



จัดจำหน่ายโดย : บริษัท เอฟเวอร์เทค จำกัด
TEL : (02)8702884-5, (02)4289793-5
Email: sales@evertech.co.th
www.evertch.co.th

ITS5300

Battery Charge & Discharge Test System

Battery performance test specialist





ITS5300 Battery Charge & Discharge Test System

ITS5300 Battery Charge & Discharge Test System (“ITS5300 Test System”) is designed for testing the performances of power batteries of all kinds (lead, NI-MH and lithium batteries, supercapacitor, hydrogen cell, etc.), which can simulate electromobiles’ requirements on battery pack under a series of equivalent operating conditions.

In response to the demand of mass testing for a production line, ITS5300 Test System can be used in performance testing of a hundred or more battery packs or 200 cells in the battery packs at a time, remarkably improving the testing efficiency and capacity of the production line. With flexible step editing and optimized protection functions, ITS5300 Test System caters to a variety of testing demands. Supports CC/CW/CR discharge mode, CC/CV charge mode, pulse charge & discharge modes and DCIR/ ACIR. Meanwhile, it can generate a charge & discharge curve and store parameters such as internal resistance (“IR”), capacity, voltage and current so as to conduct a complete analysis of battery.

ITS5300 Test System is includes composed of ITECH power supply, electronic load, battery internal resistance tester and temperature logger as well as battery testing software.

The system is characterized by high degree of automation and outstanding reliability, making it the best choice for users demanding battery testing.



Applications

- Battery charge/discharge performance testing
- Battery cycle life testing
- Battery capacity testing
- outgoing product/incoming material inspection
- Production test



outgoing product/incoming material inspection



Production test

System Features

- A pulse charge/discharge function is designed for IR and capacity testing of battery module/cell.
 - Charge mode: CC/CV/pulse charge
 - Discharge mode: CC/CR/CW/pulse discharge
 - Voltage range: 0-1200V
 - Current range: 0-1500A
 - Power range: 0-600KW
- High reliability and precision guarantee absolute measurement accuracy within the broad voltage/current range, improving the system utilization.
 - Voltage: 0.025% +0.025% F.S
 - Current: 0.05% +0.05% F.S
- High sensibility and sample rate make it applicable for charge/discharge test on power batteries of all kinds.
- V/I current sample rate: 50KHZ (one point sampled every 20us).
- Online/offline ACIR and DCIR testing features are designed for analyzing battery/cell IR.
- Standard modular design not only makes it easy for hardware extension and follow-up maintenance but also expand its applications.
- Available for temperature monitor
- A complete alarm and protection setup for effectively preventing overcharge, over-discharge and other unexpected faults.
- Multi-channel independent control
- Available for charge/discharge testing on more than a hundred channels at a time.



Please contact ITECH via sales@itechate.com, To get ITECH products information and service information.

China

TEL: +86-25-52415098
FAX: +86-25-52415068
E-mail:sales@itechate.com
108# XiShanqiao Nanlu,Nanjing city,China

USA

22820 Savi Ranch Parkway Yorba Linda, CA 92887
U.S.A.
E-mail:usa@itechate.com

Taiwan

TEL:+886-3-6684333
FAX:+886-3-6683152
E-mail:sales@itechate.com.tw
16F, #65 Gaotie 7th Rd., Zhubei City, Hsinchu
County 302 Taiwan

Korea

#153-783,Rm601,ByuckSan,GaSan-Dong,Seoul,
Korea
E-mail:korea@itechate.com

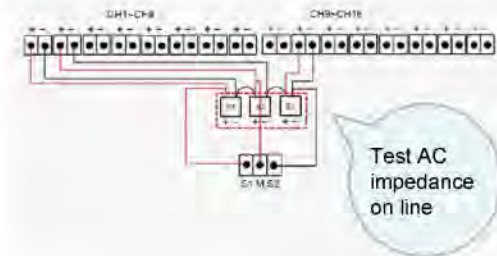


IR Testing

Different types of batteries vary in IR, and even batteries of one kind have different IRs due to distinct internal chemical properties. IR is an important technical measurement of battery performance. In general, the smaller the IR, the higher the discharge rate capability will be or vice versa.

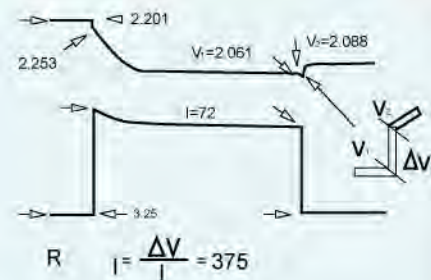
■ ACIR Testing

A battery pack is typically a set of any number of cells configured in series. A sharp difference between cells may greatly impair the battery pack's discharge performance. Therefore, measurement and systematic analysis of cell IR is also an integral part of battery performance test. IR is not a constant and may change over time during charge/discharge. The online ACIR testing feature is designed for rapidly and accurately identifying the dynamic IR variation in each cell so as to determine whether the battery has failed.



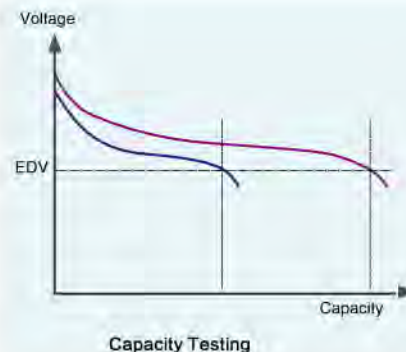
■ DCIR Testing

DCIR is typically used in testing high-capacity batteries or accumulators since low-capacity batteries are incapable of loading 40A-80A current within 2-3s. DC discharge is a measurement similar with battery mechanics. In DCIR testing, the DCR is calculated from the current and voltage differences between two different currents.



■ Battery Capacity Testing

Battery capacity is typically measured in ampere-hour. Measured battery capacities will differ with discharge rates applied. Generally, battery life will be shortened by high-rate discharge; thus, discharge capacity is usually measured at a low discharge rate (e.g. 0.2C). Meanwhile, battery tends to be damaged by deep discharge. Battery capacity refers to the effective capacity calculated from the initial voltage to the cut-off voltage.



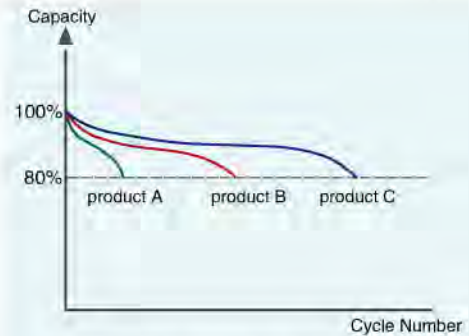
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ITS5300 Battery Charge & Discharge Test System



Battery Cycle Lift Testing

With the increase in charge/discharge cycles, IR will increase due to internal oxidation, preventing the battery from discharging stored power and in turn end the battery life. Battery cycle lift (one charge + one discharge constitute one cycle) is influenced by discharge rate, temperature, end-of-charge/discharge voltage and other factors (see the right figure). Lithium battery typically has 300-500 charge & discharge cycles. IEC and other regulations stipulate that for a standard lithium battery, the remaining capacity after 500 charge & discharge cycles must be 60% or more of the initial capacity. Therefore, charge & discharge cycle testing is an important means to evaluate and measure battery lifecycle.

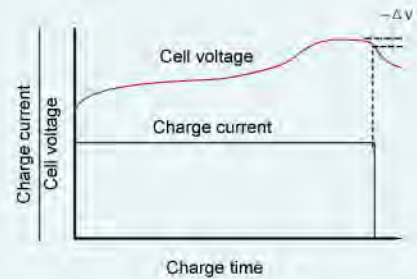


Battery Cycle lift Testing

Battery Temperature Measurement

For battery packs of different structures, temperature sensors of various quantities should be placed at different measurement points which are usually exposed to greatest variation in temperature.

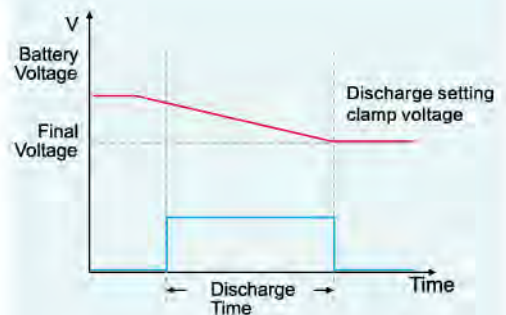
Since high-temperature cells are placed densely, a considerable amount of heat will accumulate at the center and less on the periphery, increasing the temperature imbalance between each two cells. As a result, battery modules and cells will differ from each other in performance, which will in turn impair the performance uniformity and service life of battery. Therefore, in an aging test of battery, real-time monitoring of temperature variation is a useful method for accurately evaluating the battery performance.



Battery Temperature Measurement

Battery Charge/Discharge Performance Testing

By evaluating a battery's charge/discharge performance, we may effectively simulate the actual working conditions of the battery. The charge process of a battery typically consists of four stages, including the preliminary charge, constant current charge, topping charge and trickle charge. During the discharge process, will not use continuous high current discharge. Therefore, simulation of variable pulse discharge current has become as a new tendency for developing novel battery charge/discharge testing systems. What's more, the simulation must be so flexible that it can satisfy various usage requirements of the user.



Battery Discharge function



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Modular Design

ITS5300 Test System is composed primarily of electronic load, power supply, IR tester and temperature logger. By addressing the limitation of traditional single test, the system develops professional test steps to help users radically improve the testing efficiency. Moreover, the system software can be used to conduct a synchronous remote control of each system components. With a modular design, the system allows users to select out of their true testing demands the most suitable devices for integration into an automated test platform, thus producing system architecture with highest flexibility and extendibility.

■ DC Electric Load

ITS5300 Test System includes an optional ITECH programmable DC electric load mainly used for battery discharge.

Serials	Voltage	Current	Power	Resolution
IT8500	0~500V	0~480A	120W~6KW	1mV/0.1mA
IT8800	0~800V	0~1500A	150W~600KW	0.1mV/0.01mA

■ IR Tester

ITS5300 Test System is provided with an optional ITECH IR tester used for monitoring the voltage and IR of cells in a battery pack. The ITECH IR tester works with the most sophisticated AC discharge testing technology, capable of accurately measuring battery voltage and IR and having an automatic evaluation on battery parameters.

■ Professional System Software

ITS5300 Test System is equipped with a battery charge/discharge testing software developed on the basis of user specifications. By editing test steps, the user may perform constant current charge, constant Voltage charge and constant current- power- resistance discharge tests on multi-channel cells or battery packs. Furthermore, the software will help the user monitor cell voltage, temperature and IR, produce charge/discharge curves and monitor and store relevant data.

■ Programmable DC Power Supply

ITS5300 Test System is supplied with an optional ITECH programmable DC power supply used for battery pack or cell charge.

Serials	Voltage	Current	Power	Resolution
IT6800	0~72V	0~10A	100W~180W	1mV/1mA
IT6900	0~150V	0~25A	100W~600W	1mV/0.1mA
IT6500	0~160V	0~240A	800W~6KW	1mV/1mA
IT6700	0~1200V	0~110A	850W~3KW	100mV/10mA
IT22000	0~1500V	0~510A	5KW~15KW	10mV/100mA

■ Temperature Logger

ITS5300 Test System integrates an ITECH multi-channel temperature logger used for temperature monitoring. ITECH multi-channel temperature logger is available for monitoring temperature via 24 channels at a time. The specifications of the temperature logger are as follows: measurement range -200°C - 2000°C, measurement accuracy 0.5°C and resolution 0.01°C. The superior performance of temperature logger makes it possible for ITS5300 Test System to acquire temperature data effectively and accurately and for wide application of the system in testing of batteries of all kinds.



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ITS5300 Battery Charge & Discharge Test System



A Complete Set of Safety Features

■ Power-off Memory Protection

ITS5300 Test System is superior over traditional integrated charge & discharge device in which a power-off memory feature while the latter has single protection configuration only.

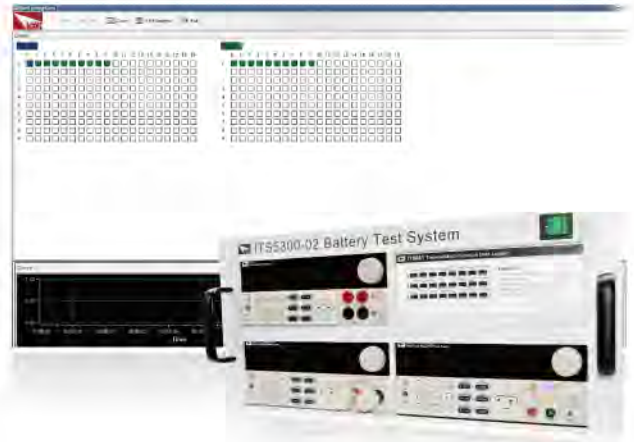
Power-off memory feature is the most cutting-edge and perfect protection function developed by ITECH and designed for time-consuming aging tests. With the protection function, previously acquired data can be effectively stored intact in case of unexpected power off or computer crash during a time-consuming aging test and the user may proceed with the test program from the faulty link after the system back to normal. In this way, repeated tests are avoided for higher efficiency.

Likewise, if the power-off state continues for long, the system will automatically cut off the active charge/discharge circuit so as to prevent overcharge and over-discharge and guarantee the safety and reliability of battery testing.



■ Complete Charge & Discharge Protection

During the aging test of battery, the user should perform real-time monitoring of cells and battery pack and cut off the circuit for protection purposes when the preset conditions are satisfied so as to prevent overcharge and over-discharge. ITS5300 Test System allows the user to observe the status of battery pack and cells in all channels on the same interface and to present abnormality or normality of each cell using different colors. The system is designed with such protection features as cell under-voltage, overvoltage, over-temperature and battery pack overvoltage, under-voltage and reverse polarity.



■ User-defined Protection Conditions

The ITS5300 Test System allows for user-defined end-of-discharge conditions. All permissible parameters of the system can be used as limiting conditions for alarm and power-off protection. In case of satisfaction of any of such conditions, the system will stop discharge automatically.

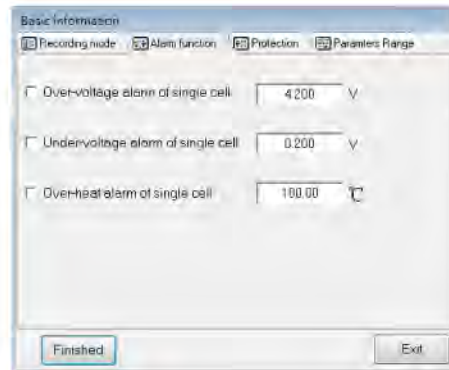


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ITS5300 Battery Charge & Discharge Test System

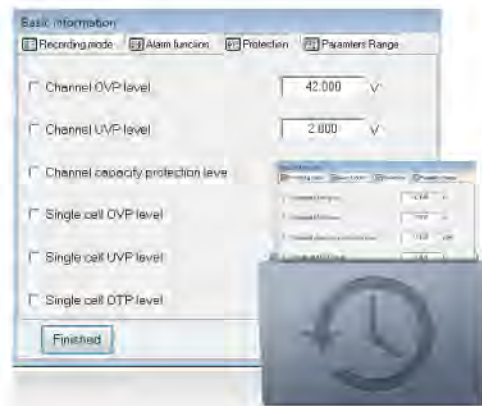
■ Safety Protection Interface

ITS5300 Test System software has a dedicated safety protection interface that is given a priority in running over others during normal course of test so as to guarantee the safety and reliability of test.



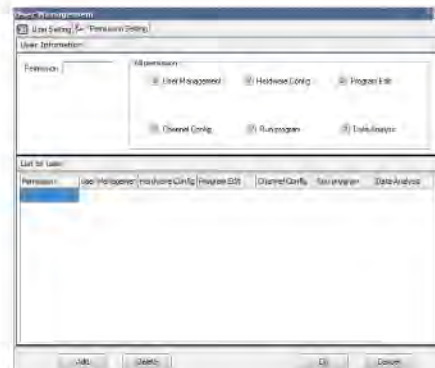
■ Data Backup

ITS5300 Test System allows the user to backup test data to the storage location so as to improve data safety and prevent data loss resulting from computer crash.



■ Configuration of User Access Rights

System operations mainly consist of editing and operation of test program and data analysis. For better controlling operation of the system by different personnel, the system is provided with the feature of user access rights configuration. With this feature, the user may assign QC, R&D and production personnel with different access right so as to prevent unauthorized modification or undesired artificial suspension of system program and in turn guarantee the system reliability and safety.



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Various in Step Editing

ITS5300 Test System provides the users with an array of charge/discharge modes such as CC/CW/CR discharge mode and it can simulate CV/CC. Various end-of-discharge conditions contribute to improvement of testing safety and prevention of over-discharge and overcharge of battery. The "AND" + "OR" logical relation may be established among time, capacity and voltage end-of-discharge conditions to cater to more complex testing requirements.



Multi-Battery Pack Simultaneous Testing

Hundreds of batteries are produced a day in a battery production line. So a multi-channel test system is required for testing many batteries at a time. ITS5300 Test System can divide a battery piece into 10 groups, each group configured with 200 measurement points. Different battery groups may be configured with different test programs but all channels in one group share the same test program, which simplifies the operation and improves the productivity. During the test, the user may clearly observe the test information of each channel on the software interface, including channel configuration, cell voltage, current, discharge capacity and other parameters, which is easy for observation and record.

A battery pack is typically a set of cells connected in series which exhibit different characteristics during charge and discharge. For this reason, monitoring of cells is of great importance.

Apart from key parameters of each channel, ITS5300 Test System may install a temperature logger and IR tester to realize real-time monitoring of cell voltage, IR and temperature. The software has intuitive colored block charts to symbolize normality or abnormality of cell characteristics and give early warning when necessary, which improves the testing reliability.



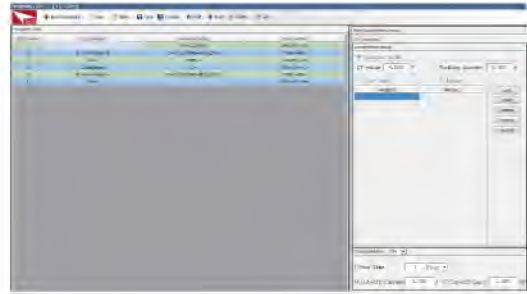


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User-friendly and Powerful Edit Interface of Test Program

ITS5300 Test System software is equipped with a user-friendly user interface. The simple and compact edit interface allows you to execute complex test program without mastery of any programming language, making programming as easy as filling out documents.



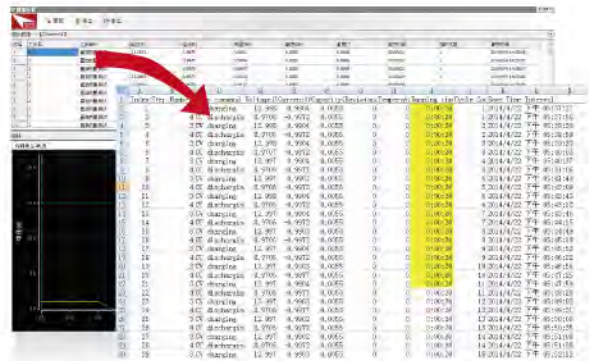
Optimized Report and Analysis Functions

ITS5300 Test System is provided with a variety of data and curve display functions, allowing users to have a real-time check-up on steps during operation. Meanwhile, the system can generate IV curve and record cell voltage, current, temperature, IR and other parameters so that the user can produce desired charts and diagrams easily.



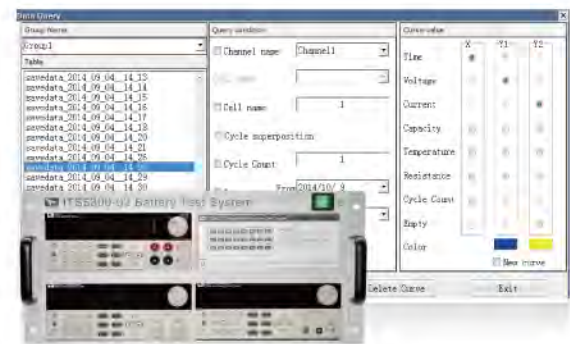
Export in EXCEL Format

Test results can be exported in EXCEL format for subsequent statistics and analysis.



Data Query

Test data tables are named by date and time automatically and can be screened by different conditions for easy search.



Your Best Power Test Solution

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ITECH Products Selection Guide

* DC Electronic Load

IT8700 series multi-channel electronic load

Model	Specification
IT8731	80V/40A/200W
IT8732	80V/60A/400W
IT8732B	500V/20A/300W
IT8733	80V/120A/600W
IT8733B	500V/30A/500W
IT8722	80V/20A/250W*CH1 80V/20A/250W*CH2 **
IT8723	80V/45A/300W CH1 80V/45A/300W CH2 **
IT8702	Mainframe for four modules
IT8703	Extended frame for four modules

- *1: The total power of dual channel for IT8722 is 300W.
 *2: IT8731, IT8732, IT8732B, IT8733, IT8733B and IT8722 should be equipped with IT8702.
 *3: Main frame equips built-in RS232/USB/GPIB/Ether Net interface.

IT8800 series multi-function input electronic load (standard RS232/USB/GPIB interface)

Model	Specification
IT8811	120V/30A/150W
IT8812	120V/30A/250W
IT8812B	500V/15A/200W
IT8812C	120V/60A/250W
IT8813	120V/60A/750W
IT8813B	500V/30A/750W
IT8814	120V/120A/1500W
IT8814B	500V/60A/1200W
IT8816	120V/240A/3000W
IT8816B	500V/100A/2500W
IT8817	120V/360A/4500W
IT8817B	500V/120A/3600W
IT8818	120V/480A/6000W
IT8818B	500V/150A/5000W
IT8830	120V/500A/10KW
IT8830B	500V/200A/10KW
IT8830H	800V/100A/10KW
IT8831	120V/750A/15KW
IT8831B	500V/300A/15KW
IT8831H	800V/150A/15KW
IT8832	120V/1000A/20KW
IT8832B	500V/400A/20KW
IT8832H	800V/200A/20KW
IT8833	120V/1500A/25KW
IT8833B	500V/500A/25KW
IT8833H	800V/250A/25KW
IT8834B	500V/600A/30KW
IT8834H	800V/300A/30KW
IT8835B	500V/700A/35KW
IT8835H	800V/350A/35KW
IT8836B	500V/800A/40KW
IT8836H	800V/400A/40KW
IT8837B	500V/900A/45KW
IT8837H	800V/450A/45KW
IT8838B	500V/1000A/50KW
IT8838H	800V/500A/50KW
IT8839B	500V/1100A/55KW
IT8839H	800V/600A/55KW

- *We receive custom design for electronic loads with higher power or special specification
 IT8500+ series upgrade single channel electronic load (optional RS232/USB/GPIB interface)

Model	Specification
IT8511+	120V/30A/150W
IT8512+	120V/30A/300W
IT8512A+	150V/30A/300W
IT8512B+	500V/15A/300W
IT8512C+	120V/60A/300W
IT8513C+	120V/120A/600W
IT8514B+	500V/60A/1500W
IT8514C+	120V/240A/1500W
IT8516C+	120V/240A/3000W

IT8200 series economic electronic load

Model	Specification
IT8211	60V/30A/150W

* DC Power Supply

IT6500 series auto-range programmable DC power supply (standard RS232/USB/GPIB/RS485 interface)

Model	Specification
IT6512 (with Dynamic test and DIN waveform)	80V/60A/1200W
IT6512A	80V/60A/1200W
IT6512D	80V/120A/1600W

IT6500 series auto-range programmable DC power supply (standard RS232/USB/GPIB/RS485 interface)

Model	Specification
IT6513 (with Dynamic test and DIN waveform)	150V/30A/1200W
IT6513A	150V/30A/1200W
IT6522A	80V/120A/3000W
IT6523D	160V/120A/3000W
IT6533A	160V/120A/6000W
IT6532A	80V/240A/6000W

IT6900A series multi-function programmable power supply (standard RS232/USB/GPIB interface)

Model	Specification
IT6922A	60V/5A/100W
IT6932A	60V/10A/200W
IT6942A	60V/15A/360W
IT6952A	60V/25A/600W
IT6953A	150V/10A/600W

IT6960A series dual-range programmable power supply (standard RS232/USB interface)

Model	Specification
IT6861A	20V/5A/100W 8V/9A/72W
IT6862A	32V/3A/96W 12V/6A/72W
IT6863A	72V/1.5A/108W 32V/3A/96W
IT6872A	35V/4A/140W 15V/7A/105W
IT6873A	75V/2A/150W 32V/4A/128W
IT6874A	150V/1.2A/180W 60V/2A/120W

IT6100 series high accuracy programmable power supply (optional RS232/USB/GPIB interface)

Model	Specification
IT6151	5.2V/60A/312W
IT6152	20V/27A/540W
IT6153	30V/18A/540W
IT6154	60V/9A/540W
IT6162	20V/48A/960W
IT6163	30V/32A/960W
IT6164	60V/16A/960W
IT6163S	30V/40A/1200W
IT6164S	60V/20A/1200W
IT6165S	40V/30A/1200W

IT6100B series accuracy programmable power supply (standard RS232/USB/GPIB interface)

Model	Specification
IT6121B	20V/5A/100W
IT6122B	32V/3A/96W
IT6123B	72V/1.2A/86W
IT6132B	30V/5A/150W
IT6133B	60V/2.5A/150W

IT6300B series triple-channel programmable power supply (standard RS232/USB/GPIB interface)

Model	Specification
IT6322B	30V/3A/90W*2CH 5V/3A/15W*1CH
IT6332B	30V/6A/180W*2CH 5V/3A/15W*1CH
IT6333B	60V/3A/180W*2CH 5V/3A/15W*1CH

IT6302 triple-channel programmable power supply (application: education industry/laboratory/volume demand)

Model	Specification
IT6302	30V/3A/90W*2CH 5V/3A/15W*1CH

IT6700 series digital control power supply

Model	Specification
IT6720	60V/5A/100W
IT6721	60V/8A/180W

IT6700H series high voltage programmable DC power supply (standard RS232/USB/GPIB interface)

Model	Specification
IT6723G	600V/5A/850W
IT6723B	150V/20A/850W
IT6723C	32V/110A/850W
IT6723	80V/40A/850W
IT6723H	300V/10A/850W
IT6724B	150V/20A/1500W
IT6724C	32V/110A/1500W
IT6724H	300V/10A/1500W
IT6724G	600V/5A/1500W
IT6724	80V/40A/1500W
IT6726B	160V/40A/3000W
IT6726H	300V/20A/3000W
IT6726G	600V/10A/3000W
IT6726V	1200V/5A/3000W

* AC Power Supply

IT7300 series AC power supply (standard RS232/USB/LAN interface)

Model	Specification
IT7321	300V/3A/300VA
IT7322	300V/6A/750VA
IT7324	300V/12A/1500VA
IT7326	300V/24A/3000VA