



# CellAdvisor™

## JD785B Base Station Analyzer

### Spectrum Analyzer (Standard)

| Frequency                                     |                                    |                 |
|---|------------------------------------|-----------------|
| Frequency range                               | 9 kHz to 8 GHz                     |                 |
| 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)<br>10 Hz to 8 GHz |                 |
| 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  | -100 dBc/Hz (-102 dBc/Hz, typical) |                 |
| 100 kHz                                       | -105 dBc/Hz (-112 dBc/Hz, typical) |                 |
| 1 MHz   | -115 dBc/Hz (-120 dBc/Hz, typical) |                 |
| Measurement Range                             |                                    |                 |
|   | DANL to +25 dBm                    |                 |
| Input attenuator range                        | 0 to 55 dB, 5 dB steps             |                 |
| Maximum Input Level                           |                                    |                 |
| Average continuous power                      | +25 dBm                            |                 |
| DC voltage                                    | ±50 V DC                           |                 |

**Spectrum Analyzer: 9 kHz to 8 GHz**

**Cable and Antenna Analyzer: 5 MHz to 6 GHz**

**Power Meter: 10 MHz to 8 GHz**

#### Specification\* Conditions

JD785B 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 |  |
| <b>Preamplifier Off</b>   |  |
| 10 MHz to 3 GHz   | -140 dBm (-145 dBm, typical)   |
| >3 GHz to 5 GHz   | -138 dBm (-142 dBm, typical)   |
| >5 GHz to 7 GHz   | -135 dBm (-138 dBm, typical)   |
| >7 GHz to 8 GHz   | -132 dBm (-135 dBm, typical)   |
| <b>Preamplifier On</b>  |  |
| 10 MHz to 3 GHz   | -160 dBm (-165 dBm, typical)   |
| >3 GHz to 5 GHz   | -158 dBm (-162 dBm, typical)   |
| >5 GHz to 7 GHz   | -155 dBm (-158 dBm, typical)   |
| >7 GHz to 8 GHz   | -152 dBm (-155 dBm, typical)   |
| Display Range   |  |
| Log scale and units (10 divisions displayed)                                | 1 to 20 dB/division in 1 dB steps<br>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                 |
| Total Absolute Amplitude Accuracy   |  |
| Preamplifier off, power level > -50 dBm, auto-coupled                       |  |
| 1 MHz to 8 GHz  | $\pm 1.3$ dB<br>( $\pm 0.5$ dB typical)  |
|   | 20 to 30°C   |
|   | Add $\pm 1.0$ dB   |
|   | -10 to 55°C after 60-minute warm up  |
| Reference Level   |  |
| Setting range   | -120 to +100 dBm   |
| <b>Setting Resolution</b>   |  |
| 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, peak left, peak right, minimum search marker to center/start/stop |
| RF Input VSWR   |  |
| 1 MHz to 8 GHz  | 1.5:1 (typical)  |
|   | Atten >20 dB   |
| Second Harmonic Distortion  |  |
| Mixer level   | -25 dBm  |
| 50 MHz to 2.6 GHz   | < -65 dBc (typical)  |
| >2.6 GHz to 8 GHz   | < -70 dBc (typical)  |

| Third-Order Inter-Modulation (third-order intercept: TOI)                       |  |                         |
|---|--|-------------------------|
| 200 MHz to 3 GHz  | +10 dBm (typical)  |                         |
| >3 GHz to 8 GHz   | +12 dBm (typical)  |                         |
| Spurious  |  |                         |
| Inherent residual response  |  |                         |
| Input terminated, 0 dB attenuation, preamplifier off, RBW at 10 kHz, Sweep mode | -90 dBm (nominal)  |                         |
| Exceptions  | -85 dBm at 164.1 MHz, 2.57264, 3.2, and 4.5 GHz<br>-80 dBm at 4.8/7.8 GHz<br>-75 dBm at 85.6 MHz and 428 MHz<br>-70 dBm at 256.8 MHz and 770.4 MHz |                         |
| Input-related spurious  | < -70 dBc (nominal)  |                         |
| Dynamic Range   |  |                         |
| 2/3 (TOI-DANL) in 1 Hz RBW  | >104 dB  | at 2 GHz                |
| Sweep Time  |  |                         |
| Range   | 0.4 ms to 1000 s<br>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  |                         |
| <b>Trigger Delay</b>  |  |                         |
| 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   |  |                         |

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

## Cable and Antenna Analyzer (Standard)

| Frequency                      |   |
|--------------------------------|---|
| Range                          | 5 MHz to 6 GHz  |
| Resolution                     | 10 kHz  |
| Accuracy                       | ±1 ppm  |
| Data Points                    |   |
| 126, 251, 501, 1001, 2001      |   |
| Measurement Speed              |   |
| Reflection/DTF                 | 1.0 ms/point (typical)  |
| Measurement Accuracy           |   |
| Corrected directivity          | 40 dB   |
| Reflection uncertainty         | $\pm(0.3 +  20\log(1+10-EP/20) )$ (typical)<br>EP = directivity – measured return loss                            |
| Output Power                   |   |
| High                           | 5 MHz to 5.5 GHz, 0 dBm (typical)<br>5.5 GHz to 6 GHz, –5 dBm (typical)   |
| Low                            | 5 MHz to 6 GHz, –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 >14 MHz from carrier frequency (nominal)   |
| On frequency                   | 0 dBm within ±10 kHz from carrier frequency (nominal)   |
| Measurements                   |   |
| <b>Reflection (VSWR)</b>       |   |
| VSWR range                     | 1 to 65   |
| Return loss range              | 0 to 60 dB  |
| Resolution                     | 0.01  |
| <b>Distance to Fault (DTF)</b> |   |
| 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<br>Maximum = 1500 m (4921 ft)                                 |
| Horizontal resolution          | $(1.5 \times 10^8) \times (V_p)/\Delta$<br>$V_p$ = propagation velocity<br>$\Delta$ = stop freq – start freq (Hz) |
| <b>Cable Loss (1-port)</b>     |   |
| Range                          | 0 to 30 dB  |
| Resolution                     | 0.01 dB   |
| <b>1-Port Phase</b>            |   |
| Range                          | –180 to +180°   |
| Resolution                     | 0.01°   |
| <b>Smith Chart</b>             |   |
| 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 8 GHz   |   |                  |
| Span                      | 1 kHz to 100 MHz  |   |                  |
| Dynamic range             | –120 to +25 dBm   |   |                  |
| Maximum power             | +25 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)<br>4 to 400 W (peak)            | 0.1 to 50 W (average)<br>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 6 GHz  |                              |
| Frequency resolution       | 10 kHz  |                              |
| Output Power               |   |                              |
| High                       | 5 MHz to 5.5 GHz, 0 dBm (typical)<br>5.5 GHz to 6 GHz, -5 dBm (typical) |                              |
| Low                        | 5 MHz to 6 GHz, -30 dBm (typical)                                       |                              |
| Measurement Speed          |   |                              |
| Vector                     | 1.6 ms/point (typical)  |                              |
| Scalar                     | 3.4 ms/point (typical)  |                              |
| Dynamic Range              |   |                              |
| Vector                     | 5 MHz to 3 GHz, 80 dB<br>>3 GHz to 6 GHz, 75 dB                         | at average 5<br>at average 5 |
| Scalar                     | 5 MHz to 4.5 GHz,<br>>110 dB<br>4.5 GHz to 6 GHz,<br>>105 dB            |                              |
| Measurements               |   |                              |
| <b>Insertion Loss/Gain</b> |   |                              |
| Range                      | -120 to 100 dB  |                              |
| Resolution                 | 0.01 dB   |                              |
| <b>2-Port Phase</b>        |   |                              |
| 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            |              |

## High Power CW Signal Generator (Option 003)

| Frequency            |  |
|----------------------|--|
| Frequency range      | 10 MHz to 5500 MHz   |
| Frequency reference  | <±1 ppm maximum  |
| Frequency resolution | 10 kHz   |
| Output Power         |  |
| Range                | 10 MHz to 3.5 GHz, -60 to +10 dBm<br>3.5 GHz to 5.5 GHz, -60 to +5 dBm |
| Step                 | 1 dB   |
| Accuracy             | ±1.5 dB (20 to 30°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<br>(0 to 50°C) | 15 minutes after<br>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   |                                 |
|-------------------|---------------------------------|
| 1 MHz to 8 GHz    |                                 |
| Measurement Range |                                 |
| 110 to +25 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) |
| Web-based remote control    |

## Wi-Fi Connectivity (Option 016)

|                           |                                   |
|---------------------------|-----------------------------------|
| 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                        |

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

| General Parameters        |  |                       |
|---------------------------|--|-----------------------|
| Frequency range           | 450 MHz to 500 MHz<br>820 MHz to 965 MHz<br>1.705 GHz to 1.995 GHz |                       |
| Input signal range        | -40 to +25 dBm   |                       |
| Burst power               | ±1.0 dB  |                       |
| Frequency error           | ±10 Hz + ref freq 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   |                       |
| Connector                 | SMA, female  |                       |

### Measurements

#### Option 022

| <b>Channel Power</b>      | <b>Spectrum Emission Mask</b>   | <b>Power vs. Time (slot)</b>  | Frequency error    | <b>Auto Measure</b>    | Phase error RMS   |
|---------------------------|---------------------------------|-------------------------------|--------------------|------------------------|-------------------|
| Channel power             | Reference power                 | Burst power                   | Phase error RMS    | Channel power          | Phase error peak  |
| Spectral density          | Peak level at defined range     | Max/min point                 | Phase error peak   | Occupied bandwidth     | EVM RMS*          |
| Peak to average power     |                                 | <b>Power vs. Time (frame)</b> | I/Q origin offset* | Spectrum emission mask | EVM Peak*         |
| <b>Occupied Bandwidth</b> | <b>Spurious Emissions</b>       | Frame average power           | TSC                | Spurious emission mask | I/Q origin offset |
| Occupied bandwidth        | Peak frequency at defined range | Burst power (Slot 0 to 7)     | BSIC               | Burst power            | C/I*              |
| Integrated power          |                                 | TSC (Slot 0 to 7)             | C/I*               | PvsT – mask            |                   |
| Occupied power            | Peak level at defined range     | <b>Constellation</b>          | EVM RMS*           | Frame average power    |                   |
|                           |                                 | Burst power                   | EVM Peak*          | Frequency error        |                   |
|                           |                                 | Modulation type               | EVM 95th*          |                        |                   |

#### Option 042

| <b>Channel/Frequency Scanner</b> | Group (traffic, control) | <b>Multipath Profile</b> | <b>Modulation Analyzer</b> | Frame average power      | Burst power     |
|----------------------------------|--------------------------|--------------------------|----------------------------|--------------------------|-----------------|
|                                  | BSIC (NCC, BCC)          | (10 strongest)           | Frame avg power trend      | BSIC, frame no. and time | Modulation type |
| Channels or frequencies          |                          | Frame average power      | C/I trend                  | C/I, frequency error     |                 |
| Absolute power                   |                          | SNR, delay               |                            |                          |                 |

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 +25 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 + ref freq accuracy  | 99% confidence level                                       |
| EVM accuracy                          | ±2.0%   | 2% ≤ EVM ≤ 20%   |
| Residual EVM                          | 2.5% (typical)  |  |
| Code domain power                     | ±0.5 dB relative power<br>±1.5 dB absolute power                      | Code channel power > -25 dB<br>Code channel power > -25 dB |
| CPICH power accuracy                  | ±0.8 dB (typical)   |  |

### Measurements

#### Option 023

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

#### Option 043

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

Longitude, latitude, and satellite in all screens

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

| General Parameters        |  |  |
|---------------------------|--|--|
| Frequency range           | Band 0 to 10                                     |  |
| Input signal level        | -40 to +25 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<br>±1.5 dB absolute power | Code channel power >-25 dB<br>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

| <i>Channel Power</i>          | <i>ACPR</i>                | <i>Spurious Emissions</i>   | <i>Code Domain Power</i>      | <i>RCSI</i>                   | <i>Auto Measure</i>          |
|-------------------------------|----------------------------|-----------------------------|-------------------------------|-------------------------------|------------------------------|
| Channel power                 | Reference power            | Peak freq at defined range  | Abs/Rel code power            | Pilot, Paging, Sync, Q-Paging | Channel power                |
| Spectral density              | Abs power at defined range | Peak level at defined range | Channel power                 |                               | Occupied bandwidth           |
| Peak to average power         |                            | <b>Constellation</b>        | Power bar graph (Abs/Rel)     | <b>CDP Table</b>              | Spectrum emission mask       |
| <b>Occupied Bandwidth</b>     | Rel power at defined range | Pilot power                 | Pilot, Paging, Sync, Q-Paging | Reference power               | ACPR                         |
| Occupied bandwidth            |                            | Rho                         |                               | Code utilization              | Multi-ACPR                   |
| Integrated power              | <b>Multi-ACPR</b>          | EVM                         | Max, avg active power         | Code, spreading factor        | Rho                          |
| Occupied power                | Lowest reference power     | Frequency error             | Max, avg inactive power       | Allocation (channel type)     | Frequency error              |
| <b>Spectrum Emission Mask</b> | Highest reference power    | Time offset                 | PN offset                     | Relative, absolute power      | Time offset                  |
| Reference power               | Abs power at defined range | Carrier feed-through        | <b>Codogram</b>               |                               | Carrier feed-through         |
| Peak level at defined range   |                            | PN offset                   | Code utilization              |                               | Pilot power                  |
|                               | Rel power at defined range |                             |                               |                               | Max inactive power           |
|                               |                            |                             |                               |                               |                              |
|                               |                            |                             |                               |                               | <b>Power Statistics CCDF</b> |

#### Option 040

| <i>Channel Scanner (up to 6)</i> | <i>PN Scanner (up to 6)</i> | <i>Multipath Profile</i> | <i>Code Domain Power</i>            | Frequency error            | Code utilization    |
|----------------------------------|-----------------------------|--------------------------|-------------------------------------|----------------------------|---------------------|
|                                  | Channel power               | Channel power            | Abs/Rel code power                  | Time offset, Rho, EVM      | Peak utilization    |
| Frequencies or channels          | Pilot dominance             | Multipath power          | Channel power                       | Carrier feed-through       | Average utilization |
| Channel power, PN offset         | PN offset                   | Ec/lo, delay             | PN offset                           | Amplifier capacity         | <b>Route Map</b>    |
| Pilot power, Ec/lo               | Ec/lo, pilot power, delay   |                          | Pilot, Paging, Sync, Q-Paging power | Peak amplifier capacity    | Pilot power         |
|                                  |                             |                          |                                     | Average amplifier capacity | Ec/lo               |
|                                  |                             |                          | Max, avg active power               |                            |                     |
|                                  |                             |                          | Max, avg inactive power             |                            |                     |

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 +25 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<br>±1.5 dB absolute power | Code channel power > -25 dB<br>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>          | <b>ACPR</b>                     | <b>Power vs. Time (idle and active slot)</b> | <b>Constellation (pilot, MAC 64/128, and data)</b> | <b>Code Domain Power (data)</b> | <b>Auto Measure</b>                              |
| Channel power                 | Reference power                 |  |  |                                 | Channel power                                    |
| Spectral density              | Abs power at defined range      | Slot average power                           | Channel power                                      | Data channel power              | Occupied bandwidth                               |
| Peak to average power         |                                 | On/off ratio                                 | Rho, EVM, peak CDE                                 | Slot average power              | Spectrum emission mask                           |
| <b>Occupied Bandwidth</b>     | Rel power at defined range      | Idle activity                                | Frequency error                                    | Max, avg active power           | ACPR   |
| Occupied bandwidth            |                                 | Pilot, MAC, data power                       | Time offset  | Max, avg inactive power         | Multi-ACPR                                       |
| Integrated power              | <b>Multi-ACPR</b>               | <b>Constellation (composite 64/128)</b>      | Carrier feed-through                               | PN offset                       | Pilot, MAC, data power                           |
| Occupied power                | Lowest reference power          |  | PN offset  | <b>MAC Codogram</b>             | On/off ratio                                     |
| <b>Spectrum Emission Mask</b> | Highest reference power         | Channel power                                | Modulation type*                                   | Code utilization                | PvsT mask (idle slot) or PvsT mask (active slot) |
|                               | Abs power at defined range      | Rho, EVM, Peak CDE                           | <b>Code Domain Power (pilot and MAC 64/128)</b>    | <b>RCSI</b>                     |  |
| Reference power               | Abs power at defined range      | Frequency error                              |  |                                 | Slot, pilot, MAC, data                           |
| Peak level at defined range   | Rel power at defined range      | Time offset                                  | Pilot/MAC channel power                            | <b>MAC CDP Table</b>            | Time offset                                      |
|                               |                                 | Carrier feed-through                         | Slot average power                                 |                                 | Reference power                                  |
|                               | <b>Spurious Emissions</b>       | PN offset                                    | Max active I/Q power                               | Code utilization                | Pilot, MAC, data Rho                             |
|                               | Peak frequency at defined range | Pilot, MAC, data power                       | Avg active I/Q power                               | Code, spreading factor          | Max inactive I/Q power                           |
|                               |                                 | Pilot, MAC, data EVM                         | Max inactive I/Q power                             | Allocation (channel type)       | PN offset  |
|                               | Peak level at defined range     |  | Avg inactive I/Q power                             | Relative, absolute power        | <b>Power Statistics CCDF</b>                     |
|                               |                                 |  | PN offset  |                                 |  |

| Option 041                       |                             |                          |                          |                      |                     |
|----------------------------------|-----------------------------|--------------------------|--------------------------|----------------------|---------------------|
| <b>Channel Scanner (up to 6)</b> | <b>PN Scanner (up to 6)</b> | <b>Multipath Profile</b> | <b>Code Domain Power</b> |                      |                     |
|                                  | Channel power               | Channel power            | Slot average power       | Frequency error      | Peak utilization    |
| Frequencies or channels          | Pilot dominance             | Multipath power          | PN offset                | Time offset          | Average utilization |
| PN offset                        | PN offset                   | Ec/Io, delay             | Pilot, MAC, data power   | Carrier feed-through | <b>Route Map</b>    |
| Pilot, MAC, data power           | Ec/Io, pilot power, delay   |                          | Pilot, MAC, data Rho     | Max active I/Q power | Pilot power         |
|                                  |                             |                          | (Composite) EVM          | Avg active I/Q power | Ec/Io               |
|                                  |                             |                          |                          | Code utilization     |                     |

Longitude, latitude, and satellite in all screens

\*Measurement is performed in Data Constellation only.

## 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                                 |   |   |                              |
| Code domain power            | ±0.5 dB relative power<br>±1.5 dB absolute power | Code channel power > -25 dB<br>Code channel power > -25 dB |   |   |                              |
| Time error (Tau)             | ±0.2 μs (typical)                                | External trigger   |   |   |                              |
| Spreading factor             | Auto (DL, UL), 1, 2, 4, 8, 16                    |  |   |   |                              |
| Measurements                 |  |  |   |   |                              |
| Option 025                   |  |  |   |   |                              |
| Channel Power                | Multi-ACLR                                       | Power vs. Time (frame)                                     | Midamble Power                            | Code Error                                | Auto Measure                 |
| Channel power                | Lowest reference power                           | Slot power   | Slot power                                | Code power and error                      | Channel power                |
| Spectral density             | Highest reference power                          | (TS [0 to 6], DwPTS, UpPTS)                                | DwPTS power                               | Individual code EVM and its constellation | Occupied bandwidth           |
| Peak to average power        | Abs power at defined range                       | Data power left  | Midamble power (1 to 16)                  |   | Spectrum emission mask       |
| Occupied Bandwidth           | Rel power at defined range                       | (TS [0 to 6], DwPTS, UpPTS)                                | Code Power                                | Data format                               | ACLR                         |
| Occupied bandwidth           |  | Midamble Power   | Abs/Rel code power                        | Slot, DwPTS power                         | Multi-ACLR                   |
| Integrated power             | Spurious Emissions                               | (TS [0 to 6], DwPTS, UpPTS)                                | Individual code EVM and its constellation | No. of active code                        | Slot power                   |
| Occupied power               |  | Data power right   |   | Scramble code                             | DwPTS power                  |
| Spectrum Emission Mask       | Peak frequency at defined range                  | (TS [0 to 6], DwPTS, UpPTS)                                | Data format                               | Max active code power                     | UpPTS power                  |
| Reference power              | Peak level at defined range                      | Time offset  | Slot power, DwPTS power                   | Avg active code power                     | On/off slot ratio            |
| Peak level at defined range  |  | (TS [0 to 6], DwPTS, UpPTS)                                | No. of active code                        | Max inactive code power                   | Frequency error              |
| ACLR                         | Rel power at defined range                       | Power vs. Time (mask)                                      | Scramble code                             | Avg inactive code power                   | EVM RMS                      |
| Reference power              |  | Power vs. Time (slot)                                      | Slot power                                | Max active code power                     | Peak CDE and peak active CDE |
| Abs power at defined range   | Slot power                                       | On/off slot ratio  | Avg active code power                     |   | Max inactive power           |
|                              | DwPTS power                                      | Off power  | Max inactive code power                   |   | Scramble code                |
| Rel power at defined range   | UpPTS power                                      | Timogram   | Avg inactive code power                   |   |                              |
|                              | On/off slot ratio                                | Constellation  |   |   |                              |
|                              | Slot PAR   | Rho  |   |   |                              |
|                              | DwPTS code                                       | EVM RMS, EVM peak  |   |   |                              |
|                              |  | Peak CDE   |   |   |                              |
|                              |  | Frequency error  |   |   |                              |
|                              |  | I/Q origin offset  |   |   |                              |
|                              |  | Time offset  |   |   |                              |
| Option 045                   |  |  |   |   |                              |
| Sync-DL ID Scanner (32)      | Sync-DL ID vs. Tau (up to 6)                     | Sync-DL ID Multipath                                       | Sync-DL ID Analyzer                       | Pilot dominance                           | Route Map                    |
| Scramble code group          | ID, power, Ec/Io, Tau                            | Ec/Io, Tau   | DwPTS power, Ec/Io trend                  | EVM, frequency error                      | DwPTS Power                  |
| Ec/Io, Tau                   |  | DwPTS power  | DwPTS power                               | Ec/Io, CINR                               |                              |
| DwPTS power                  | DwPTS power                                      | Pilot dominance  |   |   |                              |
| Pilot dominance              | Pilot dominance                                  |  |   |   |                              |

Longitude, latitude, and satellite in all screensTD-SCDMA Signal Analyzer (Option 025)

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

| General Parameters                |   |                             |                           |                        |                              |
|-----------------------------------|---|-----------------------------|---------------------------|------------------------|------------------------------|
| Frequency range                   | 2.1 GHz to 2.7 GHz<br>3.4 GHz to 3.85 GHz |                             |                           |                        |                              |
| Input signal level                | -40 to +25 dBm                            |                             |                           |                        |                              |
| Channel power accuracy            | ±1.0 dB (typical)                         |                             |                           |                        |                              |
| Supported bandwidth               | 7 MHz, 8.75 MHz, and 10 MHz               |                             |                           |                        |                              |
| Frequency error                   | ±10 Hz + ref freq accuracy                | 99% confidence level        |                           |                        |                              |
| Residual EVM (RMS)                | 1.5% (typical)                            |                             |                           |                        |                              |
| Measurements                      |   |                             |                           |                        |                              |
| Option 026                        |   |                             |                           |                        |                              |
| <i>Channel Power</i>              | <i>Spurious Emissions</i>                 | <i>Constellation</i>        | <i>EVM vs. Subcarrier</i> | <i>Auto Measure</i>    | Time offset                  |
| Channel power                     | Peak frequency at defined range           | Channel power               | RCE RMS, RCE peak         | Channel power          | I/Q origin offset            |
| Spectral density                  |   | RCE RMS, RCE peak           | EVM RMS, EVM peak         | Occupied bandwidth     | Spectral flatness            |
| Peak to average power             | Peak level at defined range               | EVM RMS, EVM peak           | Segment ID, cell ID       | Spectrum emission mask | Frequency error              |
| <i>Occupied Bandwidth</i>         | <i>Power vs. Time (frame)</i>             | Frequency error             | Preamble index            | Spurious emission mask | RCE RMS                      |
| Occupied bandwidth                | Channel power                             | Time offset                 | <i>EVM vs. Symbol</i>     | Preamble power         | RCE peak                     |
| Integrated power                  | Frame average power                       | Segment ID, cell ID         | RCE RMS, RCE peak         | DL burst power         | EVM RMS                      |
| Occupied power                    | Preamble power                            | Preamble index              | EVM RMS, EVM peak         | UL burst power         | EVM peak                     |
| <i>Spectrum Emission Mask</i>     | DL burst power                            | <i>Spectral Flatness</i>    | Segment ID, cell ID       | Frame average power    | <i>Power Statistics CCDF</i> |
| Reference power                   | UL burst power                            | Average subcarrier power    | Preamble index            |                        |                              |
| Peak level at defined range       | I/Q origin offset                         | Subcarrier power variation  |                           |                        |                              |
|                                   | Time offset                               |                             |                           |                        |                              |
|                                   |   | Max, min, avg power         |                           |                        |                              |
| Option 046                        |   |                             |                           |                        |                              |
| <i>Preamble Scanner (up to 6)</i> | <i>Multipath Profile</i>                  | <i>Preamble Power Trend</i> | Frame avg power           | Preamble               | <i>Route Map</i>             |
|                                   | Total preamble power                      | Relative power trend        | Relative power            | Cell ID, sector ID     | Preamble power               |
| Total preamble power              | Multipath power                           | Preamble power              | C/I                       | Time offset            |                              |
| Preamble, relative power          | Relative power, delay                     |                             |                           |                        |                              |
| Cell ID, sector ID                | Preamble power trend                      |                             |                           |                        |                              |
| Time offset                       |   |                             |                           |                        |                              |

Longitude, latitude, and satellite in all screens

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

| General Parameters     |   |                      |
|------------------------|---|----------------------|
| Frequency range        | Band 1 to 14, 17 to 26                            |                      |
| Input signal level     | -40 to +25 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 + ref freq accuracy                        | 99% confidence level |
| Residual EVM (RMS)     | 2.0% (typical)                                    | Data EVM             |

### Measurements

#### Option 028/030

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

#### Option 048

| Channel Scanner (up to 6) | ID Scanner (up to 6)   | Multipath Profile         | Control channel table   | PMCH subframe power* | Route Map       |
|---------------------------|------------------------|---------------------------|---|----------------------|-----------------|
| Frequency or channels     | RSRP/RSRQ dominance    | Cell, group, sector ID    | (P-SS, S-SS, PBCH, PCFICH, RS 0, RS 1, RS 2**, RS 3**, MBSFN RS*) | Time alignment error | RSRP            |
| Cell, group, sector ID    | S-SS RSSI dominance    | Ant 0 RS Ec/Io, delay     | Absolute power  | Time offset          | RSRQ            |
| Channel power             | S-SS Ec/Io dominance   | Ant 1 RS Ec/Io, delay     |   | Relative power       | <b>Datagram</b> |
| RSRP/RSRQ                 | Cell, group, sector ID | Ant 2 RS Ec/Io**, delay** | EVM RSM, phase  | Datagram             | S-SS RSSI       |
| RS-SINR                   | RSRP/RSRQ              | Ant 3 RS Ec/Io**, delay** | Frequency error   | Resource block power | P-SS/S-SS Power |
| Antenna port              | RS-SINR/S-SS RSSI      | <b>Control Channel</b>    |   | Data utilization     | S-SS Ec/Io      |
|                           | P-SS/S-SS Power        | RS power trend            |   |                      |                 |
|                           | 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 (Option 029/031 and 049)

| General Parameters          |   |  |   |                              |                                    |
|-----------------------------|---|--|---|------------------------------|------------------------------------|
| Frequency range             | Band 33 to 43                                     |  |   |                              |                                    |
| Input signal level          | -40 to +25 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 + ref freq accuracy                        |  |   | 99% confidence level         |                                    |
| Residual EVM (RMS)          | 2.0% (typical)                                    |  |   | Data EVM                     |                                    |
| Measurements                |   |  |   |                              |                                    |
| Option 029/031              |   |  |   |                              |                                    |
| Channel Power               | Spurious Emissions                                | Data EVM peak  | Subframe  | Antenna 3 RS power and EVM** | PDSCH/Data* 64 QAM EVM             |
| Channel power               | Peak frequency at defined range                   | Frequency error  | MBSFN*  | Cell, group, sector ID       | Data EVM RMS, peak                 |
| Spectral density            | Peak level at defined range                       | <b>Data Channel</b>  | Subframe summary table (P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN*, PDSCH/Data* | <b>Data Allocation Map</b>   | RS, P-SS, S-SS EVM                 |
| Peak to average power       |   | MBSFN*   | QPSK, PDSCH/Data* 16 QAM, PDSCH/Data* 64 QAM)   | Data allocation vs frame     | RS, P-SS, S-SS power               |
| Occupied Bandwidth          | Power vs. Time (frame)                            | Resource block power   |   | Resource block power         | PBCH power                         |
| Occupied bandwidth          | Frame average power                               | I/Q diagram  |   | OFDM symbol power            | Subframe power                     |
| Integrated power            | Subframe power                                    | RB power   |   | Data utilization             | OFDM power                         |
| Occupied power              |   |  |   |                              |                                    |
| Spectrum Emission Mask      | 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  |   | Resource block power         | I/Q origin offset                  |
| Peak level at defined range | Cell ID, I/Q origin offset                        | EVM RMS, EVM peak  | Subframe power  |                              | <b>Carrier Aggregation**</b>       |
|                             | Time offset                                       | <b>Control Channel</b>   | OFDM symbol power   | Data utilization             | Component carriers: up to 5        |
| ACLR                        | Power vs. Time (slot)                             | Control channel summary (P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN*) | Frequency, time error   | <b>Auto Measure</b>          | Subframe power                     |
| Reference power             | Slot average power                                |  | Data EVM RMS, peak  | Channel power                | P-SS, S-SS, PBCH, RS power and EVM |
| Abs power at defined range  | Transient period length                           |  | RS EVM RMS, peak  | Occupied bandwidth           |                                    |
|                             | 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                   |                                    |
| Multi-ACLR                  | 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  |   | Frequency error  |   | Transition period            |                                    |
| Rel power at defined range  | PDSCH/Data* 64 QAM EVM                            | I/Q origin offset  | Antenna 1 RS power and EVM  | Time alignment error         | Cell ID                            |
|                             | Data EVM RMS                                      | EVM RMS, EVM peak  | Antenna 2 RS power and EVM**  | MBSFN*                       | Frequency error                    |
|                             |   |  |   | PDSCH/Data* QPSK EVM         | Time alignment error               |
|                             |   |  |   |                              | Antenna port                       |
|                             |   |  |   |                              | <b>Power Statistics CCDF</b>       |
| Option 049                  |   |  |   |                              |                                    |
| Channel Scanner (up to 6)   | ID Scanner (up to 6)                              | Multipath Profile  | Control Channel   | EVM RSM, phase               | Route Map                          |
|                             | RSRP/RSRQ dominance                               | Cell, group, sector ID   | RS power trend  | Frequency error              | RSRP                               |
| Frequency or channels       | S-SS RSSI dominance                               | Ant 0 RS Ec/Io, delay  | Cell, group, sector ID  | PMCH subframe power*         | RSRQ                               |
| Cell, group, sector ID      | S-SS Ec/Io dominance                              | Ant 1 RS Ec/Io, delay  | Control channel table (P-SS, S-SS, PBCH, PCFICH, RS 0, RS 1, RS 2**, RS 3**, MBSFN RS*) | Time alignment error         | RS-SINR                            |
| Channel power               | Cell, group, sector ID                            | Ant 2 RS Ec/Io**, delay**  |   | Time offset                  | S-SS RSSI                          |
| RSRP/RSRQ                   | RSRP/RSRQ   | Ant 3 RS Ec/Io**, delay**  |   | <b>Datagram</b>              | P-SS, S-SS power                   |
| RS-SINR                     | RS-SINR/S-SS RSSI                                 |  |   | Datagram                     | S-SS Ec/Io                         |
| Antenna port                | 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.

## RFoCPRI™/Interference Analyzer (Option 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)<br>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 |                       |   |
| SFP Information            | SFP Information  | C and M Ethernet subchannel number  | 20 to 63                           | RSSI                  | Collect up to 72 hr of data   |
| Wavelength                 | Wavelength       |   |                                    | Spectrum replay       | X1, x2, x4, x8  |
| Vendor                     | Vendor           |   |                                    |                       |   |
| Vendor PN                  | Vendor PN        | Alarm Injection   |                                    | PIM Detection         |   |
| Vendor rev                 | Vendor rev       | R-LOS   | Single                             | Single carrier        |   |
| Power level type           | Power level type | R-LOF   | Single                             | Multi carrier         |   |
| Diagnostic byte            | Diagnostic byte  | Error Injection   |                                    | PIM calculator        |   |
| 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     |   |                                    |                       |   |

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

| General Parameters         |  |                         |                           |                       |                             |
|----------------------------|--|-------------------------|---------------------------|-----------------------|-----------------------------|
| Optical interface          | Dual SFP/SFP+ (supports all MSA compliant SFP modules)   |                         |                           |                       |                             |
| Line rates                 | 768 Mbps (1x)  | Option 008 and 070      |                           |                       |                             |
|                            | 1536 Mbps (2x)   | Option 008 and 071      |                           |                       |                             |
|                            | 3072 Mbps (4x)   | Option 008 and 072      |                           |                       |                             |
|                            | 6144 Mbps (8x)   | Option 008 and 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<br>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               |  |                         |                           |                       |                             |
| Layer-2 Monitoring         |  | Layer-2 Term            |                           | Interference analyzer |                             |
| Port 1                     | Port 2   | Port 1 or 2 (exclusive) |                           | Spectrum              | Sound indicator             |
| LOS                        | LOS  | LOS                     |                           |                       | AM/FM audio demodulation    |
| LOF                        | LOF  | LOF                     |                           |                       | Interference ID             |
| Code violation             | Code violation   | Optic RX level          | dBm                       | Spectrogram           | Spectrum recorder           |
| K30.7 words                | K30.7 words  | Optic TX level          | dBm                       |                       | 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             |                       | PIM detection               |
| Message counter            | Message counter  | TX address              | RP3 address (hexadecimal) | Multicarrier          |                             |
| <b>SFP Information</b>     | <b>SFP Information</b>   | RX address              | RP3 address (hexadecimal) | PIM calculator        |                             |
| 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)  |                      |
| 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) |                      |
| IQ Sample width    | 8 – 20 bits   |                      |
| Mapping method     | Packed and Flexible   |                      |
| Waveform           | Off: CW<br>On: 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) | 0.2% (typical)  | Data EVM             |

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

| General Parameters                   |  |  |
|--------------------------------------|--|--|
| <b>Optical Hardware (Option 008)</b> |  |  |
| Interface                            | Two SFP/SFP+ ports (supports all MSA compliant SFP modules), one Ethernet port |  |
| <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-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  |  |

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

| <b>General Parameters</b>            |  |
|--------------------------------------|--|
| <b>Optical Hardware (Option 008)</b> |  |
| Interface                            | Two SFP/SFP+ ports (supports all MSA compliant SFP modules), one Ethernet port |
| <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>CPRI Parameter</b>                |  |
| RP3 type                             | LTE  |
| 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 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-FDD Signal Analyzer (Option 091)

| 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) |                      |
| 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 MHz, 10MHz, 15MHz, 20MHz  |                      |
| 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                |                            |   |  |                              |
|---------------------------|----------------------------|---|--|------------------------------|
| Channel Power             | Power vs. Time (frame)     | Control Channel   | 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>   | MBSFN*                       |
| <b>Occupied Bandwidth</b> | Second slot power          | 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     |
| Occupied bandwidth        | Cell ID, I/Q origin offset |   |  | Each control channels'       |
| Integrated power          | <b>Constellation</b>       | I/Q diagram   | EVM, relative or absolute power, modulation type   | Data utilization             |
| Occupied power            | MBSFN*                     |   |  | Modulation format            |
|                           | RS TX power                | Frequency error   | EVM, relative or absolute power, modulation type   | Resource block power         |
|                           | PDSCH/Data* QPSK EVM       |   |  | I/Q origin offset            |
|                           | PDSCH/Data* 16 QAM EVM     | EVM RMS, EVM peak   | Frame average power  | <b>Power Statistics CCDF</b> |
|                           | PDSCH/Data* 64 QAM EVM     |   |  | <b>Subframe</b>              |
|                           | Data EVM RMS               | MBSFN*  | Frequency error  |                              |
|                           | Data EVM peak              | Error rate  | I/Q origin offset  |                              |
|                           | Frequency error            | Subframe summary table (P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN*, PDSCH/Data* QPSK, PDSCH/Data* 16 QAM, PDSCH/Data* 64 QAM) | EVM RMS, peak  |                              |
|                           | Time error                 |   | Data EVM RMS, peak   |                              |
|                           | <b>Data Channel</b>        |   | Cell, group, sector ID   |                              |
|                           | MBSFN*                     | EVM, relative or absolute power, modulation type  | <b>Time Alignment Error</b>  |                              |
|                           | Resource block power       |   | Time alignment error trend   |                              |
|                           | I/Q diagram                | EVM, relative or absolute power, modulation type  | Time alignment error   |                              |
|                           | RB power modulation format |   | RS power difference  |                              |
|                           | I/Q origin offset          | Subframe power  | Antenna 0 RS power and EVM   |                              |
|                           | EVM RMS, EVM peak          | OFDM symbol power   |  |                              |
|                           |                            | Frequency, time error   |  |                              |

\*Measurement is performed when MBMS is enabled.

## RFoCPRI™ LTE-TDD Analyzer (Option 092)

| General Parameters                                  |  |                          |                             |                              |
|---|--|--------------------------|-----------------------------|------------------------------|
| <b>Optical Hardware (Option 008)</b>                |  |                          |                             |                              |
| Interface   | Two SFP/SFP+ ports (supports all MSA compliant SFP modules), one Ethernet port |                          |                             |                              |
| <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 MHz, 10 MHz, 15 MHz, 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 008, 060, 061, 062, 063, 064, and 065</b> |  |                          |                             |                              |
| <b>Channel Power</b>                                | <b>Constellation</b>   | <b>Data Channel</b>      | <b>Time Alignment Error</b> | <b>Data Allocation Map</b>   |
| Channel power                                       | MBSFN*   | MBSFN*                   | Time alignment error trend  | Data allocation vs. frame    |
| Spectral density                                    | RS TX power  | Resource block power     | Time alignment error        | Resource block power         |
| Peak to average power                               | PDSCH/Data* QPSK EVM   | I/Q diagram              | RS power difference         | OFDM symbol power            |
| <b>Occupied Bandwidth</b>                           | PDSCH/Data* 16QAM EVM  | RB power                 | Antenna 0 RS power, EVM     | Data utilization             |
| Occupied bandwidth                                  | PDSCH/Data* 64QAM EVM  | Modulation format        | Antenna 1 RS power, EVM     | Data allocation vs.subframe  |
| Integrated power                                    | Data EVM RMS, peak   | I/Q origin offset        | Cell, group, sector ID      | Resource block power         |
| Occupied power                                      | Frequency error  | EVM RMS, peak            | <b>Frame</b>                | Data utilization             |
| <b>Power vs. Time (Frame)</b>                       | Time error   | <b>Subframe</b>          | MBSFN*                      | <b>Power Statistics CCDF</b> |
| Frame average power                                 | <b>Control Channel</b>   | MBSFN*                   | Frame summary               | Average power                |
| Subframe power                                      | Control Channel summary<br>EVM, rel., or abs. power<br>of each control channel | Subframe summary         | EVM, abs. and rel. power    | Peak power crest factor      |
| First Slot power                                    |  | EVM, abs. and rel. power | Frame Average power         |                              |
| Second Slot power                                   |  | Subframe power           | OFDM symbol power           |                              |
| Cell ID, I/Q origin offset                          | IQ diagram   | OFDM symbol power        | Frequency error             |                              |
| Time offset   | Modulation format  | Frequency error          | IQ origin Offset            |                              |
| <b>Power vs. Time (Slot)</b>                        | Frequency error  | Time error               | Data EVM RMS, peak          |                              |
| Slot average power                                  | I/Q origin offset  | Data EVM RMS, peak       | Control EVM RMS, peak       |                              |
| Transient period length                             | Control EVM RMS, peak  | RS EVM RMS, peak         | Cell, group, sector ID      |                              |
| Off power   |  | Cell, group, sector ID   |                             |                              |

Longitude, latitude, and satellite in all screens

\*Measurement is performed when MBMS is enabled.

## RFoOBSAI™ LTE-FDD Analyzer (Option 096)

| General Parameters                   |  |                          |                             |                              |
|--------------------------------------|--|--------------------------|-----------------------------|------------------------------|
| <b>Optical Hardware (Option 008)</b> |  |                          |                             |                              |
| Interface                            | Two SFP/SFP+ ports (supports all MSA compliant SFP modules), one Ethernet port                           |                          |                             |                              |
| <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<br>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                         |  |                          |                             |                              |
| <b>Channel Power</b>                 | <b>Constellation</b>   | <b>Data Channel</b>      | <b>Time Alignment Error</b> | <b>Data Allocation Map</b>   |
| Channel power                        | MBSFN**  | MBSFN**                  | Time alignment error trend  | Data allocation vs. frame    |
| Spectral density                     | RS TX power  | Resource block power     | Time alignment error        | Resource block power         |
| Peak to average power                | PDSCH/data** QPSK EVM  | I/Q diagram              | RS power difference         | OFDM symbol power            |
| <b>Occupied Bandwidth</b>            | PDSCH/data** 16QAM EVM   | RB power                 | Antenna 0 RS power, EVM     | Data utilization             |
| Occupied bandwidth                   | PDSCH/data** 64QAM EVM   | Modulation format        | Antenna 1 RS power, EVM     | Data allocation vs. subframe |
| Integrated power                     | Data EVM RMS, peak   | I/Q origin offset        | Cell, group, sector ID      | Resource block power         |
| Occupied power                       | Frequency error  | EVM RMS, peak            | <b>Frame</b>                | Data utilization             |
| <b>Power vs. Time (frame)</b>        | Time error   | <b>Subframe</b>          | MBSFN**                     |                              |
| Frame average power                  | <b>Control Channel</b>   | MBSFN**                  | Frame summary               |                              |
| Subframe power                       | Control channel summary<br>EVM, rel., or abs power of<br>each control channel                            | Subframe summary         | EVM, abs. and rel. power    |                              |
| First slot power                     |  | EVM, abs. and rel. power | Frame average power         |                              |
| Second slot power                    |  | Subframe power           | OFDM symbol power           |                              |
| Cell ID, I/Q origin offset           | IQ Diagram   | OFDM symbol power        | Frequency error             |                              |
| Time offset                          | Modulation format  | Frequency error          | IQ origin offset            |                              |
| <b>Power Statistics CCDF</b>         | Frequency error  | Time error               | Data EVM RMS, peak          |                              |
| Average power                        | I/Q origin offset  | Data EVM RMS, peak       | Control EVM RMS, peak       |                              |
| Peak power Crest Factor              | Control EVM RMS, peak  | RS EVM RMS, peak         | Cell, group, sector ID      |                              |
|                                      |  | Cell, group, sector ID   |                             |                              |

Longitude, latitude, and satellite in all screens

\*OBSAI 6144 Mbps only.

\*\*Measurement is performed when MBMS is enabled.

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

| General Parameters                   |  |                           |                       |
|--------------------------------------|--|---------------------------|-----------------------|
| <b>Optical Hardware (Option 008)</b> |  |                           |                       |
| Interface                            | Two SFP/SFP+ ports (supports all MSA compliant SFP modules), one Ethernet port |                           |                       |
| <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 ≤ 3.84 MHz)  |                           |                       |
|                                      | 1 KHz to 100 kHz (3.84 MHz < span ≤ 30.86 MHz)                                 |                           |                       |
| Accuracy                             | ±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 MHz, 10 MHz, 15 MHz, 20 MHz  |                           |                       |
| Span                                 | Adjustable (max span= sampling frequency)                                      |                           |                       |
| Measurements                         |  |                           |                       |
| <b>Carrier Configuration</b>         | <b>SFP Information</b>   | <b>Spectrum Clearance</b> | <b>Coverage Range</b> |
| RRH description                      | RRH description  | Spectrum                  | Spectrum              |
| Carrier information                  | SFP information  | Spectrogram               | Carrier information   |
| <b>CPRI and Active SW</b>            | <b>Profile Editor</b>  | RSSI                      | VSWR                  |
| RRH description                      |  | Dual spectrum             | Tilt                  |
| CPRI state                           |  | Dual active trace         | <b>PIM Analysis</b>   |
| Active SW                            |  | Dual spectrogram          | Single radio          |
|                                      |  |                           | Spectrum flatness     |

## General Information

| Inputs and Outputs           |  |                                      |
|------------------------------|--|--------------------------------------|
| <b>RF in</b>                 | Spectrum analyzer  |                                      |
| Connector                    | Type-N, female   |                                      |
| Impedance                    | 50 Ω (nominal)   |                                      |
| Damage level                 | >+33 dBm, ±50 V DC (nominal), 3 min                              |                                      |
| <b>Reflection/RF out</b>     | Cable and antenna analyzer                                       |                                      |
| Connector                    | Type-N, female   |                                      |
| Impedance                    | 50 Ω (nominal)   |                                      |
| Damage level                 | >+40 dBm, ±50 V DC (nominal), 3 min                              |                                      |
| <b>RF in</b>                 | Cable and antenna analyzer                                       |                                      |
| Connector                    | Type-N, female   |                                      |
| Impedance                    | 50 Ω (nominal)   |                                      |
| Damage level                 | >+25 dBm, ±50 V DC (nominal)                                     |                                      |
| <b>External trigger, GPS</b> |  |                                      |
| Connector                    | SMA, female  |                                      |
| Impedance                    | 50 Ω (nominal)   |                                      |
| <b>External ref</b>          |  |                                      |
| Connector                    | SMA, female  |                                      |
| Impedance                    | 50 Ω (nominal)   |                                      |
| Input frequency              | 10 MHz, 13 MHz, 15 MHz   |                                      |
| Input range                  | -5 to +5 dBm   |                                      |
| <b>USB</b>                   |  |                                      |
| USB host <sup>1</sup>        | Type A, 1 port   |                                      |
| USB client <sup>2</sup>      | Type B, 1 port   |                                      |
| <b>SFP Cage</b>              |  |                                      |
| Port 1                       | RFoFiber (with option 008)<br>SFP/SFP+ compatible                |                                      |
| Port 2                       | SFP/SFP+ compatible  |                                      |
| LAN                          | RJ45, 10/100Base-T   |                                      |
| Audio jack                   | 3.5 mm headphone jack  |                                      |
| External power               | 5.5 mm barrel connector  |                                      |
| Speaker                      | Built-in speaker   |                                      |
| <b>Display</b>               |  |                                      |
| Type                         | Resistive touch screen   |                                      |
| Size                         | 8 inch, LED backlight, transflective LCD with anti-glare coating |                                      |
| <b>Power</b>                 |  |                                      |
| 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)   |
| Charge time                                      | 3 hr (while not operating)<br>9 hr (while operating)  |
| Charging temperature                             | 0 to 45°C (32 to 104°F) ≤85% RH   |
| Discharging temperature                          | -20 to 55°C (4 to 131°F) ≤85% RH  |
| Storage temperature <sup>3</sup>                 | 0 to 25°C (32 to 77°F)  |
| <b>Data Storage</b>                              |   |
| Internal <sup>4</sup>                            | Maximum 512 MB  |
| External <sup>5</sup>                            | Limited by size of USB flash drive  |
| <b>Environmental</b>                             |   |
| <b>Operating temperature</b>                     |   |
| AC power   | 0 to 40°C (32 to 104°F) with no derating  |
| Battery  | 0 to 40°C (32 to 104°F) at charging<br>-10 to 55°C (14 to 131°F) at discharging<br>-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)  |
| <b>EMC</b>                                       |   |
| IEC/EN 61326-1:2006 (complies with European EMC) |   |
| CISPR11:2009 +A1:2010                            |   |
| <b>ESD</b>                                       |   |
| IEC/EN 61000-4-2                                 |   |
| <b>Size and Weight (standard configuration)</b>  |   |
| Weight (with battery)                            | 4.4 kg (9.7 lb)   |
| Size (W x H x D)                                 | 295 x 195 x 82 mm   |
| <b>Warranty</b>                                  |   |
| 3 years  |   |
| <b>Calibration Cycle</b>                         |   |
| 1 year   |   |

1. Connects flash drive and power sensor.
2. Connects to PC for data transfer.
3. 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.
4. Up to 3800 traces.
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:   | JD785B <sup>12</sup> |
| · Spectrum analyzer 9 kHz to 8 GHz  |                      |
| · RF power meter 10 MHz to 8 GHz  |                      |
| · Cable and antenna 5 MHz to 6 GHz  |                      |
| <b>Options</b>  |                      |
| Note: Upgrade options for the JD785B use the designation JD785BU before the respective last three-digit option number |                      |
| 2 port transmission measurements for JD785B <sup>3</sup>  | JD785B001            |
| Bias tee for JD785B <sup>4</sup>  | JD785B002            |
| High power CW signal generator for JD785B   | JD785B003            |
| Optical hardware for JD785B <sup>5</sup>  | JD785B008            |
| GPS receiver and antenna for JD785B   | JD785B010            |
| Interference analyzer for JD785B <sup>6,7</sup>   | JD785B011            |
| Channel scanner for JD785B  | JD785B012            |
| Bluetooth connectivity for JD785B <sup>8</sup>  | JD785B013            |
| LTE-FDD RAN performance indicator for JD785B <sup>9</sup>   | JD785B014            |
| LTE-TDD RAN performance indicator for JD785B <sup>10</sup>  | JD785B015            |
| Wi-Fi connectivity for JD785B <sup>11</sup>   | JD785B016            |
| cdmaOne/cdma2000 analyzer for JD785B  | JD785B020            |
| EV-DO analyzer for JD785B <sup>12</sup>   | JD785B021            |
| GSM/GPRS/EDGE analyzer for JD785B   | JD785B022            |
| WCDMA/HSPA+ analyzer for JD785B   | JD785B023            |
| TD-SCDMA analyzer for JD785B  | JD785B025            |
| Mobile WiMAX analyzer for JD785B  | JD785B026            |
| LTE - FDD analyzer for JD785B <sup>13</sup>   | JD785B028            |
| LTE - TDD analyzer for JD785B <sup>13</sup>   | JD785B029            |
| LTE Advanced - FDD analyzer for JD785B <sup>14,15</sup>   | JD785B030            |
| LTE Advanced - TDD analyzer for JD785B <sup>15,16</sup>   | JD785B031            |
| cdmaOne/cdma2000 OTA analyzer for JD785B <sup>17</sup>  | JD785B040            |
| EV-DO OTA analyzer for JD785B <sup>17</sup>   | JD785B041            |
| GSM/GPRS/EDGE OTA analyzer for JD785B <sup>17</sup>   | JD785B042            |
| WCDMA/HSPA+ OTA analyzer for JD785B <sup>17</sup>   | JD785B043            |
| TD-SCDMA OTA analyzer for JD785B <sup>17</sup>  | JD785B045            |
| Mobile WiMAX OTA analyzer for JD785B <sup>17</sup>  | JD785B046            |
| LTE - FDD OTA analyzer for JD785B <sup>17</sup>   | JD785B048            |
| LTE - TDD OTA analyzer for JD785B <sup>17</sup>   | JD785B049            |
| RFoCPRI 614M and 1.2G interference analyzer for JD785B <sup>18,19</sup>   | JD785B060            |
| RFoCPRI 2.4G interference analyzer for JD785B <sup>18,19</sup>  | JD785B061            |
| RFoCPRI 3.1G interference analyzer for JD785B <sup>18,19</sup>  | JD785B062            |
| RFoCPRI 4.9G interference analyzer for JD785B <sup>18,19</sup>  | JD785B063            |
| RFoCPRI 6.1G interference analyzer for JD785B <sup>18,19</sup>  | JD785B064            |
| RFoCPRI 9.8G interference analyzer for JD785B <sup>18,19</sup>  | JD785B065            |
| RFoBSAI 768M interference analyzer for JD785B <sup>18,19</sup>  | JD785B070            |
| RFoBSAI 1.5G interference analyzer for JD785B <sup>18,19</sup>  | JD785B071            |
| RFoBSAI 3.1G interference analyzer for JD785B <sup>18,19</sup>  | JD785B072            |
| RFoBSAI 6.1G interference analyzer for JD785B <sup>18,19</sup>  | JD785B073            |
| RFoCPRI LTE-FDD signal generator for JD785B <sup>18,19,20</sup>   | JD785B081            |
| RFoCPRI LTE-TDD signal generator for JD785B <sup>18,19,20</sup>   | JD785B082            |
| RFoBSAI LTE-FDD signal generator for JD785B <sup>18,19,21</sup>   | JD785B086            |
| RFoCPRI LTE-FDD signal analyzer for JD785B <sup>18,19,20</sup>  | JD785B091            |
| RFoCPRI LTE-TDD signal analyzer for JD785B <sup>18,19,20</sup>  | JD785B092            |
| RFoBSAI LTE-FDD signal analyzer for JD785B <sup>18,19,21</sup>  | JD785B096            |
| RFoCPRI BBU emulation for Alcatel-Lucent <sup>18,19</sup>   | JD785B101            |

| Description  | Part Number |
|--|-------------|
| <b>Optical Accessories</b>   |             |
| <b>Accessory - RF Calibrators (General)</b>                            |             |
| 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 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 <sup>24</sup>                     | G700050401  |
| MM/LC T-Jumper and 1.5 m fiber cable <sup>24</sup>                     | G700050402  |
| <b>Accessory - RF Antennas (General)</b>                               |             |
| RF Omni antenna Type-N(m), 806 to 896 MHz <sup>25</sup>                | G700050353  |
| RF Omni antenna Type-N(m), 870 to 960 MHz <sup>25</sup>                | G700050354  |
| RF Omni antenna Type-N(m), 1710 to 2170 MHz <sup>25</sup>              | G700050355  |
| RF Omni antenna Type-N(m), 720 to 800 MHz <sup>25</sup>                | G700050356  |
| RF Omni antenna Type-N(m), 2300 to 2700 MHz <sup>25</sup>              | G700050357  |
| RF Yagi antenna Type-N(f), 1750 to 2390 MHz, 10.2 dBd <sup>25,26</sup> | G700050363  |
| RF Yagi antenna Type-N(f), 806 to 896 MHz, 10.2 dBd <sup>25,26</sup>   | G700050364  |
| RF Yagi antenna Type-N(f), 866 to 960 MHz, 9.8 dBd <sup>25,26</sup>    | G700050365  |
| RF Yagi antenna SMA(f), 700 to 4000 MHz, 1.85 dBd <sup>25,26</sup>     | G700050366  |
| RF Yagi antenna SMA(f), 700 to 6000 MHz, 2.85 dBd <sup>25,26</sup>     | G700050367  |
| <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      |

## Ordering Information (Continued)

| Description   | Part Number |
|---|-------------|
| <b>Accessory - RF Adapters (Connector and 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, 50 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) <sup>27</sup> | G710050585  |
| RF combiner, 700 to 4000 MHz, Type-N(f) to Type-N(m) <sup>27</sup>  | G710050586  |
| 4x1 RF combiner, 700 to 4000 MHz, Type-N(f) to Type-N(m) <sup>28</sup>  | 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 <sup>29</sup>           | JD70050007  |
| Cross LAN cable (6ft)                         | G700550335  |
| USB A to B cable (1.8m)                       | GC73050515  |
| > 1GB USB memory                              | GC72450518  |
| Stylus pen                                    | G710550316  |
| <b>Accessory - Battery and 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 and 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  |

### Notes

- Supplied accessories: User's Guide, USB memory (1 GB), cross LAN cable, USB cable, DC car adapter, Li-Ion battery, AC/DC adapter, stylus pen.
- Highly recommended to use the Calibration Kit (JD78050509, JD78050510, JD70050509).
- Highly recommended to use the Calibration Kit (JD78050507, JD78050508) and bias tee (Option 002).
- Requires Option 001.
- Requires RfOFIBER Options 060, 061, 062, 063, 064, 065, 070, 071, 072, 073, 081, 082, 086, 091, 092, 096, 101.
- Needs Omni or Yagi antenna.
- Highly recommended to add Option 010.
- Includes a Bluetooth USB dongle with 5 dBi dipole antenna (JD70050006).
- Requires Option 13, Option 28, and TrueSite(FTA).
- Requires Option 13, Option 29, and TrueSite(FTA).
- Includes a Wi-Fi USB dongle.
- Requires Option 020.
- Highly recommended to use the RF directional coupler or RF combiner (G710050585 or G710050586).
- Requires Option 028.
- Highly recommended to use the 4x1 RF combiner (G710050587).
- Requires Option 029.
- Requires Option 010.
- Requires Option 008, including Layer2 term and monitoring.
- Requires proper SFP/SFP+ transceiver and optical tap or thru-mode fiber cable (G700050401, G700050402).
- Requires at least one of RfOCPR1 Interference Analyzer Options. (Option 060 to 065), needs each of the respective/corresponding Interference Analyzer line rates.
- Requires at least one of RfOBSAI Interference Analyzer Options (Option 070 to 073), needs each of the respective/corresponding Interference Analyzer line rates.
- Requires factory return for the upgrade.
- Requires serial number for placing an order of the upgrade.
- Requires RfOFIBER measurements. (060,61,062,063,064,065,70,71,72,73,81,91,92,96).
- Requires OTA/Interference measurements (Options 011/040, 041, 042, 043, 044, 045, 046, 048, 049).
- Requires proper RF cables for the inter-connection.
- Requires LTE measurement (Option 28, 29).
- Requires LTE-A measurement (Option 30, 31).
- Requires G70005.



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jd785bbsa-ds-cpo-nse-ae  
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