

S5800EA (9kHz to 4.0GHz) S5800EB (9kHz to 6.0GHz) Field Comm Analyzer

- Spectrum Analysis
- Base Station Analysis
- Interference Analysis



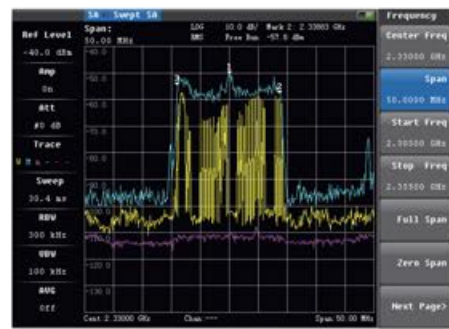
At present, the wireless communication of the world into the area of high speed, each country's FDD/TDD-LTE entered the commercial stage, but there is more to the radio spectrum environment complex, interference between different degree will use each fields that frequency band (e.g. "WLAN, mobile communications, radio and television, aerospace and military communication).

Due to the maintenance difficulty rising and increased the cost of maintenance, S5800E series field comm analyzer integrated test instrument can help engineers quickly checking interference source, but also on the 2G, 3G, 4G (LTE) to analyze a variety of mobile communication standards. Reduce the communication engineering maintenance difficulty, reduce maintenance cost.

Key Benefits

- 9kHz - 4.0/6.0GHz spectrum analyzer
- One-button measurements: Channel Power, ACPR, Field Strength, OBW
- Interference Analyzer: Spectrogram, Signal Strength, RSSI, Interference Location, XID, DPS, Delta Spectrum
- Signal Analyzer: LTE, TD-LTE, WCDMA/HSDPA+, TD-SCDMA/HSDPA+, CDMA/EVDO, GSM/EDGE
- Indoor and outdoor coverage mapping
- Analysis of bandwidth with 20MHz
- Gate sweep for TD signal analysis
- DPS spectrum display of 250 μ s minimum signal duration for 100% Probability of Intercept (POI)
- DANL < -162dBm/Hz
- Remote control via Ethernet and USB data transfer
- The GPS rapid positioning interference location
- The weight <2.5kg , working time >3.5 hours

Main Features



S5800E series field comm analyzer offers 9kHz - 4.0/6.0GHz frequency options. With built-in FFT fast scanning function, it is helpful to capture the burst signal.

1. One-button measurements

Channel Power, ACPR, Field Strength, OBW. With gate option, S5800E series provide TDD signal channel analysis

2. Interference Analysis

Due to extension of Mobile communication and applications of various radio frequency range, interference between different bands is introduced in Broadcast TV, 2G/3G/4G Wireless, Wi-Fi Wireless LAN, trunking communication, Military communication and other wireless and wire line areas. Signals interference can cause lower C/N ratio and result network performance and service quality degradation.

S5800 series handheld spectrum analyzer supports Spectrogram, Signal Strength, RSSI, XID, and Interference Locating with mapping tool, DPS and Delta Spectrum. With all measurement capabilities of the unit, users can easily pin-point the interference problem under different testing environment.

1. Spectrogram Measurement

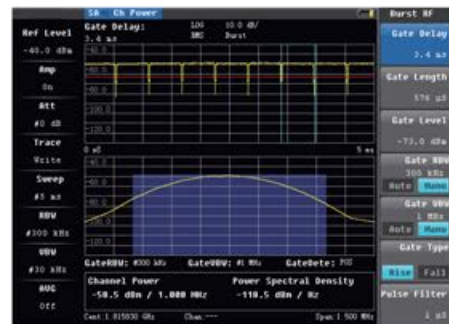
Spectrogram is used for long-term monitoring of signal spectrum, identifying continuous, intermittent or frequency hopping signal, and record the time of instance. Recorded data can also be played back during the monitoring cycle

- Maximum 72 hours of data recording; number of recorded files is dependent on hard disk capacity.
- Live play back and identify specific time when interference happened.
- Data can be recorded in accordance with limit line.

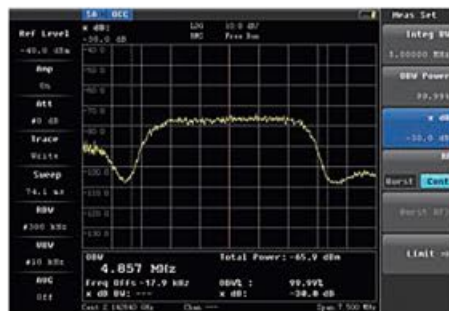
2. Signal Strength

Using with antenna, single point frequency amplitude can be measured to search interference source or signal coverage.

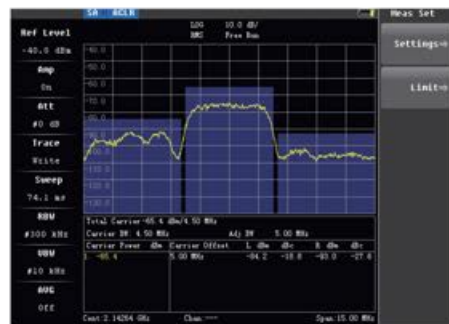
- Working with directional antenna to monitor interference signal strength and capture the interference source or the signal strength of standard carrier.
- Showing signal strength by measurement data (in dBm or W) and the dial meter with minimum and maximum records.
- Measurement data can be recorded with longitude and latitude information retrieved from GPS for ride-out drive tool and signal coverage software.
- Audio tones/speaker notification for signal strength measured.



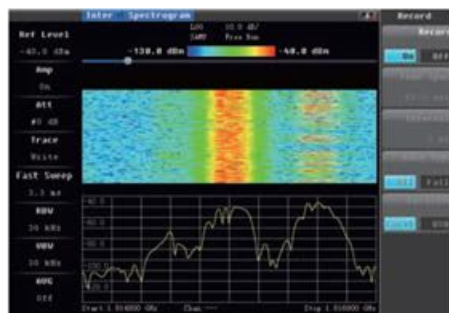
Channel power



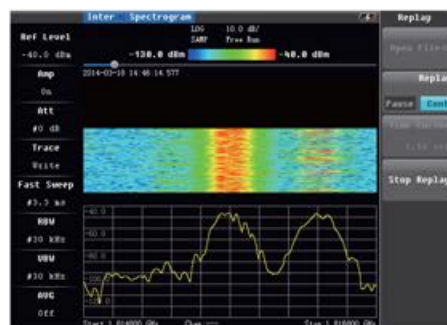
OBW



ACPR



Spectrogram Measurement, Recording Spectrogram Playback and interference source characteristics



Signal Strength



RSSI



Directional Antenna with GPS and Compass



Yagi Antenna



Mapping tool



Delta Spectrum



XID

3. Receive-Signal-Strength-Indication (RSSI)

RSSI is a measurement of the power presented in the received signal during certain period of time.

- Measurement time can be set to maximum 10 days.
- Measurement data can be recorded and played back.

4. Interference Location with Mapping Tool

Interference source can be positioned by using directional antenna, GPS, electronic compass and geographical map through 3-point localization method. Directional antenna can detect the direction of maximum signal while the electronic compass can record the direction of measured signal while GPS can record the longitude and latitude of the current position of measurement point.

Directional antenna has built-in compass and GPS. It's connected to S5800E through the USB interface. The antenna provides the measurement data of signal strength with information of direction. As shown in the diagram below, S5800E has built-in electronic map to reflect the position and the direction of maximum signal strength. User can measure the interference signal from three different locations to exactly identify the source of interference.

The mapping tool supports various mapping system including the Google Map. The electronic map can be imported through USB flash drive. S5800E can also work indoor by loading indoor floor plan for manual position function.

5. Delta Spectrum

Delta Spectrum shows the delta spectrum wave relative to the reference spectrum. The reference spectrum could be the stable background spectrum. So any new or intermittent signal will be recognized at once with the tool.

6. XID

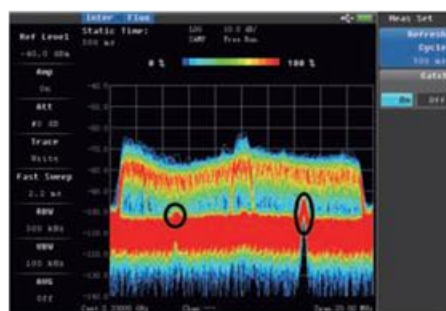
XID helps user identify the type of signal quickly. User can configure this measurement to identify all signals in the selected band or to simply monitor one single interfering frequency. The Spectrum Master then displays results that include center frequency, signal bandwidth, and signal type (FM, GSM/EDGE, W-CDMA/HSPA+, CDMA/EV-DO, Wi-Fi).

7. AM/FM Demodulation and Voice Monitoring

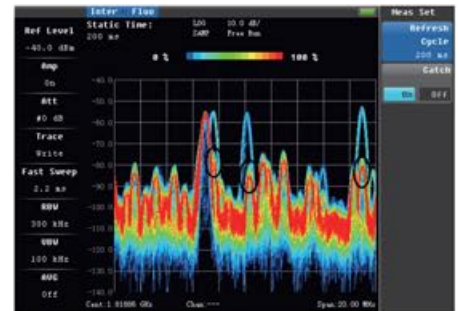
S5800 series supports AM/SSB/FM demodulation and voice monitoring to help users to identify the source of interference easier and faster.

8. DPS (Digital Persistence spectrum)

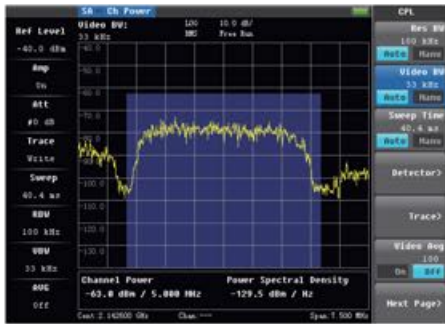
It is difficult to find interference covered by transmit signal. So it is a challenge for our traditional measurement and troubleshooting method of spectrum analyzer. S5800E series provide DPS tools to find these types of interference signals. DPS acquires several thousands of spectrum data per second and show the spectrum density over time. The colors represent the spectrum density over time.



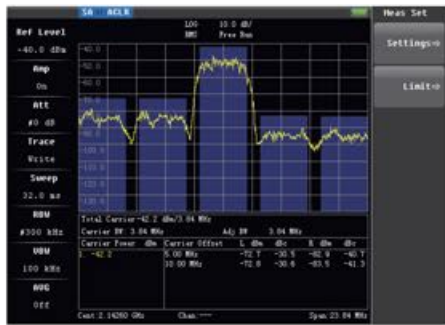
LTE Interference-DPS



GSM Interference-DPS



Channel Power and OBW



ACLR



SEM



PVT



RS/SS/PBCH/PCFICH/PHICH/PDCCH Power Measurement

3. LTE- FDD/TDD Analysis

1. LTE- FDD/TDD Analysis

S5800E series include LTE-TDD/FDD signal analysis option for downlink signal quality measurement to ensure the quality of signal coverage of base station and identify the possible interference. There are three portions of test:

- RF Testing
- Signal Modulation Quality Testing
- OTA (Over-the-air) Testing.

2. RF Testing

RF testing includes Channel Power, Occupied Bandwidth (OBW), Adjacent Channel Leakage Ratio (ACLR), Spectrum Emission Mask (SEM) and Power vs Time (PVT) measurement. All test results can be exported and printed. PVT measurement applies to LTE-TDD specifically.

3. Signal Modulation Quality Testing

Signal modulation quality testing is used to measure Error Vector Magnitude (EVM), Power and Resource Block (RB) power of control channels, EVM analysis on sub-carrier, co-channel interference (CCI) ...etc. All measurement results can be formatted in a report to export.

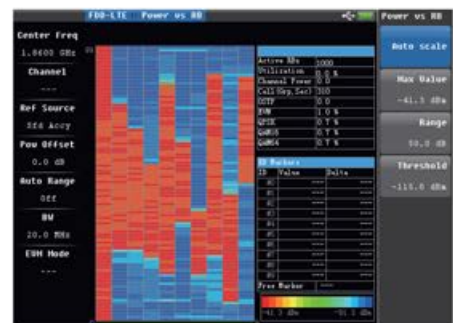
4. RB power measurement provides RB quantity, channel power, Cell ID ... etc. metrics.

5. Table of Control Channel Power

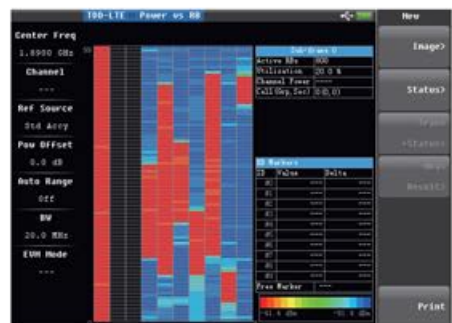
Control channel power of Reference Signal (RS), Synchronization Signals (PSS and SSS), Physical Broadcast Channel (PBCH), Physical Control Format Indicator Channel (PCFICH), Physical Hybrid ARQ Indicator Channel (PHICH) and Physical Control Channel (PDCCH) are displayed in table and bar graph formats.

6. Constellation analysis is used to test LTE-TDD/FDD signal quality to ensure the signal coverage can be received by network terminals and any potential problems. Test measurement metrics are:

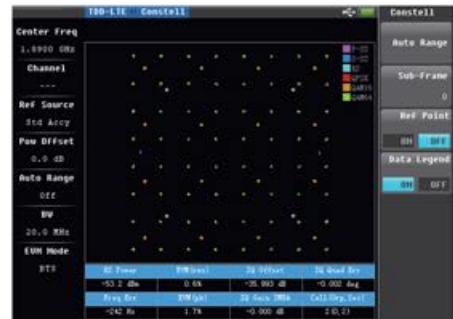
- Reference Signal Channel Power / Synchronization Signal Channel Power



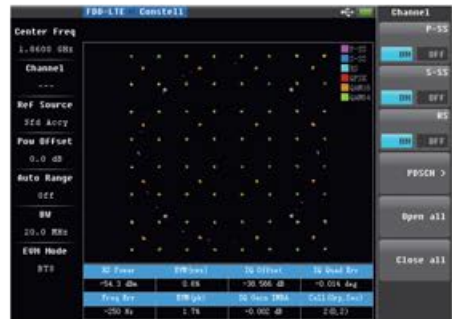
LTE-FDD RB Power Measurement



LTE-TDD RB Power Measurement



LTE-TDD Constellation Analysis

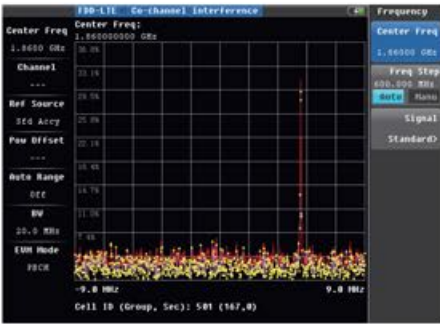


LTE-FDD Constellation Analysis

- EVM – Peak & Root Mean Square (RMS)
- Sub-Carrier EVM for in-band interference
- Frequency Deviation / Cell ID
- Constellation of BTS mode and OTA mode(SISO/MIMO2x2/MIMO4x4)

7. Co-Channel Interference (CCI) testing for LTE-FDD

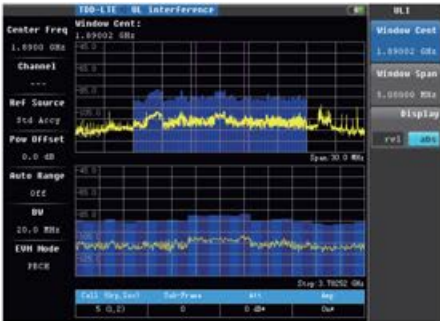
EVS tools measure EVM of reference signals and show the EVM wave vs. frequency of reference signal. If there is interference signal under the LTE carriers, the EVM of the interfered reference signal will be degraded. The degraded EVM wave will reveal the frequency of the interference signal.



CCI testing for LTE-FDD

8. Co-Channel Interference (CCI) Testing for LTE-TDD

S5800E is capable to lock the sub-frame time of LTE-TDD/FDD and shows the spectrum of any sub-frame. If user select the uplink sub-frame and the sub-frame is idle, the sub-frame spectrum will show the noise floor of the LTE channel. Any interference signal will be found with the Uplink Spectrum Analysis.



CCI Testing for LTE-TDD

9. OTA (Over-the-air) Testing.

OTA (Over-the-Air) testing measures the quality of covered signal with Scanner , Antenna Alignment, Signal Coverage Mapping

10. Signal scanner provides fast measurement of SS power, Reference Signal Receive Power (RSRP), Reference Signal Receive Quality (RSRQ), Signal to Interference plus Noise Ratio (SINR) and Cell ID(PCI). If it exists PCI mod 3 interference, PCI number will be red color words. GPS information can be recorded and exported to the geographical mapping tool.

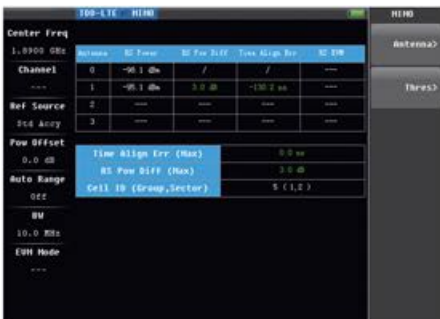


Scanner

11. Antenna Alignment Testing

Antenna Alignment is used to test the balance of MIMO antenna. It shows the RS output level and time different from the antenna 0. It supports 2 and 4 antennas.

12. Signal Coverage Mapping reflects the signal coverage of the area. Coverage measurement indicators can be CW signal strength or LTE mobile signal quality (synchronization channel power, reference signal power, Cell ID) etc.



Antenna Alignment Testing



Outdoor Signal Coverage



Indoor Signal Coverage

Specifications

Spectrum Analysis

| Model | S5800EA | S5800EB |
|---|--|---|
| Frequency | | |
| Frequency range | 9kHz - 4GHz | 9kHz - 6GHz |
| Resolution | 1Hz | |
| Frequency Counting Accuracy | (signal to noise ratio is 25 dB, the resolution bandwidth (RBW) / sweep width = 0.01) | |
| Counting Accuracy | $\pm 1 \times 10^{-6} \pm 1$ | |
| Aging Speed | $< \pm 1 \times 10^{-6}$ /year | |
| Temperature Stability | $< \pm 0.5 \times 10^{-6}$ (0 - 50°C) | |
| Frequency Span | 1kHz to 4.4GHz in 1-2-5 sequence (automode), and 0Hz (zero span) | 1kHz to 6GHz in 1-2-5 sequence (automode), and 0Hz (zero span) |
| Bandwidth | | |
| Resolution Bandwidth (RBW) | 1Hz to 3MHz in 1-3 sequence (auto or manually selectable) | |
| Video Bandwidth (VBW) | 1Hz to 3MHz in 1-3 sequence (auto or manually selectable) | |
| Bandwidth Accuracy | $< \pm 10\%$ | |
| Sensitivity | (60dB/3dB band width) $< 5:1$ | |
| Spectral Purity (Phase Noise) | | |
| @1 kHz Offset from carrier | -90 dBc/Hz (typ.) | |
| @10 kHz Offset from carrier | -100 dBc/Hz (typ.) | |
| @100 kHz Offset from carrier | -110 dBc/Hz (typ.) | |
| Amplitude | | |
| Dynamic Range | > 100 dB | |
| Measurement Range | DANL to max. safe input level | |
| Max. Safe Input Level | +30dBm (peak power, input attenuation > 15 dB), 50VDC | |
| Amplitude Accuracy | ± 1.0 dB | |
| Attenuator Range | 0dB to 55dB in 1dB steps | |
| TOI | $> +15$ dBm (typ.) | |
| DANL (typ.) | | |
| (Input terminated, RBW = 1 Hz, Attn = 0 dBm, Sample Detector) | | |
| Preamp Off | ≤ -150 dBm (2MHz-1GHz) ≤ -142 dBm (1GHz-3GHz) ≤ -142 dBm (3GHz-4GHz) | ≤ -150 dBm (1MHz-1GHz) ≤ -140 dBm (1GHz-3GHz) ≤ -140 dBm (3GHz-6GHz) |
| Preamp On | ≤ -165 dBm (10MHz-1GHz) ≤ -160 dBm (1GHz-3GHz) ≤ -158 dBm (3GHz-4GHz) | ≤ -162 dBm (1MHz-1GHz) ≤ -158 dBm (1GHz-3GHz) ≤ -152 dBm (3GHz-6GHz) |
| Spurious Response | | |
| Residual Response | 1MHz - 6GHz: ≤ -85 dBm (no signal input attenuation, 0dB) | |
| Second Harmonic Distortion | < -70 dBc (input level -20dBm, mixer input, preamp off) | |
| Reference Level (20°C - 30°C) | | |
| Range | -167dBm to +35dBm | |
| Accuracy | ± 0.5 dB | |
| Sweep & Trigger Mode | | |
| Sweep Time | 20ms - 250s (≥ 200 Hz) 10 μ s - 1000s ($= 0$ Hz) 1ms - 250s (Fast scan) | |
| Accuracy | $< \pm 0.2\%$ | |
| Trigger Mode | Free trigger, Single trigger, Video trigger, Trigger | |
| Display | | |
| Logarithmic Scale | 0.1 - 0.9 dB/ lattice, 0.1dB step; 1 - 40dB/ lattice, 1dB step | |
| Linear Scale | 10 scale | |
| Scale Unit | dBm, dBmV, dB μ V, mV | |
| Marker Readout Resolution | 0.03dB 0.03% linear reference level | |
| Trace | 6 | |
| Detector | Sample/ peak/ negative/ normal/ quasi peak/ RMS/ avg | |
| Frequency Standard Function | A peak, peak, frequency standard to the center, the reference frequency standard | |
| Marker Mode | Normal, delta, fixed, frequency counter | |
| Reference Level | -167dBm to +30dBm | |
| Level Accuracy | ± 0.5 dB (typ., 25 ± 5 °C) | |
| RBW Switching Accuracy | < 0.1 dB (typ.) | |
| Attenuator Switching Accuracy | < 0.3 dB (typ.) | |

| RF Input | |
|-------------------------------|--|
| Input Connector | N type |
| Input Impedance | 50Ω |
| VSWR (typ.) | <1.8 (10MHz-4.0GHz, attenuator ≥10dB) < 1.8 (10MHz-6GHz, attenuator ≥10dB) |
| USB Output | 1 USB2.0, 1 miniUSB |
| LAN | Adaptive 10M/100M |
| Tracking Generator (Optional) | |
| Output Connector | N type |
| Output Impedance | 50Ω |
| VSWR | < 2.0 |
| Frequency Range | 25MHz - 4.4GHz 25MHz - 6GHz |
| Frequency Stability | ±2ppm |
| Level Range | -30dBm to 0dBm |
| Level Resolution | 1dB |
| Level Accuracy | ± 2dB |
| Harmonic Distortion | -20dBc |
| Spurious | -30dBc |

LTE Measurement

| Model | S5800EA | S5800EB |
|--------------------------|---|--------------|
| Frequency range | 10MHz - 4GHz | 10MHz - 6GHz |
| Bandwidth | 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz | |
| EVM Mode | BTS mode (RS/P-SS/S-SS/PDSCH), OTA mode (RS) | |
| Measurement Report | All Measurement Results, RF Measurement Results, Signal Modulation Quality Results | |
| RF Measurement | | |
| Accuracy (typ.) | ±1.0dB (input range -50dBm to +10dBm) LTE-FDD ±1.0dB (input range -30dBm to +10dBm) LTE-TDD | |
| Modulation Measurement | | |
| Frequency Deviation | ±10Hz + Reference clock deviation | |
| EVM Accuracy (FDD-LTE) | 2% (typ., E-UTRA Test Model 3.1, -50dBm to -10dBm) | |
| EVM Accuracy (TDD-LTE) | 2% (typ., E-UTRA Test Model 3.1, -50dBm to -10dBm) | |
| Over-the-air Measurement | | |
| Scanner | Capture up to 6 signals SS-POWER, RSRP, RSRQ, SINR Automatically save with GPS information, SS power and modulation measurement results | |
| Antenna Alignment | Support MIMO 2X2, 4X4 Display RS power and multiple antenna delay | |
| Coverage Map Measurement | Sweep - S-SS power, RSRP, RSRQ/SINR, Cell ID of the strongest signal Output format: .kml, .csv | |

WCDMA Measurement

| Model | S5800EA | S5800EB |
|--------------------------|---|--------------|
| Frequency range | 10MHz - 4GHz | 10MHz - 6GHz |
| Bandwidth | 3.84MHz | |
| Maximum Spreading Factor | 256 / 512 | |
| RF Measurement | | |
| Accuracy (typ.) | ±1.0dB (input range -50dBm to +10dBm) | |
| Demodulation Measurement | | |
| Frequency Offset | ±10Hz + Reference clock deviation | |
| Modulation Type | WCDMA QPSK HSPA+ QPSK, 16QAM, 64QAM | |
| EVM (RMS) | 2% (EVM<25%) | |
| CDP | ± 1.0dB (CDP > -25dB) | |
| CPICH | ± 1.0dB | |
| Over-the-air Measurement | | |
| Scrambling Code Scanner | Up to 6 Scrambling Codes CPICH, Ec/Io, Ec, Channel Power | |
| Multipath Scanner | Up to 6 multipath Tau, RSCP, Channel Power | |

GSM/EDGE Measurement

| Model | S5800EA | S5800EB |
|---------------------------------|---------------------------------------|--------------|
| Frequency range | 10MHz - 4GHz | 10MHz - 6GHz |
| RF Measurement | | |
| Accuracy (typ.) | ±1.0dB (input range -50dBm to +10dBm) | |
| Demodulation Measurement | | |
| Frequency Offset | ±10Hz + Reference clock deviation | |
| Modulation Type | GSM GMSK | |
| | EDGE 8PSK | |
| Phase Error (GMSK) | ± 1.0deg | |
| EVM(8PSK) | ± 1.5% | |

TD-SCDMA Measurement

| Model | S5800EA | S5800EB |
|---------------------------------|---------------------------------------|--------------|
| Frequency range | 10MHz - 4GHz | 10MHz - 6GHz |
| Bandwidth | 1.6MHz | |
| Slot Selection | 256 / 512 | |
| SYNC-DL Setting | Auto or 0-31 setting | |
| Demodulation Type | Auto or QPSK/8PSK/16QAM/64QAM | |
| RF Measurement | | |
| Accuracy (typ.) | ±1.0dB (input range -50dBm to +10dBm) | |
| Demodulation Measurement | | |
| Frequency Offset | ±10Hz + Reference clock deviation | |
| Demodulation Type | QPSK, 8PSK, 16QAM, 64QAM | |
| EVM (RMS) | 2% (P-CCPCH power > -50 dBm) | |
| Over-the-air Measurement | | |
| Scrambling Code Scanner | 32 SYNC-DL | |
| | Ec/Io and Tau measurement | |
| Tau Scanner | Up to 6 SYNC-DL | |
| | DwPTS power, Tau, Ec/Io measurement | |

General Information

| Model | S5800EA | S5800EB |
|-------------------------------|--|---------|
| Display | | |
| Type / Size | TFT LCD / 6.5" (640 x 480) | |
| Data Storage | | |
| Internal | 1 GB, >2000 saved measurement files | |
| External | Limited by size of USB flash drive | |
| Battery | | |
| Type | Rechargeable lithium battery 11.1V / 5.2Ah | |
| Charging Time | > 4.5 hours | |
| Operation Time | > 3.0 hours (continuous); >2.5 hours (with tracking generator) | |
| Environmental | | |
| Operating Temperature | -10°C to +55 °C | |
| Storage Temperature | -40 °C to +80 °C | |
| Shock | Mil-PRF-28800F Class 2 | |
| EMC | | |
| European EMC | IEC/EN 61326-1:2006 | |
| AC Power | | |
| AC Adapter Output | 19V / 3.42Ah | |
| AC Adapter Input | 100 – 240 VAC, 50-60 Hz | |
| Dimension & Weight | | |
| Dimension | 257mm x 75mm x 185mm | |
| Weight | < 2.5 kg | |

Ordering Information

| Model No. | Item | Description |
|---------------------|---|---|
| Main Machine | | |
| S5800AE | Field Comm Analyzer | Frequency range: 9kHz - 4.0GHz |
| S5800BE | Field Comm Analyzer | Frequency range: 9kHz - 6.0GHz |
| Options | | |
| S5800-01 | RF Power Meter (Software) | Providing true RMS measurements with accurate measurements for both CW and complex digitally modulated signals. |
| S5800-02 | In-line Bi-Directional RF High Power Sensor | 300 MHz to 4GHz, 2mW to 150W, N(f) 50Ω |
| S5800-03 | Terminal RF Power Sensor | 1MHz to 6GHz, -30dBm to +20dBm, N(m), 50Ω |
| S5800-04 | Interference Location Analysis | Add Spectrogram, RSSI, Signal ID, Signal Strength, Interference Location Mapping, Delta Spectrum and DPS measurement applications to the spectrum analyzer. (Need directional log periodic antenna) |
| S5800-05 | Signal Coverage Mapping | Allowing users to map RSSI and ACPR measurements. (Need option S5800-06) |
| S5800-06 | GPS Module (USB) | / |
| S5800-07 | Signal Analysis | LTE,WCDMA,TDSCDMA,GSM,CDMA |
| S5800-08 | Tracking Generator | Frequency range: 25MHz - 4.4GHz |
| S5800-09 | Tracking Generator | Frequency range: 25MHz - 6.0GHz |
| S5800-10 | Spectrum Persistence | Find interference covered by transmit signal.Acquires several thousands of spectrum data per second and show the spectrum density over time. |
| S5800-11 | Gate Sweep | For TD signal analysis |
| S5800-12 | Directional Active Log Periodic Antenna | Frequency range: 9 kHz to 20MHz |
| S5800-13 | Directional Active Log Periodic Antenna | Frequency range: 20MHz to 200MHz |
| S5800-14 | Directional Active Log Periodic Antenna | Frequency range: 200MHz to 500MHz |
| S5800-15 | Directional Active Log Periodic Antenna | Frequency range: 500MHz to 3GHz |
| S5800-16 | Directional Active Log Periodic Antenna | Frequency range: 500MHz to 8GHz |
| S5800-17 | Antenna Handle with GPS and Electronics Compass | / |
| Accessories | | |
| Standard | AC/DC Adapter | / |
| Standard | Rechargeable Li-ion Battery | 11.1V / 5200mAh |
| Standard | Vehicle Charger | 12V/DC (<0.5Ω) |
| Standard | Crossover LAN Cable | / |
| Standard | USB Cable | A-MiniB |
| Standard | RF Connector | N/SMA-JK |
| Standard | Soft Carrying Case | / |
| Standard | CD | Site Workbench Software and Manual |