HST-3000
Wideband Copper II (WBII) Service Interface Module (SIM)

Key Features

- Complete copper testing to support VDSL/VDSL2 and triple-play deployments

- Expanded copper testing frequency range

  - Tx/Rx Tones ranging from 100 kHz to 30 MHz

  - Wideband Noise measurements from +15 to -90 dBm

  - Impulse Noise measurements from +15 to -60 dBm

  - Spectral analysis with spectral masks and band plans up to 30 MHz (-28 to -150 dBm/Hz)

- Wideband copper SIM functionality available in combination with VDSL/VDSL2 test SIMs

FROST & SULLIVAN

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Global Communications Test & Measurement Company of the Year Award

The JDSU HST-3000 equipped with the Wideband Copper II (WBII) Service Interface Module (SIM) delivers comprehensive copper testing, including the special requirements of VDSL, in a rugged, modular platform ideal for field use.

Providers face a significant challenge when implementing VDSL as part of an FTTx deployment because the copper plant traditionally has not been qualified to withstand the stringent needs of VDSL service delivery. The new spectrum used by VDSL expands the use of the installed plant into unfamiliar territory. Early VDSL testing has shown that the plant is susceptible to impulse noise not encountered in the current ADSL usage spectrum. In addition, the detection of short bridged taps, which create a much greater impact on VDSL signals than on ADSL signals, becomes much more critical in VDSL testing.

While experts disagree on the merits of pre-qualification of copper loops in preparation for service deployment, until now most have considered any wideband qualification in ADSL deployments cost prohibitive. However, in VDSL deployments where high-value triple-play services are carried, pre-qualification generally is considered possible and required for the access plant. The HST-3000 incorporates a rugged, weather-resistant design and long battery life that are ideally suited for use in the field and its modularity allows for field upgrades to support new testing requirements. The HST-3000 is easily upgradeable with technologies and advanced options that support the changing needs of service installers and its dynamic configurability allows it to be used by different technicians with different responsibilities to perform a wide number of tests. Standard Ethernet, USB, and serial connections offer flexibility to easily download software and offload captured test data.

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Architecture

Fully compatible with the HST-3000-CE and HST-3000C-CE mainframes, the HST-3000 WBII SIM includes an internal copper measurement board that enhances the functionality of the HST-3000C mainframe copper measurement board and adds limited wideband copper test capability to non-copper test mainframes.

The WBII SIM features dual Tip & Ring (T&R) and Ground interfaces. Due to high-frequency range and measurement sensitivity, this SIM supports special test cables, which can also be used with existing HST-3000C copper test functions. For the most accurate results, use of specially insulated cables for testing higher frequency services such as VDSL2 is recommended.

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Key Functionality

Impedance

The HST supports both 100 ohms (Ω) and 135 ohms (Ω) impedance for both Tx and Rx.

Toning

Toning functionality enables the transmission of tones through T&R across the frequency range at the desired amplitude with source impedance of 100 or 135 ohms. The WBII SIM's hot list offers a range of frequencies: 1.1 MHz, 2.2, 4, 10, 12, 17.6 MHz, and 25 MHz. If the user selects a frequency from the hot list, other frequencies can be cyled to by simply pushing the left or right arrow. The user can also enter a custom frequency within range.

The Meter View result screen allows the user to receive tones through T&R and shows the frequency and amplitude with either a 100- or 135-ohm termination. The List View displays results as an ongoing list. The user may send T1/R1 and receive T/R simultaneously with a selectable Tx and Rx status view.

Noise

WBII Noise conducts a single-pair measurement of aggregate noise in a frequency band on T&R. The higher the negative number, the lower the average noise power will be. The user may select a filter and a termination of 100 or 135 ohms with the result displayed in dBm.

– Terminations: 100 Ω and135 Ω

– Filters: G, J, and None

– Frequency Range limited by filter selection. See General Specifications for filter information.

Impulse Noise and Capture

Impulse Noise consists of intermittent interference voltages coupled into a pair from electromagnetic fields. These fields may result from inductive load switching, such as compressors or other devices that radiate fields, including lights, microwaves and televisions. WBII Impulse Noise and Capture is a single-pair measurement on T&R, which counts voltage level threshold crossings. Options include settings for the Threshold in dB or dBr n, termination to 100 or 135 ohms, Dead Time, test duration, and filter selection. Impulse Capture enables the user to view an event on the screen that causes a threshold crossing.

– Terminations: 100 Ω and 135 Ω

– Filters: None

– Frequency Range limited by filter selection. See General Specifications for filter information.

– Dead Time: 10 to 1000 milliseconds

– Settable time periods: 1 to 60 minutes in 1 minute increments, or continuous

– Multiple counters provide a + 3dB delta from main threshold

– Capture: +/- 10us around event

– Capture has no Dead Time, Timer, or Threshold deltas

Spectral Noise

The WBII SIM allows the user to choose a span to view plotted noise through T&R with a 100- or 135-ohm termination and zoom in on the X or Y axis. Moving the cursor to an event displays the frequency and amplitude of the signal at that point, and the level result is selectable in dBm or dBm/Hz. Views include Upstream or Downstream VDSL bands, valid technologies, and applicable amateur radio bands, which zoom in on the X and Y axis around the band of interest and place the cursor in the middle.

– Impedance: 100 Ω and 135 Ω

– No filter selection

– Level accuracy: Same as Rx Tones for tone at bin center. For off-center tones: - 1.4 dB

– Windows: Hanning

Spectrum Analyzer Range (Zoom by Band Plan)

When the user zooms based on technology, the WBII SIM adjusts the upper frequency range and cursor location according to center frequency of the technology under test.

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Return Loss

Return Loss is a single-pair measurement of impedance on T&R compared to the source at frequency. This measurement is used to determine the matching characteristics of the line. A mismatched line reflects transmitted signals back toward the source. The farther from the source impedance (above or below) the lower the result in dB will be. The user may select an impedance of 100 or 135 ohms and a transmit amplitude of 0, +5 or +10 dB. The result displays in dB on a graphed sweep or a spot result for a single frequency.

– TX Levels: 0, +5, and +10 dB

– Impedances: 100 Ω and 135 Ω

– No filter selection

Near End Crosstalk (NEXT)

Crosstalk between adjacent pairs occurs primarily as a result of capacitive or inductive coupling. This leads to interference on the circuit, which reduces the signal-to-noise ratio (SNR). NEXT is a two-pair measurement with transmit on T1 and R1 and receive on T&R. The test determines pair-to-pair coupling at the same end of the circuits using the local transmitter. The higher the result in dB, the less crosstalk or coupling there is between the pairs. The user may set the source impedance/termination and the frequency of the test signal. The result displays in dB on a graphed sweep or a spot result for a single frequency.

– TX Level: 0 dB

– Impedances: 100 Ω and 135 Ω

– No filter selection

Signal-to-Noise Ratio

SNR is a single-pair measurement on T&R that measures the noise immunity of a circuit by comparing the good signal to noise power using a spot frequency. This measurement looks for a signal, and when found, compares the level of that signal with the average noise that surrounds it. The higher the result in dB, the more margin there is between the signal and the noise. The closer the noise is to the signal, the lower the result. The user may select a filter and a termination of 100 or 135 ohms. The result displays in dB. This test requires a signal source of an appropriate amplitude and frequency at the far end.

– Terminations: 100 Ω and135 Ω

– Filters: G, J, and None

– Frequency Range limited by filter selection. See General Specifications for filter information.

– Noise and Signal level accuracy same as WBII Noise.

– Signal level frequency accuracy for J and No filter = 8,000 Hz

– Signal level frequency accuracy for G filter = 4,000 Hz

Specifications

Result	Range	Resolution	Accuracy
Rx Tones	100 kHz to 17.6 MHz	100 Hz	± 1000 Hz
	17.7 MHz to 30 MHz	100 Hz	± 1600 Hz
	+15 to +3 dBm	0.1 dB	± 1 dB
	+2 to -69 dBm	0.1 dB	± 0.5 dB
	-70 to -90 dBm	0.1 dB	± 1 dB
Tx Tones	100 khz to 30 MHz	1000 Hz	± 0.01%
	+15 to -10 dBm	1 dB	± 0.5 dB @ room temp.
	-11 to -40 dBm	1 dB	± 1.0 dB
Noise			
No filter	15 to -50 dBm	0.1 dB	± 1 dB
	-51 to -70 dBm	0.1 dB	± 2 dB
G filter	15 to -50 dBm	0.1 dB	± 1 dB
	-51 to -85 dBm	0.1 dB	± 2 dB
J filter	15 to -50 dBm	0.1 dB	± 1 dB
	-51 to -75 dBm	0.1 dB	± 2 dB
Impulse Noise			
No filter	30 to 105 dBrn	1 dB	± 2 dB threshold
	(-60 to +15 dBm)		
J filter	30 to 105 dBrn	1 dB	± 2 dB threshold
	(-60 to +15 dBm)		
Return Loss		0.1 dB	
Freq. Range	100 kHz to 20 MHz		± 1.5 dB for results between 0 and 10 dB
Tx Range	0, 5, and 10 dB		
Termination	100/135 Ω		± 2.5 dB for results between 11and 25 dB
NEXT			
Freq. Range	100 kHz to 30 MHz	1000 Hz	
Level	0 dB to 80 dB	0.1 dB	± 2 dB at crosstalk
Termination	100/135 Ω		0 to 50 dB
SNR			
Freq. Range	100 kHz to 30 MHz		
Level	0 dB to 50 dB	0.1 dB	± 2dB for results between 5 dB and 40 dB

Over-Voltage Protection Specifications

Mode	Working Voltage	Trip Voltage
All	250VDC, 175VAC RMS	350VDC, 250VAC + 20%

Wideband Copper II SIM Spectral Measurement Specifications

Frequency Rage	Resolution	Level Range
100 kHz -7.5 MHz	2.156 kHz	+15 to -90 dBm, -28 to -150 dBm/Hz
100 kHz -15 MHz	4.3125 kHz	+15 to -90 dBm, -28 to -147 dBm/Hz
100 kHz -30 MHz	8.625 kHz	+15 to -90 dBm, -29 to -144 dBm/Hz
Terminations		100 Ohm 135 Ohm

Wideband Filter Ranges

Filter	Lower 3dB	Upper dB	Measurement	Specification
No Filter	50 kHz	35 MHz	SNR	None
	50 kHz	35 MHz	Noise	
	100 kHz	30 MHz	Impulse Noise	
J Filter	640 kHz	17.6 MHz	SNR	None
	640 kHz	17.6 MHz	Noise	
	400 kHz	17.6 MHz	Impulse Noise	
G Filter	50 kHz	1.1 MHz	SNR	IEEE Std 743-1995
			Noise	Complies above 50 kHz

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Physical specifications

Size (h x w x d)	9.5 x 4.5 x 2.75 in.
	(241 x 114 x 70 mm)
Weight (with battery)	2.7 lbs. (1.23 kg)
Operating temperature	22° F to 122° F (5.5° C to 50° C)
Storage temperature	-40° F to 150° F
	(-40° C to 65.5° C)
Battery life	10 hrs. typical usage
Charging time	7 hrs. from full discharge
	to full charge
Operating humidity	10% to 80% relative humidity
Storage humidity	10% to 95% relative humidity
Display	3.8" diagonal, 1/4 VGA, Color Active Matrix
	with backlight (readable in direct sunlight)

General Specifications

Ruggedness	Survives 3 feet (91 cm) drop
	to concrete on all sides
Water-resistant	Splashproof
	(may be used in heavy rain)
Languages	English, German, French, Spanish,
	Italian, Chinese, Turkish
Keypad	Typical 12-button keyboard

Ordering Information

HST3000-NG	HST-3000 Mainframe without Copper (Color)
HST3000-NG-BW	HST-3000 Mainframe
	without Copper Testing (B&W)
HST3000C-NG	HST-3000 Copper Mainframe
	(Color)
HST3000C-NG-BW	HST-3000 Copper Mainframe
	(B&W)

Available SIMS (Modules)

HST3000-4WLL	4-Wire Local Loop SIM
HST3000-AR2A-TI	ASDL2+ TI (ATU-R, Annex A) SIM
HST3000-AR2A	ADSL1/2/2+ (ATU-R, Annex A)
	SIM
HST3000-AR2B	ADSL1/2/2+ (ATU-R, Annex B)
	SIM
HST3000-AR2B-TI	ADSL2+ TI (ATU-R, Annex B) SIM
HST3000-ARB	Annex B ATU-R SIM
HST3000-ARCA	ATU-R/C Dual Mode SIM,
	AoPOTS SIM
HST3000-ARCB	ATU-R/C Dual Mode SIM,
	AoISDN SIM
HST3000-ARCE	ADSL (ATU-R) SIM
HST3000-BLK	Blank SIM
HST-BRA	ETSI (Euro) ISDN BRA SIM
HST3000-BRI	ISDN BRI SIM
HST3000-CAR	Copper (ATU-R) SIM
HST3000-CAR2A	ADSL1/2/2+ with Copper
	(ATU-R, Annex A) SIM
HST3000-CAR2A-TI	Copper, ADSL2+ TI
	(ATU-R, Annex A) SIM

HST3000-CAR2B	ADSL1/2/2+ with Copper
	(ATU-R, Annex B) SIM
HST3000-CAR2B-TI	Copper, ADSL2+ TI
	(ATU-R, Annex B) SIM
HST3000-CARB	Annex B Copper/ATU-R SIM
HST3000-CARCA	Copper and ATU-R/C
	Dual Mode SIM, AoPOTS
HST3000-CARCB	Copper and ATU-R/C
	Dual Mode SIM, AoISDN
HST3000-CARCE	Copper and ATU-R (Annex A) SIM,
	CE Marked
HST3000-CSHHV	G.SHDSL, 380V SPAN, DVOM SIM
HST3000-CSH4	Copper, 4-Wire G.SHDSL
	(STU-R/C, Annex A/B) SIM
HST3000-CSHCE	G.SHDSL and Copper SIM
HST3000-CT1	T1 and Copper SIM
HST3000-CU	Dual T/R/G Interface to
	Copper Test SIM
HST3000-CUCE	Copper only SIM, CE Marked SIM
HST3000-CUVDSL-CNXT	VDSL and Copper
	with Connexant Chipset SIM
HST3000-CUVDSL-IK	VDSL and Copper
	with Ikanos Chipset SIM
HST3000-CUVDSL-INF	VDSL and Copper
	with Infineon Aware Chipset SIM
HST3000-DC	Datacom SIM
HST3000-E1	E1 SIM
HST3000-E1-DC	E1/Datacom SIM
HST3000-ETH	10/100/1000 Ethernet SIM
HST-GSH	G.SHDSL SIM
HST3000-GSHCE	2-Wire G.SHDSL SIM
HST3000-T1	Dual TX/RX Bantam T1 Interface
	and T1 SIM
HST3000-T3	Dual TX/RX Bantam T1 Interface,
	and Dual RX/Single TX BNC
	DS3 Interface/and DS3 SIM
HST3000-VDSL-CNXT	VDSL with Connexant Chipset SIM
HST-3000-VDSL-CNXT-WB2	VDSL and Copper (up to 30 MHz)
	with Connexant Chipset SIM
HST3000-VDSL-IK	VDSL with Ikanos Chipset SIM
HST-3000-VDSL-IK-WB2	VDSL and Copper (up to 30 MHz)
	with Ikanos Chipset SIM
HST3000-VDSL-INF	VDSL with Infineon Aware
	Chipset SIM
HST-3000-VDSL-INF-WB2	VDSL and Copper (up to 30 MHz)
	with Infineon Aware Chipset SIM
HST3000-WB2	Wide Band 2 (up to 30 MHz)
	Copper Test SIM

Software options

HST3000-BLUETOOTH	Bluetooth Wireless
	Software Option
HST3000-DSL2	ADSL2 and ADSL2+
	Software Option
HST3000-FR	Frame Relay Software Option
HST3000-FTP	FTP Software Option
HST3000-IPV6	IPv6 Software Option
HST3000-MPLS	MPLS Software Option
HST3000-MSTR	Multiple Streams Software Option
HST3000-MSTV	Microsoft IPTV Video Analysis
	Software Option
HST3000-OPTETH	Optical Ethernet Software Option
HST3000-PCMSIG	Signalling (PCM) Software Option
HST3000-PCMTIMS	TIMS (PCM) Software Option
HST3000-PRI	ISDN PRI Software Option
	(NC Standard)
HST3000-PS	Pulse Shape Software Option
HST3000-REMOP	Remote Operation
	Software Option
HST3000-RFL	RFL Software Option
HST3000-SCRIPT	Scripted Test Software Option
HST3000-SPE	Spectral Noise Software Option
HST3000-ST	Basic Rate ISDN S/T (ANSI)
	Software Option
HST3000-T1DDS	DDS-T1 Software Option
HST3000-TCPUDP	TCP/UDP Software Option
HST3000-TDR	TDR Software Option
HST3000-TxIMP	Transmission Impairments
	Software Option
HST3000-UNISTIM	VoIP Signaling Call Controls for
	UNISTIM Software Option
HST3000-VT100	VT100 Emulation
	Software Option
HST3000-WBTONES	WB TIMS Software Option
HST3000S-H.323	H.323 VoIP Signaling
	Software Option
HST3000S-IP	Advanced IP Suite –
	PING and Through Mode Support
	Software Option
HST3000S-IP-Video	IP Video Analysis Software Option
HST3000S-MGCP	SCCP MGCP VoIP Signaling
	Software Option
HST3000S-MOS	VoIP Mean Opinion Score
	Software Option
HST3000S-SCCP	SCCP VoIP Signaling
	Software Option
HST3000S-SIP	SIP VoIP Signaling
	Software Option
HST3000S-VMOS	Video MOS Analysis
	Software Option
HST3000S-VOIP	VoIP Software Analysis
	Software Option
HST3000S-WEB	Web Browser Software Option

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