

Data Sheet

VIAVI CellAdvisor 5G

5G analyzer CA5000 Specifications

VIAVI CellAdvisor™ 5G is the ideal field portable solution to validate 5G radio access.



**Portable Real-Time Spectrum Analyzer:
FR1 (up to 6 GHz) and
FR2 (24 GHz to 40 GHz)**

**Support for 5G TF and 5G NR
Demodulation and Beamforming Analysis**

**Signal Analysis Bandwidth up to
100 MHz**

**Cable and antenna analysis up to
6 GHz***

RF source*

**OTDR test for fronthaul, DAS and
C-RAN*****

Specification** Conditions

- CA5000 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
 - Typical and nominal values are defined as:
 - Typical: performance statistics represented by 80% of production units
 - Nominal: a general, descriptive term or parameter

* Requires a CAA module. Refer to CAA06M Data Sheet

**All specifications are subject to change without notice

*** Requires OTDR Module. Refer to 4100-Series OTDR Modules and DWDM OTDR Module datasheets

Spectrum Analyzer (Standard)

Frequency and time specifications

| Option | Frequency range |
|-------------|--|
| Option F001 | FR1 Band: 9 kHz to 6 GHz |
| Option F002 | FR1 and FR2 Bands: – FR1 Band: 9 kHz to 6 GHz – FR2 Band: 24 GHz to 40 GHz |

Frequency reference

| | | |
|--------------------|---|----------------------|
| Accuracy | ±0.05 ppm (0 to 50 °C (32 to 122 °F)) + aging | |
| Accuracy which GPS | ±25 ppb | GPS lock |
| | ±50 ppb | Hold over (72 hours) |
| Aging | ±0.5 ppm/year | |

Frequency readout accuracy (start, stop, center, marker)

± (readout frequency x frequency reference accuracy + RBW centering + 0.5 x horizontal resolution + 2 Hz)

horizontal resolution = frequency span/trace #, RBW centering = 15% x RBW

Frequency span

| | |
|--------------------|--|
| Range | 0 Hz (zero span), 9 kHz to max frequency of each band |
| Resolution | 1 Hz |
| Accuracy | ±(2 x RBW centering + horizontal resolution) |
| Sweep time readout | The time required to complete a sweep from start to finish, including tuning, data acquisition and process |

Trace update

| | | Nominal |
|--|--------------|------------------------------|
| | 15 trace/sec | Span= 260 MHz RBW 100 kHz |

Sweep time

| | | Nominal |
|----------|---|-----------|
| Range | 0.4 ms to 1000 s 24 µs to 200 s | zero span |
| Accuracy | ±2 % | zero span |
| Type | Continuous, Single | |
| Mode | Gated sweep (requires option S015), Normal, Fast | |

Trigger

| | |
|----------------|---------------------------------------|
| Trigger source | Free run, Video, External |
| Trigger delay | Range: 0 to 200 s Resolution: 6 µs |

Resolution bandwidth (RBW)

| | | Nominal |
|----------|---------------|-------------------------------------|
| Range | 1 Hz to 3 MHz | - 3 dB bandwidth 1-3-10 sequence |
| Accuracy | ±10% | |

Video bandwidth (VBW)

| | | Nominal |
|----------|---------------|-------------------------------------|
| Range | 1 Hz to 3 MHz | - 3 dB bandwidth 1-3-10 sequence |
| Accuracy | ±10% | |

Amplitude accuracy and range specifications

| Amplitude range | | |
|--|---|---------------------------|
| Measurement range | FR1 Band: DANL to +25 dBm | |
| | FR2 Band: DANL to +15 dBm | |
| Input attenuator range | FR1 Band: 0 to 55 dB in 5 dB steps | |
| | FR2 Band: 0 to 50 dB in 5 dB steps | |
| Preamplifier | | |
| Nominal | | |
| Frequency range | FR1 Band: 10 MHz to 6 GHz | |
| | FR2 Band: 24 GHz to 40 GHz | |
| Gain | FR1 Band: 20 dB | |
| | FR2 Band: 20 dB | |
| Max RF input operating level | | |
| | FR1 Band: +25 dBm, ± 50 VDC | Average CW power |
| | FR2 Band: +15 dBm, ± 50 VDC | Average CW power |
| Display range | | |
| Log/Linear scale | 10 divisions | |
| | 1 to 20 dB/Division in 1 dB | |
| Scale units | dBm, dBV, dBmV, dB μ V, V, mV, W, mW | |
| Reference level | | |
| Range | -120 to +100 dBm | |
| Resolution | Log scale: 0.1 dB | |
| | Linear scale: 1 % of reference level | |
| Trace | | |
| Detectors | Normal, Positive peak, Negative peak, Sample, Average (RMS) | |
| Number of traces | 6 | |
| States | Clear/write, Maximum hold, Minimum hold, Capture, Load, Blank, Trace math, Trace info | |
| Functions | Time expired maximum hold and minimum hold, Trace math, Trace info | |
| Marker | | |
| Type | Normal, Delta, Delta pair, Marker table | |
| Number of markers | 6 | |
| Functions | Noise marker | |
| Marker to -> | Peak, Next peak, Next peak right, Next peak left, Min search, Always peak Center, Start, Stop | |
| Audio beep | Tone change with signal strength | |
| Marker table | Display 6 markers | |
| Absolute amplitude accuracy | | |
| Preamplifier off: input signal \geq -50 dBm, auto-coupled, 15-minute warm-up | | |
| Preamplifier on: -90 dBm < input signal < -50 dBm, auto-coupled, 15-minute warm-up | | |
| | FR1 Band: 1 MHz to 6 GHz ± 1.0 dB, ± 0.5 dB typical ± 2.0 dB, ± 1.2 dB typical | 20 to 30°C (68 to 86°F) |
| | | -10 to 55°C (14 to 131°F) |
| | FR2 Band: 24 GHz to 40 GHz ± 1.5 dB, ± 0.8 dB typical ± 3.3 dB, ± 1.5 dB typical | 20 to 30°C (68 to 86°F) |
| | | -10 to 55°C (14 to 131°F) |
| Input VSWR Nominal | | |
| | FR1 Band: 1.8:1 @ 10 dB Attenuation | |
| | FR2 Band: 2.5:1 | |

Dynamic range specifications

Displayed average noise level (DANL)

1 Hz RBW, 1 Hz VBW, 50 Ω termination, 0 dB attenuation, RMS detector

| | |
|------------------|---|
| Preamplifier off | FR1 Band: 10 MHz to 3.0 GHz -143 dBm, -146 dBm typical > 3.0 GHz to 4.5 GHz -140 dBm, -143 dBm typical > 4.5 GHz to 6.0 GHz -135 dBm, -138 dBm typical |
| | FR2 Band: 24 GHz to 25 GHz -128 dBm, -132 dBm typical > 25 GHz to 30 GHz -130 dBm, -135 dBm typical > 30 GHz to 40 GHz -125 dBm, -130 dBm typical |
| Preamplifier on | FR1 Band: 10 MHz to 3.0 GHz -160 dBm, -165 dBm typical Preamp 1 > 3.0 GHz to 6.0 GHz -155 dBm, -160 dBm typical Preamp 1 10 MHz to 3.0 GHz -163 dBm, -168 dBm typical Preamp 1 and 2 > 3.0 GHz to 6.0 GHz -161 dBm, -165 dBm typical Preamp 1 and 2 |
| | FR2 Band: 24 GHz to 40 GHz -148 dBm, -153 dBm typical |

Second harmonic distortion

| |
|---|
| 50 MHz to 4.5 GHz < -65 dBc, typical |
| > 4.5 GHz to 6.0 GHz < -75 dBc, typical |

Third-order inter-modulation (third-order intercept: TOI)

| |
|---|
| FR1 Band: 10 MHz to 3.0 GHz +9 dBm typical > 3.0 GHz to 6.0 GHz +11 dBm typical |
| FR2 Band: +12 dBm typical |

Spur free dynamic range

| | |
|----------------------------|----------------------------|
| 2/3 (TOI-DANL) in 1 Hz RBW | FR1 Band: > 104 dB @ 2 GHz |
| | FR2 Band: > 95 dB @ 28 GHz |

Spurious

| | |
|----------------------------|--|
| Inherent residual response | Input terminated, 0 dB attenuation, Preamp off |
| | Sweep Tuned: 10 kHz RBW, 1 kHz VBW, RMS detector |
| | Real time: RBW: 30 kHz, VBW: 30 kHz, Peak mode, Span= 100 MHz |
| | FR1 Band: Sweep tuned: -95 dBm typical Real time: -75 dBm typical Exceptions: -62 dBm @ 5420 MHz Notice spurs: -77 dBm @ 1520 MHz, 2925 MHz -80 dBm @ 5635 MHz -87 dBm @ 1845 MHz, 3141 MHz 3500 MHz, 4495 MHz -89 dBm @ 2280 MHz |

Dynamic range specifications continued

| Spurious continued | |
|-----------------------------------|---|
| | FR2 Band: Sweep tuned: -80 dBm typical Real time: -70 dBm typical Notice spurs: -72 dBm @ 26.21 GHz -75 dBm @ 31.83 GHz |
| Input-related spurious | 0 dB attenuation, Input signal= -25 dBm, Preamp off |
| | Sweep tuned: 10 kHz RBW, 1 kHz VBW, Peak detector, Span < 1 GHz |
| | Real time: 30 kHz RBW, 30 kHz VBW, Peak detector, Span= 100 MHz |
| | FR1 Band: Carrier offset > 5 MHz Sweep tuned: -70 dBc typical Notice spurs: Span > 9 MHz Spur freq (MHz) = 7 x CF – 6 x Rin - 11 1.083 ≤ CF-Rin ≤ 2.583 Spur freq (MHz) = 4 x Rin - 3 x CF + 41.4 9.225 ≤ CF-Rin ≤ 11.475 Real time: -55 dBc typical CF: Center freq (MHz) Rin: RF input freq (MHz) |
| | FR2 Band: Carrier offset > 5 MHz Sweep tuned: -60 dBc typical Real time: -50 dBc typical |
| LO feedthrough to input | FR1 Band: < -85 dBm |
| | FR2 Band: < -47 dBm |
| Single sideband (SSB) phase noise | |
| | FR1 Band @ 1 GHz -98 dBc/Hz, -103 dBc/Hz typical @ 10 kHz offset -105 dBc/Hz, -110 dBc/Hz typical @ 100 kHz offset -120 dBc/Hz, -125 dBc/Hz typical @ 1 MHz offset |
| | FR2 Band @ 25 GHz -90 dBc/Hz, -95 dBc/Hz typical @ 10 kHz offset -90 dBc/Hz, -95 dBc/Hz typical @ 100 kHz offset -110 dBc/Hz, -115 dBc/Hz typical @1 MHz offset |

Measurements

| | |
|------------------------------------|--|
| Channel power | Channel power |
| | Spectral density |
| | PAR (Peak to average ratio) |
| Occupied bandwidth | Occupied bandwidth |
| | Integrated power |
| | Occupied power |
| | x dB bandwidth |
| Spectrum emission mask | Reference power |
| | Peak level at defined range |
| | Reference power |
| | Peak level at defined range |
| Adjacent channel power (ACP) | Reference power |
| | Absolute power at defined frequency offset |
| | Relative power at defined frequency offset |
| Multi-ACP (Adjacent channel power) | Reference power at lowest defined frequency |
| | Reference power at highest defined frequency |
| | Absolute power at defined frequency offset |
| | Relative power at defined frequency offset |
| Spurious emissions | Peak power at defined range |
| | Frequency of peak power at defined range |
| Total harmonic distortion | Power level at each harmonic |
| | % of THD |
| Field strength | Field strength power at markers |

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, μ, p) |
| Internal RF power sensor | |
| Frequency range | FR1 Band: 10 MHz to 6 GHz |
| | FR2 Band: 24 GHz to 40 GHz |
| Span | 1 kHz to 100 MHz |
| Dynamic range | FR1 Band: -120 to +25 dBm |
| | FR2 Band: -120 to +15 dBm |
| Maximum power | FR1 Band: +25 dBm |
| | FR2 Band: +15 dBm |
| Accuracy | Same as spectrum analyzer |

External RF Power Sensor (Standard, requires external RF power sensor)

| 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, μ, p) | | |
| Directional power sensor | | | |
| Model | JD731B | JD733A | |
| Frequency range | 300 MHz to 3.8 GHz | 150 MHz to 3.5 GHz | |
| Dynamic range | Average: 0.15 to 150 W | Average: 0.1 to 50 W | |
| | Peak: 4 to 400 W | Peak: 0.1 to 50 W | |
| Measurement type | Forward/Reverse average power, Forward peak power, VSWR | | |
| Accuracy | ±(4% of reading + 0.05 W) ^{1,2} | | |
| Connector type | Type-N female on both ends | | |
| Terminating power sensor | | | |
| Model | JD732B | JD734B | JD736B |
| Measurement type | Average | Peak | Average and Peak |
| Frequency range | 20 MHz to 3.8 GHz | | |
| Dynamic range | -30 to + 20 dBm | | |
| Accuracy | ±7 % ¹ | | |
| Connector type | Type-N female | | |

¹CW condition at 15 to 35 °C (59 to 95 °F)

²Forward power

GPS Connectivity with Antenna (Option S002)

| GPS receiver type | |
|-------------------------|--|
| Built-in type | |
| GPS time and location | |
| GPS information | Latitude, Longitude, Satellite, Status, GPS Engine, Satellite view, ID, and C/N |
| GPS time and location | Time, Latitude, and Longitude on display Time, Latitude, and Longitude on trace |
| High-frequency accuracy | |
| GPS lock | ±25 ppb |
| Hold over for 3 days | ±50 ppb (0 to 50 °C (32 to 122 °F)) 15 minutes after satellite locked |
| Connector | SMA, female |
| Supplied antenna | SMA (m), 3.3 VDC or 5 VDC |

Bluetooth Connectivity (Option S003)

| | |
|----------------|-----------------------------|
| Interface type | Build-in type |
| Mode | File transfer profile (FTP) |

Wi-Fi Connectivity (Option S004)

| | |
|---------------------------|---------------------|
| Interface type | Build-in type |
| Interface standard | IEEE 802.11 b/g/n |
| Wireless mode | Infrastructure mode |
| Internet protocol version | IPv4, IPv6 |

Real Time Spectrum Analyzer (Option S010 and S011)

| Frequency range | |
|--------------------------------|--|
| Option F001 | FR1 Band: 9 kHz to 6 GHz |
| Option F002 | FR1 and FR2 Bands: –FR1 Band: 9 kHz to 6 GHz –FR2 Band: 24 GHz to 40 GHz |
| Frequency span | |
| Option S010 | 50 MHz real time |
| Option S011 | 100 MHz real time 100 MHz step sequence |
| Acquisition | |
| IF bandwidth | 50 MHz or 100 MHz |
| Resolution bandwidth | 30 kHz to 3 MHz 1-3-10 sequence |
| A/D converter | 245.76 Msps, 16 bits |
| FFT lengths | 8192 |
| Maximum acquisition time | 1000 ms |
| Minimum IQ resolution | 8.138 ns |
| Probability of intercept (POI) | 125 µs Span: 100 MHz |

Real Time Spectrum Analyzer (Option S010 and S011) continued

| Spectrum display | |
|---------------------------------|--|
| Trace detectors | Normal, Positive peak, Negative peak, Sample, Average (RMS) |
| Number of traces | 6 |
| Trace states | Clear/write, Maximum hold, Minimum hold, Capture, Load, Blank |
| Marker type | Normal, Delta, Delta pair, Marker table |
| Number of markers | 6 |
| Marker to -> | Peak, Next peak, Next peak right, Next peak left, Min search, Always peak Center, Start, Stop |
| Audio beep | Tone change with signal strength |
| Marker table | Display 6 markers |
| Persistence spectrum display | |
| Spectrum processing rate | ≤ Max 15,000/s |
| Bitmap resolution | 201 x 801 |
| Marker information | Frequency, Amplitude, Signal density |
| Dwell time per step | 100 ms to 100 s |
| Trace processing | Color-graded bitmap, +Peak, -Peak, Average |
| Trace length | 801 |
| Marker type | Normal, Delta, Marker table |
| Number of markers | 6 |
| Marker to -> | Peak, Next peak, Next peak right, Next peak left, Min search, Always peak Center, Start, Stop |
| Audio beep | Tone change with signal strength |
| Marker table | Display 6 markers |
| Persistence spectrogram display | |
| Trace detection | +Peak, -Peak, Average (RMS) |
| Trace length, Memory depth | |
| Time resolution per line | 100 ms to 1 s, user selectable |

Interference Analyzer (S013)

| Measurement | |
|---------------------|---|
| Spectrum analyzer | Sound indicator, Interference ID, Spectrum recorder |
| Spectrogram | Collect up to 72 hours of data |
| RSSI | Collect up to 72 hours of data |
| Interference finder | |
| Radar chart | |
| Spectrum replayer | Playback recorded data using CA5000 |

Route Map (S014)

| | | |
|--------------|---|------------------------------------|
| Mode | Spectrum analyzer | |
| Plot method | Time, Position, GPS | |
| Plot legend | Excellent, Very good, Good, Poor | User definable range |
| Map type | Outdoor (position information embedded) | Import maps using VIAVI Mapcreator |
| | Indoor (no position information embedded) | Import maps using VIAVI Mapcreator |
| Measurements | RSSI, ACP, Peak search | |

Gated Sweep (S015)

| | |
|-------------------|-------------------------|
| Gated method | FFT |
| Gated delay range | 0 to 100 ms |
| Gated length | 1 us to 100 ms |
| Trigger source | External, Video and GPS |

Channel Scanner (S016)

| | |
|-------------------|---|
| Frequency range | FR1 Band: 10 MHz to 6 GHz |
| | FR2 Band: 24 GHz to 40 GHz |
| Measurement range | FR1 Band: -110 to +25 dBm |
| | FR2 Band: -110 to +15 dBm |
| Measurements | Channel scanner: 1 to 20 channels |
| | Frequency scanner: 1 to 20 frequencies |
| | Customer scanner: 1 to 20 channels or frequencies |

LTE/LTE-A FDD Signal Analyzer (S032)

| General Parameters | | |
|---------------------------------------|--|---------------------------------------|
| Frequency range | Band 1 to 14, 17 to 26 | |
| Input signal level | 10 MHz to 6 GHz: -75 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 | | |
| Channel Power | | Constellation |
| Channel power | MBSFN* | |
| Spectral density | RS power | |
| Peak to average ratio | PDSCH/Data* QPSK EVM | |
| Occupied Bandwidth | | PDSCH/Data* 16 QAM EVM |
| Occupied bandwidth | PDSCH/Data* 64 QAM EVM | |
| Integrated power | PDSCH/Data* 256 QAM EVM | |
| Occupied power | Data EVM RMS | |
| Spectrum Emission mask | | Data EVM peak |
| Reference power | Frequency error | |
| Peak level at defined range | Time Error | |
| ACLR | | Data Channel |
| Reference power | Physical Cell ID, Group ID, Sector ID | |
| Absolute power at defined range | MBSFN* | |
| Relative power at defined range | Resource block power | |
| Multi-ACLR | | I-Q diagram |
| Lowest reference power | Resource block power | |
| Highest reference power | Modulation power, IQ origin offset | |
| Absolute power at defined range | EVM RMS, EVM peak | |
| Relative power at defined range | Control Channel | |
| Spurious Emissions | | Physical Cell ID, Group ID, Sector ID |
| Peak frequency at defined range | MBSFN* | |
| Peak level at defined range | EVM, relative or absolute power, modulation type for P-SS, S-SS, PCFICH, PHICH, PDCCH, RS, MBSFN RS* | |
| Power vs. Time (frame) | | |
| Frame average power | Each control channels' | |
| I-Q origin offset, Time Offset | IQ diagram, Modulation format, Frequency error, IQ origin offset, | |
| Subframe power | EVM RMS, EVM peak | |
| First slot power | Subframe | |
| Second slot power | Physical Cell ID, Group ID, Sector ID | |
| Physical Cell ID, Group ID, Sector ID | MBSFN* | |
| | Subframe power | |
| | Channel summary table EVM, relative or absolute power, modulation type for P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN RS* Data QPSK, 16/64/256 QAM | |
| | Subframe summary OFDM symbol power, Frequency error, time error Data EVM RMS, data EVM peak, RS EVM RMS, RS EVM peak IQ Imbalance | |

*Measurement is performed when MBMS is enabled

| Measurements continued | | |
|---|---|---|
| Frame | Carrier Aggregation | Control Channel |
| Physical Cell ID, Group ID, Sector ID | Component carriers: up to 5 | Physical Cell ID, Group ID, Sector ID |
| MBSFN* | Subframe, P-SS, S-SS, PBCH, RS power | MBSFN* |
| Frame power | Data QPSK, 16/64/256 QAM power | RS/EVM power trend |
| Channel summary table | MBSFN RS power* | Control channel table |
| EVM, relative or absolute power, modulation type for P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN RS* PBSCH/PMCH QPSK, 16/64/256 QAM | Subframe, P-SS, S-SS, PBCH, RS EVM | Absolute power, EVM, phase for P-SS, S-SS, PBCH, PCFICH, RS0, RS1, RS2, RS3 |
| | Data QPSK, 16/64/256 QAM EVM | Frequency error |
| | MBSFN RS EVM* | Time alignment error |
| | MBSFN*, Physical Cell ID | Time offset |
| | Frequency error, time alignment error | |
| | Antenna port | |
| Subframe summary | Power Statistics CCDF | Datagram |
| OFDM symbol power, Frequency error, IQ-origin offset, Data EVM RMS, Data EVM peak EVM RMS, EVM peak | Average power | Datagram |
| | Max power | Resource block power |
| | Crest factor | Data utilization |
| | OTA Channel Scanner (up to 6) | Resource block allocation |
| | Frequency or channels | Route Map |
| Time Alignment Error | Physical Cell ID, Group ID, Sector ID | RSRP, RSRQ, RS-SINR, S-SS RSSI |
| Time alignment error trend | Channel power, RSSI, RSRP, RSRQ | P-SS,/S-SS power, S-SS Ec/Io |
| Time alignment error | RS-SINR, Antenna port | |
| RS power difference | OTA ID Scanner (up to 6) | |
| Antenna 0 RS power, EVM, time difference | RSRP, RSRQ dominance | |
| Antenna 1 RS power, EVM, time difference | S-SS RSSI, S-SS Ec/Io dominance | |
| Antenna 2 RS power, EVM, time difference | Physical Cell ID, Group ID, Sector ID | |
| Antenna 3 RS power, EVM, time difference | RSRP, RSRQ, RS-SIN, S-SS RSSI, P-SS, S-SS, S-SS Ec/Io | |
| | Multipath Profile | |
| | Physical Cell ID, Group ID, Sector ID | |
| Data Allocation Map | Antenna 0 RS Ec/Io, delay | |
| Frame data utilization | Antenna 1 RS Ec/Io, delay | |
| OFDM symbol power | Antenna 2 RS Ec/Io, delay | |
| Data allocation vs frame | Antenna 3 RS Ec/Io, delay | |
| Subframe data utilization | | |
| Resource block power | | |
| Data allocation vs subframe | | |

*Measurement is performed when MBMS is enabled

LTE/LTE-A TDD Signal Analyzer (S033)

| General Parameters | | |
|---------------------------------------|--|---------------------------------------|
| Frequency range | Band 33 to 43 | |
| Input signal level | 10 MHz to 6 GHz: -75 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 | | |
| Channel Power | | Constellation |
| Channel power | MBSFN* | |
| Spectral density | RS power | |
| Peak to average ratio | PDSCH/Data* QPSK EVM | |
| Occupied Bandwidth | | PDSCH/Data* 16 QAM EVM |
| Occupied bandwidth | PDSCH/Data* 64 QAM EVM | |
| Integrated power | PDSCH/Data* 256 QAM EVM | |
| Occupied power | Data EVM RMS | |
| Spectrum Emission mask | | Data EVM peak |
| Reference power | Frequency error | |
| Peak level at defined range | Time error | |
| ACLR | | Data Channel |
| Reference power | Physical Cell ID, Group ID, Sector ID | |
| Absolute power at defined range | MBSFN* | |
| Relative power at defined range | Resource block power | |
| Multi-ACLR | | I-Q diagram |
| Lowest reference power | Resource block power | |
| Highest reference power | Modulation power, IQ origin offset | |
| Absolute power at defined range | EVM RMS, EVM peak | |
| Relative power at defined range | Control Channel | |
| Spurious Emissions | | Physical Cell ID, Group ID, Sector ID |
| Peak frequency at defined range | MBSFN* | |
| Peak level at defined range | EVM, relative or absolute power, modulation type for P-SS, S-SS, PCFICH, PHICH, PDCCH, RS, MBSFN RS* | |
| Power vs. Time (frame) | | Each control channels' |
| Frame average power | IQ diagram, Modulation format, | |
| I-Q origin offset, Time Offset | Frequency error, IQ origin offset, | |
| Subframe power | EVM RMS, EVM peak | |
| First slot power | Subframe | |
| Second slot power | Physical Cell ID, Group ID, Sector ID | |
| Physical Cell ID, Group ID, Sector ID | MBSFN* | |
| Power vs. Time (slot) | | Subframe power |
| Slot average power | Channel summary table | |
| Transition period length | EVM, relative or absolute power, modulation type for P-SS, S-SS, | |
| Off Power | PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN RS* | |
| Physical Cell ID, Group ID, Sector ID | Data QPSK, 16/64/256 QAM | |

*Measurement is performed when MBMS is enabled

| Measurements continued | |
|---|---|
| Subframe summary OFDM symbol power, Frequency error, time error Data EVM RMS, data EVM peak, RS EVM RMS, RS EVM peak IQ Imbalance | Power Statistics CCDF Average power Max power Crest factor |
| Frame | OTA Channel Scanner (up to 6) Frequency or channels |
| Physical Cell ID, Group ID, Sector ID | Physical Cell ID, Group ID, Sector ID |
| MBSFN* | Channel power, RSSI, RSRP, RSRQ |
| Frame power | RS-SINR, Antenna port |
| Channel summary table EVM, relative or absolute power, modulation type for P-SS, S-SS, PBCH, PCFICH, PHICH, PDCCH, RS, MBSFN RS* PBSCH/PMCH QPSK, 16/64/256 QAM | OTA ID Scanner (up to 6) RSRP, RSRQ dominance S-SS RSSI, S-SS Ec/Io dominance Physical Cell ID, Group ID, Sector ID RSRP, RSRQ, RS-SIN, S-SS RSSI, P-SS, S-SS, S-SS Ec/Io |
| Subframe summary OFDM symbol power, Frequency error, IQ-origin offset, Data EVM RMS, Data EVM peak EVM RMS, EVM peak | Multipath Profile Physical Cell ID, Group ID, Sector ID Antenna 0 RS Ec/Io, delay Antenna 1 RS Ec/Io, delay Antenna 2 RS Ec/Io, delay Antenna 3 RS Ec/Io, delay |
| Time Alignment Error | Control Channel |
| Time alignment error trend | Physical Cell ID, Group ID, Sector ID |
| Time alignment error | MBSFN* |
| RS power difference | RS/EVM power trend |
| Antenna 0 RS power, EVM, time difference | Control channel table Absolute power, EVM, phase for P-SS, S-SS, PBCH, PCFICH, RS0, RS1, RS2, RS3 |
| Antenna 1 RS power, EVM, time difference | |
| Antenna 2 RS power, EVM, time difference | |
| Antenna 3 RS power, EVM, time difference | |
| Data Allocation Map | |
| Frame data utilization | Frequency error |
| OFDM symbol power | Time alignment error |
| Data allocation vs frame | Time offset |
| Subframe data utilization | Datagram |
| Resource block power | Datagram |
| Data allocation vs subframe | Resource block power |
| Carrier Aggregation | Data utilization |
| Component carriers: up to 5 | Resource block allocation |
| Subframe, P-SS, S-SS, PBCH, RS power | |
| Data QPSK, 16/64/256 QAM power | Route Map |
| MBSFN RS power* | RSRP, RSRQ, RS-SINR, S-SS RSSI |
| Subframe, P-SS, S-SS, PBCH, RS EVM | P-SS/S-SS power, S-SS Ec/Io |
| Data QPSK, 16/64/256 QAM EVM | |
| MBSFN RS EVM* | |
| MBSFN*, Physical Cell ID | |
| Frequency error, time alignment error | |
| Antenna port | |

*Measurement is performed when MBMS is enabled

5G TF Signal Analyzer (S040)

| | | |
|------------------------|---|----------------------|
| Frequency range | FR1 Band: 10 MHz to 6 GHz | |
| | FR2 Band: 24 GHz to 40 GHz | |
| Input signal level | FR1 Band: -75 to +25 dBm | |
| | FR2 Band: -75 to +15 dBm | |
| RX sensitivity | -110 dBm | PSS detection |
| Channel power accuracy | ±1.0 dBm typical | |
| Supported bandwidth | 100 MHz | |
| Frequency error | ±100 Hz | 99% confidence level |
| Residual EVM (RMS) | 3.0% typical | |
| Carrier scanner | Carrier scanner bar up to 8 carriers | |
| | BRSRP | |
| | Channel power | |
| | Carrier scanner summary | |
| | Cell ID/Beam index | |
| | Carrier frequency | |
| | Channel power | |
| | Frequency error | |
| | xPBCH EVM | |
| Beam analyzer | Beam analyzer bar/summary up to 8 beams | |
| | Cell ID/Beam index | |
| | BRSRP | |
| | PSS-RSSI | |
| | BRS-SNR | |
| Route map | Cell ID/Beam index | |
| | BRSRP | |
| | PSS-RSSI | |

5G NR Signal Analyzer (S041)

| | | |
|------------------------|----------------------------|----------------------|
| Frequency range | FR1 Band: 10 MHz to 6 GHz | |
| | FR2 Band: 24 GHz to 40 GHz | |
| Input signal level | FR1 Band: -75 to +25 dBm | |
| | FR2 Band: -75 to +15 dBm | |
| Rx sensitivity | -123 dBm | PSS (SCS 240 kHz) |
| | -118 dBm | PSS (SCS 120 kHz) |
| | -106 dBm | PSS (SCS 30 kHz) |
| | -100 dBm | PSS (SCS 15 kHz) |
| Channel power accuracy | ±1.0 dBm typical | |
| Supported bandwidth | Up to 100 MHz | |
| Frequency error | ±100 Hz | 99% confidence level |
| Residual EVM (RMS) | 2.0 % typical | Data EVM |

5G NR Signal Analyzer (S041) continued

| Measurements continued | | |
|--|---|--|
| Channel power Channel power Spectral density Peak to average power | Power vs. time Frame average power Subframe power Slot average power Transient period length Off power level | Channel scanner (up to 8) Channel scanner bar SS-RSRP Channel power Channel scanner summary Cell ID Center frequency SS-RSRP/SS-RSRQ Channel power SS-RSRP SS-RSRQ |
| Occupied bandwidth Occupied bandwidth Integrated power Occupied power | Constellation PDSCH/Data QPSK EVM PDSCH/Data 16QAM EVM PDSCH/Data 64QAM EVM PDSCH/Data 256QAM EVM Data EVM RMS, Peak Frequency error | Beam scanner (up to 8) Beam scanner bar Cell ID/Beam index SS-RSRP SS-RSRQ PSS/SSS power |
| Spectrum emission Reference power Peak level at defined range | | |
| ACLR Reference power Abs power at defined range Rel power at defined range | | Beam scanner summary Cell, Group, Sector ID Beam index SS-RSRP SS-RSRQ PSS/SSS power |
| Multi-ACLR Lowest reference power Highest reference power Abs power at defined range Rel power at defined range | | |
| Spurious emissions Peak frequency at defined range Peak level at defined range | | Route map SS-RSRP SS-RSRQ PSS power SSS Power |

RFoCPRI Interference Analyzer (Option S050, S051)

| General Parameters | | |
|----------------------------|---|--|
| Optical Interface | Dual SFP/SFP+ (supports all MSA compliant SFP modules) | Supported with CA5000-F001-O and CA5000-F002-O |
| Line rates | CPRI Rate 1 to 7 | Option S050 |
| | CPRI Rate 8 | Option S051 |
| Resolution Bandwidth (RBW) | - 3dB bandwidth | 10 kHz to 100 kHz with 1-3 step 7.5kHz |
| | Accuracy | ±10% (nominal) |
| Video Bandwidth (VBW) | - 3dB bandwidth | 10 kHz to 100 kHz with 1-3 step 7.5kHz |
| | Accuracy | ±10% (nominal) |
| CPRI Parameters | IQ Sample width | 4 – 20 bits |
| | Mapping Method | 1 and 3 |
| | TX clock | Internal, External, Recovered |
| | Port Type | Master, Slave |
| | Sampling Frequency | N x 3.84 MHz, where N=1 to 8 |

RFoCPRI Interference Analyzer (Option S050, S051) continued

| Measurements | | |
|-----------------------|--|---|
| Link Status | LOS, LOF, SDI, RAI, Optic RX Level | Port 1 and Port 2 |
| SFP Information | Wavelength, Vendor, Vendor PN, Vendor Rev, Power level type, Diagnostic byte, Nominal rate, Min rate, Max RX level, Max TX level | Port 1 and Port 2 |
| Interference Analyzer | Spectrum | Single, Dual, and Quad Chart |
| | Spectrogram | Single and Dual spectrum Chart with 2-D and 3-D waterfall diagram |
| | Interference ID | |
| | Sound Indicator | |
| | PRB Table | |
| | Spectrum Replayer | |
| | IQ Activity Scan | |

General Information

| RF in | | |
|---|--|------------------|
| Connector type | Option F001: Type-N, female | |
| | Option F002: 2.92 mm, male | |
| Impedance | 50 Ω nominal | |
| Damage level | FR1 Band: +37 dBm, \pm 50 VDC | Average CW power |
| | FR2 Band: +27 dBm, \pm 50 VDC | Average CW power |
| Trigger in/out, GPS | | |
| Connector type | SMA, female | |
| Impedance | 50 Ω nominal | |
| Reference clock in/out | | |
| Connector type | SMA, female | |
| Impedance | 50 Ω nominal | |
| Frequency | 10 MHz, 13 MHz, 15 MHz | |
| Input range | -5 to +5 dBm | |
| USB | | |
| USB host | Type A, 2 ports USB2.0 | |
| USB client | Mini USB, 1 port | |
| | Used for SCPI programming, USBTMC, and connection to AppSW | |
| SFP cage with optic HW | | |
| Port1 | SFP/SFP+ compatible | |
| Port2 | SFP/SFP+ compatible | |
| LAN | RJ45, 100/1000 Base-T | |
| LAN | | |
| RJ45, 1000 Base-T | | |
| Used for SCPI programming, remote control and connection to AppSW | | |
| Audio jack | | |
| 3.5 mm headphone jack | | |
| Built-in speaker | | |
| Display | | |
| Type | 10" capacitive touch screen | |
| Resolution | 1280 x 800 | |
| Power | | |
| Connector | Rectangular DC jack | |
| External DC input | 19 VDC | |
| Power consumption | Option F001 54 W | |
| | Option F002 64 W | |

General Information continued

| Battery | | |
|--|--|-----------------------|
| Type | 14.4 V, 6800 mAh (Lithium ion) | Accepts two batteries |
| Operating time | Option F001 standard (one battery): > 2:00 hrs typical Optional secondary battery: > 4:10 hrs typical | |
| | Option F002 standard (one battery): > 1:40 hrs typical Optional secondary battery: > 3:30 hrs typical | |
| Charging time | 100 % charging Standard (one battery): > 2:30 hrs Optional secondary battery: > 4:30 hrs | |
| | Up to 80 % charging Standard (one battery): > 1:40 hrs Optional secondary battery: > 3:20 hrs | |
| Charging temperature | -10 to 45°C (14 to 113°F) ≤ 85% RH | |
| Discharging temperature | -20 to 55°C (-4 to 131°F) ≤ 85% RH | |
| Storage temperature | -20 to 60°C (-4 to 140°F) | |
| Operating temperature | | |
| AC power | 0 to 40°C (32 to 104°F) | Battery charging |
| Battery | -10 to 55°C (14 to 131°F) | Without optic HW |
| | -10 to 40°C (14 to 104°F) | With optic HW |
| Storage temperature | | |
| -20 to 60 °C (-4 to 140 °F) | | |
| Maximum humidity | | |
| 95% RH (noncondensing) | | |
| Memory | | |
| Internal | Maximum 4 GB | |
| External | Limited by size of USB/SD flash drive | |
| | SD card (not supplied), size ≤ 32 Gbyte | |
| Data storage | | |
| Internal | > 1000 instrument setups and traces | |
| External | > 5000 instrument setups and traces | |
| Environmental | | |
| Vibration | MIL-PRF-28800F Class 2 | |
| Shock | MIL-PRF-28800F | |
| Bench handling | MIL-PRF-28800F | |
| Transit drop | MIL-PRF-28800F Class 2 | |
| EMC | | |
| IEC/EN 61326-1:2006 (complies with European EMC) | | |
| CISPR11:2009 +A1:2010 | | |
| ESD | | |
| IEC/EN 61000-4-2 | | |

General Information continued

| Size and weight (Standard configuration) | |
|---|---|
| Weight (with one battery) | Option F001: < 5.9 kg (13.00 lb.) |
| | Option F002: < 6.2 kg (13.66 lb.) |
| Size (W x H x D) | 309 mm x 241 mm x 113 mm with top bumper |
| | 309 mm x 225 mm x 113 mm without top bumper |
| Warranty | |
| 3 years | |
| Recommended calibration cycle | |
| 1 year | |

Ordering Information

| Part number | Description | Note |
|---------------------------------|--|---|
| CA5000 | CellAdvisor 5G Includes: Spectrum analyzer, RF power meter | Requires one of internal hardware options |
| Internal hardware option | | |
| CA5000-F001 | Frequency for 5G FR1 up to 6 GHz | |
| CA5000-F002 | Frequency for 5G FR1 up to 6 GHz and 5G FR2 up to 40 GHz | |
| CA5000-F001-O | Frequency for 5G NR FR1 up to 6 GHz with optic HW | |
| CA5000-F002-O | Frequency for 5G NR FR1 up to 6 GHz and FR2 up to 40 GHz with optic HW | |
| Hardware upgrade options | | |
| | Requires factory return | |
| CA5000-FU02 | Frequency upgrade to FR2 up to 40 GHz | Requires F001 or F001-O |
| CA5000-OU01 | Upgrade optic hardware | |
| Bandwidth range | | |
| CA5000-B100 | 100 MHz/100 MHz analysis bandwidth | |
| Options | | |
| CA5000-S002 | GPS connectivity with antenna | |
| CA5000-S003 | Bluetooth connectivity | |
| CA5000-S004 | Wi-Fi connectivity | |
| CA5000-S010 | 50 MHz bandwidth real time spectrum analyzer | |
| CA5000-S011 | 100 MHz bandwidth real time spectrum analyzer | Requires B100 |
| CA5000-S013 | Interference analyzer | |
| CA5000-S014 | Route map | |
| CA5000-S015 | Gated sweep | |
| CA5000-S016 | Channel scanner | |
| CA5000-S032 | LTE/LTE-A FDD signal analyzer | |
| CA5000-S033 | LTE/LTE-A TDD signal analyzer | |
| CA5000-S040 | 5G TF signal analyzer | Requires B100 |
| CA5000-S041 | 5G NR signal analyzer | Requires B100 |
| CA5000-S050 | RFoCPRI line rates 1 to 7 interference analyzer | Requires Optic HW |
| CA5000-S051 | RFoCPRI line rate 8 interference analyzer | Requires Optic HW |

Optional Accessories

| Accessory - RF cables | |
|-------------------------|--|
| G700050530 | RF cable DC to 8 GHz Type-N(m) to Type-N(m), 1.0 m |
| G700050531 | RF cable DC to 8 GHz Type-N(m) to Type-N(f), 1.5 m |
| G700050532 | RF cable DC to 8 GHz Type-N(m) to Type-N(f), 3.0 m |
| G710050533 | RF cable DC to 18 GHz Type-N(m) to SMA(m), 1.5 m |
| G710050534 | RF cable DC to 18 GHz Type-N(m) to QMA(m), 1.5 m |
| G710050535 | RF cable DC to 18 GHz Type-N(m) to SMB(m), 1.5 m |
| G710050536 | RF cable DC to 6 GHz Type-N(m) to DIN(f), 1.5 m |
| G710050537 | RF cable DC to 4 GHz Type-N(m) to 1.0/2.3 (m), 1.5 m |
| G700050540 | Phase-stable RF cable w grip DC to 6 GHz Type-N(m) to Type-N(f), 1.5 m |
| G700050541 | Phase-stable RF cable w grip DC to 6 GHz Type-N(m) to DIN(f), 1.5 m |
| G710050531 | RF cable DC to 18 GHz Type-N(m) to Type-N(f), 1.5 m |
| G700050550 | RF cable DC to 40 GHz, K(m) to K(m), 0.8 m |
| G700050551 | RF cable DC to 40 GHz, K(m) to K(f), 0.8 m |
| G700050552 | RF cable DC to 40 GHz, K(m) to K(f), 1.5 m |
| Accessory - RF antennas | |
| G700050340 | Mag mount RF omni antenna Type-K(f), 26 GHz to 40 GHz |
| G700050342 | Mag mount RF omni antenna with LNA; Type-K(f); 26 GHz to 40 GHz |
| G700050350 | RF omni antenna Type-N(m); 3300 to 3800 MHz |
| G700050353 | RF omni antenna Type-N(m), 806 to 896 MHz |
| G700050354 | RF omni antenna Type-N(m), 870 to 960 MHz |
| G700050355 | RF omni antenna Type-N(m), 1710 to 2170 MHz |
| G700050356 | RF omni antenna Type-N(m), 720 to 800 MHz |
| G700050357 | RF omni antenna Type-N(m), 2300 to 2700 MHz |
| G700050363 | RF yagi antenna Type-N(f), 1750 to 2390 MHz, 10.2 dBd |
| G700050365 | RF yagi antenna Type-N(f), 866 to 960 MHz, 9.8 dBd |
| G700050366 | RF yagi antenna SMA(f), 700 to 4000 MHz, 1.85 dBd |
| G700050367 | RF yagi antenna SMA(f), 700 to 6000 MHz, 2.85 dBd |
| G700050370 | RF directional horn antenna kit, K(f), 26.5 GHz to 40 GHz, 20 dBi |
| G700050390 | GPS SMA mount antenna |
| Accessory - RF adapters | |
| G700050572 | Adapter DIN(m) to DIN(m), DC to 7.5 GHz, 50 ohm |
| G700050573 | Adapter Type-N(m) to SMA(f) DC to 18 GHz, 50 ohm |
| G700050574 | Adapter Type-N(m) to BNC(f), DC to 4 GHz, 50 ohm |
| G700050575 | Adapter Type-N(f) to Type-N(f), DC to 18 GHz 50 ohm |
| G700050576 | Adapter Type-N(m) to DIN(m), DC to 7.5 GHz, 50 ohm |
| G700050577 | Adapter Type-N(f) to DIN(f), DC to 7.5 GHz, 50 ohm |
| G700050578 | Adapter Type-N(f) to DIN(m), DC to 7.5 GHz, 50 ohm |
| G700050579 | Adapter DIN(f) to DIN(f), DC to 7.5 GHz, 50 ohm |
| G700050580 | Adapter Type-N(m) to Type-N(m), DC to 11 GHz 50 ohm |
| G700050581 | Adapter N(m) to QMA(f), DC to 6.0 GHz, 50 ohm |
| G700050582 | Adapter N(m) to QMA(m), DC to 6.0 GHz, 50 ohm |

Optional Accessories continued

| | |
|-------------------------------------|--|
| G700050583 | Adapter N(m) to 4.1/9.5 MINI DIN(f), DC to 6.0 GHz, 50 ohm |
| G700050584 | Adapter N(m) to 4.1/9.5 MINI DIN(m), DC to 6.0 GHz, 50 ohm |
| G700050585 | Adapter N(m) to 4.3-10(f), DC to 6.0 GHz, 50 ohm |
| G700050586 | Adapter N(m) to 4.3-10(m), DC to 6.0 GHz, 50 ohm |
| G700050587 | Adapter N(f) to SMA(f), DC to 18 GHz, 50 ohm |
| Accessory - RF filters | |
| G700050601 | Bandpass filter 696 MHz to 716 MHz, N(m) to N(f), 50 ohm |
| G700050602 | Bandpass filter 776 MHz to 788 MHz, N(m) to N(f), 50 ohm |
| G700050603 | Bandpass filter 806 MHz to 849 MHz, N(m) to N(f), 50 ohm |
| G700050604 | Bandpass filter 1710 MHz to 1755 MHz, N(m) to N(f), 50 ohm |
| G700050605 | Bandpass filter 1850 MHz to 1910 MHz, N(m) to N(f), 50 ohm |
| G700050606 | Bandpass filter 703 MHz to 748 MHz, N(m) to N(f), 50 ohm |
| G700050607 | Bandpass filter 832 MHz to 862 MHz, N(m) to N(f), 50 ohm |
| G700050608 | Bandpass filter 880 MHz to 915 MHz, N(m) to N(f), 50 ohm |
| G700050609 | Bandpass filter 1710 MHz to 1785 MHz, N(m) to N(f), 50 ohm |
| G700050610 | Bandpass filter 1920 MHz to 1980 MHz, N(m) to N(f), 50 ohm |
| G700050611 | Bandpass filter 2500 MHz to 2570 MHz, N(m) to N(f), 50 ohm |
| G700050612 | Bandpass filter 663 MHz to 698 MHz, N(m) to N(f), 50 ohm |
| G700050613 | Bandpass filter 3300 MHz to 3800 MHz, N(m) to N(f), 50 ohm |
| Accessory - RF power sensors | |
| JD731B | Directional power sensor (peak and average power) 300 to 3800 MHz |
| JD732B | Terminating power sensor (Average Power) 20 to 3800 MHz |
| JD733A | Directional power sensor (peak and average power) 150 to 3500 MHz |
| JD734B | Terminating power sensor (peak power) 20 to 3800 MHz |
| JD736B | Terminating power sensor (average/peak power) 20 to 3800 MHz |
| Accessory - RF miscellaneous | |
| G710050581 | Attenuator 40 dB, 100 W, DC to 4 GHz (unidirectional) |
| G710050585 | 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) |
| G710050586 | RF combiner, 700 to 4000 MHz, Type-N(f) to Type-N(m) |
| G710050587 | 4x1 RF combiner, 700 to 4000 MHz, Type-N(f) to Type-N(m) |
| JD70050007 | AntennaAdvisor handle |
| Accessory - general | |
| G700050431 | CellAdvisor 5G soft carrying case |
| G700050150 | 98 Wh Lithium-Ion Battery |
| G700050125 | CA5G Automotive cigarette lighter DC/DC adapter |
| G700050126 | CA5G AC/DC power adapter 160 W 19 V |
| G700050433 | CA5G backpack carrying case with monopod |
| G700050434 | CA5G harness for indoor application |

| Accessory - OTDR Modules | |
|---------------------------------|---|
| E4106MA2-PC / E4106MA2-APC | 1310/1625 nm, PC or APC connector - Short/medium-haul qualification |
| E4126MA2-PC / E4126MA2-APC | 1310/1550 nm, PC or APC connector - Short/medium-haul qualification |
| E4136MA2-PC / E4136MA2-APC | 1310/1550/1625 nm, PC or APC connector - Short/medium-haul qualification |
| E4126MA3-PC / E4126MA3-APC | 1310/1550 nm - Short/medium/long-haul qualification |
| E4136MA3-PC / E4136MA3-APC | 1310/1550/1625 nm - Short/medium/long-haul qualification |
| E4146QUAD | Multimode 850/1300 nm & Singlemode 1310/1550 nm - Short/medium-haul qualification |
| E41DWDMC-PC / E41DWDMC-APC | Tunable DWDM C-band 1528 nm to 1568 nm, PC or APC connector- Short/medium/long-haul qualification |



Contact Us **+1 844 GO VIAVI**
(+1 844 468 4284)

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