VIAVI

Digital Service Analysis Meter

DSAM-6300

To achieve service-differentiating quality and reliability, network maintenance requires careful and consistent attention. While the broadband frequency response test in both the forward path (downstream) and the return path (upstream) is a core requirement of any cable network maintenance plan, maintaining cable networks requires more than sweep.

The DSAM-6300 (Digital Services Analysis Meter) combines best-in-class video, audio, and data test functions with the extremely popular SDA sweep system's downstream forward path and upstream return path sweep functions in a rugged, multi-technology handheld that performs in the harshest environments.

Because it uses powerful Stealth Sweep technology, the DSAM-6300 works with existing Stealth Digital Analyzer (SDA) rack-mounted sweep gear (SDA-5500 and SDA-5510) located at headend and hub sites. Additionally, DSAM-6300 meters can sweep side-by-side with SDA-5000 meters. Therefore, major test infrastructure modifications are not required when DSAM-6300s are added to a department's meter pool.

Why Viavi Solutions™?

Viavi has a long history of integrating the high-level functions and advanced technology necessary for maintaining cable networks with scalable hardware and software platforms. Coupling the innovative SAM with award-winning, patented Stealth Sweep technology, Viavi delivers sweep-meter solutions unequalled in performing advanced tests and measurements. These capabilities were integrated into the SDA-5000 series of products, earning its current industry-lead position.

Viavi introduced the DSAM when DOCSIS standards pushed the industry to adopt a common technology for delivering flawless high-speed data and IP services. This award-winning, landmark meter integrated well-known Viavi SAM functions with a DOCSIS cable modem element and a PC-based management and file system.

Key Features

- Improve workforce efficiency by letting technicians perform complete maintenance and quality-verification tests on the spot—one person with one instrument—including sweep, digital video, analog video, DOCSIS®, VoIP tests, and more

- Streamline operations by managing and displaying sweep files via the web and by immediately synchronizing data over DOCSIS RF

- Minimize capital expenses—sweep is compatible with existing Viavi Stealth Sweep™ systems, assuring non-interfering forward- and reverse-sweep operations

- Improve technician competency with the Digital Quality Index™ (DQI), an easy-to-understand, real-time indicator that shows up to 90 seconds of digital quality history

- Stand up to rain, cold, heat, bumps, drops, and other accidental mishaps with a rugged, lightweight design

Applications

- Non-invasive forward and reverse sweeping

- Comprehensive digital and analog video testing

- Full DOCSIS 3.0 performance testing: up to 8 downstream by 4 upstream bonded carriers

- Legacy testing — DOCSIS 1.X and 2.0

- QAM-carrier signal quality analysis and troubleshooting

- Return-path ingress troubleshooting

- Service-quality verification

Data Sheet

Features

Signal Level Meter

The DSAM-6300 features extremely accurate Viavi digiCheck™ digital power level measurements in addition to traditional signal level measurement (SLM) test functions for analog video and audio levels. In addition to the standard analog carrier-to-noise (C/N) measurement, a quadrature amplitude modulation (QAM) ingress option enables viewing noise and ingress within the QAM signal spectrum. The DSAM-6300 can measure downstream carriers to a full 1 GHz and analyze 64, 128, and 256 QAM including deep interleave (i=128, j=4) modulation. Also included are modulation error ratio (MER) and pre- and post-FEC bit error rate (BER), margin, and quality specifications.
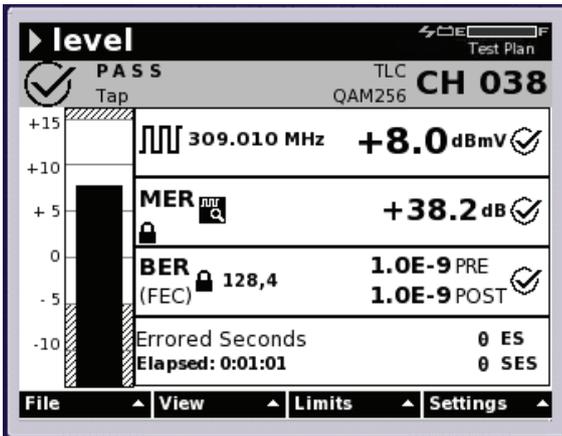
The level mode on a digital channel measures the signal level and MER and tracks the BER and errored seconds.

Miniscan and Full Scan Modes

When measuring analog and digital signals, technicians can see high- and low-frequency channels and verify how much level headroom remains when limits are activated. In miniscan mode, the DSAM monitors up to 12 channels at a time and in full scan mode it monitors the entire channel plan—up to 999 channels. The results of both scans are displayed in either an easy-to-see bar graph or an informative table.
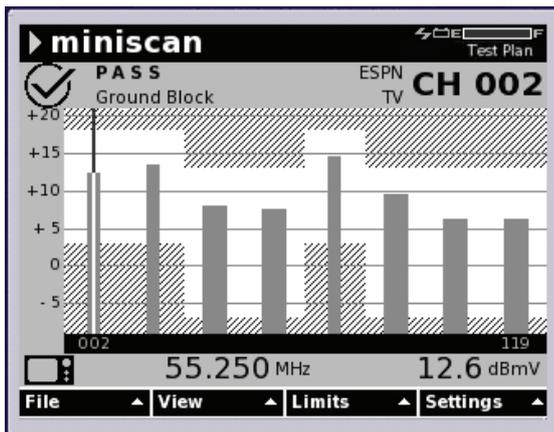
Miniscan measures signal strength of up to 12 channels simultaneously.

Tilt Mode

Part of the sweep procedure, tilt mode checks forward low- and high-frequency channel level tilt. Level variances display at the bottom of the DSAM-6300 screen, and a sampling of carrier levels throughout the spectrum provides a rough indication of frequency-response variation. Based on these results, technicians can choose an equalizer pad that will provide optimum flatness at the end of the line.
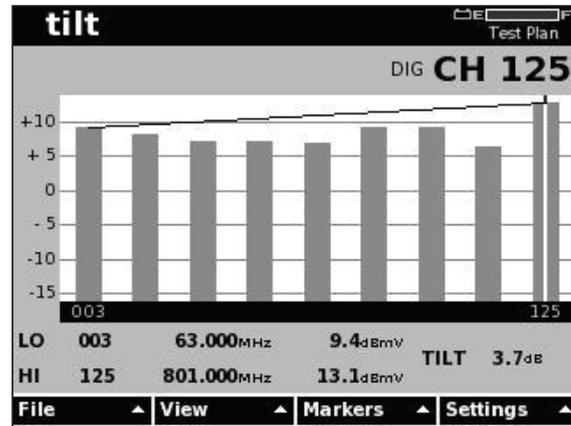
Tilt mode checks forward low- and high-frequency channel level tilt.

MER, BER, and Errored Seconds

When the DSAM 6300 is tuned to a QAM signal in the level mode, it simultaneously measures MER, BER, and errored and severely errored seconds.

MER is an indicator of transmission quality degradation resulting from noise, ingress, and composite distortions. An expression of signal-to-noise ratio plus all other non-transient distortion signals, MER also shows phase and amplitude distortions that may have been passed from the headend. MER is an overall quality measurement that can be performed on a digital QAM carrier. Viavi has perfected this valuable measurement by optimizing both custom hardware and proprietary software algorithms. The result is accurate readings that far exceed those reported from customer-premises equipment such as digital set tops.

BER quickly detects impulse noise in the system by revealing when information is lost or corrupted at the bit layer. The DSAM-6300 measures BER by tracking the number of errored bits (pre-FEC) and the number of bits that cannot be fixed by forward error correction (FEC) (post-BER).

The errored seconds measurement is for troubleshooting connections with intermittent bit errors occurring over a period of time. If an error has occurred during any second of elapsed time, the errored second field increments by one. One error or multiple errors in the same second is counted as one errored second. If there is more than 1 in 1 million bit errors occurring in the same second, the severely errored second register increments by one. The errored seconds fields are conveniently included in the digital level display.

Constellation Mode

Various elements in a network can compromise video quality. The DSAM-6300 constellation mode displays patterns of data points on a graph for easy interpretation, letting technicians detect and quickly diagnose sources of digital video problems.
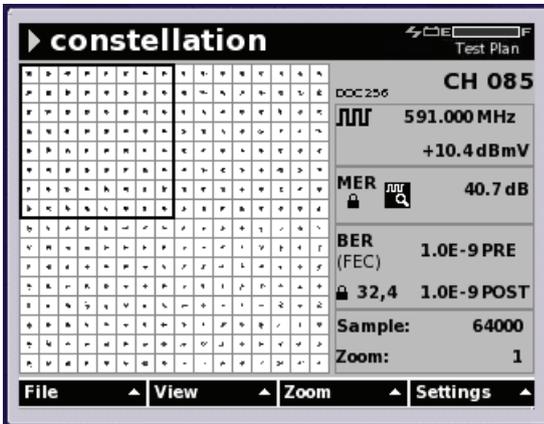
A constellation graph shows impairments on the network with patterns in the display. By identifying the pattern, technicians can figure out the probable cause of the impairment.

Digital Quality Index (DQI) Mode

DQI is an indicator of the overall health of a QAM stream. This Viavi exclusive measurement is extremely effective in tracking intermittent problems. QAM signal health is represented by an easy to understand index rating from "0" to "10" with 10 being the highest quality. DQI also catches errors sometimes missed by BER and errored seconds measurements. To help troubleshoot intermittent issues, the index is plotted on a 180-second graphical history display.
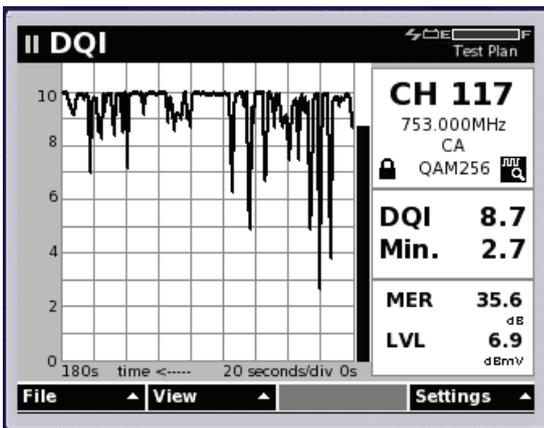
DQI displays intermittent, short-duration impairments that MER and BER miss as well as steady-state issues that MER and BER typically capture.

QAM Ingress Mode

Traditionally, detecting the presence of ingress within downstream digital signal spectrum is nearly impossible without turning off the service. The tightly spaced QAM carriers hide any visual presence of ingress or intermodulation distortions. An MER test will indicate that an issue exists, but with the DSAM-6300 and the patented QAM Ingress mode, technicians can inspect what is actually going on beneath the digital "haystack" without interrupting service.
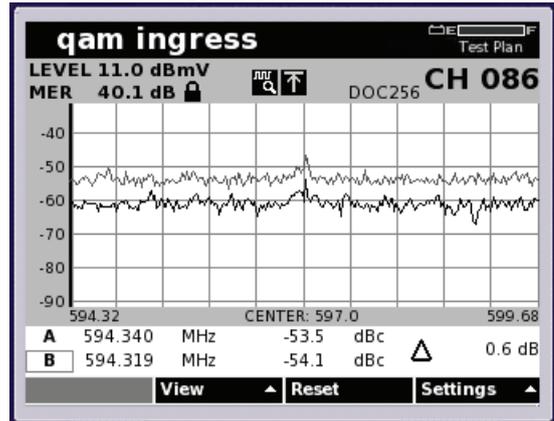
The QAM Ingress test lets technicians see spectrum underneath a live digital carrier which is usually not viewable due to the presence of the "haystack."

Field View™ Option

Field View provides the communication between Viavi PathTrak™ return-path monitoring systems and field meters such as the DSAM-6300. A Viavi HSM-1000 sends spectrum measurements from PathTrak to the field meter, where the results are displayed on the DSAM screen. By comparing local spectrum measurements to those from PathTrak, field technicians can quickly resolve return-path ingress problems.
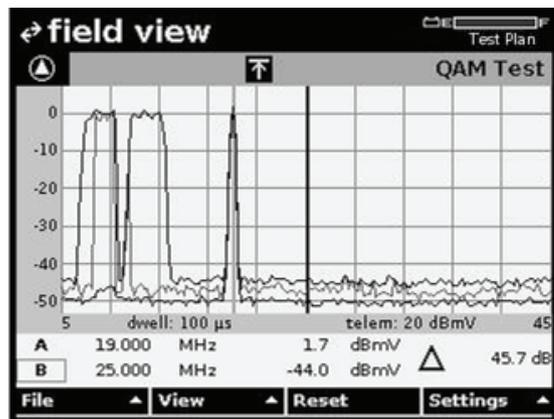
The optional Field View capability greatly improves the success rate and efficiency in locating return-path ingress. Field technicians can view the return spectrum that the Viavi PathTrak Return Path Monitoring System receives. Both the remote spectrum and the local spectrum view can be compared on the meter.

Field View QAM™ Option

The unique Field View QAM option lets technicians see upstream impairments that are invisible to spectrum analyzers and sweep tools. Observing a clean spectrum with traditional spectrum-analysis tools may indicate a pristine return path; however, the overall node health reported by the cable modem termination system (CMTS) and other reporting tools can show a low health score, even after teams of technicians have been working on the node cleaning up noise issues for several weeks. With Field View QAM, technicians can quickly identify micro-reflections, in-band frequency response, and group-delay issues. Armed with the DSAM in conjunction with MACTrak™ technology in PathTrak, technicians can easily verify the overall health of return-path carriers.
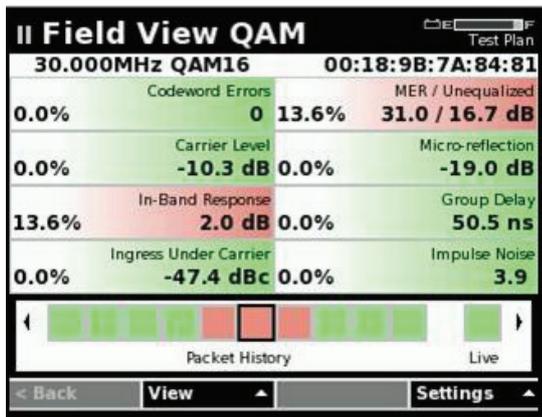
The Field View QAM dashboard shows a variety of measurements for the represented carrier, and results that are outside of user-designated limits are indicated by color. From the dashboard, technicians can select a measurement parameter to view more closely and switch directly to a full-screen display of that measurement.

QAM Egress Option

The QAM Egress option provides preset spectrum analysis with a QAM signal identifier that simplifies finding leaks (and verifying fixes) identified by leakage monitoring systems. Also available are an optional directional antenna for locating from a distance and an optional near-field antenna for close inspection and verification of repair work.
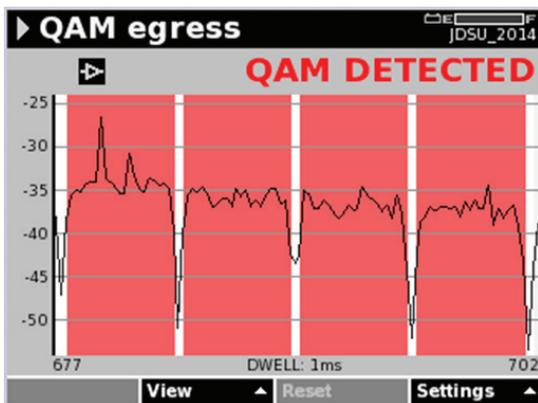
The QAM Egress option simplifies the detection of leaks (and verifying fixes) identified by leakage monitoring systems.

WiFi Option

The WiFi option enables a USB WiFi adapter to verify WiFi network strength and connectivity, or to communicate test data to Viavi TechComplete™ Test Productivity Pack (TPP).
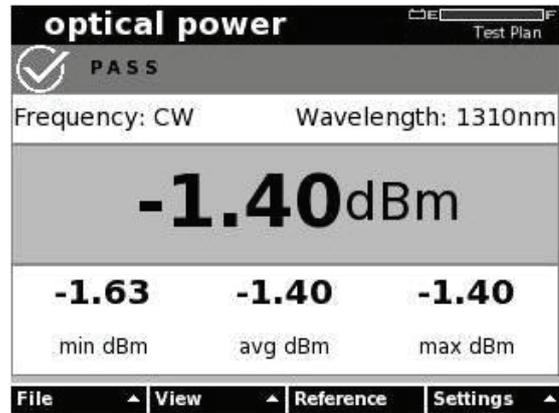
The optical power measurement option enables connecting a USB power meter (Viavi MP60A or MP80A) for verifying or troubleshooting node light levels.

Optical Power Meter Option

The optical power meter option enables connecting a USB power meter (Viavi MP-60 or MP-80) for verifying or troubleshooting node light levels.

SmartID™

Innovative advanced Viavi coax probes enable extremely quick, comprehensive home network qualification, eliminating repeat truck rolls and making troubleshooting less costly and more effective.

Applications

Comprehensive Forward Path Analog and Digital Testing

With analog and digital testing combined in a single user interface, technicians can select any specific channel or a scan of channels without having to differentiate between analog or digital video, high-speed data, or voice. The active channel plan functions as a meter configuration file as well as a channel lineup. An extensive selection of configuration elements establishes the type of tests that can be performed on a particular channel for each channel in the plan. Channel plans also include Autotest configurations for analog, digital, and DOCSIS services. Configurations are entered either directly into the meter or through the Viavi TPP client/server application software that manages channel plans and measurement files for a collection of DSAM meters. Configurations can also be conveniently cloned from meter to meter.

Networks with a history of multiple ownership transitions and/or diverse hardware architectures are not a problem for the DSAM-6300. Supervisors can create multiple channel plans for a specified group of meters or one channel plan for the whole network. The channel plans can be deployed with the ability to edit plan parameters locked when needed. Specific plans are easily selected from Configure mode, or in many cases, directly from within a measurement mode. After selecting an active plan, technicians can check the top of the measurement screen to confirm that it is using the correct plan. The channel plan name is included with any saved measurement file for reference. Because Autotests are configured within a channel plan, multiple tests can be run in a short period of time with only two button presses.

Return- and Forward-Path Testing and Maintenance

The cable plant is a two-way communication path. As a vital link between customer premises equipment (CPE) and the CMTS, the return path must be aligned and kept free of ingress and noise. With digital services, limiting noise and ingress becomes even more important as service degradation moves quickly from tiling or bit errors to catastrophic failure.
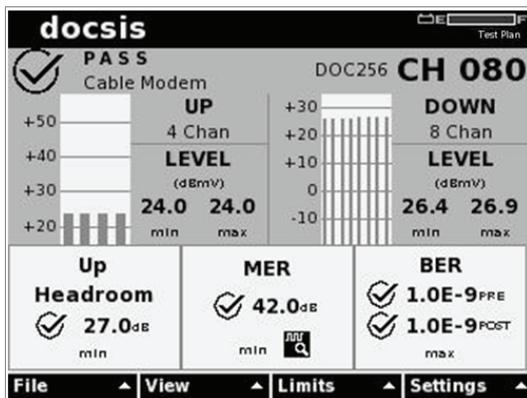
Summary view quickly identifies overall performance.

The DSAM-6300 is designed to test and maintain both forward and return paths. With its ability to sweep, conduct signal level and quality measurements, as well as analyze ingress and noise, it provides the optimal approach to maintaining a hybrid fiber/coax (HFC) network.

DOCSIS Service Testing

As service providers face increasing competition, it is important to maintain a competitive lead in data service throughput. The ability to offer higher data rates is a differentiating advantage and improves a provider's position as a preferred residential or business data service operator. This advantage, along with the more-effective use of valuable return-path spectrum, motivates service providers to migrate to DOCSIS 3.0 or to put this migration in their plans. To bolster the service provider's reputation, it is very important that new service offerings are of high quality and reliability, and testing during installation and for system maintenance and troubleshooting is essential. The DSAM DOCSIS 3.0 option lets technicians quickly and efficiently test bonded channel performance, signal levels, MER (including headroom), BER, and throughput to full range—eight downstream by four upstream channels. Other IP-related tests include packet loss and ping. The DSAM-6300 has a built-in cable modem capable of performing quick and accurate DOCSIS 3.0 RF and IP testing, eliminating the need for a test modem to verify cable modem connectivity or a computer to test the CPE connection.
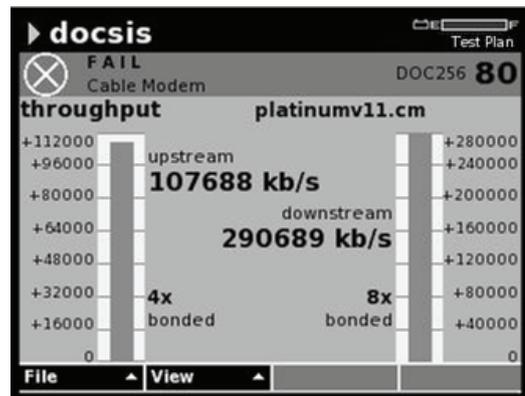
Test throughput to full DOCSIS 3.0 range.

Voice over IP (VoIP) Testing

The DSAM-6300 VoIPCheck option enables service validation over a DOCSIS connection. With VoIPCheck, the DSAM-6300 can test VoIP services independently of the VoIP specification being used. VoIPCheck can segment RF issues from IP issues, helping to eliminate organizational finger pointing. The DSAM-6300 measures packet statistics, including packet loss, jitter, and delay, as well as call-quality results such as R-value and MOS. With its in-depth results analysis capability, the DSAM-6300 can determine the source of call-quality problems, expediting the troubleshooting process.


The VoIPCheck voice-quality verification test runs over the DSAM's cable-modem DOCSIS connection. It allows for segmentation between HFC and IP issues by showing at which side of the CMTS data impairments are present.

Enhanced Downstream Spectrum

Technicians must be able to see how the network is behaving and troubleshoot spectrum-related problems. Most technicians do not require a fully featured and expensive spectrum analyzer, and the DSAM's enhanced downstream spectrum mode equips them with an "everyday" spectrum analyzer. It lets users choose between two resolution bandwidth (RBW) settings, 330 kHz or 30 kHz, and modify the amount of time spent measuring each frequency step, or dwell time of the analyzer, to a setting from 1 to 25 milliseconds. It also lets users see from 4 MHz to 1 GHz in 10 or 50 MHz spans. Furthermore, if viewing return-path frequencies, technicians can activate an internal low-pass filter to eliminate intermodulation distortion caused by relatively high-level higher frequencies on the meter input, providing a cleaner upstream view.
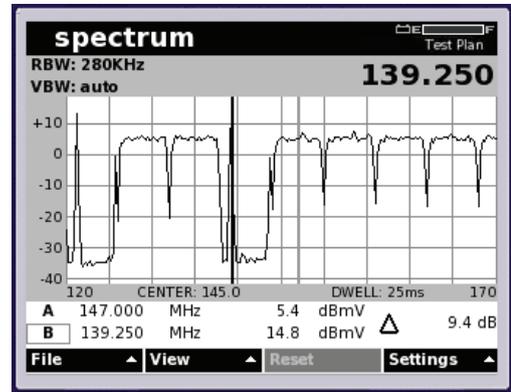
The DSAM's enhanced downstream spectrum mode equips technicians with an "everyday" spectrum analyzer.

Sweep

Service quality depends on transmitting signals with the highest carrier-to-composite noise and the lowest intermodulation distortion. The majority of all transmission errors can be detected by measuring the frequency response of the network. A sweep trace reveals every physical error in the network that influences transmitted signals. Also, since sweep results are independent of transmission methods and formats, it is the most effective and efficient method for technicians to set up the right gain versus frequency.
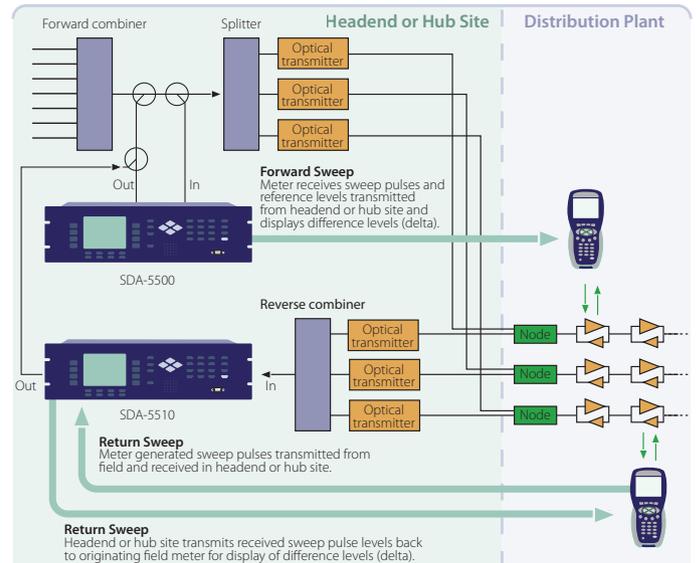
Sweepless Sweep® Mode

For fundamental forward-distribution network alignment, the Sweepless Sweep mode provides an economical solution. This mode scans the entire forward spectrum, displaying all levels across all frequencies (as defined by meter configuration). Technicians can adjust the reception of the node amplifier with this scan and then normalize the display by saving a reference. The resultant display is a flat zero-level trace. When the measurement point is moved to the output of the RF amplifier, any changes due to the amplifier will show as deviations (deltas) from the reference display. Because the cable network is designed on the unity gain principle, the same reference is used as technicians test downstream amplifiers to compensate for the effects of each cable segment. To isolate the effects of headend changes in levels, or to align portions of the spectrum where there are no active carriers to reference, the forward sweep option should be considered.
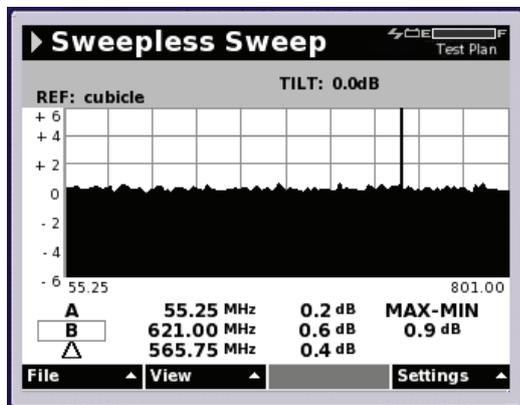
Sweepless Sweep provides a quick method to check cable system integrity using active channels to sweep the forward path. Sweep points do not need to be added and no forward-path headend gear is required.

Forward Sweep Option

The Forward Sweep option continuously references existing carriers to ensure an accurate measurement result. The DSAM-6300 offers a fast forward sweep especially in systems with numerous digital channels. By referencing 64, 128, and 256 QAM signal types, the DSAM-6300 removes any worries about subscriber interference because there is no need to inject sweep carriers in the guard bands. Referencing active carriers, instead of transmitting sweep signals over active carriers, lets the DSAM-6300 sweep without degrading service quality.

The SDA-5500 headend transceiver inserts sweep points in unoccupied spectrum to test frequency response. To remove the effects of headend level drift, the instrument monitors levels and transmits new reference information with every sweep. This means that if signal levels change in the headend, they will not affect the sweep response measurement.
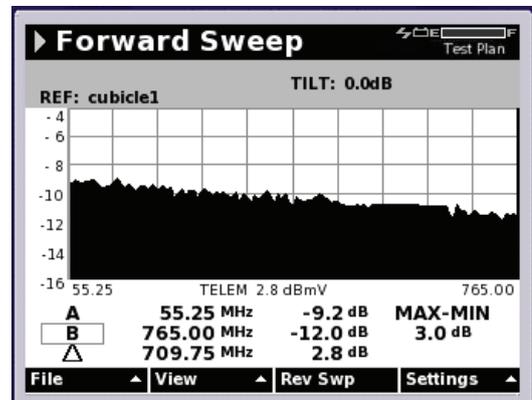
Forward sweep uses a unique referencing method to accurately reveal any problems in the system without interfering with any of the analog or digital carriers.

Reverse Sweep Option

Because the return path can be problematic, it should be tended to at least as often as the forward path; and, any impairments should promptly be fixed. One of the best procedures for preserving a clean return path is to establish an active reverse-sweep maintenance plan. A reverse sweep can uncover mismatch problems, revealed as standing waves, or diplex filter roll-offs that can severely degrade the quality of services carried in the reverse band. The DSAM-6300 built-in reverse sweep transmitter eliminates the need for a separate, cumbersome carrier generator.
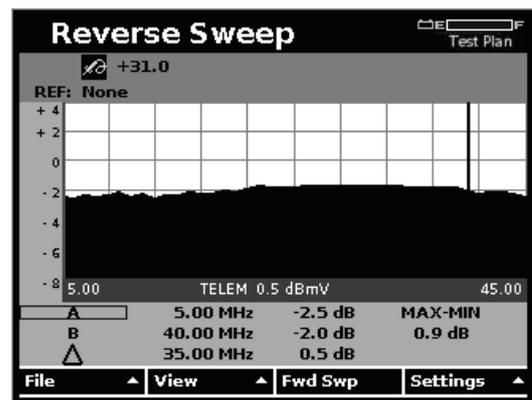
Tight reverse sweep points in the sweep plan display the entire return path with better resolution and help to find mismatches or other problems in the upstream transmission path.

Headend Sweep Equipment

With the DSAM-6300, one person can perform forward- and reverse-path alignment simultaneously. For reverse testing with more than one field technician, the rack-mounted SDA-5510 Headend Reverse Sweep Manager can perform reverse sweep on the same cluster of nodes for up to 10 different technicians. The SDA-5500 transceiver used in conjunction with the SDA-5510 receiver provides a full forward- and reverse-sweep alignment solution. The SDA-5510 can also stand alone in remote hub sites for dedicated reverse-alignment applications.

StrataSync

StrataSync is a hosted, cloud-based software application that provides asset, configuration, and test-data management of Viavi instruments. StrataSync manages inventory, test results, and performance data anywhere with browser-based ease and improves technician and instrument efficiency.

StrataSync dashboard screen

StrataSync offers:

- Updates to upgrades and options — field personnel operate at maximum capability and efficiency by knowing immediately when firmware upgrades and instrument options are available; they receive proactive, application-aware notifications, and distribution is managed for specific groups and individuals

- Asset and configuration management — user-authored standard templates ensure instruments are aligned to a specific configuration; users monitor and update asset data, modules, configurations, test plans and scripts, templates, and groups, ensuring technicians with the right instrument configurations have increased first-time success rates and reduced repeat rates

- Test-data management — a common test data repository makes baselining performance practical and enables trend analysis for proactive maintenance, improved reliability, and customer satisfaction; StrataSync also performs file storage, printing, and exporting, and provides clear dashboards and basic reports

- What's New@Viavi — instant workforce access to the latest content from Viavi, including release notes and training material, ensures that field personnel are always trained, informed, and updated

Upgrade DSAM Instruments to the DSAM-6300

DSAM models 2000, 2300, and 3300 can be upgraded to the DSAM-6300 maintenance technician meter. All meters to be upgraded to the DSAM-6300 may be sent back to the factory for hardware upgrades or upgraded on site by authorized Viavi service personnel.

Viavi PLUS™

Viavi PLUS provides a proven set of services solutions that help communications network operators meet the demands of competition, convergence, and complexity. Viavi PLUS leverages test and measurement expertise and leadership to help service providers deploy high-quality, profitable, next-generation telecommunications services.

Comprehensive PLUS deployment and support services ensure commissioning, availability, functionality, and understanding of the entire Viavi portfolio.

- Hardware support plans
- Factory and on-site calibration
- Express loaner equipment
- Technical assistance
- Managed inventory
- Installation and commissioning services
- Software upgrade services and maintenance
- Product training

PLUS support plans streamline repair, calibration, and loaner processes, making support costs predictable and cost-effective while greatly alleviating administrative burdens. Viavi support plans provide reassurance that your hardware investment is well protected and that your equipment is available, functional, and up to date.

Viavi understands that your support needs vary and will work with you to find the right hardware service support plan for your needs. Our Gold, Silver, or Bronze support plans provide various levels of support for repairs, calibration, express loaner, advanced replacement, technical assistance, and product training.

Viavi maintains service centers of excellence throughout the world to rapidly and effectively service equipment for our global customer base. These centers can process thousands of pieces of equipment each month for a variety of sophisticated test equipment and instruments. This core competency that Viavi offers in conjunction with our nationwide partners ensures coverage of your entire installed base of test equipment and provides you with the highest quality of service. Tailor your support plan with one of the following plans.

PLUS Gold

- Product repairs (fault or no fault) including updates of all proprietary engineering changes
- Priority service for all transactions
- Basic or premium technical assistance center benefits
- Basic product training
- Express loaner equipment
- Basic and/or advanced custom training

PLUS Silver

- Product repairs including updates of all proprietary engineering changes
- Product calibrations
- Priority service for all transactions
- Basic technical assistance center benefits
- Basic product training

PLUS Bronze

- Product repairs, including updates of all proprietary engineering changes
- Priority service for all transactions
- Basic product training
- Basic technical assistance center benefits

DSAM-6300 Summary Feature Matrix

Applications	Features	Included or Optional
Analog and digital carrier level verification	Analog video and audio power levels	✓
	Digital power level	✓
	Tilt (1 to 12 channels)	✓
	Mini-scan (1 to 12 channels)	✓
	Full-scan (1 to 999 channels)	✓
	Analog carrier-to-noise	✓
	Hum	✓
	SmartScan™	✓
	Spectrum analyzer with pre-amp	✓
Digital carrier quality (QAM carriers)	MER/EVM measurements	✓
	Pre- and post-FEC BER (64, 128, 256)	✓
	BER for deep interleave (128,4 or 128,5)	✓
	Constellation (64, 128, 256)	✓
	Digital Quality Index (DQI)	✓
	AGC stress	✓
	Errored/severely errored seconds	✓
	QAM ingress	Opt
Upstream physical verification	Return loopback	✓
	Local upstream spectrum for ingress check	✓
	Return QAM generator	✓
	Spectrum analyzer w/pre-amp	✓
	Extended frequency-range ingress testing	✓
	Field view of the PathTrak return spectrum	Opt
	Field view QAM of PathTrak MACTrack	Opt
DOCSIS/EuroDocsis™ testing	DOCSIS 2.0/1.1/1.0 testing 1 downstream x 1 upstream	✓
	DOCSIS 3.0 bonded carrier testing 8 downstream x 4 upstream	Opt
	Downstream MER/EVM, pre- and post-FEC BER	✓
	Dynamic DOCSIS range and registration	✓
	Cable modem configuration file verification	✓
	Upstream channel selection	✓
	Upstream transmit level and headroom	✓
	Cable modem and CPE MAC cloning	✓
	CableLabs® issued certificates	✓
	IPv6 compatibility—cable modem	✓
	Dual MAC/BPI+ Certificates	✓
DOCSIS/EuroDocsis service tests	Packet loss	✓
	Throughput — upstream and downstream (up to DOCSIS 3.0 rates)	✓
	Ping	✓
	VoIPCheck — voice over IP testing (MOS, packet loss, jitter, delay)	Opt
Ethernet testing	Throughput (DOCSIS 2.0 rates)	✓
	Packet loss	✓
	Ping	✓
	View CM diagnostics page	✓
	Gig-E option throughput (DOCSIS 3.0 rates) — up to 400 Mbps down	✓
RF network verification	Forward Sweepless Sweep	✓
	Reverse alignment	✓
	Forward (downstream) sweep	Opt
	Reverse (upstream) sweep	Opt
	Return loopback	✓
HFC network verification	Scheduled autotest	✓
	Proof test	✓
Home network verification	IP tests via 10/100/1000 Ethernet jack	✓
	Ingress resistance test (IRT)	✓
	Fault location using FDR feature in LST-1700 remote transmitter	✓
	Test point compensation	✓
	SmartID advanced coax probe support	✓
	WiFi support (USB)	Opt
Autotest	Home certification	Opt
	Video autotest	✓
	Cable modem autotest	✓
	Combination autotest (video and cable modem)	✓
	Proof of performance (scheduled autotest)	✓
	Web browser	Opt
Miscellaneous	QAM Egress	Opt
	RF, WiFi or Ethernet synchronization with TPP	✓
	Secure Sync™ — RF synchronization through firewalls	✓
	Optical power meter support (USB) MP-60A and MP-80A	✓
	StrataSync asset management — 1 year subscription	✓

Specifications

Analog-Level Measurement	
Signal types	CW, video, and audio (NTSC, PAL, and SECAM)
Frequency range	4 to 1,000 MHz
Accuracy	±10 ppm at 25°C (77°F) 10 kHz tuning resolution
Measurement range[1]	−40 to +60 dBmV (typical)
Resolution	0.1 dB
Resolution bandwidth	280 kHz
Accuracy[2]	±1.5 dB typical at 25°C (77°F)

Carrier-to-Noise	
30 to 45 dB ±2 dB	
45 to 48 dB ±3 dB	
Input at >0 dBmV (up to 750 MHz)	
Input at >6 dBmV (750 − 1,000 MHz)	

Hum	
Accuracy up to 5% hum	±0.8%
From 5 to 10%	±1.0%

Digital-Level Measurement	
Modulation types	QPSK, QAM (DVB/ACTS)
Range	−40 to +50 dBmV (typical)
Resolution	0.1 dB
Accuracy[2]	±2.0 dB typical at 25°C (77°F)

Downstream QAM Demodulation	
Modulation type 64, 128, and 256 QAM, ITU-T J.83 (Annex A, B, or C selectable at time of order, factory installed hardware)	
Input range (lock range)[3] −15 to +50 dBmV total integrated power from[4] 57 − 1,000 MHz (42 MHz diplexer 6 MHz channel spacing) 83 − 1,000 MHz (65 MHz diplexer 6 MHz channel spacing) 108 − 1,000 MHz (85 MHz diplexer 6 MHz channel spacing) 58 − 1,000 MHz (42 MHz diplexer 8 MHz channel spacing) 84 − 1,000 MHz (65 MHz diplexer 8 MHz channel spacing) 109 − 1,000 MHz (85 MHz diplexer 8 MHz channel spacing)	
50 kHz tuning resolution	
BER pre and post FEC	10^{-4} to 10^{-9}

MER[2]

Range 64 QAM Accuracy	21 to 45 dB[3] ± 2 dB (up to 40 dB typical)[5]
Range 128 QAM Accuracy	25 to 45 dB[3] ±2 dB (up to 40 dB typical)[5]
Range 256 QAM Accuracy	28 to 45 dB[3] ± 2 dB (up to 40 dB typical)[5]

Symbol Rate

Annex A	5.057 to 6.952 MSPS for 64, 128, and 256 QAM
Annex B	5.057 MSPS for 64 QAM and 5.361 MSPS for 256 QAM
Annex C	5.274 MSPS for 64 QAM, and 5.361 MSPS for 256 QAM

DOCSIS Testing	
Support for operating in DOCSIS 1.0, 1.1, 2.0, or 3.0 modes	
Compliant with CableLabs® specifications for DOCSIS 1.0, 1.1, 2.0, and 3.0	
CableLabs-compliant BPI+ root-chained certificates pre-installed	
EuroCableLabs® certificates available	

Downstream Testing	
Support for channel bonding of 8 downstream carriers	
Throughput testing	up to 304 Mbps (6 MHz carriers) and 400 Mbps (8 MHz carriers)[6]

Upstream Testing	
Support for channel bonding of 4 upstream carriers	
Throughput testing	up to 120 Mbps[6]
Upstream transmit range and diplexer crossover (DOCSIS modes only)	
5 to 42 MHz, 42/88 MHz; min. downstream center frequency 91 MHz 5 to 65 MHz 65/96 MHz; min. downstream center frequency 100 MHz 5 to 85 MHz 85/111 MHz; min. downstream center frequency 111 MHz	
Maximum output @25oC (77oF) (typical for a single channel; upstream modulation as instructed by CMTS)	+52 dBmV with 64 QAM, +55 dBmV with 16 QAM, and +58 dBmV with QPSK

Upstream Spectrum, Ingress Scan	
Spans	4 to 42 MHz, or 4 to 65 MHz, or 4 to 85 MHz, depending on diplexer configuration, and 4 to 110 MHz
Sweep rate	<2 s
Display scaling and range	1, 2, 5, and 10 dB/division; 6 vertical divisions
Resolution bandwidth	280 kHz
Sensitivity	−45 to +60 dBmV (typical)

Downstream Spectrum, Forward Scan (optional)	
Frequency range	4 to 1000 MHz
Sweep rate	<2.5 s (display)
Display scaling and range	1, 2, 5 and 10 dB/division; 6 vertical divisions
Resolution bandwidth	30 or 280 kHz
Span	10 or 50 MHz
Sensitivity	−45 to +60 dBmV (typical)
Reverse path sensitivity (with low-pass filter on; filter matches diplexer frequency)	−45 to +60 dBmV (typical)

QAM Egress (optional)

Frequency range	600 to 900 MHz
Span	25 MHz
Resolution band-width	280 kHz
Sensitivity	−45 dBmV (typical)

Constellation (optional)

Modulation type	64, 128, and 256 QAM
Constellation points	2,000, 4,000, 8,000, 16,000, 32,000, or 64,000

Return QAM Generator

Signal modulations	16 QAM, 64 QAM
Symbol rates (MSPS)	1.28, 2.56, 5.12
Frequency range	5–42 MHz, 5–65 MHz, 5–85 MHz
Supported levels	8.0–58.0 dBmV

DSAM Sweep Specifications (optional)

Forward Sweep

Requires SDA-5500 (SDA-compatible mode)

Reverse Sweep and Reverse Alignment

Requires SDA-5500 (single reverse) or
SDA-5510 (multiple reverse)
(SDA-compatible mode)

Sweep Modes

Frequency range	5–1,000 MHz forward 5–65 MHz reverse[7]
Display span	user-definable
Display scale/range	6 vertical divisions 1, 2, 5, or 10 dB/division
Sweep pulse-occupied bandwidth	30 kHz
Stability (dependent upon stability of referenced carriers)	±0.5 dB, normalized
Sweep rate (78 channels, including scrambled and digital signal types)	~1 s

Return Loopback/Sweep/Alignment

Frequency range	5–65 MHz
Transmit level	8–55 dBmV

Standards Compliance

Shock and vibration	5 Gs at 2 Hz to 5 kHz
Transportation packaging I.S.T.A.	Procedures 1C and 1G
Drop	IEC 61010
Handle stress	IEC 61010
Water resistance	MIL-STD-810F
Safety emissions	EN 55022, CE, FCC
Safety immunity	EN 61000, CE, FCC

General

Display	320 x 240 pixels, TFT color

Second-Language Options

Chinese, French, German, Hungarian, Japanese, Korean, Portuguese, Polish, or Spanish

Dimensions with battery (W x H x D)	12 x 25 x 10.8 cm (4.75 x 9.75 x 4.25 in)
Weight without battery	1.2 kg (2 lb, 10 oz)
Battery weight	0.6 kg (1 lb, 6 oz)
Storage and operating temperature range	−20 to +50°C (−4 to +122°F)

1. Total integrated power, detectable range.
2. Accuracy for analog levels between −20 to +55 dBmV. Accuracy for digital levels between −20 to +50 dBmV. Additional uncertainty of ±1.0 dB from 4 to 15 MHz. Additional uncertainty of ±0.5 dB across −20 to +50°C.
3. MER Range declines as input levels decrease. Expected MER Range at MIN LOCK Level of −15 dBmV is >30 dB MER.
4. Specifications are QAM signal center frequencies.
5. MER Typical defined as identical QAM carriers at +5 dBmV with no adjacent analog carrier.
6. Stated throughput is the max theoretical capability. Actual performance may vary.
7. With 85 MHz diplexer, 5 – 85 MHz, port 2 only (port 1 remains 5 – 65 MHz).

Ordering Information

Sweep Tech Package

DSAM-6300 with DOCSIS 3.0 w/42 MHz diplexer includes DQI, SmartScan, Return Loopback, Return Alignment, Gigabit Ethernet, 110 MHz Ingress Scan, Sweepless Sweep, and a 1-year StrataSync asset management license (standard). Package includes Forward Sweep, Reverse Sweep, QAM Ingress, browser, and VoIPCheck (DSAM-D3SWPPKG-42, DSAM-D3SWPPKG-65, or DSAM-D3SWPKG-85, where the last two digits in the part number indicate diplex filter frequency).

Viavi recommends that you work with your sales contact to customize the DSAM for your needs. Packages have been created for convenience and savings that simplify the ordering process and bundle multiple popular features. Additional options are available to add to the pre-configured packages. These packages have factory-configured hardware which may not be substituted or modified.

Note: The diplexer is used to block downstream carriers when performing measurements on the return path. Viavi recommends ordering the version that matches the system's existing return path.

Description	Part Number
Mainframe	
Sweep technician DOCSIS, sweep and signal level meter	DSAM-6300
DOCSIS 3.0 and Return Path Diplexer (choose only one—mutually exclusive)	
42 MHz DOCSIS 3.0 Diplexer	DSAM-D3DIPLEX-42*
65 MHz DOCSIS 3.0 Diplexer	DSAM-D3DIPLEX-65*
85 MHz DOCSIS 3.0 Diplexer	DSAM-D3DIPLEX-85*
Options	
Integrated web browser	1019-00-1491
VoIPCheck	1019-00-1556
Field View w/ return signal generator	1019-00-1495
Home Certification	1019-00-1513
QAM ingress software option	DSAM-QAM-INGRESS
Forward Sweep	1019-00-1567
Reverse Sweep	1019-00-1563
Substitute 75-ohm BNC connector	1019-00-1455
DSAM Field View QAM option	DSAM-FVQAM
QAM Ingress and Return Loopback package	DSAM-QINGLOOP-OPT
DSAM WiFi software option and compatible USB WiFi adapter	DSAM-WIFI-PKG

Description	Part Number
USB optical power meter with accessories	MP-60A
USB optical power meter - high power with accessories	MP-80A MP-80 -
SmartID qty.1 — additional or replacement probe	SMARTID_1PC
SmartID 2-pack and starter kit	SMARTID_2PCS_STARTERKIT
SmartID 3-pack and starter kit	SMARTID_3PCS_STARTERKIT
SmartID 4-pack and starter kit	SMARTID_4PCS_STARTERKIT
SmartID 5-pack and starter kit	SMARTID_5PCS_STARTERKIT
SmartID 6-pack and starter kit	SMARTID_6PCS_STARTERKIT
SmartID accessory kit — SmartID carrying case and USB cable	SMARTID_ACC_KIT
SmartID to DSAM USB Cable	SMARTID-USBCABLE
Extended hardware warranty 1 year DSAM-6300	DSAMWE6300
QAM Egress option, DSAM software only	DSAM-QAM-EGRESS
QAM Egress option, DSAM software and near-field antenna	QAM-EGRESS-NF-PKG
QAM Egress option, DSAM software, near-field antenna and directional antenna	QAM-EGRESS-DIR-PKG
QAM Egress near-field antenna	DSAM-NEARFIELD ANTENNA
QAM Egress directional antenna	DSAM-DIRECTIONAL ANTENNA
Headend Instruments	
SDA-5500 headend sweep transceiver: provides forward sweep and single-user reverse sweep; includes line cord, channel plan transfer cable, and operator's manual	1010-00-0470
SDA-5510 headend reverse sweep manager: receives reverse sweep from up to 10 DSAMs; includes line cord, channel plan transfer cable, and operator's manual	1010-00-0472
P5000i Fiber Microscope	
Kit: FBP-P5000i digital probe, FiberChek-PRO software, case, and tips (FBPT-SC, FBPT-LC, FBPT-U25M, FBPT-U12M)	FBP-SD101
Kit: P5000i and MP-60, FiberChekPRO software, case, tips, and adapters (FBPT-SC, FBPT-LC, FBPT-U25M, FBPT-U12M)	FIT-SD103
Kit: P5000i and MP-80, FiberChekPRO software, case, tips, and adapters (FBPT-SC, FBPT-LC, FBPT-U25M, FBPT-U12M)	FIT-SD113

* Must choose one diplex frequency to match return path.

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