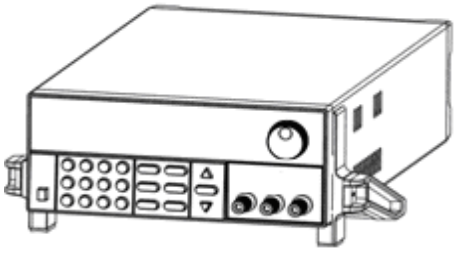
IT6100B Series SCPI

High Resolution and High Speed Programmable Power DC Supply

Models IT6100B Series

IT6121B/IT6122B/IT6123B

IT6132B/IT6133B



© Copyright 2005 All Rights Reserved

Ver1.1/MAR, 2008/ IT6100-508

Directory

About your safety 3
Certification and Warranty 3
Chapter 1 Remote Operation Mode 4
1.1 IT-E131 RS232 Communication Cable ..... 错误！未定义书签。
1.2 IT-E132 USB Communication Cable ..... 错误！未定义书签。
1.3 IT-E135 GPIB Communication Cable ..... 错误！未定义书签。
Chapter 2 Communication Order for IT6100 7
2.1 IEEE488.2 Common Order 7
2.2 SCPI Essential Order 7
2.3 Calibration Order 7
2.4 Output Order 8
2.5 Port Configure Order 9
2.6 Trigger Order 9
Chapter 3 SCPI Condition Register 9
Chapter 4 SCPI Order Description 12
4.1 IEEE488.2 Common Order 12
4.2 SCPI Essential Order 15
4.3 Output Order 17
4.4 Input measurement order 21
4.5Trigger order 23
4.6 Calibration order 24

About your safety
Pease review the following safety precautions before operating our equipment.

General information
The following safety precautions should be observed before using this product and any associated instrumentations. Although some instruments and accessories would be used with non-hazardous voltages, there are situations where hazardous conditions may be present.
This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to this manual for complete product specifications.
If the product is used in a manner not specified, the protection provided by the product may be impaired. Before performing any maintenance, disconnect the line cord and all test cables.

Protection from electric shock
Operators of this instrument must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000 volts, no conductive part of the circuit may be exposed.

Definition of users
Responsible body is the individual or group responsible for the use and maintenance of equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.
Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.
Service is only to be performed by qualified service personnel.
Safety symbols and terms
Connect it to safety earth ground using the wire recommended in the user manual.
The symbol on an instrument indicates that the user should refer to the operating instructions located in the manual.
High voltage danger

Certification and Warranty
Certification
We certify that this product met its published specifications at time of shipment from the factory.

Warranty
This instrument product is warranted against defects in material and workmanship for a period of one year from date of delivery. During the warranty period we will, at its option, either repair or replace products which prove to be defective. For warranty service, with the exception of warranty options,
this product must be returned to a service facility designated by us. Customer shall prepay shipping charges by (and shall pay all duty and taxes) for products returned to the supplier for warranty service.
Except for products returned to customer from another country, supplier shall pay for return of products to customer.

Chapter 1 Remote Operation Mode

IT6100B configure with three type of communication interface RS232 、USB and GPIB for user adopting any of it flexible.

6.1 RS232 interface

There is a DB9 connector at the rear of the power supply, when connect to computer, you need to connect a cable with COM port on both side; active connection, you need to set the front panel composite press (Shift)+I-set key configuration settings the same as computer configuration settings. RS-232 interface can be used to program all of the SCPI orders.

Note: RS232 settings must match the settings in front panel system information. If any change, please press (Shift) +I-set key.

RS-232 data format

RS-232 data is a 10-bit word which has a start bit and a stop bit. The start bit and stop bit can not be edited. However, you can select the parity items with (Shift) +I-set key on the front panel.

Parity options are stored in nonvolatile memory

Baud Rate

The front panel (Shift) +I-set button allow the user to select a baud rate which is stored in the non-volatile memory: 4,800,960,019,200 3,840,057,600,115,200

RS-232 connection cable

Use a RS232 cable with DB-9 interface, RS-232 serial port can connect with the controller (eg PC). Do not use blank Modem cable. Below table shows the plug pins.

If your computer is using a RS-232 interface with DB-25 connector, you need a adapter cable with a DB-25 connector at one end and the other side is a DB-9(not blank modem cable)



RS-232 plug pins

Pin number	Description
1	No connection
2	TXD, transfer date
3	RXD, receive data
4	No connection
5	GND, ground
6	No connection
7	CTS, clear transfer
8	RTS, ready to transfer
9	No connection

RS-232 Troubleshooting:
If there is RS-232 connection problem, check the following:
Computer and power supply must configure the same baud rate, parity, data bits and flow control options. Note that the power configuration as a start bit and a stop bit (these values are fixed).
As described before in RS-232 connector, you must use the correct interface cable or adapter. Note that even if the cable has the right plug, the internal wiring may be wrong.
Interface cable must be connected to the correct serial port on the computer (COM1, COM2, etc.).

Communication Settings
Before communication, you should first make the following parameters of power supply and PC matches.
Baud Rate: 9600 (4800, 9600, 19200, 38400, 57600, 115200). You can enter the system menu from the front panel, and then set the baud rate.
Data bits: 8
Stop Bits: 1
Calibration (none, even, odd)
EVEN 8 data bits, have even parity
ODD 8 data bits have odd parity
NONE 8 data bits, no parity
Local Address: (0 ~ 31, the factory default setting is 0)

Parity=None	Start Bit	8 Data Bits	Stop Bit

6.2 USB interface

Use a Cable with two USB port to connect the power and the computer. All power functions can be programmed via USB.
The USB488 interface functions of the power supply described as below:
◆ Interface is 488.2 USB488 interface.

◆ Interface receiver REN_CONTROL, GO_TO_LOCAL, and LOCAL_LOCKOUT request.
◆ Interface receives MsgID = TRIGGER USBTMC order information, and will pass TRIGGER order to the functional layer.

Power USB488 device functions described as follows:
◆ Devices can read all of the mandatory SCPI orders.
◆ Device is SR1 enabled.
◆ Device is RL1 enabled.
◆ Device is DT1 enabled

6.3 GPIB interface

First, Connect the GPIB interface on the power supply and the GPIB card on computer via IEEE488 bus, must be full access and tighten the screws. Then set the address, the address range of the power : 0 to 30, can set by the function key on the front panel, press the (Shift)+I-set key to enter the system menu function, find the GPIB address setting by◀▶button, type the address, Enter key to confirm. GPIB address is stored in nonvolatile memory line

6.4 Communication protocol

IT6100B programming should adopt SCPI communication protocol, please contact ITECH to get the protocol you need.

Chapter 2 Communication Order for IT6100B

2.1 IEEE488.2 Common Order

"***CLS**"
"***ESE**"
"***ESE?**"
"***ESR?**",
"***IDN?**",
"***OPC**",
"***OPC?**",
"***PSC**",
"***PSC**？ ",
"***RST**",
"***SRE**",
"***SRE?**",
"***STB?**",
"***TRG**",
"***SAV** ",
"***RCL**",

2.2 SCPI Essential Order

SYSTem
:ERRor[:NEXT]?
:VERSion?,
:ADDRess?
:REMote
:LOCal
:RWLock

STATus
:QUEStionable
[:EVENt]?
:CONDition?
:ENABle <VALUE>
:ENABle?
:OPERation
:EVENt]?
: CONDition?
:ENABle <VALUE>
:ENABle?

2.3 Calibration Order

CALibration
:SECure
[:STATe] {<ON|OFF>,<quoted code>}
]:STATe]?
:VOLTage
:LEVel {<level> }

[:DATA] {<numeric value>}
:CURRent
:LEVel {<level> }
[:DATA] {<numeric value>}
:DVM
:LEVel {<level>}
[:DATA] {<numeric value>}
:SAVe
:INITital

2.4 Output Order

OUTPut
[:STATe] {<bool>}
[:STATe]?
:TIMer
[:STATe] {<bool>}
[:STATe]?
:DATA {<timer>}
:DATA?
[SOURce:]
MODE {<FIXed|LIST|DRM>}
MODE?
VOLTage
[:LEVel] {<n>}
[:LEVel]?
:PROTection
:STATe {<bool>}
:STATe?
[:LEVel] {<n>}
[:LEVel]?
CURRent
[:LEVel] {<n>}
[:LEVel]?
LIST
:MODE {<mode>}
:MODE?
:STEP {<step>}
:STEP?
:COUNt {<n>}
:COUNt?
:CURRent
[:LEVel] {<n>,<n>}
[:LEVel]? {<n>}
:VOLTage
[:LEVel] {<n>,<n>}
[:LEVel]? {<n>}
:WIDth {<n>,<n>}
:WIDth? {<n>}
:NAME {<string code>}
:NAME?
:AREA {1|2|4|8}

:AREA?
:SAVe {1|2|3|4|5|6|7||8}
:RCL {1|2|3|4|5|6|7|8}
Input Meaaure Order
MEASure
[:SCALar]
:VOLTage[:DC]?
:CURRent[:DC]?
:POWer[:DC]?
:DVM[:DC]?
:RESistance[DC]?

2.5 Port Configure Order

[SOURce:]
SYSTem
: SENSe [:STATe] {<bool>}
[:STATe]?
PORT
:MODE {<TRIGger|RIDFi|DIGital>}
:MODE?
RI
:MODE {<OFF|LATChing|LIVE>}
:MODE?
DFI
:SOURce {<OFF|QUES|OPER|ESB|RQS>}
:SOURce?
DIGital
:OUTPut[:STATe] {<bool>}
:INPut[:STATe]?
[:SENSe]
:RESistance:RANGe {LOW | MIDdle | HIGH>}
:RANGe?

2.6 Trigger Order

TRIGger
[:IMMediate]
:SOURce {<source>}

Chapter 3 SCPI Condition Register

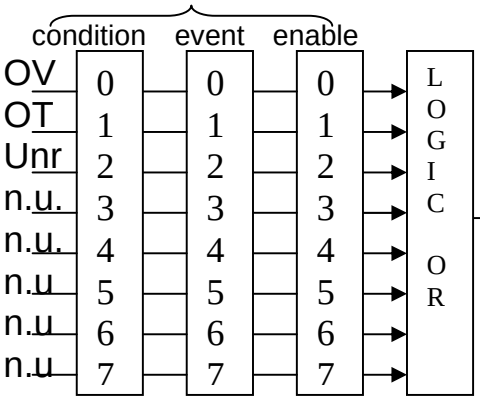
You can get the condition of power supply and read parameter from the operation register. The power supply can get the different state by 4 condition registers. These registers are status byte register, standard event register, quest condition register and operation status register. The status byte register stores the information of 3 other register. You can get each register's

meaning from the following table:

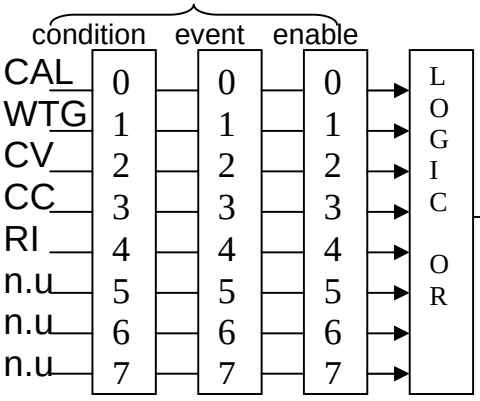
BIT	Signal	Meaning
		Operation status register
0	CAL	The power supply is calculating new calibration parameter.
1	WTG	The power supply is waiting for trigger signal.
2	CV	The power supply is in constant voltage condition.
3	CC	The power supply is in constant current condition.
4	RI	Show the input level condition of RI
		Quest condition register
0	OV	Over voltage
1	OT	Over temperature
2	UNR	The output of power supply is unregulated.
		Standard event status register
0	OPC	Operation of power supply is completed.
2	QYE	Query error. Data of output array is missing.
3	DDE	Device-dependent error. Data stored in register is missing or error occurs in preliminary checkout.
4	EXE	Execution error. Order parameter overflows or the condition is not right.
5	CME	Command error. Syntax or semantic error occurs when receiving information.
7	PON	Power on. It is 1when power supply is reset.
		Status byte register
3	QUES	If a quest enable condition changes, QUES is 1.
5	ESB	If a standard event status enable register changes, ESB is 1.
6	MSS RQS	
7	OPER	If a operation event enable register changes, OPER is 1.

Structure of condition register as following:

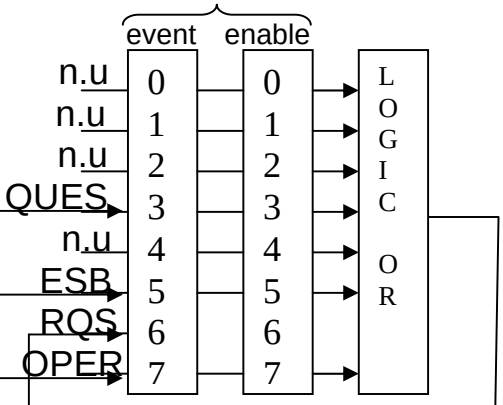
Quest condition register



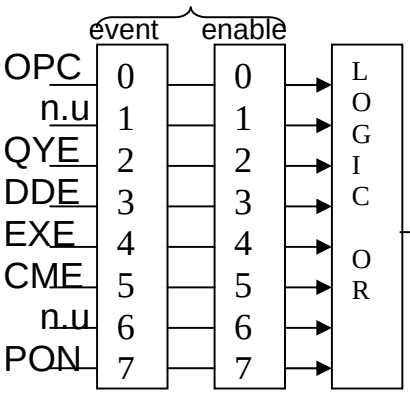
Operation event register



Status byte register



Standard event status register



Chapter 4 SCPI Order Description

4.1 IEEE488.2 Common Order

***CLS**

This order can clean the register as follows:
Standard event status register
Quest condition register
Operation event register
Status byte register
Error code

Order syntax: ***CLS**
Parameter: None

***ESE**

This order can set the parameter of standard event enable register. Setting parameter can determine which bit value of standard event register is 1 and the byte will enable ESB of status byte register is 1.

Order syntax: ***ESE** <NRf>
Parameter: 0~255
Reset value: Consult *PSC order
Example: *ESE 128
Quest syntax: ***ESE**?
Return parameter: <NR1>
Reference order: ***ESR**? ***PSC** ***STB**?

Bit determination of standard event status enable register

Bit position	7	6	5	4	3	2	1	0
Bit Name	PON	Not used	CME	EXE	DDE	QYE	Not used	OPC
Bit Weight	128		32	16	8	4		
PON Power-on CME Command error EXE Execution error				DDE Device-dependent error QYE Query error OPC Operation complete				

***ESR?**

This order can read the value of standard event status register. After executing this order, standard event status register is reset. Bit definition of standard event status register is as the same as the standard event status enable register.

Quest syntax: ***ESR**?
Parameter: None
Return parameter: <NR1>
Reference order: ***CLS** ***ESE** ***ESE**? ***OPC**

***IDN?**

This order can read information about power supply. The parameter it returns contains 4 segments divided by comma.

Quest syntax: ***IDN**?

Parameter: None

Return parameter: <AARD>

segment	description
ITECH	manufacturer
XXXX	product mode
XXXXXX	product serial number
VX. XX	software version number

For example: ITECH，6152，000004，V1.01

***OPC**

When all orders before this order are executed, OPC is 1 of the standard event status register.

Order syntax: ***OPC**

Parameter: None

Quest syntax: ***OPC**?

Return parameter: <NR1>

***PSC**

This order control if power supply send a query or not when it is reset.

1 OR ON: When power supply is reset, operation event enable register, query event enable register and standard event status register are all reset.

0 OR OFF: The data of status byte register, operation event enable register, quest event enable register and standard event status enable register is stored in nonvolatile register, and is recalled when power supply is reset.

Order syntax: ***PSC <bool>**

Parameter: 0|1|ON|OFF

Quest syntax: ***PSC**?

Return parameter: 0|1

Reference order: ***ESE** ***SRE** **STAT:OPER:ENAB** **STAT:QUES:ENAB**

***RST**

This order reset the power supply to default setting.

CAL:SEC:STAT OFF **OUTP OFF** **CURR MAX**
VOLT:PROT MAX **VOLT MIN** **TRIG:SOUR BUS** **SYST:SENS OFF** **PORT:MODE TRIG** **RI:MODE OFF**
DFI:SOUR OFF **VOLT:PROT:STAT OFF**

Order syntax: ***RST>**

Parameter: None

***SRE**

This order can set the parameter of standard event register. Setting parameter can determine which byte value of status byte register is 1 and the byte will enable RQS of status byte register is 1. Bit definition of status byte enable register is as the same as the status byte register.

Order syntax: ***SRE** <NRf>

Parameter：0~255
Reset value：Consult *PSC order
Example：*SRE 128
Quest syntax**: *SRE**?
Return parameter：<NR1>
Reference Order：***ESE *ESR? *PSC *STB?**

***STB?**
This order can read the data from status byte register. After executing this order, status byte register is reset.
Quest syntax：***STB?**
Parameter：None
Return parameter：<NR1>
Reference order：***CLS *ESE *ESR**

Bit determination of standard event status enable register

Bit Position	7	6	5	4	3	2	1	0
Bit Name	OPER	RQS	ESB	no use	QUES	no use	no use	no use
Bit Value	128	64	32		8			

***TRG**
When power supply's trigger source is a order, this order will give a trigger signal. And it's function is as the same as the function of **[SYSTem:]TRIGger** order.
Order syntax：***TRG**
Parameter：None
Reference order：**TRIG TRIG:SORU**

***SAV**
This order can save the parameters of power supply to register. These parameter contains constant current, constant voltage, maximum voltage value and step voltage value.
Order syntax：***SAV<NRf>**
Parameter：1~50
Example：***SAV** 3
Reference order：***RCL**

***RCL**
This order can recall the parameter you saved before from the register.
Order syntax：***RCL<NRf>**
Parameter：1~50
Example：***RCL** 3
Reference order：***SAV**

4.2 SCPI Essential Order

SYSTem:ERRor[:NEXT]?

This order can get the error code and error information of the power supply.

No error
(1) Too many numeric suffices in Command Spec
(10) No Input Command to parse
(14) Numeric suffix is invalid value
(16) Invalid value in numeric or channel list, e.g. out of range
(17) Invalid number of dimensions in a channel list
(20) Parameter of type Numeric Value overflowed its storage
(30) Wrong units for parameter
(40) Wrong type of parameter(s)
(50) Wrong number of parameters
(60) Unmatched quotation mark (single/double) in parameters
(65) Unmatched bracket
(70) Command keywords were not recognized
(80) No entry in list to retrieve (number list or channel list)
(90) Too many dimensions in entry to be returned in parameters
(101) Command Execution error
(100) Too many command
(110) Rxd error Parity
Error EEPROM
Config data error
Error Calibration data
Factory Data error

Order syntax: **SYST:ERR?**
Parameter: None
Return parameter:〈NR1〉,〈SRD〉

SYSTem:VERSion?

This order can query the software version.
Order syntax: **SYST:VERS?**
Parameter: None
Return parameter: <NR2>

SYSTem:ADDRess?

This order can query address of SOURCE METER.
Order syntax: **SYST:ADDR?**
Parameter: None
Return parameter: <NR2>

SYSTem:REMote

This order can set SOURCE METER as remote control mode.
Order syntax: **SYST:REM**
Parameter: None
Quest syntax: None

SYSTem:LOCal
This order can set SOURCE METER as panel control mode.
Order syntax: **SYST:LOC**
Parameter: None
Query syntax: None

SYSTem:RWLock[:STATe]
This order can set LOCAL key of SOURCE METER enable or not.
Order syntax: **SYST:RWL**

STATus:QUEStionable[:EVENt]?
This order can read the parameter from quest event register. After executing , quest event register is reset.
Quest syntax: **STATus:QUEStionable[:EVENt]?**
Parameter: None
Return parameter: <NR1>
Reference order: **STATus:QUEStionable:ENABle**

Bit determination of standard event status enable register

Bit Position	7	6	5	4	3	2	1	0
Bit name	no use	no use	no use	no use	no use	unr	OT	OV
Bit Value						4	2	1

STATus:QUEStionable:CONDition?
This order can read the parameter from quest condition register. When a bit of quest condition changes, the bit value corresponding in quest event register is 1.
Quest syntax: **STATus:QUEStionable: CONDition?**
Parameter: None
Return parameter: <NR1>

STATus:QUEStionable:ENABle
This order can set the parameter of quest event enable register. Setting parameter can determine which bit value of quest event register is 1 and the bit will enable QUES of status byte register is 1.

Order syntax: **STATus:QUEStionable:ENABle** <NRf>
Parameter: 0~255
Reset value: Consult *PSC order
Example: **STATus:QUEStionable:ENABle** 128
Quest syntax: **STATus:QUEStionable:ENABle**?
Return parameter: <NR1>
Reference order: ***PSC**

STATus:OPERation:EVENt]?
This order can read the parameter from operation event register. After executing this order, operation event register is reset.
Quest syntax: **STATus: OPERation [:EVENt]?**
Parameter: None

Return parameter: <NR1>
Reference order: **STATus: OPERation:ENABle**

Bit determination of standard event status enable register

Bit Position	7	6	5	4	3	2	1	0
Bit Name	no use	no use	no use	RI	CC	CV	WTG	CAL
Bit value				16	8	4	2	1

STATus:OPERation:CONDition?
This order can read the parameter from the operation condition. When the parameter of operation condition register changes, the bit corresponding in operation event register is 1.
Quest syntax: **STATus: OPERation: CONDition?**
Parameter: None
Return parameter: <NR1>

STATus:OPERation:ENABle
This order can set the parameter of operation even enable register. Setting parameter can determine which bit value of operation event register is 1 and the bit will enable OPER of status byte register is 1.

Order syntax: **STATus: OPERation:ENABle** <NRf>
Parameter: 0~255
Reset value: Consult *PSC order
Example: **STATus: OPERation:ENABle** 128
Quest syntax: **STATus: OPERation:ENABle**?
Return parameter: <NR1>
Reference order: ***PSC**

4.3 Output Order

OUTPut[:STATe]
This order can set power supply output on or off.
Order syntax: **OUTPut[:STATe] <bool>**
Parameter: 0|1|ON|OFF
*RST value: OFF
Quest syntax: **OUTPut:STATe?**
Return parameter: 0|1

OUTPut:TIMer[:STATe]
This order can set output timer's state of power supply.
Order syntax: **OUTPut:TIMer[:STATe] <bool>**
Parameter: 0|1|ON|OFF
*RST value: OFF
Quest syntax: **OUTPut:TIMer:STATe?**
Return parameter: 0|1

OUTPut:TIMer:DATA
This order can set the time of output timer.
Order syntax: **OUTPut:TIMer:DATA <NR1>**
Parameter: **<NR2>**
*RST value: 1
Quest syntax: **OUPut:TIMer:DATA?**
Return parameter: **<NR2>**

[SOURce:]MODE
This order can set the power supply working in order fixed mode or list mode.
FIXed Order fixed mode
LIST List mode
DRM Digital milliohm meter
Order syntax: **[SOURce:]MODE <mode>**
Parameter: FIXed|LIST|DRM
*RST value**:** FIXed
Example: **MODE** FIX
Quest syntax: **[SOURce:] MODE**?
Return parameter: <CRD>

[SOURce:]CURRent [:LEVel]
This order can set current value of power supply.
Order syntax: **[SOURce:]CURRent [:LEVel] <NRf>**
Parameter: MIN TO MAX|MIN|MAX
Unit: A mA
*RST value**:** MIN
Example: **CURR** 3A, **CURR** 30mA, **CURR** MAX, **CURR** MIN
Quest syntax: **[SOURce:]CURRent [:LEVel]**?
Parameter: [MIN|MAX]
Example: **CURR**? , **CURR**? MAX, **CURR**? MIN
Return parameter: <NR2>

[SOURce:]VOLTage[:LEVel]
This order can set voltage value of power supply.
Order syntax: **[SOURce:]VOLTage[:LEVel] <NRf>**
Parameter: MIN TO MAX|MIN|MAX
Unit: V | mV| KV
*RST value: MAX
Quest syntax: **[SOURce:]VOLTage[:LEVel]**?
Parameter: [MIN|MAX]
Return parameter: <NR2>

[SOURce:]VOLTage:PROTection:STATe
This order can set over voltage protection.
Order syntax: **[SOURce:] VOLTage:PROTection:STATe <bool>**
Parameter: 0 | 1 | ON | OFF
Unit: None
*RST value: OFF

Example: **VOLT:PROT: STAT** 1, **VOLT :PROT:STAT ON**
Quest syntax: **[SOURce:] VOLTage:PROTection:STATe?**
Parameter: None
Example: **VOLT:PROT:STAT?**
Return parameter: <0 | 1>

[SOURce:]VOLTage:PROTection[:LEVel]
This order can set voltage protection maximum level.
Order syntax: **[SOURce:] VOLTage:PROTection[:LEVel] <NRf>**
Parameter: MIN TO MAX|MIN|MAX
Unit: V mV
*RST value: MAX
Example: **VOLT:PROT** 30V, **VOLT PROT** MAX
Quest syntax: **[SOURce:] VOLTage:PROTection[:LEVel]?**
Parameter: [MIN|MAX]
Example: **VOLT:PROT?** , **VOLT PROT?** MAX
Return parameter: <NR2>

[SOURce:]LIST:MODE
This order can set list file .
CONTinious List operation is continuous mode.
STEP List operation is step mode.
Order syntax: **[SOURce:]LIST:MODE <CRD>**
Parameter: CONTinious|STEP
Quest syntax: **[SOURce:]LIST:MODE?**
Return parameter: <CRD>

[SOURce:]LIST:STEP
This order can set operation mode of list file.
ONCE List operate once
REPeat Repeat list operation
Order syntax: **[SOURce:]LIST:STEP <SRD>**
Parameter: ONCE|REPeat
Quest syntax: **[SOURce:]LIST:STEP?**
Return parameter: <CRD>

[SOURce:]LIST:COUNt
This order can set the steps of list operation.
Order syntax: **[SOURce:]LIST:COUNt <NRf>**
Parameter: 2~400
Quest syntax: **[[SOURce:]LIST:COUNt?**
Parameter: None
Return parameter: <NR1>

[SOURce:]LIST :CURRent[:LEVel]
This order can set current step.
Order syntax: **[SOURce:]LIST :CURRent[:LEVel] <NRf>**
Parameter: 0~30A
Unit: A |mA
Example: **LIST:CURR** 1，3A;
Quest syntax: **[SOURce:]TRANsition:CURRent:TLEVel**?
Parameter: None
Example: **LIST:CURR**? 1;
Return parameter: <NR2>

[SOURce:]LIST :VOLTage[:LEVel]
This order can set voltage step.
Order syntax: **[SOURce:]LIST : VOLTage [:LEVel] <NRf>**
Parameter: 0~360V
Unit: V mV
Example: **LIST:VOLT** 1，3V;
Quest syntax: **[SOURce:]TRANsition: VOLTage:TLEVel**?
Parameter: None
Example: **LIST:VOLT**? 1;
Return parameter: <NR2>

[SOURce:]LIST:WIDth
This order can set the minimum step time.
Order syntax: **[SOURce:]LIST:WIDth <NRf>**
Parameter: MIN TO MAX|MIN|MAX
Unit: S mS
Example: **LIST:WID** 1, 100mS;
Quest syntax: **[SOURce:]LIST:WIDth**?
Parameter: None
Example: **LIST:WID**? 1;
Return parameter: <NR2>

[SOURce:]LIST:NAME
This order can set name for list file. Make sure that the file name should less than 8 characters.
Order syntax: **[SOURce:]LIST:NAME <name>**
Parameter: <SRD>
Example: **LIST:NAME** 'TEST';
Quest syntax: **[SOURce:]LIST:NAME?**
Return parameter: <SRD>

[SOURce:]LIST:AREA
This order can divide the store area of list file with 4 methods.
1. 1 group of store area, 400 steps
2. 2 groups of store area, each group has 200 steps.
4. 4 groups of store area, each group has 100 steps.
8. 8 groups of store area, each group has 50 steps.

Order syntax: **[SOURce:]LIST:AREA <NR1>**
Parameter: 1|2|4|8
Example: LIST:AREA 1
Quest syntax: **[SOURce:]LIST:AREA**?
Return parameter: <NR1>

[SOURce:]LIST:SAVe
This order can save list file into register.
Order syntx: **[SOURce:]LIST:SAVe <NR1>**
Parameter: 1~8
Example: LIST:SAV 1

[SOURce:]LIST:RCL
This order can recall the list file saved before from the register.
Order syntax: **[SOURce:]LIST:SAV <NR1>**
Parameter: 1~8
Example: LIST:SAV 1

4.4 Input measurement order

MEASure[:SCALar]:VOLTage[:DC]?
This order can get the input voltage of power supply.
Order syntax: **MEASure[:SCALar]:VOLTage[:DC]?**
Parameter: None
Return parameter:〈NR2〉
Return parameter unit: V
Example: **MEAS:VOLT**?

MEASure[:SCALar]:CURRent[:DC]?
This order can get the input current of power supply.
Order syntax: **MEASure[:SCALar]:CURRent[:DC]?**
Parameter: None
Return parameter:〈NR2〉
Return parameter unit: A
Example: **MEAS:CURR**?

MEASure[:SCALar]:POWer[:DC]?
This order can get the input power of the power supply.
Order syntax: **MEASure[:SCALar]:POWer?**
Parameter: None
Return parameter:〈NR2〉
Return parameter unit: W
Example: **MEAS:POW?**

MEASure[:SCALar]:DVM[:DC]?
This order can get voltage value from the digital voltage meter.
Order syntax: **MEASure[:SCALar]:DVM?**
Parameter: None

Return parameter:〈NR2〉
Return parameter unit: V
Example: **MEAS:DVM?**

[:SENSe]:RESistance:RANGe
This order can set the range of milliohm meter.
LOW: 0.01W resistance range
MIDDLE: 0.1W resistance range
HIGH: 1W resistance range
Order syntax: [:SENSe]**:RESistance:RANGe**
Parameter: LOW | MIDdle | HIGH
Example: RES:RANG LOW
Quest syntax: **[:SENSe]:RESistance:RANGe?**
Return parameter: <SRD>

MEASure[:SCALar]:RESistance[:DC]?
This order can read the resistance value from the milliohm meter.
Order syntax: **MEASure[:SCALar]: RESistance?**
Parameter: None
Return parameter:〈NR2〉
Return parameter unit: R
Example: **MEAS:RES?**

Interface Configure Order
[SOURce:]SYSTem:SENSe [:STATe]{<bool>}
This order can control the power supply enable remote sense function or not.
Order syntax: **SYSTem: SENSe [:STATe] <bool>**
Parameter: 0|1|ON|OFF
Quest syntax: **SYSTem:SENSe [:STATe]**?
*RST value: 0

[SOURce:]PORT:MODE
This order can set port function of rear panel.:
TRIGGER function: Pin1、pin2 can be used as the external trigger source of power supply and control list operation.
RI/DFI function: Inhibit Input can control the output state of power supply. Fault Output can shows false.。
DIGITAL I/O function: It can read and control output port state by order.
Order syntax: **SOURce:PORT:MODE**
Parameter: TRIGger|RIDFi|DIGital
Quest syntax: **SOURce:PORT:MODE**?
*RST value: TRIGger

[SOURce:]RI:MODE
This order can set input mode of RI.
LITCHING mode: When the level of RI port changes from high to low, the output of power supply is off.
LIVE node: The output state of power supply changes along with the level of RI port. If the level of RI is high, the output is on; and the level of RI is low, the output of power supply is

off.
OFF mode: The level state of RI do not affect the output state of power supply.
Order syntax: **SOURce:RI:MODE**
Parameter: OFF|LATChing|LIVE
Quest syntax: **SOURce:RI:MODE**?
*RST value: OFF

[SOURce:]DFI:SOURce
This order can set output source of DFI.
LITCHING mode: When the level of RI port changes from high to low, the output of power supply is off.
LIVE node: The output state of power supply changes along with the level of RI port. If the level of RI is high, the output is on; and the level of RI is low, the output of power supply is off.
OFF mode: The level state of RI do not affect the output state of power supply.
Order syntax: **SOURce:DFI:SOURce**
Parameter: OFF|QUES|OPER|ESB|RQS
Quest syntax: **SOURce:DFI:SOURce**?
*RST value: OFF

[SOURce:]DIGital:OUTPut[:STATe]
This order can set the output state of port. When the mode of port is DIGITAL, this order is enable.
Order syntax: **SOURce:OUTPut[:STATe]**
Paremeter: OFF|ON|0|1

[SOURce:]DIGital:INPut[:STATe]?
This order can set the input state of port. When the mode of port is DIGITAL, this order is enable.
Order syntax: **SOURce:INPut[:STATe] ?**

4.5Trigger order

TRIGger[:IMMediate]
When trigger source is order mode, this order will give a trigger signal. And its function is as the same as ***TRG** order.
Order syntax: ***** **TRIGger[:IMMediate]**
Parameter: None
Reference order: **TRIG** **TRIG:SORU**

TRIGger:SOURce
This order can set the trigger mode of power supply.
IMMediate: If this function is enabled, press Shift + Trigger, the power supply will start trigger operation once.
EXTernal: External trigger signal (TTL). There is a trigger input port on the rear panel. When this function is enabled, please give this trigger input port a pulse about 5 mS, and the power supply will start trigger operation once.

Bus: Order trigger mode. When this function is enabled, and the power supply receives order*TRG or TRIgger, the power supply will start trigger operation once.
Order syntax: **TRIGger:SOURce <mode>**
Parameter: IMMediate|EXTernal|BUS
*RST value: KEY

4.6 Calibration order

CALibration:SECure:[STATe]
Set protection mode enable or disable when calibrating the power supply.
Order syntax: **CALibration:SECure:[STATe]**{ON|OFF>,[<password>]}
Parameter: 0|1|ON|OFF, '5811
Example: CAL:SEC 1, '5811; CAL:SEC OFF
Quest syntax: **CALibration:SECure:STATe?**
Parameter: None
CALibration:VOLTage:LEVel
This order can set voltage calibration point. P1、P2、P3、P4 must be calibrated orderly.
Order syntax: **CALibration:VOLTage:LEVel <point>**
Parameter: P1|P2

CALibration:VOLTage [:DATA] {<numeric value>}
Return actual output voltage value of calibration point.
Order syntax: **CALibration:VOLTage [:DATA] <NRf>**
Parameter: <NRf>
Example: CAL:VOLT 30.0002V

CALibration:CURRent:LEVel
This order can set current calibration point. P1、P2、P3、P4 must be calibrated orderly.
Order syntax: **CALibration:CURRent:LEVel <point>**
Parameter: P1|P2

CALibration:CURRent [:DATA] {<numeric value>}
Return actual output current value to calibration point.
Order syntax: **CALibration:CURRent [:DATA] <NRf>**
Parameter: <NRf>
Example: CAL:VOLT 3.0002A

CALibration:DVM:LEVel
This order can set current calibration point. P1、P2、P3、P4 must be calibrated orderly.
Order syntax: **CALibration:DVM:LEVel <point>**
Parameter: P1|P2|P3|P4

CALibration:DVM [:DATA] {<numeric value>}
Return actual output current value to calibration point.
Order syntax: **CALibration:DVM [:DATA] <NRf>**
Parameter: <NRf>
Example: CAL:VOLT 3.0002A

CALibration:SAVe
This order can save calibration coefficient into nonvolatile register.
Order syntax：**CALibration:SAVe**
Parameter：None

CALibration: INITial
This order can renew the current calibration coefficient as default.
Order syntax: CALibration: INITial
Parameter: None