



Product Name	GAOTek Line Tester
Product SKU	GAOTek-XDSLTL-145
Product URL	https://gaotek.com/product/gaotek-line-tester/



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GAOTek Line Tester



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1. Introduction

GAOTek Line Tester is specially designed to meet the urgent requirement of xDSL testing, including ADSL, ADSL2, ADSL2+, READSL and VDSL as well; It is particularly used by the field operator for the telecommunication installation and maintenance.

With the rapid development of xDSL broadband service, the field operators of installation and maintenance have to face much more and complicated workload than ever before, as a result, the equipment which is simple, portable and money-saved is eagerly wanted.

This Tester could not only test the physical parameters but also help to judge whether the line is fit for xDSL service and evaluate the quality of service. In fact the field operators do not need to know so many line parameters and specifications. To them, the most important is to determine the quality of service and locate the fault points. With the help of this tester every forefront workman is prepared to the task. Further more, it could also make PPPoE/PPPoA dialing through the built-in Modem and validate the connection between the user and ISP through emulating the user PC + Modem.

Besides the DSL Test functions, DSL Tester combine multi-functions into the one unit, It support the Optical power Meter function, Visual Fault Locator function, TDR (Cable fault locator) function, as well as the Tone Tracker function.

VDSL Tester adopts LCD display and menu operation. It could display the test results directly and intuitively. It is the ideal tool for the field technician installing and maintaining xDSL service.



2. Structure & Appearance

1. HOOK LED
2. Ethernet LED
3. PPP LED
4. LINK LED
5. Power LED
6. 6 POTS LED
7. Numbers button:
8. Central Key and OK Key , same functions (In the user manual, the central key can perform same functions as the ‘OK’ Keys)
9. Direction Keys
10. F1/F2/F3/F4; Fast Keys, to perform the functions shown on the LCD at corresponding site (DMM; TDR; OPM; VFL)

LED introduction

ETH LED: Shining - Ethernet link in normal condition.

Flicker - There is data flux in Ethernet.

Link LED: LED flicker slowly - finding central office, LED flicker rapidly - xDSL Modem is doing the xDSL handing;



Shinning - Link connected and work normally.

PPP LED: Shinning - successful PPPoE dialing or PPPoA dialing;

POTS LED: Green: POTS voltage OK. Orange: POTS voltage high. No light: No voltage or voltage too low.

POTS LED: Green: POTS voltage OK. Orange: POTS voltage high. No light: No voltage or voltage too low.





Dimension & Weight

Dimension (mm): 180 × 82 × 50

Weight: < 500g

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Operation environment

- a) Temperature: 0 °C ~ +50 °C
- b) Humidity: ≤ 85%
- c) Pressure: 86kPa ~ 106kPa

Power supply: The rechargeable lithium batteries

7200mAH, DC5V 1A charger

- d) Battery duration: > 8 hours

3. Main functions and specifications

3.1 Functions :

- DSL Test
- DMM Test
- Dial Test (WAN PING):
- PPPoE Dialing (RFC1683, RFC2684, RFC2516)
- PPPoA Dialing (RFC2364)
- LAN Ping Test
- Modem Emulation (Replace the user Modem completely)
- Telephone Function
- Optical Power Meter (Optional)
- Visual Fault Locator (Optional)
- Tone Tracker (Optional)
- TDR Cable Fault Locator (Optional)
- Data upload to computer and software management

3.2 Specifications

ADSL2+

- 1) Standards: ITU G.992.1 (G.dmt), ITU G.992.2 (G.lite), ITU G.992.3 (ADSL2) ,ITU G.994.1(G.hs), ANSI T1.413 issue #2, ITU G.992.5(ADSL2+) Annex L, Annex M. working mode set to be full-automatic mode.



- 2) Maximal connecting distance is 6.5km; Compatible with ADSL, ADSL2 and READSL
- 3) DSL transmission parameters:
- DSL up/down max speed;
 - DSL up channel speed: 0 ~ 2.5Mbps;
 - DSL down channel speed: 0 ~ 24Mbps;
 - DSL up/down attenuation: 0 ~ 63.5dB;
 - DSL up/down noise margin: 0 ~ 32dB;
 - DSL up/down output power: 0~25dBm
 - Error test for LCD, OCD, HEC;
 - Test INP (Impulse Noise Protection)0-8 ;
 - Test interlaced code: Delay, Depth;
 - Display good DSL connection mode;
 - Judge service quality, 4 grades; Excellent, Good, OK, Poor
 - Display the channel bit chart;
Display SNR Channel Map
 - Display channel Hlog and QLN map
 - Channel mode support fast channel and interlaced channel.

ADSL module

- 1) Standards: ITU G.992.1 (G.dmt), ITU G.992.2 (G.lite), ITU G.994.1 (G.hs), ANSI T1.413 Issue # 2
- 2) DSL transmission parameters:
- DSL up/down max speed;
 - DSL up channel speed: 0 ~ 1Mbps;
 - DSL down channel speed: 0 ~ 8Mbps; □ DSL up/down attenuation: 0 ~ 63.5dB;
 - DSL up/down noise margin: 0 ~ 32dB;
 - DSL up/down output power: 0~25dBm
 - Error test for LCD, OCD, HEC, FEC, CRC;
 - Test INP (Impulse Noise Protection)0-8 ;
 - Display good DSL connection mode;
 - Judge service quality, 4 grades: Excellent, Good, OK, Poor
 - Display the channel bit chart;



Channel mode support fast channel and interlaced channel.

VDSL2 module

- 1) Standard: ITU G.993.2 (VDSL2) . Be compatible with ADSL2+, ADSL standard.
- 2) DSL line transmission parameter
 - DSL line attenuation
 - DSL line noise margin
 - DSL line up channel speed (Inter/Fast mode)
 - DSL line down channel speed (Inter/Fast rate)
 - DSL line up/down maximum rate and capacity ratio □ DMT sub channel bit number: 0~15, and each sub channel frequency points
 - DSL line error number (CRC, HEC, FEC, LCD, OCD)
 - DSL line local output power
 - State display: signal loss, connection close.
 - Error Code Second
 - Impulse Noise Protection (INP)
 - SNR Chart
 - Display channel Hlog and QLN map
- 3) Support the first 7 profiles in total 8 VDSL2 profiles: profile 8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a

DMM test

This tester can test such items as follows:

- 1) AC Voltage: -400 to 400 V; Resolution: 0.1V
- 2) DC Voltage: 0 to 290 V;
- 3) Capacitance: 0 to 1000nF
Accuracy: 0—10nF: $\pm 2\text{nF}$; 10nF-1000Nf: $\pm 2\% \pm 2\text{nF}$
- 4) Loop Resistance: 0 to 20K Ω ;
Accuracy: 0-100: $\pm 3\% \pm 4\Omega$, 100—500: $\pm 3\%$, 500—20 K Ω :
 $\pm 2\%$
- 5) Insulation Resistance: 0 to 50M Ω ;
Accuracy: 0—1.0M: $\pm 0.1\text{ M}\Omega$, 1.0—30M: $\pm 10\% \pm 0.5\text{ M}\Omega$



TDR module (Optional)

TDR Test: precise length test of line fault.

TDR test: Auto test the cable fault distance.

Test scope: within 2.5 km

Test blind zone: <1m

Resolution rate: 1m

Optical Power Meter Module: (Optional)

Measurement Range: -70~+10dbm or -50~+26dbm Calibrated Wavelength:

850/1300/1310/1490/1550/1625nm

Detector: Inga As

Accuracy: $\pm 3\%$ (-10dBm、22°C)

Resolution: Linearity: 0.1%, Non-linearity: 0.01dBm

Visual Fault Locator Module: (Optional)

Output Power: 10mw


Wavelength: 650±20mw


Tone Tracker Module: (Optional):

With supplied accessory, it can do cable tracing and find the trend of the lines.




4. Operation Precautions

- For the first time use, please make sure that the battery is fully charged before initiating machine. (refer to 5.14 item)
- If there is any abnormal phenomenon during operation, please restart the instrument.
- To ensure the normal operation, please press the operation buttons for 0.5 second until you hear the tone.
- The test result will be affected if the user terminal is in use when testing. Please disconnect the user terminal before make a test.
- Please confirm user name, password, VPI/VCI and PAP/CHAP before making PPP dialing.
- If there is  on screen, please operate as it indicates.
- Turn on the tester

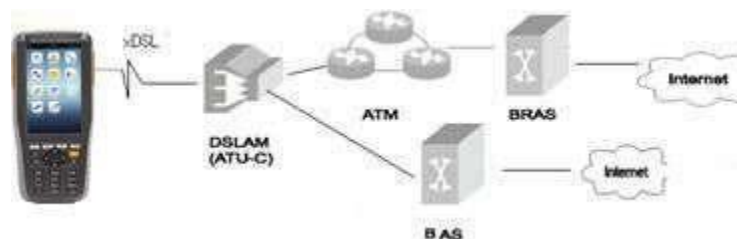
Pressing  button for 1 second, the power LED will shine. After hearing “Di...” sound, the LCD will display the main menu

- Turn off the tester

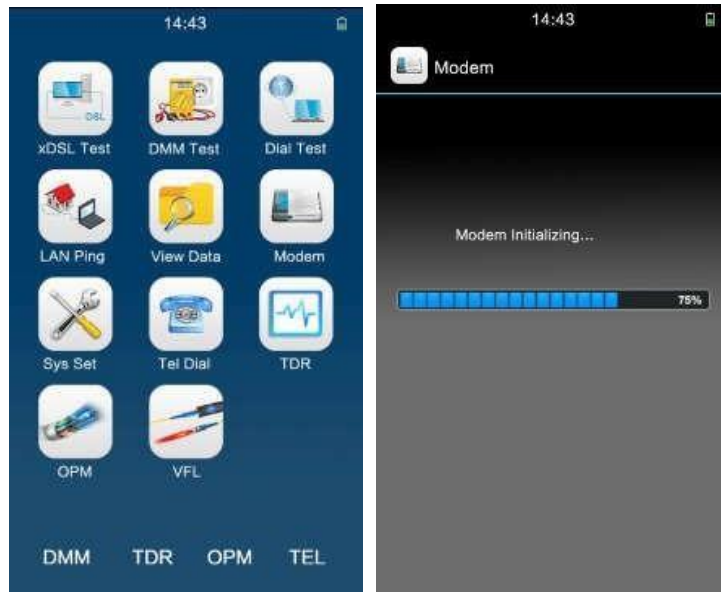
When this tester is in normal working mode, press “” button to turn off the tester step by step.

4.1 xDSL Test

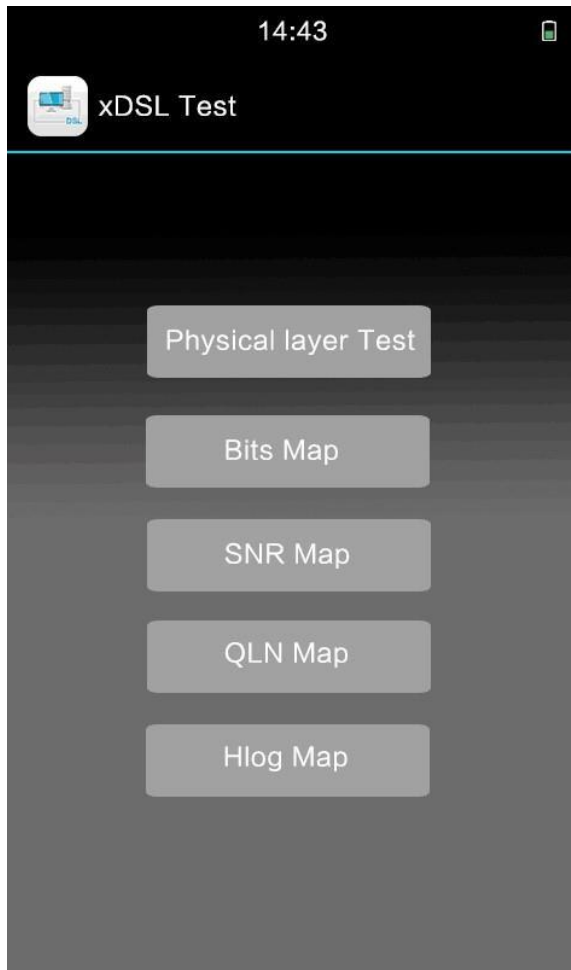
xDSL test also called physical layer test, for testing the physical parameters of xDSL lines, including the current state, link mode, up / down rate, the max rate, noise margin, the power attenuation, power output, CRC error, HEC error, FEC error, LOS error, NCD error and channel bit chart. The details refer to the following picture.



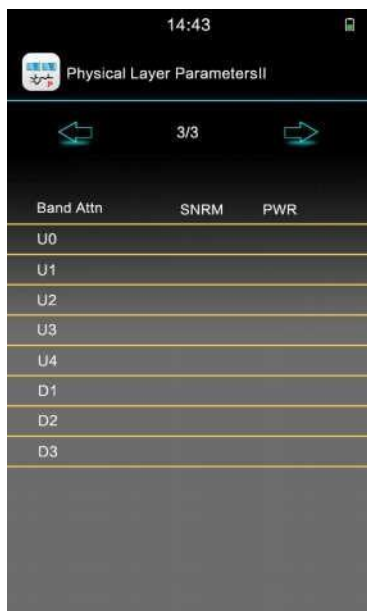
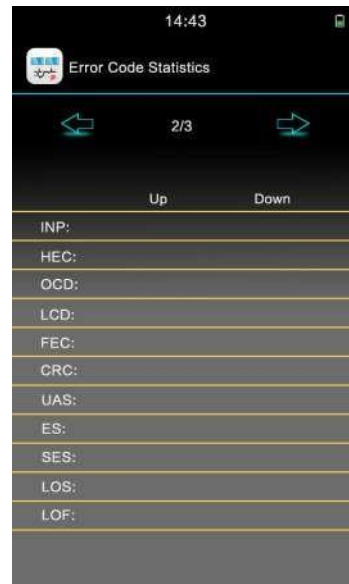
Press  or  to move the cursor to the **xDSL Test** option and press **OK** button to enter the xDSL test interface:



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4.1.1 Physical layer parameter test



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NOTES:

Fitful LNK LED shinning - Modem is not in synchronization and current state is “connecting”.

Steady LNK LED shinning - Modem is synchronizing and current state is “connected”.

Link mode:

ADI: ADI mode of ADSL;

G.dmt: ADSL G.DMT mode, ITU-T G992.1 standard compliance;

G.lite: ADSL G.LITE mode, ITU-T G992.2 standard compliance;

T1.413: ADSL T1.413 mode, ANSI T1.413 issue1 & Issue 2 standard compliance.

G.dmt.bis: ADSL2 G.DMT.BIT mode, ITU-T G992.3 standard compliance;

G.dmt.bisplus: ADSL2+ G.DMT.BISPLUS mode, ITU-T G992.5 standard compliance.

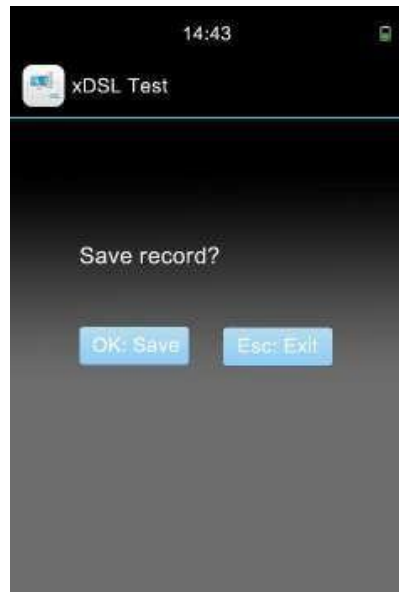
ADSL2/2+:ADSL2+G.dmt.bisplus mode, ITU-T G992.5 compliance.

Service quality: ADSL2+ Tester has 4 levels to show the service quality, that is, to show whether the line is fit for xDSL service and evaluate current service quality. They are:

Excellent, Good, OK and Poor .

4.1.2 Save test records

After the Physical Layer Test, please click “Esc” button tester will display following content.



Press “Esc” button to refuse to save record and return main menu; while press “OK” button to save record and its record number will be displayed as the right bar shows

Additionally, this tester has a memory capacity of 50 records. Once a record is saved, the record No. will increase by one automatically. When the user tries to save 51th record into the tester, the first record will be overlapped. The saved contents include line transmission parameters and channel bit chart as well as error code. Operators can view saved records through “View Data”

4.1.3 Display bit chart

In the below interface, press ▼ button, if the modem isn’t synchronized, then there will no graph.



Press ▼ Button, the bit chart with first 102 channels will be displayed, and then next until all 512 channels are displayed; press “Esc” button to return to the main menu. The number of channel bit chart will be different due to the difference of user line. Usually there are 512 or 256 channels. There will be 4096 channels when in the VDSL mode connection.

4.2 DMM Test

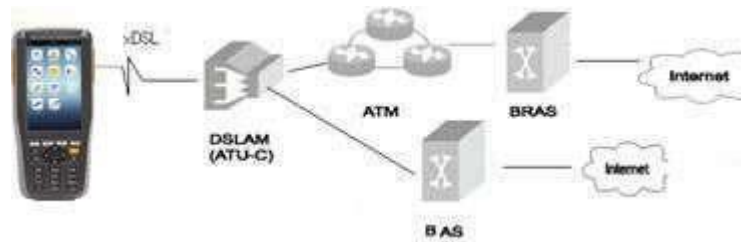
Built-in digital multimeter can test the DC and AC voltage, resistance, capacitance, insulation resistance parameters. Maintenance personnel can use these functions to test if there is danger voltage, or the existence of 48 V voltages on the telephone line. As the following Pictures:





In above picture, get the corresponding values by pressing direction keys

4.3 Dial Test



In main menu , press ▲ or ▼ to select **Dial Test** option.

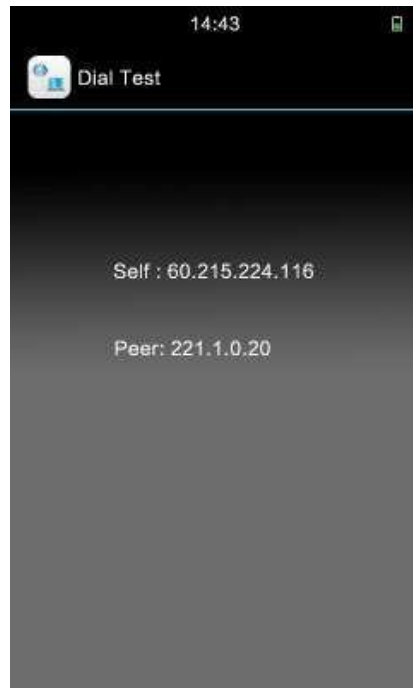
Press “OK” button and Pic. will appears as below:.



4.3.1 PPP dial

Press “OK” button in to do PPP Dial; operators can choose dial mode in Sys Set.

PPP Link LED Bright means the dial success. The PPPoE or PPPoA dialing information as below:



Now if the Modem Sync succeeded, the operator can do PPP dial; if the Modem doesn't sync, operator should wait until the Sync succeed and PPP dial will carry out automatically.

Dial parameters introduction and Modification:

There are 7 groups VPI/VCI parameters. Operators can modify them through management software (Refer to software manual), and also can modify them through the keys of the tester.

The tester has only one fixed PPP test account.

Operator can read or change it through management software (Only can read user name). Operator can also read or change the PPP auth Mode to choose PAP/CHAP Auth Mode. Before test, please confirm the fixed test account and auth mode are correct. Operator can change user name, password and auth mode through keys also.

Among the 7 groups VPI/VCI parameters, only when the testing line's VPI/VCI match 1 of the 7, the user name, the password and auth Mode are all correct, PPP dial will carry out automatically. Display "Failed to authenticate, please test turn off and test later" When dialing , because the xDSL line break inproperly, and the LAN end hang up



the line in a short time. It will be ok according to the operating instruction. VPI (Virtual Path Identifier)

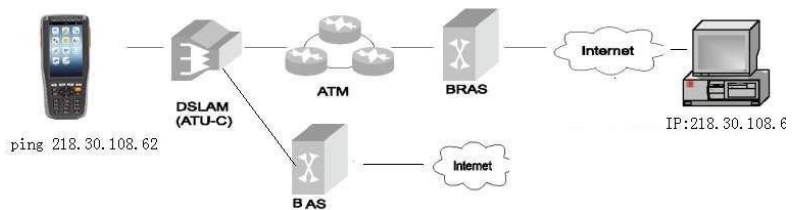
VCI (Virtual Channel Identifier)

Self: Self IP Address

Peer: Remote IP Address

4.3.2 WAN ping

Linking frame refers to the following picture:



Move the cursor to “WAN Ping”, Press “OK”, the following Pic. will be displayed.





WAN ping:

In the above Pic., “Testing, please wait” will be displayed in the screen, after about 8s the test result will comes out as follows:



The above picture shows content:

4 packets transmitted send 4 data packet

4 packets received receive 4 response data packet 0 % loss lost number is 0%

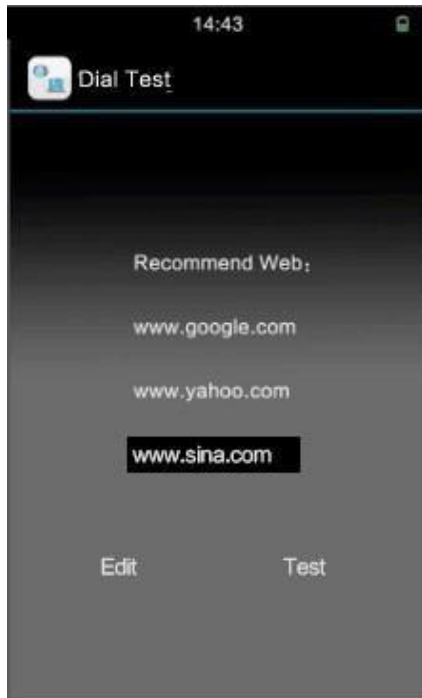
IP: 71.5.7.191 ping destination port IP address If the Dial is failure, when perform Ping Test, there will be “Please confirm the Dial succeeds, or the web is correct, and then perform Ping Test”.

Sometimes the PPP Dial succeeds, but the screen display “Test failure, please retest”. This is caused by the serial port data unstable; users can operate the tester according to the note.



Change the web address:

Move the cursor to the third web, the ‘ Edit’ “ Test” will appear on the screen:

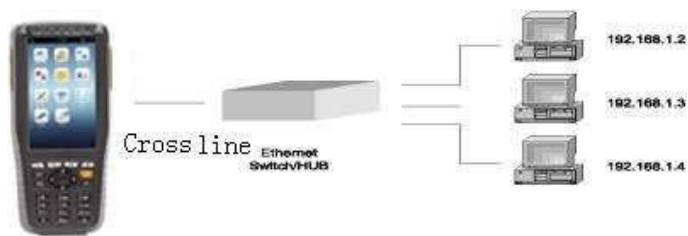


Click “ Edit”, you will see the following pic:



Pay attention that: we can modify the Input Method by pressing #
 4.4 LAN Ping

Connection frame Pic.



(1) LAN PING test → LAN ping

PING tests conducted on the LAN, according to data loss rate, judge the connection of the pinging IP address, judge the effectiveness of IP address, to confirm LAN connection (In the absence of computer).

Connect the LAN port and Ethernet port on the hub through network test line (direct line). A cross-test line is needed if connected with the computer.

(2) WAN PING test -> WAN ping



WAN ping operations please see the dial test.

Connect the ADSL port to the ADSL line to do the Wan ping test. Ping a website IP to the WAN direction to check WAN connectivity links.

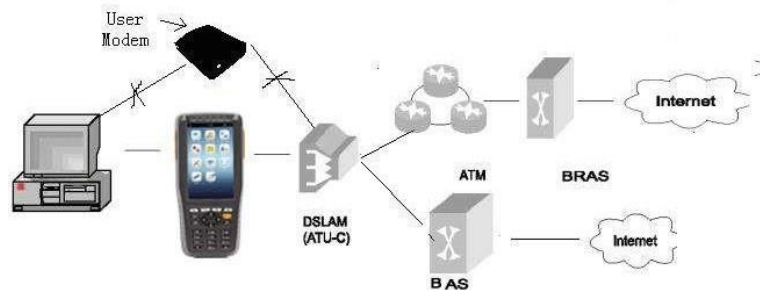
4.5 View Data

In main menu, move cursor to the **View Data** option by pressing ▲ or ▼,

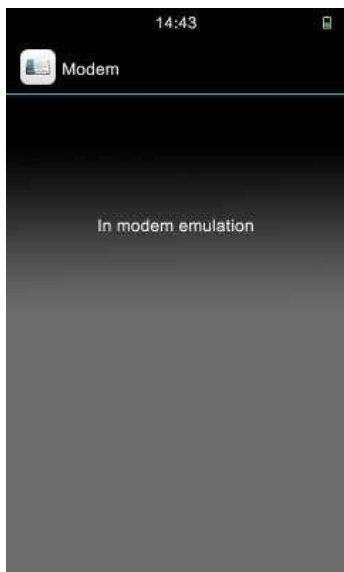
Please press “Esc” button to stop browsing and return the main menu.

4.6 Modem Emulation:

Function Introduction: If the Ethernet can not be connected, firstly, we should test the Modem is good or not. We can use tester replace the user’s Modem. As the following picture:



Then press “OK” button, the tester will display “In Modem emulation state”:





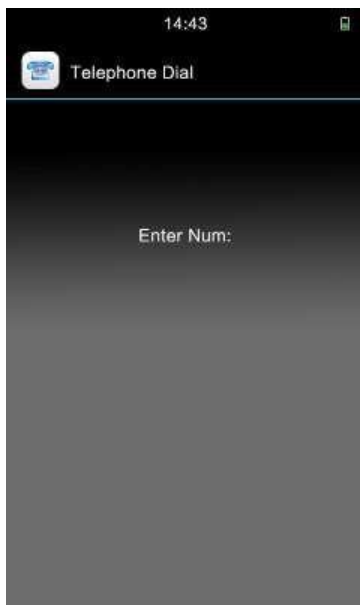
When this tester is in operation, it could be used as xDSL Modem. And user could make dialing or logon the Internet by this tester to see if there is any fault in user Modem.

During Modem emulation the tester works under RFC1483 Bridge mode.

4.7 Tel Dial (Telephone Function)

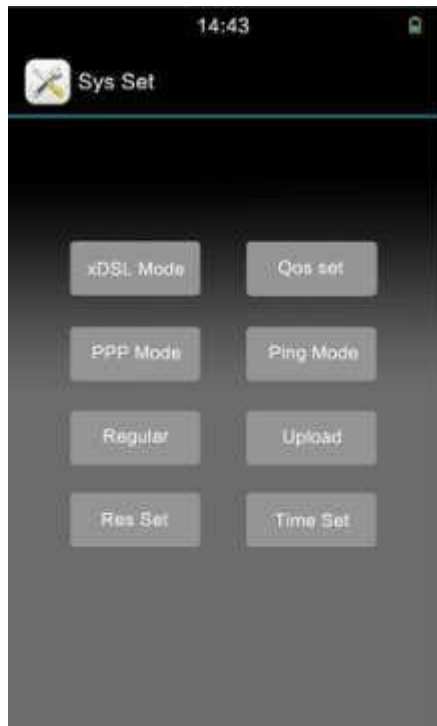
Function Introduction: Inside it a normal telephone is integrated. The user can either answer the phone or call out during a normal ADSL test. Calling won't interrupt the test.

You can hear dialing tone when entering into the dialing interface, press the keyboard to call out. If there is a call the POTS indicator light will flicker and a “didi” sound will be heard on any other interface except the DMM test. You can answer the phone by entering into the dialing interface as Pic. shows:

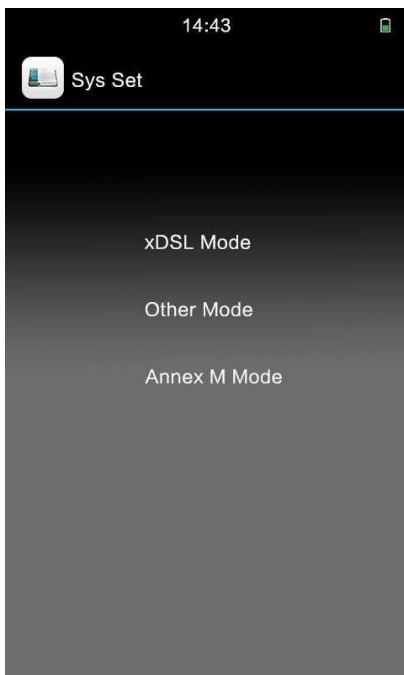


4.8 Sys set (System Set)

In main menu, please move the cursor to the **Sys Set** item by pressing ▲, ▼, ◀, ▶ according to indication. And press the “OK” button to display Modem setting parameters.



4.8.1 xDSL Mode setting





Move the cursor to other Mode, press OK to come into the xDSL mode interface.

If it is the first time to enter xDSL mode set window, the selected item is current xDSL mode setting as Pic. 5.6.1-1 shows.

Other means: G.Dmt, G.lite, T1.413, ADSL2, Annex L, ADSL2+, VDSL2.

Annex M: support ADSL2+'s appendix M, meet down rate 24Mbps, up rate 3.5 Mbps. Press OK key, you set current reverse mode, there is a tip after successful setting.

According to the indication, you can move the cursor to the item you want to set pressing ▲ or ▼. Press “OK” button, then the setting information will be displayed on the screen. If the mode is revised, press “OK” button, the xDSL Modem built in the tester will connect according to you new set standards.

4.8.2 Qos setting

➤ Standard thresholds setting, the quality of service is judged by below 4 parameters.

□



➤

Reverse **Qos Set** and press OK enter this interface.

Real Noise Margin (Down) < Noise Margin of Threshold, the service is poor

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Real Noise Margin (Down) > Noise Margin of Threshold, operators should judge the attenuation.

Reference standard:

- Real Down Attenuation < Down Attenuation of Threshold, service quality: Excellent
- Real Down Attenuation < Down Attenuation of Threshold 1, service quality: Good
- Real Down Attenuation < Down Attenuation of Threshold 2, service quality: OK
- Real Down Attenuation > Down Attenuation of Threshold 2, service quality: Poor

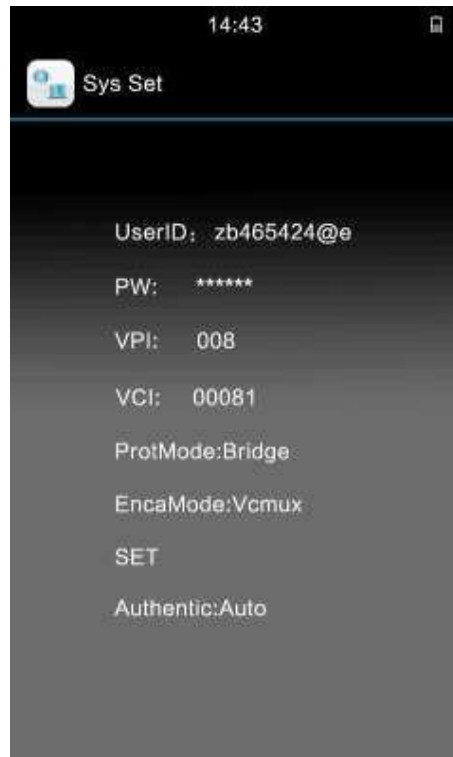
Reference standard:

Noise Margin Threshold	Down attenuation Threshold	Down Attenuation Threshold 1	Down Attenuation Threshold 2
6.0	35.5	48.5	62.5

4.8.3 PPP Mode

Move the cursor to PPP mode; press OK to enter into the modification interface. You can choose “PPPOE” “PPPOA” accordingly.

And after choose “ PPPOE”, the following interface appear :



4.8.4 Ping mode

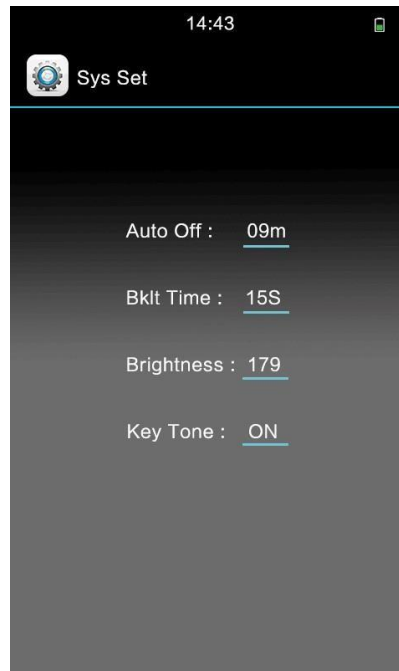
Move the cursor to “Ping Mode”, press OK, ”Ping Mode” setting is as below:



To modify the Ping frequency and Ping packet by press the buttons.

4.8.5 Regular setting

Move the cursor to “Regular”, then press “OK” button to enter into the regular setting interface.



4.8.6 Data upload

Connect the tester to the computer via USB Cable, the test records can be upload to the PC Software (NOTES: The tester must be on the “Data Upload” status)

4.8.7 Restore setting

In the “Res Set” Menu , press “OK”, there will be “Are you sure to restore factory setting?” press “OK”, then the LCD will display manufacturing default settings as shown in

Notice: All the parameters in Modem restore to the factory original setting.

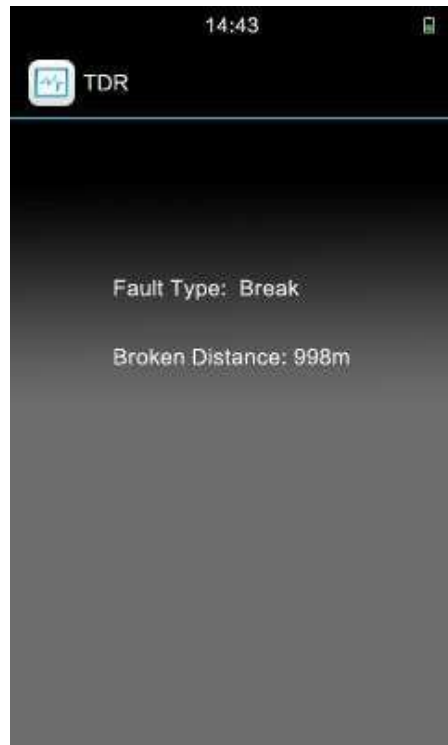
4.8.7 Set Time:



Move the direction keys to set the date and time from above interface

4.9 TDR Test (Optional)

In the “TDR Test” Menu, The tester will perform Auto test, and display the fault type as well the broken distance as below:



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4.10 OPM Test (Optical Power Meter function)



In the “OPM” Menu, customers can choose the right wavelength and the tester will measure the power automatically

4.11 VFL Test (Optional)

In the “VFL” Menu, we can see the following pic:



Press direction keys to “Open” the VFL, the following pic will display:



4.12 Tone Tracker

Applications: It is used to trace the routing path in the disorderly lines.

Method: When the tester enters into the Tone Tracker interface, the tester will produce composite high-frequency signal sound “dudu...”. The receiver head can close to the cable with the help of the receiver end. The receiving end will amplify the received signal and broadcast audio signal. You will hear “dudu...” sound; it is louder near the clip line, the smaller the contrary. The composite high-frequency signal will turn off when exiting the tracing interface.

5. Charge battery

The tester has a chargeable 7200mAh Li-polymer battery. After starting the tester the battery capacity will be shown in the top right corner of LCD. When the battery symbol is empty please charge it in time, otherwise the tester will display “Switch off after one minute as low voltage”



Charge method: Insert the charger into the charge jacket which is on the top. Then connect charger with 220V AC power socket. If the LED on charger is shining and red it means that the tester is being charged. And charge time is 6~7 hours or so. If the LED turns green from red it means that the battery is fully charged. Please take off the charger.

To ensure to get correct results and protect tester please don't operate the tester when being charged.

6. Faults and solutions

Faults	Reasons	Solutions	Notes
Link LED and PPP LED are in abnormal condition.	Low voltage.	Charge battery.	
PPP dialing failed.	Wrong username or password	Input correct username or password.	
PPP dialing failed with correct username and password	Parameters abnormal on the modem register	Enter into the Sys set, restore factory settings	

7. xDSL test management software

xDSL test management software is the management software of this tester, read real-time data, parameter setting, read and save the record and record analyze functions to help you conveniently and efficiently use this tester.

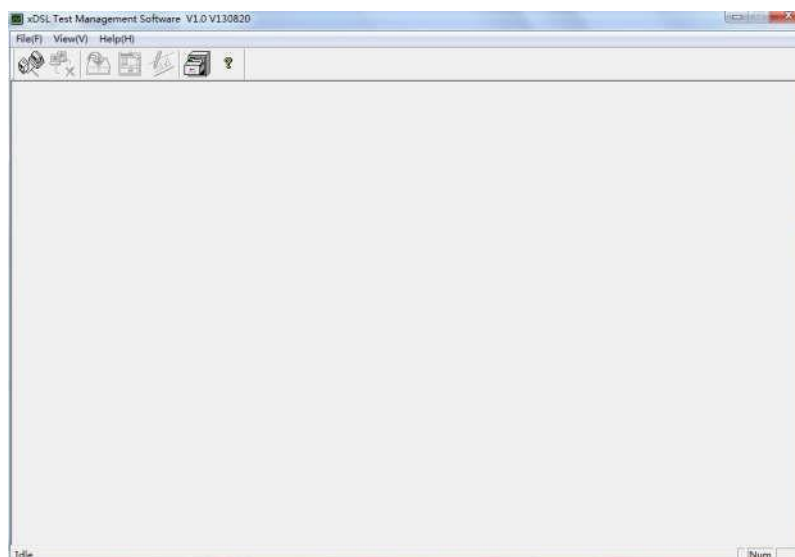


7.1 Operation environment

In “Data upload” state, Connect the VDSL Tester via USB Cable, operators can use the software to read and print the records:

7.2 Software function introduction

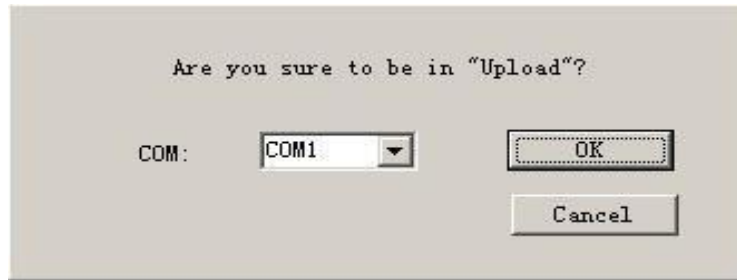
After connecting with the USB port, software will display the physical layer data statistics, channel bit chart, VCI VPI, authentication, may revised VCI VPI, authentication information, ping destination address. Instruments will be read in the records and documents stored in the form of local and analysis the records.



Pic 7.2.1

Connect this tester and Management software.

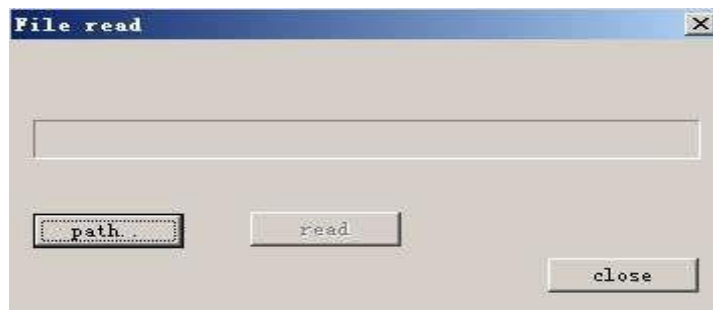
Connect the tester with PC by USB port, choose the USB port you connected, then you can find the chosen port window (Pic7.2-2). Choose the current port and make sure the machine is in the function of data upload, and then click on OK button, the connection is successful.



Pic 7.2.2


7.3 Records upload

Choose the file -> read record menu, the “FILE READ” window comes out, then click “Path” and enter the file name (the default for the current date DSL –year –month –date –hour –minute –second, Make sure the file extension is .dsl), click “Read” button to upload records. “Upload success” will display after upload.



7.4 Real-time data

7.4.1 Physical layer data


Click the icon  or choose menu view-> physical data when the connection is successful, then will popup the physical window(chart 7.4-1),and show the current physical data.

Status		Showtime		Standard		VDSL2 Annex B		
Physical info								
	Curr Rate	MaxRate	Atten	Margin	Power			
Up	33456	32598	0.0	6.6	7.4			
Down	38901	39280	18.6	6.2	14.5			
Band								
	U0	U1	U2	U3	U4	D1	D2	D3
Atten	N/A	15.5	13.7	N/A	N/A	16.2	24.9	N/A
SNR	N/A	6.4	6.6	N/A	N/A	6.1	6.2	N/A
TxFover	N/A	0.0	6.6	N/A	N/A	13.4	7.8	N/A
Data statistics								
	ISP	MBC	OCN	LCN	FEC	CRC		
Up	0.00	0	0	0	3518	4		
Down	0.50	82	0	0	26710	5		

Pic 7.4.1

7.4.2 Tester setting

After the successful connection between software and

this tester. Click the chart  on tool bar or you can choose the menu view->set button when the connection is successful, will popup the set window(Pic 7.4-2) .The set window will display the current data, if any data be changed , click “set” to confirm.

VPI/VCI
 VPI: VCI:

Ping
 LAN ping:
 WAN ping:

User/Password
 User:
 Pass:

Encapsulation Mode
 LLC Other


Protocol Mode
 PPPoA PPPoE Bridge

DSL Mode
 annex M Other

Pic 7.4.2

7.5 Record browse



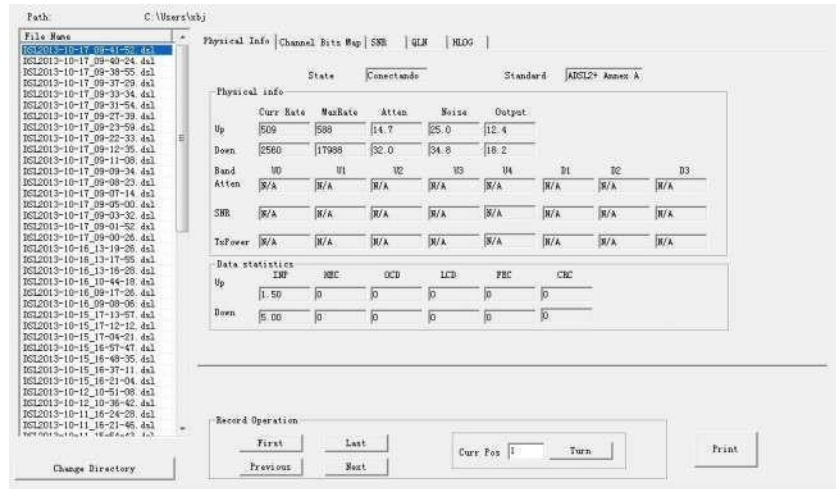
Click the chart  on tool bar or you can choose the menu view->record view, will popup the record view window (Pic 7.5-1) .Click the “Choose patch” button, if the record saved in local patch is available. The data will display when you double click on the file name.

7.5.1 The way to check the file:

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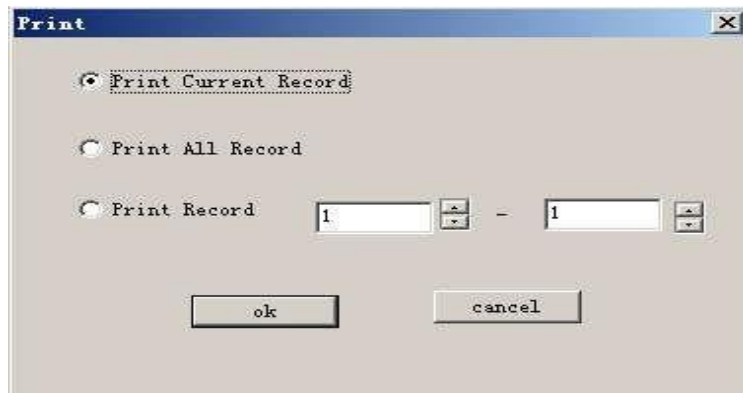
1. Input the file No. on the “Pos” of left bottom, click the button” turn”, then you can check the file.
2. Click the bottom buttons to browse files one by one
“First” go back to the No.1 file
“Previous” go back to the previous file “Next” next file “Last” last file.



Pic 7.5.1

7.5.2 Data print out

If the data need to be printed. Click on the print button you can choose the request print area in the print window (Pic 7.5-2).





Contact us: sales@gaotek.com

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