ITECH
YOUR POWER TESTING SOLUTION

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Product

IT7900 Regenerative Grid Simulator

IT7900 Regenerative Grid Simulator

Application fields

- Smart grid
- Electric and electronics
- Solar and energy storage
- Home appliances
- Universities & institutes
- EV

Your Power Testing Solution

Touchscreen

3U/15kVA

960kVA

Regenerative capability

IT7900 Regenerative Grid Simulator

The IT7900 series is a programmable, four-quadrant grid simulator. It is also a four-quadrant power amplifier, which can be used to test various grid-connected equipment. For example, PCS, energy storage system, microgrid, BOBC (V2X), PHiL, etc. With advanced SiC technolgoy, a single unit of IT7900 can realize the anti-islanding protection test through islanding mode(RLC settable). Besides, the power density of IT7900 series is very high, 6kVA in 1U, 15kVA in 3U. After parallel connection, the power can be extended to 960kVA at most. Rich operating modes meet various test requirement of single-phase, three-phase, reverse-phase and multi-channel. In reverse mode, the voltage can be extended to 200% of the rated voltage. The strong arbitrary waveform editing function can simulate various power grid disturbance waveforms, making it an ideal choice for testing and R&D laboratories.

Highlighted Features

- Adopt advanced SiC technology
- High power density, 6kVA in 1U/2U,15kVA in 3U
- 16Hz~150Hz
- Regenerative grid simulator & full 4-Quadrant AC&DC power sources
- Power Amplifier function for PHiL test
- Professional anti-islanding test mode, can set and simulate the RLC (resistive-inductive-capacitive), active and reactive power circuit for anti-islanding detection *3
- Three working modes : CV/Current Limit/Power Limit
- AC, DC, AC+DC or DC+AC output capability
- Comprehensive working modes selectable: single-phase, three-phase, reversed phase and multi-channel *1
- Programmable Output Impedance, allows simulation of
- Real-World Utility Grid Impedance
- Compliance tests incl LVRT /Phase Jump/Frequency variation /Harmonic Injection
- Supported regulatory testing include IEC61000-4-11/4-13/4-14 /4-17/4-28/4-29
- Current source mode

Features

- Wide voltage ranges: 350V/700/1050 VL-N *5
- Master-slave parallel with current sharing technology, up to 960kVA
- Intuitive touch screen;Built-in single/3-phase AC power meter;Scope function
- Fast response time and high accuracy 0.1%+0.2%FS
- Waveforms Library : Sine wave, Square wave,Triangle wave,Clipped sine waves, trapezoidal wave, THD, self-defined waves
- Harmonics and Interharmonics waveform synthesizer
- Power line disturbance simulation testing by LIST programming/SWEEP/Surge&Sag functions
- The harmonic measurement function can measure 50th order harmonics of voltage and current *2
- Settable pahse angle
- Front panel USB port for data and waveform import and export
- Provide rich trigger configuration, synchronously capture the voltage waveform of DUT, collect and simulate data
- Relay CTRL function, to cut off the connection between power supply and DUT
- 6-phase, 12-phase power output
- Built-in USB/CAN/LXI compliant LAN interface/Digital IO, optional GPIB /Analog&RS232
- Support CANopen*4, Modbus,LXI,SCPI

*1 <6kVA models only support single-phase function
*2 Voltage and current harmonic analysis, Voltage harmonic simulation
*3 Not available for multi-channel function
*4 coming soon
*5 Check IT7900 high voltage models

Applications

Solar and Energy Storage

Grid-connected inverter,electronic power regulating system, PCS, home energy storage devices

Electric Vehicles

OBC,AC charging pile, EV power supply equipment, BOBC(V2X)

Research Institute and Universities

AC-DC power adapter, EMC test

Power Electronics

Transformer, AC fan,UPS, AC motor

Electric Transportation

PV Energy Storage

Model	Voltage range	Current range	Power	Phase	Height	Front panel
IT7902-350-10U-ATE New!	350Vac L-N	10Arms	2kVA	1Φ	1U	–
IT7902-350-10U New!	350Vac L-N	10Arms	2kVA	1Φ	2U	Touch screen
IT7904-350-20U-ATE New!	350Vac L-N	20Arms	4kVA	1&2Φ	1U	–
IT7904-350-20U New!	350Vac L-N	20Arms	4kVA	1&2Φ	2U	Touch screen
IT7905-350-30U	350Vac L-N	30Arms	5kVA	1Φ	3U	Touch screen
IT7906-350-30-ATE New!	350Vac L-N	30Arms	6kVA	1, 2 & 3 Φ	1U	–
IT7906-350-30 New!	350Vac L-N	30Arms	6kVA	1, 2 & 3 Φ	2U	Touch screen
IT7906-350-90	350Vac L-N	90Arms	6kVA	1, 2 & 3 Φ	3U	Touch screen
IT7909-350-90	350Vac L-N	90Arms	9kVA	1, 2 & 3 Φ	3U	Touch screen
IT7912-350-90	350Vac L-N	90Arms	12kVA	1, 2 & 3 Φ	3U	Touch screen
IT7915-350-90	350Vac L-N	90Arms	15kVA	1, 2 & 3 Φ	3U	Touch screen
IT7930-350-180	350Vac L-N	180Arms	30kVA	1, 2 & 3 Φ	6U	Touch screen
IT7945-350-270	350Vac L-N	270Arms	45kVA	1, 2 & 3 Φ	15U	Touch screen
IT7960-350-360	350Vac L-N	360Arms	60kVA	1, 2 & 3 Φ	27U	Touch screen
IT7975-350-450	350Vac L-N	450Arms	75kVA	1, 2 & 3 Φ	27U	Touch screen
IT7990-350-540	350Vac L-N	540Arms	90kVA	1, 2 & 3 Φ	27U	Touch screen
IT79105-350-630	350Vac L-N	630Arms	105kVA	1, 2 & 3 Φ	27U	Touch screen
IT79120-350-720	350Vac L-N	720Arms	120kVA	1, 2 & 3 Φ	37U	Touch screen
IT79135-350-810	350Vac L-N	810Arms	135kVA	1, 2 & 3 Φ	37U	Touch screen
IT79150-350-900	350Vac L-N	900Arms	150kVA	1, 2 & 3 Φ	37U	Touch screen
IT79165-350-990	350Vac L-N	990Arms	165kVA	1, 2 & 3 Φ	37U	Touch screen

* Reverse phase and phase-locking functions help to meet higher voltage testing requirements
* For higher power, please call for availability

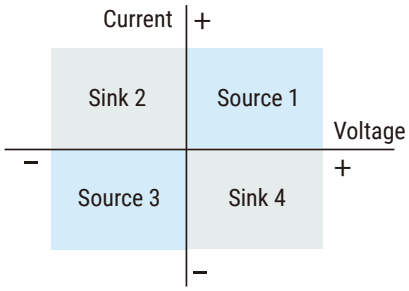
Your Power Testing Solution

IT7900 Regenerative Grid Simulator

Outstanding Features

Regenerative 4-Quadrant AC Grid Simulator

The IT7900 series are four-quadrant grid simulators with 100% of power sinking and 88% energy recovery capability. The power generated by the DUT can be fed back to the grid, rather than being dissipated as heat, which protects the environment and save the cost of electricity, HVAC and cooling infrastructure.



Production facility

24hours/day x 7 working days x 52 weeks

Power (kW)	Electricity saved (appr.USD/year)	CO2 emission reduced (appr.ton/year)
15	17,428	124
90	104,570	745
165	191,712	1,365
960	1,115,412	7,943

* The data is based on :

1. approximate electricity price 0.14USD/kWh for industry facility

R&D lab

8hours/day x 5 working days x 52 weeks

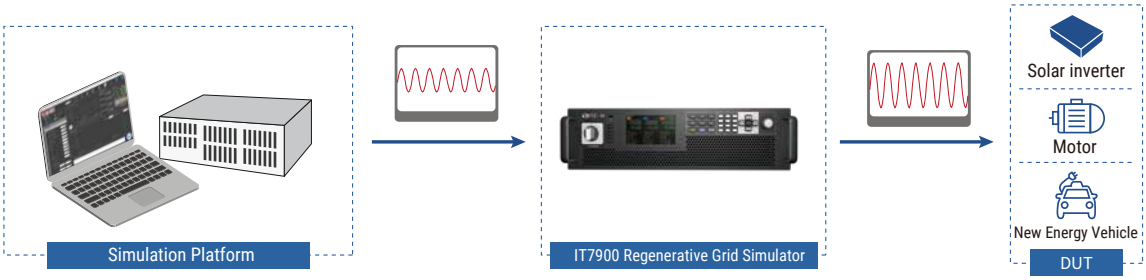
Power (kW)	Electricity saved (appr.USD/year)	CO2 emission reduced (appr.ton/year)
15	4,368	30
90	26,208	177
165	48,048	325
960	279,552	1,891

2. 1kWh power consumption ≈ 0.997 CO2 emission

* The extra cost of air conditioning is not included.

Full 4-Quadrant Power Amplifier

The IT7900 series regenerative grid simulator can be used as a power amplifier to complete power hardware in the loop (PHIL) applications for microgrids, energy storage and new energy vehicles. The digital I/O or a standard suite of analog signal can be input via an external analog interface (optional) and then amplified without distortion to a real power waveshape with an external analog response time of less than 200us.



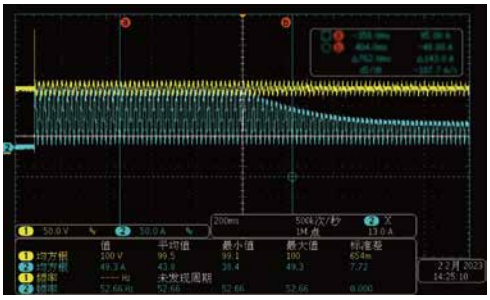
Professional Anti-islanding Test Mode

Anti-islanding protection is one of the must-test items for grid-connected inverters. IT7900 series has built-in anti-islanding protection test function, which allows testers to set the active power of resistor R, the reactive power of inductor Q and capacitor C, and also set resistor R, inductor Q, and capacitor C to simulate the inter-network resonance and test the anti-island protection function of grid-connected inverter. IT7900 island test mode can simplify the test process, improve test efficiency, and complete the test of the anti-islanding protection function in the process of grid-connected inverter research and development test, factory inspection, etc.

Outstanding Features

Current source mode

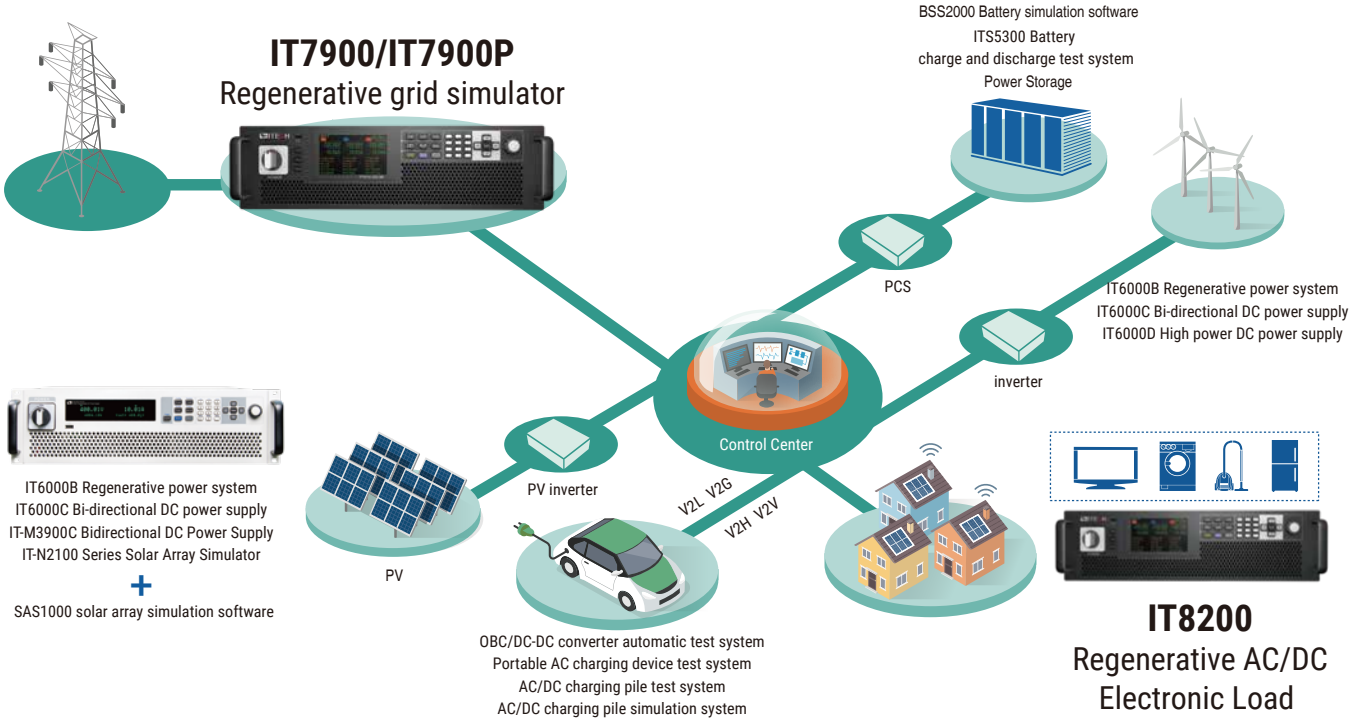
The IT7900P series has a current source mode. It can operate in various modes such as single-phase, reverse phase, AC and AC+DC. Its maximum voltage can reach 700V, which can meet various high voltage and high current applications. Meanwhile, the Normal and LIST functions can cope with various types of conventional and dynamic testing requirements. The rich waveform editing and customization functions can also help you simulate complex current waveforms. Current source mode can provide stable current output so that you can simulate various loads, such as laser drivers, LEDs, motors, etc. It can quickly do frequency sweep, charge/discharge, AC impedance and other related tests on various types of batteries. While improving test efficiency and accuracy, the IT7900P also optimizes the system design while ensuring safety.



AC+DC，AC20A+ DC30A，50Hz；limit current 10A，enter current loop

Application: Microgrid Testing

Microgrids can be seen as small power systems, but they are also a typical distributed generation system, so both equipment manufacturers and professional grid research laboratories need to establish simulation testing requirements. The IT7900 series not only meets the testing requirements of phase angle jump, low voltage ride-through, frequency variation and harmonic injection, but also feeds power back to the AC grid, meeting the microgrid testing requirements.



Your Power Testing Solution

IT7900 Regenerative Grid Simulator

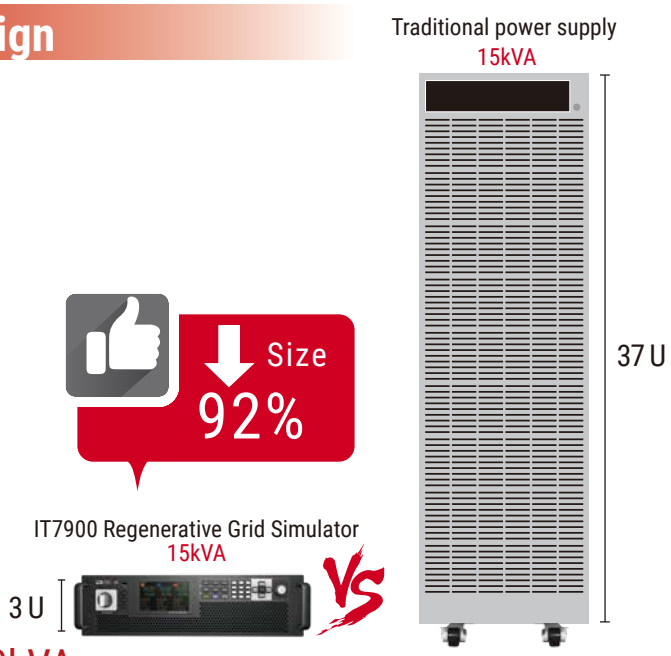
High-power density, modular design

High power density

The IT7900 series provides different compact structures from 1U/2U/3U stand-alone to 15U/27U/37U cabinets, which can meet testing needs from 2k to 165kVA. The 3U/15kVA model is only 1/12 the size of ordinary AC power supplies on the market, which greatly saves testing space. There is no need to deploy more cabinets or expand the laboratory, saving testing costs for you.

*Rack-mounting kit IT-E155A is standard equipped for 1U ATE models

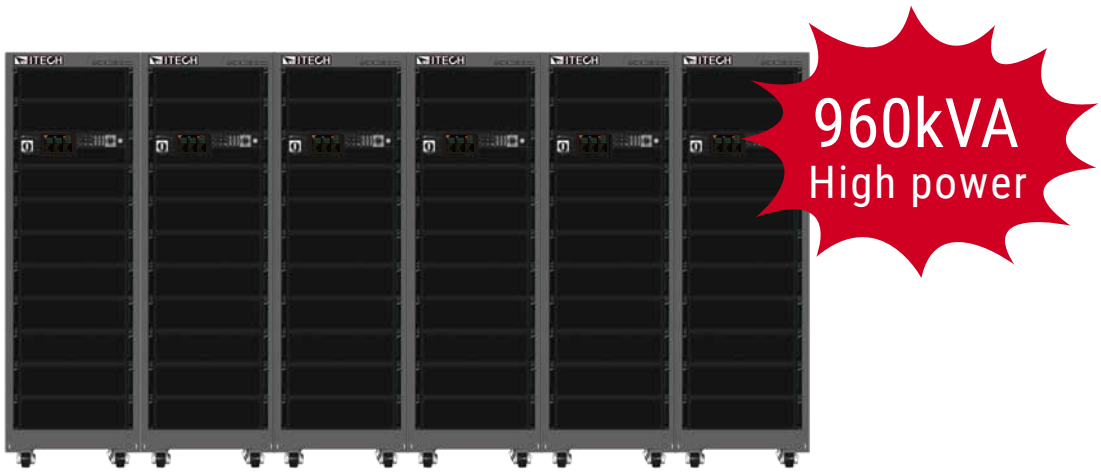
3U 15kVA	1U/2U 6kVA	ATE set up	bench test



Master/Slave parallel, power up to 960kVA

IT7900 series can be master-slave paralleled to to reach 960kVA output at most, flexible and convenient.
IT7900 comes with synchronous On/Off input and output signals, which ensure the synchronization of paralleling and ensures synchronous current sharing of multiple modules. After paralleling, all functions are retained and there's no loss of accuracy, making the construction of the power system faster, more flexible, and more economical, either it is a stand-alone test or ATE system.

* 350V 3U models with the same power can be connected in parallel with each other, and 350V 1U/2U models with the same power can be connected in parallel with each other



Application: UPS testing

·Testing purpose: the input and output testing of UPS, the AC input disturbance testing of UPS and etc.
·Application advantage: UPS modules are normally 10kVA~50kVA, by cascade connection, the UPS system can be MW, and they are used in power system, data center and etc. IT7900 series are very suitable for testing the DUT whose power will be expanded at any time without adding additional testing cost. IT7900 single module unit can test UPS module, when UPS capacity gets higher, IT7900 can still test it after paralleling.

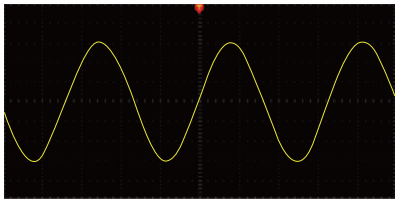
Easy-to-operate interface, abundant operation modes

Easy-to-operate interface, abundant operation modes

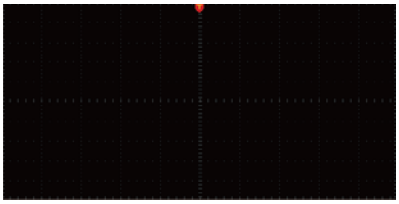
IT7900 series is equipped with innovative touch screen, simple and intuitive UI interface, and the keyboard knob design allows users to directly and quickly perform operations such as mode setting and waveform editing. The built-in digital oscilloscope function collects time-domain signals of voltage and current, phase relationship and performs waveform trigger functions. The oscilloscope sampling rate is up to 10us, and up to 6 oscilloscope curves can be displayed at the same time. Users can perform instantaneous analysis without an oscilloscope and save them in time.

AC,DC,AC+DC,DC+AC working mode

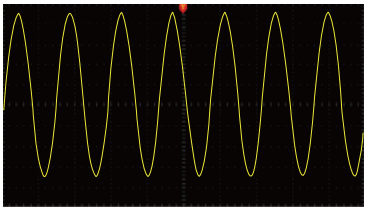
IT7900 series can be used as a "full four-quadrant AC/DC power supply" and provides four output modes: AC, DC, AC+DC, and DC+AC. Not only provide pure AC/DC output, use AC+DC and DC+AC output modes to realize "AC output superimposed DC bias" and simulate "DC output waveform with ripple" to meet the complex application requirements of engineers. In DC mode, the rated power in 100% AC mode can be achieved.



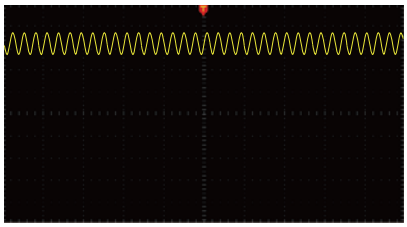
AC



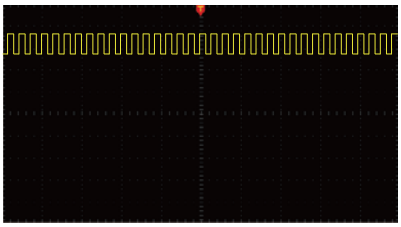
DC



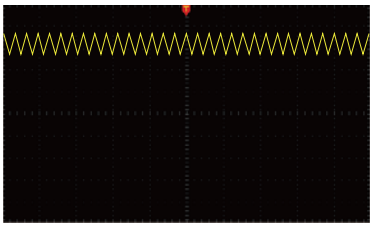
AC+DC
Vac=45V , dc bias=10V



DC+AC
Vdc=50V, sine ripple Vac=5V,frequency 150Hz



DC+AC
Vdc=50V, square ripple Vac=5V,frequency 150Hz



DC+AC
Vdc=50V, triangle ripple Vac=5V,frequency 150Hz

Single-phase, three-phase, reverse phase, multi-channel operation modes

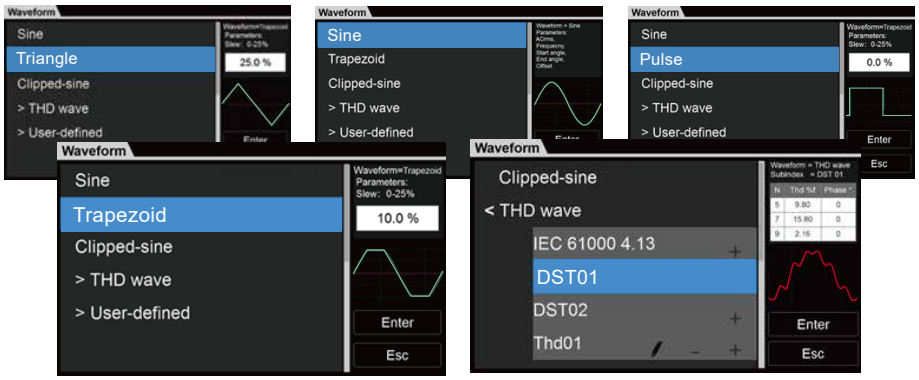
IT7900 series has very flexible operation mode that single-phase, three-phase/ reverse phase /multi-channel output mode can be selected. Combined with the powerful programming function, it can simulate three-phase unbalance , phase loss and phase sequence reverse connection and so on. In the reverse phase mode, users can obtain a single-phase output voltage of up to 700V, and the power remains at 2/3 of the original. Multi-channel mode allows users to test 1-3 independent DUT at the same time. One device for multiple purposes, better equipment utilization, and reduces test costs for enterprises.

IT7900 Operation Mode		
CH1 (1-Phase)	CH2 (1-Phase)	CH3 (1-Phase)
1-Phase		
Reverse Phase		
3-Phase		

Power Line Disturbance (PLD) test

Built-in various type of distorted waveforms

In addition to sine waveform, IT7900 series provides various standard AC waveforms, such as triangular wave, sawtooth wave, square wave, trapezoidal wave and clipped sine wave. These waves can be easily recall from the menu and displayed in the LCD touch screen. Moreover, in combination with sequence programming function, users can realize multiple waveform continuous output, to cope with complex power line disturbance test.

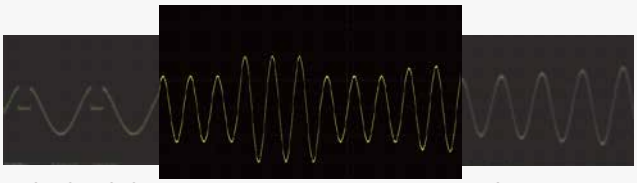


LIST/SWEEP/Surge & Sag modes

The IT7900 series supports LIST/SWEEP/Surge&Sag modes, and through easy parameter configuration can quickly complete a variety of grid disturbance waveform simulation, such as instantaneous power down, surge and voltage slow rise and slow fall, etc. In LIST mode, a single file supports up to 200 worksteps, and each workstep can select the waveform type, set the voltage, frequency, slope and start/stop phase angle parameters.During runtime, users can load a new LIST file online without stopping the current file or even interrupting the output. And when the output voltage or frequency jumps, the trigger signal can be generated to synchronize external devices, especially suitable for large test platforms with strict logic control and fast response time for inter-device linkage.

Application: Simulate Grid characteristics

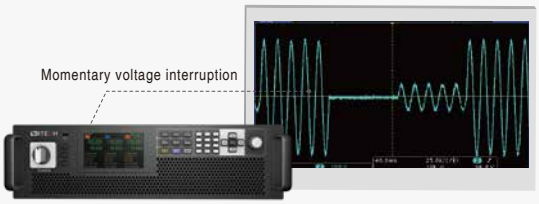
Users can edit and simulate various power disturbance conditions through the IT7900 front panel or programmable software.



SURGE & SAG LIST SWEEP

Application: Instantaneous power interruption simulation function

The IT7900 series can also effectively simulate various power interruption scenarios.



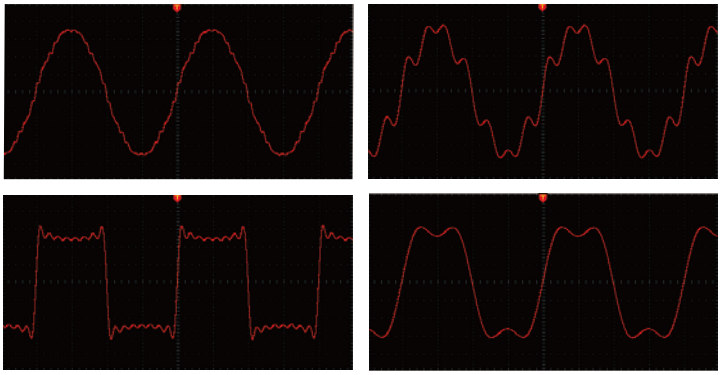
Application: LVRT test

LVRT is the ability of a power generation system, when a grid fault or disturbance causes a voltage dip within a certain voltage dip, it should continue to operate without disconnecting from the grid and even to provide some reactive power to the system to help restore voltage. The IT7900 series allows users to edit low voltage ride-through test conditions using LIST mode, with fast response time to fully meet LVRT testing requirements.

Powerful waveform editing function for grid-connected regulations and

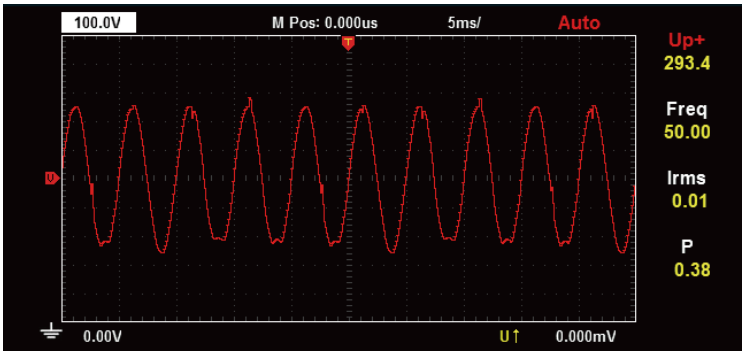
Harmonic and inter-harmonic simulation

With high-speed DSP technology, IT7900 series is capable of simulating harmonic, inter-harmonic and harmonic synthesis. By setting the amplitude and phase, it can simulate up to 50th harmonics(fundamental frequency is 50Hz or 60Hz), creating a periodic distortion waveform. It also has built-in 30 types harmonic distortion waveforms for quick recall. Harmonic test is one of the important tests for EMC immunity, and single-phase harmonics, three-phase harmonics and three-phase harmonic unbalance output can be realized, also meet IEC regulations test requirements.



User-defined waveform function

IT7900 series provides user-defined waveform editing function that allows users to simulate the effects of real AC or DC power supply systems on DUT's in different test environments by importing real waveform data into the device, it supports up to 1024 points of data import.



DUT: AC-DC power conversion module

·Reference test standard: IEC61000-4-13
·Testing advantages: For power electronic equipment, the design stage requires the developers to consider the impact of each harmonic in the grid on the power-using equipment. IT7900 series meets the IEC61000-4-13 standard for harmonic and inter-harmonic disturbance simulation requirements, the user can set the number of harmonics, harmonic phase angle, harmonic percentage through the configuration interface, it's easy to operate.

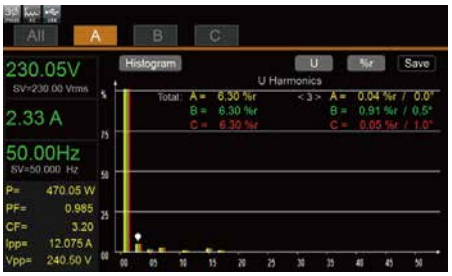
Measurement and waveform collection

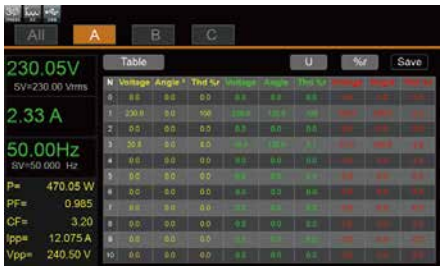
Built-in power meter - current accuracy up to 0.1% + 0.2% FS

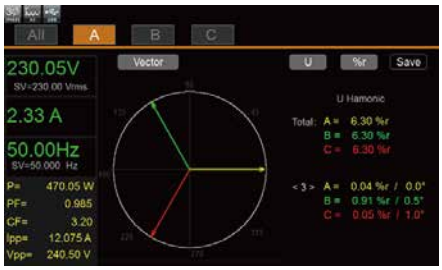
The IT7900 series integrates a data acquisition system which is based on a advance digital signal processor. It provides the measurement and waveform analysis capabilities of oscilloscopes, power meters and digital multimeters commonly found in test systems. The current measurement accuracy is up to 0.1%+0.2%FS and voltage measurement accuracy is up to 0.1%+0.1%FS. The parameters that can be measured include voltage RMS, current RMS, frequency, active power and power factor, etc. Up to 6 waveform curves can be displayed simultaneously, saving cost and simplify the operation.

Harmonic analysis and simulation

The harmonic analysis function of IT7900 series includes voltage harmonic measurement and current harmonic measurement. In the harmonic mode, the voltage and current harmonic distortion factor (THD) and the phase difference of the harmonic to the fundamental wave can be tested. In addition, it can measure multiple harmonics, and the results are displayed in tables, bar graphs or vector charts, making it easy to analyze test results at a glance.





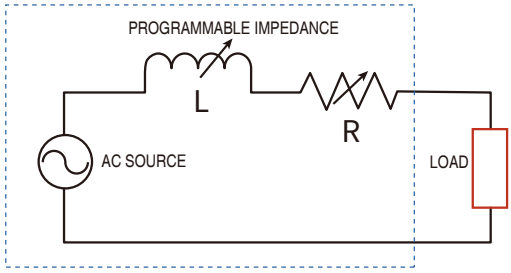


Data record

Thanks to the function of large data recording, IT7900 series is capable of recording up to 7 hours of continuous data at short intervals (fastest: 100ms). And it's easy to view the complete curve generating from the start to the end of the test. There are six curves that can be displayed at the same time at most. In addition, you can slide the vernier calipers on the screen to check the exact data at a particular point in the current trend curves. It is useful for analyzing errors during test for a long time or inflection points during loading, etc. Besides, you can export the test data for further analysis by front panel USB interface.

Programmable output impedance

The function of programmable output impedance allows you to edit the output R and L so as to simulate the impedance of the AC grid in accordance .



IT7915-350-90			
Input Parameters			
AC input	Wiring connection	3 phase 3wire + ground(PE)	
	Line voltage	RMS	(200～220V) ±10% *1/ (380～480V) ±10%
	Line current	RMS	< 34A
	Power factor	typ	0.98
Output Parameters			
AC output	Output voltage	VLN	0～350V
		VLL	0～606V（3phase）/0～700V（reverse）
	Output current	RMS	90A(1phase) / 30A(3phase/multichannel/reverse)
		Peak	270A(1phase) / 90A(3phase/multichannel/reverse)
		Crest Factor*2	6
	Output power	Per Phase	5kVA
		Max. Power	10kVA（reverse phase)/15kVA（1phase/3phase/multichannel ）
	Voltage setting		
	Range	0～350V(1phase/3phase/multichannel)/0～700V(reverse)	
	Resolution	0.01V	
	Accurancy	16Hz～150Hz	0.1%+0.1% F.S
	Current setting		
	Range	RMS	90A(1phase)/30A(3phase/multichannel/reverse)
	Resolution	0.01A	
	Accurancy	16Hz～150Hz	0.1%+0.2% F.S
	Frequency		
	Range setting	16～150Hz	
	Resolution setting	0.01Hz	
	Accurancy setting	0.01%	
	Waveform Synthesis	50/60Hz	up to 50th-order
	Phase		
	Range setting	0～360°	
	Resolution setting	0.01°	
DC output	Voltage setting		
	Range	-499～499Vdc(1phase/multichannel)/-998～998Vdc(reverse)	
	Resolution	0.01V	
	Accurancy	＜0.1%+0.1% F.S	
	Current setting		
	Range	-30～30Adc(multichannel/reverse)/-90～90Adc(1phase)	
	Resolution	0.01A	
	Accurancy	< 0.1%+0.2% F.S.	
	Max. Power		
	Phase power	Per Phase	5kW
	Output power	Max. Power	10kW(reverse phase)/15kW(1phase/multichannel)
Anti-islanding (R,L,C)	P Range	0～5kW(3phase/multichannel) / 0～15kW(1phase) / 0～10kW(reverse)	
	QL Range	0～5kVar(3phase/multichannel) / 0～15kVar(1phase) / 0～10kVar(reverse)	
	QC Range	0～5kVar(3phase/multichannel) / 0～15kVar(1phase) / 0～10kVar(reverse)	
	R Range	1～1000Ω(3phase/multichannel) / 0.333～333.333Ω(1phase) / 2～2000Ω(reverse)	
	L Range	1～5000mH(3phase/multichannel) / 0.333～1666.667mH(1phase) / 2～10000mH(reverse)	
	C Range	0.001～5mF(3phase/multichannel) / 0.003～15mF(1phase) / 0.001～2.5mF(reverse)	
Voltage Slew Rate, Typical		≥2 V/μs with full-scale programmed voltage step	
Output Isolation		550Vac	
Regenerative			
Max. Regenerative power		15kVA	
THD（current）		< 5%	

*1 (200～220) ±10%, the power of 12kw and above is 60% of the rated

*2 Under the output frequency of 50Hz/60Hz, the maximum CF is 6 without exceeding the peak current; under the condition of full current and full power, the maximum CF is 3

* This information is subject to change without notice

settable impedance	R Range	0～1Ω(3phase/multichannel) / 0～0.333Ω(1phase) / 0～2Ω(reverse)	
	L Range	0～1000uH(3phase/multichannel) / 0～333.333uH(1phase) / 0～2000uH(reverse)	
Voltage Stability	Line regulation*3	＜0.05% F.S.	
	Load regulation	DC,16Hz～150Hz	＜0.05% + 0.05% F.S.
	THD*4	16Hz～150Hz	＜0.5%
	Voltage ripple	RMS	< 0.4V
	Dynamic response*5	typ	200us
Measurement parameters			
Voltage RMS		0.01V（resolution）/＜0.1%+0.1% F.S.(Accuracy DC,16～150Hz)	
Current RMS		0.01A（resolution）/＜0.1%+0.2% F.S.(Accuracy DC,16～150Hz)	
Peak current		0.01A（resolution）/＜0.4%+0.6% F.S.(Accuracy 16～150Hz)	
Output power		0.001kW（resolution）/＜0.4%+0.4% F.S.(Accuracy DC,16～150Hz)	
Harmonic measurement	Max.harmonic analysis	50/60Hz	up to 50th-order
Others			
Efficiency	typ *6	91%	
Protection		OVP, OCP, OPP, OTP, FAN, ECP, Sense	
Working temperature		0℃-50℃	
Programming response time		2ms	

*3 For models of 30kW and above, it needs the sense remote measurement mode for testing
*4 Test condition: pure resistive load, under full power condition
*5 Test under DC mode, high speed level, DUT capacity is less than 10uf
*6 Test conditions: input 380VLL/50Hz, output three phases, each phase 350Vrms/50Hz/5kW
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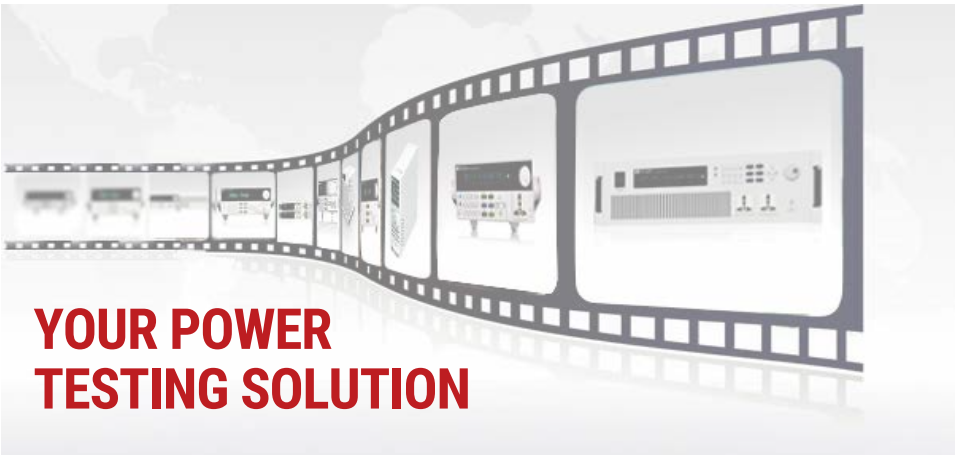

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