

SPIRENT TECH-X FLEX

CABLE SERVICES MODULE

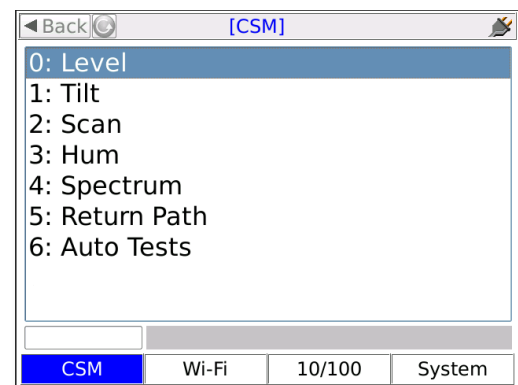
Spirent's Cable Services Module V1 provides comprehensive QAM testing and Signal Level Analysis in a single platform to enable testing and analysis of both Analog and digital RF-based video signals.

FEATURES & BENEFITS

- Measures and analyzes frequencies between 5 MHz and 1542 MHz
- Return path continuous waveform, QPSK and 16/64 QAM signal generator with multiple simultaneous carriers and forward error correction support
- Comprehensive analog and digital signal level measurement including single channel tests, tilt and scan
- Full forward and return path QAM analysis with MER, pre/post FEC BER and constellation diagrams
- User-friendly downstream and upstream spectrum analysis with zero span mode

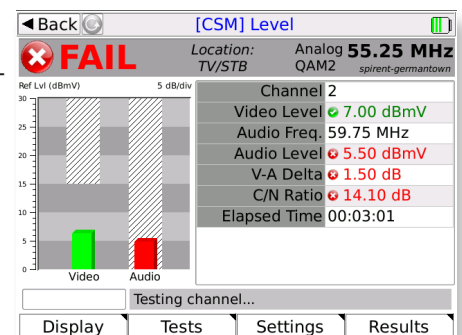


The Tech-X Flex™ Cable Services Module provides the complete range of measurements needed to fully test, analyze and assure the quality of analog and digital television services delivered via cable systems. Combined with the Tech-X Flex's advanced testing capabilities, flexibility and ease-of-use, the Cable Services Module is the ideal tool for field engineers and technicians installing and maintaining next-generation cable services.



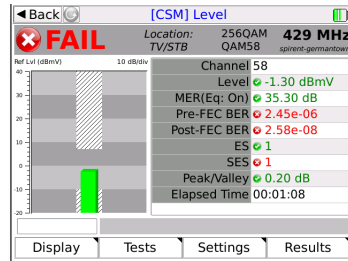
ANALOG RF CHANNEL MEASUREMENTS

Analog channel quality tests include video and audio carrier signal level measurements, video/audio signal level difference, carrier/noise ratio and hum modulation. The tests are completed using a single button push and metrics are reported based on user-defined locations and thresholds with clear pass/fail results.



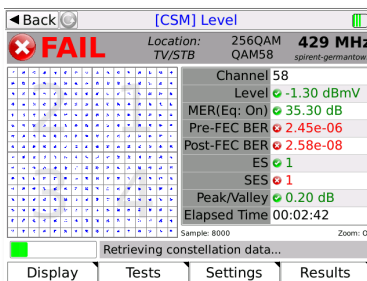
DIGITAL RF CHANNEL MEASUREMENTS

Cable Services Module 64/256 QAM digital channel quality measurements include average power levels, MER, pre/post FEC BER, errored seconds and severely errored seconds. All of the reported metrics are presented on a single screen allowing field engineers and technicians to quickly verify digital channel performance. Additionally, the display includes a dynamic constellation diagram with adjustable zoom and sample rates which facilitates the rapid resolution of digital channel quality problems including excessive noise, interference, phase jitter, or gain compression.



CONSTELLATION ANALYSIS

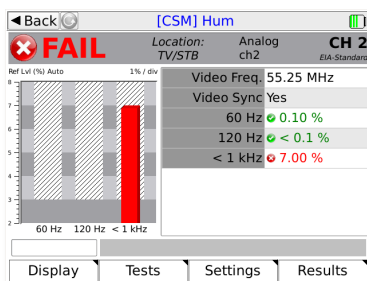
The Constellation display is an invaluable tool for the technician when trying to measure the quality of the QAM modulated signals. By visually inspecting the size and shape of the dots within the constellation matrix, the technician can easily identify the nature of the problem such as noise, interference, phase noise, gain issues.



Tech-X Flex can measure both 64 QAM and 256 QAM modulated systems as standard ensuring multiple transmission systems can be maintained.

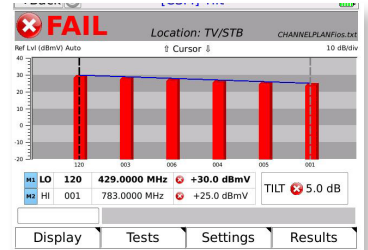
HUM MEASUREMENT

Hum is the modulation of the analog video carrier by the AC and/or DC power which transmitted “in-line” with the audio/video carriers to power the plant’s amplifiers. Hum modulation is a measurement describing the percentage of amplitude modulation caused to the analog video carrier by the 60 Hz and 100/120 Hz interference as well as the <1 kHz harmonics which are present in the video carrier’s bandwidth. A Hum analysis of the RF channel using the Tech-X Flex enables the field technician to verify that there are no such disturbances affecting the RF signal.



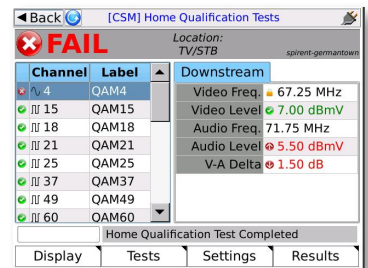
TILT MEASUREMENT

The tilt measurement allows field engineers and technicians to quickly identify signal level differences over a specified frequency range and apply attenuation or equalization to adjust the differences according to the cable system’s specifications. Between 2–12 analog, digital or DOCSIS channels can be measured using the tilt measurement. The measurement’s markers can be used to adjust the display and determine the tilt between any of the channels included in the measurement.



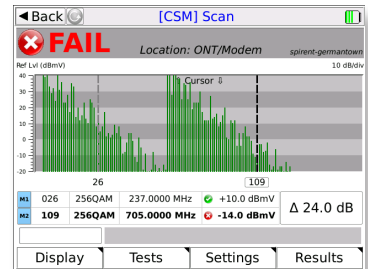
HOME QUALIFICATION TESTS

The Home Qualification Test is a quick one button test to qualify key Analog/ Digital/ DOCSIS Channel parameters. Key measurements like C/N, Hum, MER/BER analysis, DOCSIS Throughput/Packet loss etc. can be enabled/ disabled to give the desired results as per the technician’s requirement. The Speed of the test and the Flexibility in configuring the key parameters ensure the Home Qualification Test matches the needs of all Field Technicians.



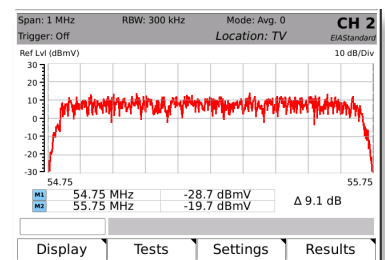
RF SCAN

Using the scan test, the signal levels of all of the analog and digital channels included in the cable system’s channel plan are measured consecutively and the overall frequency response of the system is determined. The scan measurement leverages pre-defined location based thresholds which clearly show whether or not signal levels comply with the cable system’s specifications.



SPECTRUM MODE

The Cable Services Module’s 5 MHz/1542 MHz spectrum analyzer provides field engineers and technicians a simple and effective tool for identifying and locating noise, interference, ingress and other waveforms that may be affecting cable services quality. Measurement settings including center frequency, span, resolution bandwidth, display averaging and peak hold are available to allow for quick signal level comparisons. The zero span mode is supported to measure bursty digital signals in the return path.



TECHNICAL SPECIFICATIONS		
General Specifications	Frequency Range	5 MHz / 1542 MHz
	Frequency Accuracy	10 ppm
Analog Channel Measurements	Signal Level Range	-40 dBmV / +60 dBmV
	Signal Level Resolution	0.1 dB
	Signal Level Accuracy	±1.5 dB
	Carrier/Noise Ratio Resolution	0.1 dB
	Carrier/Noise Ratio Accuracy	±1.5 dB
	Hum Modulation Range	0–5%
	Hum Modulation Resolution	0.1%
	Hum Modulation Accuracy	±0.5%
Digital Channel Measurements	Signal Level Range	-40 dBmV / +60 dBmV
	Signal Level Resolution	0.1 dB
	Signal Level Accuracy	±2.0 dB
	Modulation Types	64 QAM and 256 QAM
	Constellation Diagram	Dynamic zoom and sample size
	MER Range	15 dB / 40 dB
	MER Accuracy	±2.0 dB
	Pre and Post FEC BER Range	1.0E ⁻⁰⁹ / 1.0E ⁻⁰⁴
	Additional Results	Errored Seconds and Severely Errored Seconds
Tilt Measurement	12 Analog/Digital channels	
Scan Measurement	195 Analog/Digital out-of-band channels	
Return Path Signal Generator	Frequency Range	4 MHz / 42 MHz
	Frequency Tuning Resolution	10 kHz
	Signal Level Range	+20 to +60 dBmV
	Signal Level Resolution	0.1 dB
	Signal Level Accuracy	±1.5 dB
	Modulation Types	CW, QPSK, 16 QAM and 64 QAM
	Symbol Rates	160, 320, 640, 1280, 2560 and 5120 ksym/s
Return Path Analysis	Signal Level Range	-40 dBmV / +60 dBmV
	Signal Level Resolution	0.1 dB
	Signal Level Accuracy	±2.0 dB
	Modulation Types	QPSK, 16 QAM and 64 QAM
	MER Range	15 dB / 40 dB
	MER Accuracy	±2.0 dB
	Pre and Post FEC BER Range	1.0E ⁻⁰⁹ / 1.0E ⁻⁰⁴
	Errored Seconds and Severely Errored Seconds	

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TECHNICAL SPECIFICATIONS CONTINUED

Spectrum Analysis	Frequency Range	5 MHz / 1542 MHz
	Display	6 vertical divisions (1 dB, 2 dB, 5 dB or 10 dB)
	Span	1 MHz / 60 MHz
	Resolution Bandwidth	10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz and 3 MHz
	Video Bandwidth	Averaging
	Zero Span Mode	Voltage and time triggers

ORDERING INFORMATION

PRODUCT NUMBER	PRODUCT NAME	DESCRIPTION
T5000	Tech-X Flex	With 10/100 Ethernet interface for IP Ping, Traceroute, DHCP/Static Addressing
T5631-1	Cable Services Module–V1 with DOCSIS	Provides DOCSIS 3.0 sync to CMTS, statistics, IP testing (ping, Traceroute, web browser) and support for 5-45MHz upstream and up to 1GHz downstream RF video testing including SLM, MER, BER, Constellation, Spectral analysis, Tilt, HUM and other pertinent RF testing functions
T5632-1	Cable Services Module–V1	Provides support for 5-45MHz upstream and up to 1GHz downstream RF video testing including SLM, MER, BER, Constellation, Spectral analysis, Tilt, HUM and other pertinent RF testing functions
T5633	DOCSIS 3.0 Module	Provides DOCSIS 3.0 sync to CMTS, statistics, IP testing (ping, Traceroute, web browser)

SPIRENT SERVICES

Spirent Global Services provides a variety of professional services, support services and education services—all focused on helping customers meet their complex testing and service assurance requirements. For more information, visit the Global Services Website at www.spirent.com/gs or contact your Spirent sales representative.

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