UltraFED™ IIB

30 MHz Far-End Device

Key Benefits

- **Faster and more accurate than a single-ended test**
- **Eliminate driving to change line conditions**
- **Remotely set correct line terminations per technology**
- **Built for the future — includes crosstalk tests for VDSL2 and ADSL2+ bonded pairs**
- **Through-mode operation takes customers out of service only when necessary**

Key Features

- With JDSU HST-3000 OneCheck, it provides diagnostics to quickly identify typical copper faults
- Second-pair operation to accurately assess the effects of near-end and far-end crosstalk
- Both manual and automated operation modes
- Remote strap (short), open, drop-battery and transmit tones, and trace tone
- Supports wide frequency ranges from POTS (200 Hz) to VDSL2 (30 MHz)
- Easily view pair endings with TDR Helper, which automatically shorts and opens the pair
- New command mode lets technicians start and stop tests during execution without waiting for the previous test to complete

Various DSL access technologies, such as VDSL2 bonding and vectoring, exploit existing copper and hybrid fiber-copper infrastructures letting service providers deliver higher-bandwidth IP video and multimedia content to their customers. Yet delivering the high quality of service (QoS) that customers expect requires accuracy that surpasses single-ended copper-loop testing limitations. Accurately testing for wideband services requires changing far-end line conditions based on the tests performed, which can be both time-consuming and costly. Few technicians possess the field expertise needed and declining training budgets only further exacerbate the copper testing problem.

The JDSU UltraFED IIB Far-End Device paired with the JDSU HST-3000 fills this critical testing need because it is like having an "expert-in-a-box". The UltraFED IIB connects to the far end of the pair under test while the HST-3000 controls it remotely. One technician with one piece of equipment can now perform two-ended pair testing. Additionally, the UltraFED IIB can measure true near-end (NEXT) and far-end crosstalk (FEXT) for bonded VDSL and ADSL by terminating a second pair. For ultimate flexibility, the UltraFED IIB operates in two modes: passive mode where the HST-3000 activates the UltraFED IIB remotely for dual-ended testing and through mode where it automatically activates as needed to reduce downtime when troubleshooting marginal failures.

Isolating certain types of copper faults such as service-impacting bridged taps, splice failures, or cable sheath damage can be particularly troublesome, The OneCheck™ Copper Test Suite option for the HST-3000 simplifies this process and reduces fault repair times through seven diagnostics that run to an UltraFED IIB at the far end.

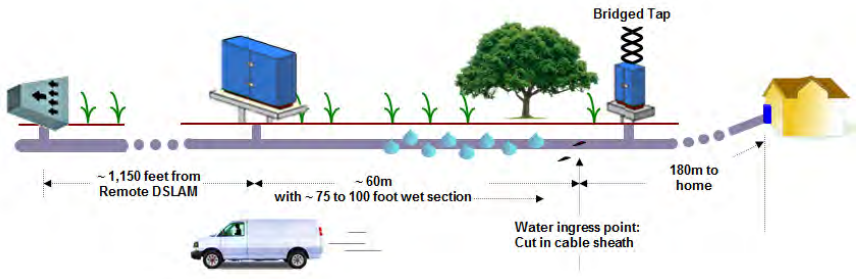
Copper Testing is More Important than Ever

Dual-Ended Testing is Better . . . and Smarter

New VDSL2 technologies such as DSL bonding and vectoring are enabling higher bandwidths for service providers to deliver multimedia content to end users. However, to deliver the performance advantages that the new technologies offer, copper-loop testing and maintenance are more important than ever before.

In the past, single-ended copper-loop testing was often perceived as just as reliable and faster than dual-ended testing. In reality, technicians who test only from one end often misdiagnose faults on higher-bandwidth circuits, such as VDSL2. Technicians conducting dual-ended tests using an HST-3000 to remotely command the UltraFED IIB at the far end can isolate customer-affecting fault conditions that otherwise go undetected during turn-up and installation or during routine copper troubleshooting.

During Installation and troubleshooting, technicians who test to an UltraFED IIB over the loop reduce drive-time and, ultimately, repeat dispatches. This testing method provides accurate terminations and remote test capabilities, including strap (short), open, drop battery, and tones, letting technicians quickly isolate faults and identify noise.

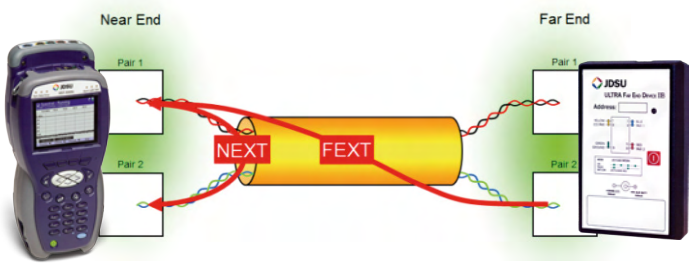


Accurately measuring copper requires changing the conditions at the far end.

Bonded Pair Turn-up and Fault Isolation

DSL-bonding technologies, according to ITU-T G.998.1, G.998.2, and G.998.3, leverage the existing technology by logically combining signals from two wire pairs to effectively double the downstream and upstream bit rates delivered to the user. However, several factors such as pair quality, frequency, and distance can affect the actual delivery rates. Optimal bandwidth delivery requires accurately testing bonded pairs. However, qualifying individual copper pairs at the physical layer fails to reveal a potentially adverse interaction, called crosstalk, between the bonded pairs when both are carrying xDSL service. The effects of crosstalk remain undetected until bringing up bonded service between the modem and DSLAM. The ability to assess crosstalk between two candidate pairs prior to provisioning can save significant time, minimize pair swapping efforts, and lower repeat rates.

Using the UltraFED IIB with a companion HST-3000 lets technicians measure both FEXT and NEXT from a single end by generating a tone on one pair while simultaneously terminating the second pair. The HST-3000 detects coupling at the near end (for NEXT) or from the far end (for FEXT) from one pair of wires to another and measures noise on another pair of wires at the near end.



HST-3000 and UltraFED IIB measure NEXT and FEXT

Multiple Measurements are Better than Just One

When testing copper pairs, making pass or fail decisions from one test result alone, such as attenuation, stress, or TDR, can lead to erroneous or incomplete conclusions. The resistive, capacitive, and inductive characteristics of each conductor in the pair as well as the similarity of one conductor to the other (pair balance) can affect DSL performance. When troubleshooting or qualifying copper pairs, experienced technicians know that achieving the most accurate and trustworthy results in determining a pair's health requires comparing multiple measurements.

OneCheck Copper Test Suite offers a set of applications that can help technicians isolate faults up to three times faster than running separate tests. Each automated test in the OneCheck Copper Test Suite runs on an HST-3000 paired with a companion UltraFED IIB to assess either overall pair quality or to isolate specific fault types.

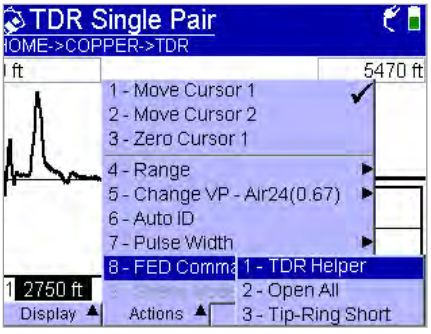
OneCheck Copper Test Suite

OneCheck Test	Tests Runs	Test Objective
OneCheck Copper for DSL	Foreign voltage (AC) Foreign voltage (DC) Resistance Longitudinal balance Series fault Opens Load coil Bridged tap Loop resistance Wideband noise (per band) Wideband impulse noise Wideband SNR Wideband balance Wideband NEXT/FEXT Power influence Circuit noise Wideband loss	Determines overall pair(s) health over the DSL technology provided and includes thresholds and filters set by technology. Lets users save results after test. Helps to identify shorts, grounds, opens one-sided opens, cable length, battery crosses, balance, splice failures, load coils, bridged taps/laterals, crosstalk, power influence, impulse-noise events, and excessive insertion loss.
OneCheck Series Fault	Longitudinal balance (to open) Longitudinal balance (to short) Tip resistance Ring resistance	Checks for series fault presence, typically from splice failures where one conductor has greater resistance (in series) than the other conductor. Helps to identify bad splices and series-resistance faults.
OneCheck Bridged Tap	TDR Opens (capacitance)	Determines bridged tap (lateral) existence on the pair, the distance to it, as well as its length.
OneCheck TrueLength	Opens Distance to short TDR to open TDR to short	Provides actual pair length by correlating capacitive and resistive and TDR loop measurements along with a confidence percentage.
OneCheck RFL Pretest	Circuit resistance Loop resistance	Indicates whether a resistive fault was found and identifies which test to run next, RFL or K-Test, or to isolate the fault.
OneCheck Kick Test	Foreign voltage (AC) Foreign voltage (DC) Circuit resistance Opens Capacitive Balance Longitudinal balance	Quick copper-check test to assess the pair's health before final test. UltraFED IIB is not required for this test.
OneCheck Shield Test	RFL	Determines resistance from the HST-3000 to the UltraFED IIB.

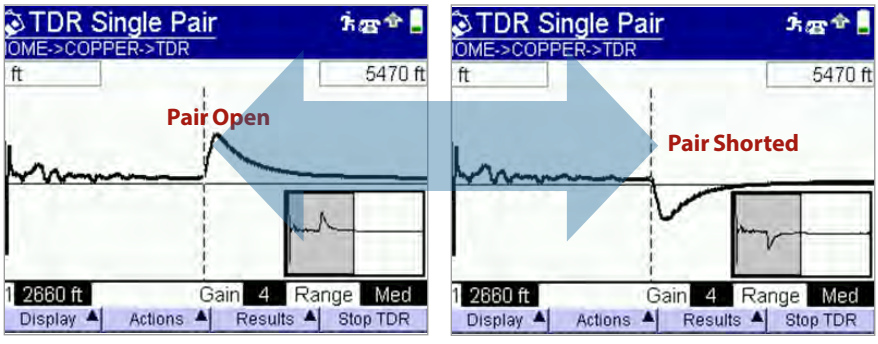
Like Having a "Copper Expert in a Box"

HST-3000 TDR Helper Reduces Fault-Isolation Time

Identifying the end of copper pairs can be challenging even for expert technicians. To simplify fault location, the HST-3000 offers a unique feature that users can enable in the HST-3000 TDR menu called "TDR Helper". TDR Helper sends DTMF tones to a remote UltraFED IIB to alternately open and short the line across tip/ring (or A/B) helping technicians identify the end of the cable pair by simply observing the dip up (open)/dip down (shorted) status. TDR Helper uniquely saves time and simplifies tip/ring (A/B) fault-finding when identifying load coils, wet sections, splices, and bridged taps.



HST-3000 TDR menu path to TDR Helper



Observing TDR Helper while running

Everything Field Technicians Need to Install and Repair Copper

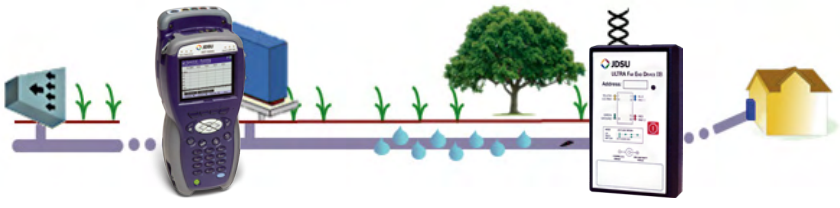
Technicians can remotely control the UltraFED IIB with the HST-3000 to test all DSL service varieties, including single- and bonded-pair VDSL2/ADSL2+ as well as legacy HDSL. Technicians can use the HST-3000 Manual FED commands to set the test mode, tone frequency and duration, terminate the line with the correct impedance, and send a "wake-up" tone to UltraFED IIB before running the test. Or they can simply run a OneCheck automated test to automatically configure the test according to the technology being tested. The HST-3000 can isolate pairs, drop the telco/exchange battery, provide the strap for resistive fault location tests, send tone/trace tone to the UltraFED IIB for the appropriate line condition, termination, and filters at the far end to achieve the most highly accurate test results.

UltraFED IIB Test Mode Functions

UltraFED IIB Test Mode	Test Mode Function
Single Tone	Connects a tone generator across tip (A) to ring (B) to measure loss
Trace Tone 1	Connects a tone generator across tip (A) to ring (B) and sends 577 and 1004 Hz tones at cadence 1
Trace Tone 2	Connects a tone generator across tip (A) to ring (B) and sends 577 and 1004 Hz tones at cadence 2
Balance Single Tone	Connects a tone from tip (A) to ring (B) to ground to assess line balance in the xDSL frequency range
Quiet Termination	Terminates the pair at the FED
Open All	Disconnects tip (A), ring (B), and ground (sleeve) from the cable pairs to isolate the pair under test
Tip-Ring Short	Also called strap mode. Connects tip (A) to ring (B) and is used with loop resistance or RFL measurements
Tip-Ring-Gnd Short	Connects tip (A), ring (B), and ground (sleeve) to ground and is used while measuring resistive balance
RFL 3-Way Strap	Connects tip (A) to T1 to ring (B) and is used primarily for measuring RFL on a verified good pair
TDR Helper	Continuously opens and shorts the pair to identify the pair's end
Off/Thru	Connects tip (A) and ring (B) to the CO tip (A) and ring (B) to maintain "in-service" customer connection and "out-of-service" as necessary during test

UltraFED IIB – Offers Best Way to Help Techs Work Like Experts

An UltraFED IIB simplifies two-ended testing with a single technician. The UltraFED IIB connects to the far end of the pair under test while the HST-3000 controls it remotely via DTMF tones. One piece of equipment can now perform two-ended pair testing, which is critical for accurately qualifying or repairing copper pairs for VDSL2 and bonded VDSL2 spans carrying wideband multimedia content. Complete with the HST-3000 along with the OneCheck Copper Test Suites, dual-ended testing with an UltraFED IIB is better and smarter, and makes it even simpler for providers to eliminate repeat dispatches by making sure tests are done right the first time.



Accurate pair qualification and troubleshooting with one technician

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Specifications

General	
Size	152 x 101 x 38 mm (6 x 4 x 1.6 in)
Weight	226.80 g (8 oz)
Battery life	20 hours of continuous use
Battery shelf life	2 months installed (20 hours of continuous use)
Operating temperature range	–18 to –60°C (–0 to 140°F)
Storage temperature range	–40 to –75°C (–40 to 165°F)
Humidity range	10 to 95% RH noncondensing
Tone transmit	200 Hz to 30 MHz ±0.015% at 0 dBm; trace tone (2 cadences)
Voiceband (POTS) frequency range	200 Hz to 20 kHz/600 Ω
Wideband (xDSL) frequency range	10 kHz to 30 MHz/100 Ω

Ordering Information

Part Number	Description
UFEDIIB	UltraFED IIB, user guide and soft cover glove
UFEDIIB-PKG1	UltraFED IIB, user guide, soft cover glove and cables
UFEDIIB-PKG2	UltraFED IIB, user guide, soft cover glove, cables and OneCheck Copper Test Suite
ULTRAFED-CB-BON	UltraFED cable RJ45 to 7 clip leads (bed of nails)
ULTRAFED-CB-PROT	Lightning protection cable
ULTRAFED-CB-RTC	UltraFED cable RJ45 to clip leads
ULTRAFED-CB-SAFE	UltraFED cable RJ45 to 4 mm safety
ULTRAFED-GLOVE	UltraFED glove
ULTRAFED-AC-ADAPTER	AC adapter for the UltraFED
CB-4MMCLP7-BON	4 mm bed of nail clips (package of 7)
S1505	Safety clips set: alligator and test probes (package of 8)
ULTRAFED-ML	UltraFED manual

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