SALUKI TECHNOLOGY

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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 µs 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.
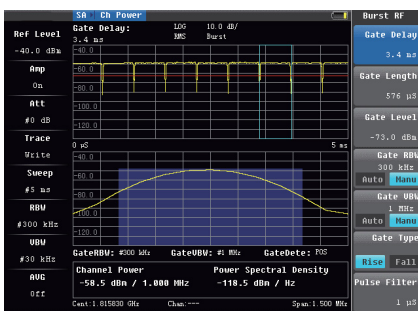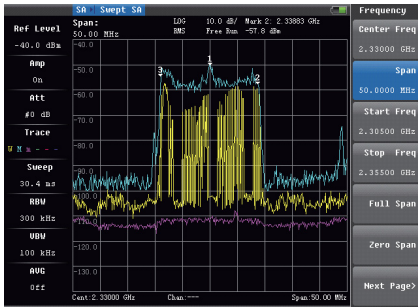

Channel power

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.
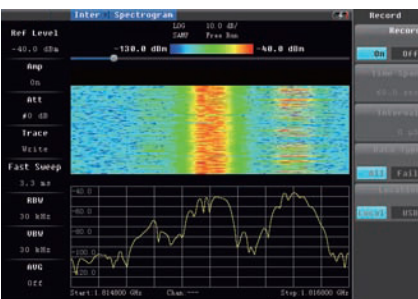   - Audio tones/speaker notification for signal strength measured.
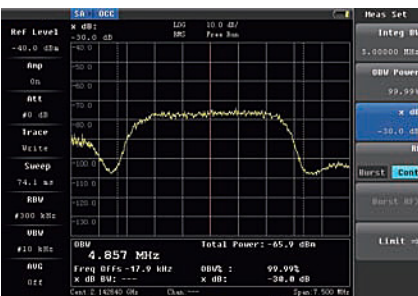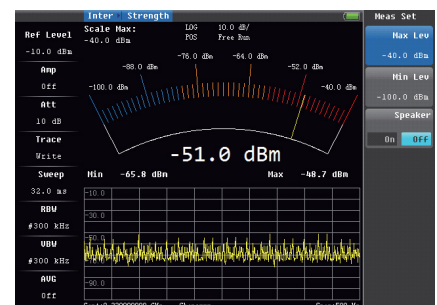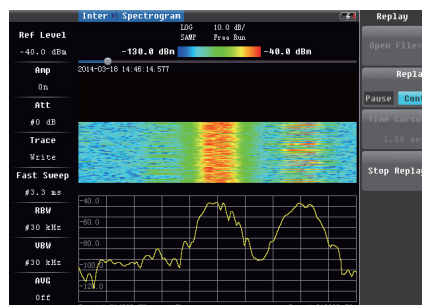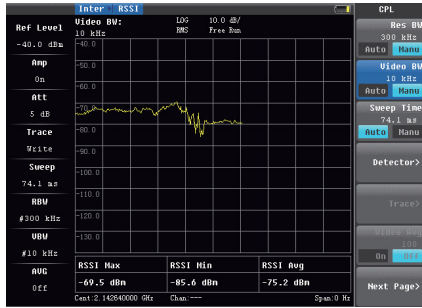

OBW
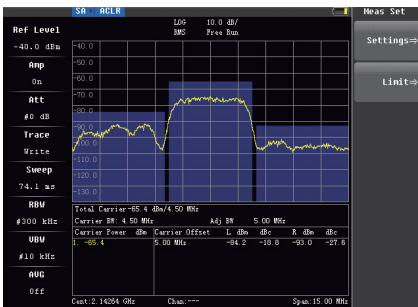
ACPR

Spectrogram Measurement, Recording Spectrogram Playback and interference source characteristics
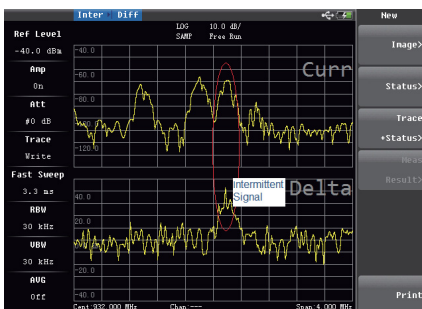
Signal Strength
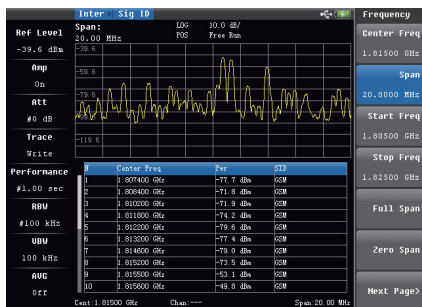
RSSI

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

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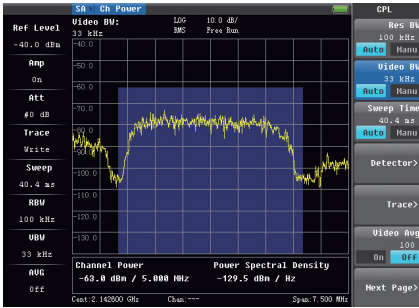
4. RB power measurement provides RB quantity, RB utilization, channel power, Cell ID … etc. metrics.

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

PVT

LTE-FDD RB Power Measurement

LTE-TDD RB Power Measurement

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

LTE-TDD Constellation Analysis

LTE-FDD Constellation Analysis

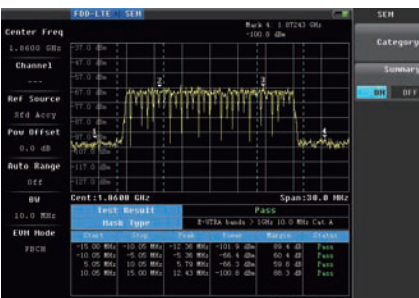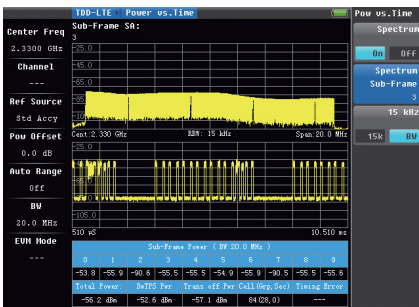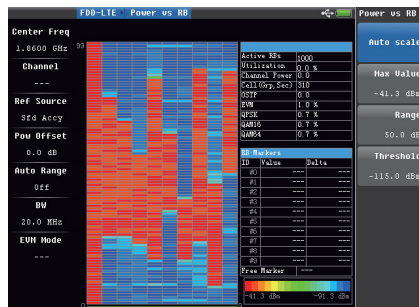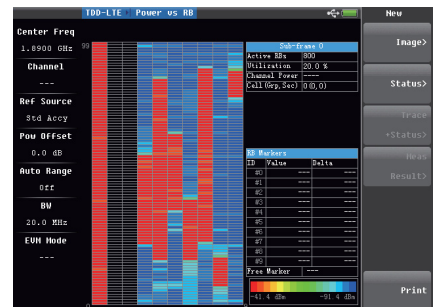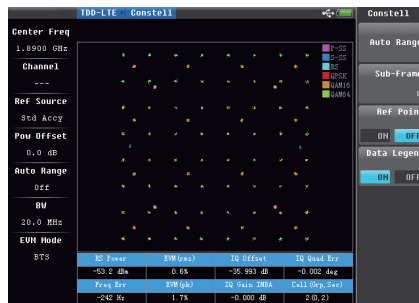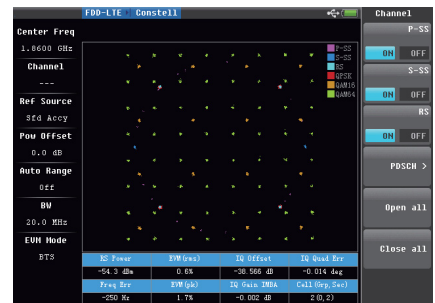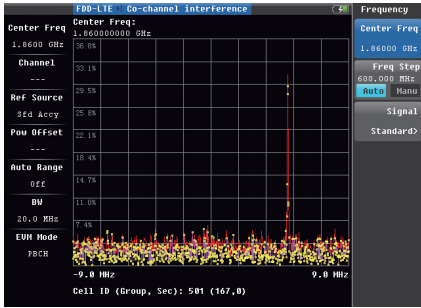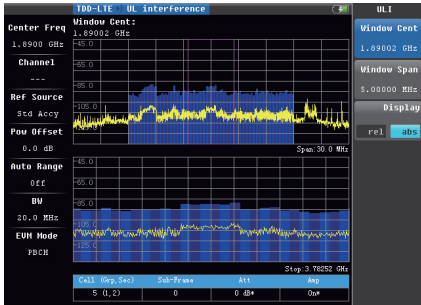CCI testing for LTE-FDD

CCI Testing for LTE-TDD

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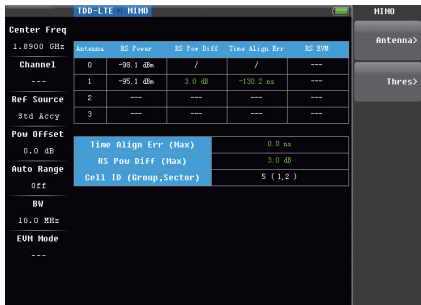
- EVM – Peak & Root Mean Square (RMS)
- Sub-Carrier EVM for in-band interference
- Frequency Deviation / Cell ID
- Constellation of BTS mode and OTA mode(SISO/MIMO2x2/MIMO4x4)

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.

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.

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.

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
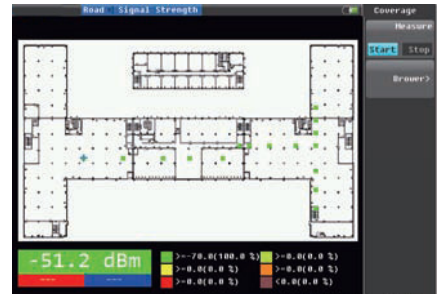
Indoor Signal Coverage

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	$\pm 1x\ 10^{-6} \pm 1$	
Aging Speed	$< \pm 1\times10^{-6}$/year	
Temperature Stability	$< \pm 0.5\times10^{-6}$ (0 - 50℃)	
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	$< \pm10\%$	
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 > 15dB), 50VDC	
Amplitude Accuracy	$\leq \pm1.0$ dB	
Attenuator Range	0dB to 55dB in 1dB steps	
TOI	> +15dBm (typ.)	
DANL (typ.)		
(Input terminated, RBW = 1 Hz, Attn = 0 dBm, Sample Detector)		
Preamp Off	≤-150dBm (2MHz–1GHz) ≤-142dBm (1GHz–3GHz) ≤-142dBm (3GHz–4GHz)	≤-150dBm (1MHz–1GHz) ≤-140dBm (1GHz–3GHz) ≤-140dBm (3GHz–6GHz)
Preamp On	≤-165dBm (10MHz–1GHz) ≤-160dBm (1GHz–3GHz) ≤-158dBm (3GHz–4GHz)	≤-162dBm (1MHz–1GHz) ≤-158dBm (1GHz–3GHz) ≤-152dBm (3GHz–6GHz)
Spurious Response		
Residual Response	1MHz - 6GHz: ≤ -85dBm (no signal input attenuation, 0dB)	
Second Harmonic Distortion	< -70dBc (input level -20dBm, mixer input, preamp off)	
Reference Level (20℃ - 30℃)		
Range	-167dBm to +35dBm	
Accuracy	≤ ±0.5dB	
Sweep & Trigger Mode		
Sweep Time	20ms - 250s (≥ 200 Hz) 10μs - 1000s (= 0 Hz) 1ms - 250s (Fast scan)	
Accuracy	< ±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, dBμV, 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	≤ ±0.5dB (typ., 25±5℃)	
RBW Switching Accuracy	< 0.1dB (typ.)	
Attenuator Switching Accuracy	< 0.3dB (typ.)	

RF Input	
Input Connector	N type
Input Impedance	50Ω
VSWR (typ.)	<1.8 (10MHz-4.4GHz, 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