GAO-Tek Multi-function Handheld xDSL tester is a light-weight xDSL tester designed to test and analyze ADSL, ADSL2, ADSL2+, VDSL2 networks and easy to use Graphical User Interface Testing. It can test Physical Layer, Network Layer and Application Layer quickly and accurately. This handheld xDSL Tester offers a widely used embedded Windows CE operation system with a TFT LCD, touch screen. The compact tester is an ideal tool for the installation, maintenance and troubleshooting of any xDSL network. It can be used in “ATUR+PC” emulation without an additional ADSL2+/VDSL2 modem or computer. The xDSL tester also functions as a digital multimeter.

APPLICATIONS

- **xDSL Test**: Physical/network/application layer test of xDSL subscriber line, thus verify the circuit quality
- **LAN Test**: can perform a LAN or BroadBand PPPoE dial-up test, LAN network layer test and application test
- **DMM and Cable Test**: Test the AC/DC, Circuit loop resistance, Circuit capacitance, Circuit insulation
- **Physical Layer Test**: ADSL2+, VDSL2, Modem Emulation, PPPoE dial-up and modify PPPoE dial-up properties
- **Network Layer Test**: Ping, Ipconfig, Route, Router trace, etc
- **Application Layer Test**: Web Browse, Network Speed Measurement, FTP Speed Measurement
- **Tone Generator**

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1-416-292-0038 x 601

Within North America
Anywhere Else
GAOTek Multi-function Handheld xDSL Tester  
Product ID GAO-XDSLT-104

KEY FEATURES

- TFT true color display and touch screen operation
- Tone generation
- Web browsing
- Windows CE operating system, Graphical interface, easy operation
- Auto-off function to save power
- Audio and LED status indicators
- Software upgradeable online
- Auto line-tracking
- Quality of xDSL service verification
- Automatic set up of critical line threshold parameters

PRODUCT DESCRIPTION

GENERAL OPERATION

- **Test Interface**: Please connect test line to the instruments test interface, please do not touch the bare metal parts of the test nip to prevent electric shock if working with a high voltage circuit.
- **USB interface**: Please do not short-circuit interface with metal, otherwise the inner circuit will be destroyed.
- **Display**: Please remove protective film enclosed for before using instrument.
- **Cleaning**: The instrument cover should be cleaned by soft dry cloth, do not use volatile chemicals as the plastic may discolor.

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- **Battery Maintenance**: Over an extended period of time if the instrument is left on a low charge, the battery could fully discharge, it is recommended that you fully charge the instrument. If you notice that the battery life has declined you should have the battery replaced.

- **Cover and Panel Protection**: Please do not sprinkle volatile chemicals on cover or panel, and do not touch Rubber or Polyvinyl Chloride with cover or panel in long time, to prevent malfunctions.

- **Instrument Movement**: When the instrument should be moved, please ensure that power line and connection cable disconnected with instrument, then take up the instrument. Unplug the cable after using

- **Malfunction**: If there are abnormal sound, smell or smog, please shut down the machine and unplug the power line.
### Instrument Configuration & Interface

| Indicator Lights | ❑ Power Indicator Light: constant red light on power up.  
|                  | ❑ Ethernet Indicator Light: constant green indicates Ethernet link; blinking green light, suggests that Ethernet has data stream.  
|                  | ❑ xDSL LINK Indicator: slow blinking green – the unit is seeking a xDSL signal; fast blinking green light suggests xDSL LINK protocol; constant green light – xDSL links has been installed.  
|                  | ❑ xDSL ACT Indicator: Ethernet data stream is present.  
| Keystroke         | ❑ Power Key: with the unit in the on state, press the Power Key for 1 second to suspend the instrument. To complete shut off, please press Power key and hold on for 5 seconds.  
|                  | ❑ Soft key on-off: in operation interface, press to switch or close soft keyboard.  
|                  | ❑ Help/ transverse and vertical Screen Switch: To operate WEB Browser, press to switch from transverse and vertical Screen along with system help.  
| LCD Display      | The TFT color LCD Display, is touch screen with lattice 480 × 272.  
| Touch Pen        | Touch Pen, an accessory of the instrument used to click on the screen.  
| Ethernet Interface | RJ-45 interface that complies with Ethernet interface standard, used to connect with Ethernet cable or RJ45 cable plug for Broad Band IP. The Ethernet interface supports auto crossover detection function.  
| xDSL Interface   | xDSL interface is xDSL user line interface and is also the input interface of DMM.  

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### Power Supply Interface
The power input is 50 Hz/60 Hz AC 100 ~ 240 V, output voltage is 8.4 V DC.

### USB Interface
USB interface used for USB Disk and USB mouse.

### xDSL and Ethernet Cable

<table>
<thead>
<tr>
<th>xDSL Test Cord</th>
<th>The instrument connects to an xDSL user line, one end plugs in test jack and other end connects to the tested line. During operation, please do not touch the bare metal of alligator as there may be high voltage on the line.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet Cable</td>
<td>The configured cable can be connected with IP-PBX or Hub; the instrument can connect with twisted cable, it can connect directly with Ethernet interface of the instrument when it connect with cable of Broad Band IP, indicator light on the interface will work when Ethernet links</td>
</tr>
</tbody>
</table>

### MAIN FUNCTIONS & TECHNICAL PARAMETERS

**xDSL Test**: This instrument can emulate Modem + PC function along with comprehensive physical layer tests, network layer test and application layer test of xDSL subscriber line, thus verify the circuit quality.

**Physical Layer Test**:

**ADSL2+**: Comply with: ITU G.994.1 (G.hs), ITU G.992.5, ITU G.992.5 Annex L, the max connecting distance: 6.5km. ADSL, ADSL2, READSL compatible.
Test DSL Transmission Parameters:

- DSL upstream channel speed (mixed mode/ Quick Mode): 0~1.2Mbps
- DSL downstream channel speed (mixed mode/ Quick Mode): 0~24 Mbps
- DSL attenuation: 0~63.5 dB
- DSL noise margin: 0~32 dB
- DSL upstream/downstream maximum speed and channel utilization rate
- DSL output power Bits adjusted on DMT sub channel: 0~15, sub channels frequency quantity.
- DSL circuit errors quantity (CRC, HEC, FEC, NCD, OCD)
- Display status on DSL circuit: LOSS, Links failure
- Display DSL circuit link mode

VDSL2: Comply with: ITU G.992.3

Test DSL transmission parameters:

- DSL upstream channel speed: 0~100 Mbp
- DSL downstream channel speed: 0~100 Mbp
- DSL attenuation
- DSL noise margin
- DSL upstream/downstream maximum speed and channel utilization rate
- DSL output power
- Bits adjusted on DMT sub channel: 0~15, sub channels frequency quantity.
- DSL circuit error second FECS, ES, RES, LOSS, UAS
- Display status on DSL circuit: LOSS, Links failure
- Display DSL circuit link mode

Modem Emulation: User can replace, dial-up and link to the internet through the instrument to verify whether there is problem with users Modem.

PPPoE dial-up and modify PPPoE dial-up properties: Simulate subscriber Modem and PC, PPPoE dial-up, verify the connectivity between subscriber and ISP service provider.
GAOTek Multi-function Handheld xDSL Tester
Product ID GAO-XDSLT-104

Network Layer Test:
Ping, Ipconfig, Route, Router trace, etc.

Application Layer Test:

LAN Test: This instrument can perform a LAN or BroadBand PPPoE dial-up test, LAN network layer test and application test. LAN Tests includes the following functions:

- DHCP subscriber end test
- PPPoE dial-up and modify PPPoE dial-up properties, verify if there is trouble in BroadBand IP or LAN.
- Network Layer Test: Ping, Ipconfig, Route, Router trace, etc.
- Application Layer Test: Web Browse, Network Speed Measurement, FTP Speed Measurement, etc.

DMM Test: Test the AC/DC, Circuit loop resistance, Circuit capacitance, Circuit insulation. DMM test parameters as follows:

<table>
<thead>
<tr>
<th>Item Range</th>
<th>Unit</th>
<th>Test</th>
<th>Relative error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Test</td>
<td>V</td>
<td>0–110 DC</td>
<td>±5 % ±2 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0–110 AC</td>
<td>±5% ±2V</td>
</tr>
<tr>
<td>Loop Resistance Test</td>
<td>Ω</td>
<td>0–10</td>
<td>±2Ω</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10–5000</td>
<td>±5%</td>
</tr>
<tr>
<td>Capacitance Test</td>
<td>nF</td>
<td>0–10</td>
<td>±2 nF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10–500</td>
<td>±10%</td>
</tr>
<tr>
<td>Insulation Test</td>
<td>MΩ</td>
<td>0–1.0</td>
<td>±0.1 MΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.0–50</td>
<td>±10 % ±0.5 MΩ</td>
</tr>
</tbody>
</table>
Tone Generator: Send an audio signal at one end of the twisted pair while using an optional tone tracer device to find the corresponding pair at the other end.

MODEM Emulation: Completely replace user’s Modem, subscriber can use this device as “Golden” Modem to dial-up and surf websites to verify if the trouble is the user’s Modem.

OPERATION

- **Power ON**: To turn on the unit press the Power key.
- **Normal Power Off**: Click the Shutdown key or press the power key, a window will emerge and ask whether you would like to shut down, then confirm to shut off.
- **Forced Power Off**: When the instrument cannot be shut down by system window or shutdown key, shut down by holding key for greater than 5 seconds.

On power up, the instrument enters the main screen which includes 3 parts:

- **Status Indicator bar**: includes time indicator, battery capacitance indicator, and return Indicator and U discs indicator.
- **Functions bar**: includes a series of icons, each represents a function, press the icon and enter the functions interface
- **Toolbar**
GAOTek Multi-function Handheld xDSL Tester
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**XDSL TEST**: The Handheld xDSL Tester tests xDSL lines and verifies dial-up service through a built-in “Golden” Modem. As an integrated test, it includes physical layer test, parameter settings, PPPoE properties, PPPoE dial-up, network layer test, Web Browse, ATM loopback test, Network Speed Measurement, FTP Speed Measurement, etc. It can emulate end user equipment to achieve PPPoE dial-up, network layer test and Web Browser, then acquire physical layer parameters of the line link and verify line quality.

**How to Use**: Connect the xDSL pair directly into the RJ11 port of the instrument or connect to an xDSL Splitter, then press icon to enter the xDSL test window, as follow

![Test Window](image)

xDSL test function includes: physical layer test, DSL parameter settings, Modem emulation, PPPoE properties, PPPoE dial-up, ATM loopback test, network layer test, Web Browse, Network Speed Measurement, FTP Speed Measurement, etc.

If you want to test whether the built-in Modem connects with xDSL station equipment, settings are not required. If connected, the instrument indicator light is on, click to enter to check the physical layer parameters.

To test whether xDSL can log onto a website, please do the following: set Modem parameter (VPI/VCI) →set PPPoE properties (can be skipped) →PPPoE dial-up, when the xDSL LINK light is on, click PPPoE dial-up, (required to input user name/ password), then Web Browse.

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**Network Layer Test**: After PPPoE dial-up link through the built-in xDSL Modem, perform a Ping, Ipconfig, Tracer, and Route Test of the Network Layer.

**How to Use**: Click Network Layer test icon to enter Network Layer test window as follows:

![Network Layer Test Window](image)

**LAN TEST**: Tests for when connected to the Ethernet and broadband IP user network. The device can verify the DSL web utility when emulates a computer connection to DSL Modem and PPPoE dial for web browsing, it also can connect to an Ethernet as an IP terminal for the test of DHCP client end, PPPoE dial and web browser, for verifying the Ethernet utility.

**How to Use**: Click LAN test icon access to LAN test options as below displayed.

![LAN Test Window](image)
**CABLE TEST** : Built-in full functional auto range digital power meter used for testing the telephone line physical characteristic, audio-tracking function can search for the matched wire pair.

**How to Use** : Click cable test icon that will access to window below:

![Cable Test Window](image)

**Constant Voltage Test** : The circuit can be tested for constant DC voltage. This test helps identify opens or no voltage across pair. This test is a DC voltage test and the range is -110 V ~ +110 V, when the reading is beyond this value the device will prompt “Test overload”.

**AC Voltage Test** : The AC Voltage tests 0-110 V AC for AC voltages across test pair, care should be taken to prevent electrical shock. When beyond 110 V value the device will prompt “Test overload”.

**Loop Resistance Test** : The length of line can be tested by loop resistance. Otherwise, if the cable length is given, the cable connection will be tested by loop resistance.

The formula for cable length loop resistance value is:

$$ L=RL/RO \text{ (Km)} $$

In above formula, RL is loop resistance test value (unit: Ω), RO is loop resistance per kilometer (unit: Ω)

In general condition 0.32 mm copper line RO=435.2Ω, 0.4 mm copper line RO=278.5Ω, 0.5 mm copper line RO=178.3Ω.
If the device prompts “Test Overload” it means that the test clap is disconnected or the test line has not been connected, please check test claps and verify the test circuit is connected to the line and test once again. During the test when line voltage is over 5V, the device will prompt “Line-voltage”, at this moment the loop resistance test is unavailable, the test will only be performed when there is no voltage on the line.

**Capacitance Test**: The line length can be measured by capacitance test. When there is no bridged tap and the cable is not in water, the length can be measured by test electric capacitance, the formula is

\[ L = \frac{C_{ab}}{C_0} \text{ (Km)} \]

In above formula, \( C_{ab} \) is electric capacitance test value (unit: nF), \( C_0 \) is electric capacity value per kilometer (unit: nF). The capacitance of the cable in commonly used cable is \( C_0 = 51 \text{nF} \).

When the device prompts “Test Overload” that means the capacitance is overload or cable default, retest it after checking the cable. During the test when line voltage is over 5V, device will prompt “Line-voltage”, at this moment the capacitance test is unavailable, and the test can only be performed when there is no voltage on the line.

**CHARGING THE INSTRUMENT**

This device uses an internal 7.4 V 4000 mAh Li battery. When the battery sign indicates a low battery, the device prompts no battery and shuts down automatically. Charge immediately. Li battery can be charged at any time and has no memory effect. We advise you to charge the battery, when charge is low. To charge: shut down the device and then connect the charger to the AC socket, note the charge indicator light is green, then plug into the test set and the indicator light turns red indicating the test set is charging. When the indicator light turns green the battery is fully charged, the charger can removed.

**BATTERY REPLACEMENT**

The 7.4V 4000 mAh battery is field replaceable and GAOTek highly recommends a factory trained technician replace the battery to prevent damage or void warranty.

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## MALFUNCTION ANALYSIS & SOLUTION

<table>
<thead>
<tr>
<th>Problems</th>
<th>Reasons Analysis</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device power on disabled</td>
<td>Low battery</td>
<td>Charge unit and then try again</td>
</tr>
<tr>
<td>When device is in the xDSL the build-in Modem activation in the ADSL line disabled.</td>
<td>1. The line 2. No signal, test if the line has 48V voltage by DMM voltage test.</td>
<td>1. Confirm if the line is connected. 2. If no voltage indicated, the line has no open service</td>
</tr>
<tr>
<td>After a short time xDSL test, indicate low battery.</td>
<td>Because the built-in Modem has large power consumption, the power cannot supply enough power for xDSL test</td>
<td>Use AC adapter xDSL test</td>
</tr>
<tr>
<td>Disable to identify U disk when properly connected</td>
<td>The device cannot read all U discs.</td>
<td>Unplug and try again, if it does not work try another U disk.</td>
</tr>
<tr>
<td>PPPoE dia does not work but there is activation</td>
<td>Please confirm the correct user name and password, VPI/VCI also the PPPoE properties setup.</td>
<td>Modify the PPPoE properties according to the line requirement, and input the correct password for PPPoE dial.</td>
</tr>
<tr>
<td>Web browsing disabled</td>
<td>Be PPPoE dial is done.</td>
<td>Be sure the PPPoE dial is correct, or try another website</td>
</tr>
<tr>
<td>Ethernet indicator light disabled when Ethernet cable is connected to device</td>
<td>Network cable divided into crossover cable and Ethernet cable</td>
<td>Connect to other Ethernet port if one Ethernet port cannot be identified</td>
</tr>
</tbody>
</table>
# TECHNICAL SPECIFICATIONS

## xDSL Testing

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attenuation</td>
<td>0 ~ 63.5 dB</td>
</tr>
<tr>
<td>Output power</td>
<td>-32.0 dB ~ 31.5 dBm</td>
</tr>
<tr>
<td>Noise Margin</td>
<td>-64.0 dB ~ 63.5 dB</td>
</tr>
<tr>
<td>ADSL2+ Downstream rate</td>
<td>0 ~ 24 Mbps</td>
</tr>
<tr>
<td>ADSL2+ Upstream rate</td>
<td>0 ~ 1.2 Mbps</td>
</tr>
<tr>
<td>VDSL2 Downstream rate</td>
<td>0 ~ 100 Mbps</td>
</tr>
</tbody>
</table>

## DMM Testing

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop Resistance</td>
<td>5Ω ~ 5K Ω ±5 %</td>
</tr>
<tr>
<td>Capacitance</td>
<td>0 ~ 500 nF ± 10 %</td>
</tr>
<tr>
<td>DC Voltage</td>
<td>-110 V ~ 110 V ±5 %</td>
</tr>
<tr>
<td>AC Voltage</td>
<td>0 ~ 110 V ±5 %</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>0.1 MΩ ~ 50 MΩ ±10 %</td>
</tr>
</tbody>
</table>
### General

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>RJ-11, RJ-45, USB, DC power</td>
</tr>
<tr>
<td>Display</td>
<td>2.8” 320 x 240 TFT true color, touch screen</td>
</tr>
<tr>
<td>Operation Mode</td>
<td>Touch and keyboard</td>
</tr>
<tr>
<td>Battery</td>
<td>Li-ion battery</td>
</tr>
<tr>
<td>Charging Time</td>
<td>3 hours</td>
</tr>
<tr>
<td>Operation Time</td>
<td>5 hours</td>
</tr>
<tr>
<td>Field of View</td>
<td>50M (expandable)</td>
</tr>
<tr>
<td></td>
<td>More than 2000 records.</td>
</tr>
<tr>
<td>Size</td>
<td>7.87 in x 4.72 in x 2.36 in(200 mm x 120 mm x 60 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>35.27 oz (1000 g)</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 % to 95 %</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-14 °F to 122 °F (-10 °C to + 50 °C)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-4 °F to 158 °F (-20 °C to + 70 °C)</td>
</tr>
</tbody>
</table>
### PACKAGING LIST

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>RJ-11 TO Alligator Clip Cable</td>
<td>2.0 m</td>
<td>1</td>
</tr>
<tr>
<td>Cross over Cat5 Ethernet Cable</td>
<td>1.5 m</td>
<td>1</td>
</tr>
<tr>
<td>Stylus</td>
<td>8.4 V/2.0 A</td>
<td>1</td>
</tr>
<tr>
<td>Power Supply</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Software Setup CD</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Waterproof Package</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>User Manual</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

### OPTIONAL ACCESSORIES

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone Generator</td>
<td>TPT-8010 A</td>
<td>-</td>
</tr>
<tr>
<td>Mouse</td>
<td>USB port</td>
<td>-</td>
</tr>
<tr>
<td>U Disk</td>
<td>4G</td>
<td>-</td>
</tr>
</tbody>
</table>