6100-Cu

SMARTER COPPER TESTING FOR INSTALLATION TECHNICIANS

Smarter verification of copper pairs and location of faults during the installation and repair of voice and DSL circuits

KEY FEATURES AND BENEFITS

Aligns with existing methods and procedures; perform single-ended testing or testing with a far-end device (FED) to minimize repair time and costs

Full suite of digital multimeter measurements to quickly and effectively determine the electrical health of the network

Optional TDR with variable gain and RFL/K-test allow service providers to scale the product based on existing or new methods and procedures

Suite of test features allow users to quickly and accurately determine physical copper circuit quality and locate faults, in addition to performing high-voltage balance testing on inactive pairs

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

Configurable pass/fail results for automated closeout testing; upload the results to the cloud with ease

Multifunction TDR family

6100-G.fast
Copper, xDSL and Multiplay Test Set

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 600Ω
		Level resolution	0.1 dB
		Level uncertainty (accuracy)	±1 dB
		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	0.1 dB
		Level uncertainty (accuracy)	±1 dB
		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
		Level resolution	0.1 dB
		Level uncertainty (accuracy)	±1 dB
		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 600Ω
		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 100Ω and 135Ω
		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% + 0.5 VDC)
		1 V for 100 V to 400 V	
AC voltage	0 to 280 Vrms	0.1 V for 0 to 99.9 V	±(1% + 0.5 VAC)
		1 V for 100 V to 280 V	

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 110mA

Isolation resistance	0 to 1 GΩ, auto-ranging	Three digits	
(stress/leakage)	1 kΩ to 99 MΩ		±(2% + 1 digit)
	100 MΩ to 999 MΩ		±(5% + 1 digit)
Resistance	0 to 100 MΩ	Three digits	
	0 to 999 Ω		±(1% + 5 Ω)
	1 kΩ to 100 MΩ		±(2% + 1 digit)
Capacitance	0.1 nF to 2 uF	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)
Station ground	0 to 1 MΩ	Up to three digits	
	0 to 999 Ω		±(1% + 3 Ω)
	1 kΩ to 1 MΩ		±(2% + 1 digit)

COPPER SPECIFICATIONS [a,b,c] (continued)		
Isolation resistance (stress/leakage) (continued)	Source	50 to 500 VDC (current safety 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	600 Q
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	600 Q
Time-domain reflectometer (TDR)	Modes	Automatic, Manual, Peak, Xtalk (Crosstalk), Differential
	Distance range (m)	0 to 6700 (0 ft to 22 000 ft)
	Pulse width	15 ns to 20 us
	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)

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

COPPER SPECIFICATIONS [a, b, c] (continued)		
Near-end crosstalk (NEXT)	Frequency range	10 kHz to 30 MHz
	Level range	0 to 90 dB
	Level resolution	0.1 dB
	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	100, 120, 135, 150 Q
Return loss	Test type	Single, Sweep
	Frequency range	20 kHz to 2.2 MHz
	Dynamic range	0 dB to 40 dB
	Resolution	0.1 dB
	Uncertainty (accuracy)	±0.5 dB, for dynamic range 0 dB to 20 dB
	Horizontal scale	4.3125 kHz to 2.2 MHz , in 4.3125 kHz steps
	Vertical scale	0 dB to 50 dB
Power spectral density (PSD)	Test type	Continuous with peak-hold
	Termination	Bridging (Hi-Z), 100, 120, 135, 150 Q
	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 dBm) to 0 dBm (90 dBm) in 1 dB steps
	Termination	Bridging (Hi-Z), 100, 120, 135, 150 Q
	Counter maximum	65 000 000
	Test duration	Maximum 100 hours
	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 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	0.1 dB
	Frequency scale	ADSL2+: 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)

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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.

COPPER SPECIFICATIONS [a, b, c] (continued)		
Single-ended frequency response (attenuation) [d]	Distance range (m)	100 m to 5000 m (300 ft to 16 000 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, 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 Küpfmuller (K-test)
	Fault detection (MQ)	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 (kQ)	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 Q) Total length, distance to fault, distance from fault to strap (three significant digits, least significant digit 1 m)
	Single fault uncertainty (accuracy)	±(0.1 Q + 1% RTS)
	K-test uncertainty (accuracy) [c]	±(1 Q + 1 % RTS)
Stressed Balance	Level range	0 to 82 dBrnC
	Resolution	0.1 dBrnC
	Longitudinal excitation	135 VDC (0 dBm, ±1 dB reproducibility)

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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	Five-color banana connector for T/A, RIB, G, T1/A1, R1/B1
Results management	> 2 GB internal memory
	Single and bulk file export to USB memory devices
Temperature operating	0 °C to 40 °C (32 °F to 104 °F)
storage	-20 °C to 60 °C (-4 °F to 140 °F)
Humidity	5 % to 95 % relative, non-condensing
Shock	1 m (39 in) drop per GR-196-CORE
Altitude	3000 m (9842 ft)
Input power	9-24 VDC, 2A, 18 W via 90-220 VAC adapter or 12 V vehicle adapter
Battery	Internal rechargeable lithium polymer, with battery-state and level indications, adjustable auto-power down
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 2 7/16 in)
Weight (with battery)	1.5 kg (3.3 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, German, Italian, Polish and Spanish