

**Anritsu** envision : ensure

# Cell Master™

Compact Handheld Base Station Analyzer

## MT8213E

2 MHz to 6 GHz  
9 kHz to 6 GHz  
10 MHz to 6 GHz

Cable & Antenna Analyzer  
Spectrum Analyzer  
Power Meter



## Introduction

Anritsu introduces its latest generation compact handheld Base Station Analyzer for installation and maintenance of wireless networks. Designed as a lightweight base station analyzer meeting virtually all the testing needs of an RF technician, the Cell Master features Signal Analyzer options for 2G, 3G, and 4G cellular networks including LTE, WiMAX, and digital broadcast.

---

## Cable and Antenna Analyzer Highlights

- Measurements: RL, VSWR, Cable Loss, DTF, Phase
- 2-port Transmission Measurement: High/Low Power
- Sweep Speed: 1 ms/data point, typical
- Display: Single or Dual Measurement Touchscreen
- Calibration: OSL, InstaCal™, and FlexCal™
- Bias Tee: 32 V internal

---

## Spectrum and Interference Analyzer Highlights

- Measurements: Occupied Bandwidth, Channel Power, ACPR, C/I
- Interference Analyzer: Spectrogram, Signal Strength, RSSI, Interference Mapping
- Dynamic Range: > 102 dB in 1 Hz RBW
- DANL: -162 dBm in 1 Hz RBW
- Phase Noise: -100 dBc/Hz max @ 10 kHz offset at 1 GHz
- Frequency Accuracy: ± 50 ppb with GPS On

---

## Capabilities and Functional Highlights

- LTE/LTE-A FDD/TDD; MIMO (2x2, 4x4)
- NB-IoT measurements
- GSM/EDGE
- W-CDMA/HSPA+
- TD-SCDMA/HSPA+
- CDMA, EV-DO
- Fixed, Mobile WiMAX
- EMF Test
- USB Power Sensors up to 50 GHz
- Coverage Mapping
- 3 hour battery operation time
- USB or Ethernet data transfer
- PIM Alert Application
- PIM Hunting
- ISDB-T, ISDB-T SFN
- DVB-T/H, DVB-T/H SFN
- Interference Analyzer
- GPS information on stored traces
- Built-in Bias Tee
- Internal Power Meter
- High Accuracy Power Meter
- Master Software Tools™
- Line Sweep Tools™
- easyTest Tools™
- Web Remote Control with Ethernet

## Table of Contents

|                                                  |    |
|--------------------------------------------------|----|
| Definitions                                      | 3  |
| Cable and Antenna Analyzer                       | 4  |
| 2-Port Transmission Measurement (Option 21)      | 5  |
| Bias-Tee (Option 10)                             | 5  |
| Spectrum Analyzer                                | 6  |
| Coverage Mapping (Option 431)                    | 8  |
| Electromagnetic Field Test (Option 444)          | 8  |
| Ethernet Connectivity (formerly Option 413)      | 8  |
| Interference Analyzer (Option 25)                | 9  |
| GPS Receiver (Option 31)                         | 9  |
| Channel Scanner (Option 27)                      | 9  |
| CW Signal Generator (Option 28)                  | 9  |
| Gated Sweep (Option 90)                          | 9  |
| Power Meter                                      | 10 |
| High Accuracy Power Meter (Option 19)            | 10 |
| LTE/LTE-A Signal Analyzers (Options 883 and 886) | 11 |
| NB-IoT Analyzer (Option 887)                     | 12 |
| GSM/EDGE Signal Analyzer (Option 880)            | 12 |
| W-CDMA/HSPA+ Signal Analyzer (Option 881)        | 13 |
| CDMA Signal Analyzer (Option 884)                | 14 |
| EV-DO Signal Analyzer (Option 884)               | 15 |
| Fixed WiMAX Signal Analyzer (Option 885)         | 16 |
| Mobile WiMAX Signal Analyzer (Option 885)        | 17 |
| TD-SCDMA/HSPA+ Signal Analyzer (Option 882)      | 18 |
| ISDB-T Signal Analyzer (Options 30, 79, 32)      | 19 |
| DVB-T/H Signal Analyzer (Options 64, 57, 78)     | 20 |
| General Specifications                           | 21 |
| Line Sweep Tools                                 | 22 |
| easyTest Tools™                                  | 22 |
| easyMap Tools™                                   | 22 |
| Master Software Tools                            | 23 |
| Web Remote Control                               | 24 |
| Programmable Remote Control                      | 24 |
| Ordering Information – Options                   | 25 |
| Standard Accessories                             | 26 |
| Manuals                                          | 26 |
| Troubleshooting Guides                           | 26 |
| Power Sensors                                    | 26 |
| Optional Accessories                             | 27 |

## Definitions

|                        |                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specifications         | All specifications and characteristics apply to Revision 2 <sup>1</sup> instruments under the following conditions, unless otherwise stated: <ul style="list-style-type: none"> <li>• After 5 minutes of warm-up time, where the instrument is left in the ON state</li> <li>• Sweep Mode set to Performance</li> <li>• When using the internal reference signal</li> </ul> |
| Typical Specifications | Typical specifications are not tested and not warranted. They are generally representative of characteristic performance.                                                                                                                                                                                                                                                   |
| Nominal                | Design parameters are not tested and not warranted.                                                                                                                                                                                                                                                                                                                         |
| Calibration Cycle      | Recommended calibration cycle is 12 months.                                                                                                                                                                                                                                                                                                                                 |
| Time Base Error        | Input Frequency × Frequency Reference Error                                                                                                                                                                                                                                                                                                                                 |

All specifications subject to change without notice. For the most current data sheet, please visit the Anritsu web site: [www.anritsu.com](http://www.anritsu.com)

1. Applies to instruments with serial number ≥ 1609XXX.



## Cable and Antenna Analyzer

### Measurements

|              |                                         |
|--------------|-----------------------------------------|
| Measurements | VSWR                                    |
|              | Return Loss                             |
|              | Cable Loss                              |
|              | Distance-to-Fault (DTF) Return Loss     |
|              | Distance-to-Fault (DTF) VSWR            |
|              | 1-Port Phase                            |
|              | Smith Chart (50/75 $\Omega$ selectable) |

### Setup Parameters

|                     |                                                                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measurement Display | Single/Dual Measurement Display with independent markers                                                                                                     |
| Frequency           | Start/Stop, Signal Standard, Start Cal                                                                                                                       |
| DTF                 | Start/Stop, DTF Aid, Units (m/ft), Cable Loss, Propagation Velocity, Cable, Windowing                                                                        |
| Windowing           | Rectangular, Normal Side Lobe, Low Side Lobe, Minimum Side Lobe                                                                                              |
| Amplitude           | Top, Bottom Auto Scale, Full Scale                                                                                                                           |
| Sweep               | Run/Hold, Single/Continuous, RF Immunity (High/Low), Data Points, Averaging/Smoothing, Output Power (High/Low), RF Pwr When Hold (On/Off)                    |
| Data Points         | 137, 275, 551, 1102, 2204                                                                                                                                    |
| Markers             | Markers 1-6 (On/Off), Delta Markers 1-6 (On/Off), Marker to Peak/Valley, Peak/Valley Auto, Marker Table (On/Off), All Markers Off                            |
| Traces              | Recall, Copy to Display Memory, No Trace Math, Trace $\pm$ Memory, (Trace + Memory)/2, and Trace Overlay (On/Off)                                            |
| Limit Line          | On/Off, Single Limit, Multi-segment Edit, Limit Alarm (On/Off), Pass Fail Message (On/Off), Pass/Fail (Unbounded/Bounded), Warning Limit Offset, Clear Limit |
| Calibration         | Start Cal, Cal Type (Standard/FlexCal™), Disp Valid Cal Temp Range                                                                                           |
| Save                | Setups (.stp), Measurements (.dat, .vna, .csv*), Screen Shots (.jpg) *Requires V4.00 firmware or higher                                                      |
| Recall              | Setups (.stp), Measurements (.dat, .vna)                                                                                                                     |

### Frequency

|                      |                                                     |
|----------------------|-----------------------------------------------------|
| Frequency Range      | 2 MHz to 6 GHz                                      |
| Frequency Accuracy   | $\leq \pm 2.5$ ppm @ 25 °C                          |
| Frequency Resolution | 1 kHz (RF immunity low), 100 kHz (RF immunity high) |

### Output Power

|      |                                                                           |
|------|---------------------------------------------------------------------------|
| High | 0 dBm, typical                                                            |
| Low  | 2 MHz to 1.5 GHz: -40 dBm, typical<br>>1.5 GHz to 6 GHz: -30 dBm, typical |

### Interference Immunity

|              |                                                    |
|--------------|----------------------------------------------------|
| On-Channel   | +17 dBm @ > 1.0 MHz from carrier frequency         |
| On-Frequency | 0 dBm within $\pm 10$ kHz of the carrier frequency |

### Measurement Speed

|                   |                                                     |
|-------------------|-----------------------------------------------------|
| Return Loss       | $\leq 1.00$ ms/data point, RF immunity low, typical |
| Distance-to-Fault | $\leq 1.25$ ms/data point, RF immunity low, typical |

### Return Loss

|                   |               |
|-------------------|---------------|
| Measurement Range | 0 dB to 60 dB |
| Resolution        | 0.01 dB       |

### VSWR

|                   |             |
|-------------------|-------------|
| Measurement Range | 1:1 to 65:1 |
| Resolution        | 0.01        |

### Cable Loss

|                   |               |
|-------------------|---------------|
| Measurement Range | 0 dB to 30 dB |
| Resolution        | 0.01 dB       |

### Distance-to-Fault

|                            |                                                                                                          |
|----------------------------|----------------------------------------------------------------------------------------------------------|
| Vertical Range Return Loss | 0 dB to 60 dB                                                                                            |
| Vertical Range VSWR        | 1:1 to 65:1                                                                                              |
| Fault Resolution (meters)  | $(1.5 \times 10^8 \times vp) / \Delta F$ (vp = velocity propagation constant, $\Delta F$ is F2-F1 in Hz) |
| Horizontal Range (meters)  | 0 to (Data Points-1) x Fault Resolution, to a maximum of 1500 m (4921 ft)                                |

### 1-Port Phase

|                   |                |
|-------------------|----------------|
| Measurement Range | -180° to +180° |
| Resolution        | 0.01°          |

Smith Chart

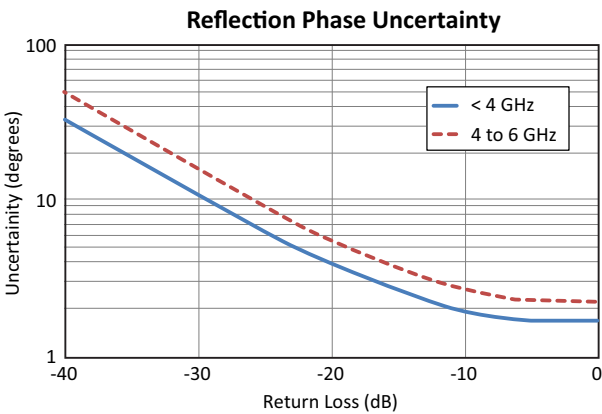
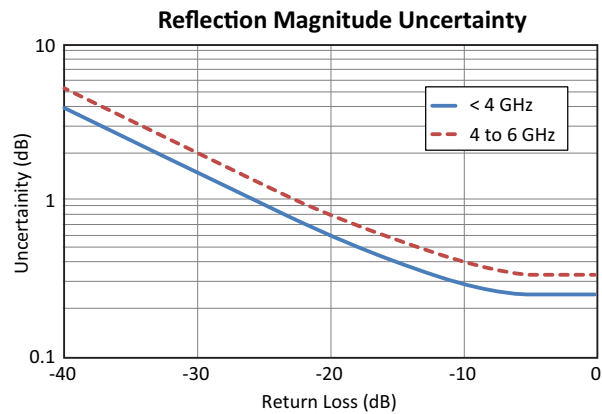
Resolution 0.01 50/75 ohm selectable



Cable and Antenna Analyzer (continued)

**Measurement Accuracy** Corrected Directivity > 42 dB, OSL Calibration  
> 38 dB, InstaCal™ Calibration

Measurement Uncertainty



2-Port Transmission Measurement (Option 21)

Frequency

Frequency Range 2 MHz to 6 GHz  
Frequency Resolution 10 Hz

Output Power

High 0 dBm, typical  
Low 2 MHz to 1.5 GHz: -40 dBm, typical  
>1.5 GHz to 4/6 GHz: -30 dBm, typical

High Dynamic Range (On)

2 MHz to 4 GHz 80 dB, 95 dB, typical  
4 GHz to 6 GHz 70 dB, 85 dB, typical  
Application Options Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)

Bias-Tee (Option 10)

Setup On/Off, Voltage, Current (Low/High)  
Voltage Range +12 V to +32 V  
Current (Low/High) 250 mA/450 mA, 1 A surge for 100 ms  
Resolution 0.1 V



## Spectrum Analyzer

## Measurements

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Smart Measurements | Field Strength (uses antenna calibration tables to measure dBm/m <sup>2</sup> , dBmV/m, dBV/m, dBμV/m, Volt/m, Watt/m <sup>2</sup> , dBW/m <sup>2</sup> , A/m, dBA/m and Watt/cm <sup>2</sup> )<br>Occupied Bandwidth (measures 99 % to 1 % power channel of a signal)<br>Channel Power (measures the total power in a specified bandwidth)<br>ACPR (adjacent channel power ratio)<br>AM/FM/SSB Demodulation (wide/narrow FM, USB and LSB), (audio out only)<br>C/I (carrier-to-interference ratio)<br>Emission Mask<br>Coverage Mapping (requires Option 431)<br>PIM Alert Application (available for download)<br>PIM Hunting |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Setup Parameters

|                     |                                                                                           |
|---------------------|-------------------------------------------------------------------------------------------|
| Frequency           | Center/Start/Stop, Span, Frequency Step, Signal Standard, Channel #, Channel Increment    |
| Amplitude           | Reference Level (RL), Scale, Attenuation Auto/Level, RL Offset, Pre-Amp On/Off, Detection |
| Span                | Span, Span Up/Down (1-2-5), Full Span, Zero Span, Last Span                               |
| Bandwidth           | RBW, Auto RBW, VBW, Auto VBW, RBW/VBW, Span/RBW                                           |
| File                | Save, Save-on-Event, Recall, Copy, Delete                                                 |
| Save                | Setups, Measurements, Screen Shots (JPEG), Limit Lines, Spurious Emission Mask            |
| Save-on-Event       | Crossing Limit Line, Sweep Complete, Save-then-Stop, Clear All                            |
| Recall              | Setups, Measurements, Limit Lines, Spurious Emission Mask                                 |
| Copy                | Selected file or files to internal/external memory (USB)                                  |
| Delete              | Selected file or files from internal/external memory (USB)                                |
| Application Options | Bias-Tee (On/Off), Impedance (50 Ω, 75 Ω, Other)                                          |

## Sweep Functions

|           |                                                                                                                                            |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Sweep     | Single/Continuous, Sweep Mode (Fast, Performance, No FFT), Reset, Detection, Minimum Sweep Time, Trigger Type, Gated Sweep (see Option 90) |
| Detection | Peak, RMS, Negative, Sample, Quasi-peak                                                                                                    |
| Triggers  | Free Run, External, Video, Change Position, Manual                                                                                         |

## Trace Functions

|                    |                                                                                        |
|--------------------|----------------------------------------------------------------------------------------|
| Traces             | Up to three Traces (A, B, C), View/Blank, Write/Hold, Trace A/B/C Operations           |
| Trace A Operations | Normal, Max Hold, Min Hold, Average, # of Averages, (always the live trace)            |
| Trace B Operations | A → B, B ↔ C, Max Hold, Min Hold                                                       |
| Trace C Operations | A → C, B ↔ C, Max Hold, Min Hold, A - B → C, B - A → C, Relative Reference (dB), Scale |

## Marker Functions

|                      |                                                                                                                                                           |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Markers              | Markers 1-6 each with a Delta Marker, or Marker 1 Reference with Six Delta Markers, Marker Table (On/Off), All Markers Off                                |
| Marker Types         | Style (Fixed/Tracking), Noise Marker, Frequency Counter Marker                                                                                            |
| Marker Auto-Position | Peak Search, Next Peak (Right/Left), Peak Threshold %, Set Marker to Channel, Marker Frequency to Center, Delta Marker to Span, Marker to Reference Level |
| Marker Table         | 1-6 markers frequency and amplitude plus delta markers frequency amplitude and offset                                                                     |

## Limit Line Functions

|                     |                                                                                    |
|---------------------|------------------------------------------------------------------------------------|
| Limit Lines         | Upper/Lower, On/Off, Edit, Move, Envelope, Advanced, Limit Alarm, Default Limit    |
| Limit Line Edit     | Frequency, Amplitude, Add Point, Add Vertical, Delete Point, Next Point Left/Right |
| Limit Line Move     | To Current Center Frequency, By dB or Hz, To Marker 1, Offset from Marker 1        |
| Limit Line Envelope | Create Envelope, Update Amplitude, Points (41 max), Offset, Shape Square/Slope     |
| Limit Line Advanced | Type (Absolute/Relative), Mirror, Save/Recall                                      |

## Frequency

|                     |                                                                                              |
|---------------------|----------------------------------------------------------------------------------------------|
| Frequency Range     | 9 kHz to 6 GHz                                                                               |
| Tuning Resolution   | 1 Hz                                                                                         |
| Frequency Reference | Aging: ± 1.0 ppm/year<br>Accuracy: ± 1.5 ppm (25 °C ± 25 °C) + aging, < ± 50 ppb with GPS On |
| Frequency Span      | 10 Hz to 6 GHz including zero span                                                           |
| Sweep Time          | Minimum 100 ms, 7 μs to 3600 s in zero span                                                  |
| Sweep Time Accuracy | ± 2 % in zero span                                                                           |

## Bandwidth

|                               |                                                                                |
|-------------------------------|--------------------------------------------------------------------------------|
| Resolution Bandwidth (RBW)    | 1 Hz to 3 MHz in 1-3 sequence ± 10% (1 MHz max in zero-span) (-3 dB bandwidth) |
| Video Bandwidth (VBW)         | 1 Hz to 3 MHz in 1-3 sequence (-3 dB bandwidth)                                |
| RBW with Quasi-Peak Detection | 200 Hz, 9 kHz, 120 kHz (-6 dB bandwidth)                                       |
| VBW with Quasi-Peak Detection | Auto VBW is On, RBW/VBW = 1                                                    |



## Spectrum Analyzer (continued)

## Spectral Purity

|                         |                                                   |
|-------------------------|---------------------------------------------------|
| SSB Phase Noise @ 1 GHz | -100 dBc/Hz, -110 dBc/Hz typical @ 10 kHz offset  |
|                         | -105 dBc/Hz, -112 dBc/Hz typical @ 100 kHz offset |
|                         | -115 dBc/Hz, -121 dBc/Hz typical @ 1 MHz offset   |

## Amplitude Ranges

|                                |                                                                                                                                                                               |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dynamic Range                  | > 102 dB (2.4 GHz), 2/3 (TOI-DANL) in 1 Hz RBW                                                                                                                                |
| Measurement Range              | DANL to +26 dBm ( $\geq 50$ MHz)<br>DANL to 0 dBm ( $< 50$ MHz)                                                                                                               |
| Display Range                  | 1 dB to 15 dB/div in 1 dB steps, ten divisions displayed                                                                                                                      |
| Reference Level Range          | -150 dBm to +30 dBm                                                                                                                                                           |
| Maximum Continuous Input Power | +30 dBm                                                                                                                                                                       |
| Attenuator Range               | 0 dB to 55 dB in 5 dB steps                                                                                                                                                   |
| Amplitude Units                | Log Scale Modes: dBW, dBm, dB $\mu$ W, dBV, dBmV, dB $\mu$ V, dBA, dBmA, dB $\mu$ A<br>Linear Scale Modes: nV, $\mu$ V, mV, V, kV, nW, $\mu$ W, mW, W, kW, nA, $\mu$ A, mA, A |

## Amplitude Accuracy

|                    |                                     |
|--------------------|-------------------------------------|
| 9 kHz to 100 kHz   | $\pm 2.00$ dB typical (Preamp Off)  |
| 100 kHz to 4.0 GHz | $\pm 1.25$ dB, $\pm 0.5$ dB typical |
| > 4.0 GHz to 6 GHz | $\pm 1.50$ dB, $\pm 0.5$ dB typical |

## Displayed Average Noise Level (DANL)

| (RBW = 1 Hz, 0 dB attenuation) | Preamp Off<br>(Reference Level -20 dBm) |          | Preamp On<br>(Reference Level -50 dBm) |          |
|--------------------------------|-----------------------------------------|----------|----------------------------------------|----------|
|                                | Maximum                                 | Typical  | Maximum                                | Typical  |
| 10 MHz to 2.4 GHz              | -141 dBm                                | -146 dBm | -157 dBm                               | -162 dBm |
| > 2.4 GHz to 4 GHz             | -137 dBm                                | -141 dBm | -154 dBm                               | -159 dBm |
| > 4 GHz to 5 GHz               | -134 dBm                                | -138 dBm | -150 dBm                               | -155 dBm |
| > 5 GHz to 6 GHz               | -126 dBm                                | -131 dBm | -143 dBm                               | -150 dBm |

## Spurs

|                        |                                                                                                                                                                                                                                                                  |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Residual Spurious      | < -90 dBm (RF input terminated, 0 dB input attenuation, > 10 MHz)                                                                                                                                                                                                |
| Input-Related Spurious | < -75 dBc (0 dB attenuation, -30 dBm input, span < 1.7 GHz, carrier offset > 4.5 MHz)                                                                                                                                                                            |
| Exceptions, typical    | < -70 dBc @ < 2.5 GHz, with 2072.5 MHz Input<br>< -68 dBc @ F1 - 280 MHz with F1 Input<br>< -70 dBc @ F1 + 190.5 MHz with F1 Input<br>< -52 dBc @ 7349 - (2F2) MHz, with F2 Input, where F2 < 2437.5 MHz<br>< -55 dBc @ 190.5 $\pm$ (F1/2) MHz, where F1 < 1 GHz |

## Third-Order Intercept (TOI)

|                      |                                                             |
|----------------------|-------------------------------------------------------------|
|                      | Preamp Off (-20 dBm tones 100 kHz apart, 10 dB attenuation) |
| 800 MHz              | +16 dBm                                                     |
| 2400 MHz             | +20 dBm                                                     |
| 200 MHz to 2200 MHz  | +25 dBm, typical                                            |
| > 2.2 GHz to 5.0 GHz | +28 dBm, typical                                            |
| > 5.0 GHz to 6.0 GHz | +33 dBm, typical                                            |

## Second Harmonic Distortion

|                       |                                                   |
|-----------------------|---------------------------------------------------|
|                       | Preamp Off, 0 dB input attenuation, -30 dBm input |
| 50 MHz                | -56 dBc                                           |
| > 50 MHz to 200 MHz   | -60 dBc, typical                                  |
| > 200 MHz to 3000 MHz | -70 dBc, typical                                  |

## VSWR

2:1, typical


**Coverage Mapping (Option 431)** (requires Option 31 GPS)

**Measurements**

|                 |            |
|-----------------|------------|
| Indoor Mapping  | RSSI, ACPR |
| Outdoor Mapping | RSSI, ACPR |

**Setup Parameters**

|                             |                                                                                           |
|-----------------------------|-------------------------------------------------------------------------------------------|
| Frequency                   | Center/Start/Stop, Span, Freq Step, Signal Standard, Channel #, Channel Increment         |
| Amplitude                   | Reference Level (RL), Scale, Attenuation Auto/Level, RL Offset, Pre-Amp On/Off, Detection |
| Span                        | Span, Span Up/Down (1-2-5), Full Span, Zero Span, Last Span                               |
| BW                          | RBW, Auto RBW, VBW, Auto VBW, RBW/VBW, Span/VBW                                           |
| Measurement Setup           | ACPR, RSSI                                                                                |
| Point Distance / Time Setup | Repeat Type Time Distance                                                                 |
| Save Points Map             | Save KML, JPEG, Tab Delimited                                                             |
| Recall Points Map           | Recall Map, Recall KML Points only, Recall KML Points with Map, Recall Default Grid       |


**Electromagnetic Field Test (Option 444)**
**Measurements**

|                     |                                                                                                                                                                                                                                                                                                                           |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Setup               | Limit lines, axis dwell time, measurement time, auto-logging, measurement units, trace display                                                                                                                                                                                                                            |
| Spectrum Analyzer   | Field strength is measured                                                                                                                                                                                                                                                                                                |
| LTE OTA, TD-LTE OTA | P-SS, S-SS, and RS are measured and displayed based on each Cell ID received                                                                                                                                                                                                                                              |
| W-CDMA OTA          | P-CPICH signals are measured and displayed for each Scrambling Code measured                                                                                                                                                                                                                                              |
| Units               | Spectrum Analyzer: dBm/m <sup>2</sup> , dBV/m, dBmV/m, dBuV/m, V/m, W/m <sup>2</sup> , dBW/m <sup>2</sup> , A/m, dBA/m, W/cm <sup>2</sup><br>LTE OTA, TD-LTE OTA: dBm/m <sup>2</sup> , V/m, W/m <sup>2</sup><br>W-CDMA OTA: dBm/m <sup>2</sup> , V/m, W/m <sup>2</sup> , % of Limit (V/m), % of Limit (W/m <sup>2</sup> ) |
| Results             | Maximum, minimum, and average of all measurements conducted                                                                                                                                                                                                                                                               |
| Display             | Measurement status, number of measurements taken, pass/fail indicators                                                                                                                                                                                                                                                    |

**Frequency Range**
**Supported Antenna**

|             |                  |
|-------------|------------------|
| 2000-1800-R | 9 kHz to 300 MHz |
| 2000-1792-R | 30 MHz to 3 GHz  |
| 2000-1791-R | 700 MHz to 6 GHz |

**Modes where EMF Measurements Available**

Spectrum Analyzer  
 LTE OTA (Option 883)  
 TD-LTE OTA (Option 883)  
 W-CDMA OTA (Option 881)

**Ethernet Connectivity (formerly Option 413)**

|                    |                                                                         |
|--------------------|-------------------------------------------------------------------------|
| Connector          | RJ45                                                                    |
| LAN Speed          | 10 Mbps                                                                 |
| Mode               | Static, DHCP                                                            |
| Static IP settings | IP address<br>Subnet Mask<br>IP Gateway                                 |
| Remote Control     | Remote capability provided with Web Remote Control and SCPI programming |
| Data Upload        | With Line Sweep Tools through Ethernet connection                       |



## Interference Analyzer (Option 25)

### Measurements

|                                           |                                                                                                                                                                                                                   |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spectrum                                  | Field Strength<br>Occupied Bandwidth<br>Channel Power<br>Adjacent Channel Power Ratio (ACPR)<br>AM/FM/SSB Demodulation (Wide/Narrow FM, Upper/Lower SSB), (audio out only)<br>Carrier-to-Interference ratio (C/I) |
| Spectrogram                               | Collect data up to 72 hours                                                                                                                                                                                       |
| Signal Strength                           | Gives visual and aural indication of signal strength                                                                                                                                                              |
| Received Signal Strength Indicator (RSSI) | Collect data up to 168 hours (one week)                                                                                                                                                                           |
| Signal ID                                 | Up to 12 signals<br>Center Frequency<br>Bandwidth<br>Signal Type (FM, GSM, W-CDMA, CDMA, Wi-Fi)<br>Closest Channel Number<br>Number of Carriers<br>Signal-to-Noise Ratio (SNR) > 10 dB                            |
| Interference Mapping                      | Draw multiple bearings of signal strength from GPS location on on-screen map<br>Pan and Zoom on-screen maps<br>Support for MA2700A Handheld Interference Hunter (see Optional Accessories)                        |
| Application Options                       | Bias-Tee (On/Off), Impedance (50 $\Omega$ , 75 $\Omega$ , Other)                                                                                                                                                  |

## GPS Receiver (Option 31) (requires external GPS antenna, sold separately)

### General

|                             |                                                                                                                                                                     |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Setup                       | On/Off, Antenna Voltage 3.3/5.0 V, GPS Info                                                                                                                         |
| GPS Time/Location Indicator | Time, Latitude, Longitude and Altitude on display<br>Time, Latitude, Longitude and Altitude with trace storage                                                      |
| High Frequency Accuracy     | Spectrum Analyzer, Interference Analyzer, CW Signal Analyzers<br>< $\pm 50$ ppb with GPS On, GPS antenna connected, 3 minutes after satellite lock in selected mode |
| Connector                   | SMA, Female                                                                                                                                                         |



## Channel Scanner (Option 27)

### General

|                     |                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------|
| Number of Channels  | 1 to 20 Channels                                                                            |
| Measurements        | Graph/Table, Max Hold (On/5 sec/Off), Frequency/Channel, Current/Maximum, Single/Dual Color |
| Scanner             | Scan Channels, Scan Frequencies, Scan Customer List, Scan Script Master™                    |
| Amplitude           | Reference Level, Scale                                                                      |
| Custom Scan         | Signal Standard, Channel, # of Channels, Channel Step Size, Custom Scan                     |
| Frequency Range     | 9 kHz to 6 GHz                                                                              |
| Frequency Accuracy  | $\pm 10$ Hz + Time base error                                                               |
| Measurement Range   | -110 dBm to +26 dBm                                                                         |
| Application Options | Bias-Tee (On/Off), Impedance (50 $\Omega$ , 75 $\Omega$ , Other)                            |



## CW Signal Generator (Option 28) (requires CW Signal Generator Kit, P/N 69793)

### Setup Parameters

|                     |                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------|
| Frequency           | Frequency, Signal Standard, Channel Number, Display Setup Help                                          |
| Amplitude           | Power Level (Low/High), Offset (dB)                                                                     |
| Frequency Range     | 2 MHz to 2 GHz                                                                                          |
| Frequency Reference | Accuracy: $\pm 1.5$ ppm (25 $^{\circ}$ C $\pm 25$ $^{\circ}$ C) + aging, < $\pm 50$ ppb with GPS On     |
| Output Power        | High 0 dBm typical, Low -30 dBm typical<br>Attenuator (included in kit 69793): 0 to 90 dB in 1 dB steps |

## Gated Sweep (Option 90)

### General

|         |                                                                                                                                                             |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode    | Spectrum Analyzer, Sweep                                                                                                                                    |
| Trigger | External TTL                                                                                                                                                |
| Setup   | Gated Sweep (On/Off)<br>Gate Polarity (Rising, Falling)<br>Gate Delay (0 ms to 65 ms typical)<br>Gate Length (1 $\mu$ s to 65 ms typical)<br>Zero Span Time |



## Power Meter

### General

|                                |                                                                                |
|--------------------------------|--------------------------------------------------------------------------------|
| Frequency                      | Center/Start/Stop, Span, Frequency Step, Signal Standard, Channel #, Full Band |
| Amplitude                      | Maximum, Minimum, Offset, Relative On/Off, Units, Auto Scale                   |
| Average                        | Acquisition Fast/Med/Slow, # of Running Averages                               |
| Limits                         | Limit On/Off, Limit Upper/Lower                                                |
| Frequency Range                | 10 MHz to 6 GHz                                                                |
| Span                           | 1 kHz to 100 MHz                                                               |
| Display Range                  | -140 dBm to +30 dBm, ≤ 40 dB span                                              |
| Measurement Range              | -120 dBm to +26 dBm                                                            |
| Offset Range                   | 0 dB to +100 dB (External Gain or Loss)                                        |
| VSWR                           | 2:1 typical                                                                    |
| Maximum Continuous Input Power | +30 dBm                                                                        |
| Accuracy                       | Same as Spectrum Analyzer                                                      |
| Application Options            | Impedance (50 Ω, 75 Ω, Other)                                                  |



### High Accuracy Power Meter (Option 19) (requires external USB Power Sensor)

|                                          |                                                              |                                       |                                                        |                                           |                                                         |
|------------------------------------------|--------------------------------------------------------------|---------------------------------------|--------------------------------------------------------|-------------------------------------------|---------------------------------------------------------|
| Amplitude                                | Maximum, Minimum, Offset, Relative On/Off, Units, Auto Scale |                                       |                                                        |                                           |                                                         |
| Average                                  | # of Running Averages, Max Hold                              |                                       |                                                        |                                           |                                                         |
| Zero/Cal                                 | Zero On/Off, Cal Factor (Center Frequency, Signal Standard)  |                                       |                                                        |                                           |                                                         |
| Limits                                   | Limit On/Off, Limit Upper/Lower                              |                                       |                                                        |                                           |                                                         |
| Power Sensor Model                       | MA24105A                                                     | MA24106A                              | MA24108A/18A/26A                                       | MA24208A/18A                              | MA24330A/40A/50A                                        |
| Description                              | Inline High Power Sensor                                     | High Accuracy RF Power Sensor         | Microwave USB Power Sensor                             | Microwave Universal USB Power Sensor      | Microwave CW USB Power Sensor                           |
| Frequency Range                          | 350 MHz to 4 GHz                                             | 50 MHz to 6 GHz                       | 10 MHz to 8/18/26 GHz                                  | 10 MHz to 8/18 GHz                        | 10 MHz to 33/40/50 GHz                                  |
| Connector                                | Type N(f), 50 Ω                                              | Type N(m), 50 Ω                       | Type N(m), 50 Ω (8/18 GHz)<br>Type K(m), 50 Ω (26 GHz) | Type N(m), 50 Ω                           | Type K(m), 50 Ω (33/40 GHz)<br>Type V(m), 50 Ω (50 GHz) |
| Dynamic Range                            | +3 dBm to +51.76 dBm (2 mW to 150 W)                         | -40 dBm to +23 dBm (0.1 μW to 200 mW) | -40 dBm to +20 dBm (0.1 μW to 100 mW)                  | -60 dBm to +20 dBm (1 nW to 100 mW)       | -70 dBm to +20 dBm (0.1 nW to 100 mW)                   |
| Measurand                                | True-RMS                                                     | True-RMS                              | True-RMS, Slot Power, Burst Average Power              | True-RMS, Slot Power, Burst Average Power | Average Power                                           |
| Measurement Uncertainty                  | ± 0.17 dB <sup>a</sup>                                       | ± 0.16 dB <sup>b</sup>                | ± 0.18 dB <sup>c</sup>                                 | ± 0.17 dB <sup>d</sup>                    | ± 0.17 dB <sup>e</sup>                                  |
| Data sheet (for complete specifications) | 11410-00621                                                  | 11410-00424                           | 11410-00504                                            | 11410-00841                               | 11410-00906                                             |

- Notes:
- Expanded uncertainty with K=2 for power measurements of a CW signal greater than +20 dBm with a matched load. Measurement results referenced to the input side of the sensor.
  - Total RSS measurement uncertainty (0 °C to 50 °C) for power measurements of a CW signal greater than -20 dBm with zero mismatch errors.
  - Expanded uncertainty with K=2 for power measurements of a CW signal greater than -20 dBm with zero mismatch errors.
  - Power uncertainty expressed with two sigma confidence level for CW measurement after zero operation. Includes calibration factor and linearity over temperature uncertainties, but not the effects of mismatch, zero set and drift, or noise.
  - Includes linearity over temperature uncertainties, but not the effects of calibration factor, mismatch, zero set and drift, and noise.

 **LTE/LTE-A Signal Analyzers (Options 883 and 886)<sup>1</sup>**

| Measurements                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RF                                                                                                                                                                                                                                                                                   | Demodulation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Over-the-Air (OTA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Pass/Fail (User Editable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Channel Spectrum<br>Channel Power<br>Occupied Bandwidth<br>Power vs. Time (TDD only)<br>Frame View<br>Sub-Frame View<br>Total Frame Power<br>DwPTS Power<br>Transmit Off Power<br>Cell ID<br>Timing Error<br>ACLR<br>Spectral Emission Mask<br>Category A or B (Opt 1)<br>RF Summary | Power vs. Resource Block (RB)<br>RB Power (PDSCH)<br>Active RBs, Utilization %, Channel Power, Cell ID<br>OSTP, Frame EVM by modulation<br>Constellation<br>QPSK, 16QAM, 64QAM<br>256QAM Demod (Option 886)<br>Modulation Results<br>Ref Signal Power (RS)<br>Sync Signal Power (SS)<br>EVM – rms, peak, max hold<br>Frequency Error – Hz, ppm<br>Carrier Frequency<br>Cell ID<br>Control Channel Power<br>Bar Graph or Table View<br>RS, P-SS, S-SS<br>PBCH, PCFICH, PHICH, PDCCH<br>Total Power (Table View)<br>EVM per Control Channel<br>Tx Time Alignment<br>Modulation Summary<br>Includes EVM by modulation<br>Antenna Icons<br>Detects active antennas (1/2) | Scanner<br>Cell ID (Group, Sector)<br>S-SS Power, RSRP, RSRQ, SINR<br>Dominance<br>Modulation Results – On/Off<br>Auto Save - On/Off<br>Tx Test<br>Scanner<br>RS Power of MIMO antennas (FDD: 2x2, 4x4) (TDD: 2x2, 4x4)<br>Cell ID, Average Power<br>Delta Power (Max-Min)<br>Graph of Antenna Power<br>Modulation Results – On/Off<br>Mapping<br>On-screen<br>S-SS Power, RSRP, RSRQ, or SINR<br>Scanner<br>Modulation Results – Off<br>Carrier Aggregation<br>Up to 5 component carriers (CC1 to CC5)<br>CP, MIMO status, RS & SS Power, EVM, Frequency Error, Time Alignment Error, Cell ID | View Pass/Fail Limits<br>All, RF, Modulation<br><br>Available Measurements<br>Channel Power<br>Occupied Bandwidth<br>ACLR<br>Frequency Error<br>Carrier Frequency<br>Dominance<br>EVM peak, rms<br>Frame EVM, rms<br>Frame EVM by mod type<br>RS, SS Power<br>RS EVM<br>P-SS, S-SS, Power, EVM<br>PBCH, PCFICH, PHICH, PDCCH Power, EVM<br>Cell, Group, Sector ID<br>OSTP<br>Tx Time Alignment<br>Frame Power (TDD only)<br>DwPTS Power (TDD only)<br>Transmit Off Power (TDD only)<br>Timing Error (TDD only) |
| <b>Setup Parameters</b>                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | E-UTRA FDD bands 1 – 14, 17 – 21, 23 – 32, 66A (tunable 10 MHz to 4.0 GHz)<br>E-UTRA TDD bands 33 – 44 (tunable 10 MHz to 4.0 GHz)<br>Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Bandwidth (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.4, 3, 5, 10, 15, 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Span (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Auto, 1.4, 3, 5, 10, 15, 20, 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Amplitude                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Scale/Division, Power Offset, Auto Range, Adjust Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Sweep                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Single/Continuous, Trigger Sweep                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Cyclic Prefix (CP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Auto, Normal, Extended                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | EVM Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Auto, PBCH only, Max Hold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Sync Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Normal (SS), RS/Cell ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | No Trigger/Ext Trigger, Rising/Falling (TDD Only)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Uplink/Downlink Configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0 to 6 (TDD Only)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Save/Recall                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Setup, Measurement, Screen Shot (JPEG - save only), to Internal/External Memory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Measurement Summary Screens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Overall Measurements, RF Measurements, Modulation Measurements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>LTE/LTE-A RF Measurements</b>                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | RF Channel Power Accuracy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ± 1.5 dB, ± 1.0 dB typical, (RF input –50 dBm to +10 dBm)<br>± 1.5 dB, ± 1.0 dB typical, (RF input –30 dBm to +10 dBm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>LTE/LTE-A Modulation Measurements</b>                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Frequency Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ± 10 Hz + time base error, 99 % confidence level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Residual EVM (rms) (FDD only)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2.0% typical (E-UTRA Test Model 3.1, RF Input –50 dBm to +10 dBm) for BW ≤ 10 MHz<br>2.5% typical (E-UTRA Test Model 3.1, RF Input –50 dBm to +10 dBm) for BW > 10 MHz                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Residual EVM (rms) (TDD only)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2.0% typical (E-UTRA Test Model 3.1, RF Input –30 dBm to +10 dBm) for BW ≤ 10 MHz<br>2.5% typical (E-UTRA Test Model 3.1, RF Input –30 dBm to +10 dBm) for BW > 10 MHz                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>LTE/LTE-A Over-the-Air (OTA) Measurements</b>                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Scanner                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Six strongest signals if present<br>Auto Save — Sync Signal Power and Modulation Results with GPS information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Tx Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Scanner — three strongest signals if present<br>RS Power — strongest signal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Mapping                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Map On-screen S-SS Power, RSRP, RSRQ, or SINR of Cell ID with strongest signal<br>Scanner — three strongest signals if present<br>Save and Export Mapping data: KML, MTD (tab delimited)                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                      | Carrier Aggregation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Up to 5 component carriers specified (CC1 to CC5)<br>Automatic detection of CP and MIMO status for each active CC<br>RS Power & RS Delta Power. SS Power. EVM (peak and rms). Freq Error (Hz & ppm). TAE. Cell ID                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

1. Requires Option 31 for full functionality.



## NB-IoT Analyzer (Option 887)

### Measurements

NB-IoT Mode      Guard Band, Standalone

### RF Measurements

|                        |                                                                                                                                                                                                      |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Summary Screen         | Carrier Frequency<br>Channel Power<br>Occupied Bandwidth<br>NPSS Power<br>NSSS Power<br>NPBCH Power<br>NPDCCH or NPDSCH Power<br>Cell ID<br>RSRP<br>RSRQ<br>SINR<br>Spectral Emission Mask Pass/Fail |
| Channel Spectrum       | Spans supported: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz, 30 MHz                                                                                                                               |
| Spectral Emission Mask | Mask Type: NB-IoT Fixed<br>Summary Table Off/On (Mask Segment; Start, Stop, Peak Frequencies; Power; Power Margin; RBW; Status)                                                                      |
| Save/Recall            | Measurement (.iot), Setup (.stp), Screen Shots (.jpg) to Internal or External Memory                                                                                                                 |



## GSM/EDGE Signal Analyzer (Option 880)

### Measurements

| RF                                                                                                                                                                                                                                                                                                                                                    | Demodulation                                                                                        | Over-the-Air (OTA)                                                                            | Pass/Fail<br>(User Editable)                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Channel Spectrum<br>Channel Power<br>Occupied Bandwidth<br>Burst Power<br>Average Burst Power<br>Frequency Error<br>Modulation Type<br>BSIC (NCC, BCC)<br>Multi-channel Spectrum<br>Power vs. Time (Frame/Slot)<br>Channel Power<br>Occupied Bandwidth<br>Burst Power<br>Average Burst Power<br>Frequency Error<br>Modulation Type<br>BSIC (NCC, BCC) | Phase Error<br>EVM<br>Origin Offset<br>C/I<br>Modulation Type<br>Magnitude Error<br>BSIC (NCC, BCC) | There are no additional OTA Measurements.<br>RF and Demodulation measurements can be made OTA | View Pass/Fail Limits<br>GSM, EDGE<br>Available Measurements<br>Channel Power<br>Occupied Bandwidth<br>Burst Power<br>Average Burst Power<br>Frequency Error<br>Phase Error<br>EVM<br>Origin Offset<br>C/I<br>Magnitude Error<br>Script Master™ |

### Setup Parameters

|                             |                                                                                  |
|-----------------------------|----------------------------------------------------------------------------------|
| GSM/EDGE Select             | Auto, GSM, EDGE                                                                  |
| Frequency                   | Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel |
| Amplitude                   | Power Offset, Auto Range, Adjust Range                                           |
| Sweep                       | Single/Continuous, Trigger Sweep                                                 |
| Save/Recall                 | Setup, Measurement, Screen Shot (JPEG - save only), to Internal/External Memory  |
| Measurement Summary Screens | Overall Measurements                                                             |

### RF Measurements (temperature range 15 °C to 35 °C)

|                    |                                                                               |
|--------------------|-------------------------------------------------------------------------------|
| Frequency Error    | ± 10 Hz + time base error, 99 % confidence level                              |
| Occupied Bandwidth | Bandwidth within which lies 99 % of the power transmitted on a single channel |
| Burst Power Error  | ± 1.5 dB, ± 1 dB typical, (-50 dBm to +20 dBm)                                |

### Demodulation (temperature range 15 °C to 35 °C)

|                                     |         |
|-------------------------------------|---------|
| GMSK Modulation Quality (RMS Phase) |         |
| Measurement Accuracy                | ± 1 deg |
| Residual Error (GMSK)               | 1 deg   |
| 8 PSK Modulation Quality (EVM)      |         |
| Measurement Accuracy                | ± 1.5 % |
| Residual Error (8 PSK)              | 2.5 %   |

W-CDMA/HSPA+ Signal Analyzer (Option 881)<sup>1</sup>

## Measurements

| RF                     | Demodulation             | Over-the-Air (OTA)            | Pass/Fail (User Editable) |
|------------------------|--------------------------|-------------------------------|---------------------------|
| Band Spectrum          | Code Domain Power Graph  | Scrambling Code Scanner (Six) | View Pass/Fail Limits     |
| Channel Spectrum       | P-CPICH Power            | Scrambling Codes              | All, RF, Demod            |
| Channel Power          | Channel Power            | CPICH                         | Available Measurements    |
| Occupied Bandwidth     | Noise Floor              | EC/IO                         | Max Output Power          |
| Peak-to-Average Power  | EVM                      | EC                            | Frequency Error           |
| Spectral Emission Mask | Carrier Feed Through     | Pilot Dominance               | EVM                       |
| Single Carrier ACLR    | Peak Code Domain Error   | OTA Total Power               | CPICH                     |
| Multi-carrier ACLR     | Carrier Frequency        | Multipath Scanner (Six)       | Occupied Bandwidth        |
| RF Summary             | Frequency Error          | Six Multipaths                | Spectral Mask             |
|                        | Control Channel Power    | Tau                           | ACLR                      |
|                        | Abs/Rel/Delta Power      | Distance                      | PCDE                      |
|                        | CPICH, P-CCPCH           | RSCP                          | P-CCPCH                   |
|                        | S-CCPCH, PICH            | Relative Power                | S-CCPCH                   |
|                        | P-SCH, S-SCH             | Multipath Power               | Code Spread 3             |
|                        | HSPA+                    |                               | PICH                      |
|                        | Power vs. Time           |                               | Code 128                  |
|                        | Constellation            |                               | Script Master™            |
|                        | Code Domain Power Table  |                               | Test Models               |
|                        | Code, Status             |                               | 1 (16), (32), (64)        |
|                        | EVM, Modulation Type     |                               | 2                         |
|                        | Power, Code Utilization  |                               | 3 (16), (32)              |
|                        | Power Amplifier Capacity |                               | 4 (+CPICH), (-CPICH)      |
|                        | Codogram                 |                               | 5 (2 HS), (4 HS), (8 HS)  |
|                        | Modulation Summary       |                               |                           |

## Setup Parameters

|                             |                                                                                                                          |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Scrambling Code, Threshold  | Auto, Manual                                                                                                             |
| User Selectable             | Scrambling Code, S-CCPCH Spread, S-CCPCH Code, PICH Code, Threshold, Max Amp Power, CPICH Power, Frequency Error Average |
| Maximum Spreading Factor    | 256, 512                                                                                                                 |
| Frequency                   | Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel                                         |
| Amplitude                   | Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/Watts)                                                |
| Marker                      | Six Markers, Table On/Off                                                                                                |
| Sweep                       | Single/Continuous, Trigger Sweep                                                                                         |
| Save/Recall                 | Setup, Measurement, Screen Shot (JPEG - save only), to Internal/External Memory                                          |
| Measurement Summary Screens | Overall Measurements, RF Measurements, Modulation Measurements                                                           |

## RF Measurements (temperature range 15 °C to 35 °C)

|                                       |                                                                                                                                                                                |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RF Channel Power Accuracy             | ± 1.25 dB, ± 0.7 dB typical                                                                                                                                                    |
| Occupied Bandwidth Accuracy           | ± 100 kHz                                                                                                                                                                      |
| Adjacent Channel Leakage Ratio (ACLR) | -54 dB/-59 dB ± 0.8 dB @ 5 MHz/10 MHz offset, typical, 824 MHz to 894 MHz, 1710 MHz to 2170 MHz<br>-54 dB/-57 dB ± 1.0 dB @ 5 MHz/10 MHz offset, typical, 2300 MHz to 2700 MHz |

## Demodulation (temperature range 15 °C to 35 °C)

|                      |                                                                                                         |
|----------------------|---------------------------------------------------------------------------------------------------------|
| W-CDMA Modulations   | QPSK, QPSK-DTX (Codecs: AMR 4.75, 5.9, 7.4, 12.2 kbps, DTX 7.4, 12.2 kbps)                              |
| HSPA+ Modulations    | QPSK, 16QAM, 64QAM                                                                                      |
| Frequency Error      | ± 10 Hz + time base error, 99% confidence level                                                         |
| EVM Accuracy         | ± 2.5 %, 6% ≤ EVM ≤ 25%                                                                                 |
| Residual EVM         | 3.25% typical                                                                                           |
| Code Domain Power    | ± 0.5 dB for code channel power > -25 dB, 16, 32, 64 DCPH (test model 1), 16, 32 DCPH (test model 2, 3) |
| CPICH (dBm) Accuracy | ± 0.8 dB typical                                                                                        |

## Over-the-Air (OTA) Measurements

|                         |                                                            |
|-------------------------|------------------------------------------------------------|
| Scrambling Code Scanner | Six strongest Scrambling Codes                             |
| Multipath Scanner       | Multipath power of six signals relative to strongest pilot |

1. Option 31 recommended.


**CDMA Signal Analyzer (Option 884)<sup>1</sup>**
**Measurements**

| RF                     | Demodulation            | Over-the-Air (OTA)             | Pass/Fail<br>(User Editable) |
|------------------------|-------------------------|--------------------------------|------------------------------|
| Channel Spectrum       | Code Domain Power Graph | Pilot Scanner (Nine)           | View Pass/Fail Limits        |
| Channel Power          | Pilot Power             | PN                             | All, RF, Modulation          |
| Occupied Bandwidth     | Channel Power           | EC/IO                          | Available Measurements       |
| Peak-to-Average Power  | Noise Floor             | Tau                            | Channel Power                |
| Spectral Emission Mask | Rho                     | Pilot Power                    | Occupied Bandwidth           |
| Single Carrier ACPR    | Carrier Feed Through    | Channel Power                  | Peak-to-Average Power        |
| Multi-carrier ACPR     | Tau                     | Pilot Dominance                | Spectral Mask Test           |
| RF Summary             | RMS Phase Error         | Multipath Scanner (Six)        | Frequency Error              |
|                        | Frequency Error         | EC/IO                          | Channel Frequency            |
|                        | Abs/Rel/ Power          | Tau                            | Pilot Power                  |
|                        | Pilot                   | Channel Power                  | Noise Floor                  |
|                        | Page                    | Multipath Power                | Rho                          |
|                        | Sync                    | Limit Test – 10 Tests Averaged | Carrier Feed Through         |
|                        | Q Page                  | Rho                            | Tau                          |
|                        | Code Domain Power Table | Adjusted Rho                   | RMS Phase Error              |
|                        | Code                    | Multipath                      | Code Utilization             |
|                        | Status                  | Pilot Dominance                | Measured PN                  |
|                        | Power                   | Pilot Power                    | Pilot Dominance              |
|                        | Multiple Codes          | Pass/Fail Status               | Multipath Power              |
|                        | Code Utilization        |                                |                              |
|                        | Modulation Summary      |                                |                              |

**Setup Parameters**

|                             |                                                                                  |
|-----------------------------|----------------------------------------------------------------------------------|
| PN Setup                    | PN Trigger (No Trigger, GPS, External), PN Search Type (Auto, Manual), PN Offset |
| Walsh Codes                 | 64, 128                                                                          |
| Measurement Speed           | Fast, Normal, Slow                                                               |
| External Trigger Polarity   | Rising, Falling                                                                  |
| Number of Carriers          | 1 to 5                                                                           |
| Carrier Bandwidth (MHz)     | 1.23, 1.24, 1.25                                                                 |
| Frequency                   | Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel |
| Amplitude                   | Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/Watts)        |
| Sweep                       | Single/Continuous, Trigger Sweep                                                 |
| Save/Recall                 | Setup, Measurement, Screen Shot (JPEG - save only), to Internal/External Memory  |
| Measurement Summary Screens | Overall Measurements, RF Measurements, Modulation Measurements                   |

**RF Measurements** (temperature range 15 °C to 35 °C)

 RF Channel Power Accuracy  $\pm 1.5$  dB,  $\pm 1.0$  dB typical, (RF input -50 dBm to +20 dBm)

**Demodulation** (temperature range 15 °C to 35 °C)

|                      |                                                                     |
|----------------------|---------------------------------------------------------------------|
| Frequency Error      | $\pm 10$ Hz + time base error, 99 % confidence level (in slow mode) |
| Rho Accuracy         | $\pm 0.005$ , for Rho > 0.9                                         |
| Residual Rho         | > 0.995, typical, > 0.99 maximum, (RF input -50 dBm to +20 dBm)     |
| PN Offset            | 1 x 64 chips                                                        |
| Pilot Power Accuracy | $\pm 1.0$ dB typical, relative to channel power                     |
| Tau                  | $\pm 0.5$ $\mu$ s typical, $\pm 1.0$ $\mu$ s maximum                |

**Over-the-Air (OTA) Measurements**

|                   |                                                            |
|-------------------|------------------------------------------------------------|
| Pilot Scanner     | Nine strongest pilots                                      |
| Multipath Scanner | Multipath power of six signals relative to strongest pilot |
| Limit Test        | Average of ten tests compared to limit                     |

1. Requires Option 31 for full functionality.

 **EV-DO Signal Analyzer (Option 884)<sup>1</sup>**
**Measurements**

| RF                     | Demodulation                | Over-the-Air (OTA)      | Pass/Fail<br>(User Editable) |
|------------------------|-----------------------------|-------------------------|------------------------------|
| Channel Spectrum       | MAC Code Domain Power Graph | Pilot Scanner (Nine)    | View Pass/Fail Limits        |
| Channel Power          | Pilot & MAC Power           | PN                      | All, RF, Modulation          |
| Occupied Bandwidth     | Channel Power               | EC/IO                   | Available Measurements       |
| Peak-to-Average Power  | Frequency Error             | Tau                     | Channel Power                |
| Power vs. Time         | Rho Pilot                   | Pilot Power             | Occupied Bandwidth           |
| Pilot & MAC Power      | Rho Overall                 | Channel Power           | Peak-to-Average Power        |
| Channel Power          | Data Modulation             | Pilot Dominance         | Carrier Frequency            |
| Frequency Error        | Noise Floor                 | Multipath Scanner (Six) | Frequency Error              |
| Idle Activity          | MAC Code Domain Power Table | EC/IO                   | Spectral Mask                |
| On/Off Ratio           | Code                        | Tau                     | Noise Floor                  |
| Spectral Emission Mask | Status                      | Channel Power           | Pilot Power                  |
| Single Carrier ACPR    | Power                       | Multipath Power         | RMS Phase Error              |
| Multi-carrier ACPR     | Code Utilization            |                         | Tau                          |
| RF Summary             | Data Code Domain Power      |                         | Code Utilization             |
|                        | Active Data Power           |                         | Measured PN                  |
|                        | Data Modulation             |                         | Pilot Dominance              |
|                        | Rho Pilot                   |                         | Multipath Power              |
|                        | Rho Overall                 |                         |                              |
|                        | Maximum Data CDP            |                         |                              |
|                        | Minimum Data CDP            |                         |                              |
|                        | Modulation Summary          |                         |                              |

**Setup Parameters**

|                             |                                                                                  |
|-----------------------------|----------------------------------------------------------------------------------|
| PN Setup                    | PN Trigger (No Trigger, GPS, External), PN Search Type (Auto, Manual), PN Offset |
| Walsh Codes                 | 64, 128                                                                          |
| Measurement Speed           | Fast, Normal, Slow                                                               |
| External Trigger Polarity   | Rising, Falling                                                                  |
| Slot Type                   | Auto, Active, Idle                                                               |
| Number of Carriers          | 1 to 5                                                                           |
| Carrier Bandwidth (MHz)     | 1.23, 1.24, 1.25                                                                 |
| Frequency                   | Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel |
| Amplitude                   | Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/Watts)        |
| Sweep                       | Single/Continuous, Trigger Sweep                                                 |
| Save/Recall                 | Setup, Measurement, Screen Shot (JPEG - save only), to Internal/External Memory  |
| Measurement Summary Screens | Overall Measurements, RF Measurements, Modulation Measurements                   |

**RF Measurements** (temperature range 15 °C to 35 °C)

|                           |                                                           |
|---------------------------|-----------------------------------------------------------|
| RF Channel Power Accuracy | ± 1.5 dB, ± 1.0 dB typical, (RF input -50 dBm to +20 dBm) |
|---------------------------|-----------------------------------------------------------|

**Demodulation** (temperature range 15 °C to 35 °C)

|                      |                                                                |
|----------------------|----------------------------------------------------------------|
| EV-DO Compatibility  | Rev 0 and Rev A                                                |
| Frequency Error      | ± 10 Hz + time base error, 99 % confidence level               |
| Rho Accuracy         | ± 0.01, for Rho > 0.9                                          |
| Residual Rho         | > 0.995 typical, > 0.99, maximum (RF input -50 dBm to +20 dBm) |
| PN Offset            | Within 1 x 64 chips                                            |
| Pilot Power Accuracy | ± 1.0 dB typical, relative to channel power                    |
| Tau                  | ± 0.5 µs typical, ± 1.0 µs maximum                             |

**Over-the-Air (OTA) Measurements**

|                   |                                                            |
|-------------------|------------------------------------------------------------|
| Pilot Scanner     | Nine strongest pilots                                      |
| Multipath Scanner | Multipath power of six signals relative to strongest pilot |

1. Requires Option 31 for full functionality.

Fixed WiMAX Signal Analyzer (Option 885)<sup>1</sup>

## Measurements

| RF                 | Demodulation                 | Over-the-Air (OTA)                                                                            | Pass/Fail<br>(User Editable) |
|--------------------|------------------------------|-----------------------------------------------------------------------------------------------|------------------------------|
| Channel Spectrum   | Constellation                | There are no additional OTA Measurements.<br>RF and Demodulation measurements can be made OTA | View Pass/Fail Limits        |
| Channel Power      | RCE (RMS/Peak)               |                                                                                               | All, RF, Modulation          |
| Occupied Bandwidth | EVM (RMS/Peak)               |                                                                                               | Available Measurements       |
| Power vs. Time     | Frequency Error              |                                                                                               | Channel Power                |
| Channel Power      | Carrier Frequency            |                                                                                               | Occupied Bandwidth           |
| Preamble Power     | Base Station ID              |                                                                                               | Burst Power                  |
| Data Burst Power   | Spectral Flatness            |                                                                                               | Preamble Power               |
| Crest Factor       | Adjacent Subcarrier Flatness |                                                                                               | Crest Factor                 |
| ACPR               | EVM vs. Subcarrier/Symbol    |                                                                                               | Frequency Error              |
| RF Summary         | RCE                          |                                                                                               | Carrier Frequency            |
|                    | EVM                          |                                                                                               | EVM                          |
|                    | Frequency Error              |                                                                                               | RCE                          |
|                    | Carrier Frequency            |                                                                                               | Base Station ID              |
|                    | Base Station ID              |                                                                                               |                              |
|                    | Modulation Summary           |                                                                                               |                              |

## Setup Parameters

|                             |                                                                                  |
|-----------------------------|----------------------------------------------------------------------------------|
| Bandwidth (MHz)             | 1.25, 1.50, 2.50, 3.50, 5.00, 5.50, 6.00, 7.00, 10.00                            |
| Cyclic Prefix Ratio (CP)    | 1/4, 1/8, 1/16, 1/32                                                             |
| Span (MHz)                  | 5, 10, 15, 20                                                                    |
| Frame Length (ms)           | 2.5, 5.0, 10.0                                                                   |
| Frequency                   | Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel |
| Amplitude                   | Scale/Division, Power Offset, Auto Range, Adjust Range                           |
| Sweep                       | Single/Continuous, Trigger Sweep                                                 |
| Save/Recall                 | Setup, Measurement, Screen Shot (JPEG - save only), to Internal/External Memory  |
| Measurement Summary Screens | Overall Measurements, RF Measurements, Modulation Measurements                   |

## RF Measurements (temperature range 15 °C to 35 °C)

RF Channel Power Accuracy ± 1.5 dB, ± 1.0 dB typical, (RF input -50 dBm to +20 dBm)

## Demodulation (temperature range 15 °C to 35 °C)

|                    |                                                          |
|--------------------|----------------------------------------------------------|
| Frequency Error    | 0.07 ppm + time base error, 99 % confidence level        |
| Residual EVM (rms) | 3 % typical, 3.5 % maximum (RF input -50 dBm to +20 dBm) |

1. Requires Option 31 for full functionality.


**Mobile WiMAX Signal Analyzer (Option 885)<sup>1</sup>**
**Measurements**

| RF                     | Demodulation                 | Over-the-Air (OTA)     | Pass/Fail<br>(User Editable) |
|------------------------|------------------------------|------------------------|------------------------------|
| Channel Spectrum       | Constellation                | Channel Power Monitor  | View Pass/Fail Limits        |
| Channel Power          | RCE (RMS/Peak)               | Preamble Scanner (Six) | All, RF, Modulation          |
| Occupied Bandwidth     | EVM (RMS/Peak)               | Preamble               | Available Measurements       |
| Power vs. Time         | Frequency Error              | Relative Power         | Channel Power                |
| Channel Power          | CINR                         | Cell ID                | Occupied Bandwidth           |
| Preamble Power         | Base Station ID              | Sector ID              | Downlink Burst Power         |
| Downlink Burst Power   | Sector ID                    | PCINR                  | Uplink Burst Power           |
| Uplink Burst Power     | Spectral Flatness            | Dominant Preamble      | Preamble Power               |
| ACPR                   | Adjacent Subcarrier Flatness | Base Station ID        | Crest Factor                 |
| Spectral Emission Mask | EVM vs. Subcarrier/Symbol    | Auto Save - On/Off     | Frequency Error              |
| RF Summary             | RCE (RMS/Peak)               |                        | Carrier Frequency            |
|                        | EVM (RMS/Peak)               |                        | EVM                          |
|                        | Frequency Error              |                        | RCE                          |
|                        | CINR                         |                        | Sector ID                    |
|                        | Base Station ID              |                        |                              |
|                        | Sector ID                    |                        |                              |
|                        | DL-MAP (Tree View)           |                        |                              |
|                        | Modulation Summary           |                        |                              |

**Setup Parameters**

|                             |                                                                                  |
|-----------------------------|----------------------------------------------------------------------------------|
| Zone Type                   | PUSC                                                                             |
| DL-MAP Auto Decoding        | Convolutional Coding (CC), Convolutional Turbo Coding (CTC)                      |
| Bandwidth (MHz)             | 3.50, 5.00, 7.00, 8.75, 10.00                                                    |
| Cyclic Prefix Ratio (CP)    | 1/8                                                                              |
| Span (MHz)                  | 5, 10, 20, 30                                                                    |
| Frame Length (ms)           | 5, 10                                                                            |
| Demodulation                | Auto, Manual, FCH                                                                |
| Frequency                   | Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel |
| Amplitude                   | Scale/Division, Power Offset, Auto Range, Adjust Range                           |
| Sweep                       | Single/Continuous, Trigger Sweep                                                 |
| Save/Recall                 | Setup, Measurement, Screen Shot (JPEG - save only), to Internal/External Memory  |
| Measurement Summary Screens | Overall Measurements, RF Measurements, Modulation Measurements                   |

**RF Measurements** (temperature range 15 °C to 35 °C)

|                           |                                                           |
|---------------------------|-----------------------------------------------------------|
| RF Channel Power Accuracy | ± 1.5 dB, ± 1.0 dB typical, (RF input -50 dBm to +20 dBm) |
|---------------------------|-----------------------------------------------------------|

**Demodulation** (temperature range 15 °C to 35 °C)

|                    |                                                             |
|--------------------|-------------------------------------------------------------|
| Frequency Error    | 0.02 ppm + time base error, 99 % confidence level           |
| Residual EVM (rms) | 2.5 % typical, 3.0 % maximum, (RF Input -50 dBm to +20 dBm) |

**Over-the-Air (OTA) Measurements**

|                       |                                                           |
|-----------------------|-----------------------------------------------------------|
| Channel Power Monitor | Over time (one week), measurement time interval 1 to 60 s |
| Preamble Scanner      | Six Strongest Preambles                                   |
| Auto Save             | Yes                                                       |
| GPS Logging           | Yes                                                       |

1. Requires Option 31 for full functionality.

Mobile WiMAX conforms to IEEE Std. 802.16e-2005, WiMAX Forum® Air Interface - Mobile System Profile - Release 1.0 Certified, System Profiles according to WMF-T24-001-R010v07.

 **TD-SCDMA/HSPA+ Signal Analyzer (Option 882)<sup>1</sup>**
**Measurements**

| RF                         | Demodulation                                        | Over-the-Air (OTA)    | Pass/Fail<br>(User Editable) |
|----------------------------|-----------------------------------------------------|-----------------------|------------------------------|
| Channel Spectrum           | Code Domain Power/Error<br>(QPSK/8 PSK/16QAM/64QAM) | Code Scan (32)        | View Pass/Fail Limits        |
| Channel Power              | Slot Power                                          | Scrambling Code Group | All, RF, Demod               |
| Occupied Bandwidth         | DwPTS Power                                         | Tau                   | Available Measurements       |
| Left Channel Power         | Noise Floor                                         | EC/IO                 | Occupied Bandwidth           |
| Left Channel Occ B/W       | Frequency Error                                     | DwPTS Power           | Channel Power                |
| Right Channel Power        | Tau                                                 | Pilot Dominance       | Channel Power RCC            |
| Right Channel Occ B/W      | Scrambling Code                                     | Tau Scan (Six)        | On/Off Ratio                 |
| Power vs. Time             | EVM                                                 | Sync-DL#              | Peak-to-Average Ratio        |
| Six Slot Powers            | Peak EVM                                            | Tau                   | Frequency Error              |
| Channel Power (RRC)        | Peak Code Domain Error                              | EC/IO                 | EVM                          |
| DL-UL Delta Power          | CDP Marker                                          | DwPTS Power           | Peak EVM                     |
| UpPTS Power                | Modulation Summary                                  | Pilot Dominance       | Peak Code Domain Error       |
| DwPTS Power                |                                                     | Record                | Tau                          |
| On/Off Ratio               |                                                     | Run/Hold              | Noise Floor                  |
| Slot Peak-to-Average Power |                                                     |                       |                              |
| Spectral Emission          |                                                     |                       |                              |
| RF Summary                 |                                                     |                       |                              |

**Setup Parameters**

|                             |                                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------|
| Slot Selection              | Auto, 0-6                                                                             |
| Trigger                     | Trigger Type (No Trigger/GPS/External), External Trigger (Rising/Falling), Tau Offset |
| SYNC-DL Code                | Auto, 0 – 31                                                                          |
| Scrambling/Midamble Code    | Auto, 0 – 127                                                                         |
| Maximum Users               | Auto, 2, 4, 6, 8, 10, 12, 14, 16                                                      |
| Measurement Speed           | Fast, Normal, Slow                                                                    |
| User Selectable             | Uplink Switch Point, Number of Carriers (1, 3), Tau Offset                            |
| Demodulation Type           | Auto, QPSK, 8PSK, 16QAM, 64QAM                                                        |
| Frequency                   | Center, Signal Standard, Channel #, Closest Channel, Decrement/Increment Channel      |
| Amplitude                   | Scale/Division, Power Offset, Auto Range, Adjust Range, Units (dBm/Watts)             |
| Sweep                       | Hold/Run, Trigger Sweep                                                               |
| Save/Recall                 | Setup, Measurement, Screen Shot (JPEG - save only), to Internal/External Memory       |
| Measurement Summary Screens | Overall Measurements, RF Measurements, Modulation Measurements                        |

**RF Measurements** (temperature range 15 °C to 35 °C)

|                                 |                                                              |
|---------------------------------|--------------------------------------------------------------|
| RF Channel Power Accuracy (RRC) | ± 1.5 dB, ±1.0 dB typical, (slot power –40 dBm to +10 dBm)   |
| Frequency Error                 | ±10 Hz + time base error, in the presence of a downlink slot |

**Demodulation** (temperature range 15 °C to 35 °C)

|                                         |                                          |
|-----------------------------------------|------------------------------------------|
| Supported Demodulation                  | QPSK, 8PSK, 16QAM, 64QAM                 |
| Residual EVM (rms)                      | 3 % typical, P-CCPH slot power > –50 dBm |
| PN Offset                               | Within 1 x 64 chips                      |
| Pilot Power Accuracy                    | ± 1.0 dB typical                         |
| Timing Error (Tau) for Dominant SYNC-DL | ± 0.2 µs (external trigger)              |
| Spreading Factor                        | 1, 16                                    |

**Over-the-Air (OTA) Measurements**

|              |                                                     |
|--------------|-----------------------------------------------------|
| Code Scanner | 32 Sync Codes and associated Scrambling Code Groups |
| Tau Scanner  | Six strongest Sync Codes                            |
| Auto Save    | Yes                                                 |
| GPS Logging  | Yes                                                 |

1. Requires Option 31 for full functionality.

ISDB-T Signal Analyzer (Options 30, 79, 32)<sup>1</sup>

## Measurements

| ISDB-T RF<br>(Option 30)   | ISDB-T Signal Analysis<br>(Option 30) | ISDB-T BER Analysis<br>(Option 79) | ISDB-T SFN Analysis<br>(Option 32) |
|----------------------------|---------------------------------------|------------------------------------|------------------------------------|
| Signal Power               | Constellation (w/zoom)                | Layer A, Layer B, Layer C          | Impulse Response (w/zoom)          |
| Channel Power              | Layer A, B, C, TMCC                   | BER and Error Count per Layer      | In-band Spectrum                   |
| Termination Voltage        | Sub-carrier MER                       | Before RS                          | Measured Data                      |
| Open Terminal Voltage      | Delay Profile (w/zoom)                | Before Viterbi                     | Channel Power                      |
| Field Strength             | Frequency Response                    | PER and Error Count per Layer      | Delay                              |
| Spectrum Monitor           | Measured Data                         | MPEG Bit Rate per Layer            | DU Ratio                           |
| Channel Power              | Frequency                             | TMCC Information per Layer         | Power                              |
| Zone Center Channel        | Frequency Offset                      | Modulation                         | Field Strength                     |
| Zone Center Frequency      | MER (Total, Layer A/B/C, TMCC, AC1)   | Code Rate                          |                                    |
| Spectrum Mask              | Modulation (Layer A/B/C)              | Interleave                         |                                    |
| Mask (Standard A) Japan    | Mode, GI                              | Segments                           |                                    |
| Mask (Standard B) Japan    | Sub-carrier MER w/marker              | Channel Power                      |                                    |
| Mask (Critical) Brazil     | Delay w/marker                        | Mode, GI                           |                                    |
| Mask (Sub-critical) Brazil | Frequency Response w/marker           | Signal Sync Status                 |                                    |
| Mask (Non-critical) Brazil |                                       | ASI Out                            |                                    |
| Phase Noise                |                                       |                                    |                                    |
| Spurious Emissions         |                                       |                                    |                                    |

## ISDB-T Measurement Modes

|        |                                                                                                        |
|--------|--------------------------------------------------------------------------------------------------------|
| Custom | User specified measurements and setup parameters                                                       |
| Easy   | User specified measurements. Some setup parameters are automatically set or detected.                  |
| Batch  | User specified measurements and channels for automatic measurement, and display and storage of results |

## Setup Parameters

|                         |                                                                                                                             |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Channel Map             | UHF (Japan), UHF (Brazil), IF (37.15 MHz), None                                                                             |
| Channel                 | 13 to 62 (Japan), 14 to 69 (Brazil)                                                                                         |
| Frequency               | 35 MHz to 806 MHz                                                                                                           |
| Bandwidths              | 6 MHz, 8 MHz                                                                                                                |
| Partial Reception       | Recognized when layer A segment count is 1                                                                                  |
| One-Seg                 | On: synchronizes with single segment transmission (Bandwidth 6 MHz only)<br>Off: synchronizes with normal 13 segment signal |
| Pre-amp                 | On, Off                                                                                                                     |
| Reference Level Setting | -25 dBm to +20 dBm/5 dB steps (Preamp Off), -50 dBm to -10 dBm/10 dB steps (Preamp On)                                      |

## ISDB-T Digital Video Measurements (Option 30)

|                                 |                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Channel Power Accuracy          | ± 2 dB, (RF input -84 dBm to -10 dBm)                                                                             |
| Frequency Lock Range            | ± 90 kHz                                                                                                          |
| Frequency Offset Accuracy       | ± (measurement frequency x reference frequency accuracy) ± 0.3 Hz                                                 |
| Residual MER                    | ≥ 42 dB, typical (Preamp Off, Reference level: -20 dBm)<br>≥ 37 dB, typical (Preamp On, Reference level: -50 dBm) |
| Sub-carrier MER Display Range   | ± 2.785 MHz from center frequency (Bandwidth 6 MHz)<br>± 3.714 MHz from center frequency (Bandwidth 8 MHz)        |
| Delay Profile Resolution        | 0.12 μs (Bandwidth 6 MHz)<br>0.09 μs (Bandwidth 8 MHz)                                                            |
| Frequency Response Resolution   | 1 kHz, 0.1 dB                                                                                                     |
| Phase Noise Range               | -40 dBc/Hz to -140 dBc/Hz                                                                                         |
| Spurious Emissions Search Range | 5 MHz to 5x input signal frequency                                                                                |

## ISDB-T BER Measurements (Option 79) (temperature range 0 °C to 40 °C)

|                                    |                                                       |
|------------------------------------|-------------------------------------------------------|
| BER Measurement Display per Layer  | Rate and Error count: Before Viterbi, Before RS       |
| PER Measurement Display per Layer  | Rate and Error count                                  |
| TMCC Information Display per Layer | Modulation, Code Rate, Interleave, Number of segments |
| ASI Output                         | BNC-J 75 Ω                                            |

## ISDB-T SFN Measurements (Option 32)

|                                     |                                                            |
|-------------------------------------|------------------------------------------------------------|
| Delay Profile Display Range         | -1008 μs to +1008 μs (Bandwidth 6 MHz)                     |
| Delay Wave Estimated Level Accuracy | ± 2.5 dB typical (-10 dBm to -79 dBm)                      |
| DU Ratio Accuracy                   | ± 1 dB typical (-10 dBm to -70 dBm)                        |
| Inband Spectrum Range               | ± 2.74 MHz (Mode 2), ± 2.76 MHz (Mode 3) (Bandwidth 6 MHz) |

1. For full specifications, refer to the Digital Broadcast Analysis Options Technical Data Sheet 11410-00624.


**DVB-T/H Signal Analyzer (Options 64, 57, 78)<sup>1</sup>**
**Measurements**

| DVB-T/H RF<br>(Option 64)  | DVB-T/H Signal Analysis<br>(Option 64) | DVB-T/H BER Analysis<br>(Option 57) | DVB-T/H SFN Analysis<br>(Option 78) |
|----------------------------|----------------------------------------|-------------------------------------|-------------------------------------|
| Signal Power               | Composite or Individual Views          | BER                                 | Impulse Response (w/zoom)           |
| Channel Power              | Constellation                          | Before RS                           | Inband Spectrum                     |
| Termination Voltage        | Impulse Response (w/zoom)              | Before Viterbi                      | Measured Data                       |
| Open Terminal Voltage      | Carrier MER (w/zoom)                   | PER (Packet)                        | Channel Power                       |
| Field Strength             | Freq Response (composite view only)    | Channel Power                       | Delay                               |
| Spectrum Monitor           | Measured Data                          | MER (Quick)                         | DU Ratio                            |
| Channel Power              | Mode, GI                               | Bit Rate                            | Power                               |
| Zone Center Channel        | Modulation                             | TPS Info                            | Field Strength                      |
| Zone Center Frequency      | Hierarchy                              | Length Indicator                    |                                     |
| Shoulder Attenuation       | Freq Offset                            | Mode, GI                            |                                     |
| Channel Power              | Channel Power                          | Modulation                          |                                     |
| Zone Center Channel        | MER (Total/Data/TPS)                   | Hierarchy                           |                                     |
| Zone Center Frequency      | TPS Warning Message                    | Interleave Type                     |                                     |
| Lower Shoulder Attenuation | TPS Info                               | Cell ID                             |                                     |
| Upper Shoulder Attenuation | Interleave Type                        | Code Rate                           |                                     |
|                            | Cell ID                                | Time Slicing                        |                                     |
|                            | Code Rate (HP/LP)                      | MPE-FEC                             |                                     |
|                            | Time Slicing (HP/LP)                   | TPS Warning Message                 |                                     |
|                            | MPE-FEC (HP/LP)                        | ASI Out                             |                                     |

**Setup Parameters**

|                  |                                                                                        |
|------------------|----------------------------------------------------------------------------------------|
| Channel Map      | UHF (Australia), UHF (Europe), VHF (Europe), None                                      |
| Channel          | 28 to 69 (Australia), 21 to 69 (Europe), 5 to 12 (Europe)                              |
| Frequency Offset | ± 166.666 kHz, ± 333.333 kHz, ± 499.999 kHz, None                                      |
| Frequency        | 30 MHz to 2.8 GHz when Channel Map is None                                             |
| Bandwidth        | 5*, 6*, 7, 8 MHz (* Not available for BER measurements)                                |
| Pre-amp          | On, Off                                                                                |
| Reference Level  | -25 dBm to +20 dBm/5 dB steps (Preamp Off), -50 dBm to -10 dBm/10 dB steps (Preamp On) |

**DVB-T/H Digital Video Measurements (Option 64)**

|                             |                                                                                                            |
|-----------------------------|------------------------------------------------------------------------------------------------------------|
| Channel Power Accuracy      | ± 2 dB, (RF input -84 dBm to -10 dBm)                                                                      |
| Frequency Lock Range        | ± 90 kHz                                                                                                   |
| Frequency Offset Accuracy   | ± (measurement frequency x reference frequency accuracy) ± 0.3 Hz                                          |
| Residual MER                | ≥ 42 dB (Preamp Off, Reference Level: -20 dBm)<br>≥ 37 dB (Preamp On, Reference Level: -50 dBm)            |
| Impulse Response Resolution | 0.11 μs (Bandwidth: 8 MHz), 0.1 dB                                                                         |
| Carrier MER Marker          | Carrier Number, Offset Frequency and MER                                                                   |
| Composite View              | Simultaneous display of Constellation (Data and TPS), Impulse Response, Carrier MER and Frequency Response |

**DVB-T/H BER Measurements (Option 57) (temperature range 0 °C to 40 °C)**

|                   |                                                                                                                                                                                                                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bit Count Setting | Range 1E+6 to 1E+12                                                                                                                                                                                                                                                                     |
| Service Type      | In Service: BER measurement of normal in-service data traffic<br>Simultaneous BER measurement Before Viterbi and Before RS error correction<br>Out of Service: BER measurement of a PRBS23 data sequence<br>BER measurement point can be selected Before Viterbi, Before RS or After RS |
| TPS Information   | Length indicator, Mode, GI, Modulation, Hierarchy, Inner Interleave, Cell ID, Code Rate, Time Slicing, MPE-FEC                                                                                                                                                                          |
| ASI Output        | BNC-J 75 Ω                                                                                                                                                                                                                                                                              |

**DVB-T/H SFN Measurements (Option 78)**

|                                |                                                                                        |
|--------------------------------|----------------------------------------------------------------------------------------|
| Impulse Response Display Range | -896 μs to +896 μs (Bandwidth 8 MHz)                                                   |
| Resolution                     | 0.11 μs (33 m) (Bandwidth 8 MHz)                                                       |
| Marker                         | Delay time, relative level (DU ratio), power and field strength or termination voltage |
| In-band Spectrum Range         | ± 3.804 MHz (Bandwidth 8 MHz)                                                          |

1. For full specifications, refer to the Digital Broadcast Analysis Options Technical Data Sheet 11410-00624.

## General Specifications

|                              |                                 |                                                                                                                                                                                                            |
|------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Parameters</b>     | System                          | Status (Temperature, Battery Info, Serial Number, Firmware Version, Options Installed)<br>Self Test, Application Self Test, GPS (see Option 31)                                                            |
|                              | System Options                  | Name, Date and Time, Brightness, Volume<br>Language (English, French, German, Spanish, Chinese, Japanese, Korean, Italian, Russian, Portuguese)<br>Reset (Factory Defaults, Master Reset, Update Firmware) |
|                              | Internal Trace/Setup Memory     | 2,000 traces, 2,000 setups                                                                                                                                                                                 |
|                              | External Trace/Setup Memory     | Limited by size of USB Flash drive                                                                                                                                                                         |
|                              | Mode Switching                  | Auto-Stores/Recalls most recently used Setup Parameters in the Mode                                                                                                                                        |
| <b>File Management</b>       | File Types                      | Vary with measurement mode                                                                                                                                                                                 |
|                              | File                            | Save, Recall, Copy, Delete                                                                                                                                                                                 |
|                              | Save                            | Setups, Measurements, Screen Shots (JPEG)                                                                                                                                                                  |
|                              | Recall                          | Setups, Measurements                                                                                                                                                                                       |
|                              | Copy                            | Selected file or files to internal/external memory (USB)                                                                                                                                                   |
|                              | Delete                          | Selected file or files from internal/external memory (USB)                                                                                                                                                 |
|                              | File Sort Method                | By Name/Date/Type, Ascend/Descend                                                                                                                                                                          |
| <b>Connectors</b>            | RF Out                          | Type N, female, 50 $\Omega$ (Reflection In)                                                                                                                                                                |
|                              | RF Out Damage Level             | +42 dBm, $\pm$ 50 VDC                                                                                                                                                                                      |
|                              | RF In                           | Type N, female, 50 $\Omega$                                                                                                                                                                                |
|                              | RF Input Damage Level           | +30 dBm peak, $\pm$ 50 VDC, Maximum Continuous Input ( $\geq$ 10 dB attenuation)                                                                                                                           |
|                              | ASI Output Connector            | BNC-J 75 $\Omega$ (with Option 57 or Option 79)                                                                                                                                                            |
|                              | GPS                             | SMA(f)                                                                                                                                                                                                     |
|                              | External Power                  | 5.5 mm barrel connector, 12.5 VDC to 15 VDC, < 4.0 Amps                                                                                                                                                    |
|                              | USB Interface (2)               | Type A (Connect USB Flash Drive and Power Sensor)                                                                                                                                                          |
|                              | USB Interface                   | 5-pin mini-B (Connect to PC for data transfer and/or remote control)                                                                                                                                       |
|                              | Ethernet Interface              | RJ45 connector for Ethernet 10-Base T                                                                                                                                                                      |
|                              | Headset Jack                    | 3.5 mm mini-phone plug                                                                                                                                                                                     |
|                              | External Reference In           | BNC, female, Maximum Input +10 dBm, 1 MHz, 5 MHz, 10 MHz, 13 MHz                                                                                                                                           |
| <b>Display</b>               | External Trigger/Clock Recovery | BNC, female, Maximum Input $\pm$ 5 VDC                                                                                                                                                                     |
|                              | Type                            | Resistive Touchscreen                                                                                                                                                                                      |
|                              | Size                            | 8.4 inch daylight viewable color LCD                                                                                                                                                                       |
|                              | Resolution                      | 800 x 600                                                                                                                                                                                                  |
| <b>Battery</b>               | Pixel Defects                   | No more than five defective pixels (99.9989% good pixels)                                                                                                                                                  |
|                              | Type                            | Li-Ion                                                                                                                                                                                                     |
|                              | Battery Operation               | 3.0 hours, typical                                                                                                                                                                                         |
|                              | Battery Charging Limits         | 0 $^{\circ}$ C to +45 $^{\circ}$ C, Relative Humidity $\leq$ 80 %                                                                                                                                          |
| <b>Regulatory Compliance</b> |                                 |                                                                                                                                                                                                            |
|                              | European Union                  | EMC 2014/30/EU, EN 61326:2013, CISPR 11/EN 55011, IEC/EN 61000-4-2/3/4/5/6/8/11<br>Low Voltage Directive 2014/35/EU<br>Safety EN 61010-1:2010<br>RoHS Directive 2011/65/EU                                 |
|                              | Australia and New Zealand       | RCM AS/NZS 4417:2012                                                                                                                                                                                       |
|                              | Canada                          | ICES-1(A)/NMB-1(A)                                                                                                                                                                                         |
|                              | South Korea                     | KCC-REM-A21-0004                                                                                                                                                                                           |
|                              |                                 |                                                                                                                                                                                                            |
| <b>Environmental</b>         |                                 |                                                                                                                                                                                                            |
|                              | Operating Temperature Range     | MIL-PRF-28800F Class 2<br>-10 $^{\circ}$ C to 55 $^{\circ}$ C                                                                                                                                              |
|                              | Storage Temperature Range       | -51 $^{\circ}$ C to 71 $^{\circ}$ C                                                                                                                                                                        |
|                              | Maximum Relative Humidity       | 95 % RH at 30 $^{\circ}$ C, non-condensing                                                                                                                                                                 |
|                              | Vibration, Sinusoidal           | 5 Hz to 55 Hz                                                                                                                                                                                              |
|                              | Vibration, Random               | 10 Hz to 500 Hz                                                                                                                                                                                            |
|                              | Half Sine Shock                 | 30 g <sub>n</sub>                                                                                                                                                                                          |
|                              | Altitude                        | 4600 meters, operating and non-operating                                                                                                                                                                   |
|                              | Explosive Atmosphere            | MIL-PRF-28800F, Section 4.5.6.3<br>MIL-STD-810G, Method 511.5, Procedure 1                                                                                                                                 |
|                              |                                 |                                                                                                                                                                                                            |
| <b>ESD</b>                   |                                 |                                                                                                                                                                                                            |
|                              | RF Port Center Pin              | Withstands up to $\pm$ 15 kV                                                                                                                                                                               |
| <b>Size and Weight</b>       |                                 |                                                                                                                                                                                                            |
|                              | Size                            | 273 mm x 199 mm x 91 mm (10.7 in x 7.8 in x 3.6 in)                                                                                                                                                        |
|                              | Weight                          | 3.71 kg (8.2 lb)                                                                                                                                                                                           |
| <b>Warranty</b>              |                                 |                                                                                                                                                                                                            |
|                              | Duration                        | Standard three-year warranty (one-year warranty on battery)                                                                                                                                                |

**Line Sweep Tools** (for your PC)**Trace Capture**

|                      |                                                                                |
|----------------------|--------------------------------------------------------------------------------|
| Browse to Instrument | View and copy traces from the test equipment to your PC using Windows Explorer |
| Open Legacy Files    | Open DAT files captured with Hand Held Software Tools v6.61                    |
| Open Current Files   | Open VNA or DAT files                                                          |
| Capture Plots To     | The Line Sweep Tools screen, DAT files, Database, or JPEG                      |

**Traces**

|               |                                                                  |
|---------------|------------------------------------------------------------------|
| Trace Types   | Return Loss, VSWR, DTF-RL, DTF-VSWR, Cable Loss, and Smith Chart |
| Trace Formats | DAT, VNA, CSV, PNG, BMP, JPG, HTML, Data Base, and PDF           |

**Report Generation**

|                  |                                                                                      |
|------------------|--------------------------------------------------------------------------------------|
| Report Generator | Includes GPS location along with measurements                                        |
| Report Format    | Create reports in HTML or PDF format                                                 |
| Report Setup     | Report Title, Company, Prepared for, Location, Date and Time, Filename, Company logo |
| Trace Setup      | 1 Trace Portrait Mode, 2 Trace Portrait Mode, 1 Trace Landscape Mode                 |

**Trace Validation**

|                   |                                                                                    |
|-------------------|------------------------------------------------------------------------------------|
| Presets           | 7 presets allow "one click" setting of up to 6 markers and one limit line          |
| Marker Controls   | 6 regular Markers, Marker Peak, Marker Valley, Marker between, and frequency entry |
| Delta Markers     | 6 Delta markers                                                                    |
| Limit Line        | Enable and drag or value entry. Also works with presets                            |
| Next Trace Button | Next Trace and Previous trace arrow keys allow quick switching between traces      |

**Tools**

|                        |                                                                                         |
|------------------------|-----------------------------------------------------------------------------------------|
| Cable Editor           | Allows creation of custom cable parameters                                              |
| Distance to Fault      | Converts a Return Loss trace to a Distance to Fault trace                               |
| Measurement Calculator | Converts Real, Imaginary, Magnitude, Phase, RL, VSWR, Rho, and Transmit power           |
| Signal Standard Editor | Creates new band and channel tables                                                     |
| Renaming Grid          | 36 user definable phrases for creation of file names, trace titles, and trace subtitles |

**Connectivity**

|             |                                       |
|-------------|---------------------------------------|
| Connections | Ethernet, USB cable, USB memory stick |
|-------------|---------------------------------------|

**easyTest Tools™** (for your PC)**Instrument Modes**

|                          |
|--------------------------|
| Cable & Antenna Analyzer |
| Spectrum Analyzer        |

**Commands**

|               |                                                                                                                                                                                |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display Image | Allows putting a custom image on the instrument screen                                                                                                                         |
| Recall Setup  | Places the instrument into a known state; auto-advance to next command available                                                                                               |
| Prompt        | Displays instructional messages on the instrument screen; timed advance to next command available; instrument users can be allowed or disallowed from making setup adjustments |
| Save          | Allows automatic or manual saving of traces; auto-advance to next command available                                                                                            |

**Connectivity**

|             |                                       |
|-------------|---------------------------------------|
| Connections | Ethernet, USB cable, USB memory stick |
|-------------|---------------------------------------|

**easyMap Tools™** (create instrument-compatible maps on your PC)**Outdoor Maps**

|                 |                                                       |
|-----------------|-------------------------------------------------------|
| On-Line Sources | Google Maps, Cloud Made Open-Source Maps              |
| Pan & Zoom Mode | AZM map file format allows pan and zoom on-instrument |
| Legacy Mode     | MAP format is compatible with older firmware          |
| Geo-Referenced  | Works with instrument based GPS                       |
| Map Conversion  | Convert scanned maps to geo-referenced                |

**Indoor Maps**

|         |                                                             |
|---------|-------------------------------------------------------------|
| Sources | Scanned images in JPG, JPEG, JPE, JFIF, GIF, TIF, TIFF, PNG |
|---------|-------------------------------------------------------------|

**General**

|              |                                                  |
|--------------|--------------------------------------------------|
| Color Filter | Grayscale, High Contrast                         |
| Coverage     | Worldwide                                        |
| Zoom Levels  | 16 total zoom levels, 7 available in any one map |
| Map Size     | Less than 1 MB to over 1 GB                      |


**Master Software Tools** (for your PC)

**Measurement Viewing**

|                                    |                                                                                                                                                   |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Display                            | Modify display settings, including scale                                                                                                          |
| Spectrum Traces                    | Add, delete, and modify limit lines and markers. Overlay traces.                                                                                  |
| Spectrum Analyzer Measurements     | Field Strength, Occupied Bandwidth, Channel Power, ACPR, Emission Mask, C/I <sup>1</sup>                                                          |
| Interference Analyzer Measurements | Spectrograms, Signal Strength Meter, RSSI <sup>2</sup>                                                                                            |
| Non-Spectrum Measurements          | Hi Accuracy Power Meter, Channel Scanner, GSM, WCDMA/HSPA, LTE, TD-LTE, TD-SCDMA, CDMA, EV-DO, Fixed WiMAX, Mobile WiMAX, Screen captures (JPEGs) |
|                                    | 1. Spurious Emissions results viewable in a browser                                                                                               |
|                                    | 2. Coverage Mapping and Interference Mapping files viewable in spreadsheet, Google Earth, or Google Maps                                          |

**Database Management**

|                      |                                                                                                   |
|----------------------|---------------------------------------------------------------------------------------------------|
| Full Trace Retrieval | Retrieve all traces from instrument into one PC directory (limited to approximately 15,000 files) |
| Trace Catalog        | Index all traces in selected folder & subfolder on PC into one catalog                            |
| Trace Rename Utility | Rename measurement traces                                                                         |
| Group Edit           | Titles, subtitles, plot scaling, markers and limit lines, simultaneously on similar files         |

**Data Analysis**

|                          |                            |
|--------------------------|----------------------------|
| Trace Math and Smoothing | Compare multiple traces    |
| Measurement Calculator   | Translate into other units |

**Report Generation**

|                     |                                                                |
|---------------------|----------------------------------------------------------------|
| Report Generator    | Includes GPS, power level, and measurements                    |
| Edit Graph          | Change scale, limit lines, and markers                         |
| Report Format       | Create reports in HTML                                         |
| Export Measurements | Export measurements or entire folders to *.jpg or *.csv format |
| Notes               | Annotate measurements                                          |

**Mapping** (GPS required on instrument)

|                                   |                                     |
|-----------------------------------|-------------------------------------|
| Spectrum Analyzer Mode            | MapInfo, MapPoint                   |
| Mobile WiMAX OTA, LTE OTA Options | Google Earth, Google Maps, MapPoint |

**Spectrogram** (Spectrum Monitoring for Interference Analysis and Spectrum Clearing)

|                             |                                                                                                                                                                                                            |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source                      | Recorded Spectrogram or multiple spectrum traces                                                                                                                                                           |
| Folder Spectrogram          | 2D View creates a composite file of multiple traces                                                                                                                                                        |
| Available Displays          | Spectrogram, Peak Power vs. Time, Variation in Total Power vs. Time, Peak Frequency vs. Time, Number of Traces Saved vs. Time (useful with Save on Limit Exceeded), Maximum/Average/Minimum Power vs. Time |
|                             | File Filter (Violations over limit lines or deviations from averages)                                                                                                                                      |
|                             | Playback                                                                                                                                                                                                   |
| Display Functions per Trace | Markers, GPS location altitude and time (when recorded), instrument time                                                                                                                                   |
|                             | Filename per trace for Folder Spectrogram                                                                                                                                                                  |
| Export to Video             | Create AVI file of 2D Spectrogram for management review/reports                                                                                                                                            |
| Export to 3D Spectrogram    | Views (Set Threshold, Markers)                                                                                                                                                                             |
|                             | - 3D (Rotate X, Y, Z Axis, Level Scale, Signal ID)                                                                                                                                                         |
|                             | - 2D (Frequency or Time Domain, Signal ID)                                                                                                                                                                 |
|                             | - Top Down                                                                                                                                                                                                 |
|                             | Playback (Frequency and/or Time Domain)                                                                                                                                                                    |

**List/Parameter Editors**

|                                    |                                                              |
|------------------------------------|--------------------------------------------------------------|
| Antennas, Cables, Signal Standards | Modify instrument's Antenna, Cable, and Signal Standard List |
| Pass/Fail                          | Create, download, or edit Signal Analysis Pass/Fail Limits   |
| Script Master                      | Create Script Master files for GSM/WCDMA or Channel Scanner  |
| Languages                          | Modify non-English language menus                            |
| Mobile WiMAX                       | DL-MAP Parameters                                            |

**Connectivity**

|                |                                                                                                                              |
|----------------|------------------------------------------------------------------------------------------------------------------------------|
| Connections    | Connect to PC using USB, LAN, or Direct Ethernet connection                                                                  |
| Network Search | Find all Anritsu handheld instruments on local network                                                                       |
| Download       | Download measurements and live traces to PC for storage and analysis                                                         |
| Upload         | Upload measurements and other files from PC to instrument                                                                    |
| Export         | Measurements can be saved in various formats, depending on the measurement type, including JPEG, CSV, and Anritsu DAT format |
| Printing       | Print individual or all measurement screens                                                                                  |

**Web Remote Control** (enabled with Option 413)

---

|                   |                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Control           | Full instrument control through a browser – all instrument functions except power switch and rotary knob                                                                                                  |
| Connections       | RJ45 Ethernet jack<br>Third party Wi-Fi router                                                                                                                                                            |
| Protocol          | HTTP/TCP/IP                                                                                                                                                                                               |
| Physical Layer    | Cat 5 Cable, Wi-Fi router compatible                                                                                                                                                                      |
| Software Required | HTML 5-compliant browser – Google Chrome, Mozilla Firefox                                                                                                                                                 |
| Operating System  | iOS, Windows, Linux, Android operating systems that can host the HTML 5-compliant browser                                                                                                                 |
| Remote Hardware   | PCs, tablets, and smart phones with Ethernet or Wi-Fi connection and an HTML 5-compliant browser                                                                                                          |
| Download          | Individual instrument files downloaded via browser<br>Multiple instrument files and directories zipped and downloaded via browser<br>File downloads are not supported by iOS<br>Screen capture capability |
| Display Modes     | Normal: All modes and displays supported<br>Fast: Spectrum traces update faster (up to 5 updates per second)                                                                                              |
| Password          | The instrument can be password protected<br>Passwords may be used to manage who is controlling the instrument                                                                                             |
| Users/Instruments | One user/device can view and control many instruments                                                                                                                                                     |

---

**Programmable Remote Control**


---

|                      |                                                                                     |
|----------------------|-------------------------------------------------------------------------------------|
| Functionality        | Many instrument functions are programmable. See the Programming Manual for details. |
| Programming Language | Standard Commands for Programmable Instruments (SCPI)                               |
| Interfaces           | USB, Ethernet                                                                       |
| Available Drivers    | LabView. Visit NI.com for driver                                                    |

---

## Ordering Information – Options

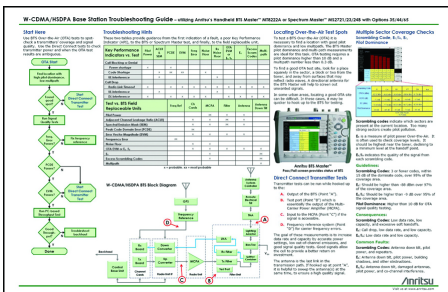
| MT8213E                                                                                                                                                                                                                                                                                                                                 |                 | Description                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------|
|     | 2 MHz to 6 GHz  | Cable and Antenna Analyzer                                                                                                 |
|                                                                                                                                                                                                                                                                                                                                         | 9 kHz to 6 GHz  | Spectrum Analyzer                                                                                                          |
|                                                                                                                                                                                                                                                                                                                                         | 10 MHz to 6 GHz | Power Meter                                                                                                                |
| Options                                                                                                                                                                                                                                                                                                                                 |                 |                                                                                                                            |
|                                                                                                                                                                                                                                                        | MT8213E-0021    | 2-Port Transmission Measurement                                                                                            |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0010    | Bias-Tee                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0031    | GPS Receiver<br>(requires GPS Antenna)                                                                                     |
|                                                                                                                                                                       | MT8213E-0019    | High-Accuracy Power Meter<br>(requires External Power Sensor)                                                              |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0025    | Interference Analyzer<br>(Option 31 recommended)                                                                           |
|                                                                                                                                                                                                                                                        | MT8213E-0027    | Channel Scanner                                                                                                            |
|                                                                                                                                                                                                                                                        | MT8213E-0431    | Coverage Mapping<br>(requires Option 31)                                                                                   |
|                                                                                                                                                                                                                                                        | MT8213E-0444    | EMF Measurements<br>(requires Anritsu Isotropic Antenna)                                                                   |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0090    | Gated Sweep                                                                                                                |
|                                                                                                                                                                                                                                                        | MT8213E-0028    | C/W Signal Generator<br>(requires CW Signal Generator Kit, P/N 69793)                                                      |
|                                                                                                                                                                                                                                                        | MT8213E-0880    | GSM/GPRS/EDGE Measurements                                                                                                 |
|                                                                                                                                                                                                                                                       | MT8213E-0881    | W-CDMA/HSPA+ Measurements<br>(Option 31 recommended.)                                                                      |
|                                                                                                                                                                                                                                                      | MT8213E-0882    | TD-SCDMA/HSPA+ Measurements<br>(requires Option 31 for full functionality)                                                 |
|                                                                                                                                                                   | MT8213E-0883    | LTE/LTE-A FDD/TDD Measurements<br>(requires Option 31 for full functionality)                                              |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0886    | LTE 256QAM Demodulation (requires Option 883)                                                                              |
|                                                                                                                                                                                                                                                      | MT8213E-0887    | NB-IoT Measurements                                                                                                        |
|                                                                                                                                                                   | MT8213E-0884    | CDMA/EV-DO Measurements<br>(requires Option 31 for full functionality)                                                     |
|                                                                                                                                                                   | MT8213E-0885    | WiMAX Fixed/Mobile Measurements<br>(requires Option 31 for full functionality)                                             |
|                                                                                                                                                                   | MT8213E-0030    | ISDB-T Digital Video Measurements                                                                                          |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0032    | ISDB-T SFN Measurements                                                                                                    |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0079    | ISDB-T BER Measurements (requires Option 30)                                                                               |
|                                                                                                                                                                   | MT8213E-0064    | DVB-T/H Digital Video Measurements                                                                                         |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0078    | DVB-T/H SFN Measurements                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0057    | DVB-T/H BER Measurements (requires Option 64)                                                                              |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0098    | Standard Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate.                                   |
|                                                                                                                                                                                                                                                                                                                                         | MT8213E-0099    | Premium Calibration to ISO17025 and ANSI/NCSL Z540-1. Includes calibration certificate, test report, and uncertainty data. |

**Standard Accessories** (included with instrument)

| Part Number | Description                            |
|-------------|----------------------------------------|
| 2000-1371-R | Ethernet Cable, 7 ft (213 cm)          |
| 2000-1654-R | Soft Carrying Case                     |
| 2000-1691-R | Stylus with Coiled Tether              |
| 2000-1797-R | Touchscreen Protective Film, 8.4 in    |
| 633-75      | Rechargeable Li-Ion Battery, 7500 mAh  |
| 40-187-R    | AC-DC Adapter                          |
| 806-141-R   | Automotive Power Adapter, 12 VDC, 60 W |
| 3-2000-1498 | USB A/5-pin mini-B Cable, 10 ft/305 cm |

**Manuals** (available at [www.anritsu.com](http://www.anritsu.com))

| Part Number | Description                                  |
|-------------|----------------------------------------------|
| 10100-00065 | Product Information, Compliance, and Safety  |
| 10580-00250 | Cell Master User Guide                       |
| 10580-00241 | Cable and Antenna Analyzer Measurement Guide |
| 10580-00242 | 2-Port Transmission Measurement              |
| 10580-00349 | Spectrum Analyzer Measurement Guide          |
| 10580-00240 | Power Meter Measurement Guide                |
| 10580-00234 | 3GPP Signal Analyzer Measurement Guide       |
| 10580-00235 | 3GPP2 Signal Analyzer Measurement Guide      |
| 10580-00236 | WiMAX Signal Analyzer Measurement Guide      |
| 10580-00237 | Digital TV Measurement Guide                 |
| 10580-00238 | Backhaul Analyzer Measurement Guide          |
| 10580-00455 | EMF Measurement Guide                        |
| 10580-00256 | Programming Manual                           |

**Troubleshooting Guides** (available at [www.anritsu.com](http://www.anritsu.com))

| Part Number | Description                       |
|-------------|-----------------------------------|
| 11410-00473 | Cable, Antenna and Components     |
| 11410-00551 | Spectrum Analyzers                |
| 11410-00472 | Interference                      |
| 11410-00566 | LTE eNodeB Testing                |
| 11410-00615 | TD-LTE eNodeB Testing             |
| 11410-00466 | GSM/GPRS/EDGE Base Stations       |
| 11410-00463 | W-CDMA/HSDPA Base Stations        |
| 11410-00465 | TD-SCDMA/HSDPA Base Stations      |
| 11410-00467 | cdmaOne/CDMA2000 1X Base Stations |
| 11410-00468 | CDMA2000 1xEV-DO Base Stations    |
| 11410-00470 | Fixed WiMAX Base Stations         |
| 11410-00469 | Mobile WiMAX Base Stations        |
| 11410-00552 | T1/DS1 Backhaul Testing           |
| 11410-00553 | E1 Backhaul Testing               |

**Power Sensors** (for complete ordering information, see the respective data sheets of each sensor)

| Model Number | Description                                                      |
|--------------|------------------------------------------------------------------|
| MA24105A     | Inline Peak Power Sensor, 350 MHz to 4 GHz, +3 dBm to +51.76 dBm |
| MA24106A     | RF USB Power Sensor, 50 MHz to 6 GHz, +23 dBm                    |
| MA24108A     | Microwave USB Power Sensor, 10 MHz to 8 GHz, +20 dBm             |
| MA24118A     | Microwave USB Power Sensor, 10 MHz to 18 GHz, +20 dBm            |
| MA24126A     | Microwave USB Power Sensor, 10 MHz to 26 GHz, +20 dBm            |
| MA24208A     | Microwave Universal USB Power Sensor, 10 MHz to 8 GHz, +20 dBm   |
| MA24218A     | Microwave Universal USB Power Sensor, 10 MHz to 18 GHz, +20 dBm  |
| MA24330A     | Microwave CW USB Power Sensor, 10 MHz to 33 GHz, +20 dBm         |
| MA24340A     | Microwave CW USB Power Sensor, 10 MHz to 40 GHz, +20 dBm         |
| MA24350A     | Microwave CW USB Power Sensor, 10 MHz to 50 GHz, +20 dBm         |
| MA25100A     | RF Power Indicator                                               |

## Optional Accessories

## Backpack and Transit Case



| Part Number | Description                                                                                                                                                                                                          |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 67135       | Anritsu Backpack (for Handheld Instrument and PC)                                                                                                                                                                    |
| 760-243-R   | Large Transit Case with Wheels and Handle<br>56 cm x 45.5 cm x 26.5 cm (22.07" x 17.92" x 10.42")                                                                                                                    |
| 760-261-R   | Large Transit Case with Wheels and Handle<br>63.1 cm x 50 cm x 30 cm (24.83" x 19.69" x 11.88"), space for MA2700A, antennas, filters, instrument inside soft case, and other interference hunting accessories/tools |
| 760-262-R   | Transit Case for MA2700A, several Yagi antennas and filters                                                                                                                                                          |
| 760-271-R   | Transit Case for Portable Directional Antennas and Port Extender<br>52.4 cm x 42.8 cm x 20.6 cm (20.62" x 16.87" x 8.12")<br>(for 2000-1777-R, 2000-1778-R, 2000-1779-R, 2000-1798-R)                                |
| 760-286-R   | Compact Transit Case with Wheels and Handle<br>55.6 cm x 35.5 cm x 22.9 cm (21.89" x 13.98" x 9.01")                                                                                                                 |

## Miscellaneous Accessories



| Part Number | Description                                                                                                   |
|-------------|---------------------------------------------------------------------------------------------------------------|
| 2000-1374-R | External Dual Charger for Li-Ion Batteries                                                                    |
| 633-75      | Rechargeable Li-Ion Battery, 7500 mAh                                                                         |
| 69793       | CW Signal Generator Kit                                                                                       |
| 2000-1689-R | EMI Near Field Probe Kit                                                                                      |
| MA2700A     | Handheld Interference Hunter (For full specifications, refer to the MA2700A Technical Data Sheet 11410-00692) |
| 2000-1884-R | PIM Hunter™ Test Probe (For full specifications, refer to the 2000-1884-R Technical Data Sheet 11410-00999)   |
| 2000-1691-R | Stylus with Coiled Tether                                                                                     |
| 2000-1797-R | Touchscreen Protective Film, 8.4 in                                                                           |
| 2000-1798-R | Port Extender, DC to 6 GHz, N(m) to N(f)                                                                      |
| MA25401A    | Atomic Clock, External, 10 MHz Frequency Reference (see 11410-01134 for details)                              |
| 66864       | Rack Mount Kit, Master Platform                                                                               |

Calibration Components, 50  $\Omega$ 

| Part Number | Description                                                              |
|-------------|--------------------------------------------------------------------------|
| ICN50B      | InstaCal™ Calibration Module, 38 dB, 2 MHz to 6.0 GHz, N(m), 50 $\Omega$ |
| OSLN50A-8   | High Performance Type N(m), DC to 8 GHz, 50 $\Omega$                     |
| OSLNF50A-8  | High Performance Type N(f), DC to 8 GHz, 50 $\Omega$                     |
| 2000-1914-R | Precision Open/Short/Load, 4.3-10(f), DC to 6 GHz, 50 $\Omega$           |
| 2000-1915-R | Precision Open/Short/Load, 4.3-10(m), DC to 6 GHz, 50 $\Omega$           |
| 2000-1618-R | Precision Open/Short/Load, 7/16 DIN(m), DC to 6.0 GHz, 50 $\Omega$       |
| 2000-1619-R | Precision Open/Short/Load, 7/16 DIN(f), DC to 6.0 GHz, 50 $\Omega$       |
| 22N50       | Open/Short, N(m), DC to 18 GHz, 50 $\Omega$                              |
| 22NF50      | Open/Short, N(f), DC to 18 GHz, 50 $\Omega$                              |
| SM/PL-1     | Precision Load, N(m), 42 dB, 6.0 GHz, 50 $\Omega$                        |
| SM/PLNF-1   | Precision Load, N(f), 42 dB, 6.0 GHz, 50 $\Omega$                        |

Calibration Components, 75  $\Omega$ 

| Part Number | Description                                           |
|-------------|-------------------------------------------------------|
| 22N75       | Open/Short, N(m), DC to 3 GHz, 75 $\Omega$            |
| 22NF75      | Open/Short, N(f), DC to 3 GHz, 75 $\Omega$            |
| 26N75A      | Precision Termination, N(m), DC to 3 GHz, 75 $\Omega$ |
| 26NF75A     | Precision Termination, N(f), DC to 3 GHz, 75 $\Omega$ |
| 12N50-75B   | Matching Pad, DC to 3 GHz, 50 $\Omega$ to 75 $\Omega$ |

## Adapters



## Part Number Description

|            |                                                         |
|------------|---------------------------------------------------------|
| 1091-26-R  | DC to 18 GHz, N(m) to SMA(m), 50 $\Omega$               |
| 1091-27-R  | DC to 18 GHz, N(m) to SMA(f), 50 $\Omega$               |
| 1091-80-R  | DC to 18 GHz, N(f) to SMA(m), 50 $\Omega$               |
| 1091-81-R  | DC to 18 GHz, N(f) to SMA(f), 50 $\Omega$               |
| 1091-172-R | DC to 1.3 GHz, N(m) to BNC(f), 50 $\Omega$              |
| 1091-417-R | DC to 6 GHz, N(m) to QMA(f), 50 $\Omega$                |
| 1091-418-R | DC to 18 GHz, N(m) to QMA(m), 50 $\Omega$               |
| 1091-465-R | DC to 6 GHz, 4.3-10(f) to N(f), 50 $\Omega$             |
| 1091-467-R | DC to 6 GHz, 4.3-10(m) to N(f), 50 $\Omega$             |
| 510-90-R   | DC to 7.5 GHz, 7/16 DIN(f) to N(m), 50 $\Omega$         |
| 510-91-R   | DC to 7.5 GHz, 7/16 DIN(f) to N(f), 50 $\Omega$         |
| 510-92-R   | DC to 7.5 GHz, 7/16 DIN(m) to N(m), 50 $\Omega$         |
| 510-93-R   | DC to 7.5 GHz, 7/16 DIN(m) to N(f), 50 $\Omega$         |
| 510-96-R   | DC to 7.5 GHz, 7/16 DIN(m) to 7/16 DIN (m), 50 $\Omega$ |
| 510-97-R   | DC to 7.5 GHz, 7/16 DIN(f) to 7/16 DIN (f), 50 $\Omega$ |
| 510-102-R  | DC to 11 GHz, N(m)-N(m), 90 degrees, 50 $\Omega$        |

## Precision Adapters



## Part Number Description

|         |                                                            |
|---------|------------------------------------------------------------|
| 34NN50A | Precision Adapter, N(m) to N(m), DC to 18 GHz, 50 $\Omega$ |
| 34NFN50 | Precision Adapter, N(f) to N(f), DC to 18 GHz, 50 $\Omega$ |

## Filters



## Part Number Description

|             |                                                                   |
|-------------|-------------------------------------------------------------------|
| 1030-114-R  | 806 MHz to 869 MHz, N(m) to SMA(f), 50 $\Omega$                   |
| 1030-109-R  | 824 MHz to 849 MHz, N(m) to SMA(f), 50 $\Omega$                   |
| 1030-110-R  | 880 MHz to 915 MHz, N(m) to SMA(f), 50 $\Omega$                   |
| 1030-111-R  | 1850 MHz to 1910 MHz, N(m) to SMA(f), 50 $\Omega$                 |
| 1030-112-R  | 2400 MHz to 2484 MHz, N(m) to SMA(f), 50 $\Omega$                 |
| 1030-105-R  | 890 MHz to 915 MHz, N(m) to N(f), 50 $\Omega$                     |
| 1030-106-R  | 1710 MHz to 1790 MHz, N(m) to N(f), 50 $\Omega$                   |
| 1030-107-R  | 1910 MHz to 1990 MHz, N(m) to N(f), 50 $\Omega$                   |
| 1030-149-R  | High Pass, 150 MHz, N(m) to N(f), 50 $\Omega$                     |
| 1030-150-R  | High Pass, 400 MHz, N(m) to N(f), 50 $\Omega$                     |
| 1030-151-R  | High Pass, 700 MHz, N(m) to N(f), 50 $\Omega$                     |
| 1030-152-R  | Low Pass, 200 MHz, N(m) to N(f), 50 $\Omega$                      |
| 1030-153-R  | Low Pass, 550 MHz, N(m) to N(f), 50 $\Omega$                      |
| 1030-155-R  | 2500 MHz to 2700 MHz, N(m) to N(f), 50 $\Omega$                   |
| 1030-178-R  | 1920 MHz to 1980 MHz, N(m) to N(f), 50 $\Omega$                   |
| 1030-179-R  | 777 MHz to 798 MHz, N(m) to N(f), 50 $\Omega$                     |
| 1030-180-R  | 2500 MHz to 2570 MHz, N(m) to N(f), 50 $\Omega$                   |
| 2000-1684-R | 791 MHz to 821 MHz, N(m) to N(f), 50 $\Omega$                     |
| 2000-1734-R | Bandpass Filter, 699 MHz to 715 MHz, N(m) and N(f), 50 $\Omega$   |
| 2000-1735-R | Bandpass Filter, 776 MHz to 788 MHz, N(m) and N(f), 50 $\Omega$   |
| 2000-1736-R | Bandpass Filter, 815 MHz to 850 MHz, N(m) and N(f), 50 $\Omega$   |
| 2000-1737-R | Bandpass Filter, 1711 MHz to 1756 MHz, N(m) and N(f), 50 $\Omega$ |
| 2000-1738-R | Bandpass Filter, 1850 MHz to 1910 MHz, N(m) and N(f), 50 $\Omega$ |
| 2000-1739-R | Bandpass Filter, 880 MHz to 915 MHz, N(m) and N(f), 50 $\Omega$   |
| 2000-1740-R | Bandpass Filter, 1710 MHz to 1785 MHz, N(m) and N(f), 50 $\Omega$ |
| 2000-1741-R | Bandpass Filter, 1920 MHz to 1980 MHz, N(m) and N(f), 50 $\Omega$ |
| 2000-1742-R | Bandpass Filter, 832 MHz to 862 MHz, N(m) and N(f), 50 $\Omega$   |
| 2000-1743-R | Bandpass Filter, 2500 MHz to 2570 MHz, N(m) and N(f), 50 $\Omega$ |
| 2000-1799-R | Bandpass Filter, 2305 MHz to 2320 MHz, N(m) and N(f), 50 $\Omega$ |
| 2000-1911-R | Bandpass Filter, 703 MHz to 748 MHz, N(m) and N(f), 50 $\Omega$   |
| 2000-1912-R | Bandpass Filter, 788 MHz to 798 MHz, N(m) and N(f), 50 $\Omega$   |
| 2000-1925-R | Bandpass Filter, 663 MHz to 698 MHz, N(m) and N(f), 50 $\Omega$   |
| 2000-1926-R | Bandpass Filter, 776 MHz to 806 MHz, N(m) and N(f), 50 $\Omega$   |

**Attenuators**

| Part Number | Description                                                |
|-------------|------------------------------------------------------------|
| 3-1010-122  | 20 dB, 5 W, DC to 12.4 GHz, N(m) to N(f)                   |
| 42N50-20    | 20 dB, 5 W, DC to 18 GHz, N(m) to N(f)                     |
| 42N50A-30   | 30 dB, 50 W, DC to 18 GHz, N(m) to N(f)                    |
| 3-1010-123  | 30 dB, 50 W, DC to 8.5 GHz, N(m) to N(f)                   |
| 1010-127-R  | 30 dB, 150 W, DC to 3 GHz, N(m) to N(f)                    |
| 3-1010-124  | 40 dB, 100 W, DC to 8.5 GHz, N(m) to N(f), Uni-directional |
| 1010-121-R  | 40 dB, 100 W, DC to 18 GHz, N(m) to N(f), Uni-directional  |
| 1010-128-R  | 40 dB, 150 W, DC to 3 GHz, N(m) to N(f)                    |

**Phase-Stable Test Port Cables, Armored w/Reinforced Grip** (recommended for cable & antenna line sweep applications)

| Part Number    | Description                                          |
|----------------|------------------------------------------------------|
| 15RNFN50-1.5-R | 1.5 m, DC to 6 GHz, N(m) to N(f), 50 $\Omega$        |
| 15RDFN50-1.5-R | 1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 $\Omega$ |
| 15RDN50-1.5-R  | 1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 $\Omega$ |
| 15RNFN50-3.0-R | 3.0 m, DC to 6 GHz, N(m) to N(f), 50 $\Omega$        |
| 15RDFN50-3.0-R | 3.0 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 $\Omega$ |
| 15RDN50-3.0-R  | 3.0 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 $\Omega$ |

**Interchangeable Adaptor Phase Stable Test Port Cables, Armored w/Reinforced Grip** (recommended for cable and antenna line sweep applications. It uses the same ruggedized grip as the Reinforced grip series cables. Now you can also change the adaptor interface on the grip to four different connector types.)

| Part Number   | Description                                                           |
|---------------|-----------------------------------------------------------------------|
| 15RCN50-1.5-R | 1.5 m, DC to 6 GHz, N(m), N(f), 7/16 DIN(m), 7/16 DIN(f), 50 $\Omega$ |
| 15RCN50-3.0-R | 3.0 m, DC to 6 GHz, N(m), N(f), 7/16 DIN(m), 7/16 DIN(f), 50 $\Omega$ |

**Phase-Stable Test Port Cables, Armored** (recommended for use with tightly spaced connectors and other general purpose applications)

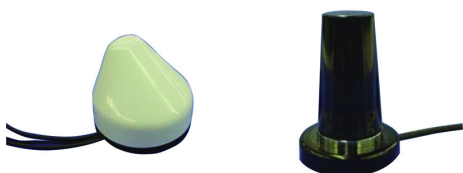
| Part Number   | Description                                                                   |
|---------------|-------------------------------------------------------------------------------|
| 15NNF50-1.5C  | 1.5 m, DC to 6 GHz, N(m) to N(f), 50 $\Omega$                                 |
| 15NN50-1.5C   | 1.5 m, DC to 6 GHz, N(m) to N(m), 50 $\Omega$                                 |
| 15NDF50-1.5C  | 1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(f), 50 $\Omega$                          |
| 15ND50-1.5C   | 1.5 m, DC to 6 GHz, N(m) to 7/16 DIN(m), 50 $\Omega$                          |
| 15NNF50-3.0C  | 3.0 m, DC to 6 GHz, N(m) to N(f), 50 $\Omega$                                 |
| 15NN50-3.0C   | 3.0 m, DC to 6 GHz, N(m) to N(m), 50 $\Omega$                                 |
| 15NNF50-5.0C  | 5.0 m, DC to 6 GHz, N(m) to N(f), 50 $\Omega$                                 |
| 15NN50-5.0C   | 5.0 m, DC to 6 GHz, N(m) to N(m), 50 $\Omega$                                 |
| 15N43M50-1.5C | Test Port Extension Cable, Armored, 1.5 meters, DC to 6GHz, N(m) to 4.3-10(m) |
| 15N43F50-1.5C | Test Port Extension Cable, Armored, 1.5 meter, DC to 6GHz, N(m) to 4.3-10(f)  |
| 15N43M50-3.0C | Test Port Extension Cable, Armored, 3 meters, DC to 6 GHz, N(m) to 4.3-10(m)  |
| 15N43F50-3.0C | Test Port Extension Cable, Armored, 3 meters, DC to 6 GHz, N(m) to 4.3-10(f)  |

**GPS Antennas (active)****Part Number Description**

|             |                                                                         |
|-------------|-------------------------------------------------------------------------|
| 2000-1528-R | Magnet Mount, SMA(m) with 5 m (16.4 ft) cable, requires 5 VDC           |
| 2000-1652-R | Magnet Mount, SMA(m) with 0.3 m (1 ft) cable, requires 3.3 VDC or 5 VDC |
| 2000-1760-R | Miniature Antenna, SMA(m), requires 2.5 VDC to 3.7 VDC                  |

**Directional Antennas****Part Number Description**

|             |                                                                                  |
|-------------|----------------------------------------------------------------------------------|
| 2000-1411-R | 824 MHz to 896 MHz, N(f), 12.3 dBi, Yagi                                         |
| 2000-1412-R | 885 MHz to 975 MHz, N(f), 12.6 dBi, Yagi                                         |
| 2000-1413-R | 1710 MHz to 1880 MHz, N(f), 12.3 dBi, Yagi                                       |
| 2000-1414-R | 1850 MHz to 1990 MHz, N(f), 11.4 dBi, Yagi                                       |
| 2000-1415-R | 2400 MHz to 2500 MHz, N(f), 14.1 dBi, Yagi                                       |
| 2000-1416-R | 1920 MHz to 2170 MHz, N(f), 14.3 dBi, Yagi                                       |
| 2000-1659-R | 698 MHz to 787 MHz, N(f), 10.1 dBi, Yagi                                         |
| 2000-1660-R | 1425 MHz to 1535 MHz, N(f), 14.3 dBi, Yagi                                       |
| 2000-1715-R | Directional Antenna, 698 MHz to 2500 MHz, N(f), gain of 2 dBi to 10 dBi, typical |
| 2000-1726-R | Antenna, 2500 MHz to 2700 MHz, N(f), 14.1 dBi, Yagi                              |
| 2000-1747-R | Antenna, Log Periodic, 300 MHz to 7000 MHz, N(f), 5.1 dBi, typical               |
| 2000-1748-R | Antenna, Log Periodic, 1 GHz to 18 GHz, N(f), 6 dBi, typical                     |
| 2000-1777-R | Portable Directional Antenna, 9 kHz to 20 MHz, N(f)                              |
| 2000-1778-R | Portable Directional Antenna, 20 MHz to 200 MHz, N(f)                            |
| 2000-1779-R | Portable Directional Antenna, 200 MHz to 500 MHz, N(f)                           |
| 2000-1812-R | Portable Yagi Antenna, 450 MHz to 512 MHz, N(f), 7.1 dBi                         |
| 2000-1825-R | Portable Yagi Antenna, 380 MHz to 430 MHz, N(f), 7.1 dBi                         |

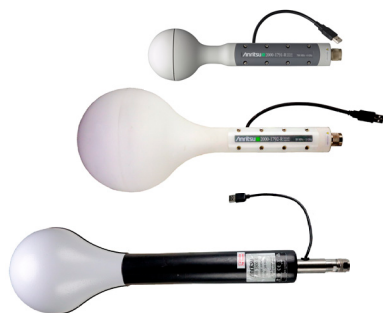
**Mag Mount and Broadband Antennas****Part Number Description**

|             |                                                                                                                                                                                                                                                         |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2000-1616-R | 20 MHz to 21000 MHz, N(f), 50 $\Omega$                                                                                                                                                                                                                  |
| 2000-1645-R | 694 MHz to 894 MHz 3 dBi peak gain,<br>1700 MHz to 2700 MHz 3 dBi peak gain, N(m), 50 $\Omega$ , 10 ft                                                                                                                                                  |
| 2000-1646-R | 750 MHz to 1250 MHz 3 dBi peak gain,<br>1650 MHz to 2700 MHz 5 dBi peak gain                                                                                                                                                                            |
| 2000-1647-R | Cable 1: 698 MHz to 1200 MHz, 2 dBi peak gain,<br>1700 MHz to 2700 MHz, 5 dBi peak gain, N(m), 50 $\Omega$ , 10 ft<br>Cable 2: 3000 MHz to 6000 MHz, 5 dBi peak gain, N(m), 50 $\Omega$ , 10 ft<br>Cable 3: GPS 26 dB gain, SMA(m), 50 $\Omega$ , 10 ft |
| 2000-1946-R | Cable 1: 617 MHz to 960 MHz, 3 dBi peak gain,<br>1710 MHz to 3700 MHz, 4 dBi peak gain, N(m), 50 $\Omega$ , 10 ft<br>Cable 2: 3000 MHz to 6000 MHz, 5 dBi peak gain, N(m), 50 $\Omega$ , 10 ft<br>Cable 3: GPS 26 dB gain, SMA(m), 50 $\Omega$ , 10 ft  |
| 2000-1648-R | 1700 MHz to 6000 MHz 3 dBi peak gain, N(m), 50 $\Omega$ , 10 ft                                                                                                                                                                                         |

**Portable Antennas****Part Number Description**

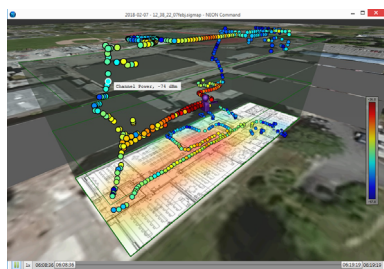
|             |                                                                                                                             |
|-------------|-----------------------------------------------------------------------------------------------------------------------------|
| 2000-1200-R | 806 MHz to 866 MHz, SMA(m), 50 $\Omega$                                                                                     |
| 2000-1473-R | 870 MHz to 960 MHz, SMA(m), 50 $\Omega$                                                                                     |
| 2000-1035-R | 896 MHz to 941 MHz, SMA(m), 50 $\Omega$ (1/2 wave)                                                                          |
| 2000-1030-R | 1710 MHz to 1880 MHz, SMA(m), 50 $\Omega$ (1/2 wave)                                                                        |
| 2000-1474-R | 1710 MHz to 1880 MHz with knuckle elbow (1/2 wave)                                                                          |
| 2000-1031-R | 1850 MHz to 1990 MHz, SMA(m), 50 $\Omega$ (1/2 wave)                                                                        |
| 2000-1475-R | 1920 MHz to 1980 MHz and 2110 MHz to 2170 MHz, SMA(m), 50 $\Omega$                                                          |
| 2000-1032-R | 2400 MHz to 2500 MHz, SMA(m), 50 $\Omega$ (1/2 wave)                                                                        |
| 2000-1361-R | 2400 MHz to 2500 MHz, 5000 MHz to 6000 MHz, SMA(m), 50 $\Omega$                                                             |
| 2000-1636-R | Antenna Kit (Consists of: 2000-1030-R, 2000-1031-R, 2000-1032-R, 2000-1200-R, 2000-1035-R, 2000-1361-R, and carrying pouch) |
| 2000-1751-R | Dipole, 698-960/1710-2170/2500-2700 MHz, SMA(m), 2 dBi, typical, 50 $\Omega$                                                |

## Isotropic Antennas

**Part Number**   **Description**

|             |                                              |
|-------------|----------------------------------------------|
| 2000-1791-R | Isotropic Antenna, 700 MHz to 6000 MHz, N(m) |
| 2000-1792-R | Isotropic Antenna, 30 MHz to 3000 MHz, N(m)  |
| 2000-1800-R | Isotropic Antenna, 9 kHz to 300 MHz, N(m)    |

## NEON® MA8100A Signal Mapper

**Model Number**   **Description**

|             |                                                                                                                                                                                                           |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MA8100A-000 | NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 1 year NEON Software License with 1 year of maintenance and support and 1 year of Cloud Service (PN: 2300-607).                   |
| MA8100A-001 | NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 1 year NEON Software License with 1 year of maintenance and support and 1 year of Cloud Service (PN: 2300-574).                   |
| MA8100A-003 | NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 3 year NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service (PN: 2300-575).                 |
| MA8100A-005 | NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes 5 year NEON Software License with 5 years of maintenance and support and 5 years of Cloud Service (PN: 2300-576).                 |
| MA8100A-100 | NEON Signal Mapper with Anritsu Integration and Tracking Unit. Includes Perpetual NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service (PN: 2300-606).              |
| 2300-606    | Perpetual NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service. Part number can also be used to order a perpetual license after a limited term license has expired. |
| 2300-612    | Renewal of 1 year NEON Software License with 1 year of maintenance and support and 1 year of Cloud Service.                                                                                               |
| 2300-613    | Renewal of 3 year NEON Software License with 3 years of maintenance and support and 3 years of Cloud Service.                                                                                             |
| 2300-614    | Renewal of 5 year NEON Software License with 5 years of maintenance and support and 5 years of Cloud Service.                                                                                             |
| 2000-1852-R | NEON Tracking Unit (includes USB cable and belt clip, Worldwide version)                                                                                                                                  |
| 2000-2015-R | NEON Tracking Unit (includes USB cable and belt clip, Japan version)                                                                                                                                      |
| 2000-1853-R | Belt clip (for NEON Tracking Unit)                                                                                                                                                                        |

## Training at Anritsu

Anritsu has designed courses to help you stay up to date with technologies important to your job. For available training courses, visit: [www.anritsu.com/training](http://www.anritsu.com/training).



### • United States

**Anritsu Americas Sales Company**  
450 Century Parkway, Suite 190  
Allen, TX 75013, U.S.A.  
Phone: +1-800-Anritsu (1-800-267-4878)

### • Canada

**Anritsu Electronics Ltd.**  
700 Silver Seven Road, Suite 120  
Kanata, Ontario K2V 1C3, Canada  
Phone: +1-613-591-2003  
Fax: +1-613-591-1006

### • Brazil

**Anritsu Eletronica Ltda.**  
Praça Amadeu Amaral, 27 - 1 Andar  
01327-010 - Bela Vista - São Paulo - SP  
Brazil  
Phone: +55-11-3283-2511  
Fax: +55-11-3288-6940

### • Mexico

**Anritsu Company, S.A. de C.V.**  
Blvd Miguel de Cervantes Saavedra #169 Piso 1,  
Col. Granada  
Mexico, Ciudad de Mexico, 11520, MEXICO  
Phone: +52-55-4169-7104

### • United Kingdom

**Anritsu EMEA Ltd.**  
200 Capability Green  
Luton, Bedfordshire, LU1 3LU, U.K.  
Phone: +44-1582-433200  
Fax: +44-1582-731303

### • France

**Anritsu S.A.**  
12 avenue du Québec, Bâtiment Iris 1- Silic 612,  
91140 Villebon-sur-Yvette, France  
Phone: +33-1-60-92-15-50  
Fax: +33-1-64-46-10-65

### • Germany

**Anritsu GmbH**  
Nemetschek Haus, Konrad-Zuse-Platz 1  
81829 München, Germany  
Phone: +49-89-442308-0  
Fax: +49-89-442308-55

### • Italy

**Anritsu S.r.l.**  
Via Elio Vittorini 129, 00144 Roma, Italy  
Phone: +39-6-509-9711  
Fax: +39-6-502-2425

List Revision Date: 20200602

### • Sweden

**Anritsu AB**  
Isafjordsgatan 32C  
164 40 Kista, Sweden  
Phone: +46-8-534-707-00

### • Finland

**Anritsu AB**  
Teknobulevardi 3-5  
FI-01530 Vantaa, Finland  
Phone: +358-20-741-8100  
Fax: +358-20-741-8111

### • Denmark

**Anritsu A/S**  
c/o Regus Winghouse, Ørestads Boulevard 73, 4th  
floor,  
2300 Copenhagen S, Denmark  
Phone: +45-7211-2200

### • Russia

**Anritsu EMEA Ltd.**  
**Representation Office in Russia**  
Tverskaya str. 16/2, bld. 1, 7th floor  
Moscow 125009, Russia  
Phone: +7-495-363-1694  
Fax: +7-495-935-8962

### • Spain

**Anritsu EMEA Ltd.**  
**Representation Office in Spain**  
Paseo de la Castellana, 141.  
Planta 5, Edificio Cuzco IV  
28046, Madrid, Spain  
Phone: +34-91-572-6761

### • United Arab Emirates

**Anritsu EMEA Ltd.**  
**Dubai Liaison Office**  
902 Aurora Tower  
P O Box: 500311 - Dubai Internet City  
Dubai, United Arab Emirates  
Phone: +971-4-3758479  
Fax: +971-4-4249036

### • India

**Anritsu India Private Limited**  
6th Floor, Indique ETA, No.38/4  
Adjacent to EMC2, Doddanekundi, Outer Ring Road  
Bengaluru 560048, India  
Phone: +91-80-6728-1300  
Fax: +91-80-6728-1301

### • Singapore

**Anritsu Pte. Ltd.**  
11 Chang Charn Road, #04-01, Shriro House  
Singapore 159640  
Phone: +65-6282-2400  
Fax: +65-6282-2533

### • P.R. China (Shanghai)

**Anritsu (China) Co., Ltd.**  
Room 2701-2705, Tower A  
New Caohejing International Business Center  
No. 391 Gui Ping Road  
Shanghai 200233, P.R. China  
Phone: +86-21-6237-0898  
Fax: +86-21-6237-0899

### • P.R. China (Hong Kong)

**Anritsu Company Ltd.**  
Unit 1006-7, 10/F.  
Greenfield Tower, Concordia Plaza  
No. 1 Science Museum Road  
Tsim Sha Tsui East, Kowloon  
Hong Kong, P.R. China  
Phone: +852-2301-4980  
Fax: +852-2301-3545

### • Japan

**Anritsu Corporation**  
8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016  
Japan  
Phone: +81-46-296-6509  
Fax: +81-46-225-8352

### • South Korea

**Anritsu Corporation, Ltd.**  
5FL, 235 Pangyojeok-ro  
Bundang-gu, Seongnam-si  
Gyeonggi-do 13494, South Korea  
Phone: +82-31-696-7750  
Fax: +82-31-696-7751

### • Australia

**Anritsu Pty. Ltd.**  
Unit 20, 21-35 Ricketts Road  
Mount Waverley, Victoria 3149, Australia  
Phone: +61-3-9558-8177  
Fax: +61-3-9558-8255

### • Taiwan

**Anritsu Company Inc.**  
7F, No. 316, Sec. 1, NeiHu Rd. Taipei 114, Taiwan  
Phone: +886-2-8751-1816  
Fax: +886-2-8751-1817