The DS2800 is truly an “all-in-one” tool for performing installation, verification and maintenance of the cable network. Its unique features, such as persistence testing and EVS analysis, enable technicians to quickly detect and isolate impairments that were not visible in the past. The analyzer reduces operational expenses by ensuring a proper installation on the first visit and by shortening the time during service calls.
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
- Equalizer, frequency response and group delay
- FCC Analog/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
Error Vector Spectrum (EVS) Analysis
The error vector spectrum analysis is new to handheld instruments. With EVS, the user can quickly detect and identify interference from the fast growing LTE network. This type of interference typically cannot be seen with frequency domain measurements as the interference signal is too weak.

Figure 1: EVS with interference

Figure 2: EVS without interference

Fast Spectrum Analysis Function
The spectrum analyzer on the DS2800 has a frequency range of up to 2150 MHz, with a dynamic range of 80 dB.

Figure 3: Spectrum Analysis

Gated Measurement
The Gated measurement enables the engineer run in-service C/N, CSO, CTB measurements.

Figure 4: Analog TV Gated Measurement

Simultaneous display of Spectrum and QAM Analysis
The DS2800 displays QAM signal spectrum analysis and QAM measurement results on one screen. This new feature empowers the user to check the signal’s different characters at the same time, and easily find the fault.

Figure 5: Simultaneous Display of Spectrum and QAM Analysis
Upstream Spectrum Persistence Technology

The new spectrum persistence analysis enables in-service detection of transient noise and impairments hiding beneath the upstream signal. Traditionally, troubleshooting the upstream channels is done by finding a free upstream spectrum. However, with the introduction of DOCSIS 3.0, the upstream channel is now extremely crowded, making it difficult to distinguish the upstream signal from the interference signal. The new persistence analysis facilitates finding impairments such as CPD and impulse noise with a color coded spectrum display.

DVB-C Signal Analysis

DS2800 supports ITU-T J.83 Annex A/B/C standards. The test automatically provides power level, MER, BER, constellation measurements.

Figure 9: DVB-C Measurement

Figure 10: Constellation Display

Figure 11: BER and MER Statistical Analysis
Equalizer, Frequency Response and Group Delay Analysis

In a cable TV network, the most common signal impairments come from impedance mismatch and filters. Impedance mismatch can cause serious micro-reflection, which can overlay the transmission signal. This results in amplitude fluctuations or standing waves, which can affect signal quality. The equalizer, frequency response and group delay analysis are the best tools to troubleshoot these linear distortions.

Cable Modem Measurement

The DS2800 includes a DOCSIS 3.0 cable modem which supports 4 bonded upstream channels and 8 downstream channels. It is also compatible with DOCSIS 1.x and 2.0. The measurement displays statistics such as downstream signal level, modulation type, bandwidth, symbol rate, MER, BER and upstream signal level, modulation type, bandwidth, symbol rate, UCD (Upstream Channel Descriptor), standard. User can change MAC address, choose DOCSIS mode, downstream channel and UCD. Basic network test tools include: Ping, Traceroute, PPPoE, FTP and Browser.
Reverse Path Sweep and Upstream Spectrum Verification

With DS1610 broadband network monitor system DS2800 can run reverse path sweep. DS2800 can use these test results to draw the frequency response curve. This curve describes from DS2800 position (Field) to DS1610 position (Headend) return path frequency response. DS2800 use FSK function connection to DS1610 can look at you test port upstream spectrum.

![Figure 17: Return Path Sweep](image)

Upstream Signal Generator

Upstream signal generator can generate both sine wave and QAM signals. The QAM signal has FEC coding, which supports both Annex A and B. The USG is useful for pre-qualifying new installations and new frequencies with an actual signal.

![Figure 18: Upstream Signal Generator](image)

Auto Test

The auto test on the DS2800 runs through a pre-configured test with the push of one button. The user can create test profiles that define a test procedure with pass/fail limits. This simplifies test result interpretation and ensures consistent testing. Even an inexperienced user can run the test and verify that the installation is up to the same specification as others. The results are then saved automatically.

![Figure 19: Auto Test Project](image)

Asset and Test-Data Management Software

Deviser’s newly launched asset and data management system, SYNCOR enhances work efficiency by allowing the user to manage test profiles, sending work orders to the instrument and managing test results and reports.

![Figure 18: System Management](image)

![Figure 19: Exported Test Report](image)
## Specifications

### Forward Spectrum Analysis
- **Frequency Range**: 4MHz ~ 1220MHz; option 4MHz ~ 2150MHz
- **Frequency Stability**: ±1x10⁻¹⁰ (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**: 20ms ~ 25s
- **Input Level Range**: -60dBmV ~ +60dBmV
- **Dynamic Range**: 80dB (30kHz RBW)
- **Attenuation**: 0~30dB in 1dB Steps
- **Accuracy of Measurements**: <±1.0dB@+25±5ºC (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)
- **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**: 20ms ~ 25s
- **Input Level Range**: -60dBmV ~ +60dBmV
- **Attenuation**: Automatic, 0~30dB
- **Pre-amplifier**: Manual, 18dB Gain
- **Accuracy of Measurements**: <±1.0dB@+25±5ºC (typical value)
- **Measurement Detector**: Positive Peak, Negative Peak, Sample, Average
- **Markers**: 2 vertical markers

### Persistence
- **0-7MHz**: 100%POI minimum signal duration 2.5ms
- **4-46MHz**: 100%POI minimum signal duration 3ms
- **4-68MHz**: 100%POI minimum signal duration 4ms
- **4-88MHz**: 100%POI minimum signal duration 5ms
- **4-120MHz**: 100%POI minimum signal duration 6ms
- **4-210MHz**: 100%POI minimum signal duration 10ms

### Analog 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 of Measurement**: <±1.0dB @ +25±5ºC (S/N>30dB)
- **Level Resolution**: 0.1dB
- **Resolution Bandwidth**: 300 kHz
- **C/N**: >53dB
- **CTB/CSO**: Optimum Input Range 82dBµV~87dBµV - Amplifier Off
  - Maximum 63dB with ±1.5dB Accuracy and 78 Channels
- **HUM Measurement**: 1% ~ 20%; ±0.5% (1~5%); ±1.0% (5%~20%)
- **Depth of Modulation**: Range 40 to 95%, ±1.5%(C/N>40dB)
- **Tilt**: Up to 16 channels
- **Pre-amplifier**: Automatic, 18dB Gain
- **Attenuator**: Automatic, 30dB
### WiFi
- **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

### Digital TV Measurement
- **Frequency Range**: 4 ~ 1220MHz
- **Power Level Range**: -30dBmV ~ +50dBmV
- **Level Resolution**: 0.1dB
- **Power Level Accuracy**: <±1.5dB (CN>20dB) @ +25±5°C
- **Pre-amplifier**: Automatic, 18dB Gain
- **Attenuator**: Automatic, 30dB
- **Modulation Type**: 16, 32, 64, 128, 256 QAM (J.83 Annex A and C); 64, 256 QAM (J.83 Annex B)
- **Interleave Depth**: 128×1 ~ 128×7 (J.83 B); 12×17 (J.83 A/C)
- **Symbol Rate**: 1.0MS/s ~ 7.0MS/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

### Cable Modem Measurement
- **Support Standard**: DOCSIS 1.1, 2.0, 3.0; EuroDOCSIS 1.0, 1.1, 2.0, 3.0
- **DS Demodulation**: 64, 256QAM
- **DS Frequency Range**: >91MHz (5~65MHz US); >100MHz (5~85MHz EU)
- **DS Maximum Speed**: Up to 304Mbps (6MHz); And 400Mbps (8MHz)
- **DS Channel Bonding**: Up to 8 channels
- **DS Bandwidth**: 6MHz / 8MHz
- **DS Input Signal Level**: -15dBmV to +15dBmV
- **US Frequency Range**: 5 ~ 42MHz; 5 ~ 65MHz; 5 ~ 85MHz
- **US Signal Bandwidth**: TDMA: 200/400/800/1600/3200/6400kHz; S-CDMA: 1600/3200/6400kHz
- **US Output Signal Level**: QAM level range: +17 to +58dBmV; QPSK level range: +17 to +61dBmV
- **US Channel Bonding**: Up to 4 channels
- **US Maximum Speed**: 120Mbps (4 channels bonding)

### Upstream Signal Generator
- **Signal Modulations**: CW, QPSK, QAM16, 64, 256, Annex A/B
- **FEC**: RS (204,188) J.83 A; RS (128,122) J83B
- **Symbol Rates**: 1~7 MS/s
- **MER**: >40dB; Accuracy: ±2.0dB
- **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
## Reverse Path Sweep

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<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>FSK Tx Frequency</td>
<td>5~65MHz</td>
</tr>
<tr>
<td>FSK Tx Amplitude</td>
<td>70 dBμV ~ 110 dBμV</td>
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<tr>
<td>FSK Rx Frequency</td>
<td>42~120MHz</td>
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<tr>
<td>FSK Rx Sensitivity</td>
<td>20dBμV</td>
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<tr>
<td>Pilot Frequency</td>
<td>5~65MHz</td>
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<tr>
<td>Pilot Frequency Amplitude</td>
<td>70 dBμV ~ 110 dBμV</td>
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<tr>
<td>Tx Test Signal Amplitude</td>
<td>60dBμV ~ 120dBμV</td>
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<tr>
<td>Tx Test Signal Frequency</td>
<td>5~65MHz</td>
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<tr>
<td>Tx Test Frequency Point</td>
<td>1~16 Frequency Points</td>
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<tr>
<td>Headend Support DS2800 Number</td>
<td>DS1610 Max Support 4 DS2800 Units</td>
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### Other

<table>
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<th>Details</th>
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<tr>
<td>FSK Tx Frequency</td>
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<tr>
<td>FSK Tx Level</td>
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<td>Display</td>
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<td>Storage Temperature</td>
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