

# DS2500Q

## Digital TV QAM Analyzer

### Key Benefits

- High-speed Spectrum Analysis: 4 ~ 1000 MHz
- Integrated DOCSIS 3.0 Cable Modem
- Integrated Upstream Signal Generator (no FEC)
- Supports ITU-T J.83 Annex A/B/C
- Error Vector Spectrum: identifies interference signals under QAM carriers, with no break in service
- Auto Test

### Overview

Integrating multiple functions in a single handheld instrument, the new DS2500Q is a powerful Digital TV QAM Analyzer with a comprehensive measurement suite specifically designed for HFC network testing, troubleshooting, and maintenance.

The DS2500Q's main functions include Enhanced Spectrum Analysis, Analog & Digital TV analysis, DOCSIS 3.0 analysis, Upstream Signal Generation, Ethernet testing, and Auto Test. The revolutionary EVS function enables users to detect coherent distortions hiding under QAM carriers - without interrupting service. The DS2500Q supports Deviser's PC software toolkit, included with each unit, to make data transfer a snap.



RF Input  
USG Output



## DVB-C Signal Analysis

The DS2500Q supports the ITU-T J.83 Annex A/B/C standard, providing Channel Power, MER, BER, and Constellation. It also offers Digital HUM distortion measurements, from the fundamental frequency to 4th harmonic components.

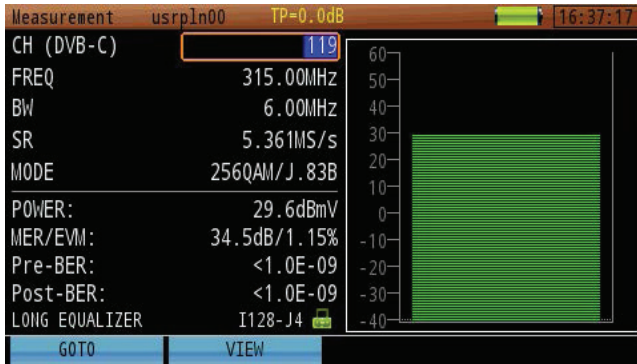


Figure 1: DVB-C Channel Measurement

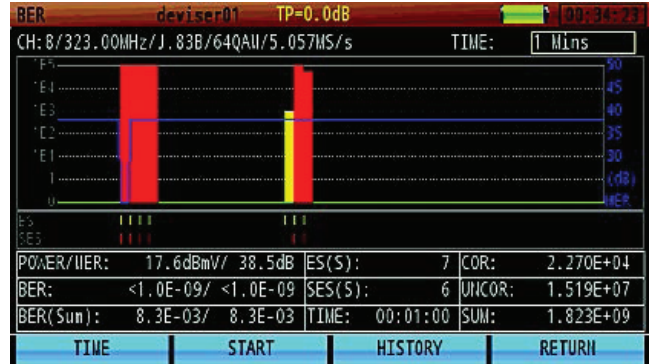


Figure 2: BER and MER Statistical Analysis

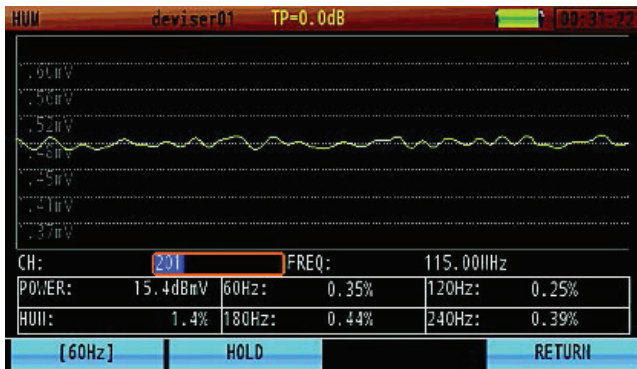


Figure 3: Digital HUM

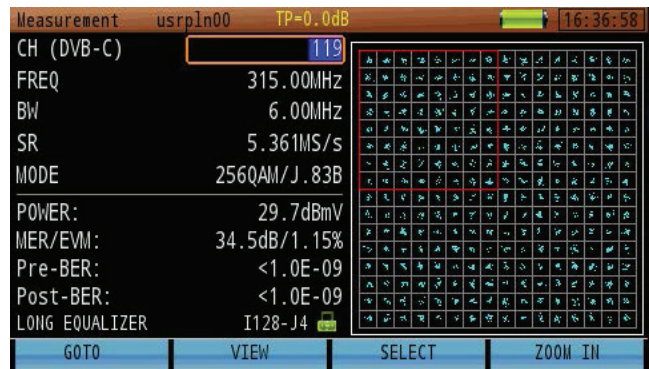


Figure 4: Constellation Display

## High-Speed Spectrum Analysis

The DS2500Q offers an enhanced spectrum analysis function, with a frequency range from 4MHz to 1000MHz and sensitivity down to -55dBmV (@300kHz). The spectrogram provides a scrolling three-dimensional display, allowing users to track frequency and level over time - excellent for analyzing intermittent signals.

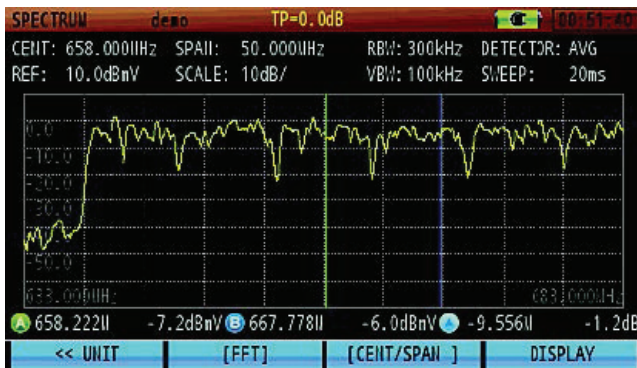


Figure 5: Spectrum Analysis

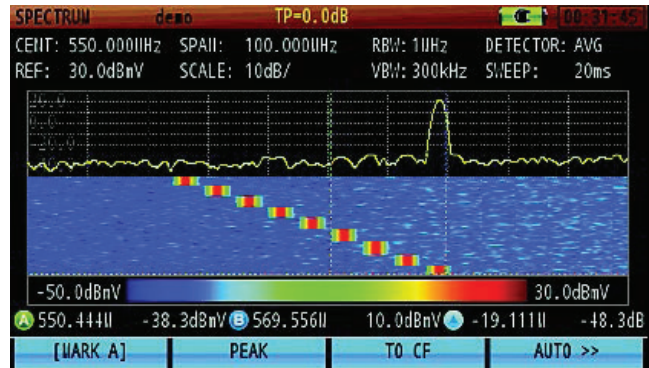


Figure 6: Spectrogram

### EVS In-Service Interference Detection

The Error Vector Spectrum feature can find interference signals under a QAM carrier without service interruptions.

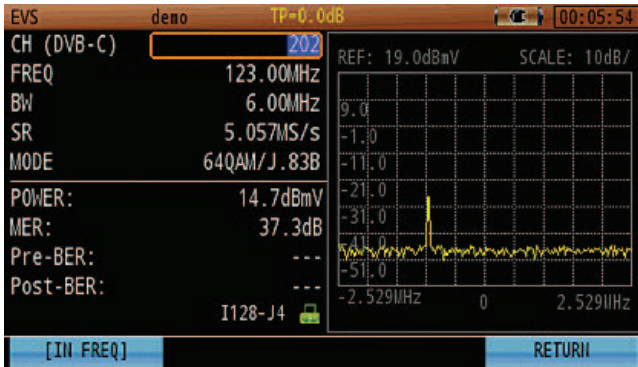


Figure 7: The EVS mode finds narrow-band interference signals with supreme clarity and ease.

### Upstream Signal Generator

The DS2500Q can generate a CW carrier or QAM signal. Sweep mode is also available.

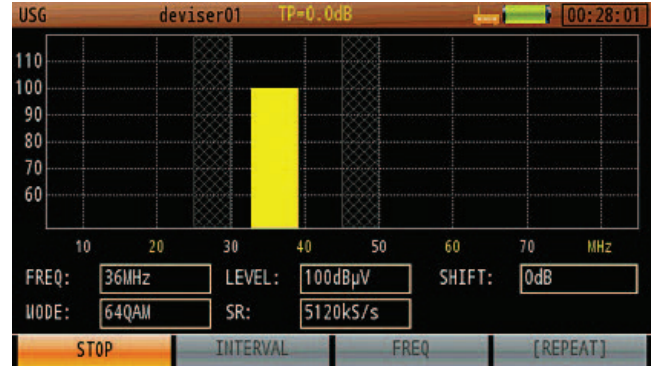


Figure 8: Upstream Signal Generator

### Cable Modem Measurement

The DS2500Q incorporates a standard DOCSIS 3.0 cable modem, compatible with DOCSIS 1.X, 2.0 & 3.0. The built-in modem supports 8x DS and 4x US bonded carriers. Figure 8 (below) shows the CM statistical info screen - including downstream signal level, modulation type, bandwidth, symbol rate, MER, BER, upstream signal level, symbol rate, & UCD (Upstream Channel Descriptor).

Users can select the desired DOCSIS mode, downstream channel, and UCD. Basic network test tools include Ping, Traceroute, PPPoE, FTP, and a web browser.

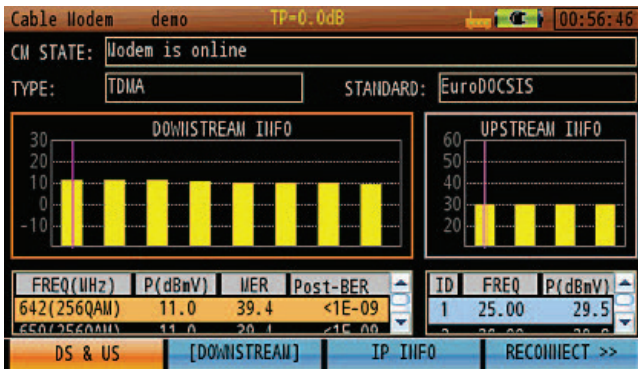


Figure 9 DOCSIS 3.0 Statistical Information Display

### Auto Test

The DS2500Q comes equipped with a wide range of region-standard channel plans spanning (in part) North America, Asia, and Europe, as well as several sets of limit profiles - allowing users to design automatic tests. Tasks that can be automated include Analog TV, Digital TV and Cable Modem testing. Once the analyzer completes an auto test, all items in the test results will indicate Pass or Fail according to the limit profile. Results are automatically saved for later analysis.



Figure 10: Auto Test Project

## Specifications

Downstream Spectrum Analysis		
Frequency Range	4 ~ 1000 MHz	
Frequency Stability	± 1 PPM (0°C ~ 50°C)	
Frequency Span	Zero span ~ full span	
Frequency Step	1kHz	
Resolution BW filters (-3dB)	30kHz; 100kHz; 300kHz; 1 MHz; 3 MHz	
Display Scale & Range	1, 2, 5, 10, 20dB/division; 8 vertical divisions	
Sweep Time	20ms ~ 25s	
Input Level Range	-60 ~ +60dBmV	
Dynamic Range	65dB (300kHz RBW)	
Sensitivity	-50dBmV (300kHz RBW, pre-amplifier on)	
Attenuation	0 ~ 40dB in 1dB steps	
Pre-amplifier	Manual; 18dB gain	
Accuracy	< ±1dB @ 25 ± 5°C (typical)	
Measurement Detector	Positive/negative peak; sample; average; RMS	
Reference Level	-80 ~ +70dBmV	
Markers	2 vertical markers	
Upstream Spectrum Analysis		
Frequency Range	4 ~ 210 MHz	
Resolution Bandwidth	100kHz; 300kHz	
Video Bandwidth	30 Hz; 100Hz; 300Hz; 1kHz; 3kHz; 10kHz; 30kHz; 100kHz; 300kHz; 1 MHz; 3 MHz	
Display Scale & Range	1, 2, 5, 10, 20dB/division	
Sweep Time	20ms ~ 25s	
Input Level Range	-60 ~ +60dBmV	
Attenuation	Automatic, 0 ~ 40dB	
Pre-amplifier	Manual, 18dB gain	
Accuracy	< ±1dB @ 25 ± 5°C (typical)	
Measurement Detector	Positive/negative peak; sample; average	
Markers	2 vertical markers	
Digital TV Measurement		
Frequency Range	46 ~ 1000 MHz	
Power Level Range	-30 ~ +50dBmV	
Level Resolution	0.1dB	
Accuracy	< ±1.5dB @ 25 ± 5°C (typical); C/N > 20dB	
Modulation Type	J.83 Ax. A/C	16 / 32 / 64 / 128 / 256 QAM
	J.83 Ax. B	64 / 256 QAM
Interleave Depth	J.83 Ax. A/C	(12, 17)
	J.83 Ax. B	(128, 1) ~ (128, 4)
Symbol Rate	4 ~ 7 MS/s	
MER	>41dB; accurate to within ± 2dB	
BER	1E-3 ~ 1E-9	
Constellation	16 / 32 / 64 / 128 / 256 QAM	

Analog TV Measurement		
Supported Standards	B/G; I; D/K; L/L'; M/N	
Color Standards	NTSC, PAL, SECAM	
Frequency Step	10kHz	
Power Level Range	-40 ~ +60dBmV	
Accuracy	< ±1dB @ 25 ± 5°C (typical); S/N >30dB	
Level Resolution	0.1dB	
Resolution Bandwidth	300kHz	
CCN	>51dB (@ +10dBmV carrier level)	
CTB/CSO	≥ 61dB; accurate to within ±2dB	
HUM Measurement	1 ~ 15%; ±5% (1 ~ 5%); ±1.0% (5 ~ 20%)	
Tilt	Up to 16 channels	
Attenuation	Automatic, 40dB	
Pre-amplifier	Automatic, 18dB gain	
Cable Modem Measurement		
Downstream		
Supported Standards	DOCSIS 1.1, 2.0, 3.0; EuroDOCSIS 1.0, 1.1, 2.0, 3.0	
Demodulation	64 / 256 QAM	
Frequency Range	>91 MHz (US); >100 MHz (EU)	
Max Speed	6 MHz BW	Up to 304 Mbps
	8 MHz BW	Up to 400 Mbps
Channel Bonding	Up to 8 channels	
Bandwidth	6 MHz / 8 MHz	
Input Level Range	-15 ~ +15dBmV	
Upstream		
Frequency Range	5 ~ 85 MHz	
Signal Bandwidth (TDMA)	200 / 400 / 800 / 1600 / 3200 / 6400kHz	
Signal Bandwidth (CDMA)	1600 / 3200 / 6400kHz	
Channel Bonding	Up to 4 channels	
Output Level (TDMA)	QPSK	8 ~ 58dBmV
	8 / 16 QAM	8 ~ 55dBmV
	32 / 64 QAM	8 ~ 54dBmV
Output Level (CDMA)	8 ~ 53dBmV (all modes)	
Max Speed	120 Mbps (4 channel bonding)	
Upstream Signal Generator		
Signal Modulation	8 / 16 / 32 / 64 / 256 QAM; CW; QPSK	
Symbol Rate	0.16; 0.32; 0.64; 1.28; 2.56; 5.12 MS/s	
MER	>38dB; accurate to within ± 2dB	
Frequency Range	5 ~ 85 MHz	
Frequency Step	1 MHz	
Power Level Range	8 ~ 58dBmV (CW, QPSK)	
Power Step	1dB	

Specifications (cont'd)

General		
RF Input	75Ω F-type connector	
USB	USB 1.1	
LAN	RJ45, 10/100T Ethernet	
Display	4.3" 480x272 TFT LCD	
Power Adapter	AC	100~240V/ 50~60 Hz
	DC	12V / 3A
Battery	Li-ion, 7.4V / 7.8Ah	
Charging Time	~4 hours	
Operation Time	>6 hours	
Storage Temperature	-20 ~ +60°C	
Operation Temperature	-10 ~ +50°C	
Dimensions (LxWxH)	9.6" x 5.1" x 2.4" (245mm x 130mm x 60mm)	
Weight	3.3 lbs (~1.5kg)	

Ordering Information

DS2500Q Base Model
DS2500Q Digital Cable TV QAM Analyzer, 4 ~ 1000 MHz, 75Ω or BNC
Options
DOCSIS 3.0 8x4 Cable Modem and Upstream Signal Generator (no FEC)
SYNCOR Asset Management
SYNCOR Certificate
ATSC (8VSB) Measurement
2-Prong Power Cord plus Ground (Europe except UK)
3-Prong Power Cord plus Ground (US)
3-Prong Power Cord plus Ground (UK)
3-Prong Power Cord plus Ground (Australia)
English Instruction Manual (hard copy)
Toko Type F(f) to F(f) Connector

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