

Triple Output Programmable DC Power Supply IT6302 Programming Guide



Model:IT6302
Version:V1.1

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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 IT6302 power supply meets 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.
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This Warranty will be rendered invalid if the product is:

- Damaged resulting from customer-wired circuits or customer-supplied parts or accessories;
- Modified or repaired by customer without authorization;
- Damaged resulting from customer-wired circuits or use in an environment not designated by us;
- 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)
	Alternating current		OFF (power)
	Both direct and alternating current		Power-on state
	Chassis (earth ground) symbol.		Power-off state
	Earth (ground) terminal		Reference terminal
	Caution		Positive terminal
	Warning (refer to this manual for specific Warning or Caution information)		Negative terminal

	A 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 power supply is provided with a power line during delivery and should be connected to junction box. Before operation, be sure that the power supply 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 of electronic load without overheating. If there are multiple loads, each pair of the load power cord must be carry out the full rated short-circuit output current of the power securely.**
- **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.**
- **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.**
- **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 instrument is designed for indoor use and an area with low condensation. The table below shows the general environmental requirements for the 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.

Regulatory Markings

	<p>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.</p>
	<p>The instrument 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.</p>
	<p>This symbol indicates the time period during which no hazardous or toxic substances are expected to leak or deteriorate during normal use. The expected useful 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.</p>

Waste Electrical and Electronic Equipment (WEEE) Directive



2002/96/EC 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 1 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 is short for Standard Commands for Programmable Instruments which defines a communication method of bus controller and instrument. It is based on ASCII and supply for testing and measuring instruments. SCPI command is based on hierarchical architecture which also known as tree system. In this system, Relevant Command is returned to a common node or root, so that a subsystem is formed.

A part of OUTPUT subsystem is listed below:

OUTPUT:

SYNC {OFF|0|ON|1}

SYNC:

MODE {NORMAL|CARRIER}

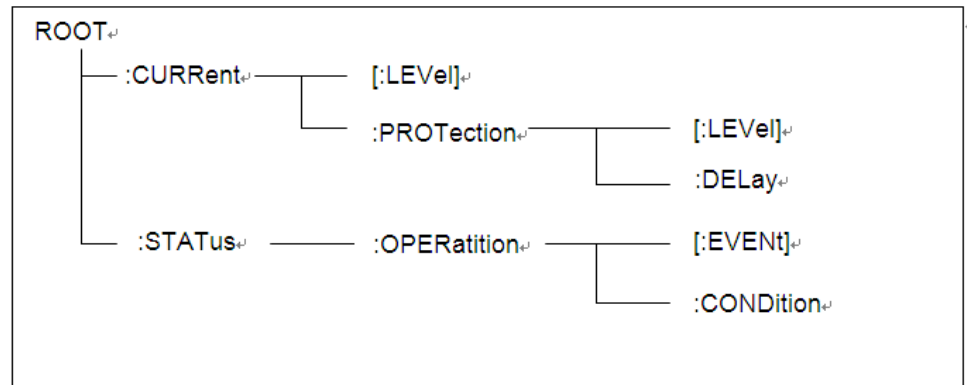
POLARITY {NORMAL|INVERTED}

OUTPUT is the root class keyword, SYNC is the second keyword, MODE and POLARITY are the third keyword. Colon(:) is used for separating the command keyword and the next level keyword.

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 ONIT872X-3X SCPI Communication protocol 17
```

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 Communication Interface

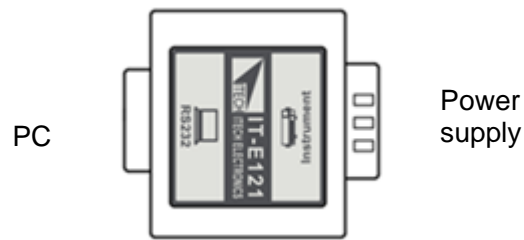
The DB9 interface connector on the rear panel of IT6302 power supply is TTL level, and you need to use level converter to connect PC serial port.

Notice: please don't connect IT6302 with standard RS232 cable. It may damage the power supply.

1.6.1 IT-E121 communication module

The DB9 interface connector on the rear panel of IT6302 power supply is TTL level. You need to use IT-E121 communication module and standard RS232 straight-through cable to connect DB9 interface connector of power supply and RS232 interface connector of PC.

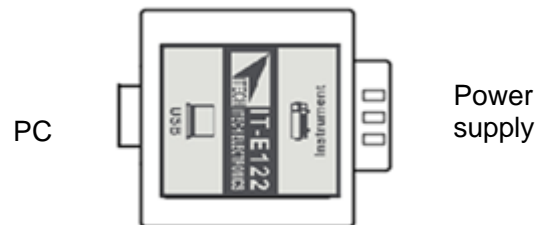
IT-E121 communication cable



1.6.2 IT-E122 communication module

The DB9 interface connector on the rear panel of IT6302 power supply is TTL level. You could use IT-E122 communication module and standard USB straight-through cable (one end is B connector, and the other end is A connector) to connect DB9 interface connector of power supply and USB interface connector of PC.

IT-E122 communication cable





1.6.3 Communication between power supply and PC

Using a Level converter circuit connect DB9 interface connector of IT6302 and RS232/USB interface connector of PC to do communication.

Below will help you to have the knowledge of controlling IT6302 power supply via PC.

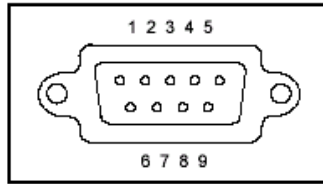
Communication setting

Before communicating, please set the following parameters of power supply and PC to make them match with each other.

Press  (Shift) +  (Menu) to enter menu operation and select the BAUD.

BAUD		
	4.8	Baudrate 4800
	9.6	Baudrate 9600
	38.4	Baudrate 38400

DB9 series interface



Connect an IT-E121 or IT-E122 module to the DB9 interface, and then use an appropriate communication cable to connect the module and PC.

Chapter2 SCPI status register

You can get the current status of the power supply by reading the operation status registers. The power supply records the different status of the instrument through the four status register group, the four status register group are: status byte register, standard event register, query status register and operation status register. Status byte register records the information of the other status register

BIT	Signal	Meaning
0 1	CAL ON	Operation status register The power supply is calculating new calibration factor The power supply is waiting for trigger signal
0 1 9	CV OC OV	Query status register Constant voltage state Constant current state Over voltage
0 2 3 4 5 7	OPC QYE DDE EXE CME PON	Standard event register Operation completed. All the parallel operations are completed. Query error. Output buffer data lost. Instrument memory data loss or self test error Execute error. Command parameter over flow or the operation condition is not consistent Command error. There is syntax or semantic error in the command received. Power on bit, this bit is set to 1 after power on
2 3 4 5 6 7	EAV QUES MAV ESB RQS OPER	Status byte register Error buffer available This bit is set to 1 when any one status of enabled query status register changes. Output buffer available Bit ESB is set to 1 when the status of a enabled standard event status register changes If the status of enabled operation register changes, then this bit is set to 1.

Chapter3 System Commands

SYSTem:ERRor?

This command is used to read the error information.

Command syntax

SYST:ERR?

Arguments

None

Returns

<NR1>, <SRD>

SYSTem:VERSion?

This command is used to query the current SCPI version.

Command syntax

SYST:VERS?

Arguments

None

Returns

<NR2>

Example

1991.1

SYSTem:REMote

This command is used to switch to the remote control mode (PC control).

Command syntax

SYST:REM

Arguments

None

SYSTem:LOCal

This command is used to switch the instrument to local control mode (control from panel).

Command syntax

SYST:LOC

Arguments

None

SYSTem:RWLock[:STATE]

This command is transmit through RS232 interface, the same function as **SYSTem:REMOte**, but the difference is: this command can lock “LOCAL” button as well. When this command is executed, the “Local” button can’t switch to local control mode.

Command syntax

SYST:RWL

Arguments

None

SYSTem:BEEPer

This order is used to test the beeper, after execute this order, the power supply will issue a beep sound.

Command syntax

SYSTem:BEEPer

Arguments

None

STATus:QUEStionable[:EVENT]?

This command can be used to read the value in query event register. After executing this command, the query event register will be cleared.

Query syntax

STATus:QUEStionable[:EVENT]?

Arguments

None

Returns

<NR1>

Related Command

STATus:QUEStionable:ENABLE

STATus:QUEStionable:ENABLE

This command edits the enable register value of query event. Setting parameter can determine which bit value of query event register is 1 and the bit will cause QUES of status byte register to be 1.

Command syntax

```
STATus:QUEStionable:ENABLE <NRf>
```

Arguments

0~255

Default set

Refer to *PSC command

Example

```
STATus:QUEStionable:ENABLE 128
```

Query syntax

```
STATus:QUEStionable:ENABLE?
```

Returns

<NR1>

Related Command

*PSC

STATus:PRESet

This command is used to clean status event.

Command syntax

```
STATus:PRESet
```

Arguments

None

STATus:QUEStionable:INSTrument[:EVENT]?

This command can query the parameter of event register in the channel. When the query value is returned, the register is reset.

Query syntax

```
STATus:QUEStionable:INSTrument[:EVENT]?
```

Arguments

None

Returns

<Nrf>

STATus:QUEStionable:INSTrument:ENABle

This command can re-write the parameter of query enable register in the channel.

Command syntax

STATus:QUEStionable:INSTrument:ENABle

Arguments

Register parameter

Query syntax

STATus:QUEStionable:INSTrument:ENABle?

STATus:QUEStionable:INSTrument:ISUMmary1[:EVENT]?

This command can query the event register in channel 1. When the query value is returned, the register is reset.

Query syntax

STATus:QUEStionable:INSTrument:ISUMmary1 [:EVENT]?

Arguments

None

STATus:QUEStionable:INSTrument:ISUMmary1:ENABle

This command can re-write the parameter of query enable register in channel 1.

Command syntax

STATus:QUEStionable:INSTrument:ISUMmary1:ENABle

Arguments

Register parameter

Query syntax

STATus:QUEStionable:INSTrument:ISUMmary1:ENABle?

STATus:QUEStionable:INSTrument:ISUMmary1:CONDition?

This command can query the parameter of query status register in channel 1.

Query syntax

```
STATus:QUEStionable:INSTrument:ISUMmary1:CONDition?
```

Arguments

None

STATus:QUEStionable:INSTrument:ISUMmary2[:EVENT]?

This command can query the event register in channel 2. When the query value is returned, the register is reset.

Query syntax

```
STATus:QUEStionable:INSTrument:ISUMmary2[:EVENT]?
```

Arguments

None

STATus:QUEStionable:INSTrument:ISUMmary2:ENABLe

This command can re-write the parameter of query enable register in channel 2.

Command syntax

```
STATus:QUEStionable:INSTrument:ISUMmary2:ENABLe
```

Arguments

Register parameter

Query syntax

```
STATus:QUEStionable:INSTrument:ISUMmary2:ENABLe?
```

STATus:QUEStionable:INSTrument:ISUMmary2:CONDition?

This command can query the parameter of query status register in channel 2.

Query syntax

```
STATus:QUEStionable:INSTrument:ISUMmary2:CONDition?
```

Arguments

None

STATus:QUEStionable:INSTrument:ISUMmary3[:EVENT]?

This command can query the event register in channel 3. When the query value

is returned, the register is reset.

Query syntax

STATus:QUEStionable:INSTrument:ISUMmary3[:EVENT]?

Arguments

None

STATus:QUEStionable:INSTrument:ISUMmary3:ENABLe

This command can re-write the parameter of query enable register in channel 3.

Command syntax

STATus:QUEStionable:INSTrument:ISUMmary3:ENABLE

Arguments

Register parameter

Query syntax

STATus:QUEStionable:INSTrument:ISUMmary3:ENABLE?

STATus:QUEStionable:INSTrument:ISUMmary3:CONDition?

This command can query the parameter of query status register in channel 3.

Query syntax

STATus:QUEStionable:INSTrument:ISUMmary3:CONDition?

Arguments

None

STATus:OPERation[:EVENT]?

This command can read the parameter from operation event register. After executing this order, operation event register is reset.

Query syntax

STATus: OPERation [:EVENT]?

Arguments

None

Returns

<NR1>

Related Command

STATus:OPERation:ENABLE

STATus:OPERation:ENABLE

This command can set the parameter of operation event enable register. Setting parameter can determine which bit value of operation event register is 1 and the bit will cause OPER of status byte register to be 1.

Command syntax

STATus: OPERation:ENABLE <NRf>

Arguments

0~255

Default set

Refer to *PSC command

Example

STATus: OPERation:ENABLE 128

Query syntax

STATus: OPERation:ENABLE?

Returns

<NR1>

STATus:OPERation:INSTrument[:EVENT]?

This command can query the parameter of operation event register in the channel. After executing this order, the register is reset.

Query syntax

STATus:OPERation:INSTrument[:EVENT]?

Arguments

None

STATus:OPERation:INSTrument:ENABLE

This command can re-write the parameter of operation enable register in the channel.

Command syntax

STATus:OPERation:INSTrument:ENABLE

Arguments

Register parameter

Query syntax

```
STATus:OPERation:INSTrument:ENABLE?
```

STATus:OPERation:INSTrument:ISUMmary1[:EVENT]?

This command can query the parameter of operation event register in channel 1. After executing this order, the register is reset.

Query syntax

```
STATus:OPERation:INSTrument:ISUMmary1[:EVENT]?
```

Arguments

None

STATus:OPERation:INSTrument:ISUMmary1:ENABLE

This command can re-write the parameter of operation enable register in the channel 1.

Command syntax

```
STATus:OPERation:INSTrument:ISUMmary1:ENABLE
```

Arguments

Register parameter

Query syntax

```
STATus:OPERation:INSTrument:ISUMmary1:ENABLE?
```

**STATus:OPERation:INSTrument:ISUMmary1:CONDitio
n?**

This command can query the parameter of operation event register in channel 1.

Query syntax

```
STATus:OPERation:INSTrument:ISUMmary1:CONDition?
```

Arguments

None

STATus:OPERation:INSTrument:ISUMmary2[:EVENT]?

This command can query the parameter of operation event register in channel 2. After executing this order, the register is reset.

Query syntax

```
STATus:OPERation:INSTrument:ISUMmary2[:EVENT]?
```

Arguments

None

STATus:OPERation:INSTrument:ISUMmary2:ENABLE

This command can re-write the parameter of operation enable register in the channel 2.

Command syntax

STATus:OPERation:INSTrument:ISUMmary2:ENABLE

Arguments

Register parameter

Query syntax

STATus:OPERation:INSTrument:ISUMmary2:ENABLE?

STATus:OPERation:INSTrument:ISUMmary2:CONDition?

This command can query the parameter of operation event register in channel 2.

Query syntax

STATus:OPERation:INSTrument:ISUMmary2:CONDition?

Arguments

None

STATus:OPERation:INSTrument:ISUMmary3[:EVENT]?

This command can query the parameter of operation event register in channel 3. After executing this order, the register is reset.

Query syntax

STATus:OPERation:INSTrument:ISUMmary3[:EVENT]?

Arguments

None

STATus:OPERation:INSTrument:ISUMmary3:ENABLE

This command can re-write the parameter of operation enable register in the channel 2.

Command syntax

STATus:OPERation:INSTrument:ISUMmary3:ENABLE

Arguments

Register parameter

Query syntax

STATus:OPERation:INSTrument:ISUMmary3:ENABle?

STATus:OPERation:INSTrument:ISUMmary3:CONDition?

This command can query the parameter of operation event register in channel 3.

Query syntax

STATus:OPERation:INSTrument:ISUMmary3:CONDition?

Arguments

None

Chapter4 Trigger Command

TRIGger[:IMMediate]

This order is used to generate a trigger signal when trigger source is in BUS mode. The function of this order is similar to *TRG.

Command syntax

*TRIGger[:IMMediate]

Arguments

None

TRIGger:DELAy

This command is used to set the delay time for triggering, which defaults to zero. When the time is set to zero, the trigger will be immediately responded.

Command syntax

TRIGger:DELAy <nr1>

Arguments

Times

Unit

S

Query syntax

TRIGger:DELAy?

Chapter5 Output Commands

OUTPut[:STATe][:ALL]

This command is used to control the output switch state.

Command syntax

OUTPut [:STATe] <bool>

Arguments

0|1|ON|OFF

*RST Value

OFF

Query syntax

OUTPut:STATe[:ALL]?

Returns

0|1

OUTPut:SERies[:STATe]

This command can set the serial state of CH1+CH2.

Command syntax

OUTPut:SERies[:STATe]

Arguments

0|1|ON|OFF

Query syntax

OUTPut:SERies[:STATe]?

OUTPut:PARAllel[:STATe]

This command can set the parallel state of CH1+CH2.

Command syntax

OUTPut:PARAllel [:STATe]

Arguments

0|1|ON|OFF

Query syntax

OUTPut:PARAllel[:STATe]?

[SOURce:]CHANnel:OUTPut[:STATe]

This command is used to control the output state (ON/OFF) of the current channel.

Command syntax

[SOURce:]CHANnel:OUTPut[:STATe] <bool>

Arguments

0|1|ON|OFF

*RST Value

OFF

Query syntax

[SOURce:]CHANnel:OUTPut[:STATe]?

Returns

0|1

[SOURce:]OUTPut:PROTection:CLEar

This command is used to clear the protection state. such as OVP,OTP.

Command syntax

[SOURce:]OUTPut:PROTection:CLEar

Arguments

None

Chapter6 Current Setting Commands

[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]

This command is used to set the current value of current channel.

Command syntax

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

Arguments

num|MIN|MAX|UP|DOWN|DEF

Unit

A mA

*RST Value

MIN

Example

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

Query syntax

[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]?

Arguments

[MIN|MAX]

Example

CURR?, CURR? MAX, CURR?MIN

Returns

<NR2>

[SOURce:]CURRent[:LEVel]:UP[:IMMediate][:AMPLitude]

This command is used to increase a current step for current channel.

Command syntax

[SOURce:]CURRent[:LEVel]:UP[:IMMediate][:AMPLitude]

Arguments

None

Related Command

[SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]

[SOURce:]CURRent[:LEVel]:DOWN[:IMMediate][:AMPLitude]

This command is used to decrease a current step for current channel.

Command syntax

[SOURce:]CURRent[:LEVel]:DOWN[:IMMediate][:AMPLitude]

Arguments

None

Related Command

[SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]

[SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]

This command is used to set the current step.

Command syntax

[SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]

Arguments

Current value

Unit

A|mA|uA

Query syntax

[SOURce:]CURRent[:LEVel][:IMMediate]:STEP[:INCRement]?

[SOURce:]CURRent[:LEVel]:TRIGGered[:IMMediate][:INCRement]

This command is used to set the trigger current.

Command syntax

[SOURce:]CURRent[:LEVel]:TRIGGered[:IMMediate][:INCRement]

Arguments

Current value|Min|Max|Def|Up|Down

Unit

A|mA|uA

Query syntax

[SOURce:]CURRent[:LEVel]:TRIGgered[:IMMediate][:INCRement]?

Chapter7 Voltage Setting Commands

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

This command is used to set output Voltage value.

Command syntax

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

Arguments

num|MIN|MAX|UP|DOWN|DEF

Unit

V mV kV

*RST Value

MIN

Query syntax

[SOURce:]VOLTage[:LEVel]?

Arguments

[MIN|MAX]

Returns

<NR2>

[SOURce:]VOLTage[:LEVel]:UP[:IMMediate][:AMPLitude]

This command is used to increase a voltage step for voltage channel.

Command syntax

[SOURce:]VOLTage[:LEVel]:UP[:IMMediate][:AMPLitude]

Arguments None

Related Command

[SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]

[SOURce:]VOLTage[:LEVel]:DOWN[:IMMediate][:AMPLitude]

This command is used to decrease a voltage step for voltage channel.

Command syntax

[SOURce:] VOLTage [:LEVel]:DOWN[:IMMediate][:AMPLitude]

Arguments

None

Related Command

[SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]

[SOURce:]VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]

This command is used to set the voltage step.

Command syntax

[SOURce:] VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]

Arguments

Voltage value

Unit

kV|V|mV|uV

Query syntax

[SOURce:] VOLTage[:LEVel][:IMMediate]:STEP[:INCRement]?

[SOURce:]VOLTage:LEVel]:TRIGgered[:IMMediate][:INCRement]

This command is used to set the trigger voltage.

Command syntax

[SOURce:] VOLTage[:LEVel]:TRIGgered[:IMMediate][:INCRement]

Arguments

Voltage value|Min|Max|Def|Up|Down

Unit

kV|V|mV|uV

Query syntax

[SOURce:] VOLTage[:LEVel]:TRIGgered[:IMMediate][:INCRement]?

[SOURce:]VOLTage:LIMIT[:LEVel]

This command is used to set the upper limited voltage.

Command syntax

[SOURce:]VOLTage:LIMIT[:LEVel]

Arguments

num|Min|Max|def

Unit

kV|V|mV|uV

Query syntax

[SOURce:]VOLTage:LIMIT[:LEVel]?

Chapter8 Compound Control Commands

[SOURce:]APPLy

This command is used to set the voltage and current values of a certain channel. It equals to the combination of instructions below.

INST <nr1>

VOLT <nr2>

CURR <nr3>

Command syntax

[SOURce:]APPLy <nr1>, <nr2>, <nr3>

Arguments 1:

CH1|CH2|CH3

Optional parameter 2:

num|MIN|MAX|UP|DOWN|DEF

Unit

V mV kV

Optional parameter 3:

num|MIN|MAX|UP|DOWN|DEF

Unit

A/ mA/ uA

Query syntax

APPL? <nr>

Arguments

CH1|CH2|CH3

Returns

<volt>, <curr>

Note: When there is no default parameter, current value will not be changed.

Chapter9 Measurement Commands

MEASure[:SCALar]:CURRent[:DC]?

FETCh:CURRent[:DC]?

These two commands are used to read the output current of power supply.

Command syntax

```
MEASure[:SCALar]:CURRent[:DC]? <nr>
```

```
FETCh:CURRent[:DC]? <nr>
```

Arguments

```
CH1|CH2|CH3|ALL
```

Returns

If optional parameter CH1|CH2|CH3 is applied to specify measure channel, return actual current of the specified channel;

If optional parameter All is applied, return actual current of all channels;

If no optional parameter is applied, return actual current of current channel.

Unit

A

Example

```
MEAS:CURRE?
```

```
FETC:CURRE?
```

MEASure[:SCALar][:VOLTage][:DC]?

FETCh[:VOLTage][:DC]?

These two commands are used to read the output voltage of power supply.

Command syntax

```
MEASure[:SCALar][:VOLTage][:DC]? <nr>
```

```
FETCh[:VOLTage][:DC]? <nr>
```

Arguments

```
CH1|CH2|CH3|ALL
```

Returns

If optional parameter CH1|CH2|CH3 is applied to specify measure channel, return actual voltage of the specified channel;

If optional parameter All is applied, return actual voltage of all channels;
If no optional parameter is applied, return actual voltage of current channel.

Unit

V

Example

MEAS?

FETC?

MEASure[:SCALar]:POWer[:DC]?**FETCh:POWer[:DC]?**

These two commands are used to read the output power of power supply.

Command syntax

MEASure[:SCALar]:POWer[:DC]? <nr>

FETCh:POWer[:DC]? <nr>

Optional parameter :

CH1|CH2|CH3|ALL

Returns

If optional parameter CH1|CH2|CH3 is applied to specify measure channel, return actual power of the specified channel;

If optional parameter All is applied, return actual power of all channels;

If no optional parameter is applied, return actual power of current channel.

Unit

W

Example

MEAS:POW?

FETC:POW?

Note: Both fetch and measure instructions can read various parameters. The difference is that fetch reads the last measured value, and measure reads the re-measured value. fetch is faster and measure is more accurate.

Chapter10 Channel Operation Commands

INSTrument[:SElect]

This command is used to switch present channel.

Command syntax

```
INSTrument[:SElect] <cr>
```

Arguments

```
CH1|CH2|CH3
```

Query syntax

```
INSTrument[:SElect]?
```

INSTrument:NSElect

This command is used to switch present channel.

Command syntax

```
INSTrument:NSElect <nr>
```

Arguments

```
1-3
```

Query syntax

```
INSTrument:NSElect?
```

INSTrument:COUPl[:TRIGger]

This command is used to specify the channel affected by the trigger command.
If no channel is specified, default to current channel.

Command syntax

```
INSTrument:COUPl[:TRIGger] <cr1> <cr2> <cr3>
```

Arguments

```
CH1|CH2|CH3|NONE
```

Query syntax

```
INSTrument:COUPl[:TRIGger]?
```

INSTrument:COMbine:SERies

Set channel 1 and channel 2 of the power supply to serial state.

Command syntax

INSTrument:COMbine:SERies

Arguments

None

Query syntax

INSTrument:COMbine?

INSTrument:COMbine:PARAllel

Set channel 1 and channel 2 of the power supply to parallel state.

Command syntax

INSTrument:COMbine:PARAllel

Arguments

None

Query syntax

INSTrument:COMbine?

INSTrument:COMbine:OFF

Disable serial/parallel state of channel 1 and channel 2.

Command syntax

INSTrument:COMbine:OFF

Arguments

None

Query syntax

INSTrument:COMbine?

Chapter11 IEEE-488 Commands

*CLS

This command clears the following registers:

- Standard event register
- Query event register
- Operation event register
- Status byte register

Command syntax

*CLS

Arguments

None

*ESE

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

Command syntax

*ESE <NRf>

Arguments

0~255

Default set

Refer to *PSC command

Example

*ESE 128

Query syntax

*ESE?

Returns

<NR1>

*ESR?

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

Query syntax

*ESR?

Arguments

None

Returns

<NR1>

Related Command

*CLS *ESE *ESE?*OPC

***IDN?**

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

Query syntax

*IDN?

Arguments

None

Returns

ITECH co.ltd Made
IT6302 Product Mode
XXXXXX Product Serial
VXX. XX Software Version

Example

ITECH co.Ltd, IT6302, 0000000004, V1.01-V1.02

***OPC**

When all commands before this command are executed, bit OPC in standard event register will be set to 1.

Command syntax

*OPC

Arguments

None

Query syntax

*OPC?

Returns

<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, status byte register 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.

Command syntax

*PSC <bool>

Arguments

0|1|ON|OFF

Query syntax

*PSC?

Returns

0|1

Related Command

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

*RST

This command reset the power supply to default settings.

CAL:SEC:STAT 1

OUTP OFF

CURR MAX

VOLT:LIMIT MAX

INST:COM:OFF

Command syntax

*RST>

Arguments

None

*SRE

This command can set the parameter of state byte enable register.setting parameter can determine which byte value of state byte register is 1 and the

byte will set RQS of state byte register to 1. Bit definition of state byte enable register is as the same as the state byte register.

Command syntax

*SRE <NRf>

Arguments

0~255

Default set

Refer to *PSC command

Example

*SRE 128

Query syntax

*SRE?

Returns

<NR1>

Related Command

*ESE *ESR? *PSC

*STB?

This command can read the data from status byte register. After execute this command, the value of bit6 in status byte register will be clean.

Query syntax

*STB?

Arguments

None

Returns

<NR1>

Related Command

*CLS *ESE *ESR

*TRG

When the trigger mode of the power supply is BUS order trigger mode, the order will Generates a trigger signal. The function is the same as **TRIGger[:IMMediate]**.

Command syntax

*TRG

Arguments

None

Related Command

TRIG

***SAV**

This command can save the current setups of power supply to specified memory. These setups contains current setups, voltage setups, max voltage set and min voltage set

Command syntax

*SAV<NRf>

Arguments

1-27

Example

*SAV 3

Related Command

*RCL

***RCL**

This command can recall the setups you saved before from the specified memory.

Command syntax

*RCL<NRf>

Arguments

1-27

Example

*RCL 3

Related Command

*SAV

***TST?**

This command is used to query the self-test by the instrument. 0 indicates that self-test succeeds; other Arguments indicate self-test fails. In addition, in case of failure, an error information will be generated to describe failure reason.

Query syntax

*TST?

Arguments

None

Returns

<NR1> 0 indicates that self-test succeeds; and other values indicate self-test fails.

***WAI**

This command instructs the power supply not to process any further commands until all pending operations are completed.

Arguments

None

Related Command

*OPC

Contact US

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