ITECH
YOUR POWER TESTING SOLUTION

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Product

IT7900E Regenerative Grid Simulator

IT7900E Regenerative Grid Simulator

Application fields

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

Your Power Testing Solution

Regenerative capability

960kVA

3U/15kVA

Touchscreen

IT7900E Regenerative Grid Simulator

The IT7900E 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 IT7900E can realize the anti-islanding protection test through islanding mode(RLC settable). Besides, the power density of IT7900E 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/minimum rack space, 3U up to 21kVA
- 16Hz~150Hz
- Regenerative grid simulator & full 4-Quadrant AC&DC power sources
- Power Amplifier function for PHiL applications
- 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, reverse phase（split phase）
- 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

Features

- Wide voltage ranges: 350/700/1050 VL-N*2
- Master-slave parallel with current sharing technology, up to 1MVA+
- 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, self-defined waves
- Harmonics and Interharmonics waveform synthesizer
- Power line disturbance simulation testing by LIST programming/SWEEP/Surge&Sag functions
- Up to 50th harmonic simulation and analysis function is included, along with built-in IEC61000-3-2/3-12 and other test regulations *1
- Harmonic simulation and analysis function can measure 50th order, built-in IEC61000-3-2/3-12 and other test regulations
- Output 0-360 ° start/stop phase angle can be set
- Front panel USB port for data and waveform import and export
- Relay CTRL function, to cut off the connection between instrument and DUT
- Built-in USB/CAN/LXI compliant LAN interface/Digital IO interface, optional GPIB /Analog&RS232
- Support CANopen、Modbus、LXI、SCPI communication

*1. Voltage/current harmonic analysis
*2. Pls. refer to IT7900E high voltage version

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)

Energy Storage

PCS energy storage converter, home PV energy storage device

Research Institute and Universities

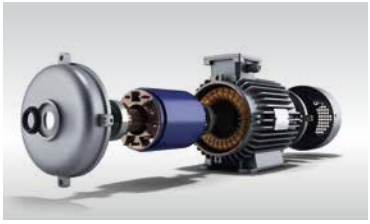
AC-DC power adapter, EMC test

Power Electronics

Transformer, AC fan,UPS, AC motor

Electric Transportation

PV Energy Storage



Model	Input Vac		Input Amps/Phs		Input Pac	Phase	Height
	V L-N	V L-L	Arms(1Φ)	Arms(3Φ)			
IT7921E-350-105	350V	606V	105A	35A	21kVA	1, 2 & 3 Φ	3U
IT7942E-350-210	350V	606V	210A	70A	42kVA	1, 2 & 3 Φ	6U
IT7963E-350-315	350V	606V	315A	105A	63kVA	1, 2 & 3 Φ	15U
IT7984E-350-420	350V	606V	420A	140A	84kVA	1, 2 & 3 Φ	27U
IT79105E-350-525	350V	606V	525A	175A	105kVA	1, 2 & 3 Φ	27U
IT79126E-350-630	350V	606V	630A	210A	126kVA	1, 2 & 3 Φ	27U
IT79147E-350-735	350V	606V	735A	245A	147kVA	1, 2 & 3 Φ	37U
IT79168E-350-840	350V	606V	840A	280A	168kVA	1, 2 & 3 Φ	37U
IT79189E-350-945	350V	606V	945A	315A	189kVA	1, 2 & 3 Φ	37U
IT79210E-350-1050	350V	606V	1050A	350A	210kVA	1, 2 & 3 Φ	37U
IT79231E-350-1155	350V	606V	1155A	385A	231kVA	1, 2 & 3 Φ	37U

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

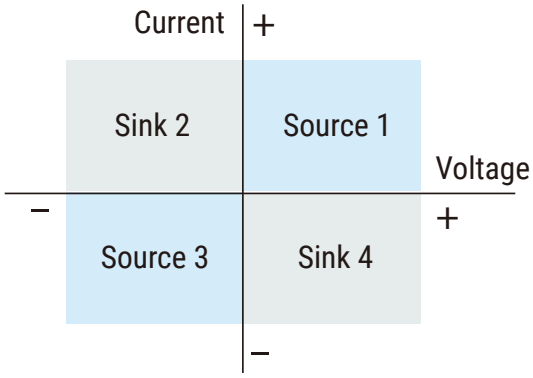
Your Power Testing Solution

IT7900E Regenerative Grid Simulator

Outstanding Features

Regenerative 4-Quadrant AC Grid Simulator

The IT7900E 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 (kWH)	CO2 emission reduced (appr.ton/year)
21	24,399	174
84	97,597	696
126	146,394	1,044
1050	1,219,950	8,700

R&D lab

8hours/day x 5 working days x 52 weeks

Power (kW)	Electricity saved (kWH)	CO2 emission reduced (appr.ton/year)
21	6,115	42
84	24,460	168
126	36,690	252
1050	305,750	2,100

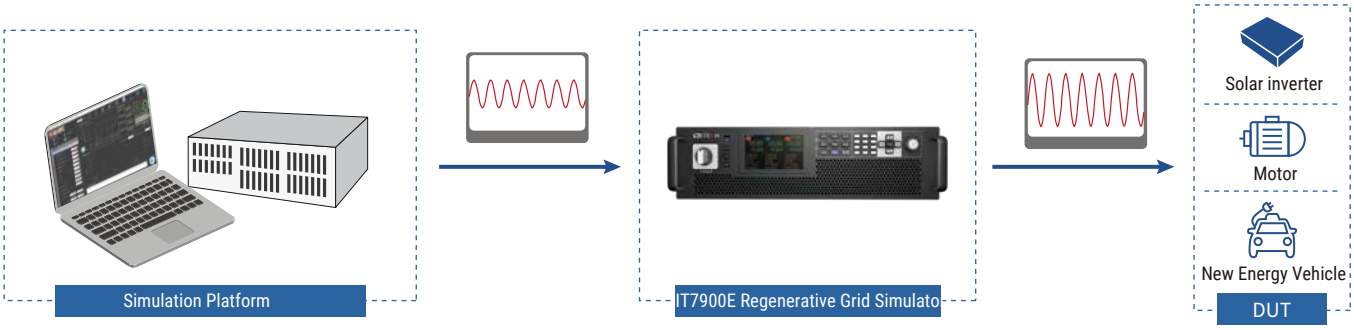
* The data is based on :

1. approximate electricity price 0.14USD/kWh for industry facility
2. 1kWh power consumption ≈ 0.997 CO2 emission

* The extra cost of air conditioning is not included.

Full 4-Quadrant Power Amplifier

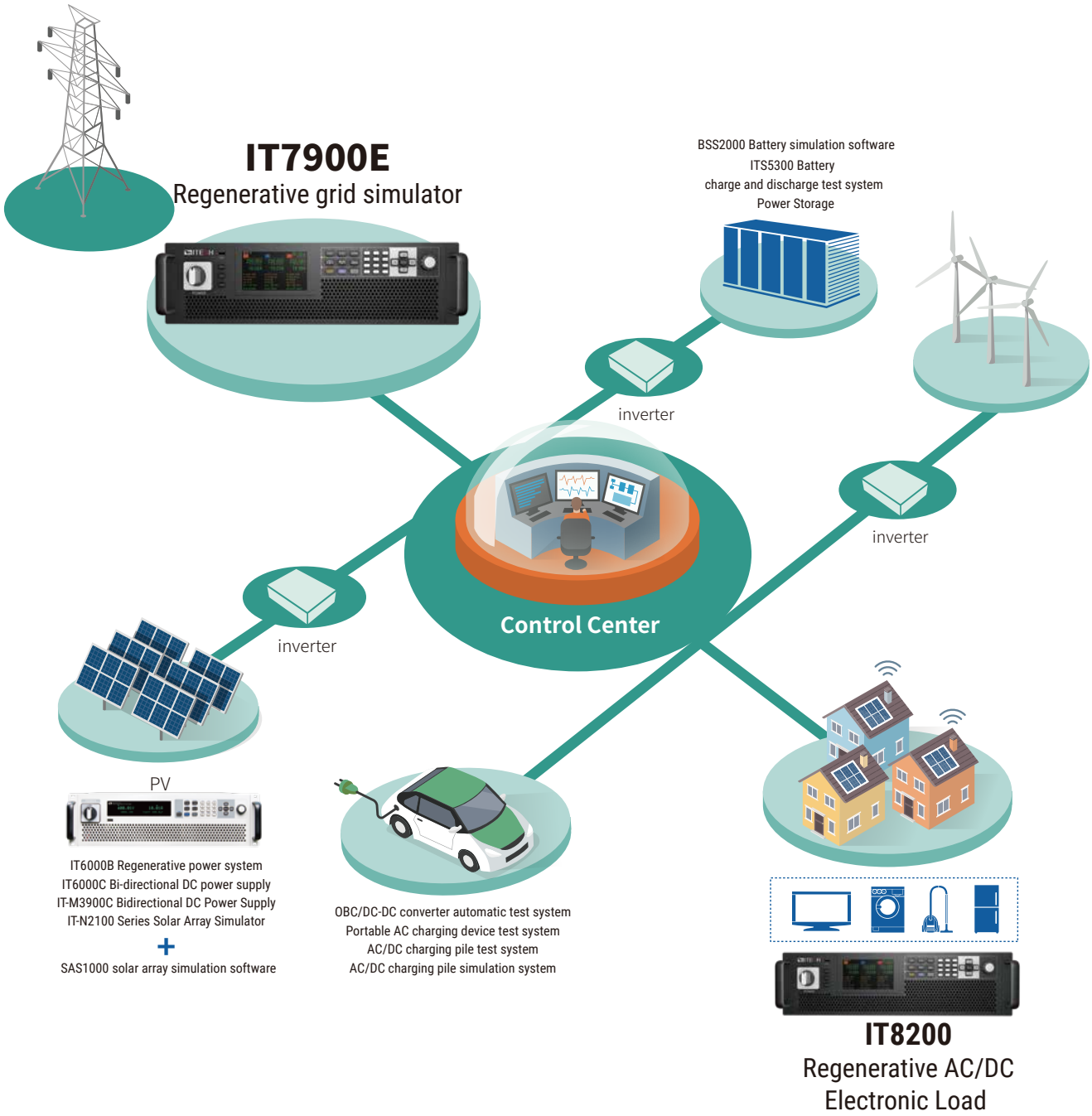
The IT7900E series regenerative grid simulator can be used as a power amplifier to complete power hardware in the loop (PHIL) applications for microgrids, energy storage and new energy vehicles. The digital I/O or a standard suite of analog signal can be input via an external analog interface (optional) and then amplified without distortion to a real power waveshape with an external analog response time of less than 100us.



Outstanding Features

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 IT7900E 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

IT7900E Regenerative Grid Simulator

High-power density, modular design

21kVA/3U High power density

With PWM switching technology, the power density is up to 21kVA in a compact 3U size. The voltage is 350VL-N and the frequency range is 16Hz~150Hz. The size is only 1/12 of a conventional type of AC power supply, and the power could be expanded higher, saving a lot in space and cost.

3U 15kVA

1U/2U 6kVA

ATE set up

bench test

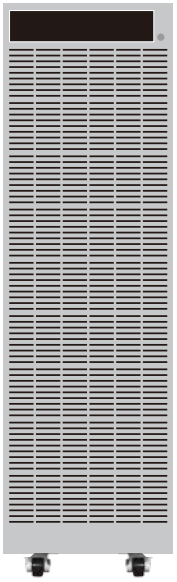
Size 92%

IT7900E Regenerative Grid Simulator
15kVA

3 U

VS

Traditional power supply
15kVA



37 U

Master/Slave parallel, power up to 960kVA

IT7900E series can be master-slave paralleled to to reach 91MVA+ output at most, flexible and convenient.IT7900E 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

960kVA
High power

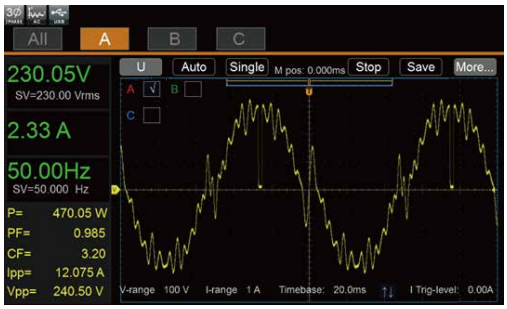
Application: UPS testing

·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. IT7900E series are very suitable for testing the DUT whose power will be expanded at any time without adding additional testing cost. IT7900E single module unit can test UPS module, when UPS capacity gets higher, IT7900E can still test it after paralleling.

Easy-to-operate interface, abundant operation modes

Easy-to-operate interface, abundant operation modes

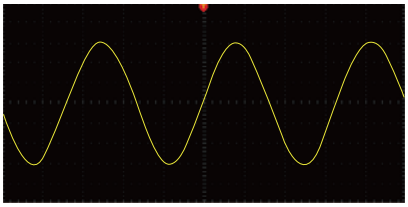
IT7900E series is equipped with innovative touch screen, simple and intuitive UI interface, and the keyboard knob design allows users to directly and quickly perform operations such as mode setting and waveform editing. The built-in digital oscilloscope function collects time-domain signals of voltage 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.



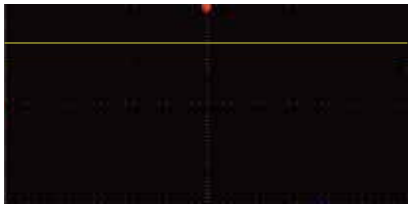
* 图片功能即将推出

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

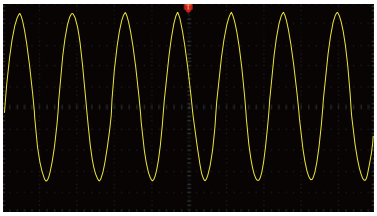
IT7900E series can be used as a "full four-quadrant AC/DC power supply" and provides four output modes: AC, DC, AC+DC, and DC+AC. Not only provide pure AC/DC output, use AC+DC and DC+AC output modes to realize "AC output superimposed DC bias" and simulate "DC output waveform with ripple" to meet the complex application requirements of engineers. In DC mode, the rated power in 100% AC mode can be achieved.



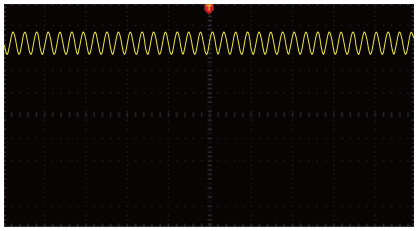
AC



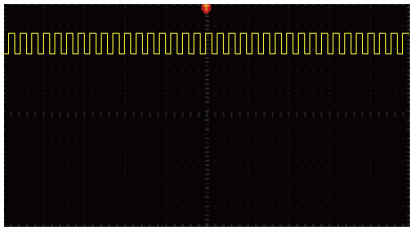
DC



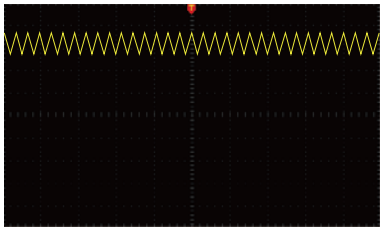
AC+DC
Vac=45V , dc bias=10V



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



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

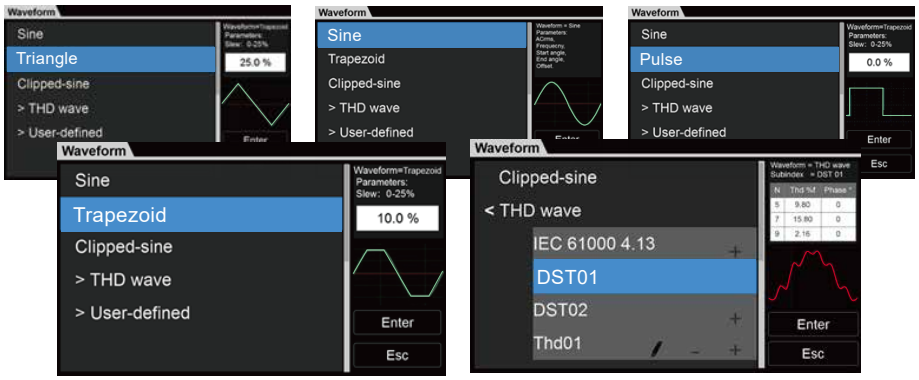


DC+AC
Vdc=50V, triangle ripple Vac=5V,frequency 150Hz

Power Line Disturbance (PLD) test

Built-in various type of distorted waveforms

In addition to sine waveform, IT7900E 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.

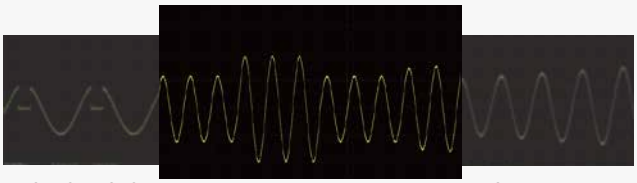


LIST/SWEEP/Surge & Sag modes

The IT7900E 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

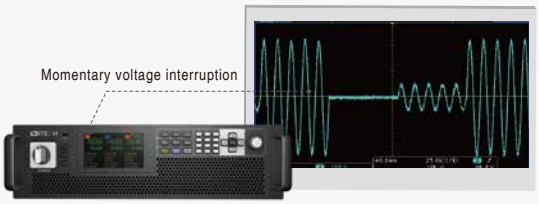
Users can edit and simulate various power disturbance conditions through the IT7900E front panel or programmable software.



SURGE & SAG LIST SWEEP

Application: Instantaneous power interruption simulation function

The IT7900E series can also effectively simulate various power interruption scenarios.



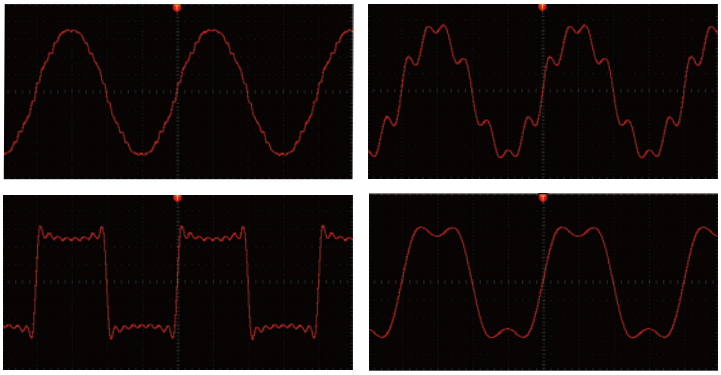
Application: LVRT test

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 IT7900E 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 power electronics disturbance testing

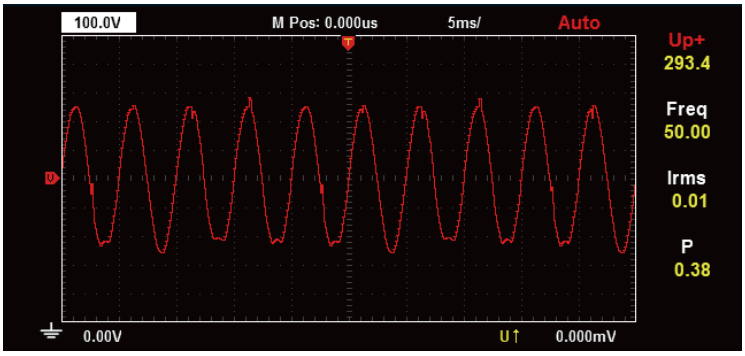
Harmonic and inter-harmonic simulation

With high-speed DSP technology, IT7900E 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

IT7900E 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. IT7900E 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.

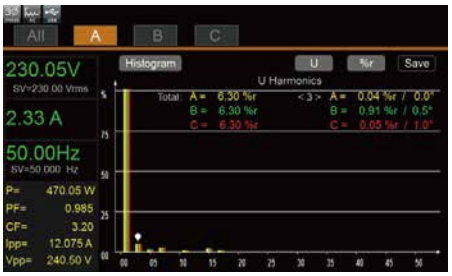
Measurement and waveform collection

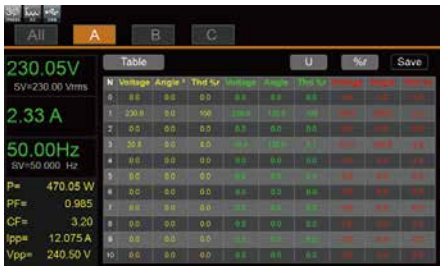
Built-in power meter - current accuracy up to 0.1% + 0.2% FS

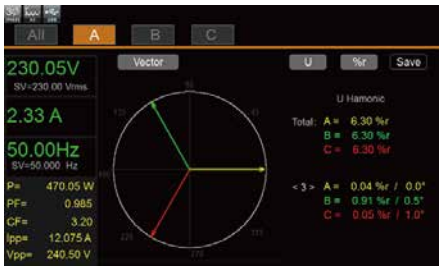
The IT7900E series integrates a data acquisition system which is based on a advance digital signal processor. It provides the measurement and waveform analysis capabilities of oscilloscopes, power meters and digital multimeters commonly found in test systems. The current measurement accuracy is up to 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 IT7900E 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.





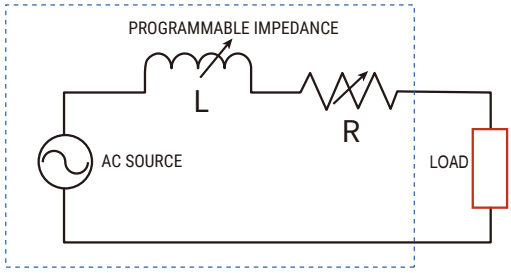


Data record

Thanks to the function of large data recording, IT7900E 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 .



IT7921E-350-105			
Input Parameters			
AC Input	Wiring connection	3 phase 3wire + ground(PE)	
	Line voltage	RMS	(200～220) ±10% *1 (380～480) ±10%
	Line current	RMS	< 47A
	Apparent power	< 24.4kVA	
	Frequency	45～65Hz	
	Power factor	typ	0.98
Input Parameters			
AC output	Output voltage	VLN	0～350V
		VLL	0～606V(3phase)/0～700V(reverse)
	Output current	RMS	105A(1phase) / 35A(3phase/reverse)
		Peak	315A(1phase) /105A(3phase/reverse)
		Crest Factor *2	6
	Output power	Per Phase	7kVA
		Max. Power	14kVA(reverse phase)/21kVA(1phase/3phase)
	Voltage setting		
	Range	0～350V(1phase/3phase)/0～700V(reverse)	
	Resolution	0.01V	
	Accuracy	16Hz～150Hz	0.1%+0.1% F.S
	Current setting		
	Range	RMS	105A(1phase)/35A(3phase/reverse)
	Resolution	0.01A	
	Accuracy	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 50 orders
	Phase		
	Range setting	0～360°	
	Resolution setting	0.01°	
DC output	Voltage setting		
	Range	-499～499Vdc(1phase)/-998～998Vdc(reverse)	
	Resolution	0.01V	
	Accuracy	＜0.1%+0.1% F.S	
	Current setting		
	Range	-35～35Adc(reverse)/-105～105Adc(1phase)	
	Resolution	0.01A	
	Accuracy	< 0.1%+0.2% F.S.	
	Max. Power		
	Phase power	Per Channel	7kW
	Output power	Max. Power	14kW(reverse phase)/21kW(1phase)
Anti-islanding (R,L,C)	P Range	0～7kW(3phase) / 0～21kW(1phase) / 0～14kW(reverse)	
	QL Range	0～7kVar(3phase) / 0～21kVar(1phase) / 0～14kVar(reverse)	
	QC Range	0～7kVar(3phase) / 0～21kVar(1phase) / 0～14kVar(reverse)	
	R Range	1～1000Ω(3phase) / 0.333～333.333Ω(1phase) / 2～2000Ω(reverse)	
	L Range	1～5000mH(3phase) / 0.333～1666.667mH(1phase) / 2～10000mH(reverse)	
	C Range	0.001～5mF(3phase) / 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		21kVA	
THD（current）		< 5%	

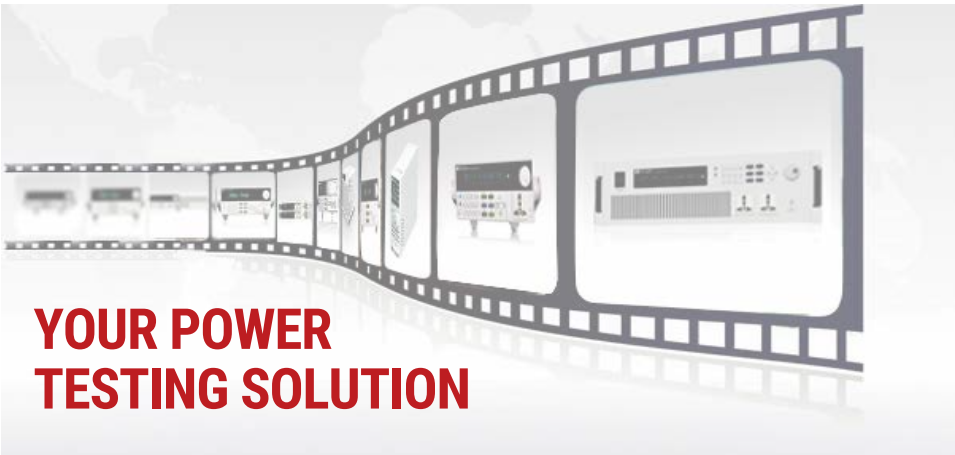
*1 (200～220) ±10%, the power of 12kw and above is 60% of the rated

*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	0～1000Ω(3phase) / 0～0.333Ω(1phase) / 0～2000Ω(reverse)	
	L Range	0～1000uH(3phase) / 0～333.333uH(1phase) / 0～2000uH(reverse)	
Voltage stability	Linear modulation rate	＜0.05% F.S.	
	Load regulation rate*3	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
Measured parameters			
Voltage RMS		0.01V（resolution）/＜0.1%+0.1% F.S.(Accuracy DC,16～150Hz)	
Current RMS		0.1A（resolution）/＜0.1%+0.2% F.S.(Accuracy DC,16～150Hz)	
Peak current		0.1A（resolution）/＜0.4%+0.6% F.S.(Accuracy 16Hz～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 50
Other			
Efficiency	typ	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
* This information is subject to change without notice



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