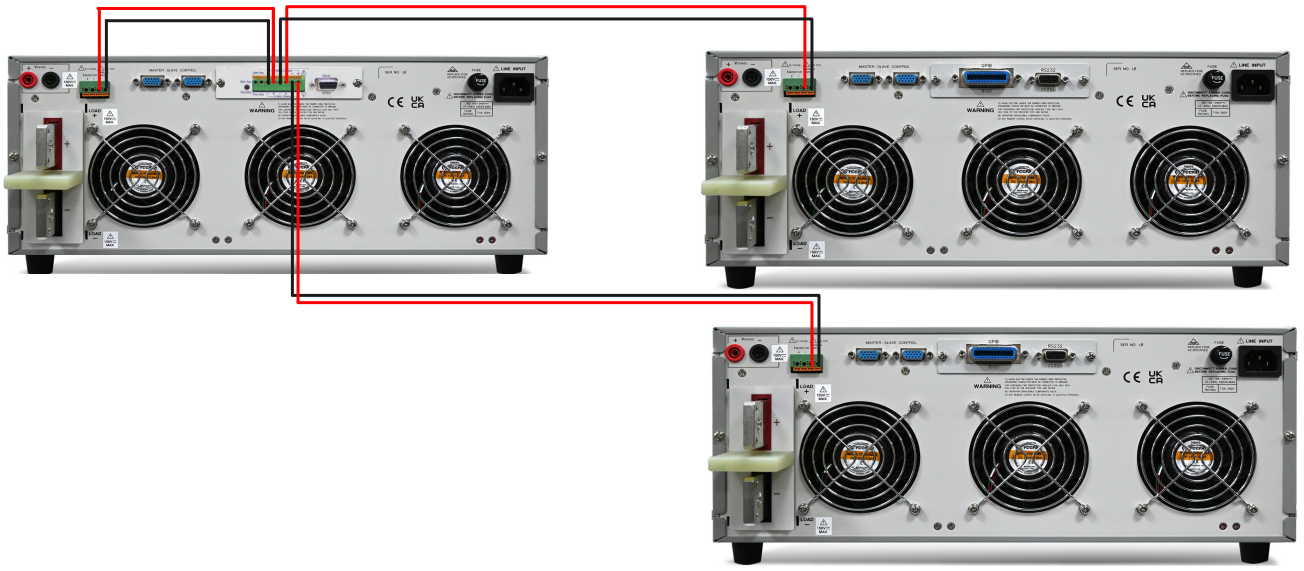
Parallel applications

The 9923 can be applied to multiple parallel loads as needed. Because the 9923 current waveform Generator uses the analog input function to control the load current, when the load power or load Current is insufficient, you can obtain higher power and current using multiple loads. The 9923 Supports parallel operation of to up to three electronic loads. The 9923 rear panel provides 3 sets Of Analog outputs (internal paralleled).

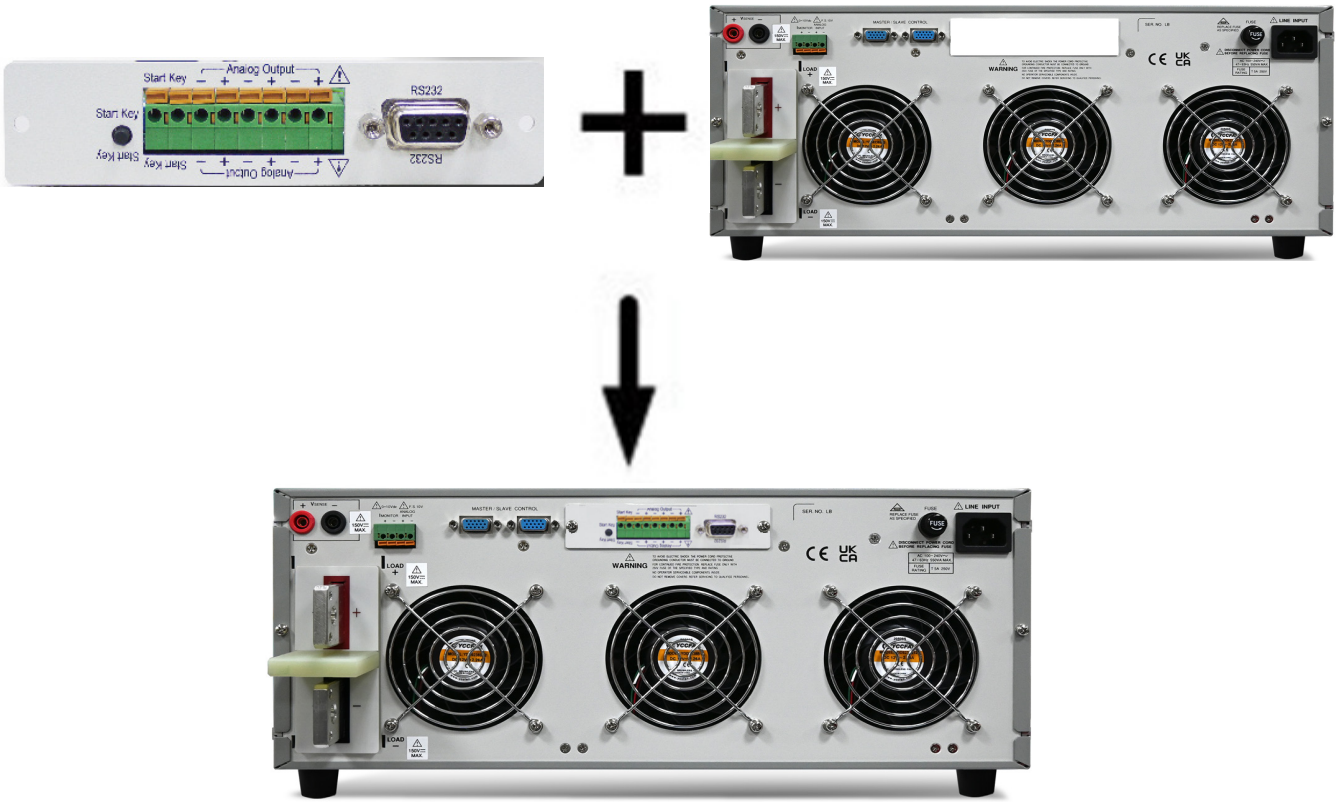
The 9923 Current Waveform Generator Application Software scales corresponding waveform Voltage level as the sum of the current of the parallel loads. For example, when 3 sets of 3371G 1200V / 40A / 1200W are required to test 80A; each 3371G must allocate 80A current Analog Input.

This requires 4A / V, 26.66/4 = 6.66V. Thus, the 9923 application software voltage must be edited to 6.66V and then through the following diagram connected in parallel with three 3371G.

Each 3371G will be see an input voltage level equivalent to a 26.66A load current, resulting in a Total of 80A.



9923 Installation method



Appendix A GPIB programming Example

C Example Program

```
/* Link this program with appropriate *cib*.obj. */

/* This application program is written in TURBO C 2.0 for the IBM PC-AT compatible. The National
Instruments Cooperation (NIC) Model PC-2A board provides the interface between the PC-AT and a
PRODIGIT MPAL ELECTRONIC LOAD. The appropriate *cib*.obj file is required in each program to
properly link the NIC board to C LANGUAGE. and include the <decl.h.> HEADER FILE to C
LANGUAGE. */

#include <stdio.h>
#include <dos.h>
#include <math.h>
#include "decl.h"        /* NI GPIB CARD HEADER FILE */

main()
{
    char ouster[20],rdbuf[15],spec[10];
    int i,ch,load;
/* Assign unique identifier to the device "dev5" and store in variable load. check for error. ibfind error =
negative value returned. */
    if((load = ibfind("dev5")) < 0)        /*   Device variable name is load   */
      {                                    /*   GPIB address is   5   */
        printf("\r*** INTERFACE ERROR ! ***\a\n");
        printf("\r\nError routine to notify that ibfind failed.\n");
        printf("\r\nCheck software configuration.\n");
        exit(1);
      }
/*   Clear the device   */
    if((ibclr(load)) & ERR);
      {
        printf("INTERFACE ERROR ! \a");
        exit (1);
      }
    clrscr();
/* Clear load error register */
      {
      outstr=chan[0];
      ibwrt(load,outstr,6);
      ibwrt(load,"CLR",3);
      }
```

```
    ibwrt( load,"NAME?",5);                          /*  Get the 3350G series load specification  */
    strset(rdbuf,'\0');                  /*  Clear rdbuf string buffer  */
    strset(spec,'\0');                   /*  Clear spec string buffer  */
    ibrd(load,spec,20);
    if (spec[3] == '9')
        printf("\n 3350G series specification error !");
/*  Set the channel 1, preset off, current sink 1.0 amps and load on commands to the load. */
    ibwrt( load,"chan 1;pres off;curr:low 0.0;curr:high 1.0;load on ",43);
    ibwrt( load,"meas:curr ?",10);
/*  Get the load actially sink current from the load  */
    ibrd( load,rdbuf,20);
/*  go to local.  */
    ibloc(load);
}
```

BASICA Example Program

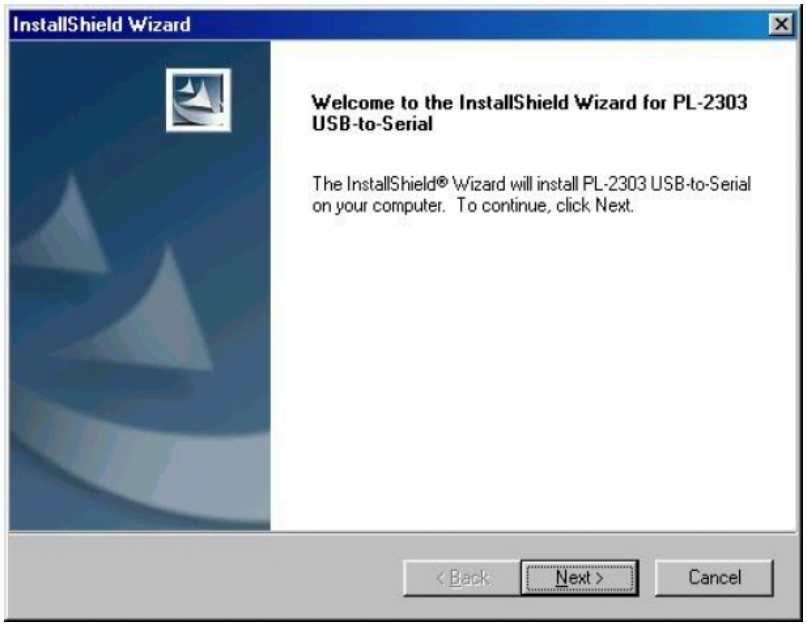
LOAD DECL.BAS using BASICA MERGE command.

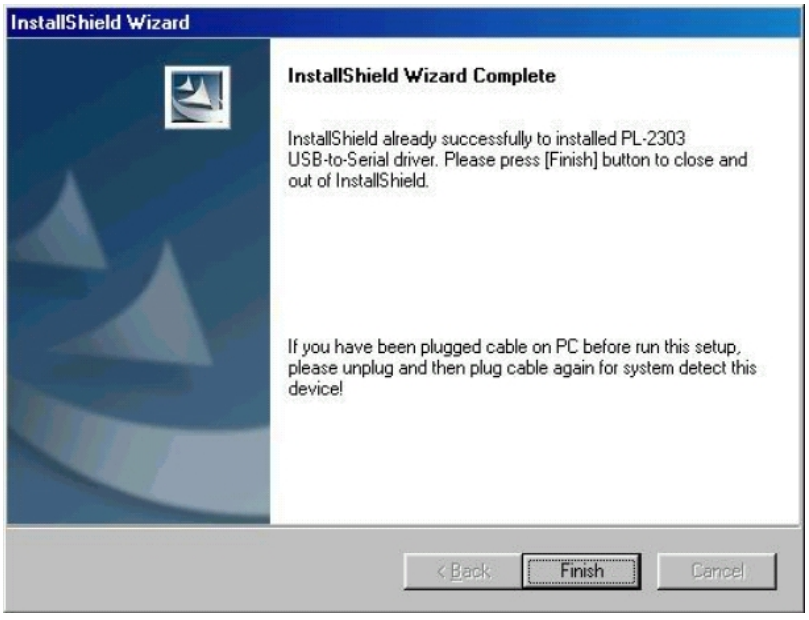
```
100 REM You must merge this code with DECL.BAS
105 REM
110 REM Assign a unique identifier to the device "dev5" and store it in variable load%.
125 REM
130       udname$ = "dev5"
140       CALL ibfind (udname$,load%)
145 REM
150 REM Check for error on ibfind call
155 REM
160       IF load% < 0 THEN GOTO 2000
165 REM
170 REM Clear the device
175 REM
180       CALL ibclr (load%)
185 REM
190 REM Get the 3356G load specification
195 REM
200       wrt$ = "NAME?" : CALL ibwrt(load%,wrt$)
210       rd$ = space$(20) : CALL ibrd(load%,rd$)
215 REM
220 REM Set the preset off, current sink 1.0 amps and load on commands to the load.
225 REM
230       wrt$ = "pres off;curr:low 0.0;curr:high 1.0;load on"
240       CALL ibwrt(load%,wrt$)
245 REM
250 REM Get the load actially sink current from the load
255 REM
260       wrt$ = "meas:curr?" : CALL ibwrt(load%,wrt$)
270       rd$ = space$(20) : CALL ibrd(load%,rd$)
275 REM
280 REM Go to local
285 REM
290 CALL ibloc(load%)

2000 REM Error routine to notify that ibfind failed.
2010 REM Check software configuration.
2020 PRINT "ibfind error !" : STOP
```

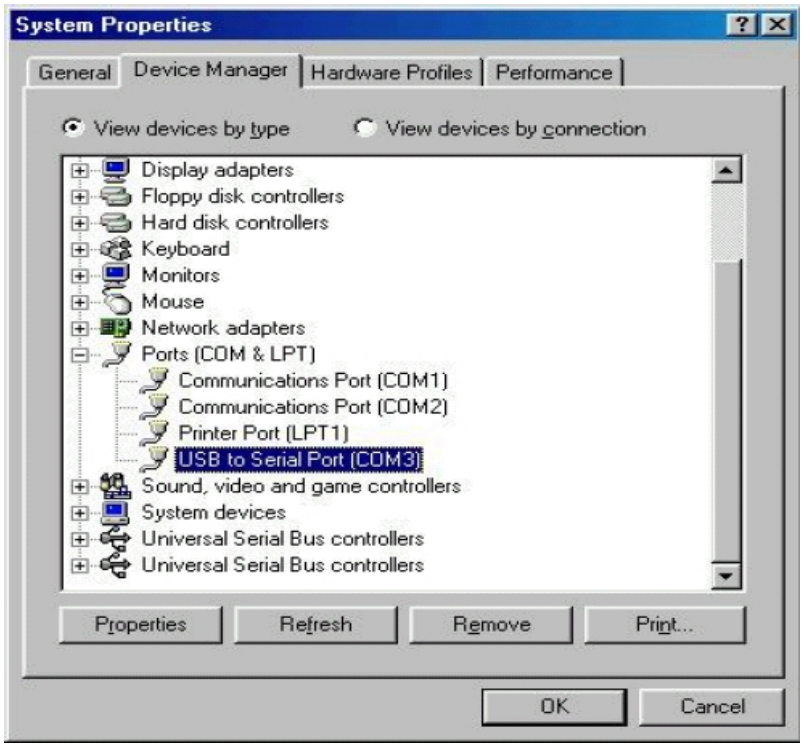
Appendix B 3350G series USB Instruction

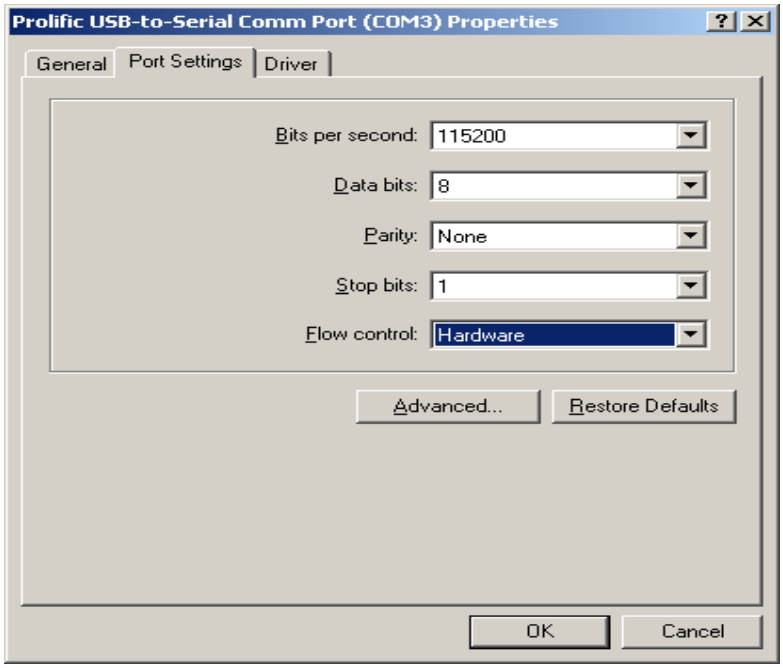
1. Link to the following website to download, select USB Driver
   https://www.prodigit.com.tw/list/cate-333497.htm
2. Install the USB DRIVER select USB\SETUP\PL-2303 Driver Installer.exe





3. After the installation, connect the 3350G series and PC with USB. Then select the item USB to Serial Port (COM3), set the BAUD-RATE and Flow control to 115200bps and Hardware to control 3350G series with COM3.





Appendix C 3350G series LAN Instruction

1. Link to the following website to download, select LAN Driver.
   https://www.prodigit.com.tw/list/cate-333497.htm

2. Connecting AC power and the network line to the 3350G series mainframe, connect the other Side of the network line to the HUB.

3. Run the ETM.EXE which bellows the path of the LAN drive, it will show as fig D2-1 if not , please press F5 to search again, or check the first step was succeed or not.

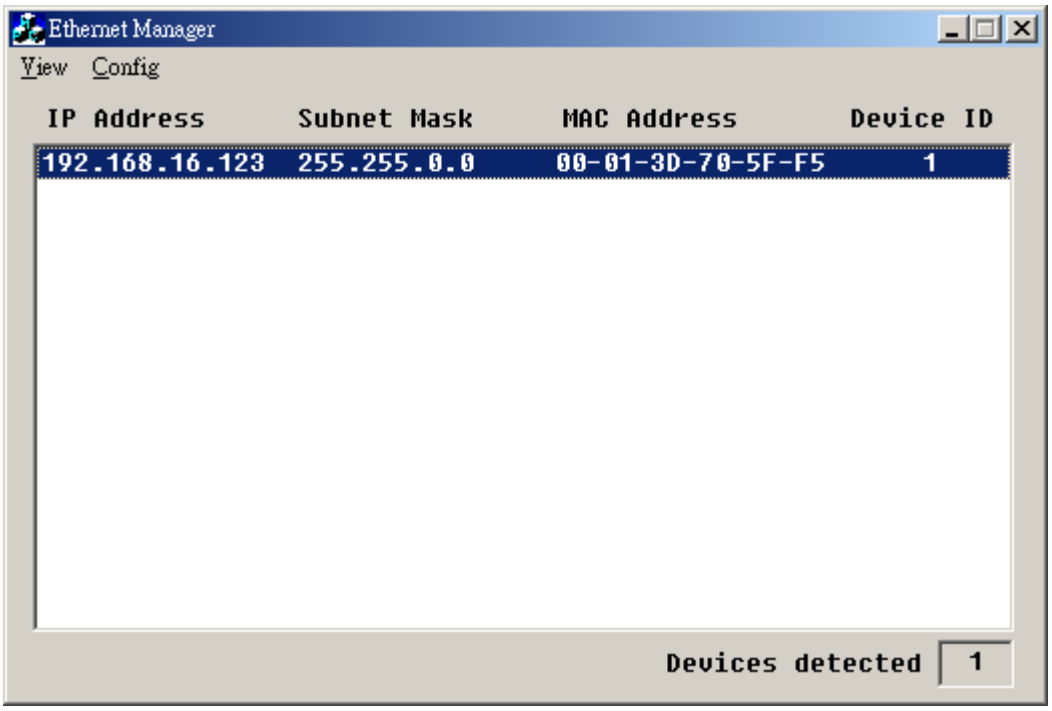
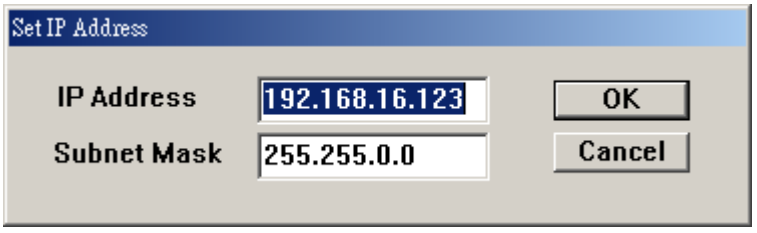


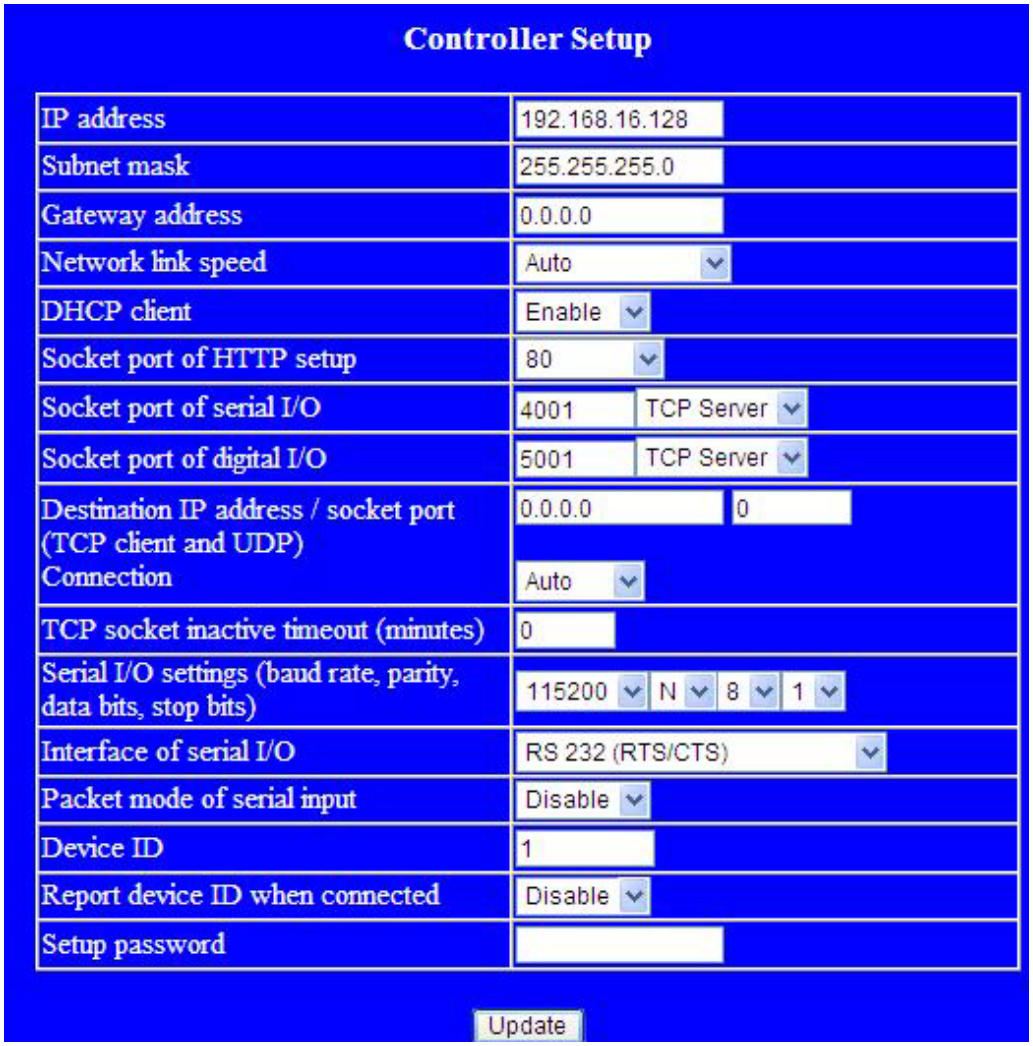
FIG D2-1

4. It will be shown the installation which has been searched on the screen , click it and select the Set IP Address bellows Config:



5. Set a useful IP Address and Subnet Mask.

6.It will be shown the Setup Device as the following figure if all steps was corrected to be run.



7.Insert the numbers as the following :

7.1 IP Address: as recommended according to your network
7.2 Subnet Mask: as recommended according to your network
7.3 Gateway Address: as recommended according to your network
7.4 Network link speed: Auto
7.5 DHCP client: Enable
7.6 Socket port of HTTP setup: 80
7.7 Socket port of serial I/O: 4001，TCP Server
7.8 Socket port of digital I/O: 5001，TCP Server
7.9 Destination IP address / socket port (TCP client and UDP) Connection: Auto
7.10 TCP socket inactive timeout(minutes)：Set the network disconnection after N minutes, set 0 minutes will work forever.
7.11 Serial I/O settings (baud rate, parity, data, bits, stop bits): 115200, N, 8, 1
7.12 Interface of serial I/O: RS 232 (RTS/CTS)
7.13 Packet mode of serial input: Disable
7.14 Device ID : 5
7.15 Report device ID when connected：Auto
7.16 Setup password: Not required

Appendix D 3350G series Auto. Sequence function

Edit mode

1. Setting mode, range, current level... Load Setting an, Load ON
2. Press the STORE key to store the load settings in the memory state
3. Repeat 1~2 for sequential loading settings.
4. Press the Shift + SEQ keys. 3350G series front panel buttons.
5. Press the Up/Down key to select Edit Mode.
6. Press the number keys 1~9 to select the program number, and press ENTER to enter the program.
7. Press the up/down key or the keyboard to input a value (1~150) to select the memory state.
8. Press the ENTER key to enter the next state and execute the time setting.
9. Press ENTER to go to the next step of the sequence and repeat steps 7~9 to edit
10. Press the SAVE key to confirm the step
11. The LCD displays "rept" to set the number of repetitions.
12. Press the Up/Down keys to set the number of repetitions of the sequence loop.
13. Press the SAVE key to confirm sequence editing.

Test mode

1. Press SEQ. key of 3350G series front panel
2. Press up/down key to select Test Mode.
3. Press 1~9 number to select sequence number
4. Press ENTER to execution the sequence
5. The LCD shows “PASS” or “FAIL” after testing.

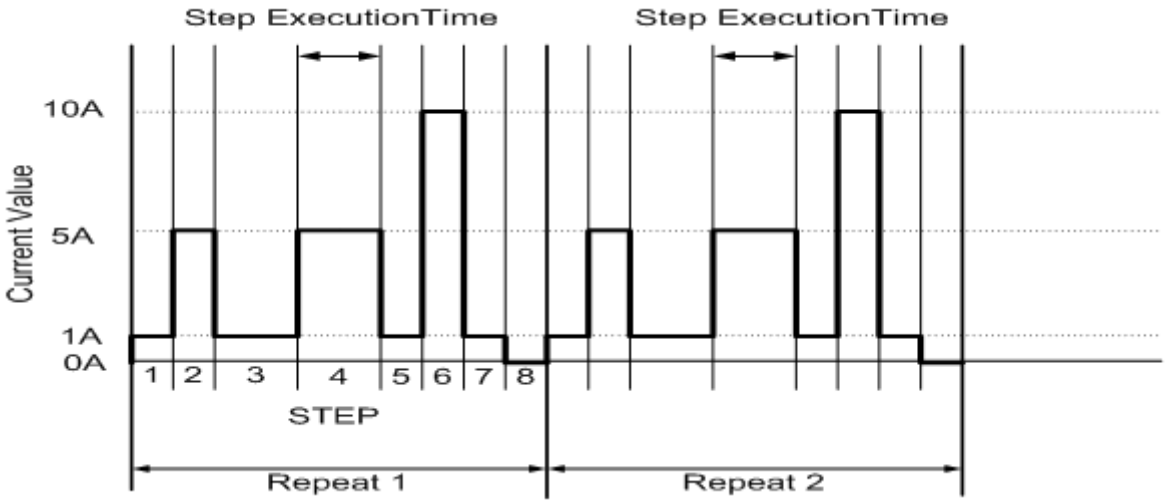
AUTO SEQUENCE:

AUTO SEQUENCE SET COMMAND	NOTE	RETURN
FILE {SP} {n}{;| NL}	n=1~9	
FILE {?} {;| NL}		1~9
STEP {SP} {n} {;| NL}	n=1~16	
STEP {?} {;| NL}		1~16
TOTSTEP {SP} {n}{;| NL}	Total step n=1~16	
TOTSTEP? {;| NL}		1~16
SB {SP} {m} {;| NL}	m=1~150 m:STATE	
SB {?} {;| NL}		1~150
TIME {SP} {NR2} {;| NL}	100~9999(ms)	100~9999(ms)
SAVE {;| NL}	Save “File n” data	
REPEAT {SP} {n} {;| NL}	n=0~9999	0~9999
REPEAT {?} {;| NL}	n=0~9999	0~9999
RUN {SP} {F} {n} {;| NL}	N=1~9	AUTO REPLY “PASS” or “FAIL:XX” (XX=NG STEP)

Example Sequence

In this example, we will create a program based on following Figure.

The program repeats steps 1 to 8 two times. After repeating the sequence two times, the load is turned off and the sequence ends.



Sequence Number	Step Number	Current Value	Execution Time(T1+T2)
3	1	1A	200mS
3	2	5A	200mS
3	3	1A	400mS
3	4	5A	400mS
3	5	1A	200mS
3	6	10A	200mS
3	7	1A	200mS
3	8	0A	200mS

Creating the program

1. Setting the Load current level and store to state 1~8
2. Set the operation mode, Press the mode key to CC mode.
3. Set the range Press RANGE key to force range 2
4. Press Load ON
5. Set the current value as step 1~8 and store to memory state 1~8
6. Press EDIT key of 3350G series mainframe
7. Press up/down key to select Edit Mode
8. Press sequence number 3 to edit the sequence
9. Press up/down key to memory state 1
10. Press ENTER key to confirm the sequence memory
11. Press up/down key to setting execution time
12. Press ENTER key to confirm the sequence step
13. Repeat 8~12 to setting step 1~8
14. Press SAVE key to confirm step 1~8
15. Press up/down key to 1 to repeat one times.
16. Press ENTER to confirm the repeat count.

Testing Waveform