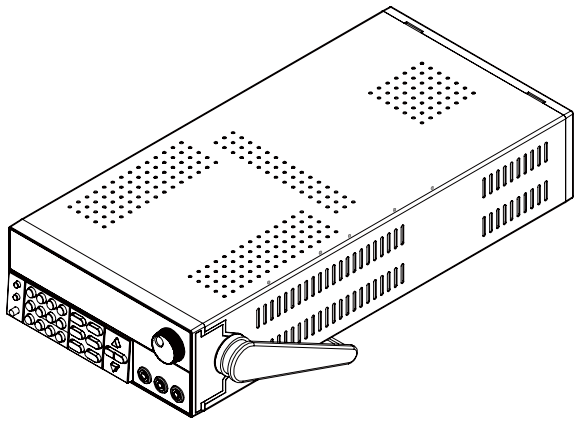
Programmable DC Power Supply IT6800 Series

Frame Format Programming Guide



Model: IT6821/IT6822/IT6823/IT6831/IT6832/IT6833
/IT6834
Version: V1.1

Notices

Manual Part Number

IT6800-402195

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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 series IT6800 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.
- 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	-	-

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 three-core power line during delivery and should be connected to a three-core junction box. 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 power supply 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.
- 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 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	-20°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

CE	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 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

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 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 [1][2][3]

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

CONTENT

Chapter1 Remote Operation

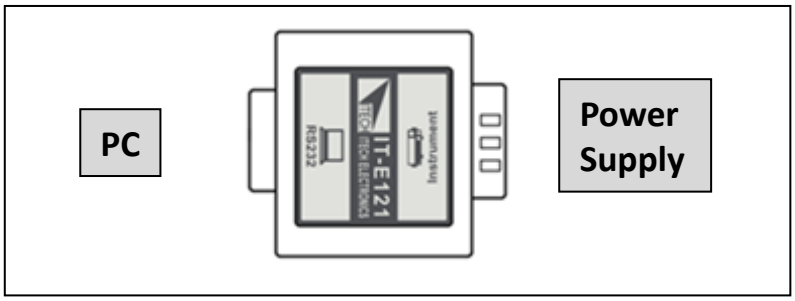
The DB9 interface connector on the rear panel of the power supply can be transferred to RS-232 interface, the following information will tell you how to use the computer to control the output of the power supply.

1.1 Communication Cable

RS232 Communication Cable

RS232 communication cable consists of the IT-E121 communication cable and a standard RS232 extension cable.

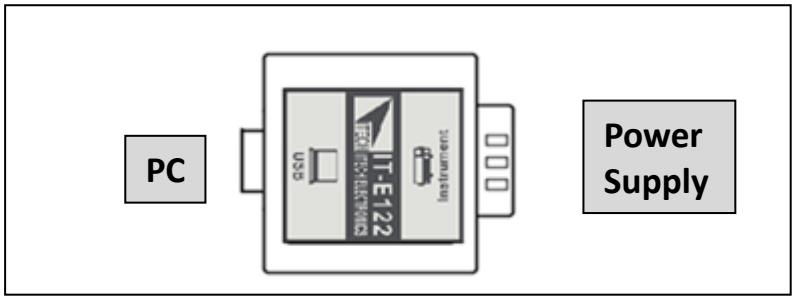
The DB9 interface connector on the rear panel of the IT6800 power supply is TTL voltage level; you can use the communication module IT-E121 and a standard RS232 extension cable to connect the DB9 interface connector of the power supply and the RS-232 interface connector of computer for the communication.



USB Communication Cable

USB communication cable consists of the IT-E122 communication cable and a standard USB communication cable.

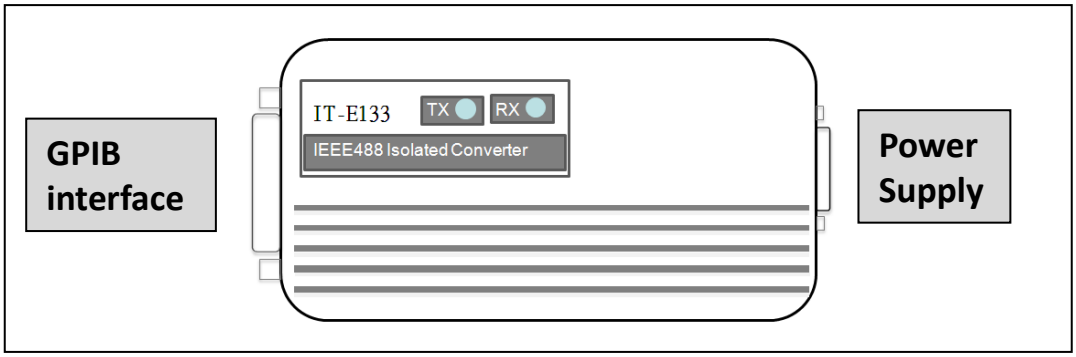
The DB9 interface connector on the rear panel of the IT6800 power supply is TTL voltage level; you can use the communication module IT-E122 and a standard USB cable to connect the DB9 interface connector of the DC load and the USB interface connector of computer for the communication. Before using IT-E122, you must install the USB driver (contained in CD or contact ITECH to get). The USB interface will be virtual serial port.



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 (IT-E133) to connect the DB9

interface connector of the power supply, and then connect the GPIB interface of the IT-E133 and computer with GPIB/IEEE 488 line for the communication.



CAUTION

The DB9 interface connector on the rear panel of power supply can't be connected to PC by using standard RS-232, USB or GPIB cable. You must use the communication module IT-E121, IT-E122 or IT-E133 to connect

1.2 Communication Between Power Supply and PC

Before using the remote operation mode, please make sure that the baud rate and communication address in power supply are the same as in the computer software, otherwise, the communication will fail, you can change the baud rate and communication address from the front panel or from computer.

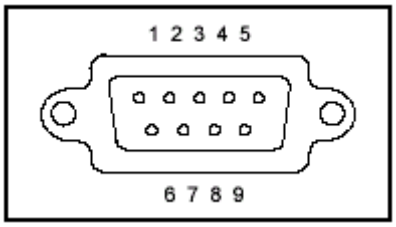
- Baud rate: 4800,9600,19200 and 38400 are selectable, default setting is 9600
- Data bit: 8 bit
- Stop bit: 1
- Parity: (none, even, odd)
- Address

Start Bit	8 Data Bits	Parity=None	Stop Bit

Note

You can change the baud rate and communication address from the front panel or from computer, but the data bite, stop bit and parity are the defaults and can't be changed.

DB9 Interface Details



Chapter2 Frame format

Frame length is 26 bytes, the format is as follows:

Start	Address	Command	4-25 bytes are information content	Check sum

Description:

- Start bit is AAH, occupies a byte.
- Address range is 0 to FE, occupies a byte.
- Command occupies a byte.

  20H----Setting the remote control mode
  21H----Setting the output ON/OFF state
  22H----Setting the maximum output voltage
  23H----Setting the output voltage
  24H----Setting the output current
  25H----Setting the communication address
  26H----Reading the present current/voltage, maximum voltage, setup voltage/current and operation states of the power supply.
  27H----Enter the calibration mode
  28H----Reading the calibration mode state
  29H----Calibrate voltage value.
  2AH----Sending the actual output voltage to calibration program.
  2BH----Calibrate current value.
  2CH----Sending the actual output current to calibration program.
  2DH----Save the calibration data to EEPROM.
  2EH----Setting calibration information.
  2FH----Reading calibration information.
  31H----Reading product's model, series number and version information.
  32H----Restoring the factory default calibration data.
  37H----Enable the local key.
  12H---- The return information of command operation in power supply.

Note

You must change the power supply to remote control mode firstly, then you can control the power supply output by computer. The command for remote control is 20H.

If you want to calibrate the power supply, set the calibration information or want to set the product serial number, you must set the calibration protection mode to OFF state firstly; the command for calibration protection is 27H.

When the power supply is in calibration mode, it is not allowed to change the output state of power supply.

- 4^{th} to 25^{th} bytes are information content.
- 26^{th} byte is check sum, the sum of the former 25 bytes.

Chapter3 Communication protocol

3.1 Setting the Remote Control Mode (20H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (20H)
4th byte	Operation mode (0 represent front panel operation mode, 1 represent remote operation mode)
5th to 25th byte	System reserve
26th byte	Check sum

Note

You cannot control the power supply from the front panel when the power supply is in calibration mode.

3.2 Setting the Output State ON/OFF (21H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (21H)
4th byte	Output state (0 is OFF, 1 is ON)
5th to 25th byte	System reserve
26th byte	Check sum

3.3 Setting the Maximum Output Voltage (22H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (22H)
4th byte	The lowest byte of voltage upper limit
5th byte	The lower byte of voltage upper limit
6th byte	The higher byte of voltage upper limit
7th byte	The highest byte of voltage upper limit
8th to 25th byte	System reserve
26th byte	Check sum

Note

We use 4 bytes of Hex number to represent a maximum voltage value. For example the maximum voltage is 16.000V, the hex code of 16.000 is 0X00003E80, so the 4th byte is 0X80, 5th bye is 0X3E, 6th byte is 0X00, 7th byte is 0X00.

3.4 Setting the Output Voltage (23H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (23H)
4th byte	The byte 0 of output voltage value
5th byte	The byte 1 of output voltage value

6th byte	The higher byte of output voltage value
7th byte	The highest byte of output voltage value
8th to 25th byte	System reserve
26th byte	Check sum

Note

We use 4 bytes of Hex number to represent an output voltage value. For example the output voltage value is 16.000V, the hex code of 16.000 is 0X00003E80, so the 4th byte is 0X80, 5th bye is 0X3E, 6th byte is 0X00, 7th byte is 0X00.

3.5 Setting the Output Current (24H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (24H)
4th byte	To set the low byte of current value
5th byte	To set the high byte of current value
6th to 25th byte	System reserve
26th byte	Check sum

Note

We use 2 bytes of Hex number to represent an output current value. For example the output current value is 1.000A, the hex code of 1.000 is 0X03E8, so the 4th byte is 0XE8, 5th bye is 0XE3

3.6 Setting the Communication Address (25H)

1st byte	Start bit (AAH)
2nd byte	The current address of power supply (0 to 0XFE)
3rd byte	Command (25H)
4th byte	The new address
5th to 25th byte	System reserve
26th byte	Check sum

3.7 Reading the Present Current/Voltage, Maximum Voltage, Setup Voltage/Current and the States of Power Supply (26H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (26H)
4th byte	Byte 0 of present output current value
5th byte	Byte 1 of present output current value
6th byte	Byte 0 of present output voltage value
7th byte	Byte 1 of present output voltage
8th byte	Byte 2 of present output voltage
9th byte	Byte 3 of present output voltage
10th byte	Power supply's state
11th byte	To set the low byte of current value
12th byte	To set the high byte of current value

13th byte	Byte 0 of the maximum voltage value
14th byte	Byte 1 of the maximum voltage value
15th byte	Byte 2 of the maximum voltage value
16th byte	Byte 3 of the maximum voltage value
17th byte	Byte 0 of output voltage value
18th byte	Byte 1 of output voltage value
19th byte	Byte 2 of output voltage value
20th byte	Byte 3 of output voltage value
21st to 25th byte	System reserve
26th byte	Check sum

Note

We use 1 byte to represent power supply's state. Each bit is defined as follows:

From higher bit to lower bit:

7 6 5 4 3 2 1 0

- 0 bit: The output state, 0 is OFF, 1 is ON.
- 1 bit: Over heat protection, 0 is normal, 1 is abnormal.
- 2, 3 bit: The output mode, 1 is CV mode, 2 is CC mode and 3 is Unreg mode.
- 4, 5, 6 bit: The fan speed, 0 is stop, 5 is the maximum fan speed.
- 7 bit: Operation state, 0 is front panel operation mode, 1 is remote control mode.

The frame format is the same as above

3.8 Entering the Calibration Mode (27H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (27H)
4th byte	Calibration protection state
5th byte	Calibration password (0X28H)
6th byte	Calibration password (0X01H)
7th to 25th byte	System reserve
26th byte	Check sum

Note

We use a byte to represent calibration protection state, each bit is defined as follows:

From higher bit to lower bit:

7 6 5 4 3 2 1 0

0 bit: Protection state, 0 is to disable protection, 1 is to enable the protection.

3.9 Reading the Calibration State (28H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (28H)
4th byte	Calibration protection state
5th byte	System reserve
26th byte	Check sum

Note

We use a byte to represent calibration protection state, each bit is defined as follows:

From higher bit to lower bit:

7 6 5 4 3 2 1 0

0 bit: Protection state, 0 is to disable protection, 1 is to enable the protection.

3.10 Calibrating the Voltage Value (29H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (29H)
4th byte	Calibrated voltage points (point 1 to 3)
5th to 25th byte	System reserve
26th byte	Check sum

Note

To calibrate the 3 points of voltage sequentially.

3.11 Sending the Present Output Voltage to Calibration Program (2AH)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (2AH)
4th byte	The byte 0 of present voltage value
5th byte	The byte 1 of present voltage value
6th byte	The byte 2 of present voltage value
7th byte	The byte 3 of present voltage value
8th to 25th byte	System reserve
26th byte	Check sum

3.12 Calibrate the Current Value (2BH)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (2BH)
4th byte	Calibrated current points (point 1 to 2)
5th to 25th byte	System reserve
26th byte	Check sum

Note

To calibrate the 2 points of the current value sequentially.

3.13 Sending the Actual Output Current to Calibration Program (2CH)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (2CH)
4th byte	The lower byte of the present current value
5th byte	The higher byte of the present current value
6th to 25th byte	System reserve
26th byte	Check sum

3.14 Saving the Calibration Data to EEPROM (2DH)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (2DH)
4th to 25th byte	System reserve
26th byte	Check sum

3.15 Setting Calibration Information (2EH)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (2EH)
4th to 23rd byte	Calibration information (ASIC code)
24th byte	System reserve
25th byte	System reserve
26th byte	Check sum

3.16 Reading Calibration Information (2FH)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (2FH)
4th to 23rd byte	Calibration information (ASCII code)
24th byte	System reserve
25th byte	System reserve
26th byte	Check sum

3.17 Reading Product's Model, Series Number and Version Information (31H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (31H)
4th to 8th byte	Product model (ASIC code)
9th byte	Lower byte of the software version
10th byte	Higher byte of the software version
11th to 20th byte	Serial number (ASCII code)
21st to 25th byte	System reserve
26th byte	Check sum

Note

For example, the serial number is 000045, the product model is IT6811, and software version is V2.03, then the returned data is as follows:

A A	0 0	3 1	3 6	3 8	3 1	3 1	0 0	0 3	0 2	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	Z Z	X X	X X	X X	X X	X X	5 7

3.18 Restore the Factory Default Calibration Data (32H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (32H)
4th to 25th byte	System reserve
26th byte	Check sum

3.19 Enable the Local Key (37H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (37H)
4th byte	Enable/disable local key (0 is disable, 1 is enable)
5th to 25th byte	System reserve
26th byte	Check sum code

Note

The local keys on the front panel are not allowed to use when the power supply is in remote mode.

3.20 The Return Information of Command Operation in Power Supply (12H)

1st byte	Start bit (AAH)
2nd byte	Address (0 to 0XFE)
3rd byte	Command (12H)
4th byte	Command checkout result
5th to 25th byte	System reserve
26th byte	Check sum

Note

When the power supply receives a frame command, it will check the frame command.

- If the check sum is correct, then it will return the corresponding reading parameters.
- If the check sum is incorrect, then it will return to 90H.
- If there is any error on setting parameter or over parameter, then it will return to A0H.
- If the command wasn't executed, then it will return to B0H.
- If the command is not effective, then it will return to C0H.
- Or otherwise, it will return to 80H.

Contact Us

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2. Visit ITECH website: www.itechate.com.
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