



# MaxTester 635G

HANDHELD SOLUTION FOR ULTRA-BROADBAND INSTALLATION AND MAINTENANCE

- Efficient copper characterization to 35 MHz and DSL/Gfast analysis for the installation and maintenance of ultra-broadband deployments.



## KEY FEATURES

Gfast with backwards compatibility to VDSL2 and ADSL2+ with one test tool

Compatible with EXFO Connect for cloud-based test asset management

Spectrally compatible VDSL2 35b support and, VDSL2 and ADSL2+ bonding

Adherence to existing methods and procedures is easy with single-ended testing or via testing to a far-end device (FED), including high-voltage stressed balance testing

High resolution 6-inch touchscreen with dual 1 GigE ports and single test lead connection supporting both Gfast/DSL and copper testing to 35 MHz bandwidth

Designed to face the challenges of the outside plant environment, with an IEC IP54 rating

## APPLICATIONS

FTTx / MDU, Gfast, VDSL2 35b and VDSL2 vectored installations

Bonded-VDSL2 and ADSL2+ deployments

Multiplay service assurance (Internet, IPTV, and VoIP), inclusive of Internet throughput validation using Speedtest™ by Ookla®)

FTTdp deployments

Gfast-based mobile backhaul, DAS or small cell deployments

Validate bandwidth performance and speed, using Speedtest by Ookla, HTTP, FTP, or iPerf

Determine the maximum ADSL2+, VDSL2-17a, and VDSL2-35b data rates that a copper loop could support, prior to connecting/provisioning the circuit and equipment, with the MaxTester's Data Rate Prediction (ADRP) pre-qualification report

## THE MAXTESTER SERIES



Copper, VDSL2, multiplay test solutions  
MaxTester 600 Series

OTDR  
MaxTester 700B Series



Fiber certifier OLTS  
MaxTester 940



## INSTALLATION AND REPAIR OF VOICE, BROADBAND, AND ULTRA-BROADBAND DEPLOYMENTS

The MaxTester 635G (MAX-635G) is a complete DSL and copper test set that features the latest in ADSL2+, VDSL2, and Gfast (ITU-T G Series 9700 and 9701 recommendations for fast access to subscriber terminals) chipset based connectivity technologies. Featuring traditional copper measurements (voltage, resistance, capacitance and time domain reflectometry) and highly automated scripted tests, the MAX-635G offers everything a technician needs to complete jobs efficiently.

For service providers considering Gfast as a possible future offering, the MAX-635G provides operators today with support for enhanced VDSL2 35b, VDSL2 and ADSL2+ single pair and bonding, in addition to copper testing capabilities. Coupled with the MAX-635G's small form factor, rugged design, easy-to-use menus and clear pass/fail test result conclusions technicians can close their jobs quickly and efficiently. The large touchscreen display makes it intuitive and user friendly. When it comes to saving results, it provides technicians with many connectivity options for uploading tests and compiling reports.

## WORK SMARTER WITH THE MAX-635G

Equipped with SmartR™, the MAX-635G allows technicians to work smarter, not harder. SmartR is a suite of intelligent and automated tests that enable any technician to quickly and easily get an understanding of the condition of the line under test, as well as to identify and locate a variety of common circuit faults. The Pair Detective feature automatically runs the most common line tests and provides graphical, color-coded results and pass/fail indications to detect conditions including shorts, grounds, opens, battery, splits and imbalances. Fault Mapper utilizes time-domain reflectometry (TDR) and resistive-fault location (RFL) technology to provide the additional capability of locating service-affecting line faults including bridged taps, shorts, grounds and opens. EXFO's unique SmartR presents results in an easy-to-understand, graphical format with plain language feedback, making copper troubleshooting easier than ever before.

## COMPREHENSIVE METALLIC TESTING

Verification of copper quality is a snap with the copper measurement capabilities of the MAX-635G. Thanks to its industry standard AC and DC voltage, resistance (shorts), capacitance (opens), power influence, balance and impulse noise measurements, technicians obtain clear graphical results with simple pass/fail indications. The MAX-635G also features a POTS dialer, an optional TDR with dual-trace comparison capability, and optional 2/4 wire RFL & K-test measurements for pinpointing loop faults. Technicians have the choice of running single-ended tests, or running tests against an optional far-end device (FED).

## MULTIPLAY PERFORMANCE MANDATE

Ultra-broadband Gfast and enhanced VDSL2 deployments such as VDSL2 35b are driven by subscriber requirements for flawless IPTV and over-the-top (OTT) video, high speed downloads and uploads, social networking push and pulls, and online gaming (e.g., MMORPG), to name a few. The MAX-635G allows technicians to connect subscriber equipment (e.g., PC, STB, gaming console) to its LAN port to transfer Gfast data at speeds up to 1000 Mbit/s. The MAX-635G offers service providers and contractors the same TCP throughput test methods that subscribers use today; namely the Speedtest by Ookla, which is the industry's standard solution. With Speedtest by Ookla, technicians will be able to validate the bandwidth available to the subscriber.

The MAX-630G offers 2.4/5 GHz WiFi scanning capability to provide technicians the ability to validate signal strength (RSSI) in the customer premise. Improperly placed modems, residential gateways (RG), routers, and/or set top boxes (STB) can impact WiFi performance and frustrate the customer if quality WiFi is not available.



## NOISE MITIGATION FEATURES

Ensuring the highest quality multiplay services to customers is critical for service providers deploying ultra-fast broadband connectivity. With an aging copper plant and the need to maximize the use of all pairs in the cable bundle, it is imperative that the appropriate mechanisms are in place to mitigate the impact of noise. Noise is a significant service-affecting condition that can have a major affect on the multiplay quality of experience. The MAX-635G has a number of measurements to help mitigate noise. Starting with determining the copper's ability to mitigate noise using stressed balance, longitudinal balance and impulse noise detection, the DSL chipset offers INP (impulse noise protection), G.INP (impulse noise protection and physical-layer retransmission as defined by ITU-T G.998.4) and vectoring (ITU-T G.993.5) plus a complete set of DELT measurements for attenuation, noise and SNR for tone analysis up to 106 MHz.

## KEY CHARACTERISTICS



- 1 GigE RJ45 ports (2)—sealed against the environment
- 2 Gfast, VDSL2, and ADSL2+ RJ11 port—sealed against the environment
- 3 All-round rubber bumper
- 4 Single test lead connection—banana connectors supporting Gfast/DSL and copper testing
- 5 Touchscreen color LCD—daylight visible
- 6 Interface connections—water and dirt protected
- 7 Innovative and icon-driven user interface
- 8 Handgrip area
- 9 Simple keypad

## ALL THE RIGHT FEATURES FOR INSTALLATION TECHNICIANS

With its small form factor, the MAX-635G can go anywhere the technician needs to go. It is rugged and lightweight, and protected from the rain—just what is needed for the demanding outside plant environment. The user interface of the MAX-635G was designed with simplicity and efficiency in mind. The large touchscreen display features colored icons and graphics for easy configuration and operation, and is simple to use for both experienced and novice users. Users can “capture” important GUI screens, whether menu’s or test results with the Screen Capture capability of the MAX-635G. Users can save the data to a USB memory device or upload to EXFO Connect’s File Manager.

## AUTOMATED SERVICE TESTING

Testing ultra-broadband circuits with the MAX-635G is easy with customizable profiling. Setup the unit to do routine jobs or setup custom profiles for special projects. Test profiles can easily be transferred between units using USB or EXFO Connect to ensure that all technicians from the same organization are testing to the same specifications. In addition, the MAX-635G boasts customizable thresholds allowing all technicians to visualize pass or failed conditions so they can quickly move on to the next job or investigate further.

## DATA MINING OF RESULTS



In today’s highly competitive network service provider environment, quality of service delivered to subscribers is paramount. With a solution such as EXFO Connect and EXFO Sync combined with the MAX-635G, service providers can manage their fleet of MaxTester units and ensure that they have the most up-to-date software installed and properly configured. These solutions on the MAX-635G also make it possible for service providers to have test results in hand for data mining and post-visualization purposes, thereby enabling them to proactively manage loop plants and ensure that they are of the highest quality.

**AUTOMATE ASSET MANAGEMENT. GET CONNECTED.**

The EXFO Connect cloud-hosted solution provides an automated, secure environment that links your EXFO test instruments together and enables the management of your deployed inventory of test sets.

EXFO Connect enables automated downloads of latest software versions to all test sets in the field to ensure consistency of testing across the organization. Test profiles and threshold settings may also be deployed to all units, to mandate testing according to the latest procedures. Enable EXFO Connect on your fleet of MaxTester units to improve operational efficiency at all levels of your business.

**KEY FEATURES**

		
<b>TEST EQUIPMENT MANAGER</b> Automated inventory tracking and software download	<b>FILE MANAGER</b> Download/upload files, work orders, test configurations or procedure documents	<b>CONTRACTOR MODE</b> Secure, segregated access for test-result upload, and automated file download

Visit [EXFO.com/EXFOConnect](http://EXFO.com/EXFOConnect) for details and features compatibility with the MaxTester handheld series.

**REAL-TIME COPPER TEST RESULTS UPLOAD—STRAIGHT FROM THE FIELD**

Working in the field with an Android™ or iOS™ device?  
Download the EXFO Sync application for your smart device.\*

EXFO Sync is an app (runs on Android and iOS) that operates together with the MAX-635G copper, DSL and IP field test set. This application provides a fully automatic copper test script and wireless transfer of the results files to a phone or tablet for upload to the customer's server.

With EXFO Sync, your copper test results can be uploaded in real-time to a central location for access and further analysis to identify trouble patterns, assess technician performance or target customers for upsell to higher revenue services.

- Copper test result are uploaded, live from the site
- GPS tagging gives visibility of location of test for mapping of test history and network performance
- Ensure compliance to service provider workflow process
- Flexibility to upload test results to an FTP or HTTPS server
- Secure, password-protected connection to upload and access results

\* Upload to smart devices is supported only over WiFi and only for the copper and DSL autotests.

Download from



## GFAST/DSL SPECIFICATIONS

DSL chipset	Broadcom 63138	
Standards compliance	ADSL1/2/2+	<ul style="list-style-type: none"> <li>• ITU-T G.992.5 (ADSL2+ including annex A, B, J, and M)</li> <li>• ITU-T G.992.3 (ADSL2 including annex A, B, J and L)</li> <li>• ITU-T G.992.1 (G.DMT including annex A and B)</li> <li>• ITU-T G.994.1</li> <li>• ATIS/ANSI T1.413 issue 2</li> <li>• IEEE 802.3ah (PTM)</li> <li>• ITU-T G.998.1, 2 (ATM, Ethernet bonding)</li> <li>• ITU-T G.998.4 (G.INP)</li> <li>• ITU-T G.992.5 (INP amendment)</li> <li>• DT 1 TR 112 U-R</li> </ul>
	VDSL2	<ul style="list-style-type: none"> <li>• ITU-T G.993.2 annex A, B, Q, Y</li> <li>• Profiles: 8a/b/c/d, 12a/b, 17a, 30a, 35b</li> <li>• Band Plan: 997, 998, US0</li> <li>• IEEE 802.3ah (PTM)</li> <li>• ITU-T G.998.2 (Ethernet bonding)</li> <li>• ITU-T G.998.4 (G.INP)</li> <li>• ITU-T G.993.5 (G.vector)</li> <li>• DT 1 TR 112 U-R2 (U-RV)</li> </ul>
	Gfast	ITU-T G.9700, G.9701
DSL parameters	<ul style="list-style-type: none"> <li>• Maximum attainable bit rates</li> <li>• Actual achieved bit rates</li> <li>• Actual bonded achieved rates</li> <li>• Latency mode: fast, interleaved</li> <li>• Data modes: ATM, PTM</li> <li>• Capacity (%)</li> <li>• SNR margin</li> <li>• Output power</li> <li>• Attenuation</li> <li>• Bits/tone</li> <li>• Hlog/tone (attenuation/tone)</li> <li>• QLN/tone</li> <li>• SNR/tone</li> <li>• ALN/tone</li> </ul>	<ul style="list-style-type: none"> <li>• Interleave depth</li> <li>• Interleave delay</li> <li>• Trellis coding</li> <li>• Bit swapping</li> <li>• INP value</li> <li>• PhyR, G.INP state, performance counters</li> <li>• Vectoring state, performance counters</li> <li>• LOS, FEC, CRC, HEC, SES</li> <li>• LATN per band</li> <li>• SATN per band</li> <li>• EWL</li> <li>• kI0 and kI0 per band</li> <li>• Vendor code, revision</li> </ul>

MULTIPLAY TESTING SPECIFICATIONS	
Test interfaces	<ul style="list-style-type: none"> <li>• Gfast</li> <li>• VDSL2</li> <li>• ADSL1/2/2+</li> <li>• Ethernet 10/100/1000 BT</li> </ul>
Encapsulation methods	<ul style="list-style-type: none"> <li>• RFC 2684/Bridged Ethernet/IPoE (IPv4 and IPv6)</li> <li>• IPoA (RFC 1577)</li> <li>• PPPoE (RFC 2516)</li> <li>• PPPoA/LLC and PPPoA/VC-MUX (RFC 2364)</li> </ul>
Operating modes	<ul style="list-style-type: none"> <li>• DSL terminate</li> <li>• DSL to Ethernet pass through</li> <li>• Ethernet terminate</li> <li>• Ethernet to Ethernet bridged pass through</li> </ul>
Login format	User name and password using PAP/CHAP
Connectivity support	<ul style="list-style-type: none"> <li>• IPv4 and IPv6 LAN/WAN status</li> <li>• IPv4 and IPv6 DNS, gateway</li> <li>• IPv4 DHCP client/server, DHCP vendor class</li> <li>• IPv6 DHCP client</li> <li>• NAT</li> <li>• VLAN ID, VLAN tagging</li> <li>• VPI/VCI</li> <li>• IP release</li> <li>• Multi-VLAN support</li> </ul>
Throughput test	<ul style="list-style-type: none"> <li>• Methods supported: Speedtest by Ookla, iPerf3</li> <li>• Address: auto-configured for Speedtest, URL or IPv4 address for iPerf3</li> <li>• Direction: upload and/or download</li> <li>• Speedtest results displayed: download and upload speed in Mbit/s, ping in milliseconds (ms), host, location, country and sponsor</li> <li>• iPerf results displayed: download and upload speed in kbit/s</li> </ul>
Ping test	<ul style="list-style-type: none"> <li>• Ping destination: gateway, IPv4 or IPv6 address or URL</li> <li>• Number of pings: 1 to 99</li> <li>• Packet size: 32 to 1200 bytes (32 is default)</li> <li>• Timeout period: 1 to 10 s</li> <li>• Results displayed: packets sent/received and average round-trip delay (ms)</li> </ul>
Traceroute test	<ul style="list-style-type: none"> <li>• Traceroute destination: gateway, IPv4 address or URL</li> <li>• Timeout period: in seconds, default is 1 s, maximum is 10 s</li> <li>• Packet size: 32 bytes</li> <li>• Number of hops: 1 to 32 (default is 30)</li> <li>• Results displayed: indicates IPv4 address of hop and round-trip time in ms</li> </ul>
FTP test	<ul style="list-style-type: none"> <li>• Address: IPv4 address or URL</li> <li>• Direction: upload and/or download</li> <li>• Results displayed: time, kB transferred, bit rate in kbit/s</li> </ul>
HTTP test	<ul style="list-style-type: none"> <li>• Address: URL</li> <li>• Direction: download</li> <li>• Simultaneous download sessions: 1 to 4</li> <li>• Results displayed: kB transferred, bit rate in kbit/s</li> </ul>
WiFi scanning (option)	<ul style="list-style-type: none"> <li>• 2.4 GHz support</li> <li>• View channel number, SSID, MAC address, RSSI value</li> <li>• Sort by channel number or RSSI value</li> </ul>
Web browser	<ul style="list-style-type: none"> <li>• Address: IPv4 address or URL</li> <li>• Bookmarks: user-definable</li> </ul>
VoIP testing (software option)	<ul style="list-style-type: none"> <li>• Protocol support: SIP (IPv4)</li> <li>• Codecs: G.711 <math>\mu</math>-Law, G.711 A-Law</li> <li>• Interface support: ADSL1/2/2+, VDSL2, Gfast, Ethernet</li> <li>• Parameter/functionality: <ul style="list-style-type: none"> <li>– Test duration timer</li> <li>– MOS (current, average)</li> <li>– R-Factor (current, average)</li> <li>– Latency (current, average, maximum)</li> <li>– Jitter (current, average, maximum)</li> <li>– Packets (lost, total)</li> </ul> </li> </ul>
IPTV testing (software option)	<ul style="list-style-type: none"> <li>• Supported video standards: MPEG2, MPEG4 part 2 and 10 (H.264/AVC), Mediarem/WM9/VC1</li> <li>• Operating modes: DSL terminate and Ethernet terminate</li> <li>• Parameters/functionality: <ul style="list-style-type: none"> <li>– IGMP version 2 and 3</li> <li>– (IPv4) join/leave requests with STB emulation <ul style="list-style-type: none"> <li>– Automatic tests to join/leave and analyze up to 5 (five) simultaneous streams</li> <li>– Programmable channel list for storage of commonly used channels</li> <li>– Bandwidth usage per channel</li> <li>– IGMP (IPv4) packet and rate information per line and channel</li> <li>– Multicast RTP/UDP IP stream support</li> <li>– Key IP video QoS parameters, packet loss, zap time, PID statistics</li> <li>– Graphical results</li> <li>– Transport</li> </ul> </li> </ul> </li> </ul>



COPPER SPECIFICATIONS <sup>a, b, c</sup>

Transmitter characteristics				
Frequency range (200 Hz to 20 kHz)	Frequency resolution	1 Hz steps		
	Frequency uncertainty (accuracy)	$\pm (50 \text{ ppm} + 1 \text{ Hz})$		
	Level range (dBm)	-20 to 10 at 600 $\Omega$		
	Level resolution	0.1 dB		
	Level uncertainty (accuracy)	$\pm 1 \text{ dB}$		
	Impedance ( $\Omega$ )	600		
Frequency range (20 kHz to 2.2 MHz)	Frequency resolution	1 kHz steps		
	Frequency uncertainty (accuracy)	$\pm (50 \text{ ppm} + 100 \text{ Hz})$		
	Level range (dBm)	-20 to 10 at 100 $\Omega$		
	Level resolution	0.1 dB		
	Level uncertainty (accuracy)	$\pm 1 \text{ dB}$		
	Impedance ( $\Omega$ )	100, 120, 135, 150		
Frequency range (2.2 MHz to 30 MHz)	Frequency resolution	1 kHz steps		
	Frequency uncertainty (accuracy)	$\pm (50 \text{ ppm} + 100 \text{ Hz})$		
	Level range (dBm)	-20 to 0 at 100 $\Omega$		
	Level resolution	0.1 dB		
	Level uncertainty (accuracy)	$\pm 1 \text{ dB}$		
	Impedance ( $\Omega$ )	100, 120, 135, 150		
Receiver characteristics				
	Reception frequency range	200 Hz to 20 kHz 20 kHz to 35 MHz		
	Frequency uncertainty range (accuracy)	$\pm (50 \text{ ppm} + 1 \text{ digit})$ for 20 kHz to 30 MHz		
	VF reception level range (dBm)	-90 to 15 at 600 $\Omega$		
	VF level uncertainty (accuracy)	200 Hz to 20 kHz -90 dBm to -50 dBm, uncertainty (accuracy) $\pm 2 \text{ dB}$ -50 dBm to 15 dBm, uncertainty (accuracy) $\pm 1 \text{ dB}$		
	WB reception level range (dBm)	-90 to 15 at 100 $\Omega$ and 135 $\Omega$		
	WB level uncertainty (accuracy)	20 kHz to 2.2 MHz -90 dBm to -50 dBm, uncertainty (accuracy) $\pm 2 \text{ dB}$ -50 dBm to 15 dBm, uncertainty (accuracy) $\pm 1 \text{ dB}$ 2.2 MHz to 30 MHz -90 dBm to -50 dBm, uncertainty (accuracy) $\pm 2 \text{ dB}$ -50 dBm to 15 dBm, uncertainty (accuracy) $\pm 1 \text{ dB}$		
	Impedance ( $\Omega$ )	100, 120, 135, 150, 600		
POTS dialer				
	DTMF	0 - 9, #, *		
	Phonebook	25 entries		
Digital multimeter (DMM)				
	Test type	Snapshot and continuous		
	Impedance selection (for voltage measurement)	100 k $\Omega$ , 1 M $\Omega$		
	<b>Measurement</b>	<b>Range</b>	<b>Resolution</b>	<b>Uncertainty (accuracy)</b>
	DC voltage	0 to 400 V	0.1 V for 0 to 99.9 V 1 V for 100 V to 400 V	$\pm (1\% + 0.5 \text{ VDC})$
	AC voltage	0 to 280 Vrms	0.1 V for 0 to 99.9 V 1 V for 100 V to 280 V	$\pm (1\% + 0.5 \text{ VAC})$
	Isolation resistance (stress/leakage)	0 to 1 G $\Omega$ , auto-ranging 1 k $\Omega$ to 99 M $\Omega$ 100 M $\Omega$ to 999 M $\Omega$	Three digits	$\pm (2\% + 1 \text{ digit})$ $\pm (5\% + 1 \text{ digit})$
	Resistance	0 to 100 M $\Omega$ 0 to 999 $\Omega$ 1 k $\Omega$ to 100 M $\Omega$	Three digits	$\pm (1\% + 5 \Omega)$ $\pm (2\% + 1 \text{ digit})$
	Capacitance	0.1 nF to 2 $\mu\text{F}$	Four digits	$\pm (2\% + 50 \text{ pF})$
	DC current	0 to 110 mA	0.1 mA	$\pm (2\% + 1 \text{ mA})$
	AC current	0 to 110 mA	0.1 mA	$\pm (2\% + 1 \text{ mA})^d$
	Station ground	0 to 1 M $\Omega$ 0 to 999 $\Omega$ 1 k $\Omega$ to 1 M $\Omega$	Up to three digits	$\pm (1\% + 3 \Omega)$ $\pm (2\% + 1 \text{ digit})$

a. Subject to change without notice.

b. Typical, at 23 °C  $\pm$  3 °C, on batteries, with no type B USB connection.

c. Specifications based on 24 AWG (PE 0.5 mm) cabling.

d. From 10 mA to 110 mA.

COPPER SPECIFICATIONS <sup>a, b, c</sup> (CONTINUED)

Isolation resistance (stress/leakage) (continued)	Source	50 to 500 VDC (current safely limited to 2 mA)
	Soak timer (s)	1 to 60
VF noise measurement	Frequency range	200 Hz to 20 kHz
	Level range (dBm)	-90 to 20
	Resolution (dB)	0.1
	Uncertainty (accuracy)	-90 dBm to -50 dBm, uncertainty (accuracy) $\pm 2$ dB -50 dBm to 20 dBm, uncertainty (accuracy) $\pm 1$ dB
	Filters	ITU: none, psophometric, P-notched, 3.4 kHz, D-filter, 15 kHz ANSI: none, C-message, C-notched, 3.4 kHz, D-filter, 15 kHz
	Impedance ( $\Omega$ )	600
VF impulse noise	Low threshold (dBm)	-40 to 0, in 1 dB steps
	Mid threshold	Low threshold plus separation
	High threshold	Mid threshold plus separation
	Separation (dB)	1 to 6, in 1 dB steps
	Dead time (ms)	125
	Filters	None, 3 kHz flat, C-message, psophometric, notched and D filter (IEEE 743-1995)
	Counter	Maximum 999 for each threshold
	Timer	Maximum 100 hours
Power influence (noise to ground)	Noise range (dBm)	-60 to 10
	Uncertainty (accuracy)	-60 dBm to -50 dBm $\pm 2$ dB -50 dBm to 10 dBm $\pm 1$ dB
VF longitudinal balance	Frequency (Hz)	1004
	Level range (dB)	0 to 100
	Level uncertainty (accuracy) (dB)	$\pm 1$
	Impedance ( $\Omega$ )	600
Time-domain reflectometer (TDR)	Modes	Automatic, Manual, Peak, Xtalk (Crosstalk), Differential
	Distance range (m)	0 to 6700 (0 ft up to 22 000 ft)
	Pulse width	15 ns to 20 $\mu$ s
	Amplitude	7.5 V p-p on cable, 9 V p-p open circuit
	Velocity of propagation (VOP)	0.400 to 0.999
	Distance uncertainty (accuracy) <sup>d</sup> (m)	$\pm(0.5 \text{ m} + 1 \% \times \text{distance})$
	Units	Meters and feet
Load coil detection	Count	Up to 5
	Plot (kHz)	Up to 10
	Distance range (m)	Up to 8000 (up to 27 000 ft)
Near-end crosstalk (NEXT)	Frequency range	10 kHz to 30 MHz
	Level range (dB)	0 to 90
	Level resolution (dB)	0.1
	Level uncertainty (accuracy)	2.2 MHz: $\pm 2.0$ dB, from 0 to 90 dB 8 MHz: $\pm 2.0$ dB, from 0 to 80 dB 12 MHz: $\pm 2.0$ dB, from 0 to 75 dB 17.6 MHz: $\pm 3.0$ dB, from 0 to 75 dB 30 MHz: $\pm 3.0$ dB, from 0 to 68 dB
	Terminations ( $\Omega$ )	100, 120, 135, 150
Return loss	Test type	Single, sweep
	Frequency range	20 kHz to 2.2 MHz
	Dynamic range (dB)	0 to 40
	Resolution (dB)	0.1
	Uncertainty (accuracy) (dB)	$\pm 0.5$ , for dynamic range 0 to 20
	Horizontal scale Vertical scale (dB)	4.3125 kHz to 2.2 MHz, in 4.3125 kHz steps 0 to 50

a. Subject to change without notice.

b. Typical, at 23 °C  $\pm 3$  °C, on batteries, with no type B USB connection.

c. Specifications based on 24 AWG (PE 0.5 mm) cabling.

d. Qualified up to 300 m (1000 ft) and does not include the uncertainty due to VOP.



COPPER SPECIFICATIONS <sup>a, b, c</sup> (CONTINUED)		
Power spectral density (PSD)	Test type	Continuous with peak-hold
	Termination	Bridging (Hi-Z), 100, 120, 135, 150 $\Omega$
	Vertical scale	15 dBm/Hz to -140 dBm/Hz or 20 dBm to -90 dBm
	Horizontal scale	4.3125 kHz to 17 MHz, in 4.3125 kHz steps or 8.625 kHz to 35 MHz, in 8.625 kHz steps
	Noise filters	None or E, F, G, ADSL2+, VDSL2-8, VDSL2-12, VDSL2-17, VDSL2-30 and VDSL2-35b
Wideband impulse noise	Threshold	-50 dBm (40 dBrrn) to 0 dBm (90 dBrrn) in 1 dB steps
	Termination	Bridging (Hi-Z), 100, 120, 135, 150 $\Omega$
	Counter maximum	65 000 000
	Test duration (h)	Maximum 100
	Uncertainty (accuracy) (dB)	$\pm 2$
	Noise filters	None or E, F, G, ADSL2+, VDSL2-8, VDSL2-12, VDSL2-17 and VDSL2-30
Wideband longitudinal balance	Level scale (dB)	0 up to 100
	Level range uncertainty (accuracy)	2.2 MHz: $\pm 2.0$ dB, from 0 to 55 dB 8 MHz: $\pm 2.0$ dB, from 0 to 45 dB 12 MHz: $\pm 3.0$ dB, from 0 to 45 dB 17.6 MHz: $\pm 3.0$ dB, from 0 to 40 dB
	Level resolution (dB)	0.1
	Frequency scale	ADSL/2+: 8.6 kHz to 2.2 MHz, in 8.6 kHz steps VDSL2-8 : 17.25 kHz to 8 MHz, in 17.25 kHz steps VDSL2-12: 17.25 kHz to 12 MHz, in 17.25 kHz steps VDSL2-17: 34.5 kHz to 17.6 MHz, in 34.5 kHz steps
	Frequency uncertainty (accuracy)	$\pm(50 \text{ ppm} + 1 \text{ digit})$
Single-ended frequency response (attenuation) <sup>d</sup>	Distance range (m)	100 m to 5000 m (300 ft to 16000 ft)
	Frequency range (Hz)	4.3 kHz to 35 MHz
	Frequency uncertainty (accuracy)	$\pm(50 \text{ ppm} + 1 \text{ digit})$ for 20 kHz to 30 MHz
	Level uncertainty (accuracy)	$\pm 2.0$ dB typical for 2.2 MHz and 8 MHz ranges $\pm 3.0$ dB for VDSL2-12 and VDSL2-17 $\pm 4.0$ dB for VDSL2-30 ranges
	Resolution (dB)	0.1
	Horizontal scale (MHz)	ADSL2+ = 2.208, VDSL2-8, VDSL2-12 = 12, VDSL2-17 = 17.66, VDSL2-30 = 30, VDSL2-35 = 35
	Vertical scale (dB)	0 to +100
Resistive fault location (RFL)	Test type	Single pair (two wire), separate good pair (four wire) and K�pfm�ller (K-test)
	Fault detection (M�)	0 to 20 for single faults; up to a total fault resistance of 30 for K-test double faults only
	Resolution	Three digits
	Loop resistance (k�)	10 maximum
	Multiple cable sections	Five (includes gauge and temperature setting)
	Fault location	Total resistance, near-end to fault resistance, fault to strap resistance (three significant digits, least significant digit 0.1 $\Omega$ ) Total length, distance to fault, distance from fault to strap (three significant digits, least significant digit 1 m)
	Single fault uncertainty (accuracy)	$\pm(0.1 \Omega + 1\% \text{ RTS})$
	K-test uncertainty (accuracy) <sup>e</sup>	$\pm(1 \Omega + 1\% \text{ RTS})$
Stressed balance	Level range (dBrrnC)	0 to 82
	Resolution (dBrrnC)	0.1
	Longitudinal excitation	135 VDC (0 dBm, $\pm 1$ dB reproducibility)

a. Subject to change without notice.

b. Typical, at 23  $^{\circ}\text{C} \pm 3^{\circ}\text{C}$ , on batteries, with no type B USB connection.

c. Specifications based on 24 AWG (PE 0.5 mm) cabling.

d. Specification based on 1 kft 24 AWG cabling. Range depends on cable type and condition.

e. For double faults only.

GENERAL SPECIFICATIONS	
Display	Touchscreen TFT LCD with backlight 152 mm (6 in) diagonal 800 x 480 resolution, WVGA
Test connections	RJ11 for Gfast/ADSL2+/VDSL2 Five-color banana connector for T/A, R/B, G, T1/A1, R1/B1 and for Gfast/ADSL2+/VDSL2 RJ45 for Ethernet 10/100/1000 WAN RJ45 for Ethernet 10/100/1000 LAN
Results management	> 2 GB internal memory Single and bulk file export to USB memory devices FTP upload
Temperature	Operating Storage
	0 °C to 40 °C (32 °F to 104 °F) -20 °C to 60 °C (-4 °F to 140 °F)
Relative humidity	5 % to 95 %, non-condensing
Shock	1 m (39 in) drop per GR-196-CORE
Altitude	3000 m (9842 ft)
Input power	12 VDC, 4.16 A, 48 W via 90-264 VAC adapter or 12 VDC, 5 A, vehicle adapter
Battery	Internal rechargeable lithium polymer, with battery state and level indication, adjustable auto-power down. Standard battery is 10 000 mAh; extended battery is 20 000 mAh
Safety	CE and CSA marked
Size (H x W x D)	254 mm x 124 mm x 62 mm (10 in x 4 <sup>7</sup> / <sub>8</sub> in x 2 <sup>7</sup> / <sub>16</sub> in)
Weight (with battery)	1.9 kg (4.2 lb)
Water/dust ingress	Designed to comply with IP54
Differential voltage protection	354 VRMS or 1000 VDC max
Common mode voltage protection	354 VRMS or 1000 VDC
Voltage detection	> 20 V will trigger alarm message
Self-test	Routine on power-up
Connectivity	USB 2.0 client ports (2) USB type B host port (1) Optional WiFi support
Languages	English, French, German, Italian, Polish and Spanish

ACCESSORIES		
<b>Standard</b>	ACC-RJ11-TC or ACC-RJ11-4MM	DSL test cables: RJ14 to RJ11 and telco clip with bed of nails or RJ14 to RJ11 and 4 mm plugs with crocodile clips
	ACC-M3COLR or ACC-M4MM	Copper/DSL test cables: Three-color (black, red, green) 4 mm banana plugs terminated with telco clips or Three-color (black, red, green) 4 mm banana plugs terminated with shrouded crocodile clips
	Certificate of compliance	
	ACC-48WPS	AC adapter
	GP-10-072	Soft carrying case
<b>Optional</b>	ACC-MTCYB or ACC-M4MMYB	Copper/Bonded DSL test cables: Yellow/blue banana connectors to telco clips or Yellow/blue banana connectors to 4 mm plugs/crocodile clips
	ACC-BD-RJ or ACC-BD-TC or ACC-BD-4MM	DSL bonded test cable RJ14 to dual RJ11 or RJ14 to four telco clips DSL with bed of nails or RJ14 to four 4 mm plugs DSL with crocodile clips
	ACC-RJRJ-UTP	RJ45 Ethernet cable
	ACC-12VLGB	12 V vehicle charger
	ACC-GLOVE for standard battery, ACC-XGLOVE for extended battery	Form fitting, protective soft glove with shoulder strap
	ACC-GFAST-BALUN	RJ11 to coax balun for Gfast operation over in-home coaxial networks
	ACC-HIZ	High impedance (Hi-Z) test cable. Requires WBAND software option.
	LGBATT	Large extended battery pack
	GP-2144	16 GB USB memory stick
	GP-1002	Headset
	GP-2223	WiFi pico adapter
	TS125	Teletech TS125 far-end device
	GP-2053	USB host/client cable
	GP-2260	Bluetooth nano USB dongle V4.0 + EDR
	GP-2272	MaxTester 600 screen protector film (Pkg 2)

## ORDERING INFORMATION

## MAX-635G-XX-XX-XX-XX

## DSL version ■

GVXAA = ADSL2+ annex A  
GVXAB = ADSL2+ annex A+B

## Platform options ■

00 = Without software options  
FTPUPLD = Result upload via FTP over WiFi, Ethernet or DSL  
LGBATT = Large extended battery pack

## DSL software options ■

00 = Without software options  
BOND = ADSL2+ and VDSL2 bonding support<sup>a, b</sup>  
GFAST = Gfast modem emulation  
IPTV = IPTV analysis  
IPV6 = IPv6 support for LAN/WAN connectivity  
MOS = MOS/R-factor for VoIP calls<sup>c</sup>  
VDSL2MOD = VDSL2 modem emulation  
VDSL2-35B = VDSL2-35b profile support<sup>a</sup>  
VOIP = VoIP emulation support (Ethernet and DSL ports)  
SPEED = Bandwidth speed test<sup>h</sup>  
WIFI = 2.4 GHz WiFi scanning capability  
MPP = Combines IPTV, VOIP, and MOS options

## Copper software options ■

00 = Without software options  
ADRP = ADSL2+ and VDSL2-17a data rate prediction option<sup>d</sup>  
V35DRP = VDSL2-35b data rate prediction<sup>i</sup>  
FED = Support for Teletch TS125 far-end device<sup>e</sup>  
HIVOLT = Enables 500V isolation resistance  
NEXT = Near-end crosstalk<sup>f</sup>  
RFL = Resistive fault location/K-test option  
RLOSS = Return loss to 2.2 MHz option<sup>f</sup>  
SBAL = Stressed balance  
SMARTR = Pair Detective and FaultMapper<sup>g</sup>  
TDR = Time-domain reflectometry  
WBAND = Extend frequency range from 20 kHz to 35 MHz

Example: MAX-635G-GVXAA-FTPUPLD-SMARTR-SBAL-VDSL2MOD-GFAST-BOND-IPTV

- a. VDSL2MOD option required to enable VDSL2-35b capability.
- b. VDSL2MOD option required to enable VDSL2 bonding capability (BOND available for GVXAA version only).
- c. VoIP option required.
- d. Requires WBAND and TDR option, or WBAND and SmartR option.
- e. Teletch TS125 far-end device sold separately.
- f. Requires the WBAND option.
- g. Includes TDR option.
- h. SPEED included with base unit.
- i. Requires ADRP option

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