MaxTester 635G

HANDHELD SOLUTION FOR ULTRA-BROADBAND INSTALLATION AND MAINTENANCE

EXFO Sync

EXFO Connect
Compatible

smart R ™

Gfast
CERTIFIED

⌀ SPEEDTEST®
by OOKLA

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

MaxTester 600 Series
Copper, VDSL2, Multiplay test solutions

MaxTester 700B
OTDR Series

MaxTester 940
Fiber Certifier OLTS

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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 than 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.

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KEY CHARACTERISTICS

1. Two, 1 GigE RJ45 ports—sealed against the environment
2. Gfast, VDSL2, and ADSL2+ RJ11 port—sealed against the environment
3. Single test lead connection—banana connectors supporting Gfast/DSL and copper testing
4. All-round rubber bumper
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.

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EXFO | Connect

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

TEST EQUIPMENT MANAGER
Automated inventory tracking and software download

FILE MANAGER
Download/upload files, work orders, test configurations or procedure documents

CONTRACTOR MODE

CONTRACTOR MODE
Secure, segregated access for test-result upload, and automated file download

Visit **EXFO.com/EXFOConnect** for details and features compatibility with the MaxTester handheld series.

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

EXFO Sync

Working in the field with an Android™ device?
Download the EXFO Sync application for your Android.

EXFO Sync is an Android application 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 the EXFO Sync application, 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, DSL, and Gfast test results 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 server
> Secure, password-protected connection to upload and access results

Download from
Google play

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GFAST/DSL SPECIFICATIONS

DSL chipset	Broadcom 63138	
Standards compliance	ADSL1/2/2+	› ITU-T G.992.5 (ADSL2+ including Annex A, B, J, and M) › ITU-T G.992.3 (ADSL2 including Annex A, B, J and L) › ITU-T G.992.1 (G.DMT including Annex A and B) › ITU-T G.994.1 › ATIS/ANSI T1.413 Issue 2 › IEEE 802.3ah (PTM) › ITU-T G.998.1, 2 (ATM, Ethernet bonding) › ITU-T G.998.4 (G.INP) › ITU-T G.992.5 (INP Amendment 3) › DT 1 TR 112 U-R
	VDSL2	› ITU-T G.993.2 Annexes A, B, Q and Y › Profiles: 8a/b/c/d, 12a/b, 17a, 30a, 35b › Band Plan: 997, 998, US0 › IEEE 802.3ah (PTM) › ITU-T G.998.2 (Ethernet bonding) › ITU-T G.998.4 (G.INP) › ITU-T G.993.5 (G.vector) › DT 1 TR 112 U-R2 (U-RV)
	Gfast	› ITU-T G.9700, G.9701
DSL parameters	› Maximum attainable bit rates › Actual achieved bit rates › Actual bonded achieved rates › Latency mode: fast, interleaved › Data modes: ATM, PTM › Capacity (%) › SNR margin › Output power › Attenuation › Bits/tone › Hlog/tone (attenuation/tone) › QLN/tone › SNR/tone › Vendor code, revision	› Interleave depth › Interleave delay › Trellis coding › Bit swapping › INP value › PhyR, G.INP state, performance counters › Vectoring state, performance counters › LOS, FEC, CRC, HEC, SES › LATN per band › SATN per band › EWL › kl0 and kl0 per band

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MULTIPLAY TESTING SPECIFICATIONS

Test interfaces	› Gfast › VDSL2	› ADSL1/2/2+ › Ethernet 10/100/1000 BT
Encapsulation methods	› RFC 2684/Bridged Ethernet/IPoE (IPv4 and IPv6) › IPoA (RFC 1577)	› PPPoE (RFC 2516) › PPPoA/LLC and PPPoA/VC-MUX (RFC 2364)
Operating modes	› DSL Terminate › DSL to Ethernet pass through	› Ethernet Terminate › Ethernet to Ethernet bridged pass through
Login format	User name and password using PAP/CHAP	
Connectivity support	› IPv4 and IPv6 LAN/WAN status › IPv4 and IPv6 DNS, gateway › IPv4 DHCP client/server, DHCP vendor class › IPv6 DHCP client › NAT	› VLAN ID, VLAN tagging › VPI/VCI › IP release › Multi-VLAN support
Throughput test	› Methods supported: Speedtest by Ookla, iPerf3 › Address: auto-configured for Speedtest, URL or IPv4 address for iPerf3 › Direction: upload and/or download › Speedtest results displayed: download and upload speed in Mbit/s, ping in milliseconds (ms), host, location, country and sponsor › iPerf results displayed: download and upload speed in kbit/s	
Ping test	› Ping destination: gateway, IPv4 or IPv6 address or URL › Number of pings: 1 to 99 › Packet size: 32 to 1200 bytes (32 is default) › Timeout period: 1 to 10 s › Results displayed: packets sent/received and average round-trip delay (ms)	
Traceroute test	› Traceroute destination: gateway, IPv4 address or URL › Timeout period: in seconds, default is 1 s, maximum is 10 s › Packet size: 32 bytes › Number of hops: 1 to 32 (default is 30) › Results displayed: indicates IPv4 address of hop and round-trip time in ms	
FTP test	› Address: IPv4 address or URL › Direction: upload and/or download › Results displayed: time, kB transferred, bit rate in kbit/s	
HTTP test	› Address: URL › Direction: download › Simultaneous download sessions: 1 to 4 › Results displayed: kB transferred, bit rate in kbit/s	
WiFi scanning (option)	› 2.4/5 GHz support › View channel number, SSID, MAC address, RSSI value › Sort by channel number or RSSI value	
Web browser (software option)	› Address: IPv4 address or URL › Bookmarks: user-definable	
VoIP testing (software option)	› Protocol support: SIP (IPv4) › Codecs: G.711 µ-Law, G.711 A-Law › Interface support: ADSL1/2/2+, VDSL2, Gfast, Ethernet › Parameter/functionality: – Test duration timer 　　　　　　　　　　　　 – MOS (current, average) 　　　　　　　　　　　　 – R-Factor (current, average) 　　　　　　　　　　　　 – Latency (current, average, maximum) 　　　　　　　　　　　　 – Jitter (current, average, maximum) 　　　　　　　　　　　　 – Packets (lost, total)	
IPTV testing (software option)	› Supported video standards: MPEG2, MPEG4 part 2 and 10 (H.264/AVC), Mediaroom/WM9/VC1 › Operating modes: DSL Terminate and Ethernet Terminate › IPTV parameters/functionality: – IGMP version 2 and 3 (IPv4) join/leave requests with STB emulation 　　　　　　　　　　　　 – Automatic tests to join/leave and analyze up to 5 (five) simultaneous streams 　　　　　　　　　　　　 – Programmable channel list for storage of commonly used channels 　　　　　　　　　　　　 – Bandwidth usage per channel 　　　　　　　　　　　　 – IGMP (IPv4) packet and rate information per line and channel 　　　　　　　　　　　　 – Multicast RTP/UDP IP stream support 　　　　　　　　　　　　 – Key IP video QoS parameters, packet loss, zap time, PID statistics 　　　　　　　　　　　　 – Graphical results 　　　　　　　　　　　　 – Transport	

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COPPER SPECIFICATIONS [a, b, c]

Transmitter characteristics		
Frequency range (200 Hz to 20 kHz)	Frequency resolution	1 Hz steps
	Frequency uncertainty (accuracy)	±(50 ppm + 1 Hz)
	Level range (dBm)	−20 to 10 at 600 Ω
	Level resolution (dB)	0.1
	Level uncertainty (accuracy) (dB)	±1
	Impedance (Ω)	600
Frequency range (20 kHz to 2.2 MHz)	Frequency resolution	1 kHz steps
	Frequency uncertainty (accuracy)	±(50 ppm + 100 Hz)
	Level range (dBm)	−20 to 10 at 100 Ω
	Level resolution (dB)	0.1
	Level uncertainty (accuracy) (dB)	±1
	Impedance (Ω)	100, 120, 135, 150
Frequency range (2.2 MHz to 30 MHz)	Frequency resolution	1 kHz steps
	Frequency uncertainty (accuracy)	±(50 ppm + 100 Hz)
	Level range (dBm)	−20 to 0 at 100 Ω
	Level resolution (dB)	0.1
	Level uncertainty (accuracy) (dB)	±1
	Impedance (Ω)	100, 120, 135, 150
Receiver characteristics	Reception frequency range	200 Hz to 20 kHz 20 kHz to 35 MHz
	Frequency uncertainty range (accuracy)	±(50 ppm + 1 digit) for 20 kHz to 30 MHz
	VF reception level range (dBm)	−90 to 15 at 600 Ω
	VF level uncertainty (accuracy)	200 Hz to 20 kHz −90 dBm to −50 dBm, uncertainty (accuracy) ±2 dB −50 dBm to 15 dBm, uncertainty (accuracy) ±1 dB
	WB reception level range (dBm)	−90 to 15 at 100 Ω and 135 Ω
	WB level uncertainty (accuracy)	20 kHz to 2.2 MHz −90 dBm to −50 dBm, uncertainty (accuracy) ±2 dB −50 dBm to 15 dBm, uncertainty (accuracy) ±1 dB
		2.2 MHz to 30 MHz −90 dBm to −50 dBm, uncertainty (accuracy) ±2 dB −50 dBm to 15 dBm, uncertainty (accuracy) ±1 dB
	Impedance (Ω)	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 kΩ, 1 MΩ

	Measurement	Range	Resolution	Uncertainty (accuracy)
	DC voltage	0 to 400 V	0.1 V for 0 to 99.9 V 1 V for 100 V to 400 V	±(|1 %| + 0.5 VDC)
	AC voltage	0 to 280 Vrms	0.1 V for 0 to 99.9 V 1 V for 100 V to 280 V	±(1 % + 0.5 VAC)
	Isolation resistance (stress/leakage)	0 to 1 GΩ, auto-ranging 1 kΩ to 99 MΩ 100 MΩ to 999 MΩ	Three digits	±(2 % + 1 digit) ±(5 % + 1 digit)
	Resistance	0 to 100 MΩ 0 to 999 Ω 1 kΩ to 100 MΩ	Three digits	±(1 % + 5 Ω) ±(2 % + 1 digit)
	Capacitance	0.1 nF to 2 µF	Four digits	±(2 % + 50 pF)
	DC current	0 to 110 mA	0.1 mA	±(|2 %| + 1 mA)
	AC current	0 to 110 mA	0.1 mA	±(|2 %|+ 1 mA) [d]
	Station ground	0 to 1 MΩ 0 to 999 Ω 1 kΩ to 1 MΩ	Up to three digits	±(1 % + 3 Ω) ±(2 % + 1 digit)

Notes

a. Subject to change without notice.

b. Typical, at 23 °C ± 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.

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COPPER SPECIFICATIONS [a, b, c] (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) ±2 dB −50 dBm to +20 dBm, uncertainty (accuracy) ±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 (Ω)	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 ± 2 dB −50 dBm to 10 dBm ± 1 dB
VF longitudinal balance	Frequency (Hz)	1004
	Level range (dB)	0 to 100
	Level uncertainty (accuracy) (dB)	±1
	Impedance (Ω)	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 µs
	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) [d] (m)	±(0.5 m + 1 % x 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: ±2.0 dB, from 0 to 90 dB 8 MHz: ±2.0 dB, from 0 to 80 dB 12 MHz: ±2.0 dB, from 0 to 75 dB 17.6 MHz: ±3.0 dB, from 0 to 75 dB 30 MHz: ±3.0 dB, from 0 to 68 dB
	Terminations (Ω)	100, 120, 135, 150
Return loss	Test Type Frequency range Dynamic range (dB) Resolution (dB) Uncertainty (accuracy) (dB) Horizontal scale Vertical scale (dB)	Single, Sweep 20 kHz to 2.2 MHz 0 to 40 0.1 ±0.5, for dynamic range 0 to 20 4.3125 kHz to 2.2 MHz , in 4.3125 kHz steps 0 to 50

Notes

a. Subject to change without notice.

b. Typical, at 23 °C ± 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.

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COPPER SPECIFICATIONS [a, b, c] (continued)

Power spectral density (PSD)	Test type	Continuous with peak-hold
	Termination	Bridging (Hi-Z), 100, 120, 135, 150 ohm
	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 dBrn) to 0 dBm (90 dBrn) in 1 dB steps
	Termination (Ω)	Bridging (Hi-Z), 100, 120, 135, 150
	Counter maximum	65 000 000
	Test duration (h)	Maximum 100
	Uncertainty (accuracy) (dB)	±2
	Noise filters	None or E, F, G, ADSL2+, VDSL2-8, VDSL2-12, VDSL2-17 and VDSL2-30
Wideband longitudinal balance	Level scale	0 up to 100 dB
	Level range uncertainty (accuracy)	2.2 MHz: ±2.0 dB, from 0 to 55 dB
		8 MHz: ±2.0 dB, from 0 to 45 dB
		12 MHz: ±3.0 dB, from 0 to 45 dB
		17.6 MHz: ±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)	±(50 ppm + 1 digit)
Single-ended frequency response (attenuation) [d]	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)	±(50 ppm + 1 digit) for 20 kHz to 30 MHz
	Level uncertainty (accuracy) (dB)	± 2.0 dB typical for 2.2 MHz and 8 MHz ranges ± 3.0 dB for VDSL2-12 and VDSL2-17 ± 4.0 dB for VDSL2-30 ranges
	Resolution (dB)	0.1
	Horizontal scale (MHz)	ADSL2+ = 2.208, VDSL2-8 = 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 Küpfmüller (K-test)
	Fault detection (MΩ)	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 (kΩ)	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 Ω)
		Total length, distance to fault, distance from fault to strap (three significant digits, least significant digit 1 m)
	Single fault uncertainty (accuracy)	±(0.1 Ω + 1 % RTS)
	K-test uncertainty (accuracy) [e]	±(1 Ω + 1 % RTS)
Stressed Balance	Level range (dBrnC)	0 to 82
	Resolution (dBrnC)	0.1
	Longitudinal excitation	135 VDC (0 dBm, ±1 dB reproducibility)

Notes

a. Subject to change without notice.

b. Typical, at 23 °C ± 3 °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.

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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 G.fast/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 range 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	9-24 VDC, 2 A, 18 W via 90-220 VAC adapter, or 12 VDC, 4.16 A, 48 W via 90-264 VAC adapter, or 12 VDC vehicle adapter (optional for unit equipped with standard battery), or 12 VDC, 5 A, vehicle adapter (optional, for unit equipped with extended battery)
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 $^7/_8$ in x 2 $^7/_{16}$ in)
Weight (with standard 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	Two USB 2.0 client ports One USB Type B host port Optional WiFi support
Languages	English, French, Italian, Polish and Spanish

STANDARD ACCESSORIES

DSL test cables: RJ14 to RJ11 and telco clip with bed of nails (ACC-RJ11-TC), or
RJ14 to RJ11 and 4 mm plugs with crocodile clips (ACC-RJ11-4MM)

Copper/DSL test cable: Three-color (black, red, green) 4 mm banana plugs terminated with telco clips (ACC-M3COLR), or
Three-color (black, red, green) 4 mm banana plugs terminated with shrouded crocodile clips (ACC-M4MM)

Certificate of compliance

AC adapter (GP-2146 for standard battery or ACC-48 WPS for extended battery)

Soft carrying case (GP-10-072)

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OPTIONAL ACCESSORIES

Copper/Bonded DSL test cables: Yellow/blue banana connectors to telco clips (ACC-MTCYB) or Yellow/blue banana connectors to 4 mm plugs/croc clips (ACC-M4MMYB)

DSL bonded test cables: RJ14 to dual RJ11 (ACC-BD-RJ) or RJ14 to four telco clips with bed of nails (ACC-BD-TC), or RJ14 to four 4 mm plugs with crocodile clips (ACC-BD-4MM)

RFL strap (ACC-STRP)

RJ45 Ethernet cable (ACC-RJRJ-UTP)

USB host/client cable (GP-2053)

12 VDC vehicle charger (GP-2205 for standard battery, ACC-12 VLGB for extended battery)

Form fitting, protective soft glove with shoulder strap (ACC-GLOVE for standard battery, ACC-XGLOVE for extended battery)

16 GB USB memory stick (GP-2144)

Headset (GP-1002)

WiFi Pico Adapter (GP-2223)

Teletech TS125 Far-End Device (TS125)

Bluetooth Nano USB Dongle V4.0 + EDR (GP-2260)

High Impedance (Hi-Z) test cable (ACC-HIZ). Requires WBAND software option.

MAX-600 Screen Protector Film (Pkg 2) (GP-2272)

RJ11 to Coax Balun for G.fast operation over in-home coaxial networks (ACC-GFAST-BALUN)

Large extended battery pack (LGBATT)

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ORDERING INFORMATION

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

Model
MAX-635G = ADSL2+ test set

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 [a, b]
BROWSER = Web browser
GFAST = Gfast modem emulation
IPTV = IPTV analysis
IPV6 = IPv6 support for LAN/WAN connectivity
MOS = MOS/R-factor for VoIP calls [c]
VDSL2MOD = VDSL2 modem emulation
VDSL2-35B = VDSL2-35b profile support [a]
VOIP = VoIP emulation support (Ethernet and DSL ports)
SPEED = Bandwidth speed test [h]
WIFI = 2.4/5 GHz WiFi scanning capability

Copper Software Options
00 = Without software options
ADRP = ADSL2+ and VDSL2-17a data rate prediction option [d]
V35DRP = VDSL2-35b data rate prediction [i]
FED = Support for Teletech TS125 far-end device [e]
HIVOLT = Enables 500V isolation resistance
NEXT = Near-end crosstalk [f]
RFL = Resistive fault location/K-test option
RLOSS = Return loss to 2.2 MHz option [f]
SBAL = Stressed balance
SMARTR = Pair Detective and FaultMapper [g]
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

Notes
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. Teletech 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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