

DS2800

Digital TV Spectrum Analyzer

Key Benefits

- Fast Spectrum Analysis: 4 - 1220 MHz, 4 - 2150 MHz
- Digital options: OPM, VFL, and fiber scope
- ITU-T J.83 Annex A/B/C/D, QAM/8VSB; auto-detects channel parameters
- Spectrum Persistence Analysis: any frequency band, max span 206 MHz
- Downstream & Upstream Spectrum Analysis covers DOCSIS 3.1 frequency band
- Integrated DOCSIS 3.0 cable modem
- Integrated Upstream Signal Generator (J.83A/B-FEC)
- Forward/Reverse Path Sweep
- TS Analysis
- TR 101 290 Monitoring, auto-generated program lists, and program-channel mapping
- Error Vector Spectrum identifies interference under QAM carriers with no interruptions in service
- Gated Measurements: in-service C/N, CSO, CTB, CLDI, DG/DP, DOM, ICR tests
- Auto Test
- Asset and Test Data management software



Overview

Integrating multiple functions in a very small portable instrument, the DS2800 is a new-generation Digital TV Spectrum Analyzer with a comprehensive measurement suite specifically designed for HFC network testing, troubleshooting, and maintenance.

The DS2800's main functions include Analog TV and Digital TV analysis, DOCSIS 3.0 analysis, Spectrum Analysis, Forward/Return Path Sweep, Upstream Signal Generation, simple Ethernet and Wi-Fi testing, and Auto Test.

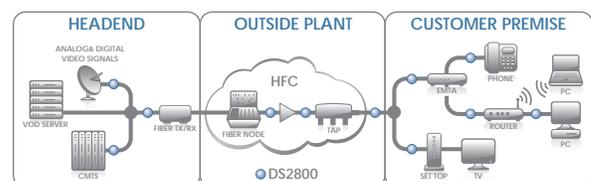
With the latest in miniaturized technology, the DS2800 affording outstanding performance to the CATV engineer. Its RF features are based on a handheld spectrum analyzer, with 80dB of dynamic range.

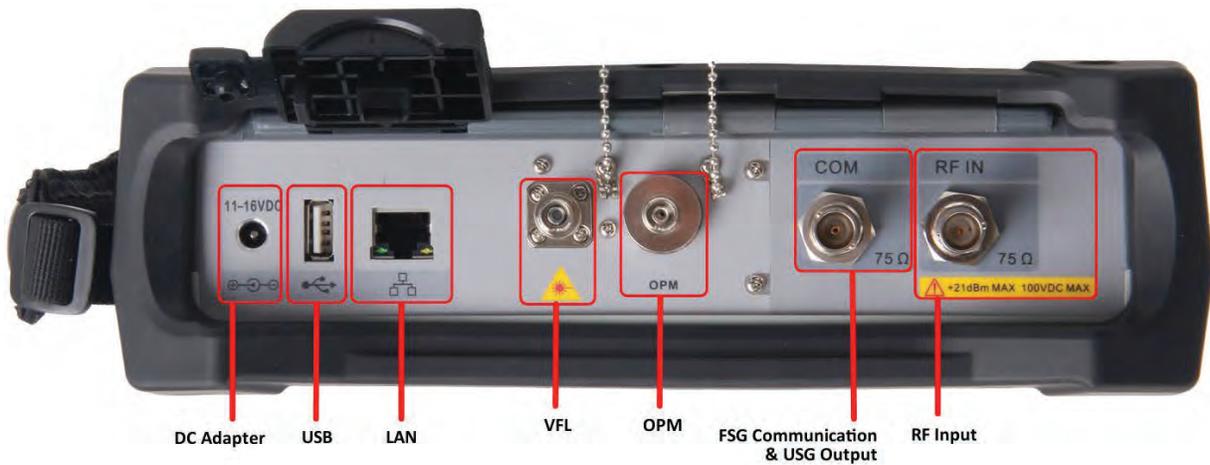
A host of new applications help HE/HUB and field engineers perform in-service measurements and locate interference. Upstream Spectrum Analysis mode offers a persistence mode (any frequency band, max span 206 MHz) that will show interference under bursty signaling.

In the Analog TV mode, when VITS signals are inserted, gated C/N, CSO, CTB, CLDI, DG-DP, DoM, and ICR measurements allow in-service channel testing; the DS2800 can also perform non-intrusive measurements.

For DVB-C and CMTS downstream signals, the revolutionary Frequency & Time EVS function enables users to detect coherent distortions hiding under QAM carriers like LTE – without interrupting service. The DS2800 also supports Transport Stream Analysis, showing reactive bandwidth usage, basic TS structure, TR 101 290, PID view, PCR, PSiP, PAT, and PMT tables.

The DS2800 supports the Toolbox PC software for small-scale applications. The SYNCOR platform manages asset and test data for larger applications. As fiber-optic technology continues to expand into the CATV network space, the DS2800's optical measurement options – including an optical power meter, visual fault location, and a fiber inspection scope – are newly offered.





Fast Spectrum Analysis

The Deviser DS2800 offers enhanced spectrum analysis performance, with a frequency range of 4MHz ~ 1220MHz (optionally expandable to 4MHz ~ 2150MHz) and 80dB of dynamic range.



Figure 1: Spectrum Analysis

Simultaneous Spectrum & QAM Display

The DS2800 supports both spectrum analysis and QAM analysis, with the ability to display both measurements at once. Users can observe multiple signal characteristics and identify faults without switching applications.

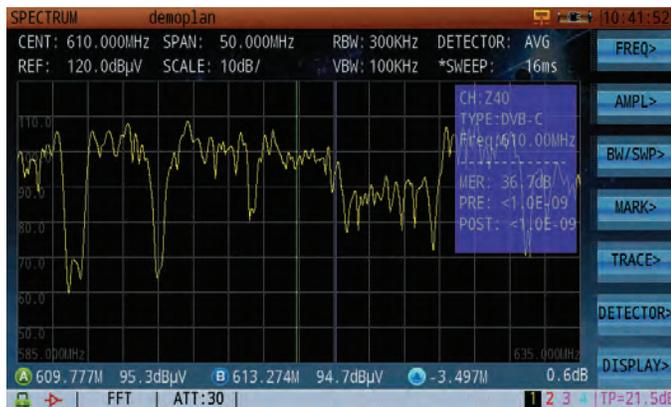


Figure 2: Simultaneous Spectrum and QAM Analysis

Spectrograph

The spectrogram provides a scrolling three-dimensional display, allowing users to track frequency and level over time - excellent for analyzing intermittent signals. Users can analyze the stability of a signal, or identify intermittent interference signals in a communications system.

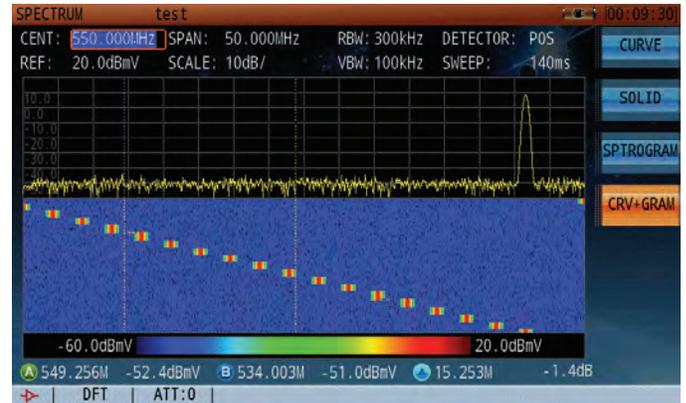


Figure 3: Spectrograph

Upstream Spectrum Persistence

Traditionally, the task of troubleshooting upstream signal involves using free regions of the upstream spectrum to measure the noise floor and monitor for interference. But in DOCSIS 3.0 systems, the upstream spectrum becomes too crowded for this approach; ordinary analyzers cannot distinguish communication signals from interference.

Deviser's Spectrum Persistence analysis technology, newly available on the DS2800, enables users to locate bursty signals hiding under QAM carriers (e.g. LTE) - **without interrupting service.**



Figure 4: Spectrum Analysis - Low-Level Signal Covered by High-Level

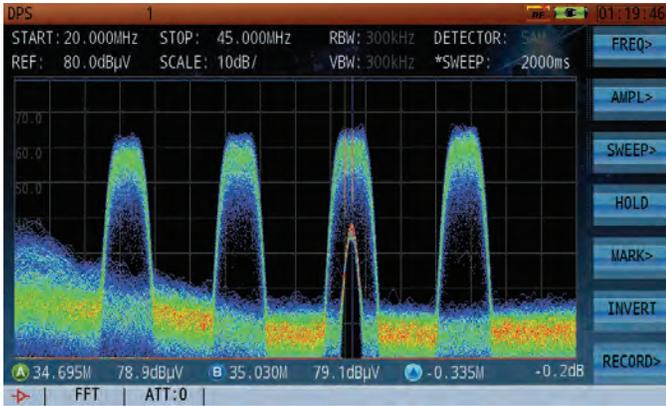


Figure 5: Persistence Shows Ingress Signal Under DOCSIS Upstream Signal

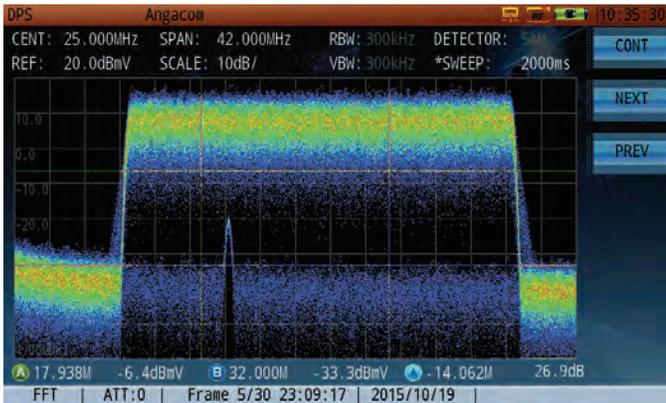


Figure 6: Replaying Recorded Persistence File

Analog TV Gated Measurement

The DS2800's suite of Analog TV tests includes the Gated measurement function. This mode supports in-service C/N, CSO, CTB, CLDI, DG/DP, DoM, and ICR measurements



Figure 7: Analog TV Gated Measurement

Use VITS signal and gated measurements to find analog TV video parameters in-service.



Figure 8: Analog TV Gated Measurement: Video Parameters

DVB-C Signal Analysis

The DS2800 supports the ITU-T J.83 Annex A/B/C standard, providing Channel Power, SNR, MER, BER, Constellation, Digital HUM, Equalizer, and TS Analysis measurements. It also supports fundamental frequency to 4th-harmonic components, and QAM signal parameter searching.

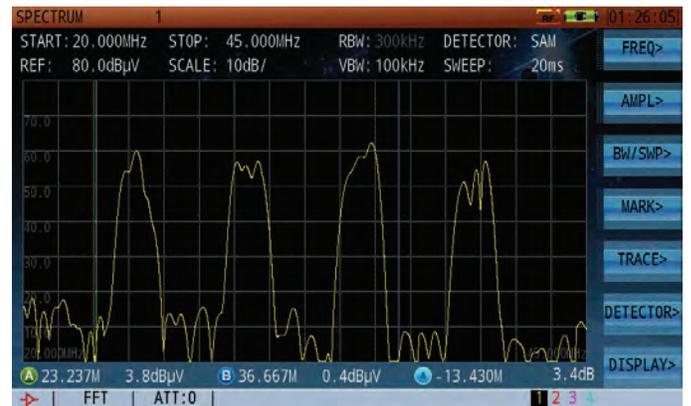


Figure 9: DVB-C Channel Measurement



Figure 10: Digital HU



Figure 11: Constellation Display

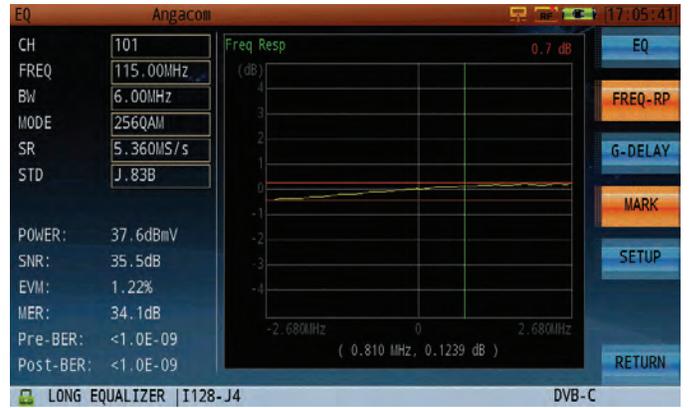


Figure 14: Frequency Response



Figure 12: BER and MER Statistical Analysis

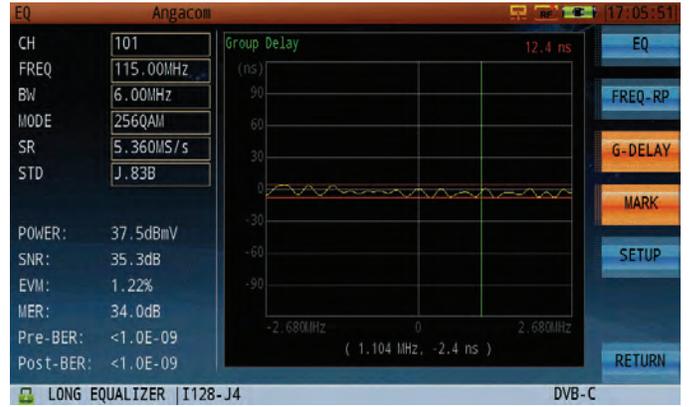


Figure 15: Group Delay

Equalizer, Frequency Response, and Group Delay Analysis

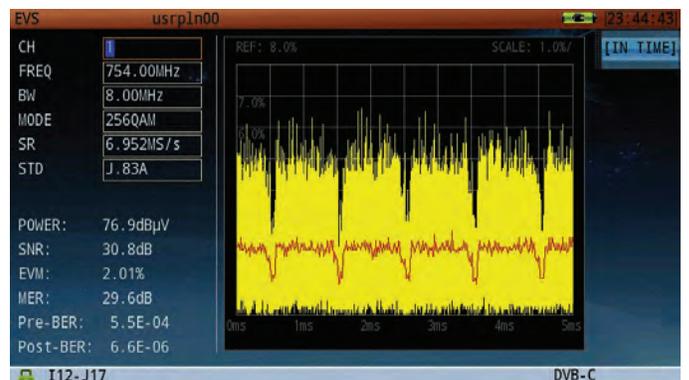
In a cable TV network, most impairments to signal quality stem from impedance mismatch and filter. Impedance mismatch can cause serious micro-reflections that overlay the initial transmission, harming signal quality. In addition, liner distortions may introduce micro-reflection, amplitude ripple/tilt, and group delay variation issues. The DS2800's Adaptive Equalizer, Frequency Response and Group Delay analysis tools are targeted to identify and solve these distortions for crystal-clear signal transmission.



Figure 13: Adaptive Equalizer

EVS In-Service Interference Detection

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



Figures 16, 17: EVS Locating Narrow- and Broadband Interference Signals

8VSB Measurement

Additional measurements include 8VSB (ITU-T J.83 Annex D) for signal demodulation testing.



Figure 18: 8VSB Signal Demodulation

MPEG-2 Transport Stream Analysis

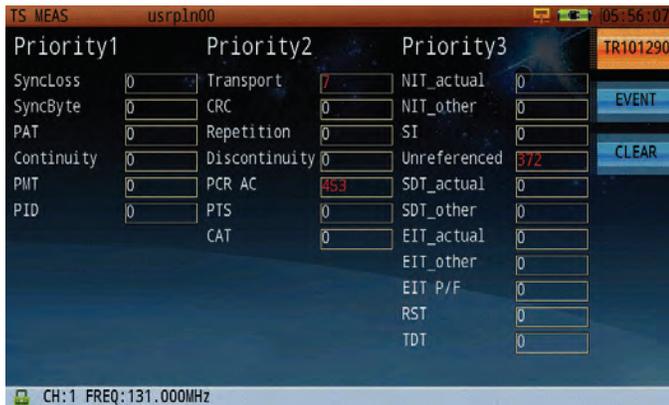


Figure 19: TR 101 290 Monitoring

Cable Modem Measurement

The DS2800 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 20 (top, right) shows the CM statistical info screen - with downstream signal level, modulation type, bandwidth, symbol rate, MER, BER, upstream signal level, symbol rate, & UCD (Upstream Channel Descriptor), and more.

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

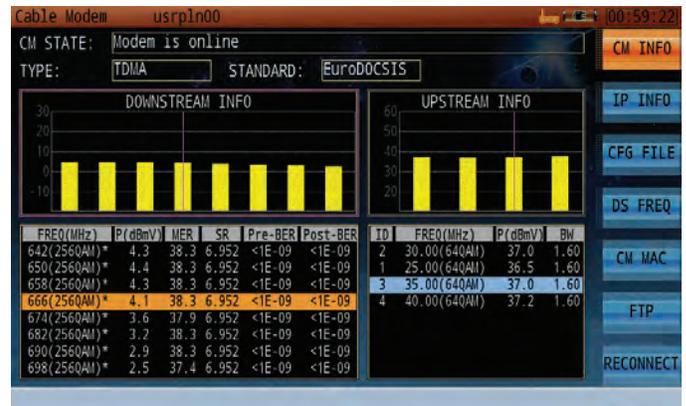


Figure 20: DOCSIS 3.0 Statistical Information Display

Upstream Signal Generator

The Upstream Signal Generator function can generate sine wave and QAM signals. This option supports Annex A and Annex B FEC coding, and a frequency sweep mode.

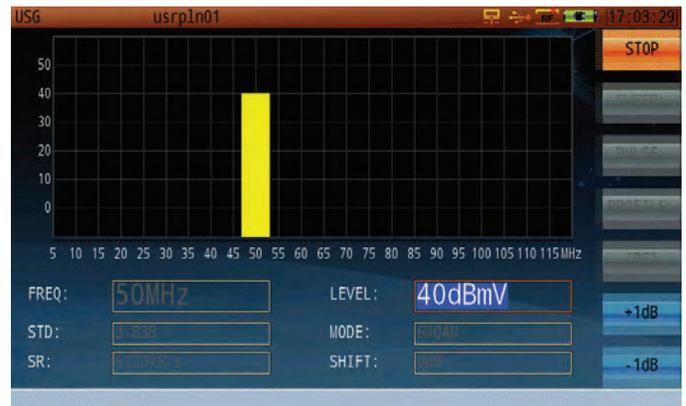


Figure 21: Upstream Signal Generator

Loopback

The DS2800's Loopback function (available only with advanced Upstream Signal Generator option) is effective for testing network or network equipment attenuation and gain from 5 - 120MHz. It can measure both CW and QAM signal frequency and sweep frequency.



Figure 22: Loopback Measurement

Reverse Path Sweep and Upstream Spectrum Measurement

When equipped with a FSK communication module and connected to a broadband network monitor system (such as Deviser's DS1610), the DS2800 can perform forward and reverse path sweep operations. By synchronizing upstream RF burst signals and test data, the DS2800 can calculate the frequency response curve, noting its own position (Field) in relation to the broadband network monitor system's position (Headend). This feature employs an FSK connection to smooth the network frequency response, maximizing the success rate of customers' transmissions.



Figure 23: Reverse Path Sweep

WiFi Analysis

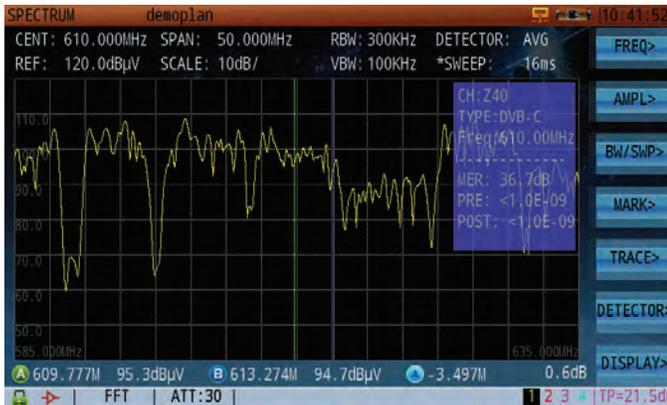


Figure 24: WiFi Analysis

Auto Test

The DS2600C 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 25: Auto Test Project

Optical Fiber Measurement

New to the DS2800 are Deviser's suite of optical fiber test functions, including the Optical Power Meter, Visual Fault Locator, and Fiber Inspection Scope. With the rapid growth of fiber-optic transmissions, proper equipment maintenance is a top priority for any CATV engineer.



Figure 26: Optical Power Meter



Figure 27: Visual Fault Location



Figure 28: Fiber Inspection Scope

Asset and Test Data Management

Deviser is proud to provide the asset and test-data management software SYNCOR with the DS2800. This PC-based toolkit can significantly enhance your test & analysis efficiency: generating and editing channel plans, transmitting work orders, receiving and managing test results from multiple devices, and more.

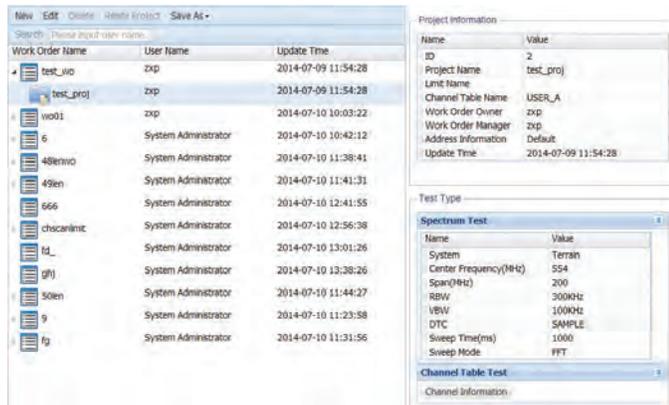


Figure 29: SYNCOR Work Order Management



Figure 30: SYNCOR Limit Plan Editor

Specifications

Frequency	
Frequency Range	4~1220 MHz; 4~ 2150 MHz (by option)
Frequency Stability	±1 PPM (0 °C ~50 °C / 32-122°F)
Frequency Step	1 Hz
Resolution Bandwidth (-3dB)	1kHz, 3kHz, 10kHz, 30kHz, 100kHz, 300kHz, 1 MHz, 3 MHz
Video Bandwidth (-3dB)	30 Hz, 100 Hz, 300 Hz, 1kHz, 3kHz, 10kHz, 30kHz, 100kHz, 300 kHz, 1 MHz, 3 MHz
Display Scale / Range	1, 2, 5, 10, 20dB/div; 8 vertical divisions
Sweep Time	20ms ~ 25s
Input Level Range	-60 ~ +60dBmV
Dynamic Range	80dB (30kHz RBW)
Sensitivity	-60dBmV (100kHz RBW, preamp on)
Attenuation	0 ~ 30dB in 1dB steps
Accuracy of Measurements	< ±1.0dB @ +25 ±5°C (typical)
Detector Modes	Positive Peak; Negative Peak; Sample; Average; RMS
Reference Level	-80 ~ +70dBmV
Markers	2 vertical markers
Analog TV Measurement	
Standards	B/G, I, D/K, L/L', M/N
Color Standards	NTSC, PAL, SECAM
Frequency Steps	10kHz
Level Measurement Range	-40 ~ +60dBmV
Accuracy	<±1.0dB @ +25 ±5 °C (S/N > 30dB)
Level Resolution	0.1dB
Resolution Bandwidth	300kHz
C/N (>53dB, 0dB attenuation)	Optimum input range: 32 ~ 37dBmV (preamp off); 12 ~ 17dBmV (preamp on) Max input range: 60dB ±1.0dB; 65dB ±3.0dB
CTB/CSO (>53dB, 0dB attenuation)	Optimum input range: 22 ~ 67dBmV (preamp off); 2 ~ 7dBmV (preamp on) Max input range: 63dB w/ ±1.5dB acc. & 78 channels 70dB w/ ±4.0dB acc. & 78 channels
HUM Measurement	1~20%; ±0.5% (1~5%); ±1.0% (5~20%)
Depth of Modulation Range	40~95%, ±1.5% (C/N>dB)
Tilt Measurement	Up to 16 channels
Pre-Amplifier	Automatic, 18dB gain
Attenuator	Automatic, 30dB
Persistence	
0 ~ 7 MHz	100% POI; minimum signal duration 2.5ms
4 ~ 46 MHz	100% POI; minimum signal duration 4.5ms
4 ~ 68 MHz	100% POI; minimum signal duration 4.64ms
4 ~ 88 MHz	100% POI; minimum signal duration 5.3ms
4 ~ 120 MHz	100% POI; minimum signal duration 6.3ms
4 ~ 210 MHz	100% POI; minimum signal duration 10.6ms

Upstream Spectrum Analysis	
Frequency Range	4 ~ 46 MHz (DOCSIS) 4 ~ 68 MHz (Euro DOCSIS 2.0) 4 ~ 88 MHz (Euro DOCSIS 3.0) 4 ~ 120 MHz upstream, 4 ~ 210 MHz downstream (DOCSIS 3.1)
Frequency Span	42 / 64 / 84 / 116 / 206 MHz, zero span
Resolution Bandwidth (-3dB)	100kHz, 300kHz
Video Bandwidth	30 Hz, 100 Hz, 300 Hz, 1kHz, 3kHz, 10kHz, 30kHz, 100kHz, 300 kHz, 1 MHz, 3 MHz
Display Scale / Range	1, 2, 5, 10, 20dB/div; 8 vertical divisions
Sweep Time	20ms ~ 25s
Input Level Range	-60 ~ +60dBmV
Attenuation	Automatic, 0 ~ 30dB
Pre-Amplifier	Manual, 18dB gain
Accuracy of Measurements	< ±1.0dB @ +25 ±5°C (typical)
Detector Modes	Positive Peak; Negative Peak; Sample; Average
Markers	2 vertical markers
Digital TV Measurement	
Frequency Range	7 ~ 1200 MHz
Power Level Range	-30 ~ +50dBmV
Accuracy	<±1.5dB @ +25 ±5°C (C/N > 20dB)
Level Resolution	7 ~ 1200 MHz
Pre-Amplifier	-30 ~ +50dBmV
Attenuator	<±1.5dB @ +25 ±5°C (C/N > 20dB)
Modulation Type	16, 32, 64, 128, 256 QAM (J.83 Annex A, C) 64, 256 QAM (J.83 Annex B)
Interleave Depth	128 x 1 ~ 128 x 4 (J.83B) 12 x 27 (J.83A,C)
Symbol Rate	1.0 ~ 7.0 MS/s
SNR	>45dB; Accuracy ±2.0dB
MER	>45dB; Accuracy ±2.0dB
EVM	>0.36%
BER	1E-3 ~ 1E-9
Constellation	16, 32 64, 128, 256 QAM

Specifications (continued)

Cable Modem Measurements	
Supported Standards	DOCSIS 1.1, 2.0, 3.0; EuroDOCSIS 1.0, 1.1, 2.0, 3.0
Downstream Demodulation	64, 256 QAM
Downstream Freq. Range	>91 MHz (5 ~ 65 MHz US); >100 MHz (5 ~ 85 MHz EU)
Downstream Bandwidth	6 MHz / 8 MHz
Downstream Max Speed	Up to 304 Mbps (6 MHz); 400 Mbps (8 MHz)
Downstream Chan. Bonding	Up to 8 channels
DS Input Signal Level	20ms ~ 25s
Upstream Freq. Range	-60 ~ +60dBmV
Upstream Signal Bandwidth	TDMA: 200 / 400 / 800 / 1600 / 3200 / 6400kHz S-CDMA: 1600 / 3200 / 6400kHz
Upstream Max Speed	120 Mbps
Upstream Chan. Bonding	Up to 4 channels
US Output Signal Level	QAM level range: 17 ~ 58dBmV; QPSK: 17 ~ 61dBmV
Upstream Signal Generator	
Signal Modulation	CW, QPSK, 16 / 64 / 256 QAM
Symbol Rate	1.28 MS/s; 2.56 MS/s; 5.12 MS/s
MER	>38dB; Accuracy ± 2.0 dB
Frequency Range	5 ~ 85 MHz
Frequency Adjustable Steps	1 MHz
Signal Level Range	8 ~ 58dBmV (CW, QPSK)
Level Adjustable Step	1dB
Advanced Upstream Signal Generator (Option)	
Signal Modulation	CW, QPSK, 16 / 64 / 256 QAM, Annex A & B
FEC	RS (204, 188) J.83A; RS (128, 122) J.83B
Symbol Rates	1 ~ 7 MS/s
MER	>40dB; Accuracy ± 2.0 dB
BER	<1E-9
Frequency Range	5 ~ 210 MHz
Frequency Adjustable Steps	10kHz
Phase Noise	100dBc @ 10kHz; 115dBc @ 100kHz (CW @ 50 MHz)
Frequency Accuracy	2ppm
Settling Time	2ms
Signal Level Range	0 ~ 60dBmV
Level Accuracy	± 1.5 dB (CW); ± 2.0 dB (QAM)
Level Adjustable Steps	0.1dB

Transport Stream Analysis	
Real-Time Analysis	Real-time transport stream info, including service name, ID, provider info, video/audio PIDs. Detailed audio/video data for unencrypted programs.
TR 101 290 Priority 1, 2, 3	TR 101 290 Priority 1, 2, 3 real-time testing & monitoring.
Basic Information	Various TS details, including data type % breakdown; transmission speed; packet length; network info.
PID List	Displays PIDs in current stream w/ type, symbol rate, and % of each.
PCR Monitor	Calculates PCR interval / accuracy; real-time dynamic graph of results; max/min interval / accuracy data.
PSI/SI List	Displays PSI/SI info (PAT, PMT, CAT, NIT, SDT, TDT, EIT) in tree view.
Program List (EPG Info)	Transport stream EPG, including program #, service name & ID, carrier frequency, provider info, modulation type & symbol rate.
Reverse Path Sweep	
FSK Tx Frequency	5 ~ 65 MHz
FSK Tx Amplitude	10 ~ 50dBmV
FSK Rx Frequency	42 ~ 210 MHz
FSK Rx Sensitivity	-40dBmV
Pilot Frequency	5 ~ 65 MHz
Pilot Frequency Amplitude	10 ~ 50dBmV
Tx Test Signal Amplitude	0 ~ 60dBmV
Tx Test Signal Frequency	5 ~ 65 MHz
Tx Test Frequency Point	1 ~ 16 frequency points
DS2800 Units Supported (HE)	DS1610 supports up to 4 units
FSK Tx Amplitude	5 ~ 65 MHz
FSK Rx Frequency	10 ~ 50dBmV
WiFi	
Frequency	2.4G, 5G
Supported Standards	802.11 a/b/g/n
Security Mode	WPA / WPA2 / WPA-PSK / WPA2-PSK
Encryption	WEP / AES / TKIP
Test Parameters	SSID, Level, Channel
Miscellaneous	
RF Input	75 Ω F
USB	USB 1.1
Ethernet	RJ45, 10/100T Ethernet
Display	7" TFT LCD, 800x480 pixels
AC/DC Adapter	AC 100 ~ 240V / 50 ~ 60Hz DC 12V / 5A
Battery	Li-ion, 7.4V / 10Ah
Charge Time	~4 hrs.
Working Time	8 hrs.
Dimensions (WxHxL)	245mm x 155mm x 60mm (9.6" x 6.1" x 2.4")
Weight	~2.2kg (4.9 lbs)
Working Temperature	-10 ~ +50 °C
Storage Temperature	-20 ~ +60 °C

Specifications (continued)

Model	Description
DS2800-002	DS2800 Handheld Digital TV Spectrum Analyzer (Option RPS and USG with FEC enabled)
SFL10-KK	TOKO F-F Connector
DS2800-003	CD (Toolbox Software and User Guide)
DS2800-004	Quick Start Guide
FSP060-DBAE1	AC/DC Adapter
DS2800-008	Soft Carrying Case
DS2800-010	Carabiness Red Deviser Logo
DS2800-011	Carabiness Blue Deviser Logo
DS2800-012	Plated Key Ring
DS2800-013	DS2800 Inspection Certificate
DS2800-700	Extended Spectrum (1220 ~ 2150 MHz)
DS2800-702	ATSC (8VSB) Measurement
DS2800-800	DPS (Digital Persistence Spectrum)
DS2800-801	C/N, CSO, CTB, Gated Measurements
DS2800-802	Analog Video Parameters Measurement (DG/DP, CLDI, ICR, DOM)
DS2800-803	EVS (Error Vector Spectrum)
DS2800-804	TS (Transport Stream) Analysis
DS2800-805	Wifi Analysis
DS2800-806	Reverse Path Sweep
DS2800-212	DS2800 FSK Unit
DS2800-807	Upstream Signal Generator with FEC
DS2800-808	SYNCOR Certificate
DS2800-810	SYNCOR Asset Management
CDA-20360	Built-in DOCSIS 3.0 8x4 Cable Modem
DS2800-809	DOCSIS 3.0 8x4 Cable Modem
DS2800-811	Passive Sweep
OPM	Optical Power Meter and VFL Module
DS2800-204	Visual Fault Locator
DS2800-210	OPM (Optical Power Meter)
DI-1000	DI-1000 LighTel Fiber Inspection Scope
DS2800-812	FIP (Fiber Inspection Probe)
DS2800-211	GPS
DS2800-005	DS2800 User Guide hard copy
AE4000-733	2-Prong Power Cord plus Ground (Europe except UK)
AE4000-734	3-Prong Power Cord plus Ground (US)
AE4000-735	3-Prong Power Cord plus Ground (UK)
AE4000-736	3-Prong Power Cord plus Ground (Australia)

©2017 Deviser Instruments Incorporated. 780 Montague Expressway, Suite 701, San Jose, CA 95131. All rights reserved. Specifications subject to change without notice. All product and company names are trademarks of their respective corporations. Deviser Instruments manufacturing facilities are ISO 9001 certified. Do not reproduce, redistribute, or repost without written permission from Deviser Instruments. DS2800 170406