ITECH

YOUR POWER TESTING SOLUTION

# IT8700P+

## High Speed Multi-channel DC Electronic Load

*Your Power Testing Solution*

# IT8700P+ High Speed Multi-channel DC Electronic Load

IT8700P+ series high-speed multi-channel DC electronic load is an upgraded version of the original IT8700P series with higher speed and higher precision. Its modules support master-slave paralleling connection for power extension. It's compatible with IT8700P mainframe, the new modules and old modules can work together. The IT8700P+ modules have faster dynamic response and can make the minimum rise time of current less than rising time of minimum current < 10 μs. In addition, the low internal resistance makes it suitable for low-voltage loading test. Faster loop speed can accurately control current without overshoot which improves test efficiency. Furthermore, it has three current ranges for higher accuracy and lower ripple. The voltage and current measurement speed of this series has been upgraded to 250kHz. It has built-in LAN, USB and RS232 interfaces, and supports SCPI protocol. Therefore, IT8700P+ is good for system integration and is suitable for R&D and production line testing of super capacitors, fuel cells, lithium ion batteries, high-speed AC-DC and DC-DC power supplies such as computer power supplies and communication power supplies.

## FEATURE

- Three-stage current range, higher accuracy and lower ripple
- Supports master-slave parallel connection of 16-channel modules, flexibly extends power
- Faster dynamic response, minimum current rise time < 10 μs
- Stable operation down to zero volts, suitable for low-voltage capacitors, solar cells, fuel cells, and other low-voltage high current power supplies
- Faster loop speed, precise control of current without overshoot
- The voltage and current measurement speed is upgraded to 250kHz, good for system integration
- Comprehensive protection functions: OVP/OCP/OPP/OTP, Sense protection
- Compatible with IT8700P mainframe, old and new modules can be matched
- Short-circuit peak current measurement function
- Available front/rear terminals*1
- 8 operating modes: CC/ CV/ CR/ CW/ CV+CC/ CR+CC/ CW+CC/ CV+CR (CR-LED)
- Automatic test function to tell whether the test results exceed the set specifications
- Built-in LAN, USB, RS232 interfaces
- CV loop speed is adjustable to match different DUTs
- Multi channel synchronous control

*1 Current is no more than 15A if connecting with front terminals

| Model | Voltage | Current | Power |
|---|---|---|---|
| IT8723P+ | 80 V | 45 A | 2 x 300 W |
| IT8732P+ | 80 V | 60 A | 400 W |
| IT8733P+ | 80 V | 120 A | 600 W |
| IT8722BP+*1 | CH1:600 V<br>CH2:600 V | CH1:15A<br>CH2:15A | CH1:250W<br>CH2:250W |
| IT8732BP+ | 600 V | 20A | 300W |
| IT8733BP+ | 600 V | 30A | 500W |

| Main Frame | |
|---|---|
| IT8701P | Mainframe for 2 modules (including three interfaces) |
| IT8702P | Mainframe for 4 modules (including three interfaces) |
| IT8703P | Expansion mainframe for 4 modules |

*1 Dynamic power allocation, the total power of two channels is 300W, and the power of one channel does not exceed 250W

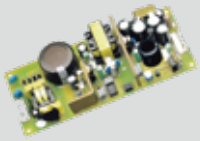
## Applications

Super Capacitors

Fuel Cells

Lithium ion Batteries

Communication power supply



DC-DC converter or PSU

High speed AC-DC converter or PSU

## Flexible modules combination

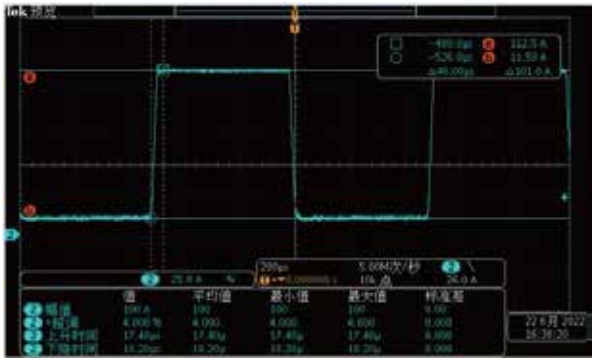
The IT8700P+ series is designed with removable modules, so that you can choose different modules according to your needs. These modules can work with the original IT8700P series modules too. There are high-performance microprocessor chips in each load module and mainframe. Parallel architecture is adopted to achieve faster testing. The load modules are controlled synchronously by the system, and the power supply with multiple outputs can also be tested synchronously.

## Low voltage loading, stable operation down to zero volts

The IT8700P+ module has ultra-low on-resistance and three ranges. Under the medium and small range, the minimum load voltage is <0.1V. In the high current range, the minimum load voltage at full current is <0.5V, and lower input impedance can be obtained after parallel connection. It is suitable for testing fuel cells, supercapacitors, solar cells, DC-DC converters and other low voltage and high current electronic devices.

## Fast dynamic response

Power supplies often have high requirements for instantaneous signals and dynamic response. In order to meet faster and faster testing requirements, IT8700P+ series provides high-speed, programmable dynamic sequence control. The current rise time is no more than 10 μs, much faster than the last generation. So it can be used for high-speed dynamic test of communication power supply and computer power supply. There are three modes of the dynamic test function, namely continuous mode, pulse mode and toggle mode.



IT8733P+（80V,120A,600W）10A~110A dynamic waveform
(current slope 5A/us)

## Master-slave parallel connection

The IT8700P+ series supports master-slave parallel connection, 8 units (16 channels) at most can be connected in parallel, and the power can be extended to 4800W. The synchronization time error is 4us between paralleled units, and current equally assigning accuracy is 0.1%+0.1%F.S. Thanks to the flexible power extension , it can be used to test various DUTs and increase equipment utilization. The current sharing mode makes no sacrifice of the dynamic performance after parallel connection.

## 3 current ranges, well applied to Energy Star standard test for consumer electronics products

IT8700P+ provides 3 current ranges and higher measurement accuracy for DUTs that require high current accuracy like batteries. No need to build a complex test bench, the low current range of the IT8700P+ can be used for Energy Star standard testing in sleep, idle and standby modes of consumer electronics products. Actually it is suitable for almost all consumer electronics products that require precise current setting and measurement at the μA and mA levels.

## Fast measurement of I-V characteristic

The voltage and current measurement of IT8700P+ is fast (up to 250kHz). It can be applied to various testing applications such as charging piles, automotive electronics; renewable energy and so on.

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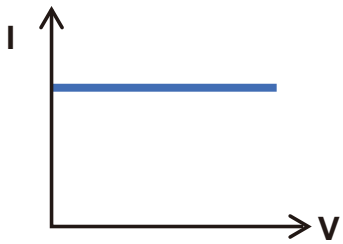
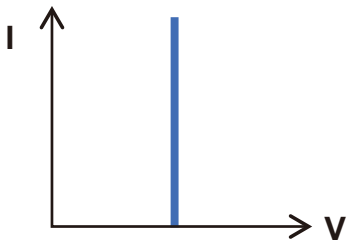
### 8 operation modes

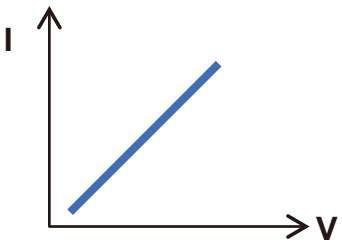
Besides the four basic operation modes of CC/CV/CR/CW, IT8700P+ provides additional 4 compound operation modes : CV/ CC/ CR+CC/CW+CC/CV+CR(CR-LED). Under CV/CR/CW operation mode, the maximum current (I-Limit) is settable.This can effectively solve the problem of instantaneous surge current during testing and avoid triggering DUT's protection, or even burning out or any other injury caused by possible misoperation or environmental factors. So it can be used in various applications.



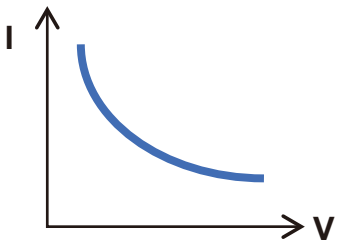
CC



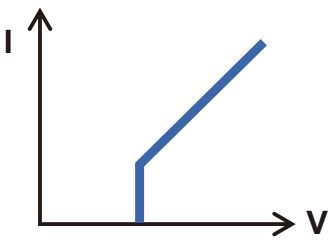
CV



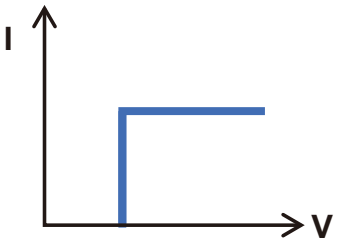
CR



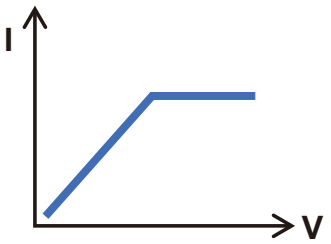
CW



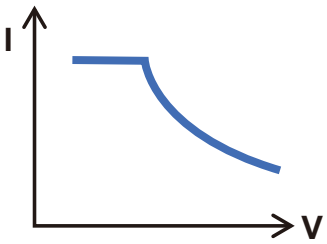
LED(CV+CR)



CV+CC



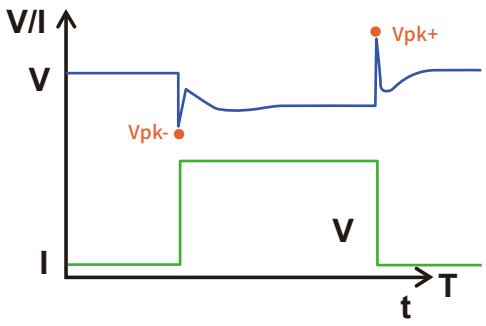
CR+CC



CW+CC

### Peak voltage measurement(Vpk)

When measuring the dynamic current of a switching power supply, an oscilloscope was usually necessary to capture the instantaneous voltage and current waveforms and obtain Vpk+ and Vpk- accordingly. But with digital data acquisition function, IT8700P can directly obtain the Vpk+ and Vpk- values without an oscilloscope.



## IT8700P+ Specification

| Parameter | | IT8723P+ | | |
|---|---|---|---|---|
| Rated value | Voltage | 0.1~18V | | 0.1~80V |
| | Current | 0 ～ 0.9A | 0 ～ 4.5A | 0~45A |
| | Power | 0 ～ 60W | 0~300W | |
| | Resistance | 0.05Ω～ 10Ω | | 0.05Ω～ 7500Ω |
| | Min. resistance | ≒50mΩ | ≒15mΩ | |
| | MOV | 0.06V at 0.9A | 0.07V at 4.5A | 0.7V at 45A |
| | Input leak current | 0.06mA | | 0.2mA |
| Set resolution | Voltage | 1mV | | 10mV |
| | Current | 0.1mA | 0.1mA | 1mA |
| | Power | 10mW | | |
| | Resistance | 16bit | | |
| Readback resolution | Voltage | 0.1 mV | | 1 mV |
| | Current | 0.1mA | 0.1mA | 1mA |
| | Power | 10mW | | |
| Set accuracy | Voltage | ±(0.05%+0.025%FS) | | ±(0.05%+0.025%FS) |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | ±(0.05%+0.05%FS) |
| | Power *3 | 0.2%+0.2%FS | | |
| | Resistance *1 | 0.01%+0.08S *2 | | 0.01%+0.0008S |
| Readback accuracy | Voltage | ±(0.025%+0.025%FS) | | |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | |
| | Power | ±(0.2%+0.2%FS) | | |
| Set temperature drift coefficient(%of Output/℃+Offset) | Voltage | ≤100ppm/℃ + 100ppm/℃*FS | | |
| | Current | ≤100ppm/℃ + 100ppm/℃*FS | | |
| Readback Temperature drift coefficient((%of Output/℃+Offset) | Voltage | ≤100ppm/℃ + 100ppm/℃*FS | | |
| | Current | ≤100ppm/℃ + 100ppm/℃*FS | | |
| Dynamic response *4 | Rising | 0.0001 ～ 0.09A/uS | 0.0001 ～ 0.45A/uS | 0.001 ～ 4.5A/uS |
| | Falling | 0.0001 ～ 0.09A/uS | 0.0001 ～ 0.45A/uS | 0.001 ～ 4.5A/uS |
| | Min.rising time*5 | ≒10uS | ≒10uS | ≒10uS |
| | Dynamic frequency | 0.001 ～ 20KHz | | |
| AC parameter | Voltage | 110V ±10% or 220V ±10% | | |
| | Frequency | 50/60Hz | | |
| | Imax. | 0.3A | | |
| | Power factor | ≥0.99 | | |
| Set stability-30min(% of Output/℃+Offset) | Voltage | ±(0.05%+0.025%FS) | | ±(0.05%+0.025%FS) |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | ±(0.05%+0.05%FS) |
| Set stability-8h(%of Output/℃+Offset) | Voltage | ±(0.05%+0.025%FS) | | ±(0.05%+0.025%FS) |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | ±(0.05%+0.05%FS) |
| Readback stability-30min (%of Output/℃+Offset) | Voltage | ±(0.025%+0.025%FS) | | |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | |
| Readback stability-8h (%of Output/℃+Offset) | Voltage | ±(0.025%+0.025%FS) | | |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | |
| Sense voltage | | ≤2V | | |
| Storage temperature | | -20℃～ 70℃ | | |
| Protection | OPP | 66W | 310W | 310W |
| | OCP | 0.99A | 4.95A | 49.5A |
| | OVP | 18.5V | | 85V |
| | OTP | 95℃ | | |
| Interfaces | | Ether Net，GPIB，USB，RS232 | | |
| Isolation(output to ground) | | 500V/DC/1mA | | |
| Isolation(input to ground) | | 1.5KV/AC/5mA | | |
| Units parallel connected | | ≤16(channel) | | |
| Protection level | | IP20 | | |
| Safety regulation | | IEC 61010 | | |
| Cooling | | fan | | |
| Working temperature | | 0 ～ 40℃ | | |
| Dimension(mm) | | 82mm*183mm*573mm | | |
| N.W. | | 5kg | | |

*1 Input voltage/current is not less than 10%FS (FS is full scale)

*2 Range of resistance readback value: ( 1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08) )

*3 Input voltage/current is not less than 10%FS

*4 The loading current is not less than 2%FS

*5 Minimum rise time: 10%~90% of current rise time

# Your Power Testing Solution

## IT8700P+ High Speed Multi-channel DC Electronic Load

## IT8700P+ Specification

| Parameter | | IT8732P+ | | |
|---|---|---|---|---|
| Rated value | Voltage | 0.1 ～ 18V | | 0.1 ～ 80V |
| | Current | 0 ～ 1.2A | 0 ～ 6A | 0 ～ 60A |
| | Power | 0 ～ 96W | 0 ～ 400W | |
| | Resistance | 0.05Ω～ 10Ω | | 0.05Ω～ 7500Ω |
| | Min. resistance | ≒50mΩ | ≒15mΩ | |
| | MOV | 0.06V at 1.2A | 0.05V at 6A | 0.5V at 60A |
| | Input leak current | 0.06mA | | 0.2mA |
| Set resolution | Voltage | 1mV | | 10mV |
| | Current | 0.1mA | 0.1mA | 1mA |
| | Power | 10mW | | |
| | Resistance | 16bit | | |
| Readback resolution | Voltage | 0.1 mV | | 1 mV |
| | Current | 0.1mA | 0.1mA | 1mA |
| | Power | 10mW | | |
| Set accuracy | Voltage | ±(0.05%+0.025%FS) | | ±(0.05%+0.025%FS) |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | ±(0.05%+0.05%FS) |
| | Power *3 | 0.2%+0.2%FS | | |
| | Resistance *1 | 0.01%+0.08S *2 | | 0.01%+0.0008S |
| Readback accuracy | Voltage | ±(0.025%+0.025%FS) | | |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | |
| | Power | ±(0.2%+0.2%FS) | | |
| Set temperature drift coefficient(%of Output/℃+Offset) | Voltage | ≤100ppm/℃ + 100ppm/℃*FS | | |
| | Current | ≤100ppm/℃ + 100ppm/℃*FS | | |
| Readback Temperature drift coefficient((%of Output/℃+Offset) | Voltage | ≤100ppm/℃ + 100ppm/℃*FS | | |
| | Current | ≤100ppm/℃ + 100ppm/℃*FS | | |
| Dynamic response | Rising *4 | 0.0001 ～ 0.1A/uS | 0.0001 ～ 0.5A/uS | 0.001 ～ 5A/uS |
| | Falling *4 | 0.0001 ～ 0.1A/uS | 0.0001 ～ 0.5A/uS | 0.001 ～ 5A/uS |
| | Min.rising time *5 | ≒10uS | ≒10uS | ≒10uS |
| | Dynamic frequency | 0.001 ～ 20KHz | | |
| AC parameter | Voltage | 110V ±10% or 220V ±10% | | |
| | Frequency | 50/60Hz | | |
| | Imax. | 0.3A | | |
| | Power factor | ≥0.99 | | |
| Set stability-30min(% of Output/℃+Offset) | Voltage | ±(0.05%+0.025%FS) | | ±(0.05%+0.025%FS) |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | ±(0.05%+0.05%FS) |
| Set stability-8h(%of Output/℃+Offset) | Voltage | ±(0.05%+0.025%FS) | | ±(0.05%+0.025%FS) |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | ±(0.05%+0.05%FS) |
| Readback stability-30min (%of Output/℃+Offset) | Voltage | ±(0.025%+0.025%FS) | | |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | |
| Readback stability-8h (%of Output/℃+Offset) | Voltage | ±(0.025%+0.025%FS) | | |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | |
| Sense voltage | | ≤2V | | |
| Storage temperature | | -20℃～ 70℃ | | |
| Protection | OPP | 100W | 410W | 410W |
| | OCP | 1.32A | 6.6A | 66A |
| | OVP | 18.5V | | 85V |
| | OTP | 95℃ | | |
| Interfaces | | Ether Net，GPIB，USB，RS232 | | |
| Isolation(output to ground) | | 500V/DC/1mA | | |
| Isolation(input to ground) | | 1.5KV/AC/5mA | | |
| Units parallel connected | | ≤16(channel) | | |
| Protection level | | IP20 | | |
| Safety regulation | | IEC 61010 | | |
| Cooling | | fan | | |
| Working temperature | | 0 ～ 40℃ | | |
| Dimension(mm) | | 82mm*183mm*573mm | | |
| N.W. | | 5kg | | |

*1 Input voltage/current is not less than 10%FS (FS is full scale)

*2 Range of resistance readback value: ( 1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08) )

*3 Input voltage/current is not less than 10%FS

*4 Rise/fall slew rate: 10%~90% of current rising from 0 to Max.current

*5 Minimum rise time: 10%~90% of current rise time

## IT8700P+ Specification

| Parameter | | IT8733P+ | | |
|---|---|---|---|---|
| Rated value | Voltage | 0.1 ～ 18V | | 0.1 ～ 80V |
| | Current | 0 ～ 2.4A | 0 ～ 12A | 0 ～ 120A |
| | Power | 0 ～ 120W | 0 ～ 600W | |
| | Resistance | 0.05Ω～ 10Ω | | 10Ω～ 7500Ω |
| | Min. resistance | ≒50mΩ | ≒13mΩ | |
| | MOV | 0.12V at 2.4A | 0.15V at 12A | 1.5V at 120A |
| | Input leak current | 0.06mA | | 0.3mA |
| Set resolution | Voltage | 1mV | | 10mV |
| | Current | 0.1mA | 1mA | 10mA |
| | Power | 10mW | | |
| | Resistance | 16bit | | |
| Readback resolution | Voltage | 0.1 mV | | 1 mV |
| | Current | 0.1mA | 0.1mA | 1mA |
| | Power | 10mW | | |
| Set accuracy | Voltage | ±(0.05%+0.025%FS) | | ±(0.05%+0.025%FS) |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | ±(0.05%+0.05%FS) |
| | Power *3 | 0.2%+0.2%FS | | |
| | Resistance *1 | 0.01%+0.08S *2 | | 0.01%+0.0008S |
| Readback accuracy | Voltage | ±(0.025%+0.025%FS) | | |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | |
| | Power | ±(0.2%+0.2%FS) | | |
| Set temperature drift coefficient(%of Output/℃+Offset) | Voltage | ≤100ppm/℃ + 100ppm/℃*FS | | |
| | Current | ≤100ppm/℃ + 100ppm/℃*FS | | |
| Readback Temperature drift coefficient((%of Output/℃+Offset) | Voltage | ≤100ppm/℃ + 100ppm/℃*FS | | |
| | Current | ≤100ppm/℃ + 100ppm/℃*FS | | |
| Dynamic response | Rising *4 | 0.0001 ～ 0.1A/uS | 0.0001 ～ 0.5A/uS | 0.001 ～ 5A/uS |
| | Falling *4 | 0.0001 ～ 0.1A/uS | 0.0001 ～ 0.5A/uS | 0.001 ～ 5A/uS |
| | Min.rising time*5 | ≒10uS | ≒10uS | ≒10uS |
| | Dynamic frequency | 0.001 ～ 20KHz | | |
| AC parameter | Voltage | 110V ±10% or 220V ±10% | | |
| | Frequency | 50/60Hz | | |
| | Imax. | 0.3A | | |
| | Power factor | ≥0.99 | | |
| Set stability-30min(% of Output/℃+Offset) | Voltage | ±(0.05%+0.025%FS) | | ±(0.05%+0.025%FS) |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | ±(0.05%+0.05%FS) |
| Set stability-8h(%of Output/℃+Offset) | Voltage | ±(0.05%+0.025%FS) | | ±(0.05%+0.025%FS) |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | ±(0.05%+0.05%FS) |
| Readback stability-30min (%of Output/℃+Offset) | Voltage | ±(0.025%+0.025%FS) | | |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | |
| Readback stability-8h (%of Output/℃+Offset) | Voltage | ±(0.025%+0.025%FS) | | |
| | Current | ±(0.1%+0.1%FS) | ±(0.05%+0.05%FS) | |
| Sense voltage | | ≤2V | | |
| Storage temperature | | -20℃～ 70℃ | | |
| Protection | OPP | 125W | 610W | 610W |
| | OCP | 2.64A | 13.2A | 132A |
| | OVP | 18.5V | | 85V |
| | OTP | 100℃ | | |
| Interfaces | | Ether Net，GPIB，USB，RS232 | | |
| Isolation(output to ground) | | 500V/DC/1mA | | |
| Isolation(input to ground) | | 1.5KV/AC/5mA | | |
| Units parallel connected | | ≤16(channel) | | |
| Protection level | | IP20 | | |
| Safety regulation | | IEC 61010 | | |
| Cooling | | fan | | |
| Working temperature | | 0 ～ 40℃ | | |
| Dimension(mm) | | 82mm*183mm*573mm | | |
| N.W. | | 5kg | | |

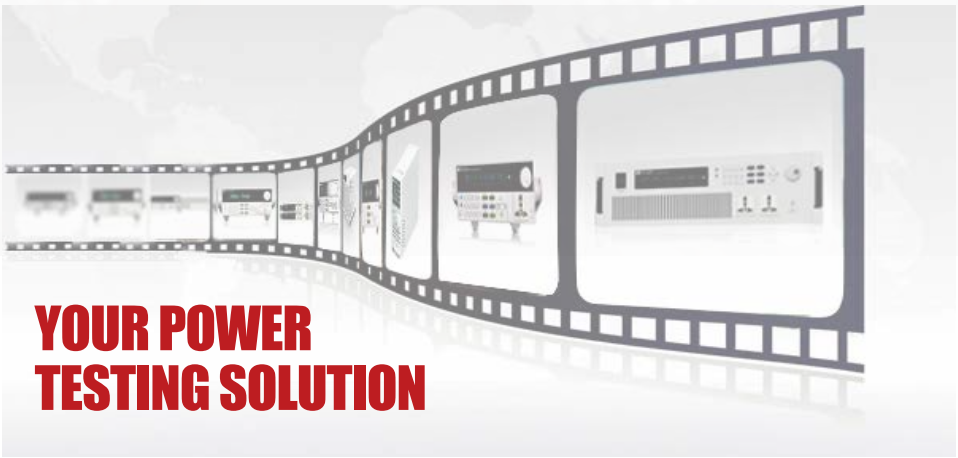
*1 Input voltage/current is not less than 10%FS (FS is full scale)

*2 Range of resistance readback value: ( 1/(1/R+(1/R)*0.01%+0.08),1/(1/R-(1/R)*0.01%-0.08) )

*3 Input voltage/current is not less than 10%FS

*4 Rise/fall slew rate: 10%~90% of current rising from 0 to Max.current

*5 Minimum rise time: 10%~90% of current rise time



# YOUR POWER TESTING SOLUTION

This information is subject to change without notice.For more information, please contact ITECH.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