Datasheet
RS Pro GPT-9000 Series Electrical Safety Tester

RS Stock No: 917-6291, 917-6294, 917-6298, 917-6308, 917-6301, 917-6305, 917-6314

RS Part	Description
917-6291	GPT-9902A 500VA Tester
917-6294	GPT-9904 500VA Tester
917-6298	GPT-9802 200VA Tester
917-6308	GPT-9804 200VA Tester
917-6301	GHT113 Test Pistol
917-6305	GHT205 Test Lead
917-6314	GHT114 Test Lead Clip

Features:

- 500VA AC Test Capacity
- 240x64 Ice Blue Dot matrix LCD
- Sweep Function for DUT characteristic analysis
- Insulation resistance measurement up to 50GΩ (GPT-9903/9904)
- Manual/Auto Mode
- Function Key for quick selection
- High intensity flash for caution & Status indication
- Safety INTERLOCK function
- Zero Crossing Turn-on Operation
- Controllable Ramp-up Time
- True RMS Current Measurement
- High resolution: 1uA for measuring current, 2V for setting voltage
- PWM amplifier to enhance the power efficiency and reliable testing
- Max. 100 memory block for test condition (step) setting. And each step can be named individually.
- Remote terminal on the front panel for "start" and "stop" control
- Rear panel output available
- Interface : RS-232C, USB device, Signal I/O and GPIB (optional)

A Solid Foundation for Reliable, Safe and Practical Safety Compliance Testing

GWInstek is launching a new safety tester (hi-pot tester/hipot tester) family, the GPT-9900 series, with 500VA maximum output capacity to the market. The family of four, including GPT-9904, GPT-9903A, GPT-9902A and GPT-9901A, come joining the GPT-9800 series, which carries 200VA output capacity, to serve the market with higher power demands for the safety tests of electronic products and components. The GPT-9000 series supports the major test items among all the needed for the compliance of the safety standards such as IEC, EN, UL, CSA, GB, JIS and other safety regulations.

The GPT-9900 series is built upon a platform of AC 500VA maximum power output. The GPT-9904 is a 4-in-1 model capable of performing AC withstanding, DC withstanding, insulation resistance and ground bond tests, whereas the GPT-9903A is a 3-in-1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9902A is capable of performing both AC and DC withstanding tests whereas The GPT-9901A is able to only perform AC withstanding tests. The GPT-9900 series safety tester follows every good feature and advantage of the GPT-9800 series. The high-efficiency PWM amplifier is the core of GPT-9900 platform design to impede the influence from the voltage fluctuation of input AC source. The output voltage is automatically cut off (within 150μs) upon the detection of an abnormal output voltage or a trip of current limits during test to protect the operator from hazardous injury. The GPT-9900 series automatically discharges the DUT after each test to eliminate excessive voltage that remains on the DUT.

Following a tidy and easy-to-use design concept, the GPT-9900 series is equipped with a simple & clear panel layout, a high resolution dot matrix LCD display, and colour LED indicators, allowing operators to interpret measurement results easily and quickly. In the role as the complement of 200VA safety testers, the GPT-9900 series is designed upon a 500VA output platform to enhance all major test functions, including AC withstanding (AC 5kV/100mA), DC withstanding (DC 6kV/20mA), insulation resistance (DC 50V ~ 1000V/50GΩ max.) and ground bond (AC 32A max./650mΩ max.) tests, with high-power measurement capabilities. Further more, the test duration, ramp up time and upper/lower limits of the output voltage are fully-adjustable to accommodate a wide variety of safety tests with accurate measurement results. The "Sweep" function of the GPT-9900 series is able to display the test results point by point all through the testing period to form a trace graph. This graphic display performs the characteristic verification of a DUT through observing the parameter response to the changes of the applied voltage or current or testing time. On the graph a movable marker is available to get the parameter reading on the specific point of user's interest.

Other significant functions and features of the GPT-9900 series include the rear panel output for system applications, the open-circuit detection to ensure proper connections of apparatus for ground bond test, 100 sets of memory to save and recall the panel settings for individual or sequential tests, a remote output on-off terminal in the front panel and a signal I/O port in the rear panel provided as the means for remote start/stop control of the safety tester, and RS-232C, USB and GPIB (optional) interfaces available for PC remote control and test result logging.

A. UNIQUE SWEEP FUNCTION FOR DUT CHARACTERISTICS ANALYSIS
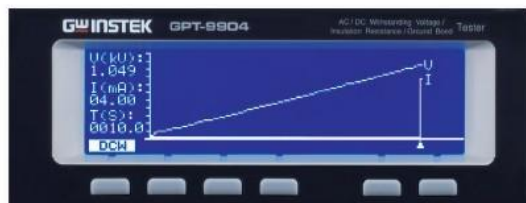
The GPT-9900 Series has a unique sweep function to show the trace graph of test results of the device under test. The test readings are recorded point by point according to the setting of the applied test voltage or current and the testing duration (ramp-up time + timer) to form a trace of parameter response. On this sweep graph, users can use a moveable cursor to locate the point of specific time or specific amount of applied source (voltage or current) within test period to know the measurement result of this point. It helps users to verify the changes of measured parameter (current or resistance) all thorough the test process, instead of just obtaining one final value at the end.

B. HIGH EFFICIENCY AND HIGH STABILITY OUTPUT
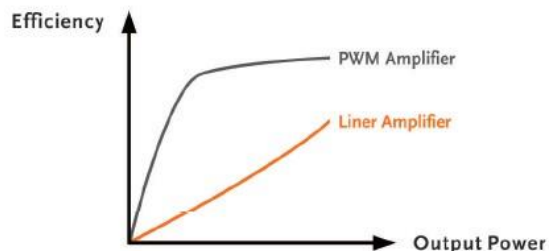
PWM Amplifier Efficiency

Unlike the conventional safety tester design that uses variable voltage transformer and class AB amplifier to provide testing voltage, the GPT-9900 Series, carrying a high-efficiency PWM amplifier design, generates output source up to 98% efficiency. This greatly reduces the amount of power loss to heat and therefore lowers the temperature within the cabinet of the GPT-9900 Series. The suppression of temperature rise during heavy-duty operations of the tester significantly increases its reliability and service lifetime. In addition, as PWM amplifier is comparatively more resistant to the fluctuations of input power voltage, a stable high-voltage output with less than 1% regulation is provided by the GPT-9900 Series to perform precision tests of the DUT.

## C. HIGH ACCURACY AND HIGH RESOLUTION TESTING PERFORMANCE

High Adjustment & Measurement Resolution

In order to provide high accuracy testing for production test, regulation compliance, and characteristic verification, the withstanding test voltage (AC 5kV/DC 6kV) of the GPT-9900 Series can be adjusted in 2V steps, while the current measurement can be done with 1 μA resolution and $\pm(1.5\% + 30\mu A)$ accuracy to enable small leakage current measurements of the products or the components. In addition, the test voltage of insulation resistance of the GPT-9900 Series can be adjusted in 50V steps within the DC output range from 50V to 1kV, carrying a measurement accuracy of $\pm(10\%$ of reading +1 count) at full scale (2000MΩ/9.999GΩ) and $\pm(15\%$ of reading +1 count) at full scale (50.00GΩ). This provides the flexibility for performing Insulation Resistance (IR) measurements under variable levels of applied voltage. As the majority of safety

regulations need an AC source for ground bond testing, the GPT-9900 Series provides 6Vac voltage (open circuit) and 3A~32Aac current for ground bond test. Furthermore, open circuit detection (via SOURCE H, SENSE H and SOURCE L terminals) for ground bond test is also provided to check whether the test apparatus is properly connected before the start of a test. This is to ensure the ground bond test is done accurately without any unnoticeable misconnection of the test leads and the test terminals.

With these capabilities, the user is able to perform various safety tests and verifications with high flexibility, accuracy and confidence.
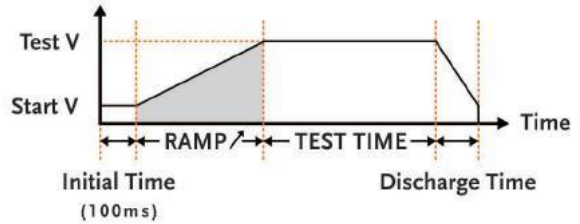
D. SAFETY GUARDING THROUGHOUT THE TESTING PERIOD
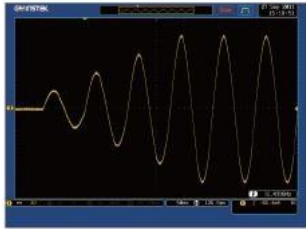
Zero-Crossing Operation

Output Voltage Variation in One Test Cycle

Once the GPT-9900 Series is turned on, the protection functions to protect operator and DUT are always in operation throughout the testing period. When the power is turned on, the GPT-9900 Series immediately goes through the self-check procedures to ensure that all test functions are performed under normal conditions, as the first protection function being applied.

The second protection function is activated once the "Start" (output) button is pressed. At the first moment of start up, the GPT-9900 will send a detection voltage (~100V) during the initialization period (100ms) to check whether the DUT has any short circuit due to poor insulation before the high voltage is applied. This is to prevent high voltage or current from returning to the DUT during the test time. To protect DUT from insulation breakdown caused by the rapid increase of test voltage

at power-on and avoid flashover or arcing phenomena that could affect the test results, the GPT-9900 Series has a Zero Crossing Turn-On feature, which ensures the output always starts from the zero crossing of a sine wave. Moreover, the adjustable voltage ramp-up time (0.1s ~ 999.9s) allows the test voltage to slowly rise to the set test voltage to reduce the risk of damaging DUT during mandatory production testing.

Furthermore, after the voltage has ramped to the set test voltage, the GPT-9900 will continue monitoring the voltage and cut off power output once any irregularity is detected. This provides both the safety tester and the operator with a high level protection, which allows the test to be done in a safe and accurate manner.

E. MULTIPLE PROTECTION MECHANISMS

Safety Interlock

Fast Cutoff in 150µs
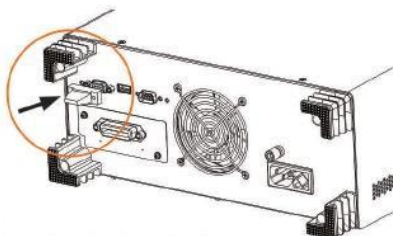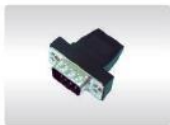
The GPT-9900 Series also offers multiple protection designs to ensure operator safety in operating the safety tester. The interlock function provides the hardware key protection for voltage output. When the interlock function is activated, the testing voltage will present at the output ONLY when the dedicated interlock key is attached to the Signal I/O port on the rear side. When the test is not intended to executed, removing the interlock key can inhibit the voltage output to prevent the hazard of high voltage output. Except connecting with the key, two inputs of the Signal I/O port can be connected alone to a senor switch
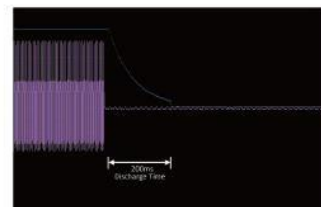
installed in safety test system. If there is any unexpected object is detected to intrude into the system, the output is disabled and thus prevents the operator from exposure to hazardous voltages/currents. In addition, the GPT-9900 Series can quickly cut off the high voltage output within 150µs when the test has completed, the high/low limits have been reached or the emergent stop caused by an abnormal situation. Lastly, when a test has stopped, the unit also automatically discharges the voltage across the DUT to reduce the risk of injury to operator.

F. FRIENDLY USER INTERFACE

High Intensity Indicators

Large LCD and Function Keys

The 240 x 64 LCD displays not only the setting parameters but also the test conditions, measurement values and DUT inspection results (PASS or FAIL) in a legible pattern. The LED indicators in different colors alert the operator to the status of the safety tester to avoid any possible risk.
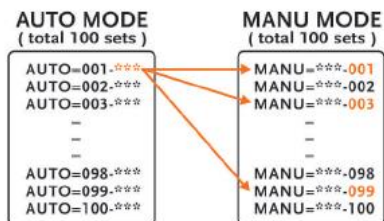
For example, the status indicator sitting above the high voltage output terminal will automatically blink when a high voltage presents at output. In addition, the function keys arranged below the LCD display provide convenient operation that test setup can be easily done by fewer key punches.

G. CONVENIENT MANUAL AND AUTOMATED TEST

Variety of Control Methods

AUTO Testing include Multiple MANU Processing

In order to comply with all safety regulations, the GPT-9900 series also offers a large number of memory locations (100 sets in total) to store a variety of test conditions. When a test condition is saved to one of the 100 fixed memory locations, a unique test file name (up to 12 characters) can also be assigned to its memory location. For example, the test file name "IEC61010AH" (IEC61010 AC Withstanding test) can saved and recalled for future use. Any test conditions that have been previously stored can be used for a single test or combined together for automatic testing- eliminating the need to perform a series of tests manually.

In addition to using the START/STOP buttons on the front panel to control the safety tester, the GPT-9900 Series also provides a remote terminal for connection to an external remote controller and a signal I/O port on the rear panel for connection to a PLC interface for actuator control. Furthermore with RS-232C and USB as standard (GPIB optional) for all the models in the GPT-9900 Series, retrieving test data and results is convenient via a PC connection.

PANEL INTRODUCTION

1. 240 x 64 Ice blue matrix LCD display, supporting a grater view of setting parameters and testing results

2. High intensity LED indicators to show the status of safety tester

3. Withstanding high voltage output for AC 5kV max. and DC 6kV max. in 2V per step; insulation resistance test from 50V~1000V in 50V per step

4. Quick selecting function keys, corresponding to the functions or parameters displayed on the screen

5. Remote terminal provides "start" and "stop" control by an external controller

6. High current output up to 30A ac for 4 wires Ground Bond testing

7. The Signal I/O port provides remote control "start" and "stop" functions and monitor the test status of the tester

8. USB and RS-232C communication ports facilitate the easy & convenient communication

9. GPIB communication is supported as optional

10. Rear Output Terminal (only GPT-9900 Series)

GPT-9904 AC 500VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
GPT-9903 AC 500VA AC/DC Withstanding Voltage/Insulation Resistance Tester

GPT-9804 AC 200VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
GPT-9803 AC 200VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9802 AC 200VA AC/DC Withstanding Voltage Tester
GPT-9801 AC 200VA AC Withstanding Voltage Tester

SELECTION GUIDE

FUNCTION / MODEL	AC	DC	IR	GB	SWEEP
GPT-9904	✓	✓	✓	✓	✓
GPT-9903	✓	✓	✓		✓
GPT-9804	✓	✓	✓	✓	
GPT-9803	✓	✓	✓		
GPT-9802	✓	✓			
GPT-9801	✓				

APPLICATIONS

- Safety Testing of Electrical Product in Manufacturing
  - Power Cord
  - Home Appliances
  - Information Technology Equipment
  - Medical Equipment
  - Household and Similar Electrical Appliances
  - Luminaires
  - Audio, Video and Similar Electronic Apparatus
- Quality Assurance Verification
- Safety Standard Compliance Pre-qualification in R&D

SPECIFICATIONS

		GPT-9800 Series		GPT-9900 Series	
AC WITHSTANDING	Output-Voltage Range	0.100kV– 5.000kV ac		0.100kV– 5.000kV ac	
	Output-Voltage Resolution	2V/step		2V/step	
	Output-Voltage Accuracy	±(1% of setting + 5V) [no load]		±(1% of setting + 5V) [no load]	
	Maximum Rated Load	200 VA (5kV/40mA)		500 VA (5kV/100mA)	
	Maximum Rated Current	40mA (0.5kV< V≤5kV); 10mA (0.1kV≤V≤0.5kV)		100mA (0.5kV< V≤5kV); 10mA (0.1kV≤V≤0.5kV)	
	Output-Voltage Waveform	Sine wave		Sine wave	
	Output-Voltage Frequency	50Hz/60Hz selectable		50Hz/60Hz selectable	
	Voltage Regulation	±(1% of rdg + 5V) [full load → no load]		±(1% of rdg + 5V) [full load → no load]	
	Voltmeter Accuracy	±(1% of rdg + 5V)		±(1% of rdg + 5V)	
	Current Measurement Range	0.001mA–40.0mA		0.001mA–100.0mA	
	Current Best Resolution	0.001mA/0.01mA/0.1mA		0.001mA/0.01mA/0.1mA	
	AC Current Measurement Accuracy	±(1.5% of rdg+30counts)when HI SET<1.00mA ±(1.5% of rdg+3counts) when HI SET≥1.00mA		±(1.5% of rdg+30counts)when HI SET<1.11mA ±(1.5% of rdg+3counts) when HI SET≥1.11mA	
	Window Comparator Method	Yes		Yes	
	ARC Detect	Yes		Yes	
	RAMP (Ramp-Up Time)	0.1s~999.9s		0.1s~999.9s	
	TIMER (Test Time)*	OFF, 0.5s~999.9s		OFF, 0.5s~999.9s	
	Sweep Function*	NOT Support		Yes	
	GND	ON/OFF		ON/OFF	
DC WITHSTANDING	Output-Voltage Range	0.100kV–6.000kV dc		0.100kV–6.000kV dc	
	Output-Voltage Resolution	2V/step		2V/step	
	Output-Voltage Accuracy	±(1% of setting + 5V) [no load]		±(1% of setting + 5V) [no load]	
	Maximum Rated Load	50W (5kV/10mA)		100W (5kV/20mA)	
	Maximum Rated Current	10mA(0.5kV< V≤6kV); 2mA (0.1kV≤V≤0.5kV)		20mA(0.5kV< V≤6kV); 2mA (0.1kV≤V≤0.5kV)	
	Voltage Regulation	±(1% of rdg + 5V)[full load → no load]		±(1% of rdg + 5V)[full load → no load]	
	Voltmeter Accuracy	±(1% of rdg + 5V)		±(1% of rdg + 5V)	
	Current Measurement Range	0.001mA~10.0mA		0.001mA~20.0mA	
	Current Best Resolution	0.001mA/0.01mA/0.1mA		0.001mA/0.01mA/0.1mA	
	DC Current Measurement Accuracy	±(1.5% of rdg+30counts)when HI SET<1.00mA ±(1.5% of rdg+3counts) when HI SET≥1.00mA		±(1.5% of rdg+30counts)when HI SET<1.11mA ±(1.5% of rdg+3counts) when HI SET≥1.11mA	
	Window Comparator Method	Yes		Yes	
	ARC Detect	Yes		Yes	
	RAMP (Ramp-Up Time)	0.1s~999.9s		0.1s~999.9s	
	TIMER (Test Time)*	OFF, 0.5s~999.9s		OFF, 0.5s~999.9s	
	Sweep Function*	NOT Support		Yes	
	GND	ON/OFF		ON/OFF	

		GPT-9800 Series		GPT-9900 Series	
INSULATION RESISTANCE	Output Voltage	50V–1000V dc		50V–1000V dc	
	Output-Voltage Resolution	50V/step		50V/step	
	Output-Voltage Accuracy	±(1% of setting +5V)[no load]		±(1% of setting +5V)[no load]	
	Resistance Measurement Range	1MΩ~ 9500MΩ		0.001GΩ~ 50.00GΩ	

	Test Voltage	Measurable Range	Accuracy	Measurable Range	Accuracy
	50V ≤V≤450V	1 – 50MΩ 51 – 2000MΩ	±(5% of rdg + 1count) ±(10% of rdg + 1count)	0.001 – 0.050GΩ 0.051 – 2.000GΩ	±(5% of rdg + 1count) ±(10% of rdg + 1count)
	500V≤V ≤1000V	1 – 500MΩ 501 – 9500MΩ	±(5% of rdg + 1count) ±(10% of rdg + 1count)	0.001 – 0.500GΩ 0.501 – 9.999GΩ 10.00 – 50.00GΩ	±(5% of rdg + 1count) ±(10% of rdg + 1count) ±(15% of rdg + 1count)

		GPT-9800 Series	GPT-9900 Series
	Window Comparator Method	Yes	Yes
	Output Impedance	600kΩ	600kΩ
	RAMP (Ramp-Up Time)	0.1s~999.9s	0.1s~999.9s
	TIMER (Test Time)	1s~999.9s	1s~999.9s
	GND	OFF (fix)	OFF (fix)
	Sweep Function*	NOT Support	Yes
GROUND BOND	Output-Current	03.00A–30.00A ac	03.00A–32.00A ac
	Output-Current Resolution	0.01A	0.01A
	Output-Current Accuracy	3A ≤I≤8A:±(1% of rdg+0.2A), 8A< I≤30A:±(1% of rdg+0.05A)	3A ≤I≤8A:±(1% of rdg+0.2A), 8A< I≤32A:±(1% of rdg+0.05A)
	Test-Voltage	6Vac max (open circuit)	6Vac max (open circuit)
	Test-Voltage Frequency	50Hz/60Hz selectable	50Hz/60Hz selectable
	Resistance Measurement Range	10mΩ~ 650.0mΩ	10mΩ~650.0mΩ
	Resistance Measurement Resolution	0.1mΩ	0.1mΩ
	Resistance Measurement Accuracy	±(1% of rdg + 2mΩ)	±(1% of rdg + 2mΩ)
	Window Comparator Method	Yes	Yes
	TIMER (Test Time)	0.5s~999.9s	0.5s~999.9s
	Sweep Function*	NOT Support	Yes
	Test Method	Four Terminal	Four Terminal
MEMORY	Single Step Memory	MANU : 100 blocks	MANU : 100 blocks
	Automatic Testing Memory	AUTO : 100 blocks, menu per auto : 16	AUTO : 100 blocks, menu per auto : 16
INTERFACE	Rear Output	NOT Support	Standard
	RS-232C	Standard	Standard
	USB	Standard	Standard
	GPIB	Option	Option
	Remote Terminal (Front)	Standard	Standard
	Signal I/O	Standard	Standard
DISPLAY		240 x 64 Ice Blue Dot matrix LCD	240 x 64 Ice Blue Dot matrix LCD
POWER SOURCE		AC100V/120V/220V/230V±10% , 50/60Hz	AC100V/120V/220V/230V±10% , 50/60Hz
DIMENSIONS & WEIGHT		330(W) x 148(H) x 452(D) mm Approx. 19kg max.	330(W) x 148(H) x 587(D) mm Approx. 27kg max.

* The sweep function and timer off can only be performed when the tester is in the special MANU mode.

Specifications subject to change without notice.   PT-9000GD2BH

ORDERING INFORMATION

GPT-9904 AC 500VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
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GPT-9803 AC 200VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9802 AC 200VA AC/DC Withstanding Voltage Tester
GPT-9801 AC 200VA AC Withstanding Voltage Tester

ACCESSORIES

Quick Start Guide x 1, Power cord x 1, CDx1(complete user manual), Interlock Key x 1,
Remote terminal male plug x 1, Test lead GHT-114 x 1 for GPT-9903/9803/9802/9801,
Test lead GHT-114 x 1, GTL-115 x 1 for GPT-9904/9804

OPTION

Opt.1 GPIB card

OPTIONAL ASSESSORIES

GHT-113 High Voltage Test Pistol
GHT-205 High Voltage Test Probe
GTL-232 RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer
GTL-247 USB Cable, A-A type, approx. 1.8m
GTL-248 GPIB Cable, approx. 2m
GTL-251 GPIB-USB-HS (High Speed)
GRA-417 RACK Adapter Panel (19", 4U)

≡ GRA-417 can not be used with GPT-9904

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917-6294	GPT-9904 500VA Tester
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