

## Deviser DS2800 Handheld Digital TV Spectrum Analyser



- ✓ Cost-Effective
- ✓ Tough & Durable
- ✓ Easy to Use
- ✓ Long Battery Life

The Deviser DS2800 Series Spectrum Analyser is packed full of new technologies designed to help solve today's DOCSIS network issues

- ✓ Downstream & Upstream Spectrum Analysis over DOCSIS 3.1 Frequency Band
- ✓ Parallel Demodulation of 3 QAM Channels
- ✓ DOCSIS 3.0 cable modem
- ✓ Support ITU T J.83 Annex A/B/C
- ✓ Return Path Sweep
- ✓ Upstream Generator
- ✓ Error Vector Spectrum
- ✓ ETR 101 290 analysis
- ✓ USB storage and upgrade
- ✓ SYNCOR Asset & Test Data management software
- ✓ Large TFT LCD



The Deviser DS2800 Handheld Spectrum Analyser is a cost effective, all-in-one Cable Modem and QAM Analyser that uncovers hidden & transient noise in the return path and detects 4G/LTE signal interference in Cable Networks.

#### DS2800 key benefits include:

- ✓ Fast Spectrum Analysis over either 4~1220MHz or 4~2150MHz
- ✓ Upstream Spectrum Persistence Analysis: 4~210MHz
- ✓ Downstream and Upstream Spectrum Analysis over DOCSIS 3.1 Frequency Band
- ✓ Integrated DOCSIS 3.0 Cable Modem
- ✓ Integrated Upstream Signal Generator (J83A/B FEC)
- ✓ Return Path Sweep
- ✓ TR 101 290 Monitoring
- ✓ Auto Generation of Channel Table by Detection of Channel Parameters
- ✓ Auto Mapping between the Program & Channel numbers
- ✓ Support ITU T J.83 Annex A/B/C
- ✓ Simultaneous Display of Spectrum & QAM Analysis
- ✓ Parallel Demodulation of 3 QAM Channels
- ✓ Error Vector Spectrum for noise under QAM measurements
- ✓ Gated Measurement: C/N, CSO, CTB
- ✓ Predefined tests run with a single button press
- ✓ with Auto Test Feature
- ✓ Asset and Test-data Management Software.

# Key Features

- Fast spectrum analysis with 80 dB dynamic range
- QAM/Digital TV analysis
- Integrated DOCSIS 3.0 cable modem
- Ultra-fast QAM signal lock
- Gated measurements
- Equaliser, frequency response and group delay
- FCC Analogue/Digital Proof-of-Performance automated tests
- Transport stream (TS)/MPEG analysis in PID with TR-101 290 MPEG monitoring
- Persistence testing
- In-Service error vector spectrum (EVS) testing
- Simultaneous display of QAM and spectrum analysis
- Integrated return path sweep
- Upstream signal generator
- WiFi Analysis
- IP Test



## Fast Spectrum Analysis Function

The DS2800 provides a fast spectrum analysis function over a frequency range of 4MHz to 1220MHz, with an option to extend this from 4MHz to 2150MHz. It does this whilst providing a dynamic range of 80dB.

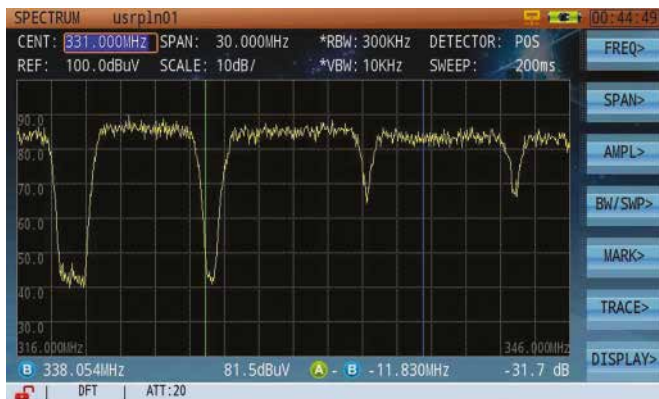


Figure 1: Spectrum Analysis

## Gated Measurement

The Gated measurement can help engineers to perform in-service C/N, CSO, CTB measurements.

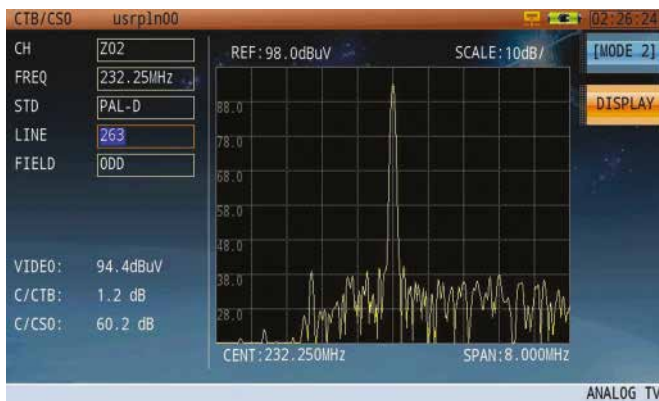


Figure 2: Analogue TV Gated Measurement

## Simultaneous display of Spectrum and QAM Analysis

This unique feature allows the user to display the spectrum and interrogate each QAM carrier to show detailed measurements i.e. MER, pre and post errors. This significantly reduces fault to resolution times.

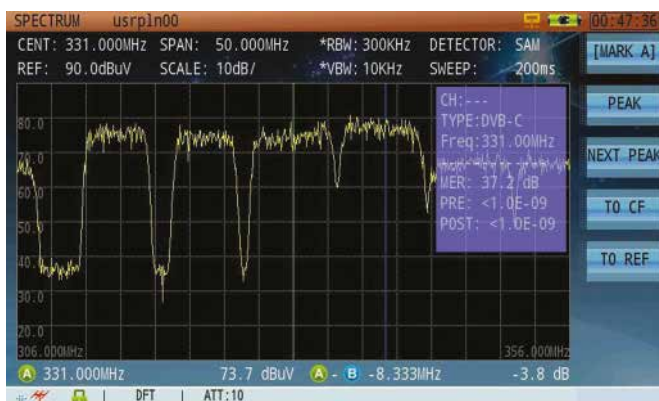


Figure 3: Simultaneous Display of Spectrum and QAM Analysis

## Upstream Spectrum Persistence Technology

Traditionally the upstream troubleshooting method is performed by using a signal free portion of the upstream spectrum to measure noise floor and monitor the interval interference signal. However, as cable operators upgrade their system to DOCSIS 3.0, the upstream spectrum is becoming more and more crowded. This makes the locating of any free upstream spectrum all the more difficult.

Traditional upstream spectrum analysis tools do not have the capability to distinguish a communication signal and interference signal.

The new "Spectrum Persistence Analysis" technology from Deviser resolves this problem. The high speed Spectrum Analysis module acquires the full upstream spectrum. This technology can capture signals hiding beneath other signals, for example CPD (Common Path Distortion) or interval impulse signal.



Figure 4: Spectrum Analysis: Traditional view of the upstream spectrum noise covered by signal.



Figure 5: Persistence Technology Shows Ingress Signal Under DOCSIS Upstream Signal

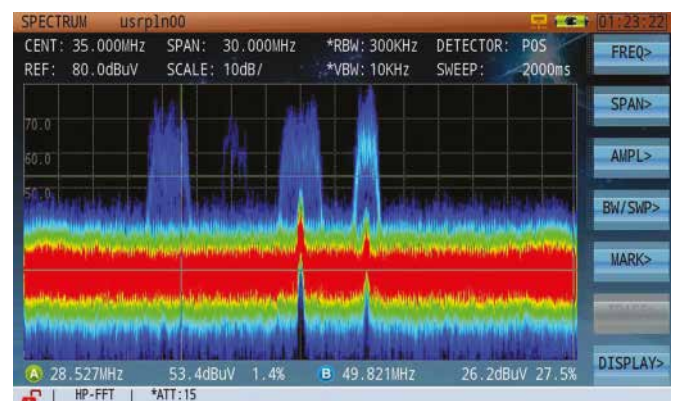


Figure 6: Persistence Technology Shows Ingress Signal Under DOCSIS Upstream Signal

## DVB-C Signal Analysis

The Deviser DS2800 supports ITU-T J.83 Annex A/B/C standard and provides power level, MER, BER, constellation measurements.

Automatic configuration of QAM signal parameters.



Figure 7: DVB-C Measurement



Figure 8: Constellation Display



Figure 9: BER and MER Statistical Analysis

## Equaliser, Frequency Response and Group Delay Analysis

In cable TV networks, the most common signal quality impairment comes from impedance mismatch. Impedence mismatch can lead to serious linear distortions on signals, i.e. micro-reflection. These micro-reflections can cause signal amplitude fluctuations or standing waves which all have a great influence on the signal quality. Linear distortions include impairments such as ripple/tilt, and group delay variation.

The best tools to troubleshoot these liner distortions are Adaptive Equaliser, Frequency Response and Group Delay.



Figure 10: Adaptive Equaliser

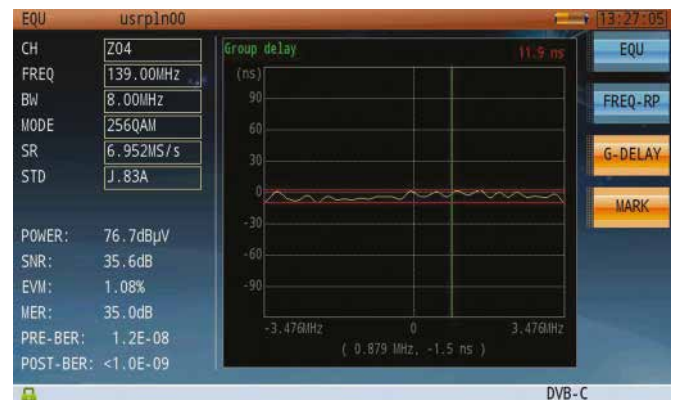


Figure 11: Group Delay

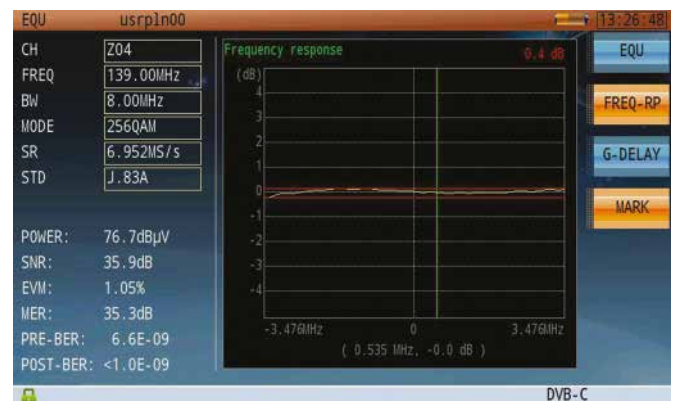


Figure 12: Frequency Response

## Parallel Demodulation of 3 QAM Channels

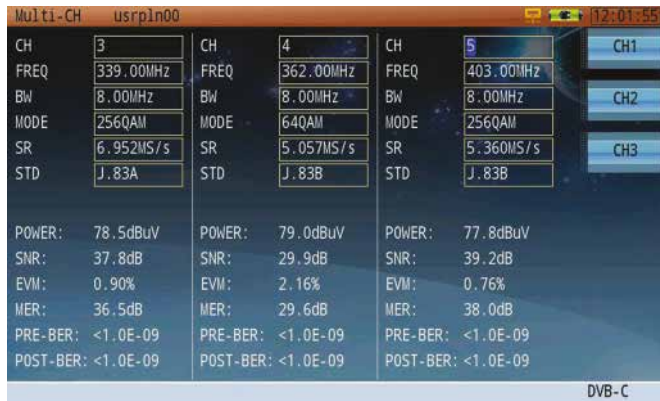


Figure 13: Parallel Demodulation of 3 QAM Channels

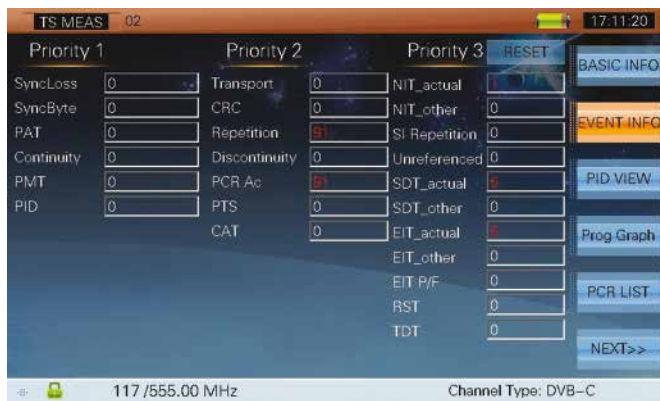


Figure 14: TR 101 290 Monitoring

## Cable Modem Measurement

The Deviser DS2800 includes a DOCSIS 3.0 cable modem as standard. This cable modem is backwards compatible with DOCSIS 1.X and DOCSIS 2.0. The integrated cable modem supports 4 bonded upstream channels and 8 downstream channels.

The user can change the MAC address and choose the DOCSIS mode, downstream channel and UCD. Basic network test tools include: Ping, Trace Route, PPPoE, Throughput and Browser.

The cable modem statistical screen provides:

- ✓ Downstream signal level
- ✓ Modulation type
- ✓ Bandwidth
- ✓ Symbol rate
- ✓ MER and BER
- ✓ Upstream signal level
- ✓ Modulation type
- ✓ Bandwidth
- ✓ Symbol rate
- ✓ UCD (Upstream Channel Descriptor).



Figure 15: DOCSIS 3.0 Statistical Information Display



## Return Path Sweep

The DS2800, together with the DSI610 broadband network monitor unit can perform return path sweeps.

The DS2800 generates a series of upstream RF burst signals with the same amplitude across the upstream spectrum. The DSI610 receives and measures these signals and then sends test results to the DS2800 by communication pilot frequency. The DS2800 can use these test results to draw the frequency response curve as seen by the DSI610.

The DS2800 is also able to connect to the DSI610 unit via Ethernet connection or cable modem connection to check upstream signals received on any of the DSI610 ports.



## Upstream Signal Generator

The upstream signal generator can generate either sine waves or QAM signals. QAM signal generation with FEC coding supports Annex A and B.

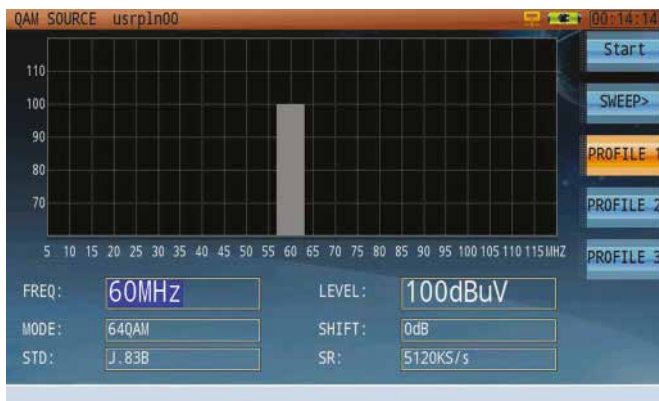


Figure 16: Upstream Signal Generator

## Auto Test

The Deviser 2800 allows users to build automatic test projects, including: Analogue TV, Digital TV and Cable Modem tests which are saved automatically.

The results are marked as pass or fail according to a customisable limit profile.

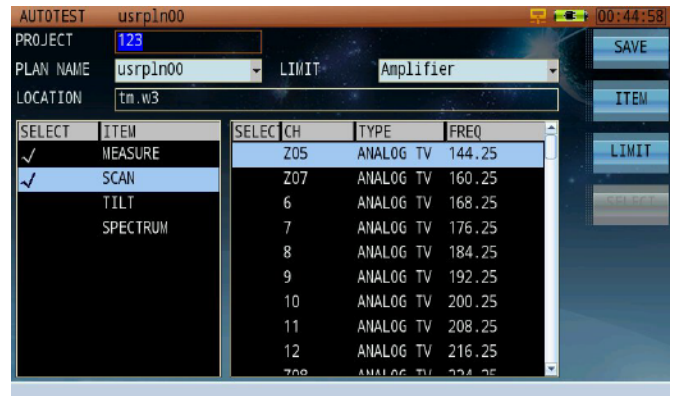


Figure 17: Auto Test Project

## Asset and Test-Data Management Software

The SYNCOR asset and test-data management software can enhance your work efficiency.

Basic functions include:

- Channel plan generation and editing
- Sending work order to instrument
- Management & storage of test results.

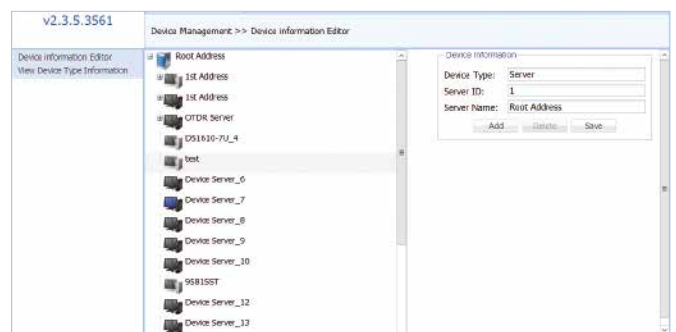


Figure 18: System Management

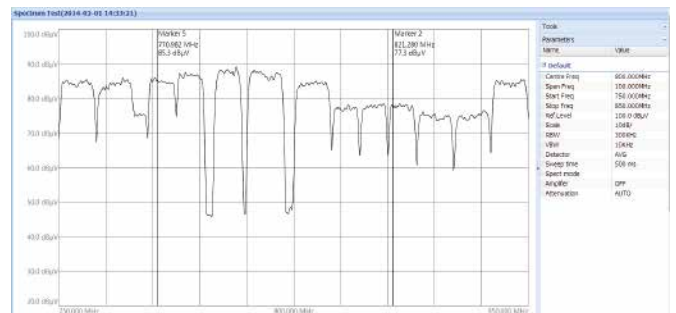


Figure 19: Exported Test Report

## Deviser DS2800 Specifications

Downstream Spectrum Analysis	
Frequency Range	4MHz ~ 1220MHz; option 4MHz ~ 2150MHz
Frequency Stability	$\pm 1 \times 10^{-6}$ (0°C ~50°C )
Frequency Span	0MHz ~ Full span
Frequency Step	1 kHz
Resolution Bandwidth (-3dB)	1kHz, 3kHz, 10kHz, 30kHz, 100kHz, 300kHz, 1MHz, 3MHz
Video Bandwidth	30Hz, 100Hz, 300Hz, 1kHz, 3kHz, 10kHz, 30kHz, 100kHz, 300kHz, 1MHz, 3MHz
Display Scale and Range	1, 2, 5, 10, 20 dB/Div; 8 vertical divisions
Sweep Time	100ms ~ 10s
Input Level Range	-60dBmV ~ +60dBmV
Dynamic Range	80dB (30kHz RBW)
Sensitivity	-60dBmV (300 kHz RBW, Pre-amplifier On)
Attenuation	0~30dB in 1dB steps
Accuracy of Measurements	$< \pm 1.0\text{dB}@+25 \pm 5^\circ\text{C}$ (typical value)
Measurement Detector	Positive Peak, Negative Peak, Sample, Average, RMS
Reference Level	-80dBmV ~ +70dBmV
Markers	2 vertical markers
Upstream Spectrum Analysis	
Frequency Range	4~46MHz (DOCSIS); 4~68MHz (Euro DOCSIS 2.0); 4~88MHz (Euro DOCSIS 3.0); 4~120MHz (DOCSIS 3.1); 4~210MHz (DOCSIS 3.1)
Frequency Span	42/64/84/116/206MHz, zero span
Resolution Bandwidth (-3dB)	100kHz, 300kHz
Video Bandwidth	30Hz, 100Hz, 300Hz, 1kHz, 3kHz, 10kHz, 30kHz, 100kHz, 300kHz, 1MHz, 3MHz
Display Scale and Range	1, 2, 5, 10, 20 dB/Div
Sweep Time	3ms ~ 10s
Input Level Range	-60dBmV ~ +60dBmV
Pre-amplifier	Automatic, 0~50dB
Attenuation	Manual, 18dB Gain
Accuracy of Measurements	$< \pm 1.0\text{dB}@+25 \pm 5^\circ\text{C}$ (typical value)
Measurement Detector	Positive Peak, Negative Peak, Sample, Average
Markers	2 vertical markers
Analogue TV Measurement	
Standards	B/G, I, D/K, L/L', M/N



Colour Standards	NTSC, PAL, SECAM
Frequency Steps	10kHz
Level Measurement Range	-40dBm ~ +60dBmV; Accuracy: $\pm 1.0\text{dB}$ @+25 $\pm 5^\circ\text{C}$ (S/N >30dB)
Level Resolution	0.1dB
Resolution Bandwidth	300 kHz
C/N	>53dB
CTB/CSO	82dB $\mu\text{V}$ ~87dB $\mu\text{V}$ 0dB Attenuation ~ Amplifier Off; 62dB $\mu\text{V}$ ~67dB $\mu\text{V}$ 0dB Attenuation ~ Amplifier Off 63dB with $\pm 1.5\text{dB}$ Accuracy and 78 channels; 70dB with $\pm 4.0\text{dB}$ Accuracy and 78 channels
HUM Measurement	1 ~ 20%; $\pm 0.5\%$ (1~5%); $\pm 1.0\%$ (5~20%)
Depth of Modulation	Range 40 to 95%, $\pm 1.5\%$ (C/N>40dB)
Tilt	Up to 16 channels
Pre-amplifier	Automatic, 18dB Gain
Attenuator	Automatic, 50dB
<b>Digital TV Measurement</b>	
Frequency Range	4 ~ 1220MHz
Power Level Range	-30dBmV ~ +50dBmV; Accuracy: $\pm 1.5\text{dB}$ @+25 $\pm 5^\circ\text{C}$ (C/N>20dB)
Level Resolution	0.1dB
Pre-amplifier	Automatic, 18dB Gain
Attenuator	Automatic, 50dB
Modulation Type	16, 32, 64, 128, 256 QAM (J.83 Annex A and C); 64, 256 QAM (J.83 Annex B)
Interleave Depth	128 $\times$ 1~128 $\times$ 7(J.83 B); 12 $\times$ 17(J.83 A/C)
Symbol Rate	1.0MS/s ~ 7.0MS/s
SNR	>45dB; Accuracy: $\pm 2.0\text{dB}$
MER	>45dB; Accuracy: $\pm 2.0\text{dB}$
EVM	<0.36
BER	1E-3 ~ 1E-9
Constellation	16, 32, 64, 128, 256 QAM
<b>Cable Modem Measurement</b>	
Support Standard	DOCSIS 1.1, 2.0, 3.0; EuroDOCSIS 1.0, 1.1, 2.0, 3.0
Downstream Demodulation	64, 256QAM
Downstream Frequency Range	>91MHz (5~65MHz US); >100MHz (5~85MHz EU)
Downstream Maximum Speed	Up to 304Mbps (6MHz); And 400Mbps (8MHz)
Downstream Channel Bonding	Up to 8 channels
Downstream Bandwidth	6MHz / 8MHz
Downstream Input Signal Level	-15dBmV ~ +15dBmV
Upstream Frequency Range	5 ~ 42MHz; 5 ~ 65MHz; 5 ~ 85MHz
Upstream Signal Bandwidth	TDMA: 200/400/800/1600/3200/6400kHz; S-CDMA: 1600/3200/6400kHz
Upstream Output Signal Level	QAM level range: +17 to +58dBmV; QPSK level range: +17 to +61dBmV
Upstream Channel Bonding	Up to 4 channels
Upstream Maximum Speed	120Mbps (4 channels bonding)
<b>Upstream Signal Generator</b>	
Signal Modulations	CW, QPSK, QAM16, 64, 256, Annex A/B
FEC	RS (204, 188) J.83 A; RS (128, 122) J83B
Signal Modulations	X1~7 MS/s
MER	>40dB; Accuracy $\pm 2.0\text{dB}$
BER	<1E-9
Frequency Range	5~120MHz
Frequency Adjustable Steps	10kHz
Phase Noise	85dBc@10kHz; 105dBc@100kHz (CW@50MHz)
Frequency Accuracy	2ppm

Settling Time	2ms
Supported Level	0~60dBmV
Level Accuracy	±1.5dB(CW); ±2.0dB(QAM)
Level Adjustable Step	0.1dB
<b>WiFi</b>	
Frequency	2.4G, 5G
Support Standard	802.11 a/b/g/n
Security Mode	WPA/WPA2/WPA-PSK/WPA2-PSK
Encryption	WEP/AES/TKIP
Test Parameters	SSID, Level, Channel
<b>Others</b>	
RF Input	75Ω F
USB	USB 1.1
Ethernet	RJ45, 10/100T Ethernet
Display	7 inches TFT LCD 800×480 pixels
AC/DC Adapter	AC 100 ~ 240V/50 ~ 60Hz DC 12V / 5A
Battery	Li-ion, 7.4V/10Ah
Charge Time	Around 4 hours
Working Time	8Hours
Dimension (W×H×L)	245mm×155mm×60mm
Weight	Around 2.2kg
Work Temperature	-10°C ~ +50°C
Storage Temperature	-20°C ~ +70°C

## Ordering Information

Items/Description	Model	Order number
Standard shipped items		
DS2800	DS2800	0110.2800.00
CD (Toolbox Software and Operation Manual)	DS2800-003	6190.0600.70
Quick Start Guide	DS2800-004	6190.0600.71
AC/DC Adapter	FSP060-DBAEI	6290.0700.01
Power Cord	SA8300-700	6190.0500.40
Soft Carrying Case		
Two F-F Connectors	SFL10-KK	6190.0500.01
<b>Option</b>		
Frequency Range Extend to 2150MHz	DS2800-700	2110.2800.27
Digital Persistence Technology (4~210MHz)	DS2800-800	2110.2800.28
C/N, CSO, CTB Gated Measurement	DS2800-801	2110.2800.29
Video Parameters I. Gated Measurement	DS2800-802	2110.2800.30
EVS (Error Vector Spectrum)	DS2800-803	2110.2800.31
MPEG-2 Transport Stream Analysis	DS2800-804	2110.2800.32
WiFi Measurement	DS2800-805	2110.2800.33
Return Path Sweep	DS2800-806	2110.2800.34
Upstream Signal Generator (QAM Modulation)	DS2800-807	2110.2800.35
DOCSIS 3.0 Cable Modem	DS2800-701	2110.2800.36
Work Order Management System	DS2800-808	2110.2800.36

Note: I Video Parameter Include: Differential Gain, Differential Phase, Chrominance to Luminance Delay, In-channel Frequency Response, Depth of Modulation.