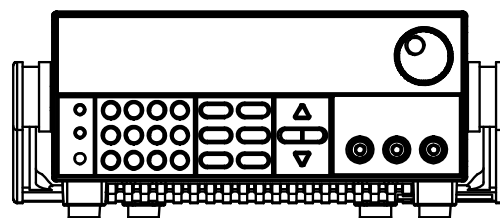


IT6100B Series SCPI High Resolution and High Speed Programmable Power DC Supply Models IT6100B Series



Model: IT6121B/IT6122B/IT6123B/
IT6132B/IT6133B/IT6162B/
IT6164B
Version: V2.2

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Safety Notices

CAUTION

A CAUTION sign denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

WARNING

A WARNING sign denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.



NOTE

A NOTE sign denotes important hint. It calls attention to tips or supplementary information that is essential for users to refer to.

Quality Certification and Assurance

We certify that IT6100B series instruments meet all the published specifications at time of shipment from the factory.

Warranty

ITECH warrants that the product will be free from defects in material and workmanship under normal use for a period of one (1) year from the date of delivery (except those described in the Limitation of Warranty below).

For warranty service or repair, the product must be returned to a service center designated by ITECH.

- The product returned to ITECH for warranty service must be shipped PREPAID. And ITECH will pay for return of the product to customer.
- If the product is returned to ITECH for warranty service from overseas, all the freights, duties and other taxes shall be on the account of customer.

Limitation of Warranty

This Warranty will be rendered invalid in case of the following:

- Damage caused by circuit installed by customer or using customer own products or accessories;
- Modified or repaired by customer without authorization;
- Damage caused by circuit installed by customer or not operating our products under designated environment;
- The product model or serial number is altered, deleted, removed or made illegible by customer;
- Damaged as a result of accidents, including but not limited to lightning, moisture, fire, improper use or negligence.

Safety Symbols

	Direct current		ON (power on)
	Alternating current		OFF (power off)
	Both direct and alternating current		Power-on state
	Protective conductor terminal		Power-off state
	Earth (ground) terminal		Reference terminal
	Caution, risk of electric shock		Positive terminal
	Warning, risk of danger (refer to this manual for specific Warning or Caution information)		Negative terminal

	Frame or chassis terminal	-	-
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Safety Precautions

The following safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or specific warnings elsewhere in this manual will constitute a default under safety standards of design, manufacture and intended use of the instrument. ITECH assumes no liability for the customer's failure to comply with these precautions.

WARNING

- Do not use the instrument if it is damaged. Before operation, check the casing to see whether it cracks. Do not operate the instrument in the presence of inflammable gasses, vapors or dusts.
- The electronic load is provided with a power line during delivery and should be connected to a socket with a protective earth terminal. Before operation, be sure that the instrument is well grounded.
- Make sure to use the power cord supplied by ITECH.
- Check all marks on the instrument before connecting the instrument to power supply.
- Use electric wires of appropriate load. All loading wires should be capable of bearing maximum short-circuit current of electronic load without overheating. If there are multiple electronic loads, each pair of the power cord must be capable of bearing the full-loaded rated short-circuit output current
- Ensure the voltage fluctuation of mains supply is less than 10% of the working voltage range in order to reduce risks of fire and electric shock.
- If you use the power supply to charge the battery, pay attention to the positive and negative polarity of the battery when wiring, otherwise the power supply will be damaged!
- Do not install alternative parts on the instrument or perform any unauthorized modification.
- Do not use the instrument if the detachable cover is removed or loosen.
- To prevent the possibility of accidental injuries, be sure to use the power adapter supplied by the manufacturer only.
- We do not accept responsibility for any direct or indirect financial damage or loss of profit that might occur when using the instrument.
- This instrument is used for industrial purposes, do not apply this product to IT power supply system.
- Never use the instrument with a life-support system or any other equipment subject to safety requirements.

CAUTION

- Failure to use the instrument as directed by the manufacturer may render its protective features void.
- Always clean the casing with a dry cloth. Do not clean the internals.

- Make sure the vent hole is always unblocked.

Environmental Conditions

The IT6100B series power supply is only permitted for indoor use and in low-condensation environments. The table below outlines the general environmental requirements for this instrument.

Environmental Conditions	Requirements
Operating temperature	0°C to 40°C
Operating humidity	20%-80% (non-condensation)
Storage temperature	-10°C to 70 °C
Altitude	Operating up to 2,000 meters
Pollution degree	Pollution degree 2
Installation category	II



Note

To make accurate measurements, allow the instrument to warm up for 30 min before operation.

Regulatory Markings

	The CE mark indicates that the product complies with all the relevant European legal directives. The specific year (if any) affixed refers to the year when the design was approved.
	The UKCA mark indicates that the product complies with all relevant UK legal regulations (if accompanied by a year, it indicates the year the design was approved).
	The instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard the electrical/electronic product in domestic household waste.
	This symbol indicates the time period during which no hazardous or toxic substances are expected to leak or deteriorate during normal use. The expected service life of the product is 10 years. The product can be used safely during the 10-year Environment Friendly Use Period (EFUP). Upon expiration of the EFUP, the product must be immediately recycled.

Waste Electrical and Electronic Equipment (WEEE) Directive



This product complies with the WEEE Directive (2002/96/EC) marking requirement. This affix product label indicates that you must not discard the electrical/electronic product in domestic household waste.

Product Category

With reference to the equipment classifications described in the Annex I of the WEEE Directive, this instrument is classified as a "Monitoring and Control Instrument".

To return this unwanted instrument, contact your nearest ITECH office.

Compliance Information

Complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Low-Voltage Directive (Safety) 2014/35/EU

Conforms with the following product standards:

EMC Standard

IEC 61326-1:2012/ EN 61326-1:2013 ¹²³

Reference Standards

CISPR 11:2009+A1:2010/ EN 55011:2009+A1:2010 (Group 1, Class A)

IEC 61000-4-2:2008/ EN 61000-4-2:2009

IEC 61000-4-3:2006+A1:2007+A2:2010/ EN 61000-4-3:2006+A1:2008+A2:2010

IEC 61000-4-4:2004+A1:2010/ EN 61000-4-4:2004+A1:2010

IEC 61000-4-5:2005/ EN 61000-4-5:2006

IEC 61000-4-6:2008/ EN 61000-4-6:2009

IEC 61000-4-11:2004/ EN 61000-4-11:2004

1. The product is intended for use in non-residential/non-domestic environments. Use of the product in residential/domestic environments may cause electromagnetic interference.
2. Connection of the instrument to a test object may produce radiations beyond the specified limit.
3. Use high-performance shielded interface cable to ensure conformity with the EMC standards listed above.

Safety Standard

IEC 61010-1:2010/ EN 61010-1:2010

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Chapter1 Remote Control

1.1 Overview

This chapter will provide following remote configuration introductions:

- SCPI Command Introduction
- Command type
- Command format
- Data format
- Remote Operation

1.2 SCPI Command Introduction

SCPI (Standard Commands for Programmable Instruments), also known as the Standard Commands for Programmable Instruments, defines the communication protocol between a bus controller and instruments. It is an ASCII-based command language used for test and measurement equipment.

SCPI commands are organized in a hierarchical structure (referred to as a tree system). In this system, related commands are grouped under a common node or root, forming subsystems. Below is an excerpt from the OUTPut subsystem to illustrate the tree system:

OUTPut:

SYNC {OFF|0|ON|1}

SYNC:

MODE {NORMa|CARRier}

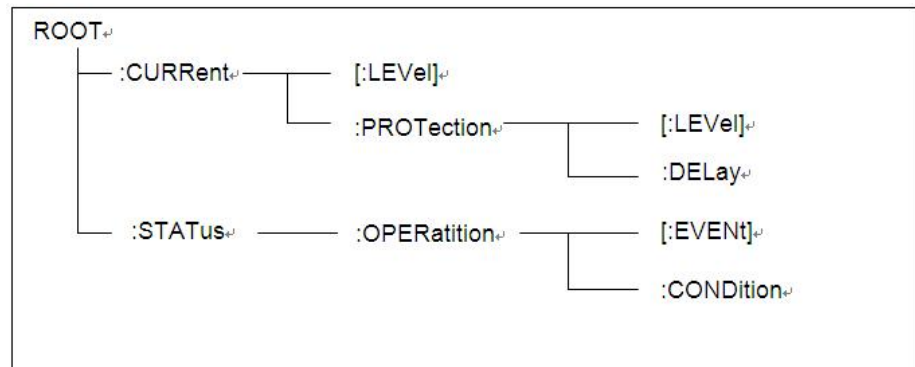
POLarity {NORMa|INVerted}

OUTPut is the root-level command, SYNC represents the second-level command, while MODE and POLarity constitute third-level commands. The colon (:) serves as the delimiter between command levels in the hierarchy.

1.3 Command Type of SCPI

SCPI has two types of commands, common and subsystem.

- Common commands generally are not related to specific operation but to controlling overall electronic load functions, such as reset, status, and synchronization. All common commands consist of a three-letter mnemonic preceded by an asterisk: *RST *IDN? *SRE 8.
- Subsystem commands perform specific electronic load functions. They are organized into an inverted tree structure with the "root" at the top. The following figure shows a portion of a subsystem command tree, from which you access the commands located along the various paths.



Multiple commands in a message

Multiple SCPI commands can be combined and sent as a single message with one message terminator. There are two important considerations when sending several commands within a single message:

- Use a semicolon to separate commands within a message.
- Head paths influence how the instrument interprets commands.

We consider the head path as a string which will be inserted in front of every command of a message. As for the first command of a message, the head path is a null string; for each subsequent command, the head path is a string which is defined to form the current command until and including the head of the last colon separator. A message with two combined commands:

CURR:LEV 3;PROT:STAT OFF

The example indicates the effect of semicolon and explains the concept of head path. Since the head path is defined to be "CURR" after "curr: lev 3", the head of the second command, "curr", is deleted and the instrument explains the second command as:

CURR:PROT:STAT OFF

If "curr" is explicitly included in the second command, it is semantically wrong. Since combining it with the head path will become "CURR:CURR:PROT:STAT OFF", resulting in wrong command.

Movement in the subsystem

In order to combine commands from different subsystems, you need to be able to reset the header path to a null string within a message. You do this by beginning the command with a colon (:), which discards any previous header path. For example, you could clear the output protection and check the status of the Operation Condition register in one message by using a root specifier as follows:

PROTection:CLEAr;:STATus:OPERation:CONDition?

The following message shows how to combine commands from different subsystems as well as within the same subsystem:

POWER:LEVel 200;PROTection 28; :CURRent:LEVel 3;PROTection:STATe ON

Note the use of the optional header LEVel to maintain the correct path within the voltage and current subsystems, and the use of the root specifier to move between subsystems.

Including Common Commands

You can combine common commands with subsystem commands in the same message. Treat the common command as a message unit by separating it with a semicolon (the message unit separator). Common commands do not affect the header path; you may insert them anywhere in the message.

VOLTage:TRIGgered 17.5;:INITialize;*TRG

OUTPut OFF;*RCL 2;OUTPut ON

Case sensitivity

Common commands and SCPI commands are not case sensitive. You can use upper or lower for example:

*RST = *rst

:DATA? = :data?

:SYSTem:PRESet = :system:preset

Long-form and short-form versions

A SCPI command word can be sent in its long-form or short-form version. The command subsystem tables in Section 5 provide the in the long-form version. However, the short-form version is indicated by upper case characters. Examples:

:SYSTem:PRESet long-form

:SYST:PRES short form

:SYSTem:PRES long-form and short-form combination

Note that each command word must be in long-form or short-form, and not something in between.

For example, :SYSTe:PRESe is illegal and will generate an error. The command will not be executed.

Query

Observe the following precautions with queries:

- Set up the proper number of variables for the returned data. For example, if you are reading back a measurement array, you must dimension the array according to the number of measurements that you have placed in the measurement buffer.
- Read back all the results of a query before sending another command to the electronic load. Otherwise a Query Interrupted error will occur and the unreturned data will be lost.

1.4 Command Format

Formats for command display are as follows:

[SOURce[1|2]:]VOLTage:UNIT {VPP|VRMS|DBM}

[SOURce[1|2]:]FREQuency:CENTer

{<frequency>|MINimum|MAXimum|DEFault}

Based on the command syntax, most commands (and certain Parameter) are expressed in both upper and lower cases. Upper case refers to abbreviation of commands. Shorter program line may send commands in abbreviated format. Long-format commands may be sent to ensure better program readability.

For example, both formats of VOLT and VOLTAGE are acceptable in the above syntax statements. Upper or lower case may be used. Therefore, formats of VOLTAGE, volt and Volt are all acceptable. Other formats (such as VOL and VOLTAG) are invalid and will cause errors.

- Parameter options with given command strings are included in the brace ({ }). The brace is not sent along with command strings.
- Vertical stripes (|) separate several parameter options with given command strings. For example, {VPP|VRMS|DBM} indicates that you may assign "APP", "VRMS" or "DBM" in the above commands. Vertical stripes are not sent along with command strings.
- Angle brackets (< >) in the second example indicates that a value must be assigned to the parameter in the brace. For example, the parameter in the angle bracket is <frequency> in the above syntax statements. Angle brackets are not sent along with command strings. You must assign a value (such as "FREQ:CENT 1000") to the parameter, unless you select other options displayed in the syntax (such as "FREQ:CENT MIN").
- Some syntax elements (such as nodes and Parameter) are included in square brackets ([]). It indicates that these elements can be selected and omitted. Angle brackets are not sent along with command strings. If no value is assigned to the optional Parameter, the instrument will select a default value. In the above examples, "SOURce[1|2]" indicates that you may refer to source channel 1 by "SOURce" or "SOURce1" or "SOUR1" or "SOUR". In addition, since the whole SOURce node is optional (in the square bracket), you can refer to the channel 1 by omitting the whole SOURce node. It is because the channel 1 is the default channel for SOURce language node. On the other hand, if you want to refer to channel 2, "SOURce2" or "SOUR2" must be used in the program line.

Colon (:)

It is used to separate key words of a command with the key words in next level. As shown below:

APPL:SIN 455E3,1.15,0.0

In this example, APPLy command assigns a sine wave with frequency of 455 KHz, amplitude of 1.15 V and DC offset of 0.0 V.

Semicolon (;)

It is used to separate several commands in the same subsystem and can also minimize typing. For example, to send the following command string:

TRIG:SOUR EXT; COUNT 10

has the same effect as sending the following two commands:

```
TRIG:SOUR EXT
```

```
TRIG:COUNT 10
```

Question mark (?)

You can insert question marks into a command to query current values of most Parameter. For example, the following commands will trigger to set the count as 10:

```
TRIG:COUN 10
```

Then, you may query count value by sending the following command:

```
TRIG:COUN?
```

You may also query the allowable minimum or maximum count as follows:

```
TRIG:COUN?MIN
```

```
TRIG:COUN?MAX
```

Comma (,)

If a command requires several Parameter, then a comma must be used to separate adjacent Parameter.

Space

You must use blank characters, [TAB] or [Space] to separate Parameter with key words of commands.

Generic commands (*)

Execute functions like reset, self-inspection and status operation. Generic commands always start with an asterisk (*) and occupy 3 character sizes, including one or more Parameter. Key words of a command and the first parameter are separated by a space. Semicolon (;) can separate several commands as follows:

```
*RST; *CLS; *ESE 32; *OPC?
```

Command terminator

Command strings sent to the instrument must end with a <Newline> (<NL>) character. IEEE-488 EOI (End or Identify) information can be used as <NL> character to replace termination command string of <NL> character. It is acceptable to place one <NL> after a <Enter>. Termination of command string always resets current SCPI command path to root level.



NOTE

As for every SCPI message with one query sent to the instrument, the instrument will use a <NL> or newline sign (EOI) to terminate response of return. For example, if "DISP:TEXT?" is sent, <NL> will be placed after the returned data string to terminate response. If an SCPI message includes several queries separated by semicolon (such as "DISP?;DISP:TEXT?"), <NL> will terminate response returned after response to the last query. In all cases, the program must read <NL> in response before another command is sent to the instrument, otherwise errors will be caused.

1.5 Data Type

SCPI language defines several data types used for program message and response messages.

- Numerical parameter

Commands requiring numerical Parameter support the notations of all common decimal notations, including optional signs, decimal points, scientific notation, etc. Special values of numerical Parameter are also acceptable, such as MIN, MAX and DEF. In addition, suffixes for engineering units can also be sent together with numerical Parameter (including M, k, m or u). If the command accepts only some specific values, the instrument will automatically round the input Parameter to acceptable values. The following commands require numerical Parameter of frequency value:

[SOURce[1|2]:]FREQuency:CENTer {<Frequency>|MINimum|MAXimum}

- Discrete parameter

Discrete Parameter are used for settings with limited number of programming values (such as IMMEDIATE, EXTERNAL or BUS). They can use short and long format like key words of commands. They may be expressed in both upper and lower case. The query response always returns uppercase Parameter in short format. The following commands require discrete Parameter in voltage unit:

[SOURce[1|2]:]VOLTage:UNIT {VPP|VRMS|DBM}

- Boolean parameter

Boolean Parameter refer to true or false binary conditions. In case of false conditions, the instrument will accept "OFF" or "0". In case of true conditions, the instrument will accept "ON" or "1". In query of Boolean settings, the instrument will always return "0" or "1". Boolean Parameter are required by the following commands:

DISPlay {OFF|0|ON|1}

- ASCII string Parameter

String Parameter may actually include all ASCII character sets. Character strings must start and end with paired quotation marks; and single quotation marks or double quotation marks are both allowed. Quotation mark separators may also act as one part of a string, they can be typed twice without any character added between them. String parameter is used in the following command:

DISPlay:TEXT <quoted string>

For example, the following commands display message of "WAITING..." (without quotation marks) on the front panel of the instrument.

DISP:TEXT "WAITING..."

Single quotation marks may also be used to display the same message.

DISP:TEXT 'WAITING...'

1.6 Remote Interface Connection

The IT6100B series power supply comes standard with three communication interfaces: RS232, USB, and GPIB. Users can select any one of these to

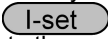
establish communication with a computer.

1.6.1 RS232 Interface

The rear panel of the power supply features a DB9 port. To connect to a computer, use a cable with COM ports (DB9) on both ends. To activate the connection, the configured values in the system menu must match the corresponding settings on the computer. All SCPI commands can be used for programming via the RS-232 interface.



NOTE

The RS232 settings in the program must match those set in the front panel system menu. To view and change, press the compound key  (Shift) +  key to enter the system menu setting page for query or change, please refer to the user manual menu function for details.

RS-232 Data Format

RS-232 data is a 10-bit word with one start bit and one stop bit. The number of start and stop bits is not editable. However, the following parity option can be selected using the front panel  (Shift)+  key. The parity option is stored in non-volatile memory.

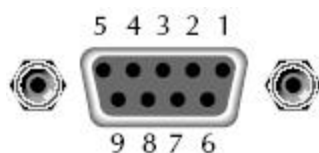
Baud Rate

The front panel  (Shift)+  key allows the user to select a baud rate stored in non-volatile memory: 4800/9600/19200/38400/57600/115200

RS-232 Connection

Use an RS-232 cable with a DB-9 connector and an RS-232 serial port that can be connected to the controller's serial port (e.g., a PC). Do not use an air-conditioning mediator cable. Table 2-2 shows the plug pins.

If your computer uses an RS-232 interface with a DB-25 plug, you will need a cable and an adapter with a DB-25 plug on one end and a DB-9 plug on the other (not an air-conditioned mediator cable).



RS232 Pins of Plug

Base pin number	Description
1	No conjunction
2	TXD, data transmission
3	RXD, data receiving
4	No conjunction
5	GND, grounding
6	No conjunction
7	CTS, clear to send
8	RTS, request to send
9	No conjunction

RS-232 Troubleshooting:

If there is RS-232 connection problem, check the following:

- The computer and power supply must be configured with the same baud rate, parity bits, data bits and flow control options. Note that the power supply is configured for 1 start bit (fixed to 1) and 1 or 2 stop bits.
- As described in RS232 Connectors, the correct interface cable or adapter must be used. Note that even if the cable has the right plug, the internal wiring may not be correct.
- The interface cable must be connected to the correct serial port (COM1, COM2, etc.) on the computer.

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
-------------	-----------	-------------	----------

1.6.2 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:

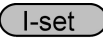
- Interface is 488.2 USB488 interface.
- Interface receiver REN_CONTROL, GO_TO_LOCAL, and LOCAL_LOCKOUT request.
- Interface receives MsgID = TRIGGER USBTMC order information, and will pass TRIGGER order to the functional layer.

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

1.6.3 GPIB Interface (Only for IT6100B(G) series)

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)+  key to enter the system menu function, find the GPIB address setting by  button, type the address,  key to confirm. GPIB address is stored in nonvolatile memory line.

Chapter2 SCPI Status Register

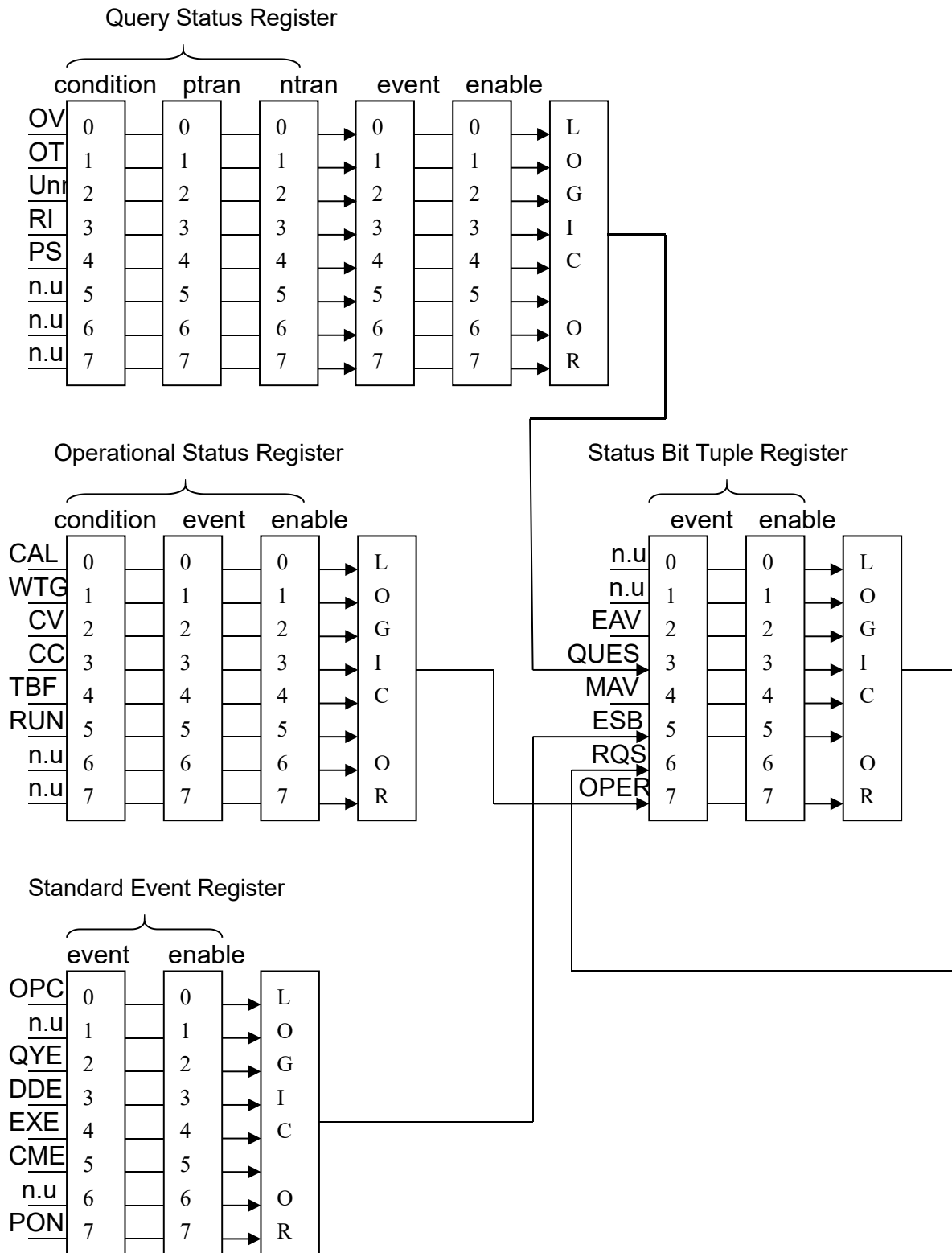
SCPI Status Register

You can determine the current state of the power supply by reading the value of the Operational Status Register. The power supply records the different instrument states through four status register groups, which are the Status Bit Group Register, the Standard Event Register, the Query Status Register, and the Operational Status Register. The status byte group registers record messages from other status registers. The following table gives the definition of each status register.

BIT	Signal	Meaning
0 1 2 3 4 5	CAL WTG CV CC TBF RUN	Operation status register ● Power supply is memorizing new calibration coefficients ● Power supply is waiting for a trigger signal ● Power supply in constant voltage output state ● Power supply in constant current state ● TRACE BUFFER FULL ● LIST IS RUNNING
0 1 2 3 4	OV OT UNR RI PS	Query Status Register ● Over Voltage ● Over Temperature ● Power output is unstable ● Indicates RI status ● PROTECTION SHUTDOWN
0 2 3 4 5 7	OPC QYE DDE EXE CME PON	Standard Event Register ● Operation completed. All parallel operations of the power supply were completed ● Query error. Output queue data lost ● Instrument related error. Loss of instrument memory data or self-test error ● Execution error. Command parameter overflow or inconsistent operating conditions ● Command error. Syntax or semantic error in the received command message. ● Power-on bit. This bit is 1 after each power-up
2 3 4 5	EAV QUES MAV ESB	Status byte register ● Error buffer is available ● QUES position 1 if the status of an enabled query status register changes ● Output Buffer is available ● ESB location 1 if the status of an enabled standard event status register has changed

6	RQS	● OPER location 1 if the status of an enabled operation status register has changed
7	OPER	

The following figure defines the structure of the power status registers.



Chapter3 System Commands

SYSTem:ERRor[:NEXT]?

This command is used to read the error code and error message of the power supply.

Command Syntax:

SYST:ERR?

Parameter:

None

Return Parameters:

<NR1>, <SRD>

SYSTem:VERSion?

This command queries the version number of SCPI. For example, 1990.0

Command Syntax:

SYST:VERS?

Parameter:

None

Return Parameters:

<NR2>

SYSTem:REMOte

This command is used to set SOURCE METER to remote control mode.

Command Syntax:

SYST:REM

Parameter:

None

Query Syntax:

None

SYSTem:LOCaI

This command sets SOURCE METER to panel control mode.

Command Syntax:

SYST:LOC

Parameter:

None

Query Syntax:

None

SYSTem:RWLock[:STATe]

This command sets the power supply to remote control mode and the LOCAL key is not available. Executing this command sets the power supply to remote control mode just like the SYST:REM command, but the difference is that all the keys on the front panel, including the LOCAL key, will be locked.

Command Syntax:

SYST:RWL

Parameter:

None

Query Syntax:

None

SYSTem:POSetup

This command is used to set the power-up parameter settings of SOURCE METER.

Command Syntax:

SYST:POSetup {<RST | SAV0>}

Parameter:

RST | SAV0

Query Syntax:

SYST:POSetup?

Return Parameters:

RST | SAV0

STATus:QUEStionable[:EVENT]?

This command can be used to read the value of the query event register. After this command is executed, the value of the query event register is cleared.

Query Syntax:

STATus:QUEStionable[:EVENT]?

Parameter:

None

Return Parameters:

<NR1>

Related Commands:

STATus:QUEStionable:ENABLE

Standard event enable register bit definitions:

Bit	7	6	5	4	3	2	1	0
Name	no use	no use	no use	PS	RI	unr	OT	OV
Value				16	8	4	2	1

STATus:QUEStionable:CONDition?

This command can be used to read the value of the query condition register. When the value of a bit in the query condition register changes, the corresponding bit in the query event register is set to 1.

Query Syntax:

STATus:QUEStionable:CONDition?

Parameter:

None

Return Parameters:

<NR1>

STATus:QUEStionable:PTRansition

This command edits the value of the Query Event Rising Edge Change Register. The programming parameters determine which bits in the Query Condition Register will cause a 1 in the corresponding position of the Query Event Register when they change from 0 to 1.

Command Syntax:

STATus:QUEStionable:PTRansition <NR1>

Parameter:

0~255

Power-on Value:

Reference *PSC command

Example:

STATus:QUEStionable:PTRansition 128

Query Syntax:

STATus:QUEStionable:PTRansition?

Return Parameters:

<NR1>

STATus:QUEStionable:NTRansition

This command edits the value of the Query Event Falling Edge Change Register. The programming parameter determines which bits in the Query Condition Register will cause a 1 in the corresponding position of the Query Event Register when they change from 1 to 0.

Command Syntax:

STATus:QUEStionable:NTRansition <NR1>

Parameter:

0~255

Power-on Value:

Reference *PSC command

Example:

STATus:QUEStionable:NTRansition 128

Query Syntax:

STATus:QUEStionable:NTRansition?

Return Parameters:

<NR1>

STATus:QUEStionable:ENABLE

This command edits the value of the Query Event Enable Register. The programming parameter determines which bits in the Query Event Register will cause a 1 in the QUES position in the Status Bit Tuple Register.

Command Syntax:

STATus:QUESTionable:ENABLE <NR1>

Parameter:

0~255

Power-on Value:

Reference *PSC command

Example:

STATus:QUESTionable:ENABLE 128

Query Syntax:

STATus:QUESTionable:ENABLE?

Return Parameters:

<NR1>

Related Commands:

*PSC

STATus:OPERation:[EVENT]?

This command can be used to read the value of the operation event register. After this command is executed, the value of the operation event register is cleared.

Query Syntax:

STATus:OPERation[:EVENT]?

Parameter:

None

Return Parameters:

<NR1>

Related Commands:

STATus:OPERation:ENABLE

Standard event enable register bit definitions:

Bit	7	6	5	4	3	2	1	0
Name	no use	no use	RUN	TBF	CC	CV	WTG	CAL
Value			32	16	8	4	2	1

STATus:OPERation:CONDition?

This command can be used to read the value of the operation condition register. When the value of a bit in the operation condition register changes, the corresponding bit in the operation event register is set to 1.

Query Syntax:

STATus:OPERation:CONDition?

Parameter:

None

Return Parameters:

<NR1>

STATus:OPERation:ENABLE

This command edits the value of the operation event enable register. The programming parameter determines which bits in the operation event register will cause a 1 in the OPER position in the status bit tuple register.

Command Syntax:

STATus:OPERation:ENABLE <NRf>

Parameter:

0~255

Power-on Value:

Reference *PSC command

Example:

STATus:OPERation:ENABLE 128

Query Syntax:

STATus:OPERation:ENABLE?

Return Parameters:

<NR1>

Related Commands:

*PSC

Chapter4 Trigger Commands

TRIGger[:IMMediate]

This command will immediately generate a trigger signal regardless of the mode of the power trigger source.

Command Syntax:

TRIGger[:IMMediate]

Parameter:

None

Related Commands:

TRIG TRIG:SORU

TRIGger:SOURce

This command is used to select the trigger mode of the power supply.

MANUal:Keyboard (Trigger key) Trigger. When the user presses the Trigger key while the keyboard trigger method is active, a trigger operation will be performed.

EXTeRnal:External trigger signal (TTL level). There is a trigger input terminal on the rear panel of the power supply. When a falling edge is detected by the power supply while the external trigger signal method is active, the power supply will perform a trigger operation.

HOLD:Trigger Hold. A trigger operation can be generated only when another TRIG:IMM command is received.

BUS:Command Trigger Mode. When the Command Trigger Mode is active, the power supply will perform a trigger operation when the power supply receives the trigger command *TRG.

Command Syntax:

TRIGger:SOURce <source>

Parameter:

MAUNal|EXTeRnal|BUS|HOLD

Default Value:

MANUal

Query Syntax:

TRIGger:SOURce?

Chapter5 Output Measurement Commands

FETCh:VOLTage[:DC]?

MEASure:VOLTage[:DC]?

This command is used to read the input voltage of the power supply.

Command Syntax:

FETCh:VOLTage[:DC]?
MEASure:VOLTage[:DC]?

Parameter:

None

Return Parameters:

<NR2>

Return Value Units:

V

Example:

FETC:VOLT?
MEAS:VOLT?

FETCh:CURRent[:DC]?

MEASure:CURRent[:DC]?

This command is used to read the input current of the power supply.

Command Syntax:

FETCh:CURRent[:DC]?
MEASure:CURRent[:DC]?

Parameter:

None

Return Parameters:

<NR2>

Return Value Units:

A

Example:

FETC:CURR?

MEAS:CURR?

FETCh:POWer[:DC]?

This command is used to read the input power of the power supply.

Command Syntax:

FETCh:POWer[:DC]?

Parameter:

None

Return Parameters:

⟨NR2⟩

Return Value Units:

W

Example:

FETC:POW?

FETCh:DVM[:DC]?

MEASure:DVM[:DC]?

This command is used to read the input voltage of the power supply voltmeter.

Command Syntax:

FETCh:DVM[:DC]?

MEASure:DVM[:DC]?

Parameter:

None

Return Parameters:

⟨NR2⟩

Return Value Units:

V

Example:

FETC:DVM?

MEAS:DVM?

FETCh:RESistance[:DC]?

MEASure:RESistance[:DC]?

This command is used to read the input resistance value when the power supply is in milliohmmeter mode.

Command Syntax:

FETCh:RESistance[:DC]?

MEASure:RESistance[:DC]?

Parameter:

None

Return Parameters:

⟨NR2⟩

Return Value Units:

R

Example:

FETC:RES?

MEAS:RES?

Note: The fetch command and the measure command can also read the values of various parameters, but the difference is that fetch reads the last measured value, while measure reads the re-measured value. The difference is that fetch reads the last measured value, while measure remeasures it. The speed of fetch is faster, but the accuracy of measure is higher.

Chapter6 Output Setting Commands

[SOURce:]OUTPut[:STATe]

This command is used to control the power output on or off.

Command Syntax:

OUTPut[:STATe] <bool>

Parameter:

0|1|ON|OFF

Default Value:

OFF

Query Syntax:

OUTPut:STATe?

Return Parameters:

0|1

[SOURce:]OUTPut:TIMer[:STATe]

This command is used to control the state of the power output timer.

Command Syntax:

OUTPut:TIMer[:STATe] <bool>

Parameter:

0|1|ON|OFF

Default Value:

OFF

Query Syntax:

OUTPut:TIMer:STATe?

Return Parameters:

0|1

[SOURce:]OUTPut:TIMer:DELaY

This command sets the power output timer.

Command Syntax:

OUTPut:TIMer:DELaY <NRf | MIN | MAX | DEF>

Parameter:

S

Default Value:

1

Query Syntax:

OUTPut:TIMer:DELaY?

Return Parameters:

0|1

[SOURce:]OUTPut:PONSetup

This command is used to set the output ON/OFF state when SOURCE METER is powered up.

Command Syntax:

OUTP:PONSetup {<RST | RCL0>}

Parameter:

RST | RCL0

Query Syntax:

OUTP:PONSetup?

Return Parameters:

RST | RCL0

[SOURce:]OUTPut:RI:MODE

This command sets the RI input mode:

LATCHING mode: When a right high to low change in level is detected in the RI port, the power output is turned off, and the latched state can be cleared only by sending the OUTP:PROT:CLE command.

LIVE mode: the output state of the output power supply changes with the level

of RI, the power supply output is unaffected when the RI input is high, and the power supply output is turned off when the RI input is low.

OFF mode: the output state of the power supply is not affected by the RI input level.

Command Syntax:

SYSTem:RI:MODE

Parameter:

OFF|LATChing|LIVE

Query Syntax:

SYSTem:RI:MODE?

Default Value:

OFF

[SOURce:]OUTPut:DFI:SOURce

This command is used to set the DFI output source.

Command Syntax:

SYSTem:DFI:SOURce

Parameter:

OFF|QUES|OPER|ESB|RQS

Query Syntax:

SYSTem:DFI:SOURce?

Default Value:

OFF

[SOURce:]OUTPut:PROTection:CLEar

This command is used to clear the fault protection caused by OV, OT, RI, etc., which turns off the output.

Command Syntax:

OUTP:PROT:CLE

Parameter:

None

[SOURce:]DIGital:FUNction

This command is used to set the power back panel port function:

TRIGGER Function: Pins 1 and 2 can be used as an external trigger source for the power supply to control the sequential operation of the power supply.

RI/DFI Functions: Inhibit Input can be used to control the output state of the power supply, and Fault Output is used for power supply fault indication.

DIGITAL I/O Function: Used as a general-purpose digital I/O port, it can read and control the status of input and output ports through communication commands.

Command Syntax:

DIG:FUNC

Parameter:

TRIGger|RIDFi|DIGital

Query Syntax:

DIGital:FUNction?

Default Value:

TRIGger

[SOURce:]DIGital:DATA

This command is used to set the output state of the port, this command works only when the port is in DIGITAL mode.

Command Syntax:

DIGital:DATA

Parameter:

OFF|ON|0|1

[SOURce:]DIGital:DATA?

This command is used to read the input status of the port, this command works only when the port is in DIGITAL mode.

Command Syntax:

DIGital:DATA?

[SOURce:]FUNCTION:MODE

This command is used to select the power supply to work in command setting mode or sequential list mode.

FIXed Command Setting Mode

LIST Sequential List Mode

DRM Milliohmmeter Mode

Command Syntax:

[SOURce:]FUNCTION:MODE <mode>

Parameter:

FIXed|LIST|DRM

Default Value:

FIXed

Example:

FUNC:MODE FIX

Query Syntax:

[SOURce:]FUNCTION:MODE?

Return Parameters:

<CRD>

[SOURce:]CURRENT[:LEVel]

This command sets the power supply current value.

Command Syntax:

[SOURce:]CURRENT[:LEVel] <NRf>

Parameter:

MIN TO MAX|MIN|MAX|DEF

Units:

A mA

Default Value:

MIN

Example:

CURR 3A, CURR 30mA, CURR MAX, CURR MIN

Query Syntax:

[SOURce:]CURRent[:LEVel]?

Parameter:

[MIN|MAX|DEF]

Example:

CURR?, CURR? MAX, CURR?MIN

Return Parameters:

<NR2>

[SOURce:]VOLTage[:LEVel]

This command sets the power supply voltage value.

Command Syntax:

[SOURce:]VOLTage[:LEVel] <NRf>

Parameter:

MIN TO MAX|MIN|MAX|DEF

Units:

V mV kV

Default Value:

MIN

Query Syntax:

[SOURce:]VOLTage[:LEVel]?

Parameter:

[MIN|MAX|DEF]

Return Parameters:

<NR2>

[SOURce:]VOLTage:RANGe

This command sets the upper limit of the power supply voltage.

Command Syntax:

[SOURce:]VOLTage:RANGe <NRf>

Parameter:

MIN TO MAX|MIN|MAX|DEF

Units:

V mV kV

Default Value:

MAX

Query Syntax:

[SOURce:]VOLTage:RANGe?

Parameter:

[MIN|MAX|DEF]

Return Parameters:

<NR2>

[SOURce:]VOLTage:PROTection:STATe

This command sets the overvoltage protection status of the power supply.

Command Syntax:

[SOURce:]VOLTage:PROTection:STATe <bool>

Parameter:

0 | 1 | ON | OFF

Units:

None

Default Value:

OFF

Example:

VOLT:PROT: STAT 1, VOLT :PROT:STAT ON

Query Syntax:

[SOURce:]VOLTage:PROTection:STATe?

Parameter:

None

Example:

VOLT:PROT:STAT?

Return Parameters:

<NR2>

[SOURce:]VOLTage:PROTection[:LEVel]

This command sets the overvoltage protection value of the power supply.

Command Syntax:

[SOURce:]VOLTage:PROTection[:LEVel] <NRf>

Parameter:

MIN TO MAX|MIN|MAX|DEF

Units:

V mV

Default Value:

MAX

Example:

VOLT:PROT 30V, VOLT PROT MAX

Query Syntax:

[SOURce:]VOLTage:PROTection[:LEVel]?

Parameter:

[MIN|MAX]

Example:

VOLT:PROT?, VOLT PROT? MAX

Return Parameters:

<NR2>

[SOURce:]LIST:MODE

This command is used to sequentially manipulate the set mode of a file.

CONTinious	Sequential operation in continuous mode
STEP	Sequential operation in single-step mode

Command Syntax:

[SOURce:]LIST:MODE <CRD>

Parameter:

CONTinious|STEP

Query Syntax:

[SOURce:]LIST:MODE?

Return Parameters:

<CRD>

[SOURce:]LIST:COUNT

This command is used to sequence the operation of a file.

ONCE	Sequential operations are executed only once
REPeat	Sequential operations are executed repeatedly

Command Syntax:

[SOURce:]LIST:COUNT <NR1>

Parameter:

1~65535 |ONCE | REPeat

Query Syntax:

[SOURce:]LIST:COUNT?

Return Parameters:

<CRD>

[SOURce:]LIST:STEP

This command sets the number of input single steps for sequential operation.

Command Syntax:

[SOURce:]LIST:STEP <NR1>

Parameter:

2~80|MIN|MAX

Query Syntax:

[[SOURce:]LIST:STEP?

Parameter:

None

Return Parameters:

<NR1>

[SOURce:]LIST:CURRent[:LEVel]

This command sets the current value for the specified single step.

Command Syntax:

[SOURce:]LIST:CURRent[:LEVel] <NR1>,<NRf>

Parameter:

1~80, 0~30A

Units:

A mA

Example:

LIST:CURR 1,3A

Query Syntax:

[SOURce:]TRANSition:CURRent[:LEVel]? <NR1>

Parameter:

1~80

Example:

LIST:CURR? 1

Return Parameters:

<NR2>

[SOURce:]LIST:VOLTage[:LEVel]

This command sets the voltage value for the specified single step.

Command Syntax:

[SOURce:]LIST:VOLTage[:LEVel] <NR1>,<NRf>

Parameter:

1~80, 0~MAX

Units:

V mV

Example:

LIST:VOLT 1, 3V;

Query Syntax:

[SOURce:]LIST:VOLTage[:LEVel]? <NR1>

Parameter:

1~80

Example:

LIST:VOLT? 1

Return Parameters:

<NR2>

[SOURce:]LIST:WIDth

This command sets the minimum single-step time.

Command Syntax:

[SOURce:]LIST:WIDth <NR1>,<NRf>

Parameter:

1~3600, MIN TO MAX|MIN|MAX

Units:

S mS

Example:

LIST:WID 1, 100mS

Query Syntax:

[SOURce:]LIST:WIDth? <NR1>

Parameter:

1~80

Example:

LIST:WID? 1

Return Parameters:

<NR2>

[SOURce:]LIST:NAME

This command is used to set the file name of the current list file. Note that the file name should be less than 8 characters.

Command Syntax:

[SOURce:]LIST:NAME <name>

Parameter:

<SRD>

Example:

LIST:NAME 'TEST'

Query Syntax:

[SOURce:]LIST:NAME?

Return Parameters:

<SRD>

[SOURce:]LIST:SAVe

This command is used to save the current list file in the specified storage area.

Command Syntax:

[SOURce:]LIST:SAVe <NR1>

Parameter:

1~7

Example:

LIST:SAV 1

[SOURce:]LIST:RCL

This command is used to retrieve a list file from the specified storage area for use in sequential operations.

Command Syntax:

[SOURce:]LIST:RCL <NR1>

Parameter:

1~7

Example:

LIST:SAV 1

Chapter7 Interface Configuration Commands

SENSe:AVERage:COUNT {<NR1>}

This command sets the average number of power measurements.

Command Syntax:

SENSe:AVERage:COUNT <NR1 | MIN | MAX | DEF>

Parameter:

1~128 | MIN | MAX | DEF

Query Syntax:

SENSe:AVERage:COUNT?

Default Value:

128

SENSe:SPEED {<NR1>}

This command is used to set the sampling speed of power measurement.

Command Syntax:

SENSe:SPEED <NR1 | MIN | MAX | DEF>

Parameter:

1~10 | MIN | MAX | DEF

Sampling frequency approx. $3,4 * 2^{(10-N)}$ times/sec.

Query Syntax:

SENSe:SPEED?

Default Value:

3

SENSe:DVM:RANGe {<NR1>}

This command sets the range of the power supply voltmeter.

Command Syntax:

SENSe:DVM:RANGe <NRf | AUTO | LOW | HIGH>

Parameter:

NRf | AUTO | LOW | HIGH

Query Syntax:

SENSe:DVM:RANGe?

Default Value:

AUTO

SENSe:RESistance:RANGe {<NR1>}

This command sets the range of the power supply milliohm meter.

Command Syntax:

SENSe:RESistance:RANGe < LOW | MIDdle | HIGH>

Parameter:

LOW | MIDdle | HIGH

Query Syntax:

SENSe:RESistance:RANGe?

Default Value:

HIGH

Chapter8 TRACE Commands

TRACe subcommand

This command in the subsystem is used to configure and control the storage of data into the buffer.

TRACe:CLEAr

This action command is used to clear the read cache. If you do not clear the cache, subsequent stores will write over the old reads. If the subsequent store is abnormally interrupted before the cache is full, you can read it with the “old” reading still in the cache.

Command Syntax:

TRACe:CLEAr

Parameter:

None

Example:

STAT:PRES

TRACe:FREE?

This command is used to read the status of the memory. After sending this command and the power dialog, two comma separated values are sent to the computer. The first separated value indicates how many groups of the memory are available and the second value indicates how many groups of free storage areas are still available.

Query Syntax:

TRACe:FREE?

Return Parameters:

<NR1>,<NR1>

Example:

TRAC:FREE?

TRACe:POINts

This command is used to specify the size of the cache.

Command Syntax:

TRACer:POINts <NRf+>

Parameter:

2 to 1000 | MINimum | MAXimum | DEFault

Default Value:

1000

Example:

TRAC:POIN 10

Query Syntax:

TRACe:POINts? [MINimum | MAXimum | DEFault]

Return Parameters:

<NR1>

Related Commands:

TRAC:FEED

TRACe:FEED

This command selects the source of readings to be placed in the cache. When VOLTage is selected, voltage readings are placed in the cache. When CURRent is selected, current readings are placed in the cache. When both are selected, both voltage and current are placed in the cache when the store action is executed.

Command Syntax:

TRACe:FEED <CRD>

Parameter:

VOLTage | CURRent | TWO

Default Value:

TWO

Example:

TRAC:FEED VOLT

Query Syntax:

TRACe:FEED?

Return Parameters:

<CRD>

Related Commands:

TRAC:POIN

TRACe:FEED:CONTRol

This command is used to select cache control. When NEVer is selected, store until the cache is disabled. When NEXT is selected, the procedure starts, fills the cache, and stops. The cache size is defined by the :POINTs command.

Command Syntax:

TRACe:FEED:CONTRol <CRD>

Parameter:

NEVer | NEXT

Default Value:

NEVer

Example:

TRAC:FEED:CONT NEXT

Query Syntax:

TRACe:FEED:CONT?

Return Parameters:

<CRD>

Related Commands:

TRAC:FEED

TRACe:DATA?

When this command is issued, the power supply starts talking and all readings stored in the cache are sent to the computer.

Query Syntax:

TRACe:DATA?

Return Parameters:

{<NR3>}

TRACe:DELaY

This command is used to select the cache trigger delay time.

Command Syntax:

TRACe:DELaY <NRf>

Parameter:

0 to 3600s | MINimum | MAXimum | DEFault

Units:

S (second)

Default Value:

0

Example:

TRAC:DEL 1

Query Syntax:

TRACe:DELaY? [MINimum | MAXimum | DEFault]

Return Parameters:

<NR3>

TRACe:TIMer

This command is used to select the cache interval.

Command Syntax:

TRACe:TIMer <NRf>

Parameter:

0.001 to 3600s | MINimum | MAXimum | DEFault

Units:

S (second)

Default Value:

0.001

Example:

TRAC:TIM 0.1

Query Syntax:

TRACe:TIMer? [MINimum | MAXimum | DEFault]

Return Parameters:

<NR3>

Chapter9 IT6164B-specific instructions

[SOURce:]OUTPut:RANGe

Switches the output range high and low gears.

Command Syntax:

[SOURce:]OUTPut:RANGe

Parameter:

LOW|HIGH

Query Syntax:

[SOURce:]OUTPut:RANGe?

Notes:

There can not be another gear-cutting action within 2S after gear-cutting, otherwise an error will be reported.

[SOURce:]OUTPut[:WAREform][:PRIOrity]:Mode

Sets the output priority mode.

Command Syntax:

[SOURce:]OUTPut[:WAREform][:PRIOrity]:Mode

Parameter:

VOLT|CURR

Query Syntax:

[SOURce:]OUTPut[:WAREform][:PRIOrity]:Mode?

[SOURce:]OUTPut[:STATe]

Output Switch.

Command Syntax:

[SOURce:]OUTPut[:STATe]

Notes:

The output command involves cutting gears. Therefore, the set voltage cannot be changed for about 40mS after the output command ON is executed.

[SOURce:]VOLTage[:LEVel][:IMMediate]

Voltage setting.

Command Syntax:

[SOURce:]VOLTage[:LEVel][:IMMediate]

Notes:

The voltage setting command involves a gear cut. Therefore, the set voltage cannot be changed for about 30mS after the output is turned ON.

Chapter10 IEEE488.2 Common Commands

***CLS**

This command clears the following registers:

- Standard Event Register
- Query event register
- Operation event register
- Status Bit Tuple Register
- Error Code

Command Syntax:

*CLS

Parameter:

None

***ESE**

This command edits the value of the Standard Event Enable Register.
Programming Parameter:Determines which bits in the Standard Event Register will cause an ESB location 1 in the Status Bit Tuple Register when they are 1.

Command Syntax:

*ESE <NRf>

Parameter:

0~255

Power-on Value:

Reference *PSC command

Example:

*ESE 128

Query Syntax:

*ESE?

Return Parameters:

<NR1>

Related Commands:

*ESR? *PSC *STB?

Standard event enable register bit definitions:

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		1
PON	Power-on			DDE	Device-dependent error			
CME	Command error			QYE	Query error			
EXE	Execution error			OPC	Operation complete			

*ESR?

This command can be used to read the value of the standard event register. After this command is executed, the value of the standard event register is cleared to zero. The bit definition of the standard event register is the same as that of the standard event enable register.

Query Syntax:

*ESR?

Parameter:

None

Return Parameters:

<NR1>

Related Commands:

*CLS *ESE *ESE? *OPC

*IDN?

This command reads information about the power supply. It returns Parameter: which contains four comma-separated segments.

Query Syntax:

*IDN?

Parameter:

None

Return Parameters:

<AARD>

Segment

ITECH

PWS4XXX

Description

makers

Product Model

XXXXXX Product Serial Number
X. XX-X. XX software version number

Example:

ITECH, IT6122B, 000004, 1.01-1.20

***OPC**

The OPC bit of the Standard Event Register is set to 1 when all commands preceding this command have been executed.

Command Syntax:

*OPC

Parameter:

None

Query Syntax:

*OPC?

Return Parameters:

<NR1>

***PSC**

This command controls whether a service request is generated when the power supply is reloaded.

1 OR ON: When the power supply is powered up, the values of the Status Bit Group Enable Register, Operation Event Enable Register, Query Event Enable Register and Standard Event Enable Register are cleared to zero.

0 OR OFF: The values of the status tuple enable register, the operation event enable register, the query event enable register and the standard event enable register are stored in non-volatile memory for retrieval upon power-up.

Command Syntax:

*PSC <bool>

Parameter:

0|1|ON|OFF

Query Syntax:

*PSC?

Return Parameters:

0|1

Related Commands:`*ESE *SRE STAT:OPER:ENAB STAT:QUES:ENAB`***RST**

This command resets the power supply to the factory-set state.

The default parameters are as follows:

CAL:SEC:STAT	OFF	OUTP OFF	CURR MIN
VOLT:PROT MAX		VOLT MIN	OUTP:TIM 60
VOLT:PROT:STAT	OFF	VOLT:RANG MAX	TRAC:DEL 0
TRAC:TIM MIN		TRAC:POIN 1000	TRAC:FEED TWO
SENS:AVER 128		SENS:SPEE 3	OUTP:TIM:STAT OFF

Command Syntax:`*RST>`**Parameter:**

None

***SRE**

This command edits the value of the Status Bit Tuple Enable Register. Programming Parameter: determines which bits in the Status Bit Tuple Register will cause the RQS location in the Status Bit Tuple Register to be 1. The bit definitions for the Status Bit Tuple Enable Register are the same as the bit definitions for the Status Bit Tuple Register.

Command Syntax:`*SRE <NRf>`**Parameter:**

0~255

Power-on Value:Reference `*PSC` command**Example:**`*SRE 128`

Query Syntax:

*SRE?

Return Parameters:

<NR1>

Related Commands:

*ESE *ESR? *PSC *STB?

*STB?

This command can be used to read the value of the Status Bit Tuple Register. After this command is executed, the value of the Status Bit Tuple Register is cleared to zero.

Query Syntax:

*STB?

Parameter:

None

Return Parameters:

<NR1>

Related Commands:

*CLS *ESE *ESR

Standard event enable register bit definitions:

Bit	7	6	5	4	3	2	1	0
name	OPER	RQS	ESB	MAV	QUES	EAV	no use	no use
value	128	64	32	16	8	4		

*TRG

This command will generate a trigger signal when the power trigger source is in command mode. The function is the same as the TRIG:IMM command.

Command Syntax:

*TRG

Parameter:

None

Related Commands:

TRIG TRIG:SORU

***SAV**

This command will save the current set values of the power supply to the specified memory area. These Parameter: include current set value, voltage set value, maximum voltage value and step voltage value.

Command Syntax:

*SAV<NRf>

Parameter:

0~100

Example:

*SAV 3

Related Commands:

*RCL

***RCL**

This command will restore the power supply setpoint from the specified storage area.

Command Syntax:

*RCL <NRf>

Parameter:

0~100

Example:

*RCL 3

Related Commands:

*SAV

***TST?**

This command causes the power supply to perform a self-test and prompts an error message if there is an error.

Command Syntax:

TST?

Parameter:

None

Return Parameters:

<NR1>

A return of 0 indicates that the power supply has passed the self-test.

Returning a non-zero value indicates an error code, see Appendix for error code definitions.

***WAI**

When this command is executed, the power supply waits for all commands to complete before executing any others. For example, the following command string ensures that the first trigger is received and executed until the second trigger is recognized.

```
TRIG:SOUR BUS; *TRG; *WAI; *TRG; *WAI
```

Command Syntax:

WAI?

Parameter:

None

Related Commands:

*OPC

Appendix

Error Code List

This appendix gives the error numbers and descriptions that are returned by the electronic load. Error numbers are returned in two ways:

1. Error numbers are displayed on the front panel
2. Error numbers and messages are read back with the `SYSTem:ERRor?` query. `SYSTem:ERRor?` returns the error number into a variable and returns two parameters, an NR1 and a string.

The following table lists the errors that are associated with SCPI syntax errors and interface problems. It also lists the device dependent errors. Information inside the brackets is not part of the standard error message, but is included for clarification. When errors occur, the Standard Event Status register records them in bit 2, 3, 4, or 5:

Error	Error String [Description/Explanation/Examples]
-------	---

Command Errors 100 through 199 (sets Standard Event Status Register bit #5 CME)

101	DESIGN ERROR: Too many numeric suffices in Command Spec
110	No Input Command to parse
114	Numeric suffix is invalid value
116	Invalid value in numeric or channel list, e.g. out of range
117	Invalid number of dimensions in a channel list
120	Parameter of type Numeric Value overflowed its storage
130	Wrong units for parameter
140	Wrong type of parameter(s)
150	Wrong number of parameters
160	Unmatched quotation mark (single/double) in parameters
165	Unmatched bracket
170	Command keywords were not recognized
180	No entry in list to retrieve (number list or channel list)
190	Too many dimensions in entry to be returned in parameters
191	Too many char

Execution Errors –200 through –299 (sets Standard Event Status Register bit #4 EXE)

–200	Execution error [generic]
–221	Settings conflict [check current device state]
–222	Data out of range [e.g., too large for this device]
–223	Too much data [out of memory; block, string, or expression too long]
–224	Illegal parameter value [device-specific]

-225	Out of memory
-270	Macro error
-272	Macro execution error
-273	Illegal macro label
-276	Macro recursion error
-277	Macro redefinition not allowed

System Errors -300 through -399 (sets Standard Event Status Register bit #3 DDE)

-310	System error [generic]
-350	Too many errors [errors beyond 9 lost due to queue overflow]

Query Errors "C400 through "C499 (sets Standard Event Status Register bit #2)

-400	Query error [generic]
-410	Query INTERRUPTED [query followed by DAB or GET before response complete]
-420	Query UNTERMINATED [addressed to talk, incomplete programming message received]
-430	Query DEADLOCKED [too many queries in command string]
-440	Query UNTERMINATED [after indefinite response]

Selftest Errors 0 through 99 (sets Standard Event Status Register bit #3)

0	No error
1	Module Initialization Lost
2	Mainframe Initialization Lost
3	Module Calibration Lost
4	Non-volatile RAM STATE section checksum failed
5	Non-volatile RAM RST section checksum failed
10	RAM selftest
40	Flash write failed
41	Flash erase failed
80	Digital I/O selftest error

Device-Dependent Errors 100 through 32767 (sets Standard Event Status Register bit #3)

213	RS-232 buffer overrun error
216	RS-232 receiver framing error
217	RS-232 receiver parity error
218	RS-232 receiver overrun error
220	Front panel uart overrun
221	Front panel uart framing
222	Front panel uart parity
223	Front panel buffer overrun
224	Front panel timeout
225	Front Crc Check error

226	Front Cmd Error
401	CAL switch prevents calibration
402	CAL password is incorrect
403	CAL not enabled
404	Computed readback cal constants are incorrect
405	Computed programming cal constants are incorrect
406	Incorrect sequence of calibration commands
407	CV or CC status is incorrect for this command
603	FETCH of data that was not acquired
604	Measurement overrange

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