

VIAVI

Trilithic DSP Series Meters

Value-based models for every technician work group

The DSP Series Meters

As cable networks migrate to newer technologies, and anticipating an eventual move to DOCSIS 3.1 and 1.2 GHz downstream range for all meters, the complete VIAVI meter line provides these installation and service measurement capabilities for cable service providers and contractors. These robust and compact DOCSIS 3.1 meters are known for their long battery life.

The 180 DSP-Lite starts the line with basic measurement capabilities, including levels, and DOCSIS 3.1 OFDM signal quality.

Key Features

- 1.25 GHz Frequency range
- Meters with DOCSIS® 3.1 RF measurements and with cable modem service tests
- Auto-discovery of channel plans

Applications

- Return spectrum analysis (4 to 110 MHz)
- Level, C/N; QAM and OFDM measurement
- Complete channel plan scan with tilt measurement
- Advanced, yet simple testing and troubleshooting with channel plan auto discovery

Benefits

- Provides cable installers and field technicians a full complement of RF measurement functions
- Color touch screen reduces installer entry errors and improves decision making
- Multiple tests in a single autotest app provide a convenient way to standardize tech processes and procedures
- Powerful troubleshooting tools to improve overall system health



Basic Signal Level Meter – 180 DSP

A dependable tool for basic cable installation needs, the 180 DSP signal level meter features a compact rugged design, easy-to-use color user interface and an unparalleled selection of digital and analog channel measurements, including DOCSIS 3.1 OFDM signal analysis.

When testing or troubleshooting within analog, digital or mixed analog/digital transmission systems, the 180 DSP is the perfect tool for measuring analog and QAM carrier power levels. Additionally, for QAM carriers (including deep interleave) the 180 DSP provides Hum¹, Constellation, Equalizer Tap, MER and BER measurement displays. This allows users to quickly analyze 64 and 256 QAM downstream channels for quality verifications or to locate impairments with the meter, all right out of the box.

The 180 DSP performs an extensive set of OFDM signal measurements to enable testing in DOCSIS 3.1 deployments. In addition to average level, peak-to-valley, and in-channel tilt, the meter displays PLC constellation, level, pre/post BER, MER, decoder stress over time, and a summary for the default profile.

With its channel plan scan feature, the 180 DSP displays the frequency response of the entire channel lineup. This measurement displays a color-coded bar graph of each channel or your favorite channels in the active channel plan. The channel plan scan also includes on-screen markers that can be adjusted to perform a tilt measurement.

The 180 DSP comes standard with the ability to display the full return spectrum from 4 to 205 MHz. The spectrum display provides peak measurements, color-coded markers, and delta measurements. This feature also includes adjustable detector modes which are useful for capturing bursty transient noise. The 180 DSP optionally performs forward spectrum measurements from 5 MHz to 1,250 MHz².

Installation Troubleshooting and Certification

180 and 360 DSP signal level meters are specifically tailored for fast installation RF signal testing and troubleshooting. These meters come equipped with all needed analog and digital signal measurements to ensure the highest quality installation—and at a price point that makes it feasible for system operators to outfit their entire fleet.

Designed for installer, contractor and service tech challenges, the 180 and 360 DSP help simplify decision making and streamline standardization processes and procedures, while improving tech efficiencies and the overall health of the entire system.

The 180 and 360 DSP feature intuitive, color touchscreen interfaces, simple pass/fail indicators, and autotest apps to streamline basic RF installation and make the installer's job easier. These meters are built with the technician in mind—from the quick charge time to the unique, built-in LED flashlight and glow in the dark keypad for those dark, cramped spaces.

The 180 and 360 DSP meters make basic RF installation a breeze for installers and contractors. Techs will appreciate the advantages of a quick and efficient device, featuring a flexible and easy-to-operate interface inspired by modern smart devices. These next-gen fulfillment tools come equipped with powerful troubleshooting tools and simplified autotest apps to perform triple-play tests, set home certifications standards, and measure both Analog and Digital signals. The 360 DSP has built-in DOCSIS 3.1 Modem, Ethernet, and WiFi communications capabilities, and test results can be easily to StrataSync for near real-time views of measurement data.

¹ Hum is optional on 180 DSP-Lite

² Forward spectrum analysis is optional on 180 DSP-Lite

Maintenance Meter – Plant Maintenance – 1G DSP

Maintaining the health of your plant can now be achieved with one instrument, including everything needed for systemwide testing. Eliminate the need for multiple instruments – the 1G DSP conveniently combines CATV, DOCSIS 3.1 Cable Modem, Gigabit Ethernet, and Optical testing, and save capital expenses at the same time.

Designed to meet maintenance technician challenges, this meter has powerful troubleshooting tools for experienced techs, yet simplifies decision making and streamlines standard processes and procedures for the more novice tech. This results in more efficient technicians, greater overall system health, and allows techs to continue using the same meter as they become more experienced.

The 1G DSP can achieve throughput testing speeds of up to a gigabit/sec using a dedicated Ethernet test port or the internal cable modem.

The 1G DSP can perform either roundtrip or one-way Key Parameter Index (KPI) measurements for full Ethernet service testing. With constant payload testing for Layer 2 through Layer 4, the 1G DSP is built for verification of both Ethernet Service Level Agreement (SLA) and Quality of Service (QoS) metrics.

For optical power measurements, the 1G DSP can be optionally equipped with a single input port for measurement of single mode (1310 nm, 1490 nm, and 1550 nm) wavelengths with interchangeable FC, SC, and ST style adapters.

The 1G DSP features a large, high resolution, ultra-bright, color touchscreen interface, simple pass/fail indicators, and powerful autotest apps to streamline troubleshooting and make the technician's job easier. Everything about this next-gen meter was built with the technician in mind—from remote control of the meter via a web browser, to the long battery life, quick charge time, and glow in the dark keypad for those dark, cramped spaces. This meter also includes a visual fault locator (VFL) that makes it easy for the technician to locate and identify loss points in patch cords, patch panels, and enclosures.

StrataSync

Keeping track of test equipment inventory is typically a challenge for field operation groups. Asset management includes types of instruments, firmware versions, options, and automated test configurations that match standardized methods and procedures. The challenge increases every time a change occurs. Without a means to efficiently collect and analyze test data, valuable information about network health is missed.

StrataSync is a cloud-based, hosted solution that manages assets, configurations, and test data for VIAVI instruments to ensure they are all equipped with the latest software and installed options. It manages inventory, test results, and performance data from anywhere with browser-based ease—improving both technician and instrument efficiency. Operators can then leverage data from the entire network for results analysis and to inform and train the workforce.

There are many options for syncing the Trilithic DSP series meters with StrataSync including Ethernet, DOCSIS, or with WiFi (consider the many WiFi hotspots) when a data connection is established. Syncing on a consistent schedule becomes more important as techs are required to upload data to show that all tests for a service activation were performed and show that all tests passed. This provides confidence to the service provider that the installation was performed successfully, and in contractor situations helps to avoid bill-backs due to customer complaints post-installation.

Workforce management is more objective with StrataSync. Supervisors can verify compliance with methods and procedures, and will know which techs need coaching or further instruction. Trend analysis allows identification of problems like: incorrect test configurations or limits causing unnecessary retests; geographic clusters of failures that point to outside plant problems; workgroup-wide issues that may indicate a training deficit.

StrataSync provides insight into installation quality and trends, while enabling methods and procedures compliance verification. This leads to higher customer satisfaction as techs get the job done right the first time, reducing repeat visits.

Fiber

Broadband CATV networks and broadband triple-play services often rely on fiber networks. For point-to-point fiber installations such as FTTC or business connections, field technicians can use the DSP meter together with the VIAVI MP-60 or MP-80 USB optical power meter (OPM) to ensure that fiber cable attenuation meets system requirement performance and is ready to survive network aging and environmental impacts. In combination with a VIAVI SmartPocket optical laser source (OLS), the DSP meter equipped with an MP-60 or MP-80 OPM can automatically perform optical link loss measurement at different wavelengths—resulting in a faster and more comprehensive fiber test.

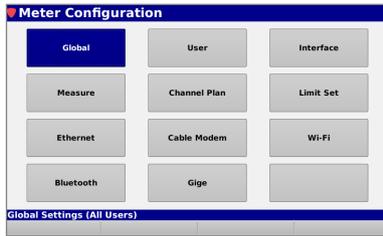
Using the P5000i optical fiber scope, technicians can test the #1 cause for troubleshooting in optical networks—contaminated fiber connectors. The P5000i provides pass/fail analysis based on user-selectable acceptance profiles.

Fiber Test	What It Tests	Why It Is Needed
Optical fiber scope	Pass/fail against a predefined profile; includes dual magnification	Contaminated fiber connectors are the #1 cause for troubleshooting in optical networks
Optical power level	Optical power level with pass/fail and reference values	Optical loss must be within budget at ONU site

Basic Operational Features

Easy Setup and Configuration

- Global configuration settings can be applied to all users of the device, while other settings can be tailored to suit each user
- Setting adjustments can be locked out using the ViewPoint software



Job Management

- Create and close out your jobs from this screen
- Shows what channel plan and how many tests have been run on a particular job

Name	Status	Tests	Channel Plan
w20140822113149	Open	0	tap
w20140822113154	Open	0	outlet
w20140822113205	Open	0	ground block
w20140822113209	Open	0	ground block
w20140822113213	Open	0	tap
w20140822113218	Open	0	outlet
w20140822113245	Closed	0	outlet
w20140822113159	Closed	0	tap

Intuitive File Management

- Intuitive File Explorer that displays the files that are stored in the meter
- View and sort files by; name, type, size and date/time saved
- Export files to USB, delete files, database backup and restore, and save system logs

Name	Type	Date/Time	Size
4444-1	package	1970-01-01 00:06:23	0.9 KB
Home Cert	autotest	2013-12-18 19:25:09	2.7 KB
CPE	limit	2014-01-08 23:02:50	1.5 KB
CalCheck	autotest	2013-07-15 18:55:21	0.3 KB
CalCheck	limit	2013-07-15 18:55:21	0.4 KB
Screen	limit	2014-02-09 00:57:17	44.3 KB
Tap	limit	2013-02-22 13:44:12	1.0 KB
GB - Ingress Check	limit	2013-02-22 13:44:12	0.4 KB
CalCheck	plan	2013-07-15 18:55:21	3.2 KB
Drop	limit	2013-02-22 13:44:12	1.0 KB
NCTA Base	plan	2014-01-08 23:02:50	131.1 KB
config	ini	2014-02-07 21:53:19	7.3 KB
browser	cookie	2014-02-09 01:37:05	0.8 KB

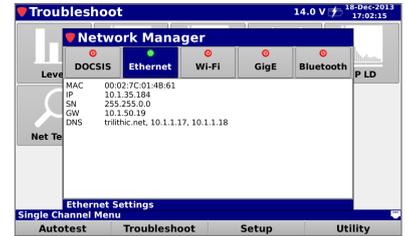
Remote Access

- Remotely access the meter using any active network connection
- Control and monitor almost any function of the meter from your PC, smart phone, or tablet



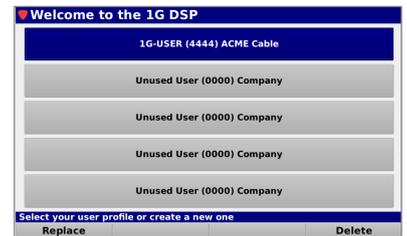
Simple Network Management

- Choose between Ethernet, WiFi, GigE, or cable modem connection methods
- Provides connection details such as MAC, IP, gateway and DNS



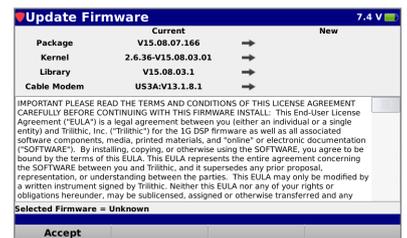
Multiple User Profiles

- Allows up to 5 technicians to share a 1G DSP
- Each technician has his or her own profile, which loads in completely different sets of channel plans, autotests, etc.



Convenient Firmware Updates

- Easily update the meter firmware through the web or via USB to ensure you always have the latest features



Web Browser

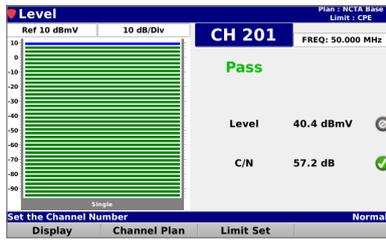
- The web browser allows you to view your favorite websites
- The web browser displays a default home page which includes a list of six favorite websites. These favorites can be set to any IP address or URL using the ViewPoint WFM Module software



Level Measurements

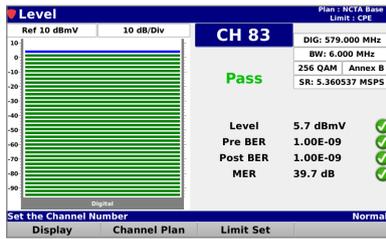
Single Frequency Pilot Carriers

- Shows a bar graph for the level of the selected single frequency carrier channel
- Provides Pass/Fail results for Level and Carrier-to-Noise measurements when compared against user-defined limit sets



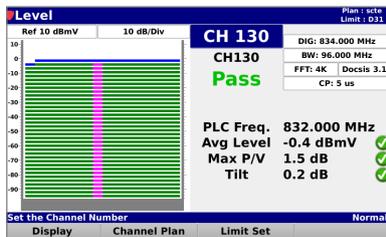
SQ-QAM Carriers

- Shows a bar graph for the level of the selected digital SC-QAM channel
- Provides Pass/Fail results for Level, Pre-BER, Post-BER, and MER measurements when compared against user-defined limit sets



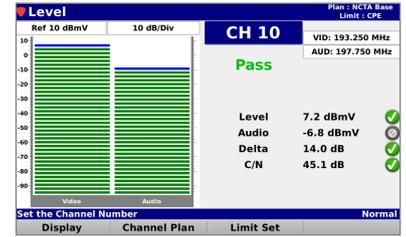
OFDM Carriers

- Shows the Physical Link Channel (PLC) frequency and a bar graph for the level of the selected digital OFDM channel
- Provides Pass/Fail results for Average Level, Max P/V, and Tilt measurements when compared against user-defined limit sets



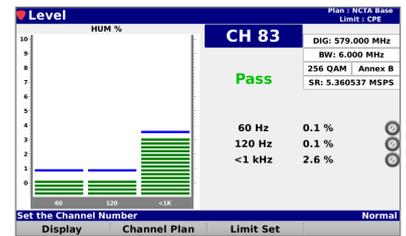
NTSC/PAL/SECAM Carriers

- Shows a bar graph for the video and audio levels of the selected analog channel
- Provides Pass/Fail results for Video Level, Audio Level, Delta V/A, and Carrier-to-Noise measurements when compared against user-defined limit sets



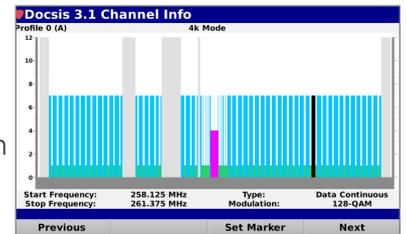
Analog and Digital Hum Measurement³

- Measure the amplitude of 50/60 Hz, 100/120 Hz, and low frequency interference present on analog or digital channels
- Provides Pass/Fail results for limit sets



DOCSIS 3.1 Channel Information

- Displays the PLC, BPSK Sub-Carriers, Blocks of QAM Sub-Carriers, and Exclusion Zones defined within Profile A of the DOCSIS 3.1 OFDM Channel
- Provides Markers for closer inspection of individual carriers, which include the start/stop frequency of the carrier as well as its type and modulation.

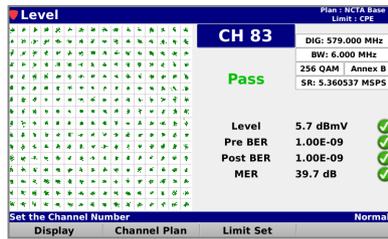


³ Hum is optional on 180 DSP-Lite

Constellation Measurements

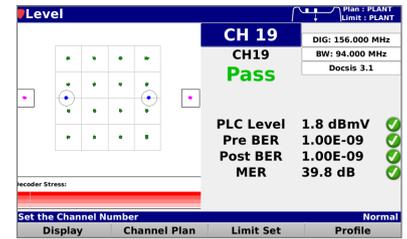
SC-QAM

- Shows the constellation diagram of the selected digital SC-QAM channel
- Provides Pass/Fail results for Level, Pre-BER, Post-BER, and MER measurements when compared against user-defined limit sets



OFDM Physical Link Channels (PLC)

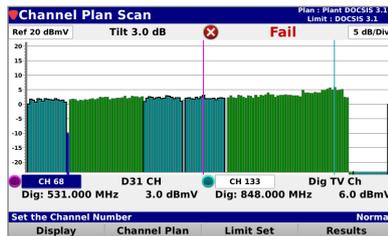
- Shows the constellation diagram for the PLC continuous pilots, BPSK symbols, and 16 QAM data of the selected digital OFDM channel
- Provides Pass/Fail results for PLC Level, Pre-BER, Post-BER, and MER measurements when compared against user-defined limit sets



Multi-Channel Measurements

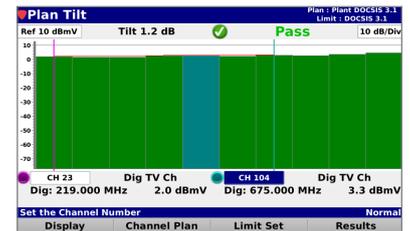
Channel Plan Scan

- Full channel plan scan displays the frequency response of the entire channel lineup
- Provides Pass/Fail results for limit sets and color-coded channels; blue for analog, green for SC-QAM digital, and aqua for OFDM digital



Tilt Measurement

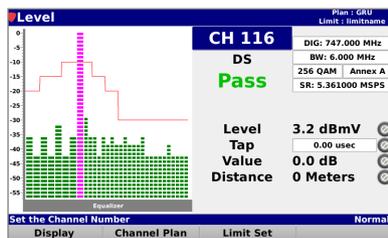
- Full channel plan scan displays the frequency response of the entire channel lineup
- Provides Pass/Fail results for limit sets and color-coded channels; green for digital and blue for analog
- Tilt shows the level difference between two selectable channels



Digital Troubleshooting

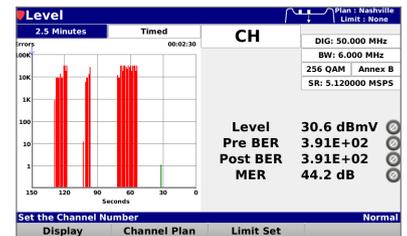
Equalizer Tap Display

- Shows the equalizer tap levels of the selected digital SC-QAM channel in comparison to the DOCSIS specification for allowable correction
- Easy identification with Pass/Fail results for RF issues and impairments related to group-delay and microreflections



BER-Over-Time Display

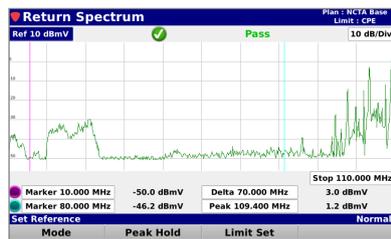
- Shows the BER measurement of the selected digital SC-QAM channel over a user-defined time period
- The graph displays green lines for Pre-BER and red lines for Post-BER and provides Pass/Fail results for Level, Pre-BER, Post-BER, and MER measurements when compared against user-defined limit sets



Spectrum Measurements

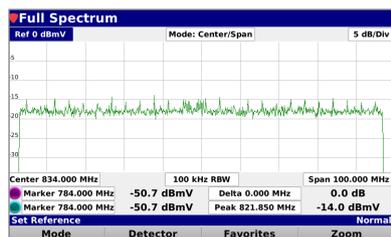
Return Spectrum Measurement

- Provides the ability to view raw return spectrum traces from 4 to 205 MHz
- Fast DSP spectrum snapshots give the user extreme speed to capture fast transients on the upstream



OFDM Channel Spectrum

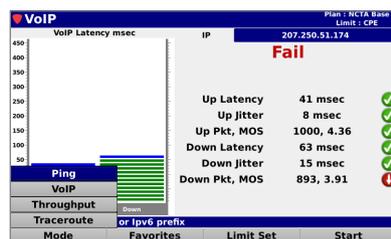
- Provides the ability to view raw forward and return spectrum traces of full 24 to 192 MHz OFDM channels
- Fast DSP spectrum snapshots give the user extreme speed to capture fast transients on the upstream and downstream



Network Connectivity Testing

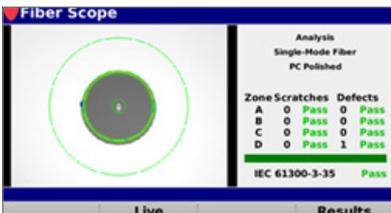
Network Test Suite

- The Network Test Suite includes Ping, VoIP, Throughput, and Traceroute tests
- These tests provide a quick and simple connectivity test to your favorite testing sites or to the Trilithic ACTS software



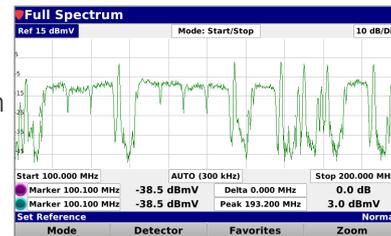
Fiber Inspection Scope

- Connects to USB port
- P5000i enables fast and easy certification for clear and optimized connections
- Intelligent fiber microscope eliminates fiber inspection guesswork



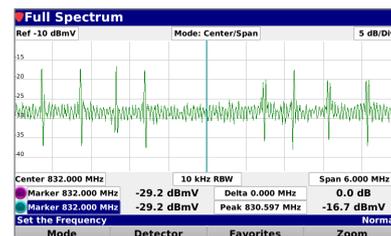
Full Spectrum Measurement⁴

- Provides the ability to view raw forward spectrum traces from 5 to 1250 MHz
- Fast DSP spectrum snapshots give the user extreme speed to capture fast transients on the downstream



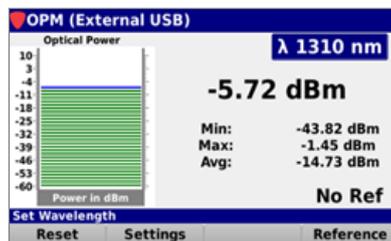
OFDM Physical Link Channels (PLC)

- Provides the ability to view raw spectrum traces of the continuous pilot carriers needed for locking onto an OFDM signal
- Identify locations of ingress or interference that could potentially affect the PLC



Optical Power Meter

- THUMB drive size, connects to USB port
- Verify power levels within design specification at various points in fiber network
- MP-series optical power meter size, functionality, and ease-of-use makes it an extremely useful and practical tool



⁴ Forward spectrum analyzer is optional on 180 DSP-Lite

Cable Modem Measurements (360 and 1G DSP)

Cable Modem Network Connectivity and Status

- The Network Manager view allows users to quickly and easily use the internal cable modem for network connectivity and performance testing

Cable Modem Statistics		Plan: PLANT	Limit: None
Summary			
Cable Modem Type	Docsis 3.1		
Meter IP Address	192.168.8.232		
Modem IP Address	192.168.18.246		
Downstream	Bonded 31 QAM + 1 OFDM		
Min/Avg/Max Rx Level	7.7/10.5/11.1 dBmV		
Min/Avg/Max MER	43.4/43.7/47.9 dB		
Upstream	Bonded 8 QAM		
Min/Avg/Max Tx Level	40.5/42.7/45.5 dBmV		
Display	Limit Set		

- Upon connecting, the Network Manager displays the MAC address, IP address, subnet, gateway, and DNS information for the cable modem network connection

Cable Modem Statistics		Plan: PLANT	Limit: None
P Info			
Meter IP Address:	192.168.8.232		
Modem IP Address:	192.168.18.246		
Modem Net Mask:	255.255.255.0		
Gateway:	192.168.18.1		
DHCP Server:	192.168.0.2		
LOG Server:	192.168.0.2		
TFTP Server:	192.168.0.2		
Display	Limit Set		

- The Cable Modem Statistics view provides a summary that displays the type of Cable Modem being used, meter IP address, and modem IP address

Cable Modem Statistics		Plan: PLANT	Limit: None
Config File			
Configuration File Parameters:			
Network_Access =	1		
Maximum_Number_of_CPEs =	16		
Upstream_Service_Flow_Encoding :	Service_Flow_Reference = 1		
	QoS_Parameters_Set_Type = 07		
	Traffic_Priority = 01		
Downstream_Service_Flow_Encoding :	Service_Flow_Scheduling_Type = 2		
	Service_Flow_Reference = 2		
	QoS_Parameters_Set_Type = 07		
	Traffic_Priority = 1		
Privacy_Enable =	1		
Display	Limit Set		

- This view also displays the current channel bonding along with the min/max/avg Rx Level and BER of the downstream channels and the min/max/avg Tx Level of the downstream channels

Upstream and Downstream Cable Modem Statistics

- Internal DOCSIS 3.1 modem that operates in both DOCSIS 3.0 (32x8) and DOCSIS 3.1 modes

Cable Modem Statistics		Plan: tri-plant	Limit: tri-plant
Upstream			
ID	Frequency (MHz)	Tx Level	Pass
55	74.300 (64 QAM)	50.3 dBmV	✓
56	80.900 (64 QAM)	51.3 dBmV	✓
54	67.700 (64 QAM)	49.3 dBmV	✓
53	61.100 (64 QAM)	49.3 dBmV	✓
52	28.100 (64 QAM)	47.7 dBmV	✓
51	21.500 (64 QAM)	46.8 dBmV	✓
50	14.900 (64 QAM)	46.8 dBmV	✓
49	8.300 (64 QAM)	46.8 dBmV	✓
Display	Limit Set		

- Measure up to eight (8) upstream SC-QAM channels
- Displays the ID, channel frequency, Tx Level, SNR, PreBER, and Post BER of each upstream channel

- Measure up to 32 downstream SC-QAM channels when operating in a DOCSIS 3.0 only environment

Cable Modem Statistics		Plan: tri-plant	Limit: tri-plant			
Downstream						
Freq	Frequency (MHz)	Rx Level	SNR	PreBER	PostBER	Pass
534.000	(OFDM 4K)	2.7 dBmV	47.1 dB	1.00E-05	1.00E-05	✓
585.000	(256 QAM)	8.4 dBmV	43.4 dB	3.87E-08	1.00E-09	✓
591.000	(256 QAM)	8.1 dBmV	40.9 dB	1.29E-08	1.00E-09	✓
597.000	(256 QAM)	8.8 dBmV	42.4 dB	1.00E-09	1.00E-09	✓
603.000	(256 QAM)	9.1 dBmV	43.4 dB	6.41E-08	1.00E-09	✓
609.000	(256 QAM)	8.2 dBmV	40.9 dB	1.00E-09	1.00E-09	✓
615.000	(256 QAM)	7.9 dBmV	40.4 dB	1.29E-08	1.00E-09	✓
621.000	(256 QAM)	8.7 dBmV	40.9 dB	1.00E-09	1.00E-09	✓
627.000	(256 QAM)	8.8 dBmV	40.9 dB	3.24E-09	1.00E-09	✓
639.000	(256 QAM)	8.2 dBmV	43.4 dB	3.24E-09	1.00E-09	✓
Display	Limit Set					

- Measure up to two (2) downstream OFDM channels and 30 downstream SC-QAM channels when operating in a mixed DOCSIS 3.0 and DOCSIS 3.1 environment
- Displays the primary status, channel frequency, Rx Level, SNR, PreBER, and Post BER of each downstream channel

OFDM Profile Statistics

- Displays the performance statistics for all of the available OFDM profiles

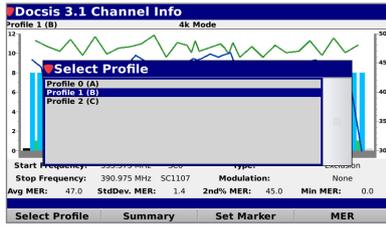
Cable Modem Statistics		Plan: PLANT	Limit: PLANT
Downstream			
D3.1 Profile Statistics			
Profile	Locked	PreCWER	PostCWER
PCL	Yes	0.00E+00	0.00E+00
NCP	Yes	0.00E+00	0.00E+00
A	Yes	0.00E+00	0.00E+00
B	Yes	2.00E-04	0.00E+00
C	Yes	6.20E-01	0.00E+00
Display	Profile	Limit Set	CWER

- Displays the Profile Name, Locked Status, PreBER/CWER, and PostBER/CWER of each downstream DOCSIS 3.1 OFDM Channel

Cable Modem Measurements (360 and 1G DSP) continued

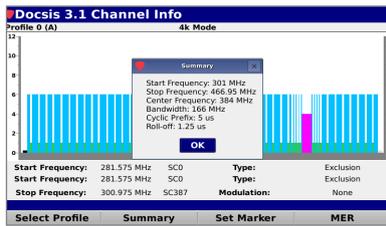
OFDM Multiple Profile Selection

- Capability to decode up to four (4) Profiles 0–3 (A–D)
- Allows for switching between the multiple profiles.

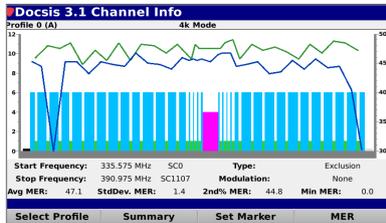


OFDM Profile Summary with Distributed MER

- Displays the PLC, BPSK Sub-Carriers, Blocks of QAM Sub-Carriers, and Exclusion Zones defined within each profile of the DOCSIS 3.1 OFDM Channel



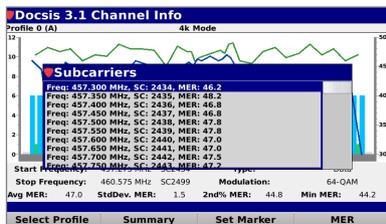
- Provides Markers for closer inspection of individual carriers, which include the start/stop frequency of the carrier as well as its type and modulation.



- MER is measured on all continuous pilot carriers and is displayed as a plot of MER versus frequency. This view also displays the average, standard deviation, 2nd percentile, and minimum MER for the entire OFDM channel.

OFDM Subcarrier Measurement Details

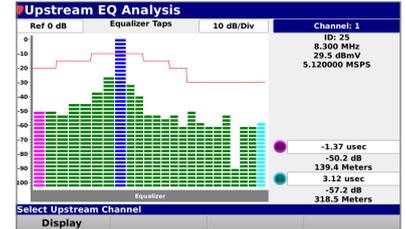
- Displays the performance statistics for all of the OFDM subcarriers
- Displays the Frequency, Subcarrier Number, and MER of each individual OFDM subcarrier



Upstream Linear Distortions Testing (360 and 1G DSP)

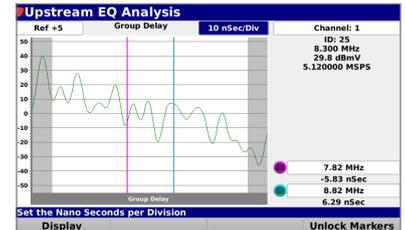
Equalizer Taps Measurement

- Used to determine if equalization is hiding potential problems within the upstream
- View the pre-equalization of the upstream channel and the distance to the EQ taps



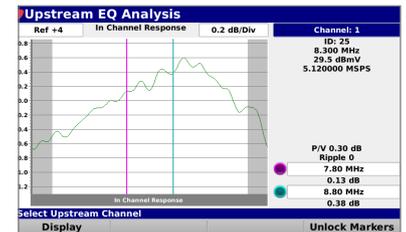
Group Delay Measurement

- Used to determine if equalization is hiding potential problems within the upstream
- View the pre-equalization of the upstream channel and group delay



In-Channel Response Measurement

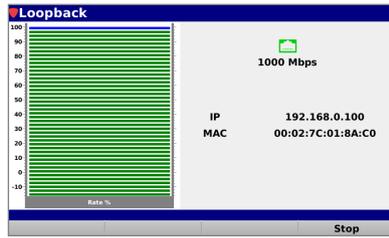
- Used to determine if equalization is hiding potential problems within the upstream
- View the pre-equalization of the upstream channel and the in-channel frequency response



Ethernet Service Testing (1G DSP)

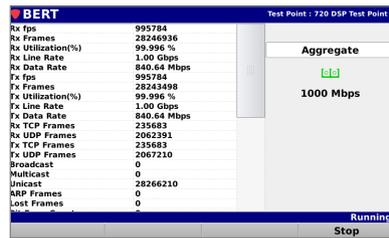
Ethernet Loopback Functionality

- Provides the ability to measure the optical power through the optical transceiver
- Provides link speed, wavelength, Tx power, and Rx power measurements of active SFP connection



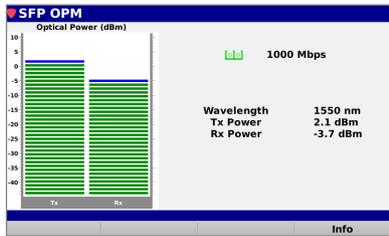
Gigabit Bit-Error-Rate Testing

- Throughput testing speeds of up to 1 GbE using a dedicated test port
- Roundtrip or one-way constant payload testing for Layer 2–4 for verification of Ethernet SLA and QoS metrics



SFP Optical Power Measurement

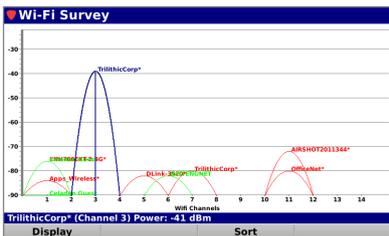
- Provides the ability to measure the optical power through the optical transceiver
- Provides link speed, wavelength, Tx power, and Rx power measurements of active SFP connection



WiFi Testing (360 and 1G DSP)

N-Speed WiFi with Survey Test Mode

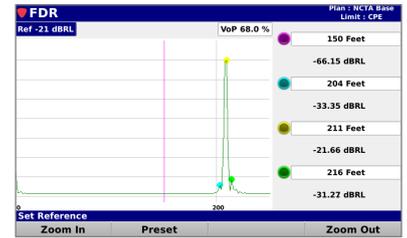
- Built-in 802.11 "b/g/n" 2.4/5 GHz wireless adapter
- Actively view live signal strengths of WiFi networks in the area
- Provides WiFi details such as SSID, channel, and power level



Cable Continuity Testing

Frequency Domain Reflectometer⁵

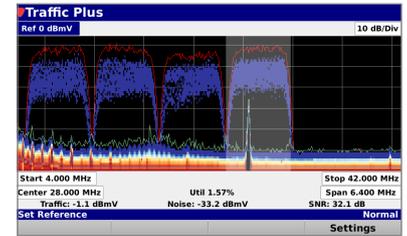
- Determine the distance to cable faults (opens, shorts, splitters, etc.)
- Events shown on a distance versus amplitude display
- Markers to identify the distance and loss at the source of the reflection



Ingress Under Carrier Measurements (360 and 1G DSP)

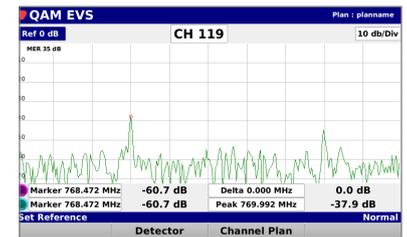
Upstream Traffic Control Plus

- Allows for a high-speed real-time view of ingress in the upstream
- Heat map allows for simplified view of ingress hotspots
- 100% coverage so technicians can see the shortest cable modem bursts and ingress even under the busiest upstream



Downstream QAM Error Vector Spectrum

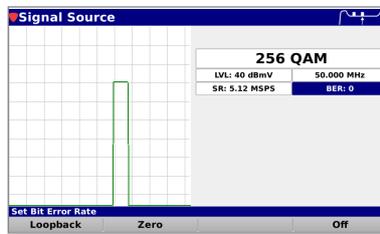
- Tune to downstream QAM channels to display Error Vector Spectrum (EVS)
- Display the ingress that is present "underneath" a downstream cable modem channel, or any bursty signal



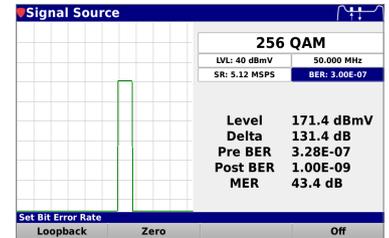
⁵ FDR is unavailable on DSP 180-Lite

Dual RF Test Ports and Source Generator⁶

- The meter features two (2) built-in test ports for RF loopback testing that allow for the simultaneous transmission of a source signal from the TX Port and the measurement of the same signal using the TX/RX Port
- The Source Generator provides the ability to transmit continuous wave (CW), 16 to 256 QAM, or 4K/8K OFDM carriers within the return band from 5 to 85 MHz with user-adjustable bit error injection



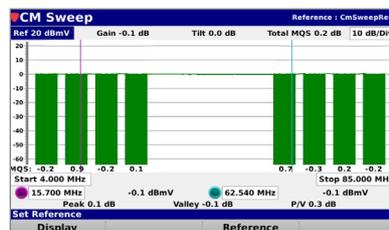
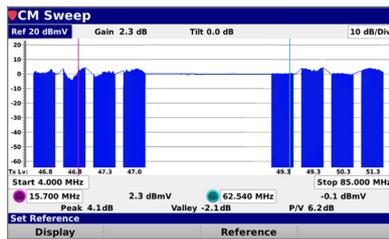
- When combined, these features allow maintenance techs to use a single field analyzer to identify issues with active and passive devices, such as amplifiers, nodes, pads, and cables



In-Band Return Sweep (1G DSP)

Cable Modem (CM) Sweep

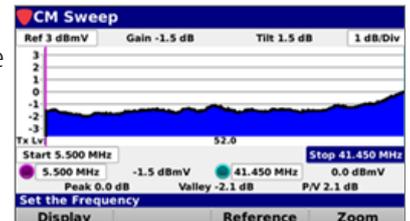
- The optional CM Sweep feature (Sweepless Model) is a first of its kind, patent pending sweep that uses the cable modem built into the meter to perform in-band sweeps within your modem carriers
- This feature not only allows operators to balance the upstream, but also allows them to see the percentage of pre-qualizer effort and isolate problems between active components without causing any issues with upstream modem performance
- When this function is selected, the meter injects up to eight (8) upstream modem carriers to talk back to the CMTS and use the pre-equalized data for each of the upstream carriers to plot a frequency response of what your upstream sweep would look like with injected carriers



- This feature doesn't require any expensive headend sweep gear and works with any DOCSIS 3.0 or DOCSIS 3.1 compatible CMTS with pre-EQ enabled

Cable Modem Sweep – with OFDMA (1G DSP Sweepless and Sweep)

- Detailed return band sweep using only the internal DOCSIS 3.1 cable modem
- Modem tests entire return band including close to diplexer

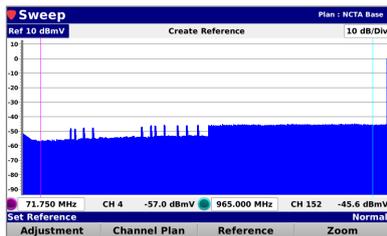


⁶Source Generator is unavailable on DSP 180 Lite

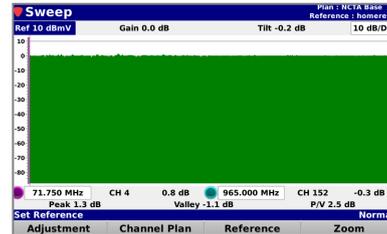
Forward Sweep (1G DSP)

Passive and Active Forward Sweep

- The optional **Forward Passive Sweep** feature (Sweepless Model) is a stand-alone test that doesn't use injected carriers but instead passively uses the live carriers in the HFC distribution system to test and set the tilt and gain of distribution amplifiers without the need for any dedicated headend gear



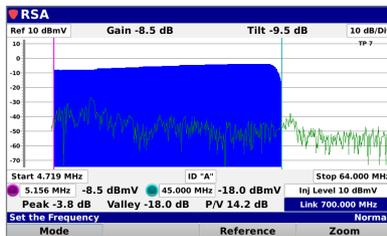
- The optional **Forward Active Sweep** feature (Sweep Model) uses carriers injected into non-active channel spaces by the 8300B FST Forward SpeedSweep Transmitter in the headend to test and set the tilt and gain of distribution amplifiers over frequency bands where there aren't any active carriers
- The instrument compensates for differences in the amplitudes of the carriers by comparing two sweeps, a reference scan saved to the 1G DSP (typically at the node or first active component of the network) and a test point in the field



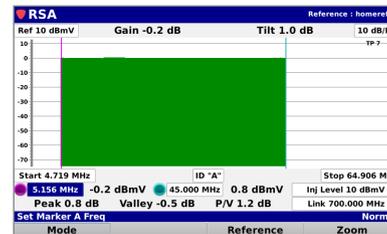
High-Resolution Return Sweep (1G DSP)

RSA Sweep

- The optional RSA Sweep feature (Sweep Model) enables the 1G DSP to function as an upstream return path sweep transmitter for troubleshooting micro-reflections and instances of narrow suck-outs between the test point and the headend, while also stepping around active channels in order to avoid interference
- When this function is selected, the 1G DSP transmits the return sweep from a test point in the field to the 8310 RSA Return SpeedSweep Analyzer in the headend for analysis



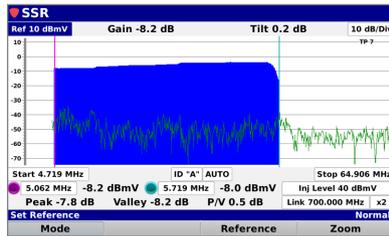
- The channel plan on the 8310 RSA and the sweep response information are then sent back to the 1G DSP via a telemetry signal which allows the 1G DSP to track up to 643 individual sweep points and display a full sweep on the screen every four seconds
- The instrument compensates for differences in the amplitudes of the carriers by comparing two sweeps, a reference scan saved to the 1G DSP (typically at the node or first active component of the network) and a test point in the field



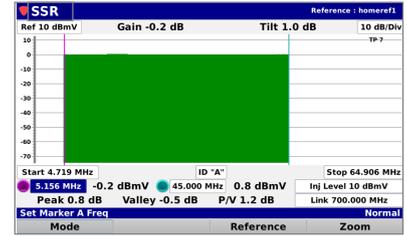
Hi-Speed Return Sweep (1G DSP)

SSR Sweep

- The optional SSR Sweep feature (Sweep Model) enables the 1G DSP to function as a return path spectrum transmitter to catch bursty ingress and impulse noise interference to voice services with an extremely high spectrum acquisition speed
- When this function is selected, the 1G DSP injects up to eight user-selectable test carriers into the upstream that the 9581 SST automatically measures in the headend



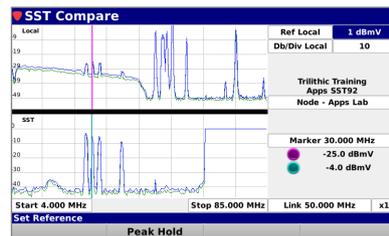
- The 9581 SST then analyzes the test signals from the 1G DSP and the return spectrum separately to compute the gain and tilt of the return path before packaging the measurement results into a data stream for transmission back to the 1G DSP
- When the 1G DSP receives its data, the response of the return path is displayed as a line graph with numeric values for gain and tilt. The ingress and noise are also displayed as spectrum analyzer traces
- The instrument compensates for differences in the amplitudes of the carriers by comparing two sweeps, a reference scan saved to the 1G DSP (typically at the node or first active component of the network) and a test point in the field



Local and Remote Return Path Spectrum (1G DSP)

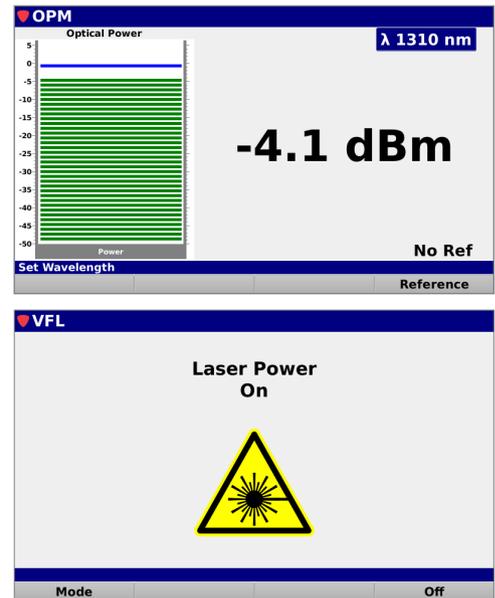
SST Compare

- The optional SST Compare feature (Sweep Model) simultaneously displays the return path spectrum measured locally and the spectrum as scanned from the headend by the 9581 SST
- This feature is used to determine if disrupting ingress detected by the 9581 SST is coming from the leg of the system to which the meter is currently connected



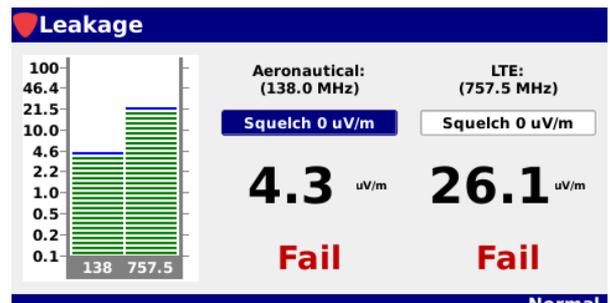
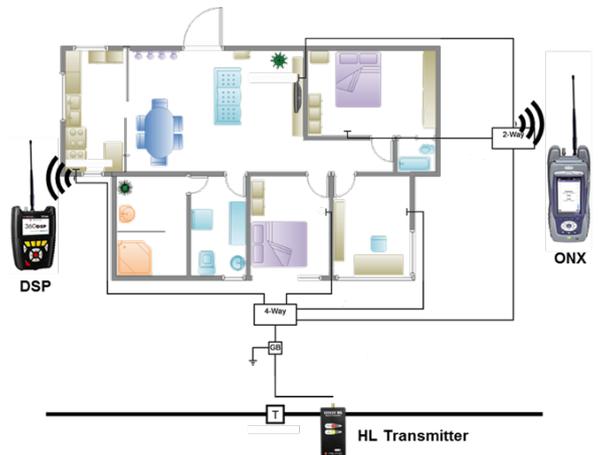
Optical Power Meter and VFL (Optional for 1G DSP only)

- This optional hardware package and measurement suite includes both a built-in FTTx ready Optical Power Meter (OPM) for testing of passive optical networks and a Visual Fault Locator (VFL) to identify loss points in patch cords, patch panels, and enclosures
- The optical power meter provides the ability to perform both absolute and relative measurements of ITU-T G983.3 recommended wavelengths of 1310 nm, 1490 nm, and 1550 nm. Additionally, the VFL emits a Class III visible red light laser beam with 3 mW of power that allows you to quickly and easily locate light escaping from damaged single-mode and multi-mode fiber cables



Home Leakage Testing (Optional, all meters)

- Installation and service technicians perform “pressure tests” on home networks to accentuate any breaches in RF shielding integrity that can enable ambient RF in the home to get into the closed network (ingress).
- A DSP meter (or OneExpert CATV) can be fitted with an antenna and a “leakage” software option that enables it to receive signals leaking during a pressure test.
- The tech connects a hand-held Seeker HL (Home Leakage) transmitter to the drop at the tap or to the ground block to inject high-level signals in the aeronautical and LTD frequency ranges. The tech then walks throughout the house and when a signal is detected, the meter emits a tone that varies in pitch with the received field strength.
- This test is very effective in locating home network trouble spots, so they can be eliminated while the tech is there for installation for service. This saves the tech time in troubleshooting as it eliminates a time-consuming trial and error method.



Specifications

Level Measurement	
Channel Bandwidth	6 MHz and 8 MHz
Amplitude Range	-40 dBmV to +50 dBmV
Modulation Types	Analog: NTSC, PAL B/D/G/H/I/K/N and SECAM B/D/G/H/I/K
	Digital: 16/32/64/128/256 QAM Annex A, 64/256 QAM Annex B/C, OFDM 4K/8K
Analog Measurement Accuracy	± 0.75 dB @ 77° F (25° C); ± 2.0 dB from 0 to 122° F (-18 to 50° C)
Digital Measurement Accuracy	± 0.75 dB @ 77° F (25° C); ± 2.5 dB from 0 to 122° F (-18 to 50° C)
Resolution	0.1 dB
Spectrum Measurement	
Frequency Range*	Return Path: 4 to 205 MHz
	Forward Path: 5 to 1250 MHz
Dual Return Path Diplexers	42 MHz: 4 to 42 MHz
	85 MHz: 4 to 85 MHz
Manually Adjustable Resolution Bandwidth	Return Path: 300 kHz
	Forward Path: 10, 30, 100, and 300 kHz; 1 and 3 MHz
Auto Ranging Resolution Bandwidth	10 kHz: Span \leq 3.5 MHz
	30 kHz: Span \leq 12.0 MHz
	100 kHz: Span \leq 35.9 MHz
	300 kHz: Span \leq 300 MHz
	1 MHz: Span \leq 259.2 MHz
Display Spans	3 MHz: Span \geq 359.3 MHz
	Return Path: 4 to 42 MHz, 4 to 65 MHz, 4 to 85 MHz or 4 to 205 MHz
	Forward Path: User-selectable in 1 kHz steps
Display Scale	1, 2, 5, 7.5 or 10 dB/division
Display Range	8 vertical divisions (when marker bar is hidden)
Spurious Free Dynamic Range	60 dB @ 25° C (77° F) (+50 dBmV)
Sensitivity (terminated)	Return Path: -40 dBmV (4 to 205 MHz)
	Forward Path: -40 dBmV (5 to 1250 MHz)

* Forward spectrum analysis is optional on 180 DSP and 180 DSP-Lite

Specifications continued

Digital Channel Measurement	
Deep Interleave Compatibility	Yes
Downstream MER	40 ±2 dB @ +6 dBmV RF Input Level
	34 ±2 dB @ -6 dBmV RF Input Level
Downstream BER	Method: True BER, derived from code words not from MER
	Standard: ITU J.83 annex A, B, C
	Range: 1 E-7 to 1 E-9 @ -6 dBmV RF Input Level
Symbol Rates	≥ 2 msps; ≤ 6.952 msps
Cable Modem Measurement (360 and 1G DSP Only)	
Protocol Support	DOCSIS 1.1 / 2.0 / 3.0 / 3.1
	SNMP V1, V2c, V3
Compliance Certificates	FCC
CM Diplexer	85 MHz: 5 to 85 MHz
Receiver Demodulation	Frequency (edge to edge): 108 to 1218 MHz
	Channel Bandwidth: 6 MHz
	Signal Level: -15 to 15 dBmV
	DOCSIS 3.0 Demodulation: 64 QAM, 256 QAM
	DOCSIS 3.0 Data Rate: Up to 1.2 Gbps with 32 downstream channel bonding (DOCSIS 32x8)
	DOCSIS 3.1 Demodulation: Multi-Carrier OFDM 16 to 4096 QAM
	DOCSIS 3.1 Data Rate: Up to 2.5 Gbps with 2 OFDM 196 MHz Downstream Channels
Transmitter Modulation	Frequency (edge to edge): 5 to 85 MHz
	Signal Level: Controlled by CMTS through power ranging function
	DOCSIS 3.0 Modulation: QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM, and 128 QAM (SCDMA only)
	DOCSIS 3.0 Data Rate: Up to 320 Mbps with 8 upstream channels bonding
	DOCSIS 3.1 Modulation: Multi-Carrier OFDMA BPSK to 4096 QAM
	DOCSIS 3.1 Data Rate: Up to 1 Gbps with 2 OFDMA 96 MHz Upstream Channels
Carrier-to-Noise Measurement (In-service, non-scrambled standard channels only)	
Minimum Input Level for Full Range	+10 dBmV
Dynamic Range	50 dB
Resolution	< 0.5 dB
Tilt Measurement	
Max Number of Carriers	14 (dependent on favorite channel setup)
High/Low Delta Resolution	0.1 dB
Scan	Video, audio, pilot, and digital carriers

Specifications continued

Analog and Digital Hum (In-service, non-scrambled standard channels only)*	
Minimum Input Level	0 dBmV
Range	0 to 5%
Resolution	0.10%
Accuracy	±0.5%
Frequency Domain Reflectometer (360 DSP Advanced and Pro Models, 1G DSP)	
Velocity of Propagation	Adjustable from 60.0 to 99.0% in 0.1% increments
Working Distance	Minimum: 755 feet (230 meters) @ VoP of 60.0%
	Maximum: 1247 feet (380 meters) @ VoP of 99.0%
Amplitude Range	0 to -80 dBRL
Distance Accuracy	5 feet
Source Generator (Advanced and Pro Models, 1G DSP)	
Modulation	CW, 16 QAM, 32 QAM, 64 QAM, 128 QAM, 256 QAM, OFDM (4K/8K)
OFDM Subcarrier Modulation	16 to 4096 QAM, PLC Configurable
Frequency Range	5 to 85 MHz
Source Width	CW: 50 kHz
	QAM: 6 MHz
	OFDM: 6 to 24 MHz
Amplitude	CW: Adjustable from 10 to 55 dBmV
	QAM: Adjustable from 10 to 45 dBmV
	OFDM: Adjustable from 10 to 40 dBmV
QAM Symbol Rates	0.64, 1.28, 2.56, 5.12 MSPS
QAM Error Rates	BER: Adjustable from 0 to 1.00E-2
	MER: > 38 dB
CW Source Accuracy	±2 dB
Optical Power Meter (1G DSP Only)	
Finish	UPC and APC
Additional Connectors	FC/SC/ST
Measurement Range	-50 dBm to +26 dBm
Display Resolution	0.01
Tone Detection Range	-30 dBm to +6 dBm
Tone Detection	270 Hz, 330 Hz, 1 kHz, 2 kHz
Wavelengths	1310 nm, 1490 nm, 1550 nm
Accuracy	+/-0.5dB > -40 dBm @ 25C
	+/- 1dB < -40 dBm @ 25C

* Hum is optional on 180 DSP-Lite

Specifications continued

Visual Fault Locator (VFL) (1G DSP Only)	
Port Style	FC Style Adapter
Fiber Size	9/125 μm
Wavelength	650 nm
Output Power	3 mW
Pulse Duration	CW (always on) or 2 Hz (0.25 sec pulse)
Maximum Radiant Power	< 5 mW
Turn-On Safety Delay	2 seconds
Physical	
Construction	Rubber overmolded plastic housing
Control	Glow in the dark keypad and LCD touchscreen and/or via a wireless connection to a mobile device such as a laptop, tablet, iPad® or iPhone®, or Android® handset
Display	Color LCD touchscreen 480 x 272 pixels (approx 4" x 2.25")
Annunciators	Audible annunciator for key strokes
Antenna	Internal WiFi antenna, 2 dB gain
Flashlight	High-intensity LED (0.25W)
Dimensions w/o Case (H x W x D)	8.6 x 6.1 x 2.00 in (21.84 x 15.94 x 5.08 cm)
Dimensions w/ Case (H x W x D)	9.6 x 7.1 x 3.00 in (24.38 x 18.03 x 7.62 cm)
Weight w/o Case	360 DSP: 2.9 lbs (1.32 Kg); 1G DSP: 3.75 lbs (1.70 Kg)
Weight w/ Case	360 DSP: 3.9 lbs (1.79 Kg); 1G DSP: 4.75 lbs (2.15 Kg)
Available Interface Types	
Tx Test Port	5 Ohm Replaceable F-Type Connector
	Source Generator Output Transmission Only
Tx/Rx Test Port	75 Ohm Replaceable F-Type Connector
	Upstream and Downstream RF Measurements
	DOCSIS 3.1 Modem
Ethernet	RJ45 Management Port (10/100 Mbps)
	RJ45 Electrical Test Port (10/100/1000 Base-T) (1G Only)
	SFP Optical Test Port (100/1000 Base-X) (1G Only)
WiFi	802.11 b/g/n 2.4/5 GHz WiFi Adapter (360 & 1G only)
USB	USB 2.0 Type-A Standard Port
Battery and Power	
Operating Time	360 DSP: 8 to 10 hours, dependent on use; 1G DSP: 12 hours plus, dependent on use
Charge Time	4 hours
Battery	Two 2600 mAh @ 7.4V Li-Ion internal batteries, factory replaceable (1G DSP, Three 2600 mAh batteries)
Power Adapter	Input: 100 to 240 VAC ~ 50 to 60 Hz, 1.2A Max
	Output: 15 VDC, 3.34A
Environmental	
Storage and Operating Temperature	-18° to +50° C (0° to 122° F)



Ordering Information

Model	Description	Part Number
180 DSP-Lite	Installation and Service Meter	TRI-DSP-180-LITE
180 DSP Base	Installation and Service Meter	TRI-DSP-180-BASE
180 DSP Advanced	Adds FDR and Source Generator	TRI-DSP-180-ADV
360 DSP	DOCSIS Installation and Service Meter	TRI-DSP-360-D31-BASE
360 DSP Advanced	Adds FDR and Source Generator	TRI-DSP-360-D31-ADV
360 DSP Pro	Adds Upstream Traffic Control Plus, Upstream Linear Distortion Measurements, and QAM Error Vector Spectrum Analysis	TRI-DSP-360-D31-PRO
1G DSP Pro	Plant Maintenance Meter	TRI-DSP-1G-D31-PRO
1G DSP Sweepless	Plant Maintenance Meter with Sweepless Sweep	TRI-DSP-1G-D31-SWPLS
1G DSP Sweep	Plant Maintenance Meter with Active Sweep	TRI-DSP-1G-D31-SWEEP
1G DSP with OPM/VFL Pro	Plant Maintenance Meter with optical power meter and visual fault locator	TRI-DSP-1G-D31-VFL-PRO
1G DSP with OPM/VFL Sweepless	Plant Maintenance Meter with Sweepless Sweep, optical power meter and visual fault locator	TRI-DSP-1G-D31-VFL-SWPLS
1G DSP with OPM/VFL Sweep	Plant Maintenance Meter with Active Sweep, optical power meter and visual fault locator	TRI-DSP-1G-D31-VFL-SWEEP
Optional Accessories	Description	Part Number
I/O-15	Precision test cable	TRI-ACCY-RF-TEST-CBL
I-Stop 1 GHz Test Probe	Ingress troubleshooting probe	TRI-ISTOP-1000MHZ or TRI-ISTOP-1250MHZ
TLB-46	Return measurement low-pass filter	TRI-TLB-46-LPF
MP-80A	USB Optical Power Meter	MP-80A
P5000i USB Fiber Scope	USB Fiber Scope	FBP-P5000i
Replacement fitted case		TRI-DSP-180-CASE-REPL, TRI-DSP-360-CASE-REPL, or TRI-DSP-1G-CASE-REPL
Replacement shoulder strap		TRI-DSP-STRAP-REPL
Replacement charger (no power cord)		TRI-DSP-PWR-ADPT-NEW
Ordering Information		
Seeker Home Leakage Companion Kit Seeker HL Source Transmitter, Antenna and Case		TRI-LKG-HL-METER-KIT DSP
Meter Leakage Software Option		TRI-DSP-SW-HL-LKG-OPT

Feature Matrix

Model	180 DSP Lite	180 DSP	360 DSP	1G DSP
Analog NTSC/PAL Channel Measurements				
Video/Audio Level	■	■	■	■
Delta V/A	■	■	■	■
Carrier-to-Noise	■	■	■	■
Hum	Option	■	■	■
Digital QAM Channel Measurements				
Level	■	■	■	■
Pre/Post BER	■	■	■	■
MER	■	■	■	■
Constellation	■	■	■	■
Equalizer	■	■	■	■
BER vs Time	■	■	■	■
Errored Seconds	■	■	■	■
Severely Errored Seconds	■	■	■	■
Hum	Option	■	■	■
Digital OFDM Channel Measurements				
Average Level	■	■	■	■
Max P/V	■	■	■	■
In-Channel Tilt	■	■	■	■
PLC Constellation	■	■	■	■
PLC Level	■	■	■	■
PLC Pre/Post BER	■	■	■	■
PLC MER	■	■	■	■
Decoder Stress vs Time	■	■	■	■
Default Profile Summary	■	■	■	■
Cable Modem Statistics				
Priority			■	■
Channel Frequency			■	■
Tx/Rx Level			■	■
Signal-to-Noise Ratio			■	■
Pre/Post BER/CWER			■	■
MER			■	■
Cable Modem OFDM Measurements				
Summary for All Profiles			■	■
Advanced Profile Statistics			■	■
Multiple Profile Selection			■	■
Continuous Pilot Distributed MER			■	■
Subcarrier Measurement Details			■	■

Feature Matrix continued

Model	180 DSP Lite	180 DSP	360 DSP	1G DSP
Net Tests				
Ping	■	■	■	■
Trace Route	■	■	■	■
Throughput	■	■	■	■
VoIP	■	■	■	■
Modem Speed Test			■	■
Miscellaneous Features				
Tilt Measurement	■	■	■	■
Channel Plan Auto Discovery	■	■	■	■
Channel Plan Scan	■	■	■	■
Multi-language support	■	■	■	■
Create jobs right on the meter	■	■	■	■
Interactive basic RF installation process	■	■	■	■
Forward Spectrum Analysis (5 to 1250 MHz)	Option	■	■	■
Return Spectrum Analysis (4 to 205 MHz)	■	■	■	■
Built-in web browser, real-time data transmission	■	■	■	■
Multi-user support	■	■	■	■
WiFi Survey			■	■
Frequency Domain Reflectometer		Advanced	Advanced	■
Source Generator (CW, QAM & OFDM)		Advanced	Advanced	■
Upstream Traffic Control Plus			Pro	■
Upstream Linear Distortion Measurement			Pro	■
QAM Error Vector Spectrum Analysis (Ingress under QAM)			Pro	■
Cable Modem Sweep				Sweepless
Forward Passive Sweep				Sweepless
Forward Active Sweep (w/8300A FST)				Sweep
RSA High-Resolution Return Sweep (w/8310 RSA)				Sweep
SSR High-Speed Return Sweep (w/9581 SST)				Sweep
SST Compare with 9581 SST				Sweep
Home Leakage Test	Option	Option	Option	Option

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Contact Us **+1 844 GO VIAVI**
(+1 844 468 4284)

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visit viavisolutions.com/contact.

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