

DG~~+~~* \$00 series SCPI

Programmable DC Power Supply



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Ver2.0 /Sep 2005/

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About your safety

Please review the following safety precautions before operating our equipment.

General information

The following safety precautions should be observed before using this product and any associated instrumentations. Although some instruments and accessories would be used with non-hazardous voltages, there are situations where hazardous conditions may be present.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to this manual for complete product specifications.

If the product is used in a manner not specified, the protection provided by the product may be impaired.

Before performing any maintenance, disconnect the line cord and all test cables.

Protection from electric shock

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

Definition of users

Responsible body is the individual or group responsible for the use and maintenance of equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

Service is only to be performed by qualified service personnel.

Safety symbols and terms



Connect it to safety earth ground using the wire recommended in the user manual.



The symbol on an instrument indicates that the user should refer to the operating instructions located in the manual.



High voltage danger

Certification and Warranty

Certification

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

Warranty

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

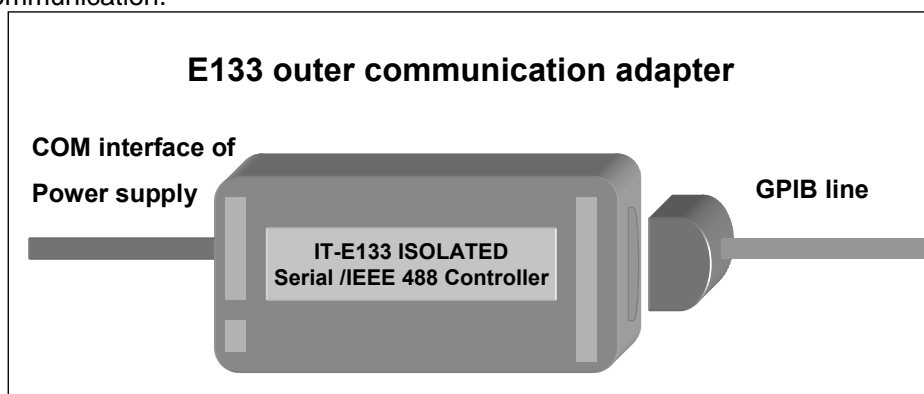
Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Customer, Customer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation and maintenance.

Chapter 1 Remote Operation Mode

E133 GPIB Communication Cable

The DB9 interface connector on the rear panel of power supply is TTL voltage level; you can use the GPIB communication cable (E133) to connect the DB9 interface connector of the power supply, and then connect the GPIB interface of the E133 and computer with GPIB/IEEE 488 line for the communication.



Chapter 2 SCPI 7 ca a UbX List

2.1 IEEE488.2 Common 7 ca a UbXg

```
"*CLS"  
"*ESE"  
"*ESE?"  
"*ESR?"  
"*IDN?"  
"*SRE"  
"*SRE?"  
"*STB?"
```

2.2 SCPI Essential 7 ca a UbXg

```
SYSTem  
:ERRor[:NEXT]?  
:VERSion?
```

```
STATus  
:QUESTionable  
[:EVENT]?  
:CONDition?  
:ENABle <VALUE>  
:ENABle?
```

2.3 Calibration 7 ca a UbXg

```

CALibration
  :SECure
    [:STATE] {<ON|OFF>,<quoted code>}
    [:STATE]?
  :VOLTage
    :LEVel {<level>}
    [:DATA] {<numeric value>}
  :CURRent
    :LEVel {<level>}
    [:DATA] {<numeric value>}

:SAVe
:INITial
  
```

2.4 Output 7 ca a UbXg

```

OUTPut
  [:STATE] <b>
  [:STATE]?
[SOURce:]
  VOLTage
    [:LEVel][:IMMediate][:AMPLitude]
    [:A MPLitude]?
    :PROtection[:LEVel]
    [:LEVel]?
  CURRent
    [:LEVel][:IMMediate][:AMPLitude]
    [:A MPLitude]?
  
```

2.5 Output Measure 7 ca a UbXg

```

MEASure
  [:SCALar]
  :VOLTage[:DC]?
  :CURRent[:DC]?
  :POWER[:DC]?
  
```

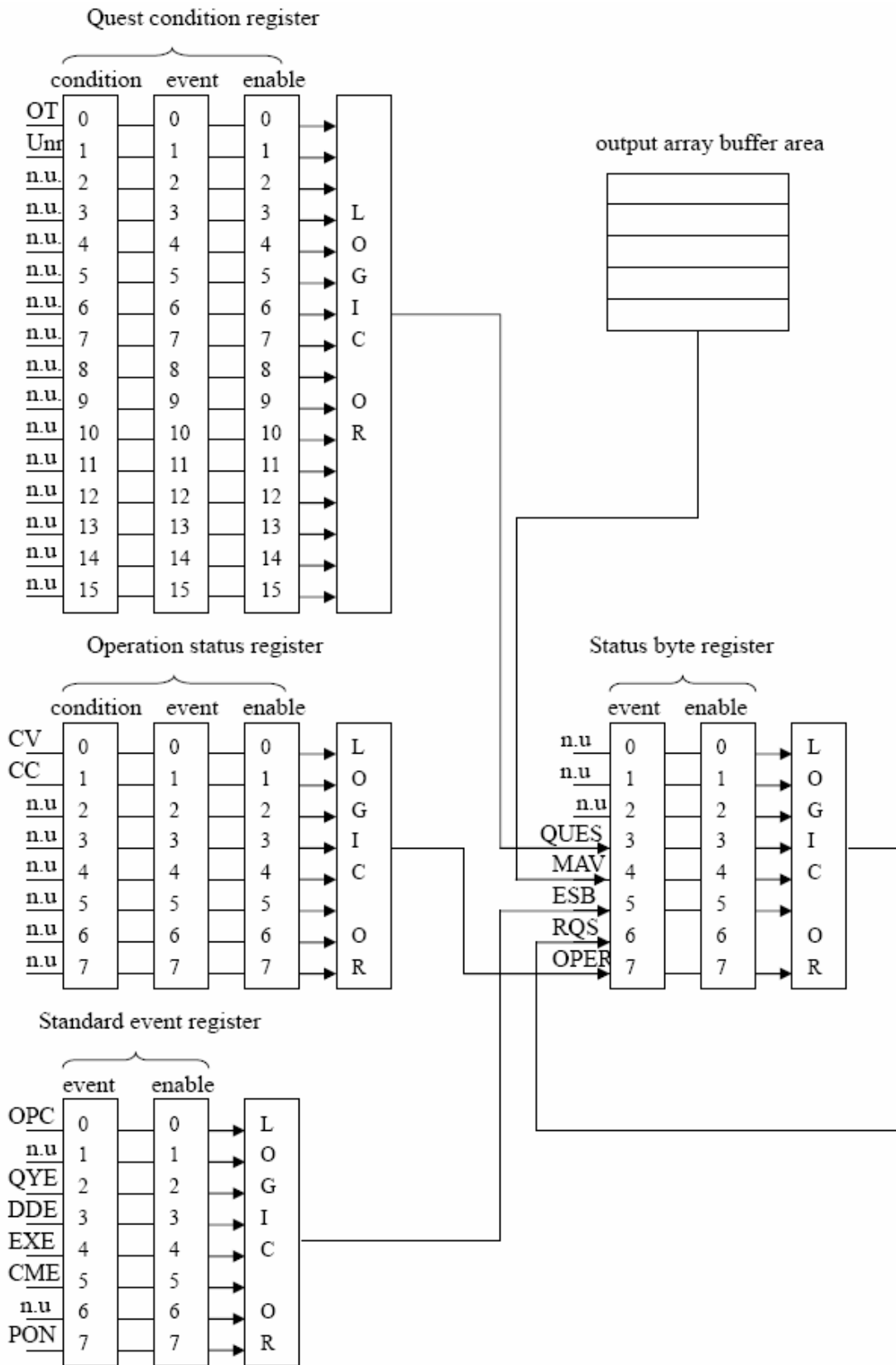
Chapter 3 SCPI Condition Register

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

BIT	Signal	Meaning
0	CV	UÜÜÜation status register. The power supply is in constant voltage condition.

1	CC	The power supply is in constant current condition. A
0	OT	Quest condition register Overtemperature
1	UNR	The output of power supply is unregulated.
0	OPC	Standard event status register Operation of power supply is completed.
2	QYE	Query error. Data of output array is missing.
3	DDE	Device-dependent error. Data stored in register is missing or error occurs in preliminary checkout.
4	EXE	Execution error. Order parameter overflows or the condition is not right.
5	CME	Command error. Syntax or semantic error occurs when receiving information.
7	PON	Power on. It is 1 when power supply is reset.
3	QUES	Status byte register If a quest enable condition changes, QUES is 1.
4	MAV	If the output array buffer storage is not empty, MAV is 1.
5	ESB	If a standard event status enable register changes, ESB is 1.
6	MSS	
	RQS	
7	OPER	If a operation event enable register changes, OPER is 1.

Structure of condition register 'jg' as following:



Chapter 4 SCPI Order Description

4.1 IEEE488.2 Common Commands

*CLS

This order can clean the register as follows::

Standard event status register

Quest condition register

Operation event register

Status byte register

Error code

Order syntax: ***CLS**

Parameter: None

*ESE

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

Order syntax: ***ESE <NRf>**

Parameter: 0~255

Reset value: Consult *PSC order

Example: *ESE 128

Quest syntax: ***ESE?**

Return parameter: <NR1>

Reference order: ***ESR? *PSC *STB?**

Bit determination of standard event enable register

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

*ESR?

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

Quest syntax: ***ESR?**

Parameter: None

Return parameter: <NR1>

Reference order: ***CLS *ESE *ESE? *OPC**

*IDN?

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

Quest syntax: ***IDN?**

Parameter: None

Return parameter: <AARD> segment description

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

For example: ITECH, IT6822, 6970001004, V1.54

***SRE**

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

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

Parameter: 0~255

Reset value: Consult ***PSC** order

Example: ***SRE 128**

Quest syntax: ***SRE?**

Return parameter: <NR1>

Reference Order: ***ESE *ESR? *PS C *STB?**

***STB?**

This order can read the data from status byte register. After executing this order, status byte register is reset.

Quest syntax: ***STB?**

Parameter: None

Return parameter: <NR1>

Reference order: ***CLS *ESE *ESR**

Bit determination of standard event status enable register

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

4.2 SCPI Essential Commands

SYSTEM:ERRor[:NEXT]?

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

- (0) No error
- (1) Too many numeric suffices in Command Spec
- (10) No Input Command to parse
- (14) Numeric suffix is invalid value
- (16) Invalid value in numeric or channel list, e.g. out of range
- (17) Invalid number of dimensions in a channel list
- (20) Parameter of type Numeric Value overflowed its storage

- (30) Wrong units for parameter
- (40) Wrong type of parameter(s)
- (50) Wrong number of parameters
- (60) Unmatched quotation mark (single/double) in parameters
- (65) Unmatched bracket
- (70) Command keywords were not recognized
- (80) No entry in list to retrieve (number list or channel list)
- (90) Too many dimensions in entry to be returned in parameters
- (101) Command Execution error
- (100) Too many command
- (110) Rxd error Parity
- (200) Error EEPROM data,Out Initial.
- (201) Error Calibration data

Order syntax: **SYST:ERR?**

Parameter: None

Return parameter: <NR1>, <SRD>

SYSTem:VERSion?

This order can query the software version.

Order syntax: **SYST:VERS?**

Parameter: None

Return parameter: <NR2>

STATus:QUEStionable[:EVENT]?

This order can read the parameter from quest event register. After executing , quest event register is reset.

Quest syntax: **STATus:QUEStionable[:EVENT]?**

Parameter: None

Return parameter: <NR1>

Reference order: **STATus:QUEStionable:ENABLE**

Bit determination of quest event register

Bit Position	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit name	n.u	n.u	n.u	n.u	n.u	n.u	n.u	n.u	n.u	n.u	n.u	n.u	n.u	n.u	Un	OT
Bit Value															2	1

STATus:QUEStionable:CONDition?

This order can read the parameter from quest condition register. When a bit of quest condition changes, the bit value corresponding in quest event register is 1.

Quest syntax: **STATus:QUEStionable: CONDition?**

Parameter: None

Return parameter: <NR1>

STATus:QUEStionable:ENABLE

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

Order syntax: **STATus:QUEStionable:ENABLE <NRf>**

Parameter: 0~255

Reset value: Consult *PSC order

Example: **STATus:QUEStionable:ENABle** 128

Quest syntax: **STATus:QUEStionable:ENABle?**

Return parameter: <NR1>

Reference order: ***PSC**

STATus:OPERation:EVENT?

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

Quest syntax: **STATus: OPERation [:EVENT]?**

Parameter: None

Return parameter: <NR1>

Reference order: **STATus: OPERation:ENABle**

Bit determination of operation event enable register

Bit Position	7	6	5	4	3	2	1	0
Bit Name	no use	no use	no use	no use	no use	no use	CC	CV
Bit value							2	1

STATus:OPERation:CONDition?

This order can read the parameter from the operation condition. When the parameter of operation condition register changes, the bit corresponding in operation event register is 1.

Quest syntax: **STATus: OPERation: CONDition?**

Parameter: None

Return parameter: <NR1>

STATus:OPERation:ENABle

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

Order syntax: **STATus: OPERation:ENABle** <NRf>

Parameter: 0~255

Reset value: Consult *PSC order

Example: **STATus: OPERation:ENABle** 128

Quest syntax: **STATus: OPERation:ENABle?**

Return parameter: <NR1>

Reference order: ***PSC**

4.3 Output Commands

ONPut[:STATe]

This order can set power supply output on or off..

Order syntax: **ONPut[:STATe]** <bool>

Parameter: 0|1|ON|OFF

*RST value: OFF

Quest syntax: **ONPut:STATe?**

Return parameter: 0|1

[SOURce:]CURRent [:LEVel]

This order can set current value of power supply.

Order syntax: **[SOURce:]CURRent [:LEVel] <NRf>**

Parameter: MIN TO MAX|MIN|MAX

Unit: A mA

*RST value: MIN

Example: **CURR 3A, CURR 30mA, CURR MAX, CURR MIN**

Quest syntax: **[SOURce:]CURRent [:LEVel]?**

Parameter: [MIN|MAX]

Example: **CURR? , CURR? MAX, CURR? MIN**

Return parameter: <NR2>

[SOURce:]VOLTage[:LEVel]

This order can set voltage value of power supply.

Order syntax: **[SOURce:]VOLTage[:LEVel] <NRf>**

Parameter: MIN TO MAX|MIN|MAX

Unit: V mV kV

*RST value: MAX

Quest syntax: **[SOURce:]VOLTage[:LEVel]?**

Parameter: [MIN|MAX]

Return parameter: <NR2>

[SOURce:]VOLTage:PROTection[:LEVel]

This order can set voltage protection maximum level.

Order syntax: **[SOURce:] VOLTage:PROTection[:LEVel] <NR f>**

Parameter: MIN TO MAX|MIN|MAX

Unit: V mV

*RST value: MAX

Example: **VOLT:PROT 30V, VO LT PROT MAX**

Quest syntax: **[SOURce:] VOLTage:PROTection[:LEVel]?**

Parameter: [MIN|MAX]

Example: **VOLT:PROT? , VO LT PROT? MAX**

Return parameter: <NR2>

4.4 Input measurement commands

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

This order can get the input voltage of power supply.

Order syntax: **MEASure[:SCALar]:VOLTage[:DC]?**

Parameter: None

Return parameter: <NR2>

Return parameter unit: V

Example: **MEAS:VOLT?**

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

This order can get the input current of power supply.

Order syntax: **MEASure[:SCALar]:CURRent[:DC]?**

Parameter: None

Return parameter: <NR2>

Return parameter unit: A

Example: **MEAS:CURR?**

MEASure[:SCALar]:POWER[:DC]?

This order can get the input power of the power supply.

Order syntax: **MEASure[:SCALar]:POWER?**

Parameter: None

Return parameter: <NR2>

Return parameter unit: W

Example: **MEAS:POW?**

Calibration order**CALibration:SECure:[STATe]**

Set protection mode enable or disable when calibrating the power supply.

Order syntax: **CALibration:SECure:[STATe]{ON|OFF>,[<password>]}**

Parameter: 0|1|ON|OFF, '5811

Example: CAL:SEC 1, '5811; CAL:SEC OFF

Quest syntax: **CALibration:SECure:STATe?**

Parameter: None

CALibration:VOLTage:LEVel

This order can set voltage calibration point. P1、 P2、 P3、 P4 must be calibrated orderly.

Order syntax: **CALibration:VOLTage:LEVel <point>**

Parameter: P1|P2

CALibration:VOLTage [:DATA] {<numeric value>}

Return actual output voltage value of calibration point.

Order syntax: **CALibration:VOLTage [:DATA] <NRf>**

Parameter: <NRf>

Example: CAL:VOLT 30.0002V

CALibration:CURRent:LEVel

This order can set current calibration point. P1、 P2、 P3、 P4 must be calibrated orderly.

Order syntax: **CALibration:CURRent:LEVel <point>**

Parameter: P1|P2

CALibration:CURRent [:DATA] {<numeric value>}

Return actual output current value to calibration point.

Order syntax: **CALibration:CURRent [:DATA] <NRf>**

Parameter: <NRf>

Example: CAL:VOLT 3.0002A