



# GPT-9000 Series

## Electrical Safety Tester

**2** Year WARRANTY

### FEATURES

- 500VA and 200VA AC Test Capacity
- 240x64 Ice Blue Dot Matrix LCD
- Manual/Auto Mode
- Function Key for Quick Selecting
- 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 : 1  $\mu$ A for Measuring Current, 2V for Setting Voltage
- PWM Switching 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 by External
- Interface : RS-232C, USB Device, Signal I/O and GPIB (Optional)

**GW INSTEK**  
Simply Reliable

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

The GPT-9900 series is built upon a platform of AC 500VA, and the GPT-9800 series is built upon a platform of AC 200VA maximum power output. Each series with 4 models, The GPT-9904 and GPT-9804 are a 4-in-1 model capable of performing AC withstanding, DC withstanding, insulation resistance and ground bond tests. The GPT-9903A and GPT-9803 are a 3-in-1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9902A and GPT-9802 are capable of performing both AC and DC withstanding tests, whereas the GPT-9901A and GPT-9801 are able to perform AC withstanding test. The high-efficiency PWM amplifier is the core of both series platform design to impede the influence from the voltage fluctuation of input AC source. Each 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.

Following a tidy and easy-to-use design concept, the both series are equipped with a simple & clear panel layout, a high resolution dot matrix LCD display, and color LED indicators, allowing operators to interpret measurement results easily and quickly. All major test functions, including AC withstanding (AC 5kV), DC withstanding (DC 6kV), insulation resistance (DC 50V ~ 1000V) and ground bond (AC 32A max.) tests, are performed under a high-stability voltage or current output with high-resolution measurement results. Furthermore, the test duration, ramp up time and upper/lower limits of the tripping current/resistance are fully-adjustable to accommodate a wide variety of safety tests with accurate measurement results.

The unique “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.

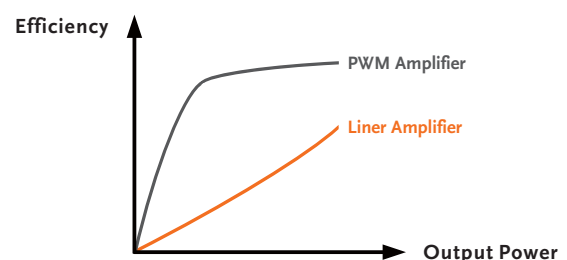
Other significant functions and features are also incorporated with both series such as the output voltage is automatically cut off (within 150  $\mu$ s) upon the detection of an abnormal output voltage or a trip of current limits during test to protect the operator from hazardous injury and automatically discharges a DUT after test to eliminate excessive voltage on a DUT, 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 on 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  $\mu$ A resolution and  $\pm(1.5\% + 30 \mu\text{A})$  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 (2000M $\Omega$ /9.999G $\Omega$ ) and  $\pm(15\%$  of reading +1 count) at full scale (50.00G $\Omega$ ). 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.

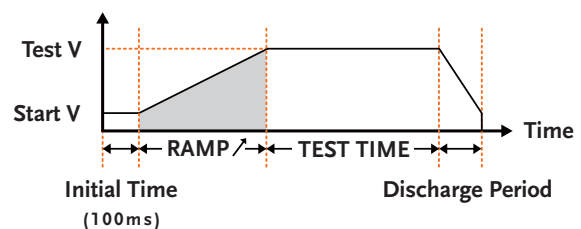
## D. SAFETY GUARDING THROUGHOUT THE TESTING PERIOD



### Zero-Crossing Operation

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.

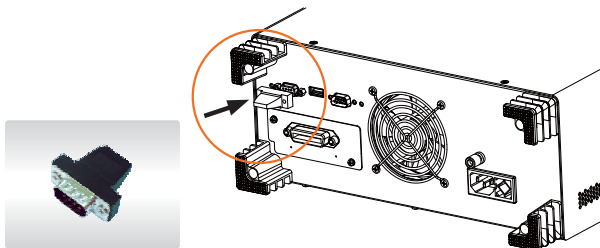
The second protection function is activated once the “Start” (output) button is pressed. At the first moment of start up, the GPT-9900 will send a detection voltage (~50V) during the initialization period (100ms) to check whether the DUT has any short circuit due to poor insulation before the high voltage 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



### Output Voltage Variation in One Test Cycle

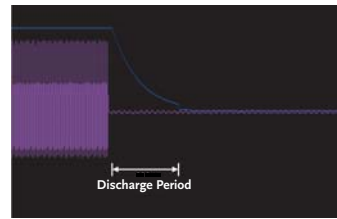
at power-on and avoid flashover or arcing phenomena that could affect the test results, the GPT-9900 Series has a Zero Crossing Turn-On feature, which ensures the output always starts from the zero crossing of a sine wave. Moreover, the adjustable voltage ramp-up time (0.1s ~ 999.9s) allows the test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



**Safety Interlock**

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 sensor switch



**Fast Cutoff in 150µs**

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.**



**High Intensity Indicators**

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.



**Large LCD and Function Keys**

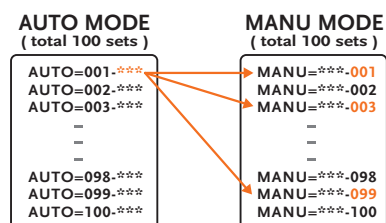
For example, the status indicator sitting above the high voltage output terminal will automatically blink when a high voltage presents at output. In addition, the function keys arranged below the LCD display provide convenient operation that test setup can be easily done by fewer key punches.

## **G. CONVENIENT MANUAL AND AUTOMATED TEST**



**Variety of Control Methods**

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.



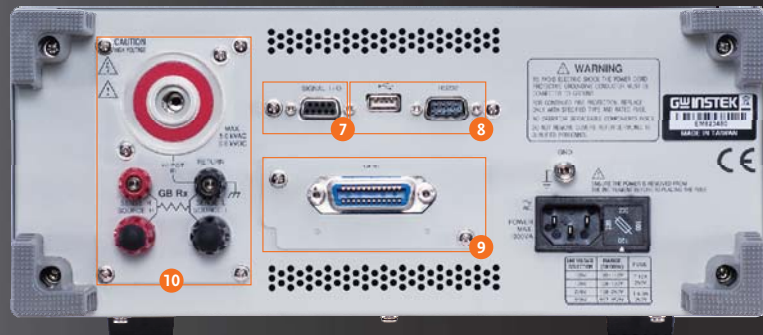
**AUTO Testing include Multiple MANU Processing**

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-9903A** AC 500VA AC/DC Withstanding Voltage/Insulation Resistance Tester  
**GPT-9902A** AC 500VA AC/DC Withstanding Voltage Tester  
**GPT-9901A** AC 500VA AC Withstanding Voltage 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

MODEL	FUNCTION	AC	DC	IR	GB	SWEEP
GPT-9904		✓ *	✓	✓	✓	✓
GPT-9903A		✓ *	✓	✓		✓
GPT-9902A		✓ *	✓			✓
GPT-9901A		✓ *				✓
GPT-9804		✓	✓	✓	✓	
GPT-9803		✓	✓	✓		
GPT-9802		✓	✓			
GPT-9801		✓				

\* Short Current >200mA

## 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 Output-Voltage Resolution Output-Voltage Accuracy Maximum Rated Load Maximum Rated Current Output-Voltage Waveform Output-Voltage Frequency Voltage Regulation Voltmeter Accuracy Current Measurement Range Current Best Resolution AC Current Measurement Accuracy  Window Comparator Method ARC Detect RAMP (Ramp-Up Time) TIMER (Test Time)* Sweep Function* GND	0.050kV~ 5.000kV ac 2V/step ±(1% of setting + 5V) [no load] 200 VA (5kV/40mA) 40mA (0.5kV< V≤5kV); 10mA (0.05kV≤V≤0.5kV) Sine wave 50Hz/60Hz selectable ±(1% of rdg + 5V) [full load → no load] ±(1% of rdg + 5V) 0.001mA~40.0mA 0.001mA/0.01mA/0.1mA ±(1.5% of rdg+30counts)when HI SET<1.11mA ±(1.5% of rdg+30counts)when HI SET≥1.11mA Yes Yes 0.1s~999.9s OFF, 0.5s~999.9s NOT Support ON/OFF	0.050kV~ 5.000kV ac 2V/step ±(1% of setting + 5V) [no load] 500 VA (5kV/100mA) 100mA (0.5kV< V≤5kV); 10mA (0.05kV≤V≤0.5kV) Sine wave 50Hz/60Hz selectable ±(1% of rdg + 5V) [full load → no load] ±(1% of rdg + 5V) 0.001mA~100.0mA 0.001mA/0.01mA/0.1mA ±(1.5% of rdg+30counts)when HI SET<1.11mA ±(1.5% of rdg+30counts)when HI SET≥1.11mA Yes Yes 0.1s~999.9s OFF, 0.5s~999.9s Yes ON/OFF		
DC WITHSTANDING	Output-Voltage Range Output-Voltage Resolution Output-Voltage Accuracy Maximum Rated Load Maximum Rated Current Voltage Regulation Voltmeter Accuracy Current Measurement Range Current Best Resolution DC Current Measurement Accuracy  Window Comparator Method ARC Detect RAMP (Ramp-Up Time) TIMER (Test Time)* Sweep Function* GND	0.050kV~6.000kV dc 2V/step ±(1% of setting + 5V) [no load] 50W(5kV/10mA) 10mA(0.5kV< V≤6kV); 2mA (0.05kV≤V≤0.5kV) ±(1% of rdg + 5V) [full load → no load] ±(1% of rdg + 5V) 0.001mA~10.0mA 0.001mA/0.01mA/0.1mA ±(1.5% of rdg+30counts)when HI SET<1.11mA ±(1.5% of rdg+30counts)when HI SET≥1.11mA Yes Yes 0.1s~999.9s OFF, 0.5s~999.9s NOT Support ON/OFF	0.050kV~6.000kV dc 2V/step ±(1% of setting + 5V) [no load] 100W(5kV/20mA) 20mA(0.5kV< V≤6kV); 2mA (0.05kV≤V≤0.5kV) ±(1% of rdg + 5V) [full load → no load] ±(1% of rdg + 5V) 0.001mA~20.0mA 0.001mA/0.01mA/0.1mA ±(1.5% of rdg+30counts)when HI SET<1.11mA ±(1.5% of rdg+30counts)when HI SET≥1.11mA Yes Yes 0.1s~999.9s OFF, 0.5s~999.9s Yes ON/OFF		
INSULATION RESISTANCE	Output Voltage Output-Voltage Resolution Output-Voltage Accuracy Resistance Measurement Range  Test Voltage 50V≤V≤450V  500V≤V≤1000V  Window Comparator Method Output Impedance RAMP (Ramp-Up Time) TIMER (Test Time) GND Sweep Function*	50V~1000V dc 50V/step ±(1% of setting +5V)[no load] 1MΩ~ 9500MΩ		50V~1000V dc 50V/step ±(1% of setting +5V)[no load] 0.001GΩ~ 50.00GΩ	
		Measurable Range	Accuracy	Measurable Range	Accuracy
		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)
		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) ±(20% of rdg + 1count)
GROUND BOND	Output-Current Output-Current Resolution Output-Current Accuracy Test-Voltage Test-Voltage Frequency Resistance Measurement Range Resistance Measurement Resolution Resistance Measurement Accuracy Window Comparator Method TIMER (Test Time) Sweep Function* Test Method	03.00A~30.00A ac 0.01A 3A ≤I≤8A±(1% of rdg+0.2A), 8A< I≤30A±(1% of rdg+0.05A) 6Vac max (open circuit) 50Hz/60Hz selectable 10mΩ~ 650.0mΩ 0.1mΩ ±(1% of rdg + 2mΩ) Yes 0.5s~999.9s NOT Support Four Terminal	03.00A~32.00A ac 0.01A 3A ≤I≤8A±(1% of rdg+0.2A), 8A< I≤32A±(1% of rdg+0.05A) 6Vac max (open circuit) 50Hz/60Hz selectable 10mΩ~650.0mΩ 0.1mΩ ±(1% of rdg + 2mΩ) Yes 0.5s~999.9s Yes Four Terminal		
MEMORY	Single Step Memory Automatic Testing Memory	MANU : 100 blocks AUTO : 100 blocks, menu per auto : 16		MANU : 100 blocks AUTO : 100 blocks, menu per auto : 16	
INTERFACE	Rear Output RS-232C USB GPIB Remote Terminal (Front) Signal I/O	NOT Support Standard Standard Option Standard Standard		Standard Standard Standard Option 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)x148(H)x482(D)mm(GPT-9902A/9901A/9903A); 330(W)x148(H)x587(D)mm(GPT-9904); 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-9000G3BH

ORDERING INFORMATION	
GPT-9904	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
GPT-9903A	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9902A	AC 500VA AC/DC Withstanding Voltage Tester
GPT-9901A	AC 500VA AC Withstanding Voltage 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
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-9903A/9902A/9901A/9803/9802/9801, Test lead GHT-114 x 1, GTL-115 x 1 for GPT-9904/9804	

OPTION	
Opt.1 GPIB card	Opt.2 GSB-01(8CH H.V.)Multiplex Scanner Box
Opt.3 GSB-02(6CH H.V./2CH G.B.)Multiplex Scanner Box	
OPTIONAL ASSESSORIES	
GHT-113 High Voltage Test Pistol	GTL-247 USB Cable, A-A type, approx. 1.8m
GHT-117 HV Adapter	GTL-232 RS-232C Cable, 9-pin Female to
GHT-118 HV/GB Adapter	9-pin null Modem for Computer
GHT-205 High Voltage Test Probe	GRA-417 RACK Adapter Panel (19", 4U)
GTL-248 GPIB Cable, approx. 2m	GRA-433 RACK Adapter Panel (19", 4U)
GTL-251 GPIB-USB-HS (High Speed)	for GPT-9904 only
FREE DOWNLOAD	
PC Software	GPT-9000

**GW INSTEK**  
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