



# CellAdvisor™

## JD745B Base Station Analyzer Specifications

### Spectrum Analyzer (standard)

Frequency		
Frequency range	100 kHz to 4 GHz	
Frequency accuracy	± (Readout frequency x Internal 10MHz Frequency reference accuracy + RBW centering + 2 Hz + 0.5 x Horizontal resolution)	
Internal 10 MHz Frequency Reference		
Accuracy	±0.05 ppm + aging (0 to 50°C)	
Aging	±0.5 ppm/year	
Frequency Span		
Range	0 Hz (zero span) 10 Hz to full span	
Resolution	1 Hz	
Resolution Bandwidth (RBW)		
-3 dB bandwidth	1 Hz to 3 MHz	1-3-10 sequence
Accuracy	±10% (nominal)	
Video Bandwidth (VBW)		
-3 dB bandwidth	1 Hz to 3 MHz	1-3-10 sequence
Accuracy	±10% (nominal)	
Single Sideband (SSB) Phase Noise		
Fc 1 GHz, RBW 10 kHz, VBW 1 kHz, RMS detector		
Carrier Offset		
30 kHz	< -90 dBc/Hz (typical)	
100 kHz	< -95 dBc/Hz (typical)	
1 MHz	< -102 dBc/Hz (typical)	
Measurement Range		
DANL to +20 dBm		
Input attenuator range	0 to 50 dB, 5 dB steps	
Maximum Input Level		
Average continuous power	+20 dBm	
DC voltage	±50 V DC	

**Spectrum Analyzer: 100 kHz to 4 GHz**

**Cable and Antenna Analyzer: 5 MHz to 4 GHz**

**Power Meter: 10 MHz to 4 GHz**

### Specification Conditions

JD745B specifications apply under these conditions:

- The instrument has been turned on for at least 15 minutes
- The instrument is operating within a valid calibration period
- Data with no tolerance are considered typical values
- Cable and antenna measurements apply after calibration to the OSL standard
- Typical and nominal values are defined as:
  - Typical: expected performance of the instrument operating at 20 to 30°C after being at this temperature for 15 minutes
  - Nominal: a general, descriptive term or parameter

Displayed Average Noise Level (DANL)	
1 Hz RBW, 1 Hz VBW, 50 $\Omega$ termination, 0 dB attenuation, RMS detector	
Preamplifier Off	
10 MHz to 2.3 GHz	-140 dBm (-146 dBm, typical)
>2.3 GHz to 3 GHz	-138 dBm (-144 dBm, typical)
>3 GHz to 4 GHz	-135 dBm (-140 dBm, typical)
Preamplifier On	
10 MHz to 2.3 GHz	-155 dBm (-160 dBm, typical)
>2.3 GHz to 3 GHz	-153 dBm (-158 dBm, typical)
>3 GHz to 4 GHz	-150 dBm (-156 dBm, typical)
Display Range	
Log scale and units (10 divisions displayed)	1 to 20 dB/division in 1 dB steps dBm, dBV, dBmV, dB $\mu$ V
Linear scale and units (10 divisions displayed)	V, mV, mW, W
Detectors	Normal, positive peak, sample, negative peak, RMS
Number of traces	6
Trace functions	Clear/write, maximum hold, minimum hold, capture, load view on/off, trace math
Total Absolute Amplitude Accuracy	
Preamplifier off, power level > -50 dBm, auto-coupled (20 to 30°C)	
5 MHz to 4 GHz	$\pm 1.25$ dB, $\pm 0.5$ dB (typical)
	Attenuation < 40 dB
	$\pm 1.55$ dB, $\pm 1.0$ dB (typical)
	Attenuation $\geq 40$ dB
Reference Level	
Setting range	-120 to +100 dBm
Setting Resolution	
Log scale	0.1 dB
Linear scale	1% of reference level
Markers	
Marker types	Normal, delta, delta pair, noise, frequency count marker
Number of markers	6
Marker functions	Peak, next peak, next peak left, next peak right, minimum search marker to center/start/stop, always peak on/off
RF Input VSWR	
20 MHz to 4 GHz	1.5:1 (typical)
Second Harmonic Distortion	
Mixer level	-25 dBm
10 MHz to 1.3 GHz	< -65 dBc (typical)
>1.3 GHz to 4 GHz	< -70 dBc (typical)
Third-Order Inter-Modulation (third-order intercept: TOI)	
200 MHz to 2 GHz	+10 dBm (typical)
>2 GHz to 4 GHz	+12 dBm (typical)

Spurious	
Inherent residual response Input terminated, 0 dB attenuation, preamplifier off, RBW at 10 kHz, Sweep mode	
20 MHz to 3 GHz	-90 dBm (nominal)
>3 GHz to 4 GHz	-85 dBm (nominal)
Exceptions	< -70 dBm at 22788/770.4/1791.8/2647.8/2927.3/3195.2/3915.1/3640 MHz
Input-related spurious	< -67 dBc (nominal)
Dynamic Range	
2/3 (TOI-DANL) in 1 Hz RBW	>95 dB
Sweep Time	
Range	80 ms to 1000 s 24 $\mu$ s to 200 s
	Span = 0 Hz (zero span)
Accuracy	$\pm 2\%$
	Span = 0 Hz (zero span)
Mode	Continuous, single
Gated Sweep	
Trigger source	External, video, and GPS
Gate length	1 $\mu$ s to 100 ms
Gate delay	0 to 100 ms
Trigger	
Trigger source	Free run, video, external, GPS
Trigger Delay	
Range	0 to 200 s
Resolution	6 $\mu$ s
Measurements*	
Channel power	
Occupied bandwidth	
Spectrum emission mask	
Adjacent channel power	
Spurious emissions	
Field strength	
AM/FM audio demodulation	
Route map	
PIM detection	
Dual spectrum	

\* CW signal generator (Option 003) can be set up simultaneously.

## Cable and Antenna Analyzer (standard)

Frequency	
Range	5 MHz to 4 GHz
Resolution	10 kHz
Accuracy	±25 ppm + aging (20 to 30C°)
Aging	±5 ppm
Data Points	
126, 251, 501, 1001	
Measurement Speed	
1.65 ms/point (nominal)	
Measurement Accuracy	
Corrected directivity	40 dB
Reflection uncertainty	$\pm(0.3 +  20\log(1+10^{-EP/20}) )$ (typical) EP = directivity – measured return loss
Output Power	
High	0 dBm (typical)
Low	-30 dBm (typical)
Dynamic Range	
Reflection	60 dB
Maximum Input Level	
Average continuous power	+25 dBm (nominal)
DC voltage	±50 V DC
Interference Immunity	
On channel	+17 dBm at >1.4 MHz from carrier frequency (nominal)
On frequency	0 dBm within ±10 kHz from the carrier frequency (nominal)
Measurements	
Reflection (VSWR)	
VSWR range	1 to 65
Return loss range	0 to 60 dB
Resolution	0.01
Distance to Fault (DTF)	
Vertical VSWR range	1 to 65
Vertical return loss range	1 to 60 dB
Vertical resolution	0.01
Horizontal range	0 to (# of data points – 1) x horizontal resolution Maximum = 1500 m (4921 ft)
Horizontal resolution	$(1.5 \times 10^8) \times (V_p)/\Delta$ $V_p$ = propagation velocity $\Delta$ = stop freq – start freq (Hz)
Cable Loss (1-port)	
Range	0 to 30 dB
Resolution	0.01 dB
1-Port Phase	
Range	-180 to +180°
Resolution	0.01°
Smith Chart	
Resolution	0.01

## RF Power Meter (standard)

General Parameters			
Display range	100 to +100 dBm		
Offset range	0 to 60 dB		
Resolution	0.01 dB or 0.1 x W (x = m, u, p)		
Internal RF Power Sensor			
Frequency range	10 MHz to 4 GHz		
Span	100 kHz to 100 MHz		
Dynamic range	-120 to +20 dBm		
Maximum power	+20 dBm		
Accuracy	Same as spectrum analyzer		
External RF Power Sensors			
Directional	JD731B	JD733A	
Frequency range	300 MHz to 3.8 GHz	150 MHz to 3.5 GHz	
Dynamic range	0.15 to 150 W (average) 4 to 400 W (peak)	0.1 to 50 W (average) 0.1 to 50 W (peak)	
Connector type	Type-N female on both ends		
Measurement type	Forward/reverse average power, forward peak power, VSWR		
Accuracy	±(4% of reading + 0.05 W) <sup>1,2</sup>		
Terminating	JD732B	JD734B	JD736B
Frequency range	20 MHz to 3.8 GHz		
Dynamic range	-30 to +20 dBm		
Connector type	Type-N male		
Measurement type	Average	Peak	Average and peak
Accuracy	±7% <sup>1</sup>		

## Optical Power Meter (Standard)

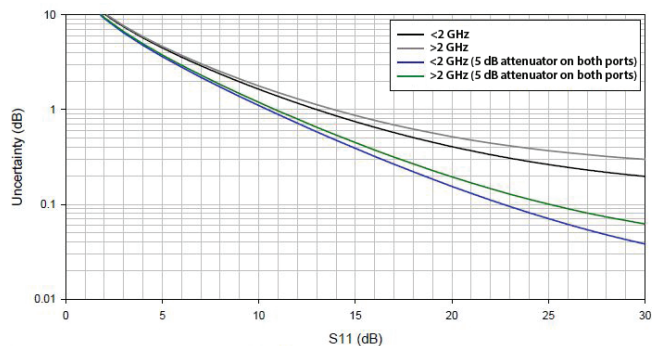
Optical Power Meter			
Display range	-100 to +100 dBm		
Offset range	0 to 60 dB		
Resolution	0.01 dB or 0.1 mW		
External Optical Power Sensors			
	MP-60A	MP-80A	
Wavelength range	780 to 1650 nm		
Max permitted input level	+10 dBm	+23 dBm	
Connector type	Type-N female on both ends		
Connector input	Universal 2.5 and 1.25 mm		
Accuracy	±5%		

1. CW condition at 25°C ±10°C

2. Forward power

## 2-Port Transmission Measurements (Option 001)

Frequency	
Frequency range	5 MHz to 4 GHz
Frequency resolution	10 kHz
Transmission uncertainty	



Use 5 dB attenuators on both ports to lessen uncertainty.

Output Power	
High	0 dBm (typical)
Low	-30 dBm (typical)
Measurement Speed	
Vector	2.2 ms/point (nominal)
Dynamic Range	
Vector	5 MHz to 3 GHz, 80 dB >3 GHz to 4 GHz, 75 dB
Scalar	5 MHz to 4 GHz, >100 dB
Measurements	
Insertion Loss/Gain	
Range	-120 to 100 dB
Resolution	0.01 dB
2-Port Phase	
Range	-180 to +180°
Resolution	0.01°

## Bias-Tee (Option 002)

Voltage	
Voltage range	+12 to +32 V
Voltage resolution	0.1 V
Power	
8 W Max	

## CW Signal Generator (Option 003)

Frequency	
Frequency range	25 MHz to 4 GHz
Frequency reference	±25 ppm Maximum
Frequency resolution	10 kHz
Output Power	
Range	0 dBm, -30 to -80 dBm
Step	1 dB
Accuracy	±1.5 dB, (0 dBm, -30 to -70 dBm) ± 2.5 dB (-70 to -80 dBm) (15 to 35°C)

## GPS Receiver and Antenna (Option 010)

GPS Indicator		
Latitude, longitude, altitude		
High-Frequency Accuracy		
Spectrum, interference, and signal analyzer		
GPS lock	±25 ppb	
Hold over (for 3 days)	±50 ppb (0 to 50°C)	15 minutes after satellite locked
Connector	SMA, female	

## Interference Analyzer (Option 011)

Measurements	
Spectrum analyzer	Sound indicator, AM/FM audio demodulation, interference ID, spectrum recorder
Spectrogram	Collect up to 72 hours of data
RSSI	Collect up to 72 hours of data
Interference finder	
Spectrum replayer	
Dual spectrogram	

## Channel Scanner (Option 012)

Frequency Range	
10 MHz to 4 GHz	
Measurement Range	
-110 to +20 dBm	
Measurements	
Channel scanner	1 to 20 channels
Frequency scanner	1 to 20 frequencies
Custom scanner	1 to 20 channels or frequencies

## Bluetooth Connectivity (Option 013)

Personal area network (PAN)	
File transfer profile (FTP)	

## WiFi Connectivity (Option 016)

Measurements	
Interface type	USB LAN card
Interface standard	IEEE 802.11 b/g/n
Chipset	RealTek, Ralink
USB wireless mode	Infrastructure mode
Web-based remote control	Internet Explorer, Chrome, Safari
Internet protocol version	IPv4, IPv6

## cdmaOne/cdma2000® Signal Analyzer (Options 020 and 040)

General Parameters				
Frequency range	Band 0 to 10			
Input signal level	-40 to +20 dBm			
RF channel power accuracy	±1.0 dB (typical)			
CDMA compatibility	cdmaOne and cdma2000			
Frequency error	±10 Hz + ref freq accuracy	99% confidence level		
Rho accuracy	±0.005	0.9 < Rho < 1.0		
Residual Rho	>0.995 (typical)			
PN offset	1 x 64 chips			
Code domain power	±0.5 dB relative power ±1.5 dB absolute power	Code channel power >-25 dB Code channel power >-25 dB		
Pilot power accuracy	±1.0 dB (typical)			
Time offset	±1.0 μs, ±0.5 μs (typical)	External trigger		
Measurements				
Option 020				
<b>Channel Power</b>	Rel power at defined range	Time offset	Pilot, Paging, Sync, Q-Paging	Frequency error
Channel power	<b>Multi-ACPR</b>	Carrier feed-through	<b>CDP Table</b>	Time offset
Spectral density	Lowest reference power	PN offset	Reference power	Carrier feed-through
Peak to average power	Highest reference power	<b>Code Domain Power</b>	Code utilization	Pilot power
<b>Occupied Bandwidth</b>	Abs power at defined range	Abs/Rel code power	Code, spreading factor	Max inactive power
Occupied bandwidth	Rel power at defined range	Channel power	Allocation (channel type)	PN offset
Integrated power	<b>Spurious Emissions</b>	Power bar graph (Abs/Rel)	Relative, absolute power	<b>Power Statistics CCDF</b>
Occupied power	Peak freq at defined range	Pilot, paging, sync, Q-paging	<b>Auto Measure</b>	
<b>Spectrum Emission Mask</b>	Peak level at defined range	Max, avg active power	Channel power	
Reference power	<b>Constellation</b>	Max, avg inactive power	Occupied bandwidth	
Peak level at defined range	Pilot power	PN offset	Spectrum emission mask	
<b>ACPR</b>	Rho	<b>Codogram</b>	ACPR	
Reference power	EVM	Code utilization	Multi-ACPR	
Abs power at defined range	Frequency error	<b>RCSI</b>	Rho	
Option 040				
<b>Channel Scanner (up to 6)</b>	Ec/Io, pilot power, delay	PN offset	Peak amplifier capacity	
Frequencies or channels	<b>Multipath Profile</b>	Pilot, paging, sync, Q-paging power	Average amplifier capacity	
Channel power, PN offset	Channel power	Max, avg active power	Code utilization	
Pilot power, Ec/Io	Multipath power	Max, avg inactive power	Peak utilization	
<b>PN Scanner (up to 6)</b>	Ec/Io, delay	Frequency error	Average utilization	
Channel power	<b>Code Domain Power</b>	Time offset, Rho, EVM	<b>Route Map</b>	
Pilot dominance	Abs/Rel code power	Carrier feed-through	Pilot power	
PN offset	Channel power	Amplifier capacity	Ec/Io	

Longitude, latitude, and satellite in all screens

## EV-DO Signal Analyzer (Options 021 and 041)

General Parameters				
Frequency range	Band 0 to 10			
Input signal level	-40 to +20 dBm			
RF channel power accuracy	±1.0 dB (typical)			
EV-DO compatibility	Rev 0, Rev A and Rev B			
Frequency error	±10 Hz + ref freq accuracy	99% confidence level		
Rho accuracy	±0.005	0.9 < Rho < 1.0		
Residual Rho	>0.995 (typical)			
PN offset	1 x 64 chips			
Code domain power	±0.5 dB relative power ±1.5 dB absolute power	Code channel power >-25 dB Code channel power >-25 dB		
Pilot power accuracy	±1.0 dB (typical)			
Time offset	±1.0 μs, ±0.5 μs (typical)	External trigger		
Measurements				
Option 021				
<b>Channel Power</b>	Abs power at defined range	Pilot, MAC, data EVM	Data channel power	Spectrum emission mask
Channel power	Rel power at defined range	<b>Constellation (pilot, MAC 64/128, and data)</b>	Slot average power	ACPR
Spectral density	<b>Spurious Emissions</b>	Channel power	Max, avg active power	Multi-ACPR
Peak to average power	Peak frequency at defined range	Rho, EVM, peak CDE	Max, avg inactive power	Pilot, MAC, data power
<b>Occupied Bandwidth</b>	Peak level at defined range	Frequency error	PN offset	On/off ratio
Occupied bandwidth	<b>Power vs. Time (idle and active slot)</b>	Time offset	<b>MAC Codogram</b>	PvsT mask (idle slot) or PvsT mask (active slot)
Integrated power	Slot average power	Carrier feed-through	Code utilization	Frequency error
Occupied power	On/off ratio	PN offset	<b>RCSI</b>	Time offset
<b>Spectrum Emission Mask</b>	Idle activity	Modulation type*	Slot, pilot, MAC, data	Carrier feed-through
Reference power	Pilot, MAC, data power	<b>Code Domain Power (pilot and MAC 4/128)</b>	<b>MAC CDP Table</b>	Pilot, MAC, data Rho
Peak level at defined range	<b>Constellation (composite 64/128)</b>	Pilot/MAC channel power	Reference power	Max inactive I/Q power
<b>ACPR</b>	Channel power	Slot average power	Code utilization	PN offset
Reference power	Rho, EVM, Peak CDE	Max active I/Q power	Code, spreading factor	<b>Power Statistics CCDF</b>
Abs power at defined range	Frequency error	Avg active I/Q power	Allocation (channel type)	
Rel power at defined range	Time offset	Max inactive I/Q power	Relative, absolute power	
<b>Multi-ACPR</b>	Carrier feed-through	Avg inactive I/Q power	<b>Auto Measure</b>	
Lowest reference power	PN offset	PN offset	Channel power	
Highest reference power	Pilot, MAC, data power	<b>Code Domain Power (data)</b>	Occupied bandwidth	
Option 041				
<b>Channel Scanner (up to 6)</b>	Pilot dominance	Ec/Io, delay	(Composite) EVM	Code utilization
Frequencies or channels	PN offset	<b>Code Domain Power</b>	Frequency error	Peak utilization
PN offset	Ec/Io, pilot power, delay	Slot average power	Time offset	Average utilization
Pilot, MAC, data power	<b>Multipath Profile</b>	PN offset	Carrier feed-through	<b>Route Map</b>
<b>PN Scanner (up to 6)</b>	Channel power	Pilot, MAC, data power	Max active I/Q power	Pilot power
Channel power	Multipath power	Pilot, MAC, data Rho	Avg active I/Q power	Ec/Io

Longitude, latitude, and satellite in all screens

\*Measurement is performed in Data Constellation only.

## GSM/GPRS/EDGE Signal Analyzer (Options 022 and 042)

General Parameters		
Frequency range	450 MHz to 500 MHz 820 MHz to 965 MHz 1.705 GHz to 1.995 GHz	
Input signal range	-40 to +20 dBm	
Burst power	±1.0 dB	
Frequency error	±10 Hz + reference-frequency accuracy	99% confidence level
GMSK modulation quality		
<b>Phase RMS Accuracy</b>		
Residual error	±1.0 degrees	(0 < Phase RMS < 8)
Phase peak accuracy	0.7 degrees (typical)	
8 PSK modulation quality	±2.0 degrees	(0 < Phase peak < 30)
<b>EVM Accuracy</b>		
Residual error	±1.5%	(2% < EVM < 8%)
RF power vs. time	2.5%	
	±0.25 symbol	

Measurements				
Option 022				
<b>Channel Power</b>	Peak level at defined range	TSC (Slot 0 to 7)	C/I*	PvsT – Mask
Channel power	<b>Spurious Emissions</b>	<b>Constellation</b>	EVM RMS*	Frame average power
Spectral density	Peak frequency at defined range	Burst power	EVM Peak*	Frequency error
Peak to average power	Peak level at defined range	Modulation type	EVM 95th*	Phase error RMS
<b>Occupied Bandwidth</b>	<b>Power vs. Time (slot)</b>	Frequency error	<b>Auto Measure</b>	Phase error peak
Occupied bandwidth	Burst power	Phase error RMS	Channel power	EVM RMS*
Integrated power	Max/min point	Phase error peak	Occupied bandwidth	EVM Peak*
Occupied power	<b>Power vs. Time (frame)</b>	I/Q origin offset*	Spectrum emission mask	I/Q origin offset
<b>Spectrum Emission Mask</b>	Frame average power	TSC	Spurious emission mask	C/I*
Reference power	Burst power (Slot 0 to 7)	BSIC	Burst power	
Option 042				
<b>Channel/Frequency Scanner</b>	BSIC (NCC, BCC)	SNR, delay	Frame average power	Modulation type
Channels or frequencies	<b>Multipath Profile</b>	<b>Modulation Analyzer</b>	BSIC, frame no. and time	
Absolute power	(10 strongest)	Frame avg power trend	C/I, frequency error	
Group (traffic, control)	Frame average power	C/I trend	Burst power	

Longitude, latitude, and satellite in all screens

\* Measurements performed for 8PSK modulation signals (edge) only.

## WCDMA/HSPA + Signal Analyzer (Options 023 and 043)

General Parameters		
Frequency range	Band 1 to 14, 19 to 22, 25, 26	
Input signal range	-40 to +20 dBm	
RF channel power accuracy	±1.0 dB, ±0.7 dB (typical)	
Occupied bandwidth accuracy	±100 kHz	
Adjacent channel leakage ratio (ACLR)	< -56 dB, ±0.7 dB at 5 MHz offset, < -58 dB, ±0.8 dB at 10 MHz offset	
WCDMA modulation	QPSK	
HSPA+ modulations	QPSK, 16 QAM, 64 QAM	
Frequency error	±10 Hz + reference-frequency accuracy	99% confidence level
EVM accuracy	±2.0%	2% ≤ EVM ≤ 20%
Residual EVM	2.5% (typical)	
Code domain power	±0.5 dB relative power ±1.5 dB absolute power	Code channel power > -25 dB Code channel power > -25 dB
CPICH power accuracy	±0.8 dB (typical)	

### Measurements

#### Option 023

<b>Channel Power</b>	Abs power at defined range	Max, avg active power	Allocation (channel type)
Channel power	Rel power at defined range	Max, avg inactive power	EVM, modulation type
Spectral density	<b>Spurious Emissions</b>	Scramble code	Relative, absolute power
Peak to average power	Peak frequency at defined range	<b>Relative Code Domain Error</b>	<b>Auto Measure</b>
<b>Occupied Bandwidth</b>	Peak level at defined range	Abs/Rel code power	Channel power
Occupied bandwidth	<b>Constellation</b>	Code error	Occupied bandwidth
Integrated power	CPICH power	Individual code EVM, RCDE, and its constellation	Spectrum emission mask
Occupied power	Rho, EVM	Channel power	ACLR
<b>Spectrum Emission Mask</b>	Peak CDE	Power bar graph (Abs/Rel/Delta power) CPICH, P-CCPCH, S-CCPCH, PICH, P-SCH, S-SCH	Multi-ACLR
Reference power	Frequency error	Avg RCDE QPSK, 16 QAM, 64 QAM	Spurious emission mask
Peak level at defined range	Time offset	<b>Codogram</b>	Frequency error
<b>ACLR</b>	Carrier feed-through	Code utilization	EVM
Reference power	Scramble code	<b>RCSI</b>	Peak CDE
Abs power at defined range	<b>Code Domain Power</b>	CPICH, P-CCPCH, S-CCPCH, PICH, P-SCH, S-SCH	Carrier feed-through
Rel power at defined range	Abs/Rel code power	<b>CDP Table</b>	CPICH absolute power
<b>Multi-ACLR</b>	Individual code EVM and its constellation	Reference power	CPICH relative power
Lowest reference power	Channel power	Code utilization	Max inactive power
Highest reference power	Power bar graph (Abs/Rel/Delta power) CPICH, P-CCPCH, S-CCPCH, PICH, P-SCH, S-SCH	Code, spreading factor	Scramble code
			<b>Power Statistics CCDF</b>

#### Option 043

<b>Channel Scanner (up to 6)</b>	<b>Multipath Profile</b>	CPICH, P-CCPCH, S-CCPCH, PICH, P-SCH, S-SCH	Amplifier capacity
Frequencies or channels	Channel, multipath power	Max, avg active power	Peak amplifier capacity
Channel power, scramble code, CPICH power, Ec/Io	Ec/Io, delay	Max, avg inactive power	Average amplifier capacity
<b>Scramble Scanner (up to 6)</b>	<b>Code Domain Power</b>	Frequency error	Code, peak utilization
Channel power	Abs/Rel code power	Time offset, Rho	Average utilization
CPICH dominance	Individual code EVM	Carrier feed-through	<b>Route Map</b>
Scramble code	Channel power	(Composite) EVM	CPICH power, Ec/Io
Ec/Io, CPICH power, delay	Scramble code	CPICH EVM, P-CCPCH EVM	

Longitude, latitude, and satellite in all screen



## TD-SCDMA Signal Analyzer (Options 025 and 045)

General Parameters				
Frequency range	1.785 GHz to 2.22 GHz			
Input signal level	-40 to +25 dBm			
Channel power (RRC) accuracy	±1.0 dB (typical)			
Modulations	QPSK, 8 PSK, 16 QAM, 64 QAM			
Frequency error	±10 Hz + ref freq accuracy	99% confidence level		
Residual EVM (RMS)	2.0% (typical)	P-CCPCH slot and 1 channel		
Time error (Tau)	±1.0 μs (typical)	External trigger		
Spreading factor	Auto (DL, UL), 1, 2, 4, 8, 16			
Measurements				
Option 025				
<b>Channel Power</b>	<b>Power vs. Time (slot)</b>	<b>Constellation</b>	Code Power and Error Chart	Peak CDE
Channel power	Slot power	Rho	Constellation diagram for Individual code	Max inactive power
Spectral density	DwPTS power	EVM RMS, EVM peak	Data format	Spurious Emission
Peak to average power	UpPTS power	Peak CDE	Slot, DwPTS power	
<b>Occupied Bandwidth</b>	On/off slot ratio	Frequency error	No. of active code	
Occupied bandwidth	Slot PAR	I/Q origin offset	Scramble code	
Integrated power	DwPTS code	Time offset	Max active code power	
Occupied power	<b>Power vs. Time (frame)</b>	<b>Midamble Power</b>	Avg active code power	
<b>Spectrum Emission Mask</b>	Slot Power, Data Power (L), Midamble Power, Data Power (R), Time offset of all TS (from TS0 to TS7) and DwPTS, UpPTS	Slot power	Max inactive code power	
Reference power		DwPTS power	Avg inactive code power	
Peak level at defined range		Midamble power (1 to 16)	Peak CDE and peak active CDE	
<b>ACLR</b>		<b>Code Power</b>	<b>Auto Measure</b>	
Reference power		Individual code EVM and its constellation	Channel power	
Abs power at defined range		Constellation diagram for Individual code	Occupied bandwidth	
Rel power at defined range		(Modulation) format	Spectrum emission mask	
<b>Multi-ACLR</b>		Slot power, DwPTS power	ACLR	
Lowest reference power		No. of active code	Multi-ACLR	
Highest reference power		Scramble code	Slot power	
Abs power at defined range	<b>Power vs. Time (mask)</b>	Max active code power	DwPTS power	
Rel power at defined range	Slot power	Avg active code power	UpPTS power	
<b>Spurious Emissions</b>	On/off slot ratio	Max inactive code power	On/off slot ratio	
Peak frequency at defined range	Off power	Avg inactive code power	Frequency error	
Peak level at defined range	<b>Timogram</b>	<b>Code Error</b>	EVM RMS	
Option 045				
<b>Sync-DL ID Scanner (32)</b>	<b>Sync-DL ID vs. Tau (up to 6)</b>	Ec/Io, Tau	DwPTS power	DwPTS Power
Scramble code group	ID, power, Ec/Io, Tau	DwPTS power	Pilot dominance	
Ec/Io, Tau	DwPTS power	Pilot dominance	EVM, frequency error	
DwPTS power	Pilot dominance	<b>Sync-DL ID Analyzer</b>	Ec/Io, CINR	
Pilot dominance	<b>Sync-DL ID Multipath</b>	DwPTS power, Ec/Io trend	<b>Route Map</b>	

Longitude, latitude, and satellite in all screens

## Mobile WiMAX Signal Analyzer (Options 026 and 046)

General Parameters		
Frequency range	2.1 GHz to 2.7 GHz 3.4 GHz to 3.85 GHz	
Input signal level	-40 to +20 dBm	
Channel power accuracy	±1.0 dB (typical)	
Supported bandwidth	7 MHz, 8.75 MHz, and 10 MHz	
Frequency error	±10 Hz + reference-frequency accuracy	99% confidence level
Residual EVM (RMS)	1.5% (typical)	

Measurements				
Option 026				
<b>Channel Power</b>	Peak level at defined range	Frequency error	<b>EVM vs. Symbol</b>	Frame average power
Channel power	<b>Power vs. Time (frame)</b>	Time offset	RCE RMS, RCE peak	Time offset
Spectral density	Channel power	Segment ID, cell ID	EVM RMS, EVM peak	I/Q origin offset
Peak to average power	Frame average power	Preamble index	Segment ID, cell ID	Spectral flatness
<b>Occupied Bandwidth</b>	Preamble power	<b>Spectral Flatness</b>	Preamble index	Frequency error
Occupied bandwidth	DL burst power	Average subcarrier power	<b>Auto Measure</b>	RCE RMS
Integrated power	UL burst power	Subcarrier power variation	Channel power	RCE peak
Occupied power	I/Q origin offset	Max, min, avg power	Occupied bandwidth	EVM RMS
<b>Spectrum Emission Mask</b>	Time offset	<b>EVM vs. Subcarrier</b>	Spectrum emission mask	EVM peak
Reference power	<b>Constellation</b>	RCE RMS, RCE peak	Spurious emission mask	<b>Power Statistics CCDF</b>
Peak level at defined range	Channel power	EVM RMS, EVM peak	Preamble power	
<b>Spurious Emissions</b>	RCE RMS, RCE peak	Segment ID, cell ID	DL burst power	
Peak frequency at defined range	EVM RMS, EVM peak	Preamble index	UL burst power	
Option 046				
<b>Preamble Scanner (up to 6)</b>	Total preamble power	Preamble power	Time offset	
Total preamble power	Multipath power	Frame avg power	<b>Route Map</b>	
Preamble, relative power	Relative power, delay	Relative power	Preamble power	
Cell ID, sector ID	Preamble power trend	C/I		
Time offset	<b>Preamble Power Trend</b>	Preamble		
<b>Multipath Profile</b>	Relative power trend	Cell ID, sector ID		

Longitude, latitude, and satellite in all screens

## LTE/LTE-Advanced – FDD Signal Analyzer (Options 028/030/032 and 048)

General Parameters		
Frequency range	Band 1 to 14, 17 to 26	
Input signal level	-40 to +20 dBm	
Channel power accuracy	±1.0 dB (typical)	
Supported bandwidths	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, and 20 MHz	
Frequency error	±10 Hz + reference-frequency accuracy	99% confidence level
Residual EVM (RMS)	2.0% (typical)	Data EVM

### Measurements

Option 028/030/032						
<b>Channel Power</b>	<b>Power vs. Time (frame)</b>	<b>Control Channel</b>	Data EVM RMS, peak	Antenna 1 RS power and EVM	PDSCH/Data* 64 QAM EVM	
Channel power	Frame average power	Control channel summary (P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN*)	RS EVM RMS, peak	Antenna 2 RS power and EVM**	PDSCH 256QAM EVM	
Spectral density	Subframe power		Cell, group, sector ID		Antenna 3 RS power and EVM**	Data EVM RMS, peak
Peak to average power	First slot power		<b>Frame</b>	RS, P-SS, S-SS EVM		
<b>Occupied Bandwidth</b>	Second slot power		MBSFN*	RS, P-SS, S-SS power	PBCH power	
Occupied bandwidth	Cell ID, I/Q origin offset	EVM, relative or absolute power, modulation type	Frame summary table (P-SS, S-SS, PBCH, PC-FICH, PHICH, PDCCH, RS, MBSFN*, PDSCH/Data* 16 QAM, PDSCH/Data* 64 QAM, PDSCH 256QAM)	<b>Data Allocation Map</b>	Subframe power	
Integrated power	Time offset		Each control channels'	Data allocation vs frame	OFDM power	
Occupied power	<b>Constellation</b>			Resource block power	Time error	
<b>Spectrum Emission Mask</b>	MBSFN*	I/Q diagram	QPSK, PDSCH/Data* 16 QAM, PDSCH/Data* 64 QAM, PDSCH 256QAM)	OFDM symbol power	I/Q origin offset	
Reference power	RS TX power	Modulation format		Data utilization	<b>Carrier Aggregation**</b>	
Peak level at defined range	PDSCH/Data* QPSK EVM	Frequency error		Data allocation vs subframe	Component carriers: up to 5	
<b>ACLR</b>	PDSCH/Data* 64 QAM EVM	EVM RMS, EVM peak	EVM, relative or absolute power, modulation type	Resource block power		
	PDSCH 256QAM EVM					
Reference power	Data EVM RMS	<b>Subframe</b>	Frame average power	Data utilization	Subframe power	
Abs power at defined range	Data EVM peak	MBSFN*	OFDM symbol power	<b>Auto Measure</b>	P-SS, S-SS, PBCH, RS power and EVM	
Rel power at defined range	Frequency error	Subframe summary table (P-SS, S-SS, PBCH, PC-FICH, PHICH, PDCCH, RS, MBSFN*, PDSCH/Data* QPSK, PDSCH/Data* 16 QAM, PDSCH/Data* 64 QAM, PDSCH 256QAM)	Frequency error	Channel power	Channel power and EVM	
<b>Multi-ACLR</b>	Time error		EVM RMS, peak	I/Q origin offset	Occupied bandwidth	PDSCH/Data* QPSK power and EVM
Lowest reference power	MBSFN*				Spectrum emission mask	PDSCH/Data* 16 QAM power and EVM
Highest reference power	Resource block power				ACLR	PDSCH/Data* 64 QAM power and EVM
Abs power at defined range	I/Q diagram	EVM, relative or absolute power, modulation type	<b>Time Alignment Error</b>	Spurious emission mask	PDSCH 256QAM EVM	
	RB power		Time alignment error trend	Frame average power	Cell ID	
Rel power at defined range	Modulation format			Time alignment error	Frequency error	
<b>Spurious Emissions</b>	I/Q origin offset	Subframe power	Time alignment error	Frequency error	Time alignment error	
Peak frequency at defined range	EVM RMS, EVM peak	OFDM symbol power	RS power difference	MBSFN*	<b>Power Statistics</b>	
		Frequency, time error	Antenna 0 RS power and EVM	PDSCH/Data* QPSK EVM	<b>CCDF</b>	
Peak level at defined range				PDSCH/Data* 16 QAM EVM		

### Option 048

<b>Channel Scanner (up to 6)</b>	<b>ID Scanner (up to 6)</b>	<b>Multipath Profile</b>	Control channel table	PMCH subframe power*	<b>Route Map</b>
Frequency or channels	RSRP/RSRQ dominance	Cell, group, sector ID	(P-SS, S-SS, PBCH, PC-FICH, RS 0, RS 1, RS 2**)	Time alignment error	RSRP
Cell, group, sector ID	S-SS RSSI dominance	Ant 0 RS Ec/Io, delay	RS 3**, MBSFN RS*)	Time offset	RSRQ
Channel power	S-SS Ec/Io dominance	Ant 1 RS Ec/Io, delay		<b>Datagram</b>	RS-SINR
RSRP/RSRQ	Cell, group, sector ID	Ant 2 RS Ec/Io**, delay**	Absolute power	Datagram	S-SS RSSI
RS-SINR	RSRP/RSRQ	Ant 3 RS Ec/Io**, delay**	Relative power	Resource block power	P-SS/S-SS Power
Antenna port	RS-SINR/S-SS RSSI	<b>Control Channel</b>	EVM RMS, phase	Data utilization	S-SS Ec/Io
	P-SS/S-SS Power	RS power trend	Frequency error		
	S-SS Ec/Io	Cell, group, sector ID			

Longitude, latitude, and satellite in all screens

\*Measurement is performed when MBMS is enabled.

\*\*Measurement is performed when option 030 is enabled.

## LTE/LTE-Advanced – TDD Signal Analyzer (Options 029/031/033 and 049)

General Parameters		
Frequency range	Band 33 to 43	
Input signal level	-40 to +20 dBm	
Channel power accuracy	±1.0 dB (typical)	
Supported bandwidth	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, and 20 MHz	
Frequency error	±10 Hz + reference-frequency accuracy	99% confidence level
Residual EVM (RMS)	2.0% (typical)	Data EVM

### Measurements

Option 029/031/033					
<b>Channel Power</b>	<b>Spurious Emissions</b>	Data EVM peak	<b>Subframe</b>	Antenna 3 RS power and EVM**	PDSCH/Data* 64 QAM EVM
Channel power	Peak frequency at defined range	Frequency error	MBSFN*		PDSCH 256QAM EVM
Spectral density		Time error	Subframe summary table	Cell, group, sector ID	Data EVM RMS, peak
Peak to average power	Peak level at defined range	<b>Data Channel</b>	(P-SS, S-SS, PBCH, PC-FICH, PHICH, PDCCH, RS, MBSFN*, PDSCH/Data* QPSK, PDSCH/Data* 16 QAM, PDSCH/Data* 64 QAM, PDSCH 256QAM)	<b>Data Allocation Map</b>	RS, P-SS, S-SS EVM
<b>Occupied Bandwidth</b>		MBSFN*		Data allocation vs frame	RS, P-SS, S-SS power
Occupied bandwidth	<b>Power vs. Time (frame)</b>	Resource block power		Resource block power	PBCH power
Integrated power	Frame average power	I/Q diagram		OFDM symbol power	Subframe power
Occupied power	Subframe power	RB power		Data utilization	OFDM power
<b>Spectrum Emission Mask</b>	First slot power	Modulation format	EVM, relative or absolute power, modulation type	Data allocation vs subframe	Time error
Reference power	Second slot power	I/Q origin offset			I/Q origin offset
Peak level at defined range	Cell ID, I/Q origin offset	EVM RMS, EVM peak	Subframe power	Resource block power	<b>Carrier Aggregation**</b>
	Time offset	<b>Control Channel</b>	OFDM symbol power	Data utilization	Component carriers: up to 5
<b>ACLR</b>	<b>Power vs. Time (slot)</b>	Control channel summary	Frequency, time error	<b>Auto Measure</b>	
Reference power	Slot average power	(P-SS, S-SS, PBCH, PC-FICH, PHICH, PDCCH, RS, MBSFN*)	Data EVM RMS, peak	Channel power	Subframe power
Abs power at defined range	Transient period length		RS EVM RMS, peak	Occupied bandwidth	P-SS, S-SS, PBCH, RS power and EVM
	Off power		Cell, group, sector ID	Spectrum emission mask	
Rel power at defined range	<b>Constellation</b>	EVM, relative or absolute power, modulation type	<b>Time Alignment Error</b>	ACLR	PDSCH/Data* QPSK power and EVM
	MBSFN*		Time alignment error trend	Multi-ACLR	
<b>Multi-ACLR</b>	RS TX power	Each control channels'	Time alignment error	Spurious emission mask	PDSCH/Data* 16 QAM power and EVM
Lowest reference power	PDSCH/Data* QPSK EVM	I/Q diagram	RS power difference	Slot average power	
Highest reference power	PDSCH/Data* 16 QAM EVM	Modulation format	Antenna 0 RS power and EVM	Off power	PDSCH/Data* 64 QAM power and EVM
Abs power at defined range	PDSCH/Data* 64 QAM EVM	Frequency error		Transition period	
	PDSCH 256QAM EVM			Time alignment error	PDSCH 256QAM EVM
Rel power at defined range	Data EVM RMS	I/Q origin offset	Antenna 1 RS power and EVM	MBSFN*	Cell ID
		EVM RMS, EVM peak	Antenna 2 RS power and EVM**	PDSCH/Data* QPSK EVM	Frequency error
				PDSCH/Data* 16 QAM EVM	Time alignment error
					Antenna port
					<b>Power Statistics CCDF</b>

Option 049					
<b>Channel Scanner (up to 6)</b>	<b>ID Scanner (up to 6)</b>	<b>Multipath Profile</b>	<b>Control Channel</b>	EVM RSM, phase	<b>Route Map</b>
Frequency or channels	RSRP/RSRQ dominance	Cell, group, sector ID	RS power trend	Frequency error	RSRP
Cell, group, sector ID	S-SS RSSI dominance	Ant 0 RS Ec/Io, delay	Cell, group, sector ID	PMCH subframe power*	RSRQ
Channel power	S-SS Ec/Io dominance	Ant 1 RS Ec/Io, delay	Control channel table	Time alignment error	RS-SINR
RSRP/RSRQ	Cell, group, sector ID	Ant 2 RS Ec/Io**, delay**	(P-SS, S-SS, PBCH, PC-FICH, RS 0, RS 1, RS 2**, RS 3**, MBSFN RS*)	Time offset	S-SS RSSI
RS-SINR	RSRP/RSRQ	Ant 3 RS Ec/Io**, delay**		<b>Datagram</b>	P-SS, S-SS power
Antenna port	RS-SINR/S-SS RSSI			Datagram	S-SS Ec/Io
	P-SS/S-SS power		Absolute power	Resource block power	
	S-SS Ec/Io		Relative power	Data utilization	

Longitude, latitude, and satellite in all screens

\*Measurement is performed when MBMS is enabled.

\*\*Measurement is performed when option 031 is enabled.

## NB-IoT Signal Analyzer (Option 034)

General Parameters		
Operation Mode	In-Band	
Input signal level	-40 to +25 dBm	
Channel power accuracy	±1.0 dB (typical)	
Supported bandwidths	180 kHz	
Anchore Carrier	PRBS Index	
Measurement Type	Frame, Subframe	
Frequency error	±10 Hz + ref freq accuracy	99% confidence level
Residual EVM (RMS)	2.0% (typical)	Data EVM
Measurement		
Option 034		
<b>Channel Summary</b> EVM, Power (dBm), and Modulation type	<b>IQ Diagram</b> Constellation diagram and Modulation quality indices	
Frame / Subframe Power	Physical Cell ID	Modulation Format
NPSS	NPDSCH	IQ Origin Offset
NSSS	NRS0	EVM RMS (Current/ Accumulated)
NPBCH	NRS1	
		Frequency Error (Hz / PPM)
		EVM Peak (Current/ Accumulated)

## EMF Analyzer (Option 050)

General Parameters		
Supported Antenna	Isotropic Antenna G700050380 26 MHz to 3 GHz	
Mode	Sweep / FFT	
Trace	X-Axis, Y-Axis, Z-Axis, Current, Isotropic, Isotropic Accumulated	
Limit lines	MSL, ICNIRP	
Dwell Time	1 to 60s	
Measurement Time	1 to 30 min (# of measurement= Measurement Time / (Dwell Time x 3)	
Units	dBµV/m, dBmV/m, dBV/m, V/m, W/m², dBm/m², dBW/m², A/m, dBA/m, and Watt/cm².	
Miscellaneous	Spectrum logging and Replay Export to CSV PDF Report Generation	
Measurement		
<b>Option 050 and G700050380</b>		
Trace: X-Axis, Y-Axis, Z-Axis, Current, Isotropic, Isotropic Accumulated	Isotropic EMF Power: AVG, Max, Min	Accumulated Isotropic EMF Power: AVG, Max, Min

## RFoCPRI/Interference Analyzer (Options 008, 060, 061, 062, 063, 064, and 065)

General Parameters					
Optical interface		Dual SFP/SFP+ (supports all MSA-compliant SFP modules)			
Line rates		614.4 Mbps (1x) , 1228.8 Mbps (2x)		Option 008 and 060	
		2457.6 Mbps (4x)		Option 008 and 061	
		3072.0 Mbps (5x)		Option 008 and 062	
		4915.2 Mbps (8x)		Option 008 and 063	
		6144.0 Mbps (10x)		Option 008 and 064	
		9830.4 Mbps (16x)		Option 008 and 065	
Resolution Bandwidth (RBW)					
-3 dB bandwidth		1 kHz to 10 kHz (span ≤ 3.84 MHz) 1 KHz to 100 kHz (3.84 MHz < span < 30.86 MHz)		1-3-10 sequence	
Accuracy		±10% (nominal)			
VBW					
-3 dB bandwidth		1 Hz to 100 KHz		1-3-10 sequence	
Accuracy		±10% (nominal)			
CPRI Parameter					
IQ Sample width		4 – 20 (step 1)			
Mapping method		1 and 3			
TX clock		Internal/external/recovered			
Port type		Master/slave			
Map position		AxC#0 – AxC#7			
Bandwidth		1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz			
Measurements					
Layer-2 Monitoring		Layer-2 Term		Interference Analyzer	
Port 1	Port 2	Port 1 or 2 (exclusive)		Spectrum	Sound indicator, AM/FM audio demodulation, interference ID, spectrum recorder
LOS	LOS	LOS	SDI		
LOF	LOF	LOF	RAI		
SDI	SDI	Optic RX level	dBm		
RAI	RAI	Protocol version	1 to 10	Spectrogram	Collect up to 72 hr of data
Optic RX level	Optic RX level	C and M HDLC rate (kbps)	No HDLC, 240, 480, 960, 1920, 2400	RSSI	Collect up to 72 hr of data
<b>SFP Information</b>	<b>SFP Information</b>				
Wavelength	Wavelength	C and M Ethernet subchannel number	20 to 63	<b>PIM Detection</b>	Single carrier Multi carrier PIM calculator
Vendor	Vendor				
Vendor PN	Vendor PN	<b>Alarm Injection</b>			
Vendor rev	Vendor rev	R-LOS	Single		
Power level type	Power level type	R-LOF	Single		
Diagnostic byte	Diagnostic byte	<b>Error Injection</b>			
Nominal rate	Nominal rate	Code	Single/rate		
Min rate	Min rate	K30.7	Single/rate		
Max RX level	Max RX level	Error rate	1E-3 to 1E-9		
Max TX level	Max TX level				

## RFoCPRI GSM (Option 068)

General Parameters					
Optical interface		Dual SFP/SFP+ (supports all MSA compliant SFP modules)			
Line rates		614.4 Mbps (1x) 1228.8 Mbps (2x) 2457.6 Mbps (4x) 3072.0 Mbps (5x) 4915.2 Mbps (8x), 6144.0 Mbps (10x) 9830.4 Mbps (16x)			
Resolution Bandwidth (RBW)		1 KHz to 30 kHz (Span≤960 kHz)			
		Accuracy		±10% (nominal)	
Video Bandwidth (RBW)		1 Hz to 30 KHz			
		Accuracy		±10% (nominal)	
CPRI Parameter					
IQ Sample Width		4 – 20 (step 1)			
Sample Rate		960 KHz			
Mapping		NA=1, S=1, K=4, NC=1			
TX clock		Internal/external/recovered			
Port type		Master/slave			
Measurements					
Layer-2 Monitoring		Layer-2 Term		Layer-2 Term (cont.)	
Port 1	Port 2	Port 1 or 2 (exclusive)		Error	
LOS	LOS	LOS	Error rate	Code	Single/rate
LOF	LOF	LOF	K30.7	Error rate	Single/rate
RAI	RAI	Optic RX level	dBm	K30.7	
SDI	SDI	Optic TX level	dBm	<b>Interference analyzer</b>	
Optic RX level	Optic RX level	Port Type	Master	Spectrum	
SFP Information	SFP Information	Protocol Version	1 to 10	Sound indicator	
Wavelength	Wavelength	C&M HDLC rate (kbps)	No HDLC, 240, 480, 960, 1920, 2400	AM/FM audio demodulation	
Vendor	Vendor	C&M Ethernet Subchannel number	20 to 63	Interference ID,	
Vendor PN	Vendor PN			Spectrum recorder	
Vendor rev	Vendor rev	Word Sync Loss Event		Spectrogram	
Power level type	Power level type	Code Violation		RSSI	
Diagnostic byte	Diagnostic byte	K30.7 words		Spectrum replay	
Nominal rate	Nominal rate	Frame Sync Loss Events		<b>PIM Detection</b>	
Min rate	Min rate	<b>Alarm Injection</b>		Single Carrier	
Max RX level	Max RX level	R-LOS	SDI	Multi Carrier	
Max TX level	Max TX level	R-LOF	RAI	PIM Calculator	

## RFoBSAI™ Interference Analyzer (Options 070, 071, 072, and 073)

General Parameters					
Optical interface	Dual SFP/SFP+ (supports all MSA-compliant SFP modules)				
Line rates	768 Mbps (1x)	Option 070			
	1536 Mbps (2x)	Option 071			
	3072 Mbps (4x)	Option 072			
	6144 Mbps (8x)	Option 073			
Resolution Bandwidth (RBW)	1 kHz to 10 kHz (span ≤3.84 MHz)				
	1 KHz to 100 kHz (3.84 MHz < span ≤30.86 MHz)				
	Accuracy	±10% (nominal)			
Video bandwidth (RBW)	1 Hz to 100 KHz				
	Accuracy	±10% (nominal)			
RP3 type	LTE (FDD/TDD), UMTS (FDD)				
RP3 address	Hexadecimal				
TX clock	Internal/external/recovered				
Port type	Master/slave				
Bandwidth	LTE-FDD/TDD: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz UMTS: 3MHz for downlink, 5MHz for Uplink				
RP3 address list	RP3 address, technology, scrambler seed*, message count*				
Scrambler seed	Nx7 Index: 0 – 17, step 1				
Measurements					
Layer-2 Monitoring		Layer-2 Term		Interference Analyzer	
Port 1	Port 2	Port 1 or 2 (exclusive)		Spectrum	Sound indicator, AM/FM audio demodulation, interference ID, spectrum recorder
LOS	LOS	LOS			
LOF	LOF	LOF			
Code violation	Code violation	Optic RX level	dBm		
K30.7 words	K30.7 words	Optic TX level	dBm	Spectrogram	Collect up to 72 hr of data
Optic RX level	Optic RX level	Port Type	Master	RSSI	Collect up to 72 hr of data
Optic TX level	Optic TX level	TX state	State machine	Spectrum replay	X1, x2, x4, x8
Messages address	Message address	RX state	State machine	<b>PIM Detection</b>	Single carrier Multi carrier PIM calculator
Message counter	Message counter	TX address	RP3 address (hexadecimal)		
<b>SFP Information</b>	<b>SFP Information</b>	RX address	RP3 address (hexadecimal)		
Wavelength	Wavelength	Word sync loss event			
Vendor	Vendor	Code violation			
Vendor PN	Vendor PN	K30.7 words			
Vendor rev	Vendor rev	Frame sync loss events			
Power level type	Power level type	<b>Alarm Injection</b>			
Diagnostic byte	Diagnostic byte	K30.7	Single		
Nominal rate	Nominal rate	<b>Error Injection</b>			
Min rate	Min rate	Code	Single/rate		
Max RX level	Max RX level	Error rate	1E-3 to 1E-9		
Max TX level	Max TX level				

\*Available only when the link rate is 6.1 Gbps.



## RFoCPRI™ LTE-FDD Signal Generator (Option 081)

General Parameters		
Optical interface	Dual SFP/SFP+ (supports all MSA-compliant SFP modules)	
Link Rate	614.4 Mbps (1x), 1228.8 Mbps (2x), 2457.6 Mbps (4x), 3072.0 Mbps (5x), 4915.2 Mbps (8x), 6144.0 Mbps (10x), 9830.4 Mbps (16x)	
IQ Sample width	8 – 20 bits	
Mapping method	Packed and flexible	
Waveform	Off: CW On: LTE-FDD E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3	
Bandwidth	5/10/15/20 MHz	
Sampling Frequency	N x 3.84 MHz (N=2, 4, 6, 8)	
Gain dynamic range	0 to –50 dB	
Frequency error	±10 Hz + ref freq accuracy	99% confidence level
Residual EVM (RMS)	0.2% (typical)	Data EVM

## RFoCPRI LTE-TDD Signal Generator (Option 082)

General Parameters		
<b>Optical Hardware</b> (Option 008)		
Optical interface	Dual SFP/SFP+ (supports all MSA-compliant SFP modules)	
<b>CPRI Parameter</b>		
Line coding	8B/10B	
Line rates	614.4 Mbps, 1228.8 Mbps (Option 060) 2457.6 Mbps (Option 061) 3072.0 Mbps (Option 062) 4915.2 Mbps (Option 063) 6144.0 Mbps (Option 064) 9830.4 Mbps (Option 065)	
<b>CPRI Parameter</b>		
IQ sample width	4 – 20 (step 1)	
Mapping method	1 and 3	
Waveform	CW, LTE-TDD E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3	
Bandwidth	5/10/15/20 MHz	
Sampling frequency	N x 3.84 MHz (N=2, 4, 6, 8)	
Gain dynamic range	0 to –50 dB	
Frequency error	±10 Hz + ref freq accuracy, 99% confidence level	
Residual EVM (RMS)	0.02% (typical), data EVM	

## RFoCPRI LTE-FDD Multi Carrier Signal Generator (Option 083)

General Parameters	
<b>Optical Hardware (Option 008)</b>	
Interface	Two SFP/SFP+ ports (supports all MSA compliant SFP modules)
Max TX	4 carriers / SFP port, Dual port operation is available
<b>CPRI Parameter</b>	
Line coding	8B/10B
Line rates	614.4 Mbps 1228.8 Mbps 2457.6 Mbps 3072.0 Mbps 4915.2 Mbps 6144.0 Mbps 9830.4 Mbps
<b>CPRI Parameter</b>	
IQ Sample width	8 – 20 (step 1)
Waveform mapping	Carrier / TX Container Map Position
Waveform	CW, CW (two tone), LTE-FDD E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
Bandwidth	5 MHz, 10 MHz, 15 MHz, 20 MHz
Sampling Frequency	N x 3.84 MHz (N=2, 4, 6, 8)
Gain dynamic range	0 to –50 dB
Frequency error	±10 Hz + ref freq accuracy, 99% confidence level
Residual EVM (RMS)	0.02% (typical), Data EVM

## RFoCPRI LTE-TDD Multi Carrier Signal Generator (Option 084)

General Parameters	
<b>Optical Hardware (Option 008)</b>	
Interface	Two SFP/SFP+ ports (supports all MSA compliant SFP modules)
Max TX	4 carriers / SFP port, Dual port operation is available
<b>CPRI Parameter</b>	
Line coding	8B/10B
Line rates	614.4 Mbps 1228.8 Mbps 2457.6 Mbps 3072.0 Mbps 4915.2 Mbps 6144.0 Mbps 9830.4 Mbps
<b>CPRI Parameter</b>	
IQ Sample width	8 – 20 (step 1)
Waveform mapping	Carrier / TX Container Map Position
Waveform	CW, CW (two tone), LTE-TDD E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
Bandwidth	5 MHz, 10 MHz, 15 MHz, 20 MHz
Sampling Frequency	N x 3.84 MHz (N=2, 4, 6, 8)
Gain dynamic range	0 to –50 dB
Frequency error	±10 Hz + ref freq accuracy, 99% confidence level
Residual EVM (RMS)	0.02% (typical), Data EVM

## RFoOBSAI™ LTE-FDD Signal Generator (Option 086)

### General Parameters

#### Optical Hardware (Option 008)

Optical interface	Dual SFP/SFP+ (supports all MSA-compliant SFP modules)
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#### OBSAI Parameter

Line coding	8B/10B
Line rates	768 Mbps (Option 070) 1536 Mbps (Option 071) 3072 Mbps (Option 072) 6144 Mbps (Option 073)

#### CPRI Parameter

RP3 type	LTE, UMTS
RP3 address	Hexadecimal
Waveform	CW, LTE-FDD E-TM1.1, E-TM1.2, E-TM2, E-TM3.1, E-TM3.2, E-TM3.3
Bandwidth	5/10/15/20 MHz
Sampling frequency	N x 3.84 MHz (N=2, 4, 6, 8)
Gain dynamic range	0 to -50 dB
Frequency error	±10 Hz + ref freq accuracy, 99% confidence level
Residual EVM (RMS)	0.02% (typical), data EVM

## RFoCPRI LTE-FDD Signal Analyzer (Option 091)

General Parameters				
Optical interface	Dual SFP/SFP+ (supports all MSA-compliant SFP modules)			
Link rate	614.4 Mbps (1x), 1228.8 Mbps (2x), 2457.6 Mbps (4x), 3072.0 Mbps (5x), 4915.2 Mbps (8x), 6144.0 Mbps (10x), 9830.4 Mbps (16x)			
RBW	100 kHz			
IQ sample width	Uplink: 4 - 20 bits, downlink: 8 - 20 bits			
Mapping method	Packed and flexible			
AxC container/Carrier	Up to 8 AxC container per carrier			
LTE signal bandwidth	5/10/15/20 MHz			
Span	Fixed and equal to sampling frequency of LTE signal.			
Frequency error	±10 Hz + ref freq accuracy	99% confidence level		
Residual EVM (RMS)	0.02% (typical)	Data EVM		
Measurements				
Option 091				
<b>Channel Power</b>	<b>Power vs. Time (frame)</b>	<b>Control Channel</b>	Data EVM RMS, peak	Antenna 1 RS power and EVM
Channel power	Frame average power	Control channel summary (P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN*)	RS EVM RMS, peak	Antenna 2 RS power and EVM
Spectral density	Subframe power		Cell, group, sector ID	
Peak to average power	First slot power		<b>Frame</b>	
<b>Occupied Bandwidth</b>	Second slot power		MBSFN*	
Occupied bandwidth	Cell ID, I/Q origin offset	EVM, relative or absolute power, modulation type	Frame summary table (P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN*, PDSCH/Data* QPSK, PDSCH/Data* 16 QAM, PDSCH/Data* 64 QAM)	Data allocation vs frame
Integrated power	Time offset	Each control channels'	EVM, relative or absolute power, modulation type	Resource block power
Occupied power	<b>Constellation</b>			I/Q diagram
	MBSFN*	Modulation format	EVM, relative or absolute power, modulation type	Data utilization
	RS TX power	Frequency error		Data allocation vs subframe
	PDSCH/data* QPSK EVM	I/Q origin offset	EVM, relative or absolute power, modulation type	Resource block power
	PDSCH/data* 16 QAM EVM			EVM RMS, EVM peak
	PDSCH/data* 64 QAM EVM	<b>Subframe</b>	Frame average power	<b>Power Statistics CCDF</b>
	Data EVM RMS	MBSFN*	OFDM symbol power	
	Data EVM peak	Subframe summary table (P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN*, PDSCH/data* QPSK, PDSCH/data* 16 QAM, PDSCH/data* 64 QAM)	Frequency error	
	Frequency error		I/Q origin offset	
	Time error		EVM RMS, peak	
	Data Channel		Data EVM RMS, peak	
	MBSFN*		Cell, group, sector ID	
	Resource block power		<b>Time Alignment Error</b>	
	I/Q diagram		Time alignment error trend	
	RB power modulation format		Time alignment error	
	I/Q origin offset	Subframe power	RS power difference	
	EVM RMS, EVM peak	OFDM symbol power	Antenna 0 RS power and EVM	
		Frequency, time error		

## RFoCPRI LTE-TDD Analyzer (Option 092)

General Parameters			
<b>Optical Hardware</b> (Option 008)			
Interface	Dual SFP/SFP+ (supports all MSA-compliant SFP modules)		
<b>CPRI Parameter</b>			
Line coding	8B/10B		
Line rates	614.4 Mbps, 1228.8 Mbps (Option 060) 2457.6 Mbps (Option 061) 3072.0 Mbps (Option 062) 4915.2 Mbps (Option 063) 6144.0 Mbps (Option 064) 9830.4 Mbps (Option 065)		
<b>Resolution Bandwidth (RBW)</b>			
-3 dB bandwidth	100 kHz		
Accuracy	±10% (nominal)		
<b>CPRI Parameter</b>			
IQ sample width	4 – 20 (step 1)		
Mapping method	1 and 3		
TX clock	Internal/external/recovered		
Port type	Master/slave		
Map position	AxC#0 – AxC#7		
Bandwidth	5/10/15/20 MHz		
Span	Fixed and equal to sampling frequency of LTE signal		
Frequency error	±10 Hz + ref freq accuracy, 99% confidence level		
Residual EVM (RMS)	0.02% (typical), Data EVM		
<b>Measurements</b>			
<b>Option 92</b>			
<b>Channel Power</b>	<b>Constellation</b>	<b>Subframe</b>	<b>Data Allocation Map</b>
Channel power	MBSFN*	MBSFN*	Data allocation vs. frame
Spectral density	RS TX Power	Subframe Summary	Resource block power
Peak to average power	PDSCH/data* QPSK EVM	EVM, Abs. and Rel. power	OFDM symbol power
<b>Occupied bandwidth</b>	PDSCH/data* 16QAM EVM	Subframe power	Data utilization
Occupied bandwidth	PDSCH/data* 64QAM EVM	OFDM symbol power	Data allocation vs I
Integrated Power	Data EVM RMS, peak	Frequency error	Resource block power
Occupied power	Frequency error	Time error	Data utilization
<b>Power vs. Time (Frame)</b>	Time error	Data EVM RMS, peak	<b>Power Statistics CCDF</b>
Frame average power	<b>Control Channel</b>	RS EVM RMS, peak	Average power
Subframe power	Control channel summary	Cell, group, sector ID	Peak power crest factor
First Slot power	EVM, Rel or Abs power of each control channel	<b>Time Alignment Error</b>	
Second slot power		Time alignment error trend	
Cell ID, I/Q origin offset	IQ Diagram	Time alignment error	
Time offset	Modulation format	RS power difference	
<b>Power vs. Time (Slot)</b>	Frequency error	Antenna 0 RS power, EVM	
Slot average power	I/Q origin offset	Antenna 1 RS power, EVM	
Transient period length	Control EVM RMS, peak	Antenna 2 RS power, EVM **	
Off power	<b>Data Channel</b>	Antenna 3 RS power, EVM **	
	MBSFN*	Cell, group, sector ID	
	Resource block power		
	I/Q diagram		
	RB power		
	Modulation format		
	I/Q origin offset		
	EVM RMS, peak		

Longitude, latitude, and satellite in all screens

## RFoOBSAI LTE-FDD Analyzer (Option 096)

General Parameters			
<b>Optical Hardware</b> (Option 008)			
Interface	Dual SFP/SFP+ (supports all MSA-compliant SFP modules)		
<b>OBSAI Parameter</b>			
Line coding	8B/10B		
Line rates	768 Mbps (Option 070) 1536 Mbps (Option 071) 3072 Mbps (Option 072) 6144 Mbps (Option 073)		
<b>Resolution Bandwidth (RBW)</b>			
-3 dB bandwidth	100 kHz		
Accuracy	±10% (nominal)		
<b>OBSAI Parameter</b>			
RP3 type	LTE (FDD/TDD), UMTS (FDD)		
RP3 address	Hexadecimal		
TX clock	Internal/external/recovered		
Port type	Master/slave		
Bandwidth	LTE-FDD/TDD: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz UMTS: 3 MHz for downlink, 5 MHz for uplink		
RP3 address list	RP3 address, technology, scrambler seed*, message count*		
Scrambler seed	Nx7 index: 0 – 17, step 1		
Measurements			
Option 96			
<b>Channel Power</b>	<b>Constellation</b>	<b>Subframe</b>	<b>Frame</b>
Channel power	MBSFN*	MBSFN*	MBSFN*
Spectral density	RS TX power	Subframe summary	Frame summary
Peak to average power	PDSCH/data* QPSK EVM	EVM, Abs. and Rel. power	EVM, Abs. and Rel. power
<b>Occupied bandwidth</b>	PDSCH/data* 16 QAM EVM	Subframe power	Frame average power
Occupied bandwidth	PDSCH/data* 64 QAM EVM	OFDM symbol power	OFDM symbol power
Integrated Power	Data EVM RMS, peak	Frequency error	Frequency error
Occupied power	Frequency error	Time error	IQ origin offset
<b>Power vs. Time (Frame)</b>	Time error	Data EVM RMS, peak	Data EVM RMS, peak
Frame average power	<b>Control Channel</b>	RS EVM RMS, peak	Control EVM RMS, peak
Subframe power	Control channel summary	Cell, group, sector ID	Cell, group, sector ID
First Slot power	EVM, Rel or Abs power of each control channel	<b>Time Alignment Error</b>	<b>Data Allocation Map</b>
Second slot power		Time alignment error trend	Data allocation vs. frame
Cell ID, I/Q origin offset	IQ Diagram	Time alignment error	Resource block power
Time offset	Modulation format	RS power difference	OFDM symbol power
<b>Power Statistics CCDF</b>	Frequency error	Antenna 0 RS power, EVM	Data utilization
Average power	I/Q origin offset	Antenna 1 RS power, EVM	Data allocation vs. subframe
Peak power crest factor	Control EVM RMS, peak	Antenna 2 RS power, EVM **	Resource block power
	<b>Data Channel</b>	Antenna 3 RS power, EVM **	Data Utilization
	MBSFN*	Cell, group, sector ID	
	Resource block power		
	I/Q diagram		
	RB power		
	Modulation format		
	I/Q origin offset		
	EVM RMS, peak		

Longitude, latitude, and satellite in all screens

## RFoCPRI BBU Emulation for Alcatel-Lucent (Option 101)

General Parameters			
<b>Optical Hardware</b> (Option 008)			
Interface	Dual SFP/SFP+ (supports all MSA-compliant SFP modules)		
Max TX	4 Carrier/SFP port (Option 083 or 084), Dual port operation		
<b>CPRI Parameter</b>			
Line coding	8B/10B		
Line rates	614.4 Mbps, 1228.8 Mbps (Option 060) 2457.6 Mbps (Option 061) 3072.0 Mbps (Option 062) 4915.2 Mbps (Option 063) 6144.0 Mbps (Option 064) 9830.4 Mbps (Option 065)		
<b>Resolution Bandwidth (RBW)</b>			
-3 dB bandwidth	1 kHz to 10 kHz (span $\leq$ 3.84 MHz) 1 kHz to 100 kHz (3.84 MHz < span $\leq$ 30.86 MHz)		
Accuracy	$\pm$ 10% (nominal)		
<b>CPRI parameter</b>			
IQ Sample width	4 – 20 (step 1)		
Mapping method	1 and 3		
TX clock	Internal/external		
Port type	Master		
Bandwidth	5/10/15/20 MHz		
Span	Adjustable (max span= sampling frequency)		
Measurements			
Option 101			
<i>Carrier Configuration</i>	<i>SFP Information</i>	<i>Spectrum Clearance</i>	<i>Coverage Range</i>
RRH description	RRH description	Spectrum	Spectrum
Carrier information	SFP information	Spectrogram	Carrier information
<i>CPRI and Active SW</i>	<i>RTD Information</i>	RSSI	VSWR
RRH description	Round Trip Delay	Dual spectrum	Tilt
CPRI state	Round Trip Delay (avg/min/max)	Dual active trace	<i>PIM Analysis</i>
Active SW		Dual spectrogram	Single radio Spectrum flatness
Option 101/083/084			
PIM Analysis with two sweep tones from a single SFP port.		PIM Detection with up to 4 LTE carriers	
PIM Analysis with two sweep tones from each SFP port under dual BBU emulation mode		PIM Detection with up to 8 LTE carriers (2 SFP ports x 4 carriers) under dual BBU emulation mode	

## Layer-2 BERT (Option 110)

General Parameters			
Optical interface	Dual SFP/SFP+ (supports all MSA compliant SFP modules)		
Line rates	614.4 Mbps (1x), 1228.8 Mbps (2x), 2457.6 Mbps (4x), 3072.0 Mbps (5x), 4915.2 Mbps (8x), 6144.0 Mbps (10x), 9830.4 Mbps (16x)		
TX clock	Internal/external/recovered		
Port	SFP Port 1 and Port 2 (Dual independent operation)		
Port type	Master/Slave		
Alarm / Error Injection	Alarm	R-LOS/R-LOF/RAI/SDI	
	Error	Code/ K30.7/ Bit	
	Insert Type	Single/ Rate	
Bit Pattern	Live, Digital Word, ANSI 2 <sup>23</sup> -1, ANSI 2 <sup>23</sup> -1 Inv, ANSI 2 <sup>31</sup> -1, ANSI 2 <sup>31</sup> -1 Inv, ANSI 2 <sup>20</sup> -1, ANSI 2 <sup>20</sup> -1 Inv, ANSI 2 <sup>15</sup> -1, ANSI 2 <sup>15</sup> -1 Inv, ANSI 2 <sup>11</sup> -1, ANSI 2 <sup>11</sup> -1 Inv, ITU 2 <sup>23</sup> -1, ITU 2 <sup>23</sup> -1 Inv, ITU 2 <sup>31</sup> -1, ITU 2 <sup>31</sup> -1 Inv, ITU 2 <sup>15</sup> -1, ITU 2 <sup>15</sup> -1 Inv, ITU 2 <sup>11</sup> -1, ITU 2 <sup>11</sup> -1 Inv		
Bit Pattern Mapping mode	Bulk mode for whole payload		
	Channelized mode for AxC Group	Bandwidth: 5MHz, 10MHz, 15MHz, 20MHz Map Position: AxC 0 - 7	
Round Trip Delay	Resolution: ns (min step: 1ns)		
Measurements			
Common			
LOS	RAI	Pattern Sync	Optic Rx level
LOF	SDI		Optic Tx level
BERT	Count	L1 Inband	
Code Violation	Rx Code Words	RX Protocol Version	
Code Violation Rate	Tx Code Words	Rx C&M HDLC Rate (kbps)	
RX K30.7 Words	Rx Frame	Rx C&M Eth Subchannel Number	
Word Sync Loss Events	Tx Frame	TX Protocol Version	
Frame Sync Loss Events	Round Trip Delay	TX C&M HDLC Rate (kbps)	
Bit Errors	Round Trip Delay (Offset)	TX C&M Eth Subchannel Number	
Bit Error Rate	Round Trip Delay (avg)	Port Type	
Svc Disruption (ms)	Round Trip Delay (min)	Start-up State	
	Round Trip Delay (max)		



## General Information

Inputs and Outputs	
<b>RF In</b> Connector Impedance Damage level	Spectrum analyzer Type-N, female 50 $\Omega$ (nominal) >+40 dBm, $\pm$ 50 V DC (nominal)
<b>Reflection/RF Out</b> Connector Impedance Damage level	Cable and antenna analyzer Type-N, female 50 $\Omega$ (nominal) >+37 dBm, $\pm$ 50 V DC (nominal)
<b>RF In</b> Connector Impedance Damage level	Cable and antenna analyzer Type-N, female 50 $\Omega$ (nominal) >+25 dBm, $\pm$ 50 V DC (nominal)
<b>External Trigger, GPS</b> Connector Impedance	SMA, female 50 $\Omega$ (nominal)
<b>External Ref</b> Connector Impedance Input frequency Input range	SMA, female 50 $\Omega$ (nominal) 10 MHz, 13 MHz, 15 MHz -5 to +5 dBm
<b>USB</b> USB host <sup>1</sup> USB client <sup>2</sup>	Type A, 1 port Type B, 1 port
<b>SFP Cage</b> Port 1 Port 2	RFoFiber (with option 008) SFP/SFP+ compatible
LAN <sup>3</sup>	RJ45, 10/100Base-T
Audio jack	3.5 mm headphone jack
External power	5.5 mm barrel connector
Speaker	Built-in speaker
Display	
Type	Resistive touch screen
Size	8 inch, LED backlight, transfective LCD with anti-glare coating
Power	
External DC input	18 to 19 V DC
Power consumption	42 W 54 W maximum (when charging battery)

Battery		
Type	10.8 V, 7800 mA/hr (Lithium ion)	
Operating time	>3 hr (typical at spectrum analyzer)	
Charge time	3 hr (while not operating) 9 hr (while operating)	
Charging temperature	0 to 45°C (32 to 104°F) $\leq$ 85% RH	
Discharging temperature	-20 to 55°C (4 to 131°F) $\leq$ 85% RH	
Storage temperature <sup>4</sup>	0 to 25°C (32 to 77°F)	
Data Storage		
Internal	Maximum 512 MB	
External <sup>5</sup>	Up to 32 GB with FAT32 format	
Environmental		
Operating Temperature		
AC power	0 to 40°C (32 to 104°F) with no derating	
Battery	0 to 40°C (32 to 104°F) at charging -10 to 55°C (14 to 131°F) at discharging -10 to 50°C (14 to 122°F) at discharging with Option 008	
Maximum humidity	95% RH (noncondensing)	
Shock and vibration	MIL-PRF-28800F class 2	
Storage temperature <sup>6</sup>	-30 to 71°C (-22 to 160°F)	
EMC		
IEC/EN 61326-1:2013 (complies with European EMC)		
CISPR11:2009 +A1:2010		
ESD		
IEC/EN 61000-4-2		
Size and Weight (standard configuration)		
Weight (with battery)	Standard	4.17 kg (9.19 lb)
	Fully loaded	4.34 kg (9.57 lb)
Size (W x H x D)	295 x 195 x 82 mm	
Warranty		
3 years		
Calibration Cycle		
1 year		

1. Connects flash drive, power sensor, EZ-Cal kit, and fiber microscope.
2. Data transfer and PC Application based remote control.
3. Data transfer or PC Application/Web-based remote control.
4. 20 to 85% RH, store battery pack in low-humidity environment; extended exposure to temperature above 45°C could significantly degrade battery performance and life.
5. Supports USB 2.0 compatible memory devices.
6. With the battery pack removed.

## Ordering Information

Description	Part Number
<b>Standard CellAdvisor Base Station Analyzer</b>	
Base station analyzer includes: Spectrum analyzer 100 kHz to 4 GHz RF power meter 10 MHz to 4 GHz Cable and antenna 5 MHz to 4 GHz	JD745B <sup>1,2</sup>
<b>Options</b>	
NOTE: Upgrade options for the JD745B use the designation JD745BU before the respective last three-digit option number.	
2 Port transmission measurements for JD745B <sup>3</sup>	JD745B001
Bias Tee for JD745B <sup>4</sup>	JD745B002
CW signal generator for JD745B	JD745B003
Optical hardware for JD745B <sup>5</sup>	JD745B008
GPS receiver and antenna for JD745B	JD745B010
Interference analyzer for JD745B <sup>6,7</sup>	JD745B011
Channel scanner for JD745B	JD745B012
Bluetooth connectivity for JD745B <sup>8</sup>	JD745B013
LTE-FDD RAN performance indicator for JD745B <sup>9</sup>	JD745B014
LTE-TDD RAN performance indicator for JD745B <sup>10</sup>	JD745B015
Wi-Fi connectivity for JD745B <sup>11</sup>	JD745B016
cdmaOne/cdma2000 analyzer for JD745B	JD745B020
EV-DO analyzer for JD745B <sup>12</sup>	JD745B021
GSM/GPRS/EDGE analyzer for JD745B	JD745B022
WCDMA/HSPA+ analyzer for JD745B	JD745B023
TD-SCDMA analyzer for JD745B	JD745B025
Mobile WiMAX analyzer for JD745B	JD745B026
LTE - FDD analyzer for JD745B <sup>13</sup>	JD745B028
LTE - TDD analyzer for JD745B <sup>13</sup>	JD745B029
LTE Advanced - FDD analyzer for JD745B <sup>14,15</sup>	JD745B030
LTE Advanced - TDD analyzer for JD745B <sup>15,16</sup>	JD745B031
LTE-FDD 256 QAM Demodulator for JD745B <sup>17</sup>	JD745B032
LTE-TDD 256 QAM Demodulator for JD745B <sup>18</sup>	JD745B033
NB-IoT Analyzer for JD745B <sup>14</sup>	JD745B034
cdmaOne/cdma2000 OTA analyzer for JD745B <sup>19</sup>	JD745B040
EV-DO OTA analyzer for JD745B <sup>19</sup>	JD745B041
GSM/GPRS/EDGE OTA analyzer for JD745B <sup>19</sup>	JD745B042
WCDMA/HSPA+ OTA analyzer for JD745B <sup>19</sup>	JD745B043
TD-SCDMA OTA analyzer for JD745B <sup>19</sup>	JD745B045
Mobile WiMAX OTA analyzer for JD745B <sup>19</sup>	JD745B046
LTE - FDD OTA analyzer for JD745B <sup>19</sup>	JD745B048
LTE - TDD OTA analyzer for JD745B <sup>19</sup>	JD745B049
EMF analyzer for JD745B <sup>20</sup>	JD745B050
RFoCPRI 614M & 1.2G interference analyzer for JD745B <sup>21,22</sup>	JD745B060
RFoCPRI 2.4G interference analyzer for JD745B <sup>21,22</sup>	JD745B061
RFoCPRI 3.1G interference analyzer for JD745B <sup>21,22</sup>	JD745B062
RFoCPRI 4.9G interference analyzer for JD745B <sup>21,22</sup>	JD745B063
RFoCPRI 6.1G interference analyzer for JD745B <sup>21,22</sup>	JD745B064
RFoCPRI 9.8G interference analyzer for JD745B <sup>21,22</sup>	JD745B065
RFoCPRI GSM interference analyzer for JD745B <sup>21,22,23</sup>	JD745B068

Description	Part Number
RFoBSAI 768M Interference analyzer for JD745B <sup>21,22</sup>	JD745B070
RFoBSAI 1.5G interference analyzer for JD745B <sup>21,22</sup>	JD745B071
RFoBSAI 3.1G interference analyzer for JD745B <sup>21,22</sup>	JD745B072
RFoBSAI 6.1G interference analyzer for JD745B <sup>21,22</sup>	JD745B073
RFoCPRI LTE-FDD signal generator for JD745B <sup>21,22,23</sup>	JD745B081
RFoCPRI LTE-TDD signal generator for JD745B <sup>21,22,23</sup>	JD745B082
RFoCPRI LTE-FDD multi carrier signal generator for JD745B <sup>21,22,24</sup>	JD745B083
RFoCPRI LTE-TDD multi carrier signal generator for JD745B <sup>21,22,25</sup>	JD745B084
RFoBSAI LTE-FDD signal generator for JD745B <sup>21,22,26</sup>	JD745B086
RFoCPRI LTE-FDD signal analyzer for JD745B <sup>21,22,23</sup>	JD745B091
RFoCPRI LTE-TDD signal analyzer for JD745B <sup>21,22,23</sup>	JD745B092
RFoBSAI LTE-FDD signal analyzer for JD745B <sup>21,22,26</sup>	JD745B096
ALU BBU emulation for JD745B <sup>21,22</sup>	JD745B101
CPRI Layer-2 BERT for JD745B <sup>21,22,23</sup>	JD745B110
2 port transmission measurements floating license for JD740B/JD780B	JD780B001-FL
GPS receiver and antenna floating license for JD740B/JD780B	JD780B010-FL
Interference analyzer floating license for JD740B/JD780B	JD780B011-FL
Channel scanner floating license for JD740B/JD780B	JD780B012-FL
Bluetooth connectivity floating license for JD740B/JD780B	JD780B013-FL
LTE-FDD RAN performance indicator floating license for JD740B/JD780B	JD780B014-FL
LTE-TDD RAN performance indicator floating license for JD740B/JD780B	JD780B015-FL
Wi-Fi connectivity floating license for JD740B/JD780B	JD780B016-FL
cdmaOne/cdma2000 analyzer floating license for JD740B/JD780B	JD780B020-FL
EV-DO analyzer floating license for JD740B/JD780B	JD780B021-FL
GSM/GPRS/EDGE analyzer floating license for JD740B/JD780B	JD780B022-FL
WCDMA/HSPA+ analyzer floating license for JD740B/JD780B	JD780B023-FL
TD-SCDMA analyzer floating license for JD740B/JD780B	JD780B025-FL
Mobile WiMAX analyzer floating license for JD740B/JD780B	JD780B026-FL
LTE - FDD analyzer floating license for JD740B/JD780B	JD780B028-FL
LTE - TDD analyzer floating license for JD740B/JD780B	JD780B029-FL
LTE Advanced - FDD analyzer floating license for JD740B/JD780B	JD780B030-FL
LTE Advanced - TDD analyzer floating license for JD740B/JD780B	JD780B031-FL
LTE-FDD 256 QAM Demodulator floating license for JD740B/JD780B	JD780B032-FL
LTE-TDD 256 QAM Demodulator floating license for JD740B/JD780B	JD780B033-FL
cdmaOne/cdma2000 OTA analyzer floating license for JD740B/JD780B	JD780B040-FL

## Ordering Information (Continued)

Description	Part Number
EV-DO OTA analyzer floating license for JD740B/JD780B	JD780B041-FL
GSM/GPRS/EDGE OTA analyzer floating license for JD740B/JD780B	JD780B042-FL
WCDMA/HSPA+ OTA analyzer floating license for JD740B/JD780B	JD780B043-FL
TD-SCDMA OTA analyzer floating license for JD740B/JD780B	JD780B045-FL
Mobile WiMAX OTA analyzer floating license for JD740B/JD780B	JD780B046-FL
LTE - FDD OTA analyzer floating license for JD740B/JD780B	JD780B048-FL
LTE - TDD OTA analyzer floating license for JD740B/JD780B	JD780B049-FL
EMF analyzer floating license for JD740B/JD780B	JD780B050-FL
RFoCPRI 614M & 1.2G interference analyzer floating license for JD740B/JD780B	JD780B060-FL
RFoCPRI 2.4G interference analyzer floating license for JD740B/JD780B	JD780B061-FL
RFoCPRI 3.1G interference analyzer floating license for JD740B/JD780B	JD780B062-FL
RFoCPRI 4.9G interference analyzer floating license for JD740B/JD780B	JD780B063-FL
RFoCPRI 6.1G interference analyzer floating license for JD740B/JD780B	JD780B064-FL
RFoCPRI 9.8G interference analyzer floating license for JD740B/JD780B	JD780B065-FL
RFoBSAI 768M interference analyzer floating license for JD740B/JD780B	JD780B070-FL
RFoBSAI 1.5G interference analyzer floating license for JD740B/JD780B	JD780B071-FL
RFoBSAI 3.1G interference analyzer floating license for JD740B/JD780B	JD780B072-FL
RFoBSAI 6.1G interference analyzer floating license for JD740B/JD780B	JD780B073-FL
RFoCPRI LTE-FDD signal generator floating license for JD740B/JD780B	JD780B081-FL
RFoCPRI LTE-TDD signal generator floating license for JD740B/JD780B	JD780B082-FL
RFoBSAI LTE-FDD signal generator floating license for JD740B/JD780B	JD780B086-FL
RFoCPRI LTE-FDD signal analyzer floating license for JD740B/JD780B	JD780B091-FL
RFoCPRI LTE-TDD signal analyzer floating license for JD740B/JD780B	JD780B092-FL
RFoBSAI LTE-FDD signal analyzer floating license for JD740B/JD780B	JD780B096-FL
ALU BBU emulation floating license for JD740B/JD780B	JD780B101-FL

Description	Part Number
<b>Optional Accessories</b>	
<b>Accessory — RF Calibrators (General)</b>	
Y- calibration kit Type-N(m), DC to 4 GHz, 50 ohm	JD72450509
Y- calibration kit DIN(m), DC to 4 GHz, 50 ohm	JD72450510
Y- calibration kit Type-N(m), DC to 6 GHz, 50 ohm	JD78050509
Y- calibration kit DIN(m), DC to 6 GHz, 50 ohm	JD78050510
EZ-Cal kit Type-N(m), DC to 6 GHz, 50 ohm	JD70050509
Dual port Type-N 4 GHz calibration kit	JD71050507
Dual port DIN 4 GHz calibration kit	JD71050508
Dual port Type-N 6 GHz calibration kit	JD78050507
Dual port DIN 6 GHz calibration kit	JD78050508
50 ohm Load, DC to 4 GHz, 1 W	GC72550511
<b>Accessory - RF Cables (Cables)</b>	
RF cable DC to 8 GHz Type-N(m) to Type-N(m), 1.0 m	G700050530
RF cable DC to 8 GHz Type-N(m) to Type-N(f), 1.5 m	G700050531
RF cable DC to 8 GHz Type-N(m) to Type-N(f), 3.0 m	G700050532
RF cable DC to 18 GHz Type-N(m) to SMA(m), 1.5 m	G710050533
RF cable DC to 18 GHz Type-N(m) to QMA(m), 1.5 m	G710050534
RF cable DC to 18 GHz Type-N(m) to SMB(m), 1.5 m	G710050535
RF cable DC to 6 GHz Type-N(m) to DIN(f), 1.5 m	G710050536
RF cable DC to 4 GHz Type-N(m) to 1.0/2.3 (m), 1.5 m	G710050537
Phase-stable RF cable w grip DC to 6 GHz Type-N(m) to Type-N(f), 1.5 m	G700050540
Phase-stable RF cable w grip DC to 6 GHz Type-N(m) to DIN(f), 1.5 m	G700050541
RF cable DC to 18 GHz Type-N(m) to Type-N(f), 1.5 m	G710050531
<b>Accessory - Optic Cables (Cables)</b>	
SM/LC T-Jumper and 1.5 m fiber cable	G700050401
MM/LC T-Jumper and 1.5 m fiber cable	G700050402
<b>Accessory - RF Antennas (General)</b>	
RF omni antenna Type-N(m), 806 to 896 MHz	G700050353
RF omni antenna Type-N(m), 870 to 960 MHz	G700050354
RF omni antenna Type-N(m), 1710 to 2170 MHz	G700050355
RF omni antenna Type-N(m), 720 to 800 MHz	G700050356
RF omni antenna Type-N(m), 2300 to 2700 MHz	G700050357
Mag mount RF omni antenna Type-N(m), 689 to 1200 MHz, 1700 to 2700 MHz, 3000 to 6000 MHz	G700050358
RF yagi antenna Type-N(f), 1750 to 2390 MHz, 10.2 dBd	G700050363
RF yagi antenna Type-N(f), 806 to 896 MHz, 10.2 dBd	G700050364
RF yagi antenna Type-N(f), 866 to 960 MHz, 9.8 dBd	G700050365
RF yagi antenna SMA(f), 700 to 4000 MHz, 1.85 dBd	G700050366
RF yagi antenna SMA(f), 700 to 6000 MHz, 2.85 dBd	G700050367
Isotropic Antenna Type-N(m), 26 MHz to 3 GHz	G700050380

## Ordering Information (Continued)

Description	Part Number
<b>Accessory - RF Power Sensor (General)</b>	
Directional power sensor (peak and average power) 300 to 3800 MHz	JD731B
Terminating power sensor (Average Power) 20 to 3800 MHz	JD732B
Directional power sensor (peak and average power) 150 to 3500 MHz	JD733A
Terminating power sensor (peak power) 20 to 3800 MHz	JD734B
Terminating power sensor (average/peak power) 20 to 3800 MHz	JD736B
<b>Accessory - RF Adapters (Connector &amp; Adapters)</b>	
Adapter Type-N(m) to DIN(f), DC to 7.5 GHz, 50 ohm	G700050571
Adapter DIN(m) to DIN(m), DC to 7.5 GHz, 50 ohm	G700050572
Adapter Type-N(m) to SMA(f) DC to 18 GHz, 50 ohm	G700050573
Adapter Type-N(m) to BNC(f), DC to 4 GHz, 50 ohm	G700050574
Adapter Type-N(f) to Type-N(f), DC to 18 GHz 50 ohm	G700050575
Adapter Type-N(m) to DIN(m), DC to 7.5 GHz, 50 ohm	G700050576
Adapter Type-N(f) to DIN(f), DC to 7.5 GHz, 50 ohm	G700050577
Adapter Type-N(f) to DIN(m), DC to 7.5 GHz, 50 ohm	G700050578
Adapter DIN(f) to DIN(f), DC to 7.5 GHz, 50 ohm	G700050579
Adapter Type-N(m) to Type-N(m), DC to 11 GHz 50 ohm	G700050580
Adapter N(m) to QMA(f), DC to 6.0 GHz, 50 ohm	G700050581
Adapter N(m) to QMA(m), DC to 6.0 GHz, 50 ohm	G700050582
Adapter N(m) to 4.1/9.5 MINI DIN (f), DC to 6.0 GHz, 50 ohm	G700050583
Adapter N(m) to 4.1/9.5 MINI DIN (m), DC to 6.0 GHz, 0 ohm	G700050584
Adapter N(m) to 4.3-10 (f), DC to 6.0 GHz, 50 ohm	G700050585
Adapter N(m) to 4.3-10 (m), DC to 6.0 GHz, 50 ohm	G700050586
Adapter Type-N(m) to DIN(f), DC to 4 GHz, 50 ohm	G710050571
Adapter N(f) to N(f), DC to 4 GHz, 50 ohm	G710050575
Adapter Type-N(f) to DIN(f), DC to 4 GHz, 50 ohm	G710050577
Adapter Type-N(f) to DIN(m), DC to 7 GHz, 50 ohm	G710050578
<b>Accessory - RF Miscellaneous (General)</b>	
Attenuator 40 dB, 100 W, DC to 4 GHz (unidirectional)	G710050581
RF directional coupler, 700 to 4000 MHz, 30 dB, 50 W Input/output; Type-N(m) to Type-N(f), tap off; Type-N(f)	G710050585
RF combiner, 700 to 4000 MHz, Type-N(f) to Type-N(m)	G710050586
4x1 RF combiner, 700 to 4000 MHz, Type-N(f) to Type-N(m)	G710050587
Bandpass filter 696 MHz to 716 MHz, N(m) to N(f), 50 ohm	G700050601
Bandpass filter 776 MHz to 788 MHz, N(m) to N(f), 50 ohm	G700050602
Bandpass filter 806 MHz to 849 MHz, N(m) to N(f), 50 ohm	G700050603
Bandpass filter 1710 MHz to 1755 MHz, N(m) to N(f), 50 ohm	G700050604
Bandpass filter 1850 MHz to 1910 MHz, N(m) to N(f), 50 ohm	G700050605

Description	Part Number
<b>Accessory - General</b>	
USB Bluetooth dongle and dipole antenna 5 dBi	JD70050006
GPS antenna for JD740 and JD780 series	JD71050351
AntennaAdvisor handle	JD70050007
Cross LAN cable (6ft)	G700550335
USB A to B cable (1.8m)	GC73050515
> 1GB USB memory	GC72450518
Stylus pen	G710550316
<b>Accessory - Battery &amp; Chargers</b>	
Rechargeable lithium ion battery	G710550325
JD700B series AC/DC power adapter_90 W_15 V	JD70050326
Automotive cigarette lighter/12V DC adapter	G710550323
External battery charger	G710550324
<b>Accessory - Manual &amp; Documentation</b>	
JD700B series user's guide - printed version	JD700B362
<b>Accessory - Carrying Case</b>	
Soft carrying case	JD74050341
Hard carrying Case	JD71050342
Hard carrying case with wheels	JD70050342
CellAdvisor backpack carrying case	JD70050343
<b>Optional TAP</b>	
Optical nTAP, three-channel, 50 µm, MM, LC, 50/50 split ratio	TO3-M5-LC-55-K
Optical nTAP, three-channel, 9 µm, SM, LC, 50/50 split ratio	TO3-SM-LC-55-K
<b>Optional SFP Transceiver</b>	
SFP 4G/2G/1G Fibre Channel & 1G Ethernet, 850nm, 150-500m, SX	CSFP-4G-8-1
SFP 4G/ 2G/ 1G Fibre Channel & 1G Ethernet, 1310nm, 5km, LX	CSFP-4G-3-1
SFP 4G/2G/1G Fibre Channel & 1G Ethernet, 1310nm, 20km, LX	CSFP-4G-3-2
SFP+ 8G/4G/2G Fibre Channel, 6G/4.9G CPRI 850 nm MM Multirate	CSFP-PLUS-8G-8-1
SFP+ 8G/4G/2G Fibre Channel, 6G/4.9G CPRI 1310nm SM, 10km	CSFP-PLUS-8G-3-1
SFP+ 1G/10G Ethernet, 1G/10G Fiber Channel & 9.8G CPRI, 850nm, MM, 300m	SFPPLUS-1GE-10GE-8-1
SFP+ 1G/10G Ethernet, 1G/10G Fiber Channel & 9.8G CPRI, 1310nm, SM, 10km <sup>32</sup>	SFPPLUS-1GE-10GE-3-1

## Ordering Information (Continued)

Description	Part Number
<b>Optical Power Meters and Fiber Microscope Kits</b>	
USB optical power meter with software, 2.5 and 1.25 mm interfaces, 30-inch USB extender, and carry- ing pouch	MP-60A
USB optical power meter — high power, with software, 2.5 and 1.25 mm interfaces, 30-inch USB extender, and carrying pouch	MP-80A
KIT: FBP-P5000i digital probe, FiberChekPRO software, case, and four tips	FBP-SD101
KIT: FBP-P5000i digital probe, FiberChekPRO software, case, and seven tips	FBP-MTS-101
KIT: FBP-P5000i digital probe, MP-60A USB power meter, FiberChekPRO software, case, tips, and adapters	FIT-SD103
KIT: FBP-P5000i digital probe, MP-60A USB power meter, FiberChekPRO software, case, tips, adapters, and cleaning materials	FIT-SD103-C
KIT: FBP-P5000i digital probe, MP-80A USB power meter, FiberChekPRO software, case, tips, and adapters	FIT-SD113

- Supplied accessories: User's Guide, USB Memory (1GB), Cross LAN Cable, USB Cable, DC car adapter, Li-Ion Battery, AC/DC adapter, Stylus Pen
- Highly recommended using the Calibration Kit (JD78050509, JD78050510, JD70050509)
- Highly recommended using the Calibration Kit (JD78050507, JD78050508) and Bias Tee (option 002)
- Requires option 001
- Needs for RfOFIBER options 060,061,062,063,064,065,068,070,071,072,073,081,082,083,084,086,091,092,096,101
- Needs Omni or Yagi antenna
- Highly recommended adding option 010
- Includes a Bluetooth USB dongles with 5 dBi dipole antennas (JD70050006)
- Requires option 013 and option 028 and Needs TrueSite(FTA)
- Requires option 013 and option 029 and Needs TrueSite(FTA)
- Includes a Wi-Fi USB dongle
- Requires option 020
- Highly recommended using the RF Directional Coupler or RF combiner (G710050585 or G710050586)
- Requires option 028
- Highly recommended using the 4x1 RF combiner (G710050587)
- Requires option 029
- Requires option 030
- Requires option 031
- Requires option 010
- Requires G700050380
- Requires option 008, Including Layer2 Term and Monitoring
- Needs proper SFP/SFP+ Transceiver and Optical Tap or thur mode fiber cable (G700050401 or G700050402)
- Requires at least one of RfOCPRI Interference Analyzer options (option 060 to 065), needs each of the respective/corresponding Interference Analyzer line rate
- Requires option 081
- Requires option 082
- Requires at least one of RfOBSAI InterferenceAnalyzer options (option 070 to 073), needs each of the respective/corresponding InterferenceAnalyzer line rate



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