5G Radio Access

CellAdvisor 5G Solution

CellAdvisor 5G

Multifunctional solution for any radio technology (4G, and 5G) and all types of cell sites (macro-cell, small-cell, DAS, C-RAN)

- **Backhaul verification** : Ethernet transport assessment
- **Fronthaul verification** :
  - Coaxial based : return loss, VSWR, DTF, cable loss, and insertion gain-loss
  - Fiber-based : fiber-scope, OTDR
- **Interference Analysis**
  - Real time spectrum analysis with persistence display
  - RFoFiber, RFoEthernet: Spectrum and Spectrogram
  - RFoAir : Spectrum and Spectrogram (sub 6GHz and up to 40GHz)
- **Signal Analysis**
  - 4G (LTE, LTE-Advance-Pro, NB-IoT, LTE-M)
  - 5G carrier aggregation, signal modulation quality, beamforming assessment, and coverage profile for FR1 (Sub 6GHz) and FR2 (24GHz to 40GHz)

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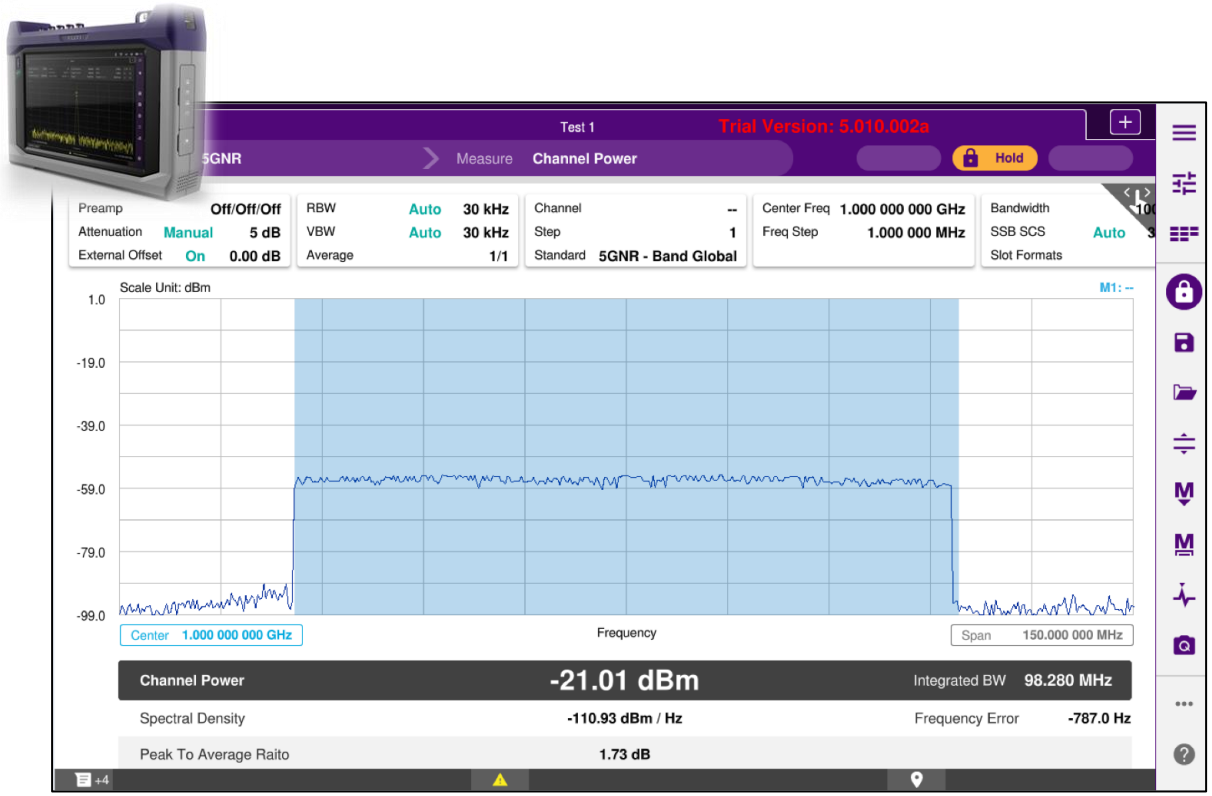
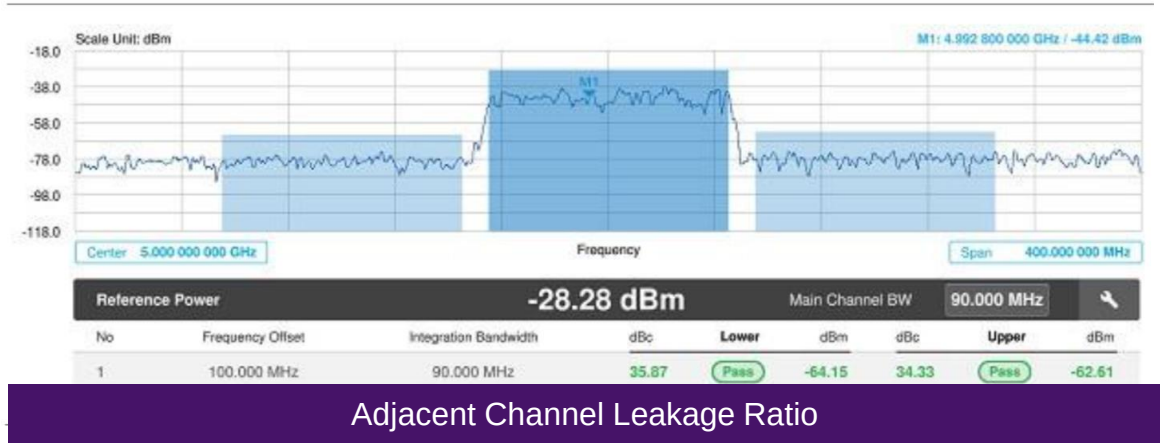
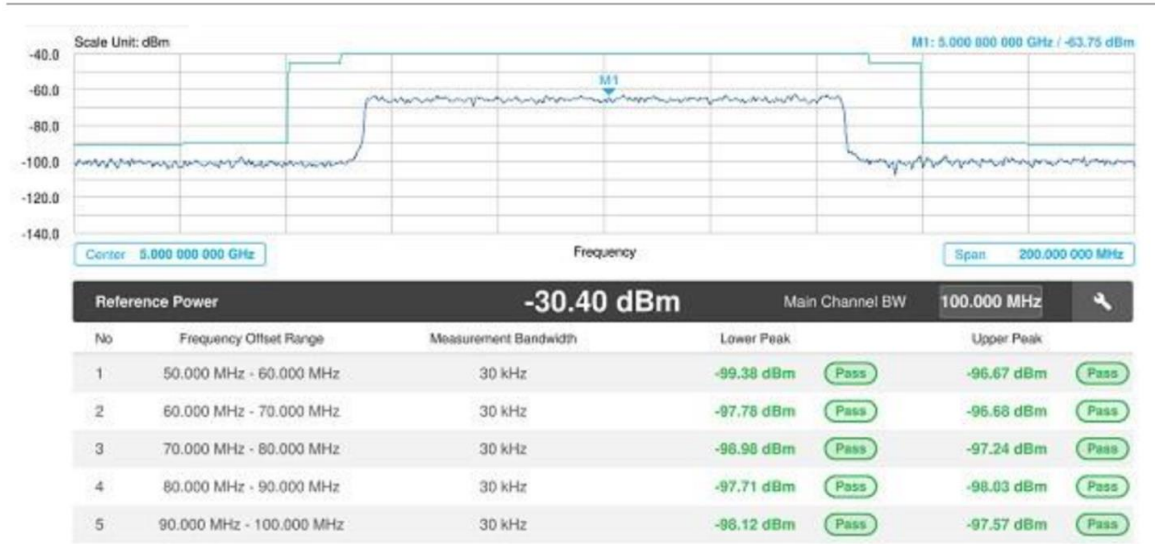
RF Characterization and Conformance Test



5G RF Characterization
Channel Power, Occupied Bandwidth, ACLR



Adjacent Channel Leakage Ratio



Spurious Emission Mask

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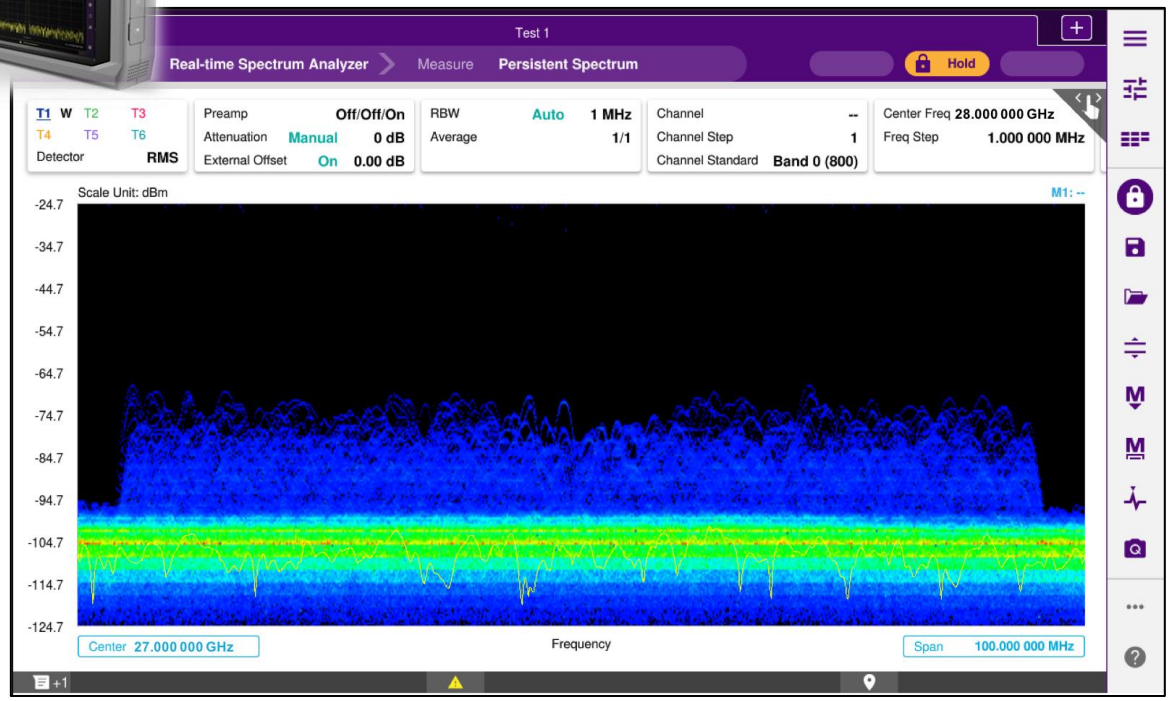
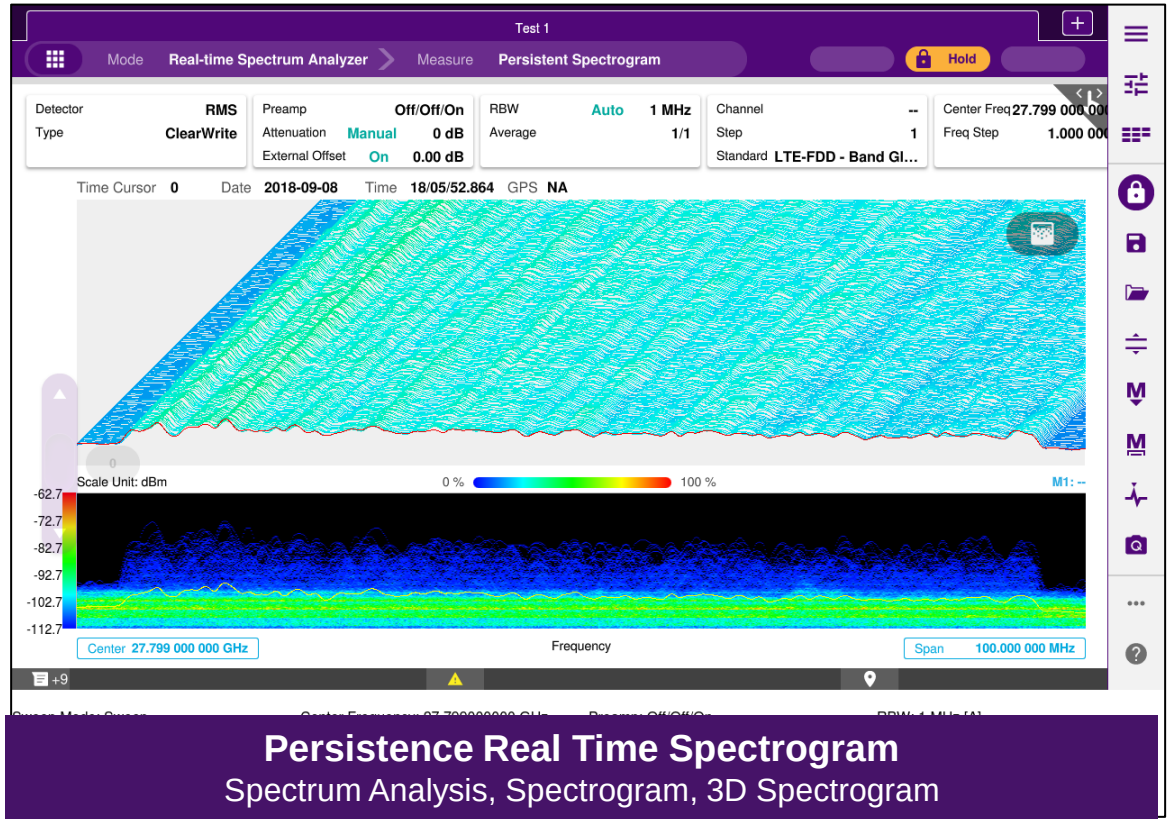
Persistence Spectrum and Spectrogram



Persistence Real Time Spectrum
Spectrum Analysis, Spectrogram, 3D Spectrogram



Persistence Real Time Spectrogram
Spectrum Analysis, Spectrogram, 3D Spectrogram

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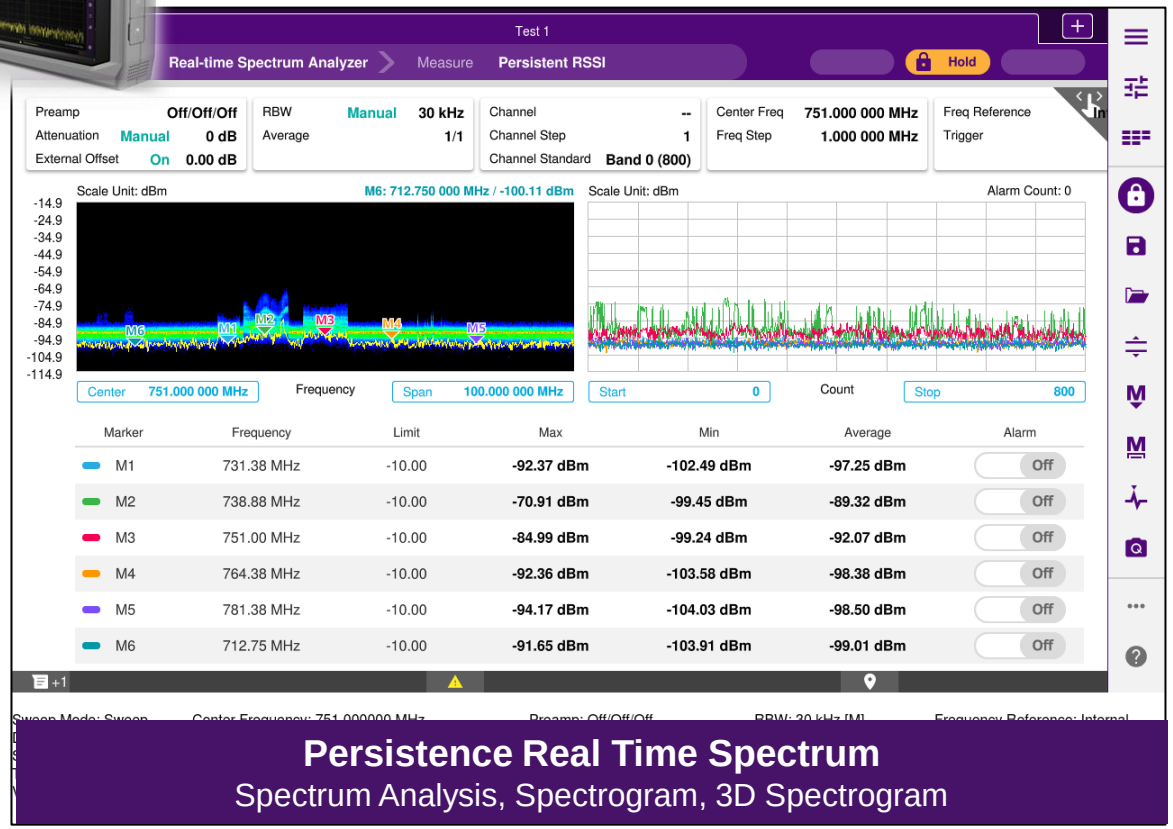
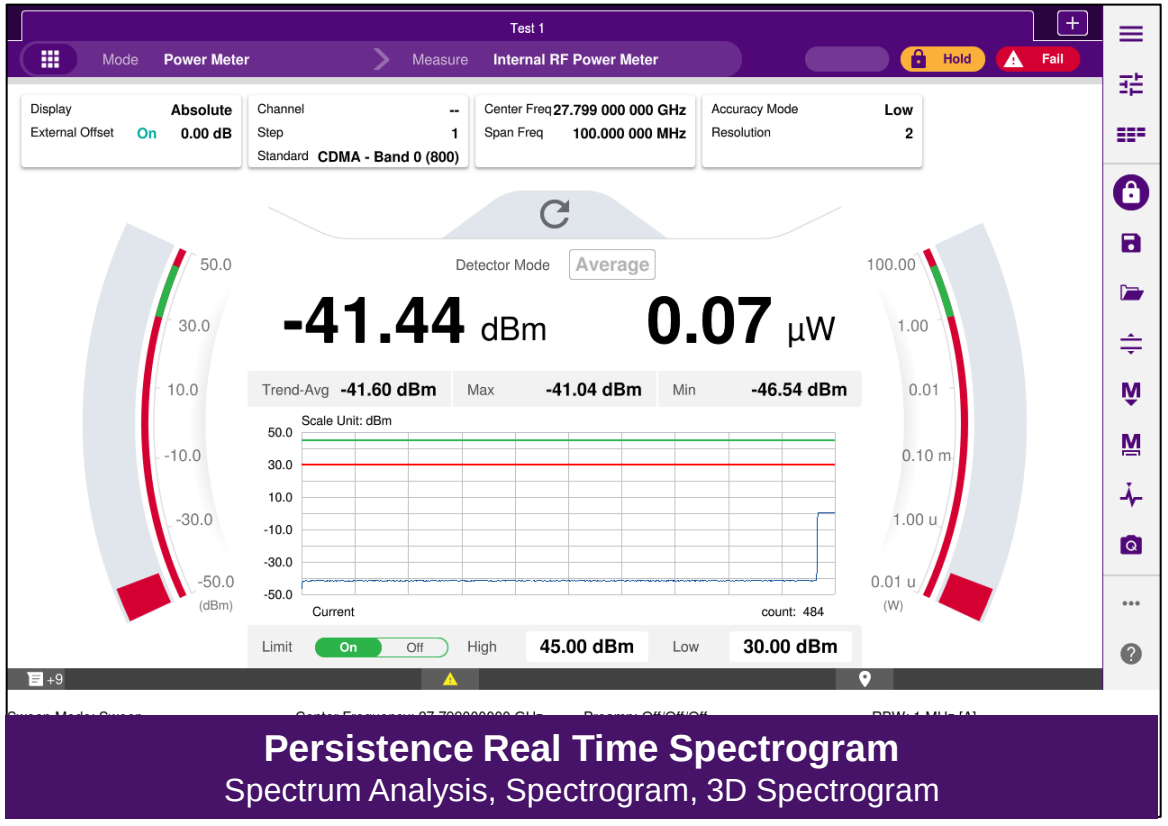
RF RSSI and Power Meter



Persistence Real Time Spectrum

Spectrum Analysis, Spectrogram, 3D Spectrogram



Persistence Real Time Spectrogram

Spectrum Analysis, Spectrogram, 3D Spectrogram

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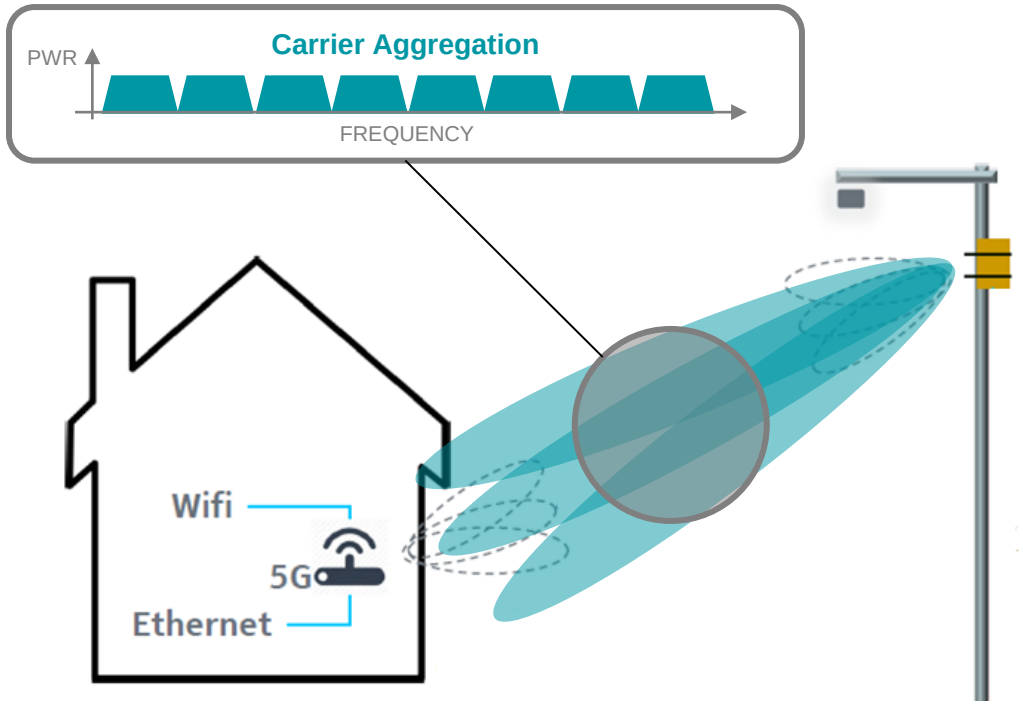
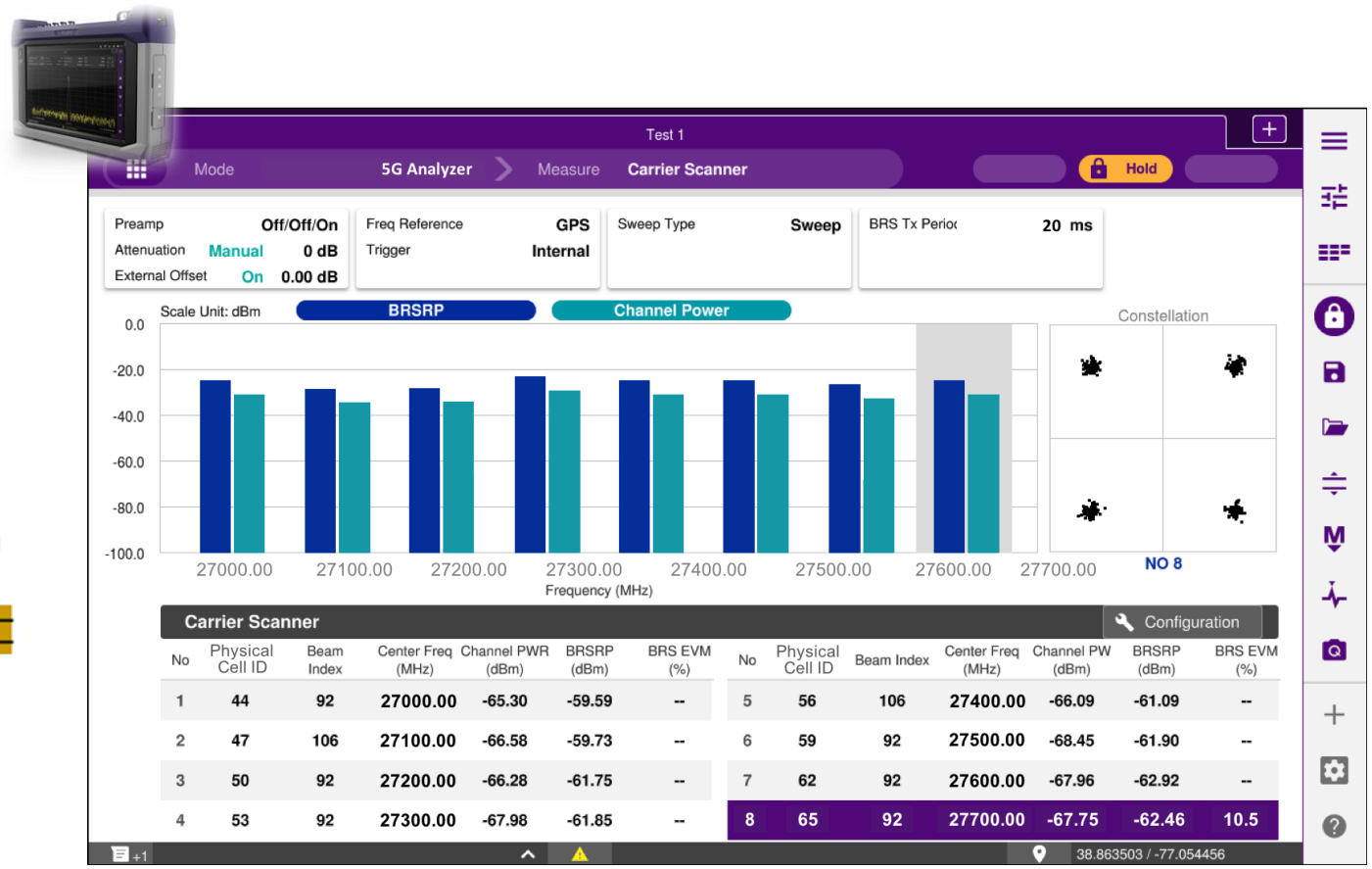
5G Carrier Aggregation (x8)

Multi-Carrier Power Balance

- Spectral impairments in mmWave
- Aggregated 100MHz carriers (x8)
- Carrier's in-band, contiguous and non-contiguous
- Radio's power performance of all carrier's





No	Physical Cell ID	Beam Index	Center Freq (MHz)	Channel PWR (dBm)	BRSRP (dBm)	BRS EVM (%)
1	44	92	27000.00	-65.30	-59.59	--
2	47	106	27100.00	-66.58	-59.73	--
3	50	92	27200.00	-66.28	-61.75	--
4	53	92	27300.00	-67.98	-61.85	--

No	Physical Cell ID	Beam Index	Center Freq (MHz)	Channel PW (dBm)	BRSRP (dBm)	BRS EVM (%)
5	56	106	27400.00	-66.09	-61.09	--
6	59	92	27500.00	-68.45	-61.90	--
7	62	92	27600.00	-67.96	-62.92	--
8	65	92	27700.00	-67.75	-62.46	10.5

5G Carrier Scanner (8 component carriers)

Physical Cell ID, Beam ID, Carrier's Frequency and Power, Beam Power and Quality

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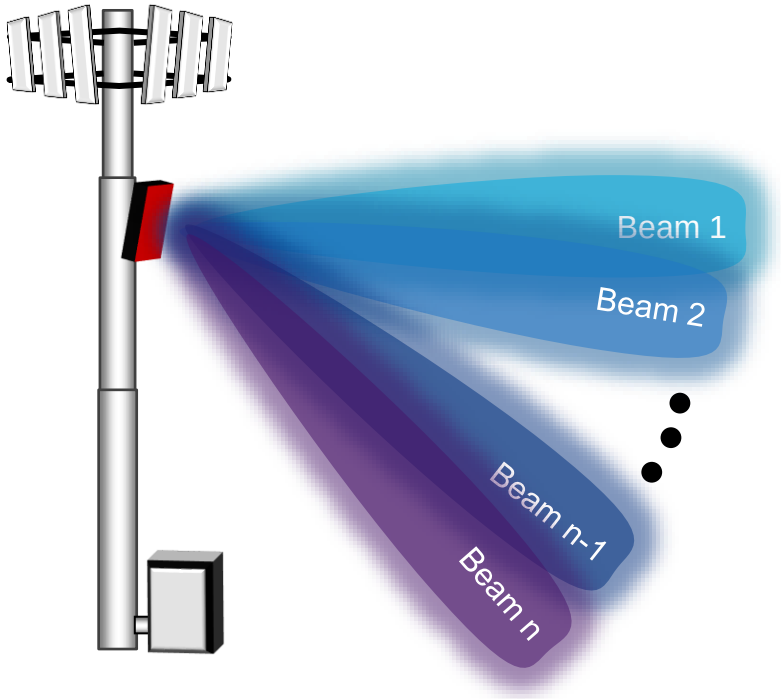
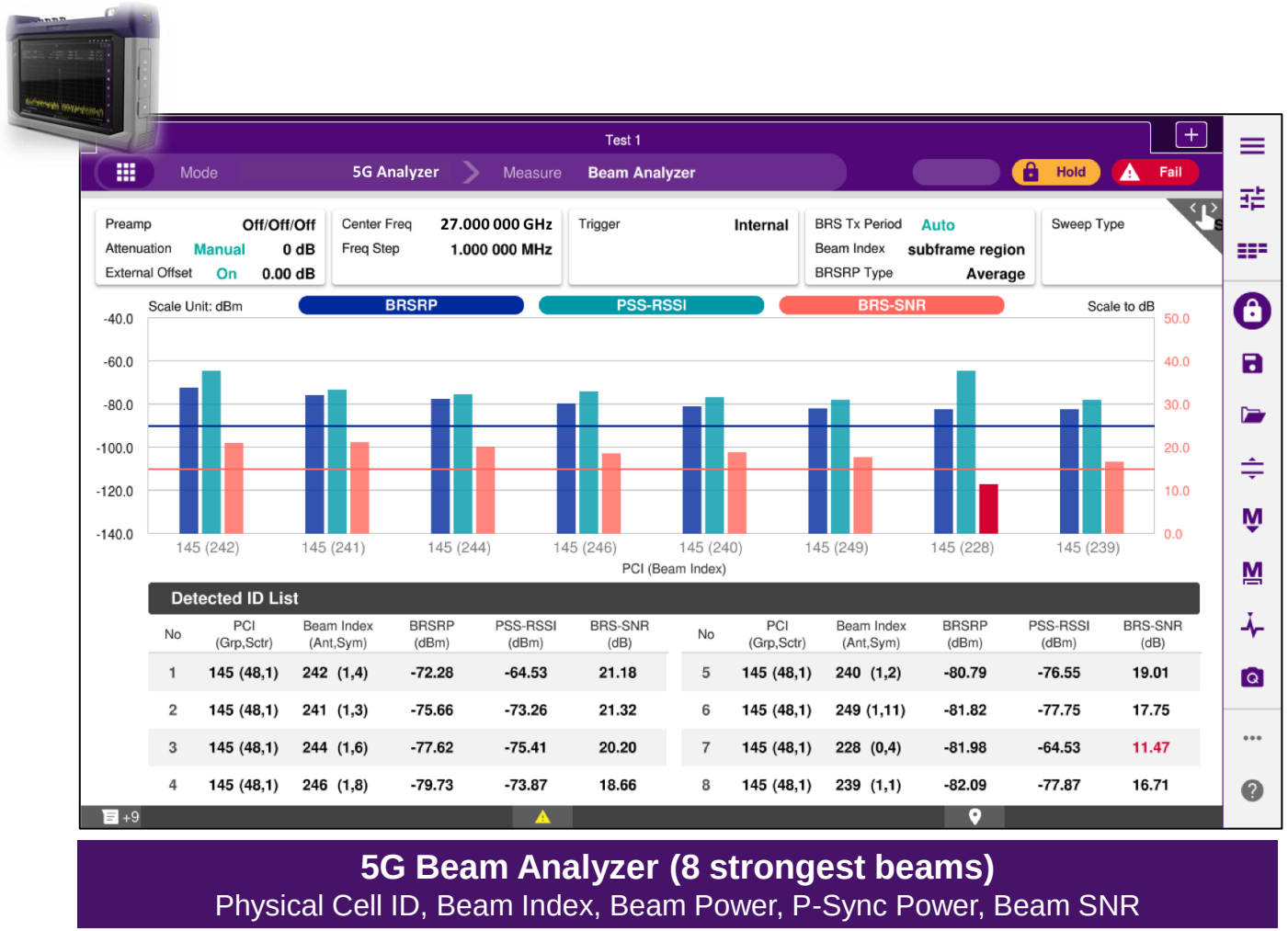
5G Beam Analysis

Beamforming Performance

- Increase cell capacity (bandwidth)
- Increase cell coverage (diversity)





5G Beam Analyzer (8 strongest beams)

Physical Cell ID, Beam Index, Beam Power, P-Sync Power, Beam SNR

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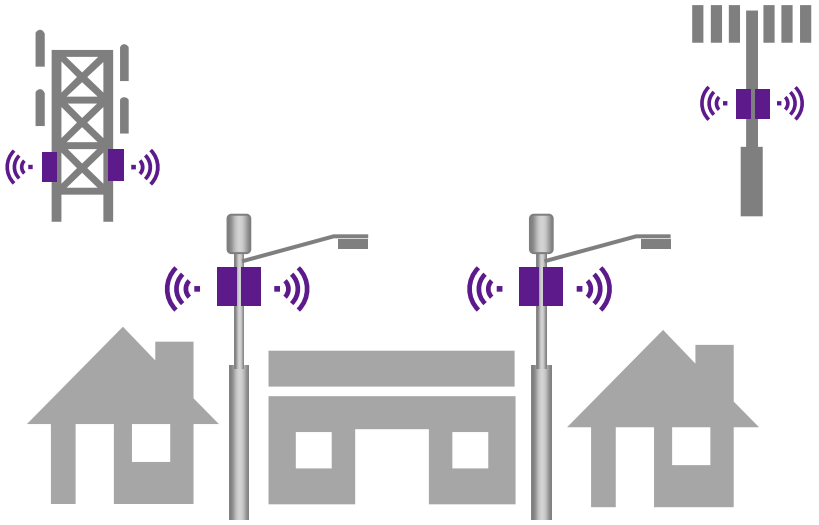
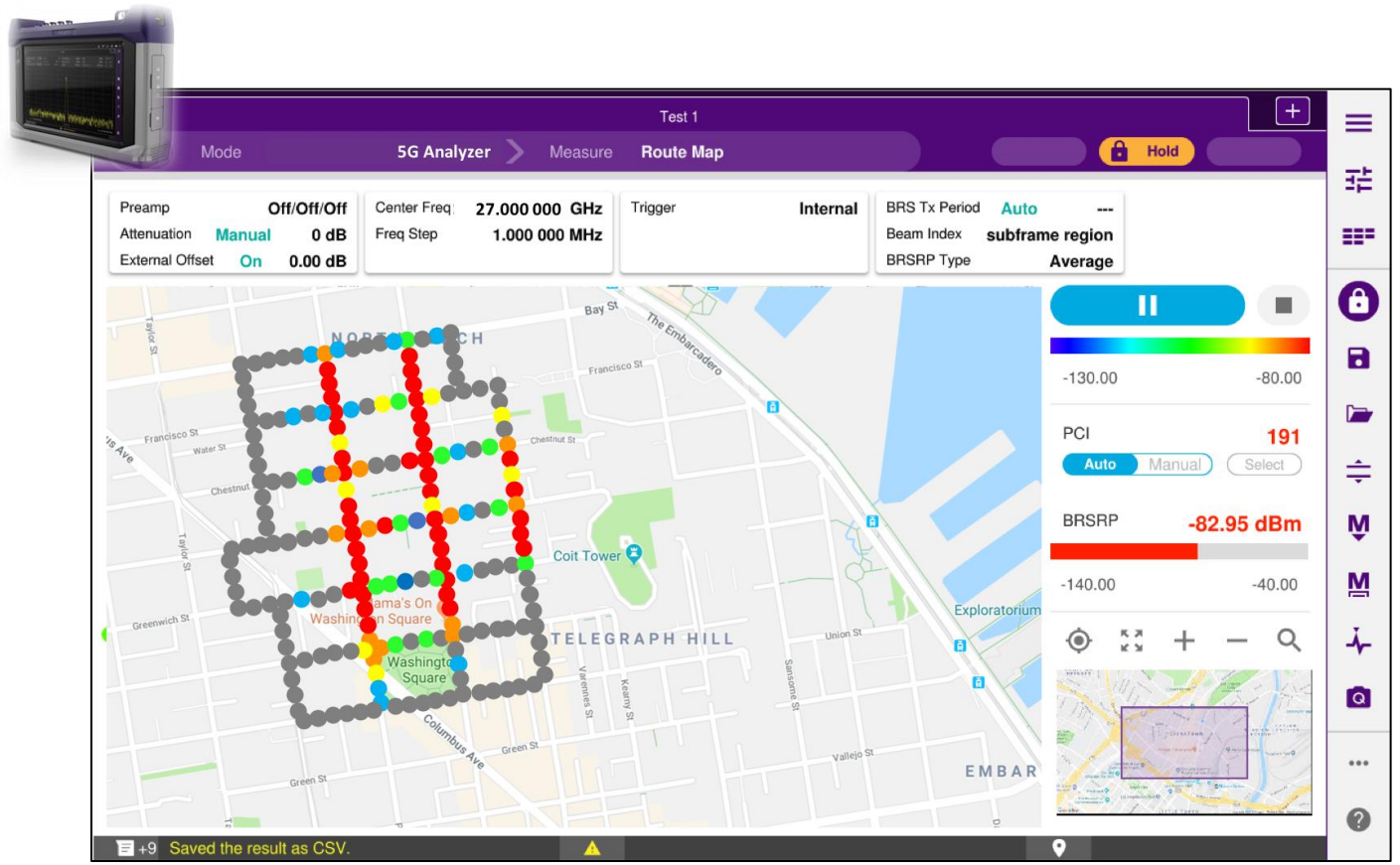
5G Route Map Coverage

5G Coverage Mapping

- Cell Coverage
- Beam Availability
- Beam Propagation

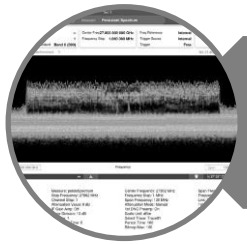




5G Route Map (Coverage)
Physical Cell ID, Beam Index, Beam Power, Beam SNR

Topics

5G Overview

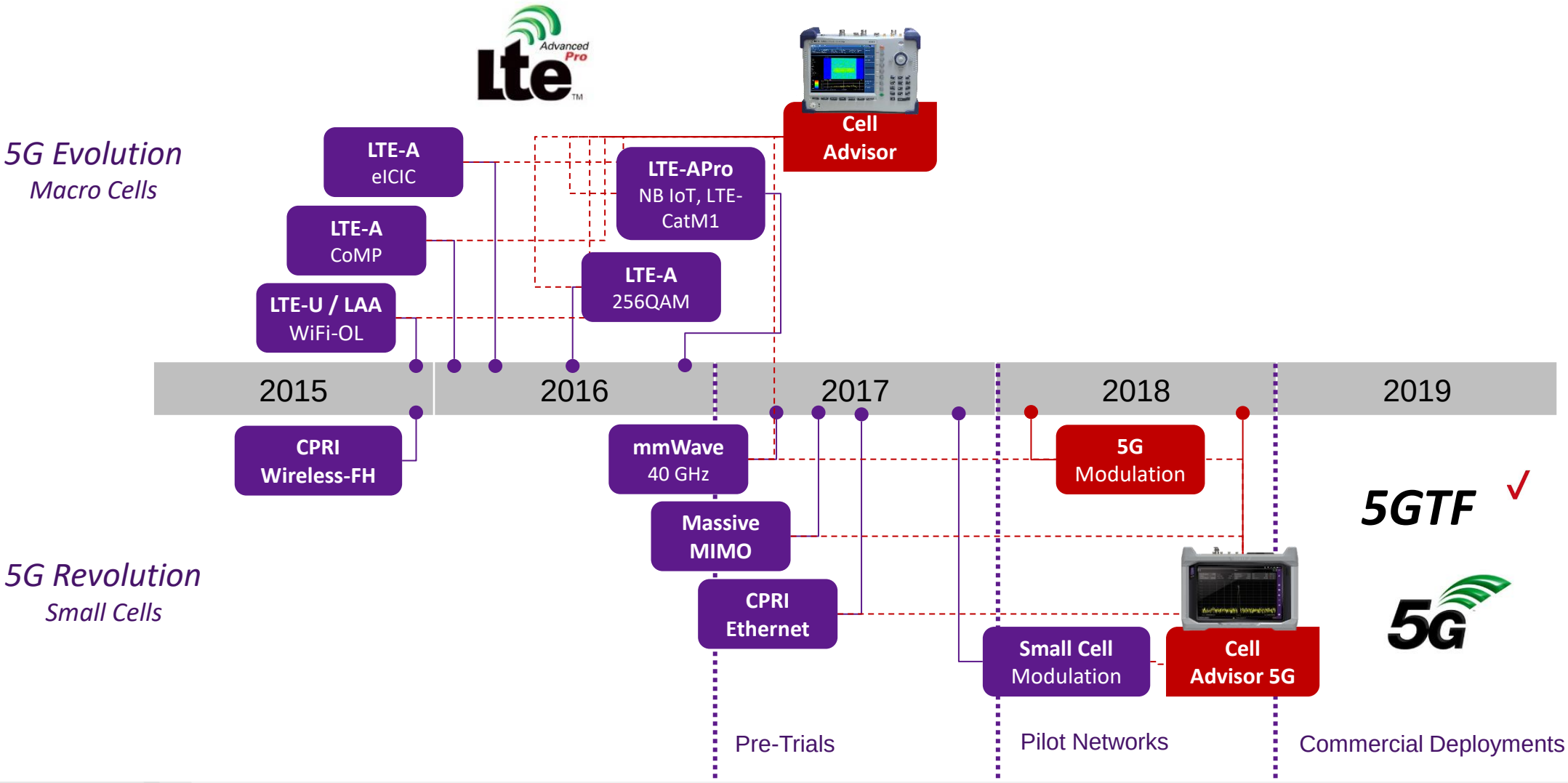


5G Metrics

Summary

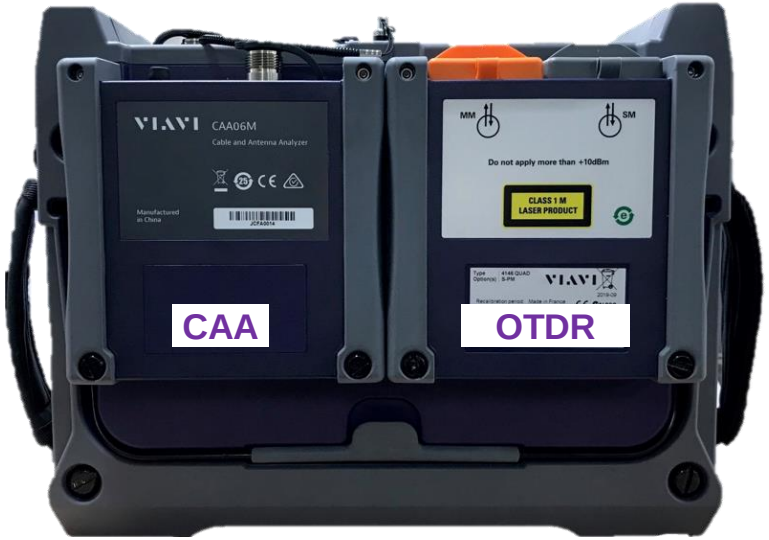
5G Radio Access

Technology Timeline



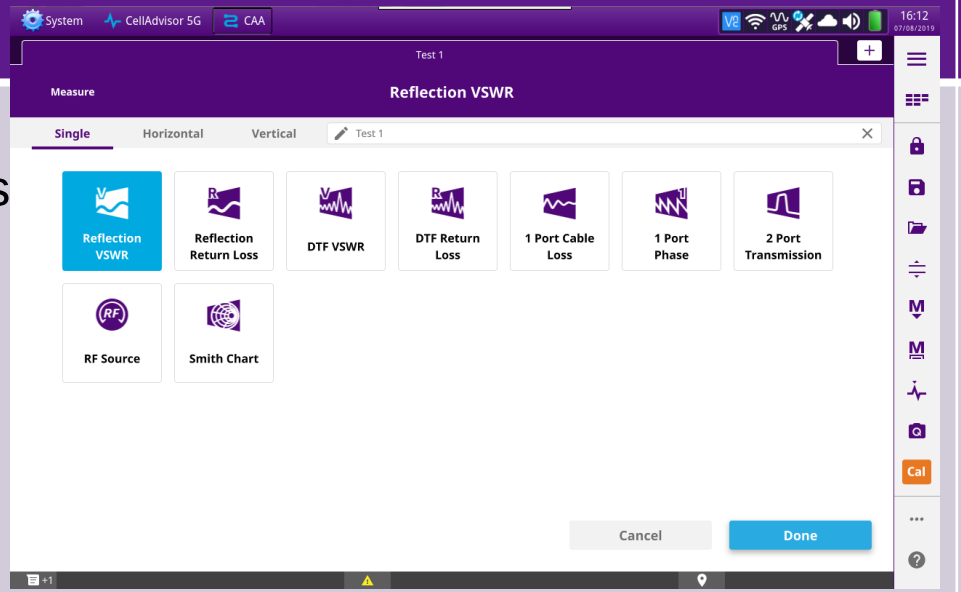
6 GHz CAA Module on CellAdvisor 5G

Automatically detected by hosting instrument



Cable and Antenna Tests Summary

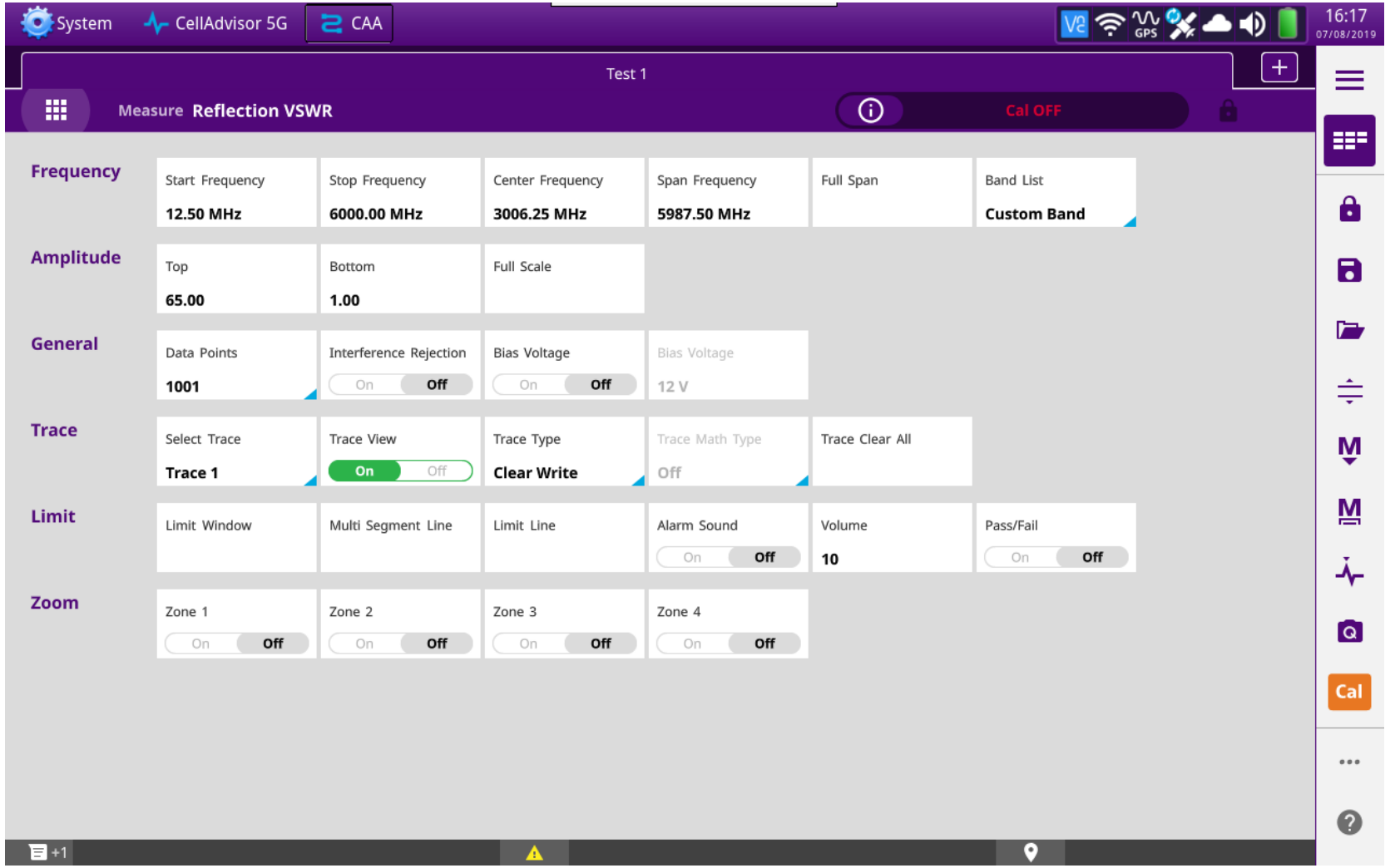
Test Purpose	Measurement Modes	SW Options
Feedline verification	- Reflection VSWR - Reflection Return Loss - DTF VSWR - DTF Return Loss - 1 Port Cable Loss - 1 Port Phase - Smith Chart	-Standard measurements that require no software options
Performance of	-2 Port Transmission (Gain/Insertion Loss)	-Optional measurem



Key Features

Features	Details
Measurement display	- Single, dual horizontal, or dual vertical display - Up to 6 independent measurement tabs
Trace	- Trace overlay, trace math - Trace zoom and up to 4 zoom zones
Alt DTF band	Available for DTF measurements only
Marker	- Up to 6 markers - 3 marker types: normal, delta, and delta pair
Peak/valley search	Peak/valley search, peak/valley between markers
Limit	Single limit line, multi segment limit line, limit window
Calibration type	- 1 Port: Standard OSL, EZ-Cal, and Quick - 2 Port: Thru
Report generation	Onboard report generation in .pdf
Cloud service	StrataSync
Post-processing	JDViewer PC application

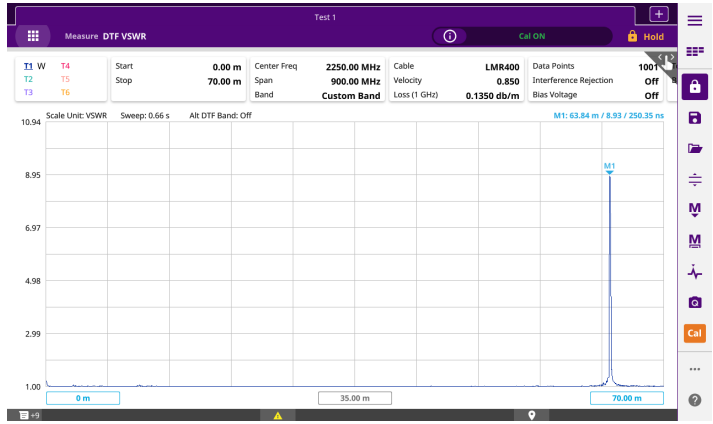
Measurement Setup and Parameters Summary



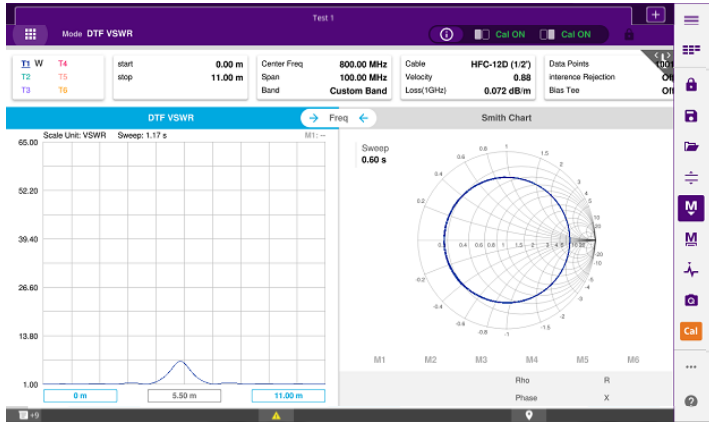
Multiple Measurement Display Choices

Horizontal Dual Display

- Frequency syncing in dual display
- Independent dual calibrations in dual display
- Independent markers and limits



Single Test Tab

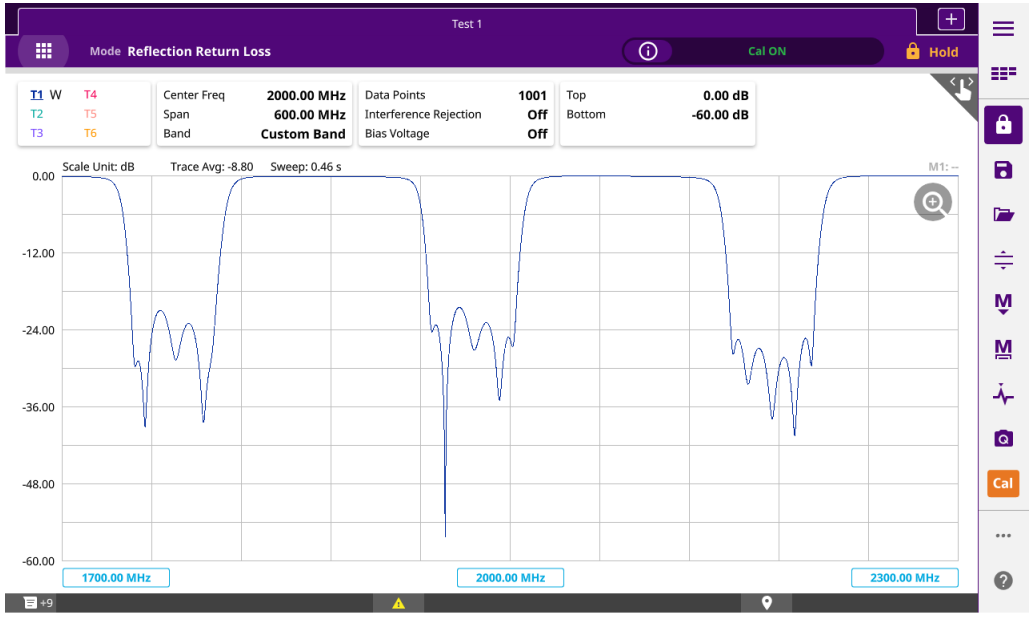


Vertical Dual Display

Up to 4 Zoom Zones

Cable and Antenna Test Screenshots

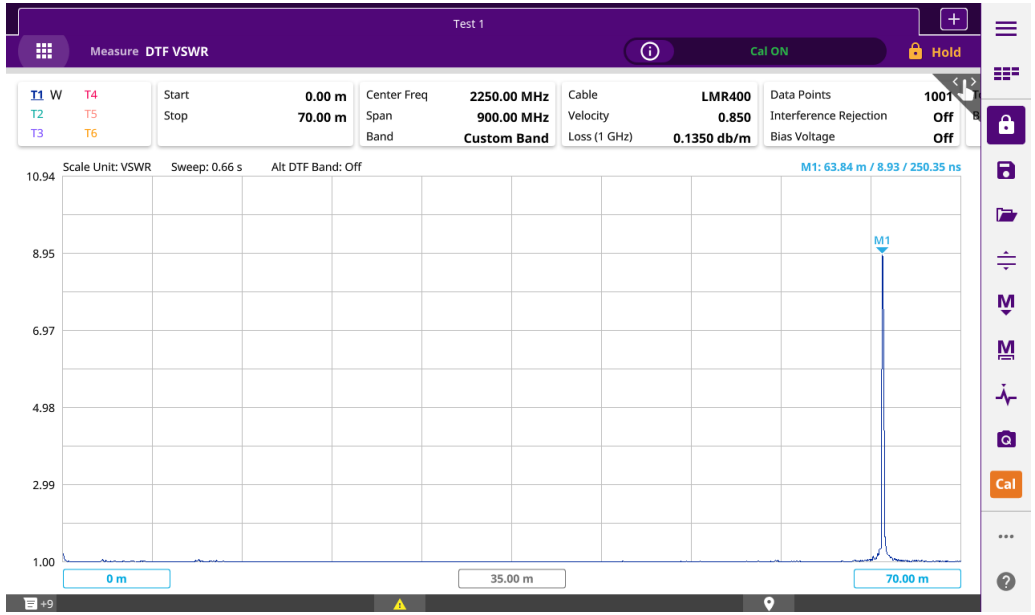
- **Reflection**: Measures the impedance performance of the cell-site transmission line across the frequency range of interest in Voltage Standing Wave Ratio (VSWR) or Return Loss VSWR



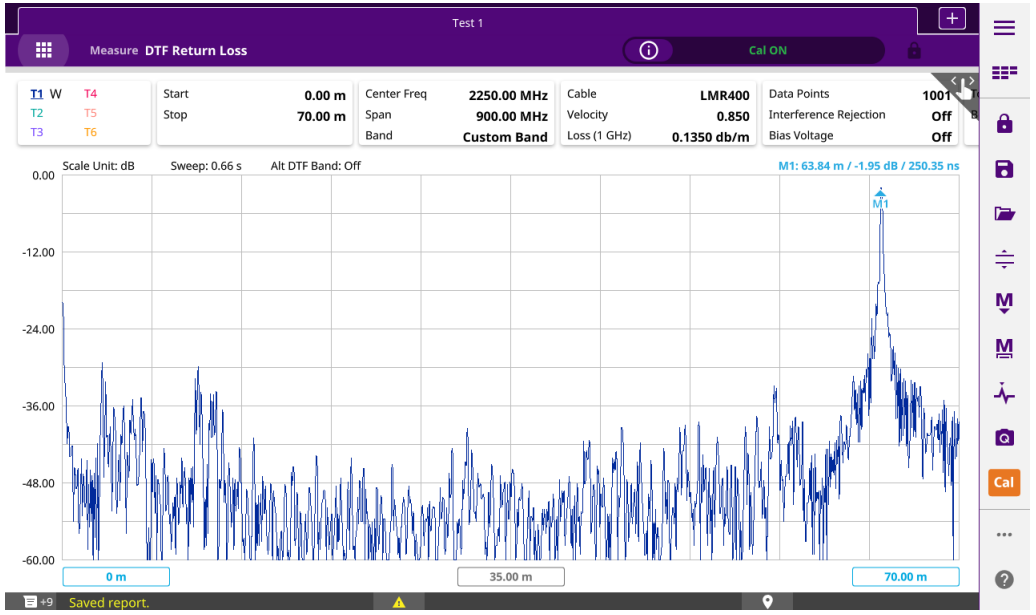
Reflection Return Loss

DTF VSWR and Return Loss

- **DTF**: Measures distance to fault locations in a transmission system, which has signal discontinuities



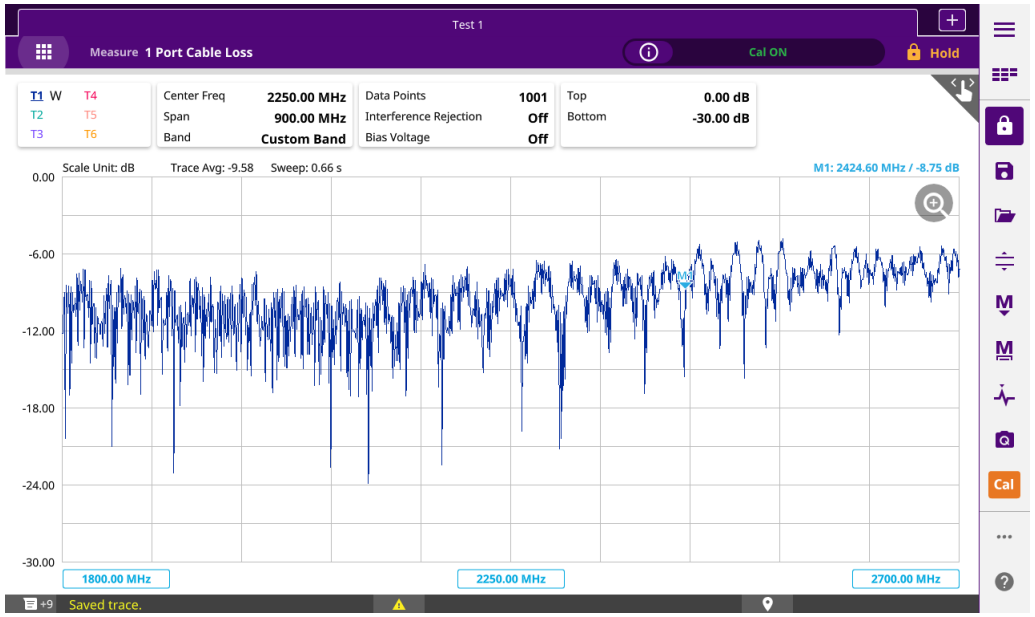
DTF VSWR



DTF Return Loss

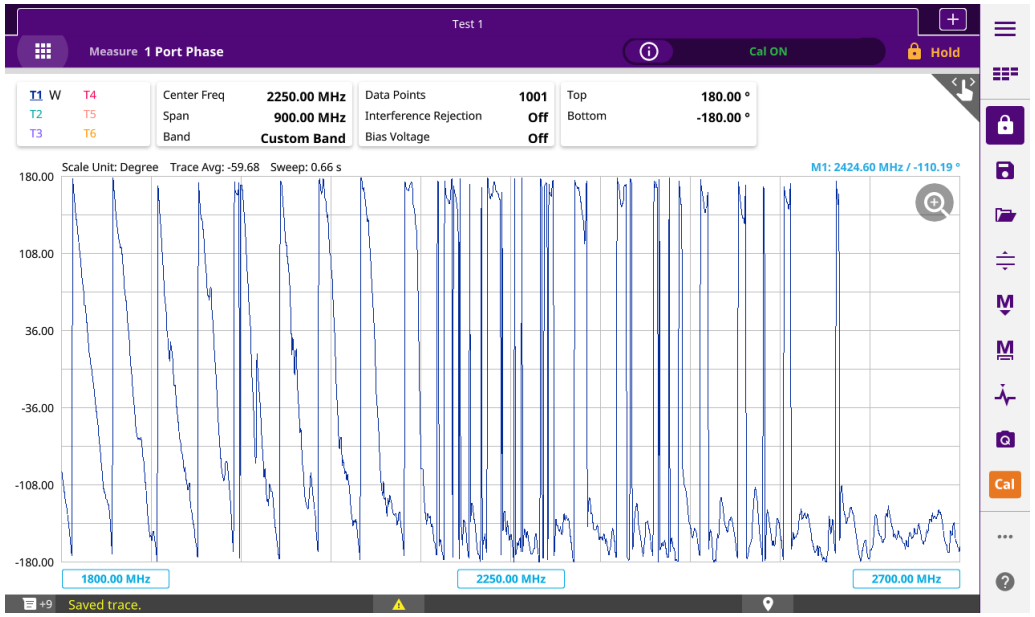
1 Port Cable Loss and Phase

- **1 Port Cable Loss**: Measures signal loss in a cable or other devices over the frequency range of interest



1 Port Cable Loss

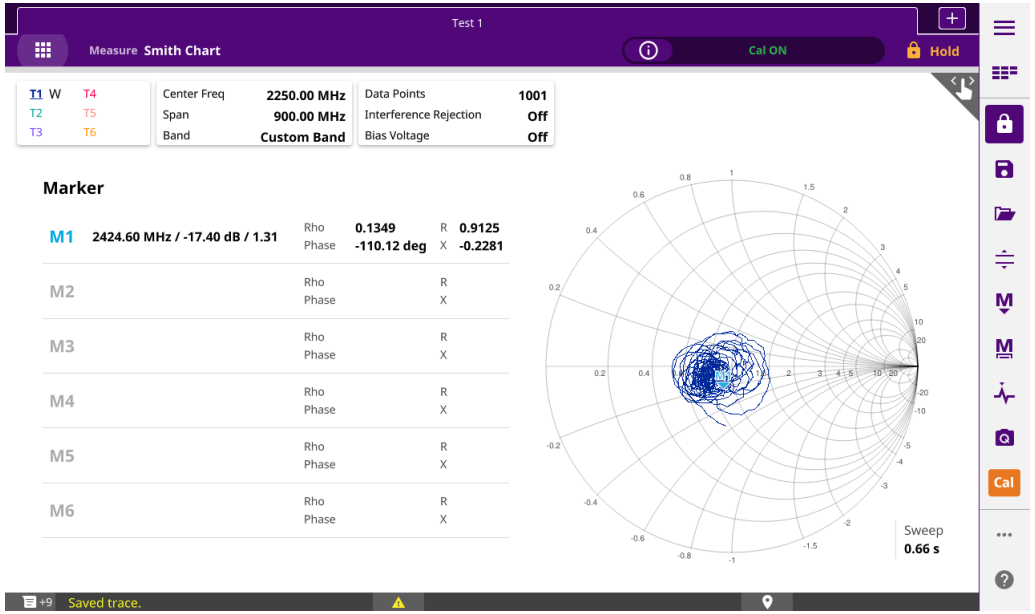
- **1 Port Phase**: Measures S_{11} phase in order to tune antennas and phase match cables



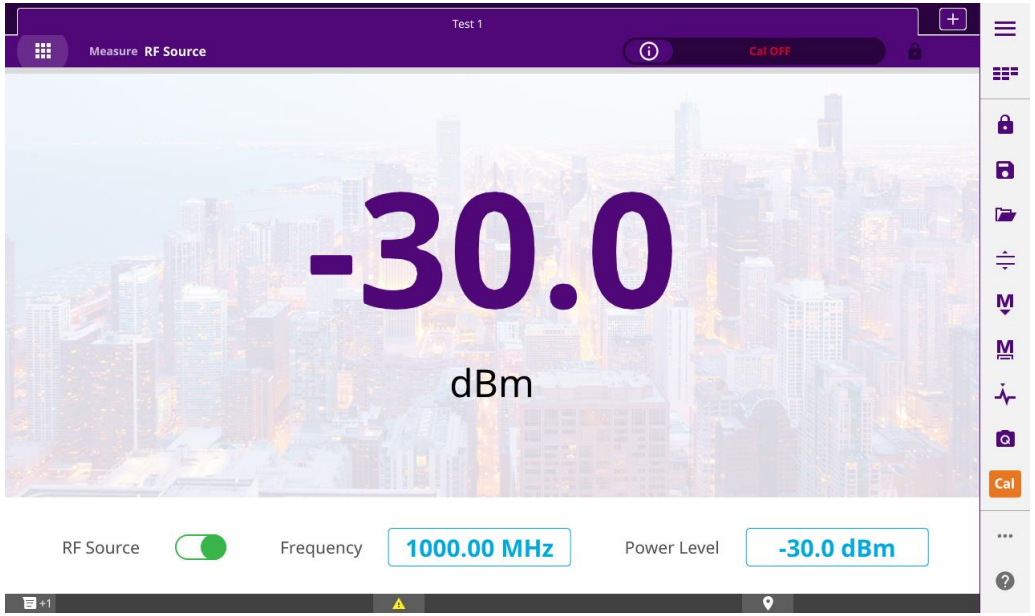
1 Port Phase

Smith Chart and RF Source

- **Smith Chart**: Is used to display impedance matching characteristics in cable and antenna system as well RF devices.
- **RF Source**: Supplies a sine wave or continuous wave source for small cell coverage or DAS testing



Smith Chart



RF Source

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