

MS2090A Product Training

A decorative graphic on the right side of the slide. It features a large green triangle pointing upwards and to the right. Overlaid on this triangle are several parallel, curved lines in various shades of green, creating a sense of motion or a stylized 'A' shape. The lines curve from the bottom left towards the top right, then bend and curve again towards the top right corner.

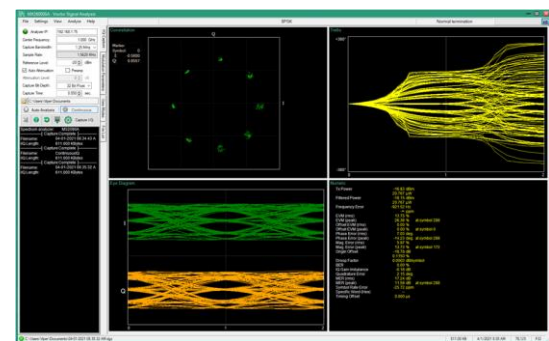
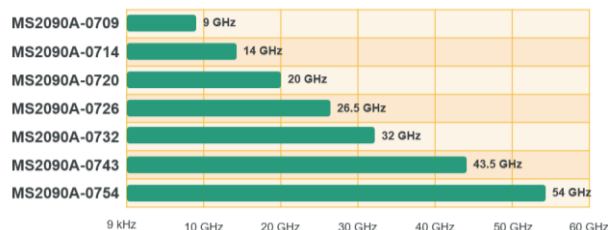
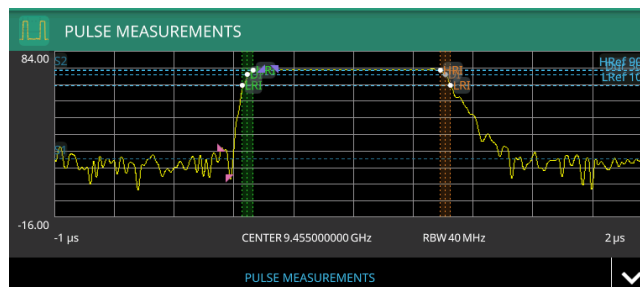
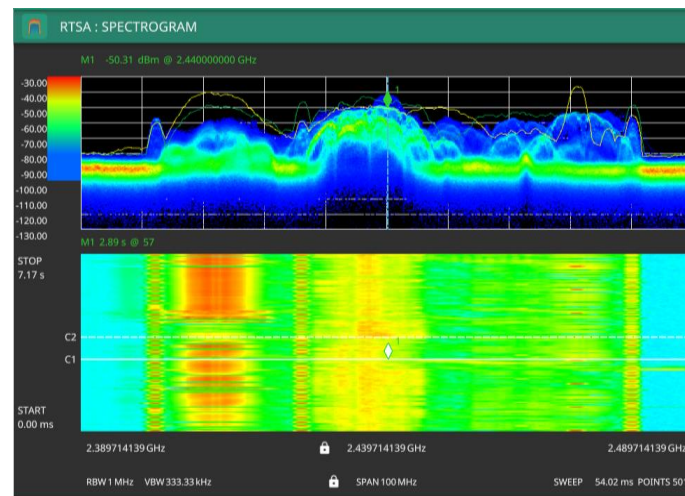
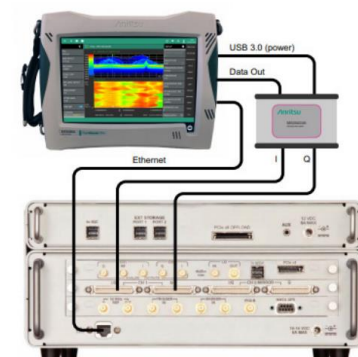
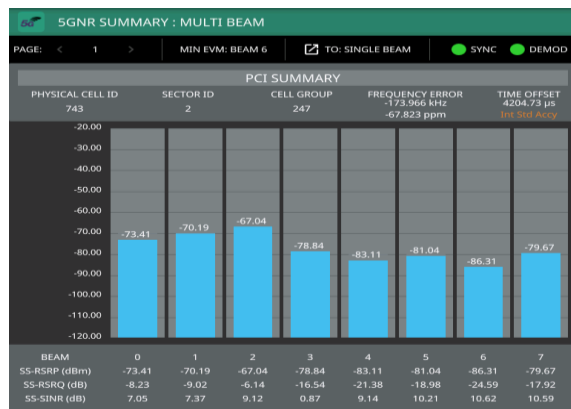
Agenda

1. Introduction
2. 5G Measurement
3. EIRP Measurement
4. RTSA
5. Interference Finding
6. Other Use Tips

1. Introduction

MS2090A Functions Overview

- Handheld spectrum analyzer with the best-in-class RF performance
- Frequency band covers from 9kHz to 54GHz, and with No Gaps, No Misses
- Real-Time spectrum analyzer with 110MHz BW
- Multi-mission signal analysis
 - Fully new design for 5G NR field test
 - 4G LTE analyzer
 - General purpose modulated signals analysis
 - Full EMF solutions
 - *Signal recorder and replay*
 - *Smart interference hunter*
 - Pulse analysis



Online Help System

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https://www.anritsu.com/en-us/test-measurement/products/ms2090a

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ONLINE HELP SYSTEM

	RELEASE DATE
MS2090A Field Master Pro - Help	4/10/2023
IQ Signal Master MX280005A Vector Signal Analysis Software Help	1/24/2023
MA25101A IQ Streaming PCIe Kit and MX280006A IQ Acquisition Tool Help	5/10/2022

MS2090A Field Master Pro™

- Field Master Series Product Information, Compliance, and Safety
- Field Master Pro™ MS2090A User Guide
 - General Information
 - Instrument Overview
 - Instrument Notifications and Troubleshooting
 - Upgrading Software Options
 - Introduction
 - Exporting a Software Configuration File
 - Installing Software Options
 - Software Update
 - Installing the Software
 - PC Software
 - Spectrum Analyzer Measurement Guide
 - Real-Time Spectrum Analyzer (RTSA) Measurement Guide
 - 5G NR Analyzer Measurement Guide
 - LTE FDD/TDD Signal Analyzer Measurement Guide
 - Pulse Analyzer Measurement Guide
 - Electromagnetic Field (EMF) Meter Measurement Guide
 - IQ Capture/Streaming (Option 124/126 and 125/127) Measurement Guide
 - High Accuracy Power Meter Measurement Guide
 - Cable and Antenna Analyzer Measurement Guide
 - Field Master Pro™ MS2090A Programming Manual

Software Update

Field Master Pro™ MS2090A User Guide : Upgrading Software Options : Software Update

Software Update

To **update** your Anritsu instrument **software**, use a high quality USB memory device with at least 1 GB of free space and FAT32 file system format.

1. Insert the USB memory device into your PC or laptop.
2. From a browser, go to the following Anritsu products page:
<http://www.anritsu.com/en-US/test-measurement/products/ms2090a>
3. On the product page, click Downloads.
4. Select the **software update** for your product and copy the downloaded **software** into the USB memory device.
5. Insert the USB memory device into the one of the MS2090A USB ports.

Installing the Software

1. Start the **software update** via one of the two ways below (see [Figure: Updating the Software](#)):
 - Access the upper left **System Menu** (3-line icon), then press **SYSTEM INFORMATION > INSTALL UPDATE**. Refer to [System Information Menu](#) for more information.
 - Select the **software update** icon from the **Title bar**. Refer to [Common GUI Controls](#) for list of GUI icons.
2. Select the latest available **update** from the Available Updates drop-down and press **INSTALL**.
 - A dialog will appear stating **Software Update in Progress**.
3. When the installation is complete, see [Verify the Software Update](#).

Updating the Software

SYSTEM INFORMATION

Instrument

Manufacturer: Anritsu

Model Number: MS2090A

Options: 001A, 002A, 003A, 004A, 005A, 006A, 007A, 008A, 009A, 010A, 012A, 013A, 014A, 015A, 016A, 017A, 018A, 019A, 020A, 021A, 022A, 023A, 024A, 025A, 026A, 027A, 028A, 029A, 030A, 031A, 032A, 033A, 034A, 035A, 036A, 037A, 038A, 039A, 040A, 041A, 042A, 043A, 044A, 045A, 046A, 047A, 048A, 049A, 050A, 051A, 052A, 053A, 054A, 055A, 056A, 057A, 058A, 059A, 060A, 061A, 062A, 063A, 064A, 065A, 066A, 067A, 068A, 069A, 070A, 071A, 072A, 073A, 074A, 075A, 076A, 077A, 078A, 079A, 080A, 081A, 082A, 083A, 084A, 085A, 086A, 087A, 088A, 089A, 090A, 091A, 092A, 093A, 094A, 095A, 096A, 097A, 098A, 099A, 100A, 101A, 102A, 103A, 104A, 105A, 106A, 107A, 108A, 109A, 110A, 111A, 112A, 113A, 114A, 115A, 116A, 117A, 118A, 119A, 120A, 121A, 122A, 123A, 124A, 125A, 126A, 127A, 128A, 129A, 130A, 131A, 132A, 133A, 134A, 135A, 136A, 137A, 138A, 139A, 140A, 141A, 142A, 143A, 144A, 145A, 146A, 147A, 148A, 149A, 150A, 151A, 152A, 153A, 154A, 155A, 156A, 157A, 158A, 159A, 160A, 161A, 162A, 163A, 164A, 165A, 166A, 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2. 5G Measurement

Anritsu Advancing beyond

Application Note

5G NR Base Station Measurements
in the Field

<https://www.anritsu.com/en-US/test-measurement/support/downloads/application-notes/dwl20867>

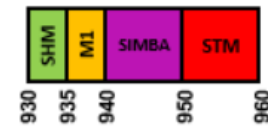
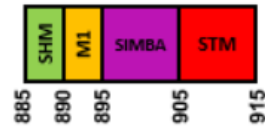
Uplink

Downlink

FDD Bands

B8

(880 – 915 MHz /
925 – 960 MHz)



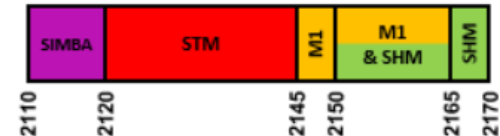
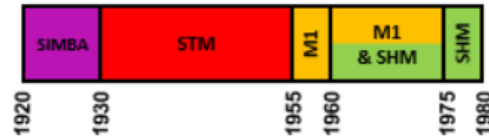
B3

(1710 – 1785 MHz /
1805 – 1880 MHz)



B1

(1920 – 1980 MHz /
2110 – 2170 MHz)



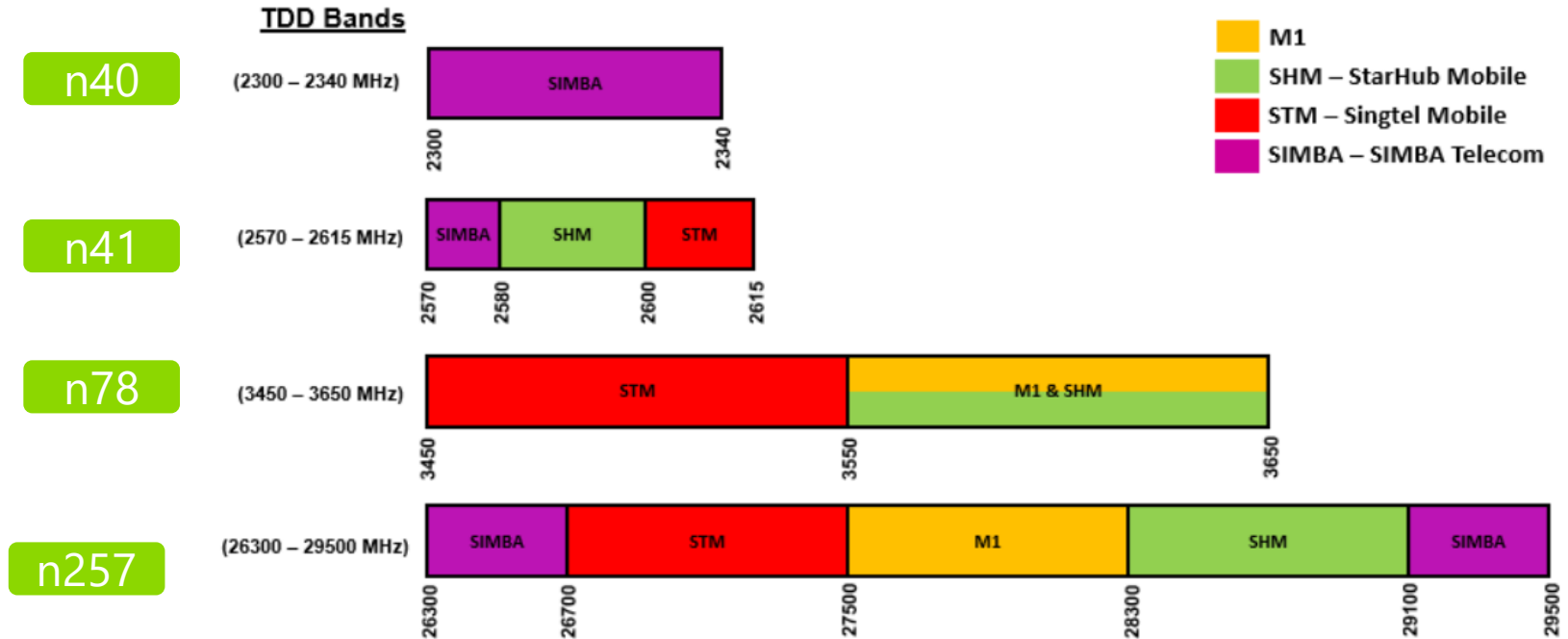
B7

(2500 – 2560 MHz /
2620 – 2680 MHz)



LTE Band	Identifier	Uplink (MHz)	Downlink (MHz)
B1 (2100 MHz)	IMT Core Band	1920 - 1980	2110 - 2170
B3 (1800 MHz)	1800	1710 - 1785	1805 - 1880
B7 (2600 MHz)	IMT Extension	2500 - 2570	2620 - 2690
B8 (900 MHz)	900	880 - 915	925 - 960

5G NR Band



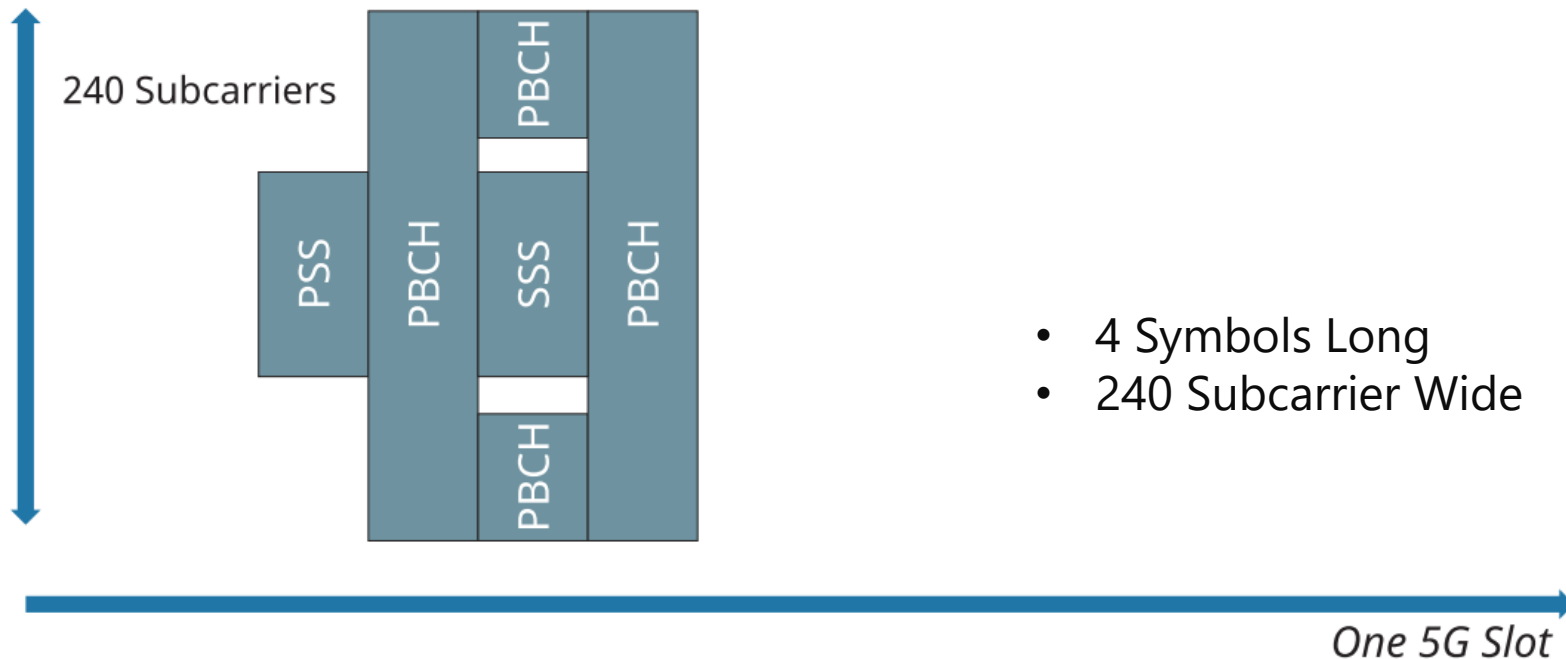
Band	Duplex Mode	Identifier	Uplink / TDD Frequency
n40 (2300 MHz)	TDD	TD 2300	2300 - 2400 MHz
n41 (2500 MHz)	TDD	TD 2500	2496 - 2690 MHz
n78 (3500 MHz)	TDD	TD 3500	3300 - 3800 MHz
n257 (28 GHz)	TDD	28 GHz	26500 - 29500 MHz

5G SSB (Sync Signal Block)

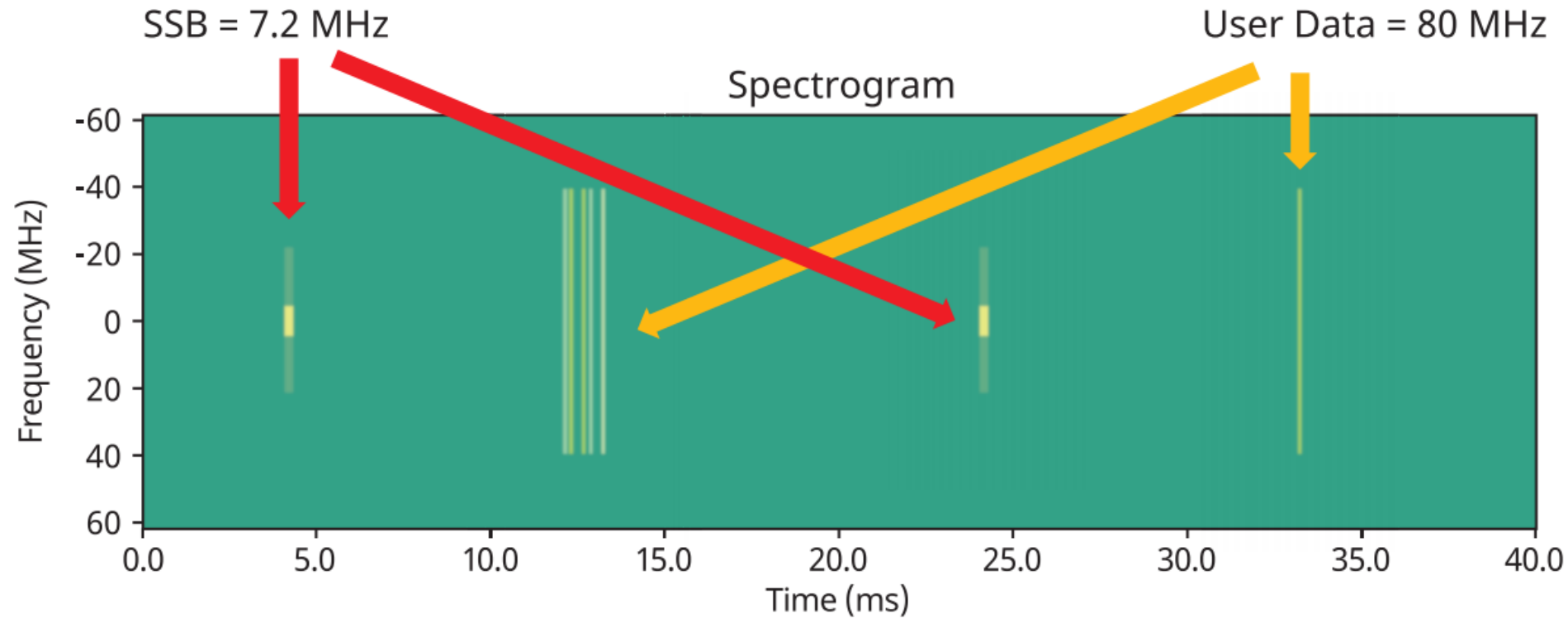
Frequency	SCS	# Subcarriers	SSB Bandwidth
FR1	15 kHz	240	3.6 MHz
	30 kHz	240	7.2 MHz
FR2	120 kHz	240	28.8 MHz
	240 kHz	240	57.6 MHz

SYMBOLS

0	1	2	3	4	5	6	7	8	9	10	11	12	13
---	---	---	---	---	---	---	---	---	---	----	----	----	----

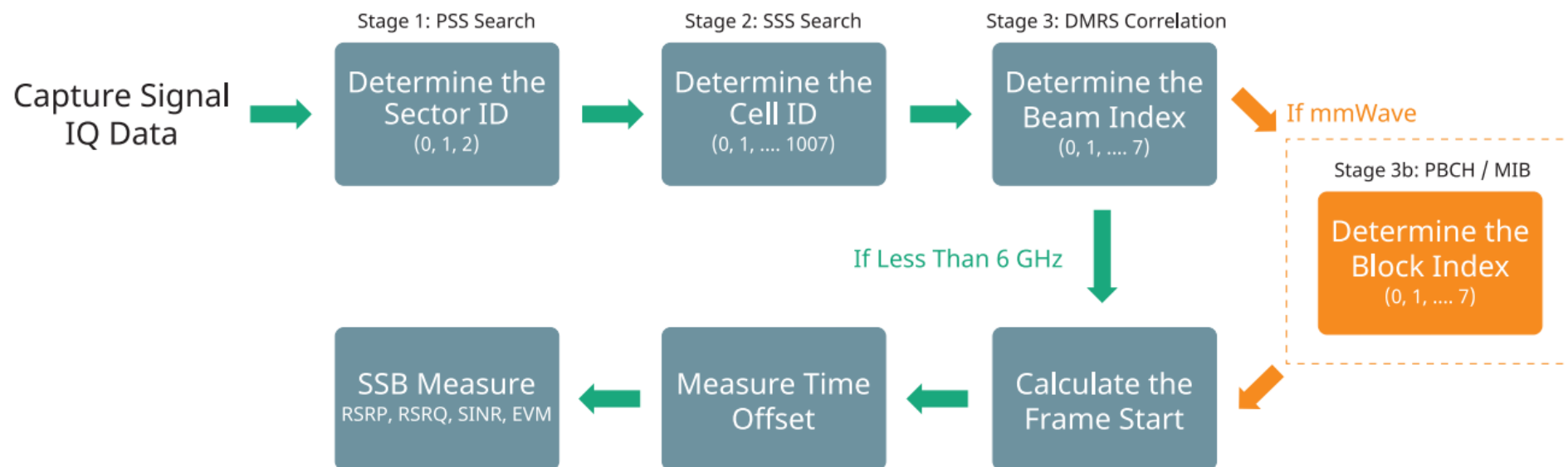


SSB from 5G frame capture



- 40ms Spectrogram captured
- 4x 5G Frames (10ms each)
- BW = 100MHz
- 2x SSB with 7.2MHz BW
- Zero Frequency Offset

SSB Decoding Process



From Preset Mode

Using 5GNR Summary mode **when BTS is seen OTA**, for example if using a directional antenna.

The screenshot shows the Anritsu MS2090A interface in 5GNR Summary mode. The main display area is titled '5GNR SUMMARY > MULTI BEAM' (annotated with a green circle 1). Below this is a 'PCI SUMMARY' table with columns: PHYSICAL CELL ID, SECTOR ID, CELL GROUP, FREQUENCY ERROR, TIME OFFSET, and STATUS. The table shows a single entry with a status of 'PSS Failure'. To the right of the table is a 'FREQUENCY' panel (annotated with a green circle 2) containing settings: BAND CONFIG, CENTER FREQUENCY (4.500000000 GHz), CHANNEL BW (100 MHz), SSB FREQUENCY (4.500000000 GHz), SSB OFFSET (0 Hz), AUTO DETECT SSB..., SUBCARRIER SPACING (30 kHz), and MAPPING PATTERN (Auto). A green arrow points from the 'FREQUENCY' panel to the 'FREQUENCY ERROR' column in the table. At the bottom, a 'BEAM' section shows 'BEAM 0' with various signal quality metrics. A green circle 3 highlights a secondary 'FREQUENCY' panel that is open, showing settings for a different frequency (3.525600000 GHz). A green circle 4 points to the 'AUTO DETECT SSB...' option in this secondary panel, with the text '4. Use Auto SSB if required'.

1

2

3

4. Use Auto SSB if required

5GNR SUMMARY > MULTI BEAM

PCI SUMMARY

PHYSICAL CELL ID	SECTOR ID	CELL GROUP	FREQUENCY ERROR	TIME OFFSET	STATUS
-1	-1	-1	--	--	PSS Failure

FREQUENCY

BAND CONFIG

CENTER FREQUENCY 4.500000000 GHz

CHANNEL BW 100 MHz

SSB FREQUENCY 4.500000000 GHz

SSB OFFSET 0 Hz

AUTO DETECT SSB...

SUBCARRIER SPACING 30 kHz

MAPPING PATTERN Auto

BEAM 0

SS-RSRP (dBm) --

SS-RSRQ (dB) --

SS-SINR (dB) --

SS-RSSI (dBm) --

AUTO DETECT SSB...

SUBCARRIER SPACING 30 kHz

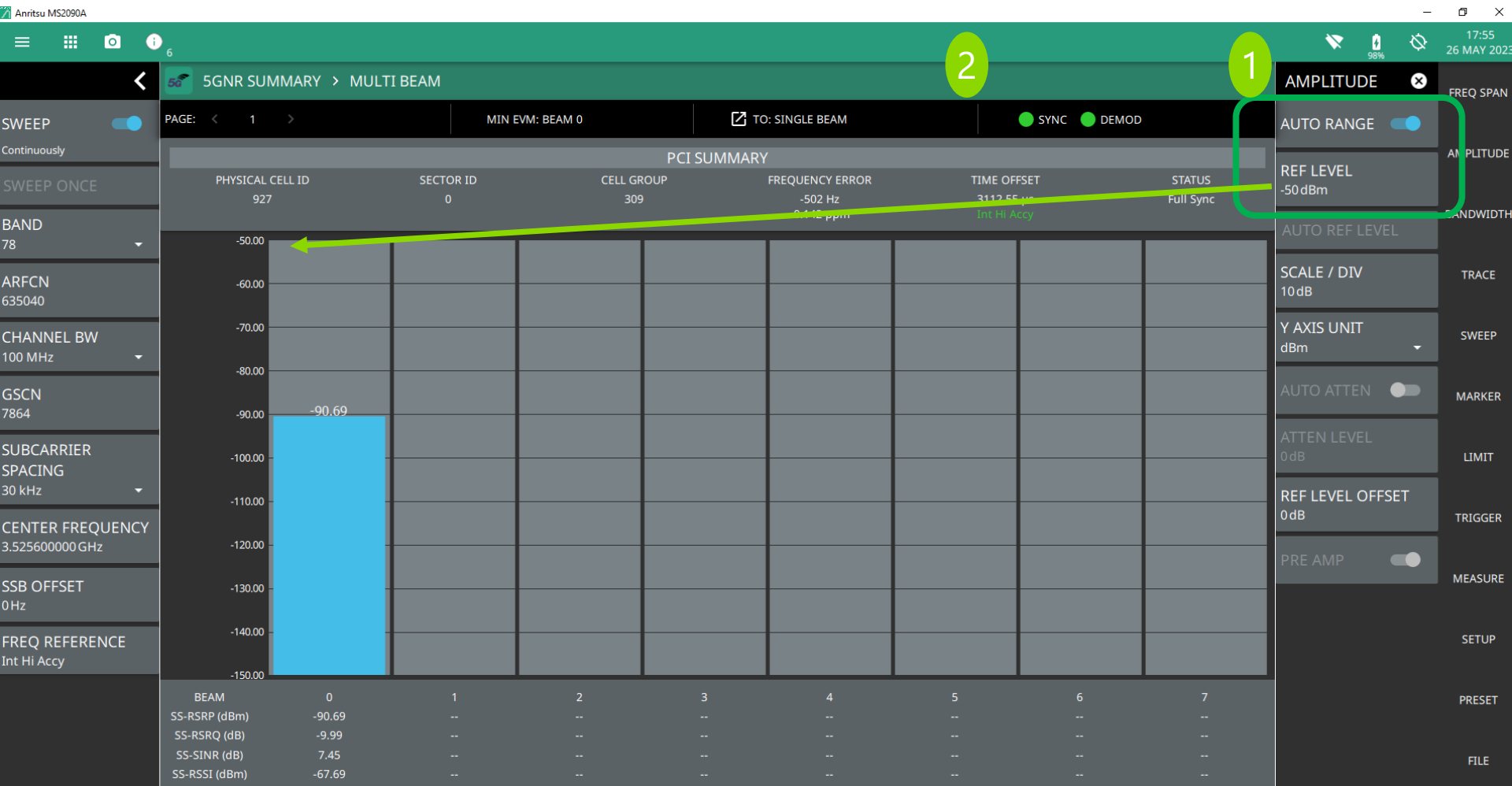
MAPPING PATTERN Auto

ANRITSU CORPORATION

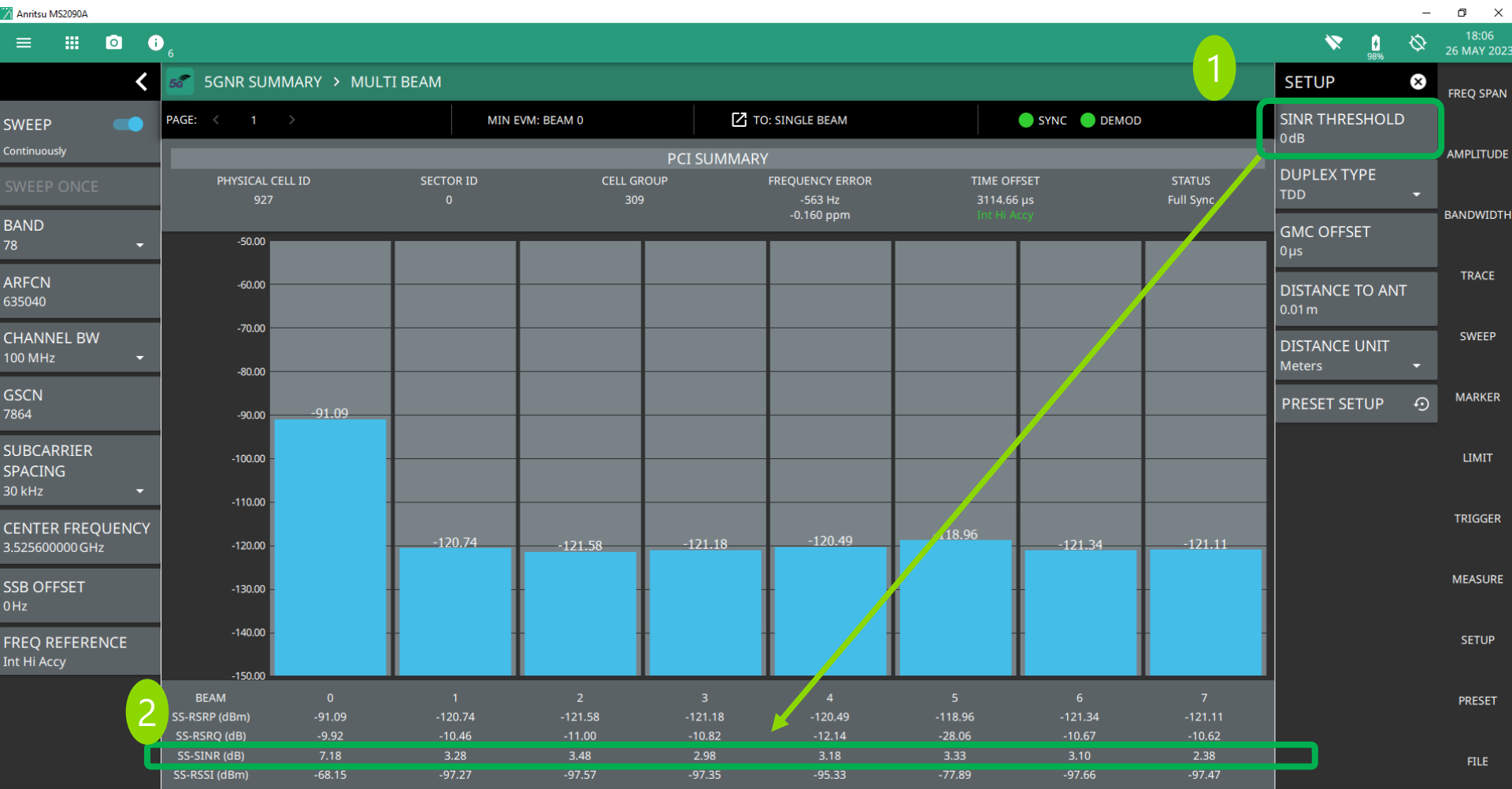
Presentation Title

12

Set of Amplitude



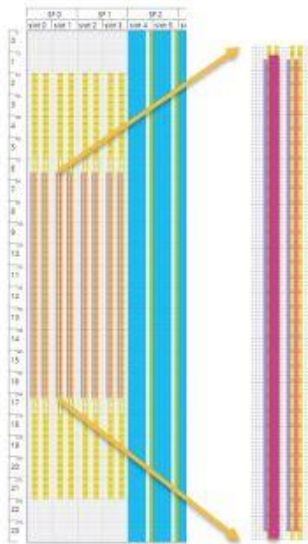
Set SINR Threshold



5G FR1 < 3 GHz			
	Definition	RSRP	RSRQ
Excellent	Maximum data throughput	> -80 dBm	> -10 dB
Good	Good data throughput	-80 dBm to -95 dBm	-10 dB to -12 dB
Poor	Maintain data connection with restricted throughput	-95 dBm to -115 dBm	-12 dB to -16 dB
Bad	Connection dropped	< -115 dBm	< -16 dB

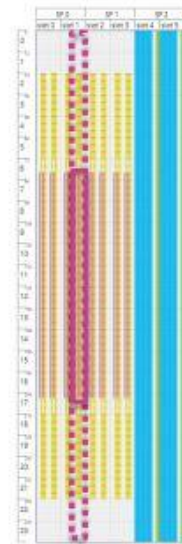
5G FR1 3 GHz to 6 GHz			
	Definition	RSRP	RSRQ
Excellent	Maximum data throughput	> -85 dBm	> -10 dB
Good	Good data throughput	-85 dBm to -100 dBm	-10 dB to -12 dB
Poor	Maintain data connection with restricted throughput	-100 dBm to -115 dBm	-12 dB to -16 dB
Bad	Connection dropped	< -115 dBm	< -16 dB

RSRP, RSRQ, SINR : QoS Measurements



$$SS_RSRP = \frac{\text{Sum of power 127 RE's in SSS}}{127}$$

SS_RSRP is the **Reference Signal Received Power** of the Synchronisation Signals (blue and red blocks) and is an average of the signal strength all REs containing synchronisation information. It is measured in dBm.



$$SS_RSRQ = \frac{SS_RSRP}{(RSSI/N)}$$

N: total number of RB

SS_RSRQ is the **Reference Signal Received Quality**. It is a ratio measurement that compares the power in the reference signals (SS-RSRP) against the average power in the physical channel (RSSI). Since the physical channel will also contain noise and co-channel interference, the result is always < 1 or < 0dB. → Typically -3dB is very good whereas -20dB is unlikely to be decoded correctly.



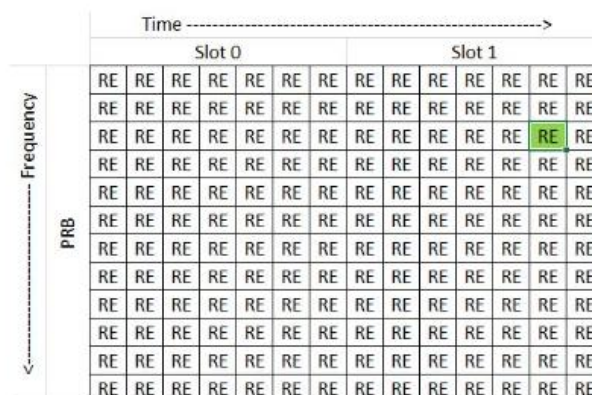
$$SS_SINR = \frac{SS_RSRP}{\text{Interference} + \text{Noise}}$$

$$\approx \frac{1}{(EVM)^2}$$

SINR is measured on the 127 RE's in the SSS

EPRE (Energy Per Resource Element) Calculator 5G, 4G

This Page provides information about EPRE (Energy Per Resource Element) Calculator 5G, 4G.



Calculator help you to get average RE (Resource Element power). EPRE can to be calculate from total power across all the allocated RBs.

Approximately EPRE can be calculated using the formula:

$$EPRE \text{ Power, dBm} = [\text{Output power per TX, dBm}] - 10 * \log_{10}[\text{No of RB per cell}] * 12)$$

Calculator is based on 3GPP communication standards.

EPRE (Energy Per Resource Element) Calculator 5G, 4G

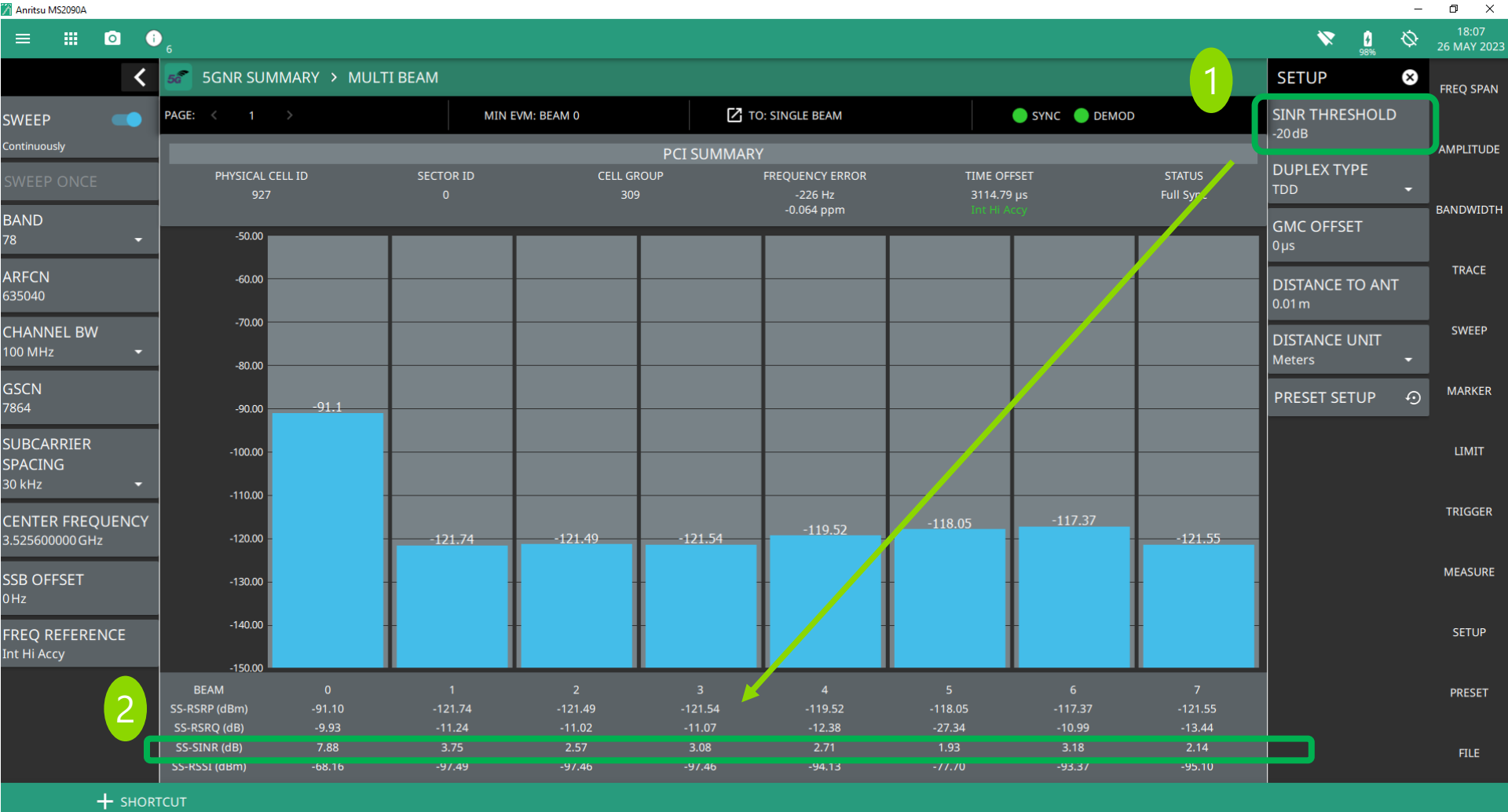
Output power per TX, dBm

Number of RB

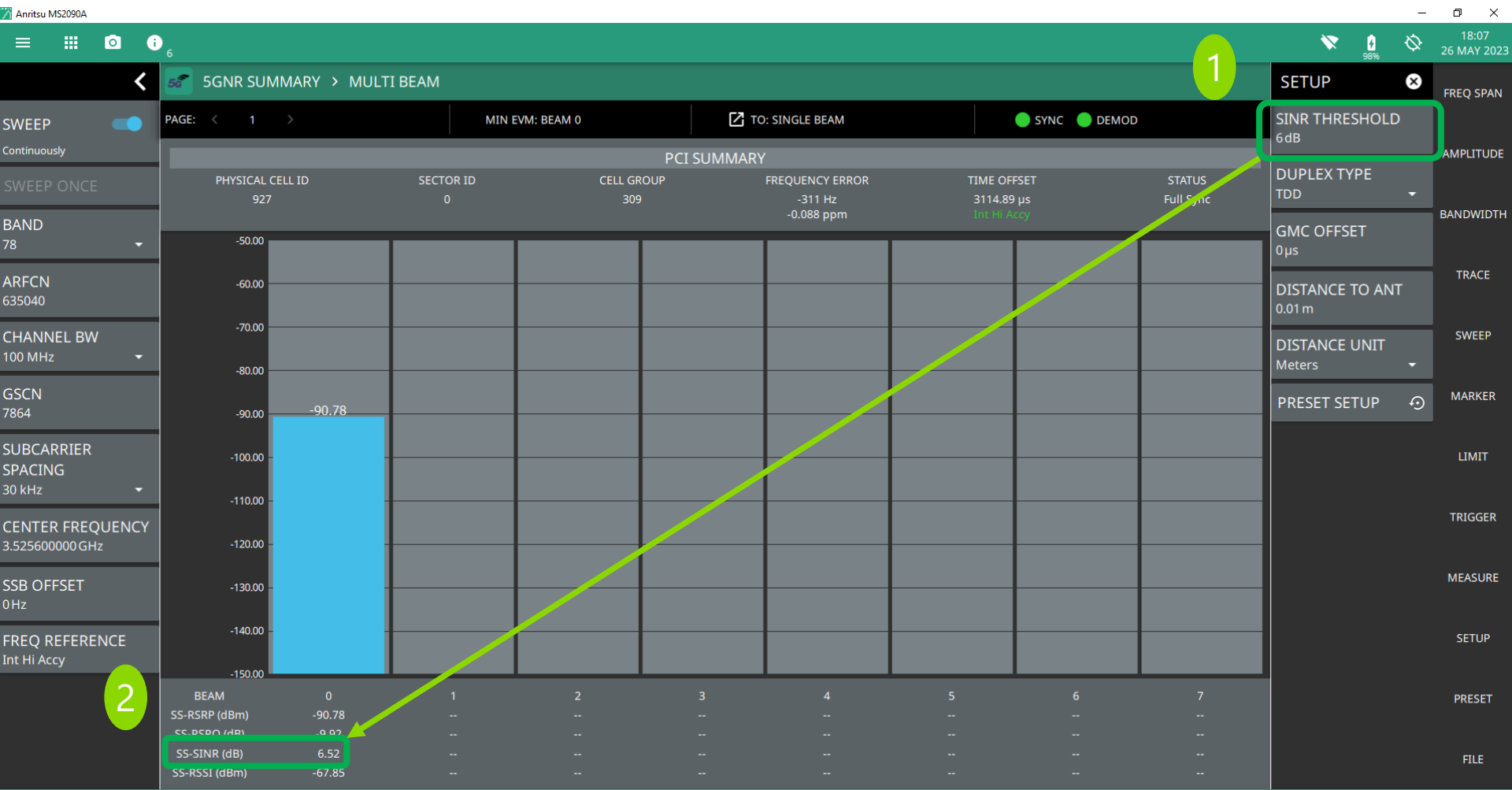
EPRE Calculator (Energy Per Resource Element), dBm

<https://5g-tools.com/epre-energy-per-resource-element-calculator-5g-4g/>

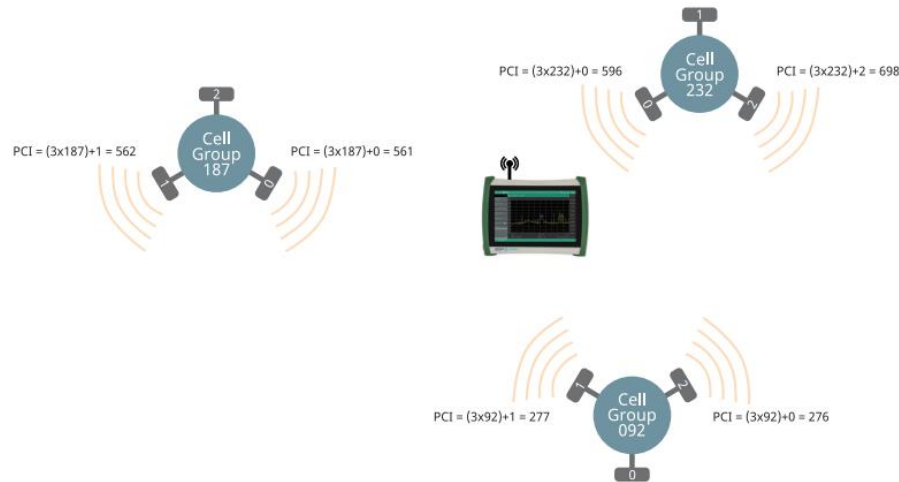
SINR Threshold -20dB can be set



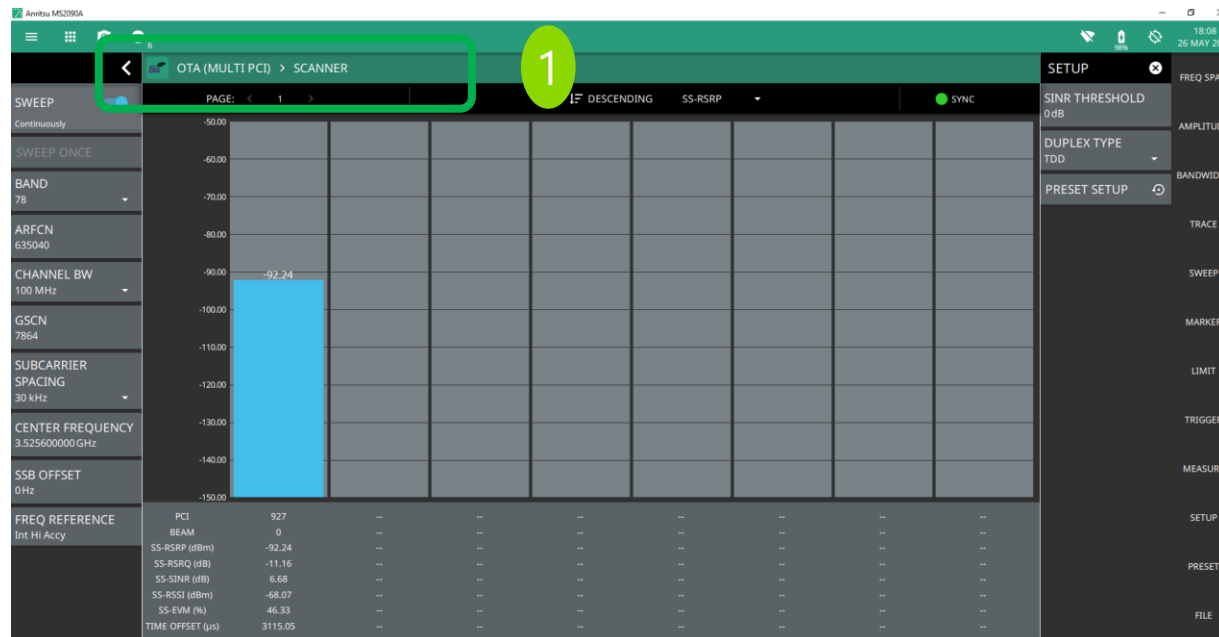
Set higher threshold for desired value



Using OTA (Multi PCI mode)



When Used in OTA Multi PCI Mode, the Field Master MS2080A Decodes Modulation Quality Results from all Base Stations within Range



5GNR Summary – Single Beam

5G

5GNR SUMMARY > SINGLE BEAM

BEAM: < 1 > MIN EVM: BEAM 1 TO: MULTI BEAM SYNC DEMOD

SWEEP
Continuously

SWEEP ONCE

BAND
78

ARFCN
640000

CHANNEL BW
100 MHz

GSCN
7915

SUBCARRIER
SPACING
30 kHz

CENTER FREQUENCY
3.600000000 GHz

SSB OFFSET
0.60 MHz

PCI SUMMARY

PHYSICAL CELL ID	SECTOR ID	CELL GROUP	FREQUENCY ERROR	TIME OFFSET	STATUS
565	1	188	235 Hz 0.065 ppm	2264.36 µs Int Std Accy	Full Sync

SYNC SIGNAL (SS)

SS-RSRP	SS-RSRQ	SS-SINR	SS-RSSI
-84.92 dBm	-10.14 dB	18.58 dB	-61.76 dBm

CHANNEL SUMMARY

BLOCK MEAS	AVG EVM	PEAK EVM [@ SUBCARRIER / SYMBOL]	POWER
PSS	9.75 %	33.55 % [@ 810 / 8]	-84.58 dBm
SSS	11.78 %	38.60 % [@ 803 / 10]	-84.92 dBm
PBCH	17.53 %	41.99 % [@ 838 / 9]	-85.02 dBm
PBCH-DMRS	13.82 %	33.94 % [@ 731 / 9]	-84.96 dBm

SETUP

SINR THRESHOLD
6 dB

DUPLEX TYPE
TDD

GMC OFFSET
0 µs

DISTANCE TO ANT
0.01 m

DISTANCE UNIT
Meters

PRESET SETUP

FREQ SPAN

AMPLITUDE

BANDWIDTH

TRACE

SWEEP

MARKER

LIMIT

TRIGGER

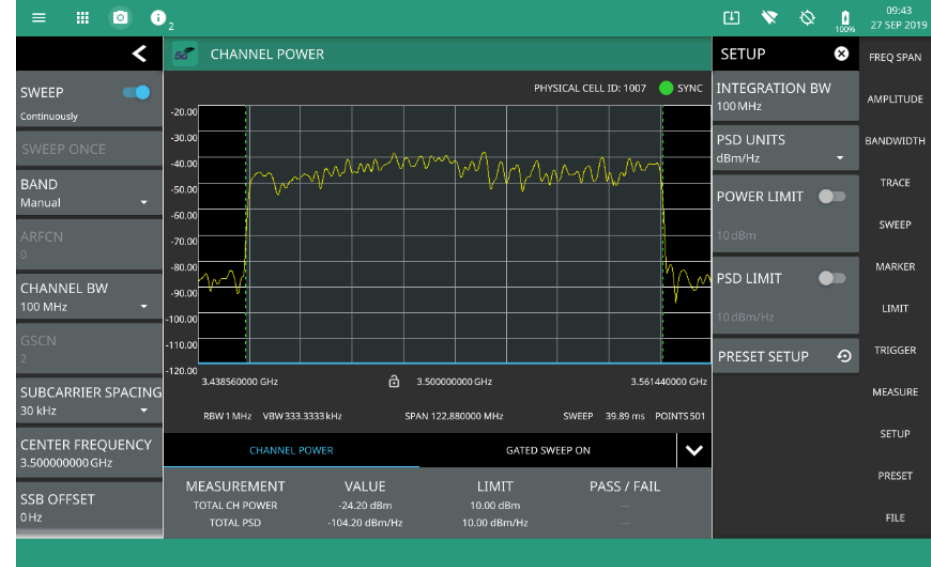
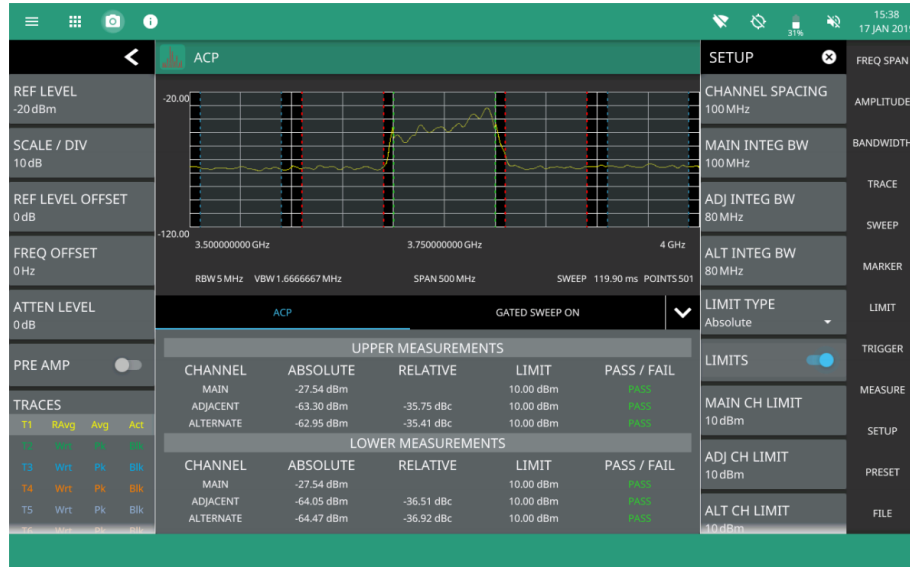
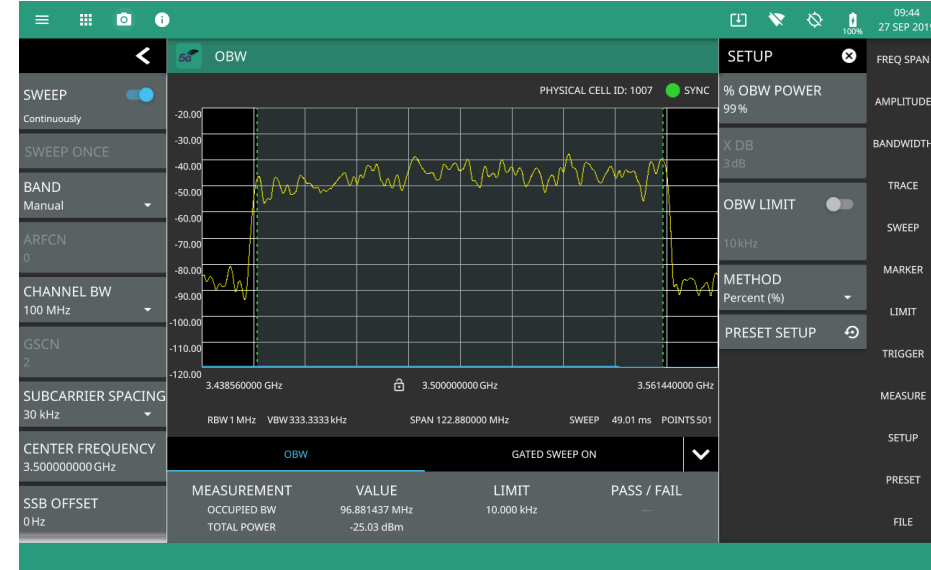
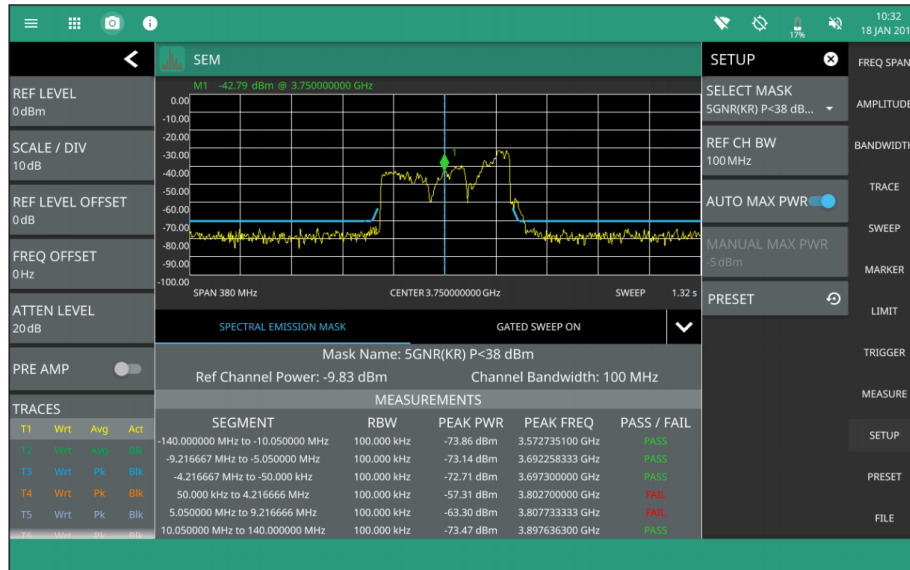
MEASURE

SETUP

PRESET

FILE

5G RF Performance Test



- ✓ Precise RF tests for 3GPP TS 38.104 V15 compliance:
 - ✓ Channel Power , Occupied Bandwidth , Spectral Emission Mask, Spurious Emissions

Anritsu
Advancing beyond



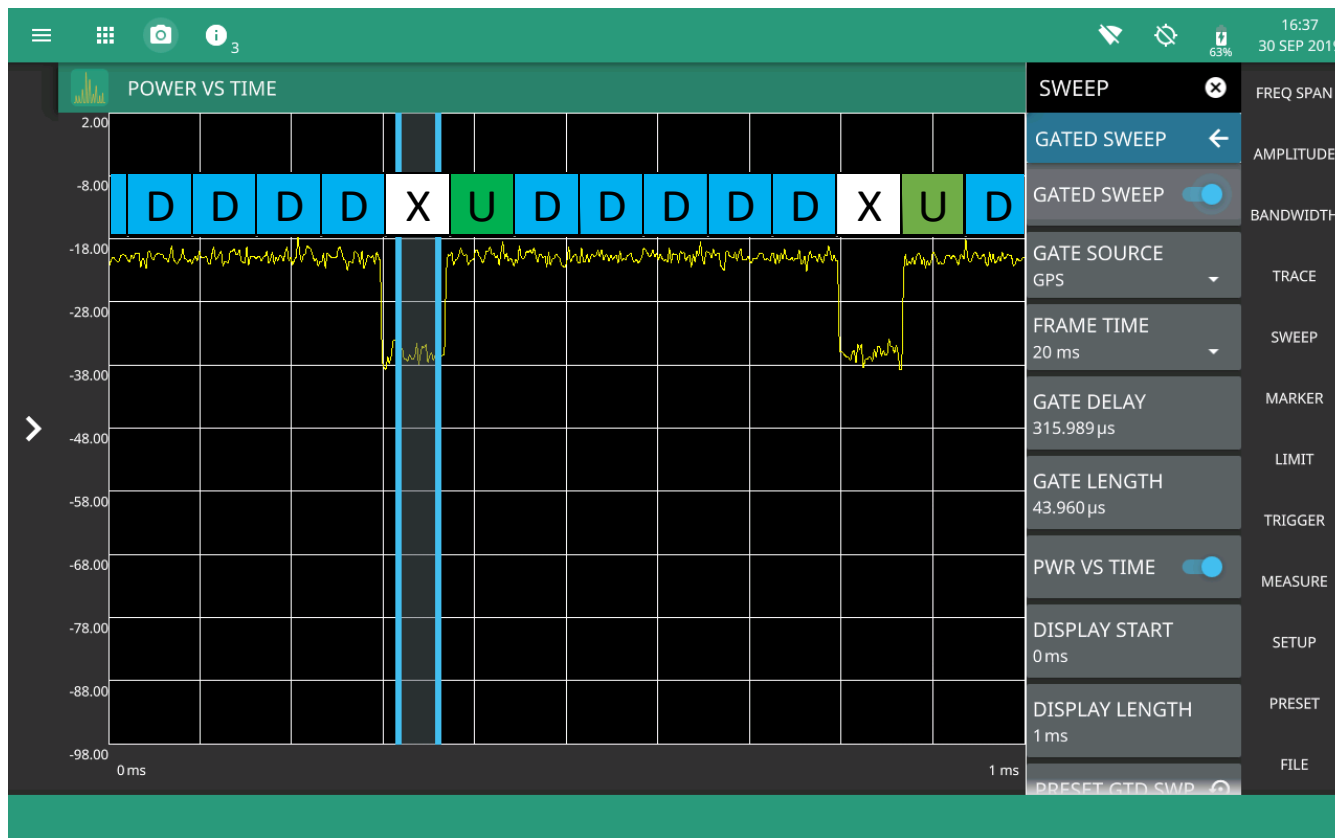
4. Turn on GATED SWEEP

2.Turn "on" PWR vs TIME

5. Turn "off" PWR vs TIME to check in Spectrum Mode

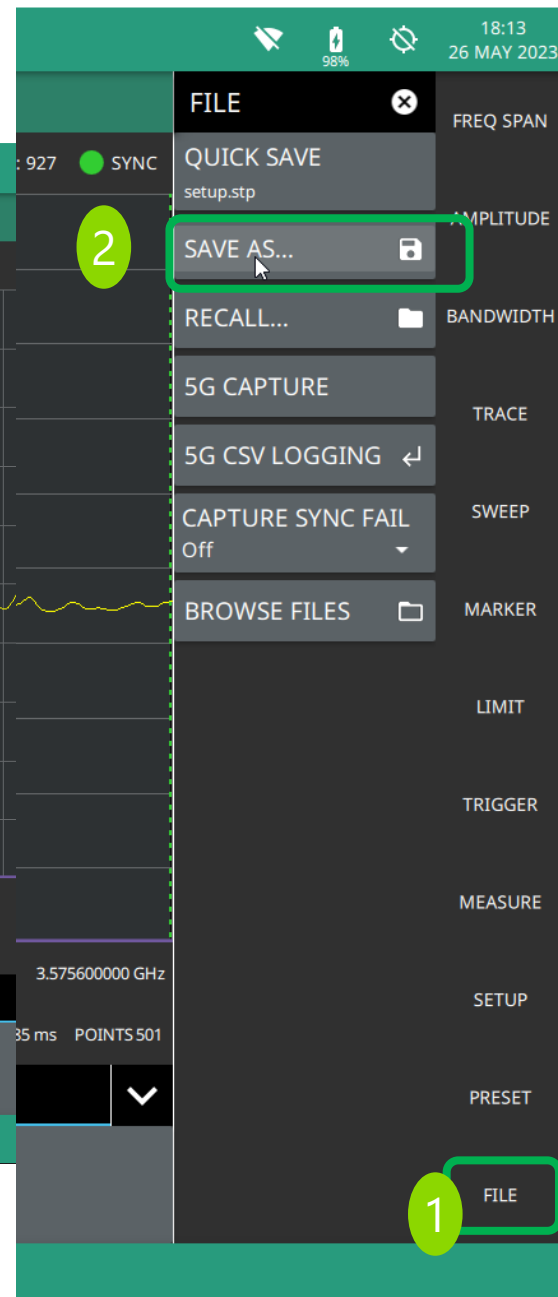
ANRITSU CORPORATION

Time Domain (Power vs Time)



Save Parameter files and Create Shortcut

Anritsu MS2090A



3. EIRP Measurement



Application Note

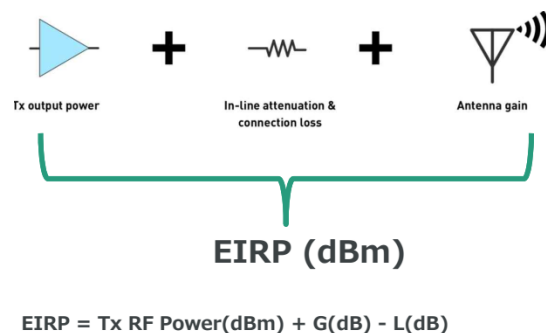
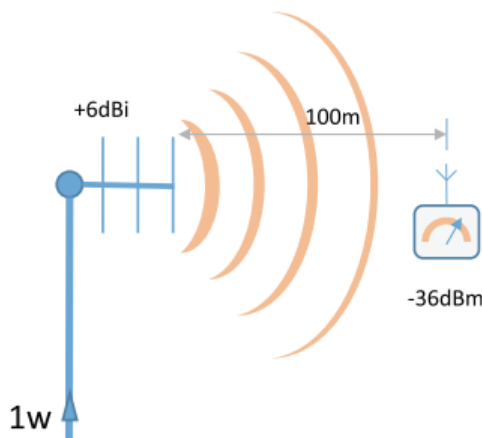
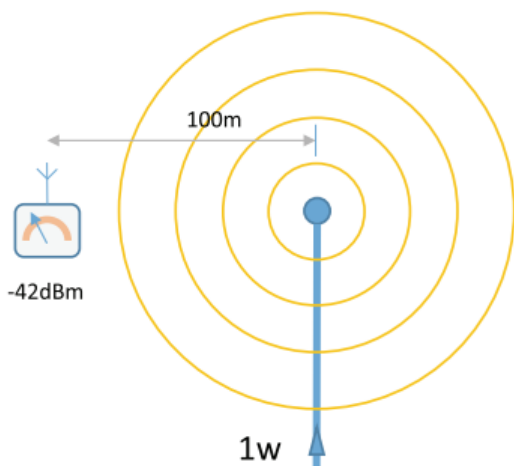
Making EIRP Measurements on 5G Base Stations

<https://www.anritsu.com/en-AU/test-measurement/support/downloads/application-notes/dwl19975>

What is EIRP?

EIRP:

The equivalent isotropically radiated power of a transmitter (with antenna, transmission line, duplexers etc.) is the power that would be necessary at the input terminals of a reference isotropic radiator in order to produce the same maximum field intensity. An isotropic radiator is a theoretical lossless point source of radiation with unity gain in all directions.



The directional antenna has the Effective Radiated Power of an Isotropic Antenna fed with +36 dBm (4W). It has an EIRP of 4W, although actual power fed is only 1W (Power Efficiency in intended direction).

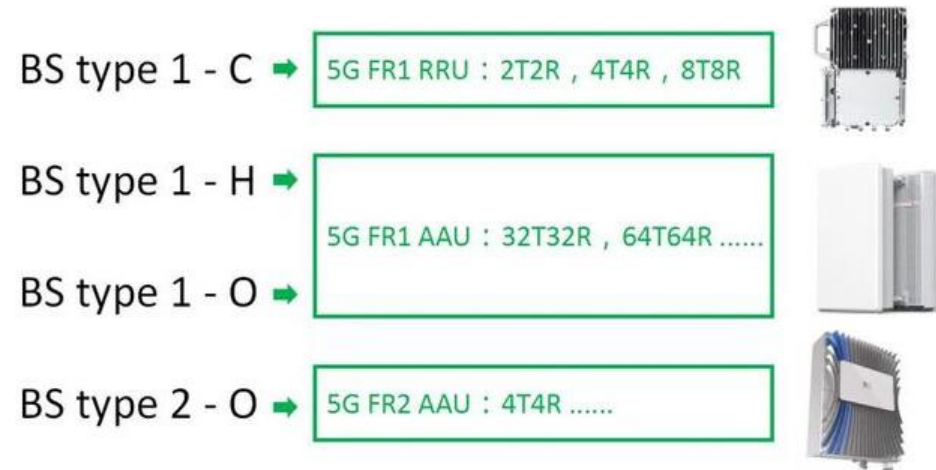
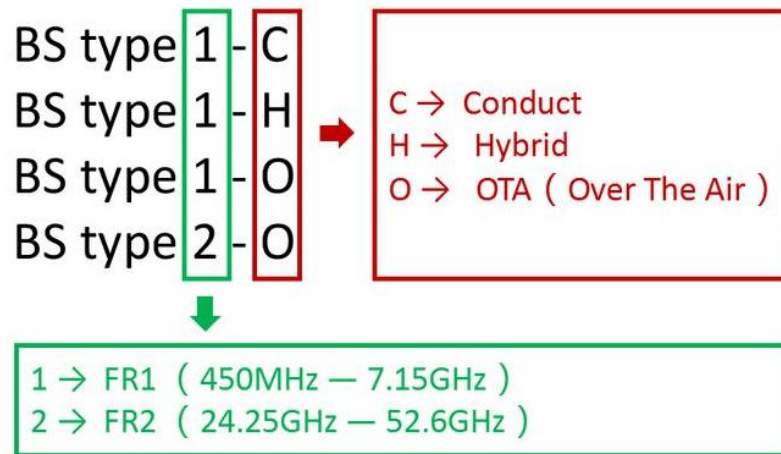
Why need EIRP test for 5G gNB

Before 5G:

- RRU and antenna is separate, and antenna port quantity is less, such as 4T4R... so if you know RRU output power, antenna gain and distance, then EIRP result can be calculated or estimated.

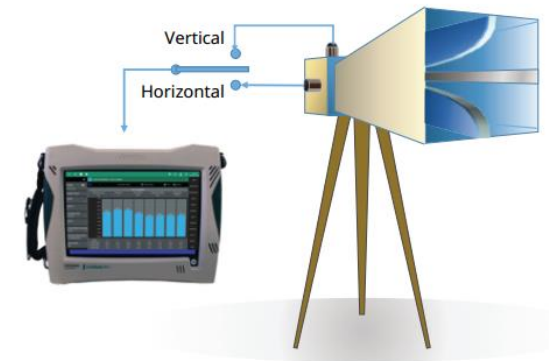
5G NR

- Massive MIMO
- RRU integrates with antenna array, particularly FR2, only OTA available. No way to know output power of RRU, so EIRP is only way to know emission power of gNB.

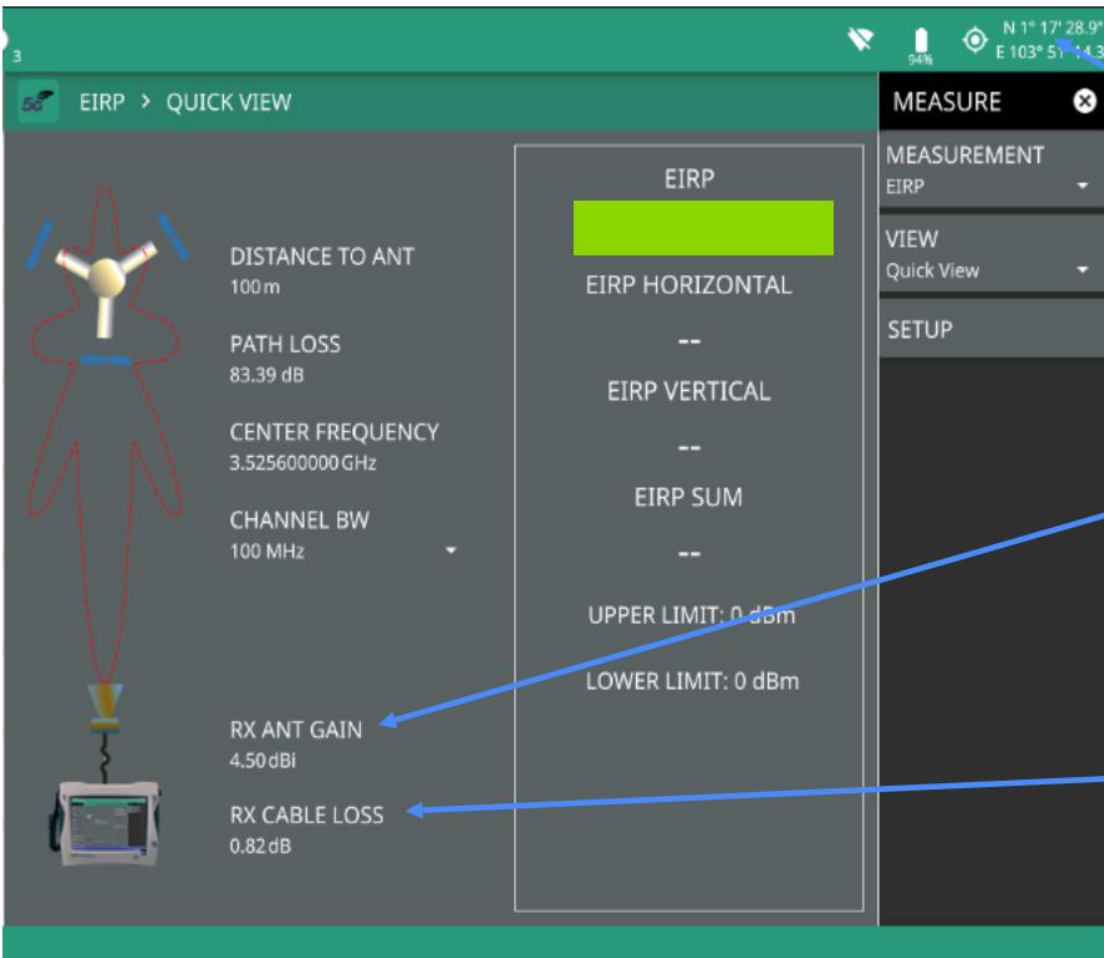


How to make EIRP test in the field (Simplify)

- Obtain key parameters via data sheet or measurement: receiver antenna gain, cable loss, distance, switch response (if necessary)
- Get right bi-polarization results of EIRP. Make sure 90-degree rotation for another polarization position;
- **Plan, and look for suitable location** with clear propagation path, especially for FR2 measurement.
 - Avoid objects or building that might cause strong reflection
 - Fine weather

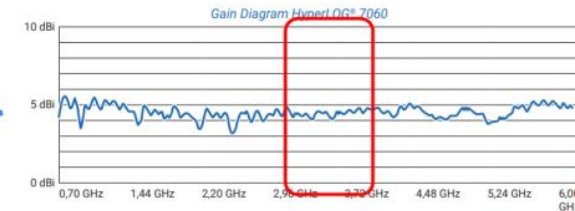


Trial in Singapore

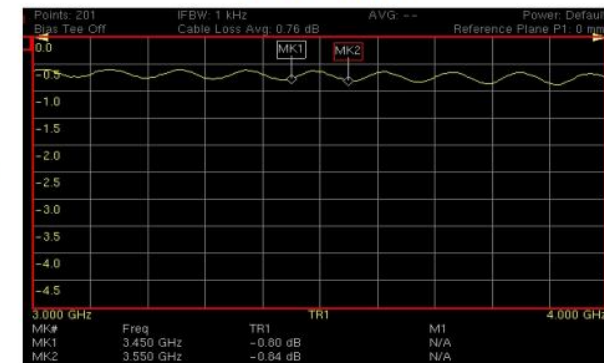


gNodeB

Antenna Gain



Cable loss



Test Equipment and Accessories Used

Filter



MS2090A Spectrum Analyzer

1. 5G demodulation
2. EIRP measurement



gNodeB
- Transmitting around 66dB



Rangefinder

- The test site is measured to be 70m between gNodeB and antenna



Hyperlog 0760 Directional Antenna

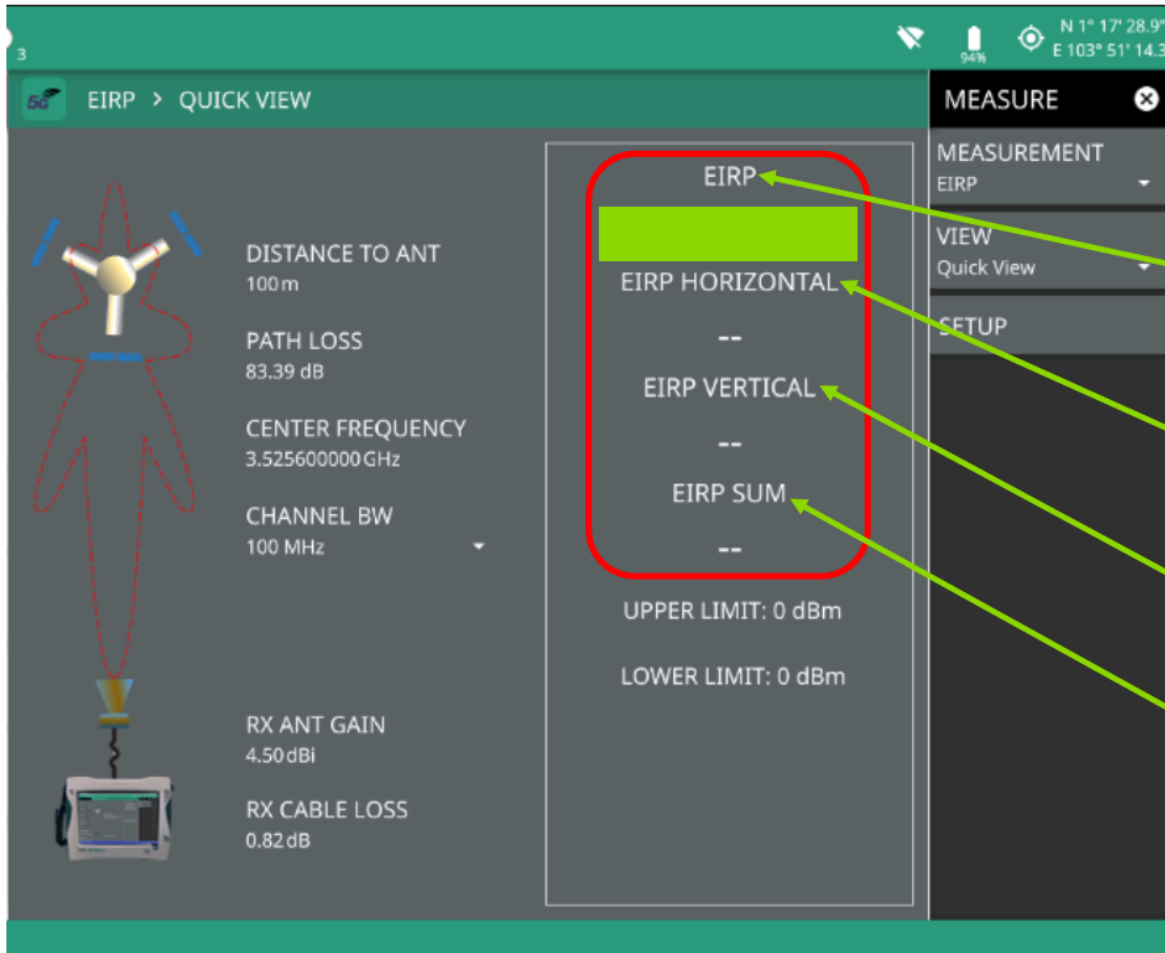


Test phone will do a 90% PRB activated download sequence
- Ensure DL RB is filled up as much as possible

UDP server

Test Phone +
Test PC

Measurement Result Screen



EIRP	Represents the live measurement (value will change)
EIRP Horizontal	Based on EIRP measurement. User can store the value
EIRP Vertical	Based on EIRP measurement, user can store the value
EIRP Sum	EIRP horizontal + EIRP vertical

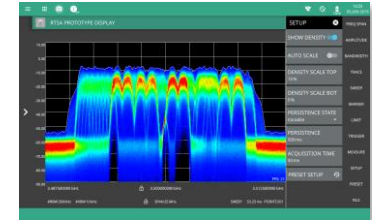
Test Results based on PRB usages....

4. Real Time Spectrum Analyzer

POI
2.055 μ s

- **Probability of Intercept (POI)**

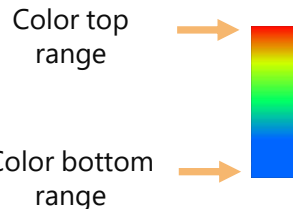
- Minimum event duration for 100% probability of capturing a single non-repetitive event. A minimum event is defined as the narrowest rectangular pulse that can be captured with 100% certainty at the amplitude accuracy from the datasheet.
- The wider the RBW is, the more the POI improves and the smaller it becomes



MIN DETECT
0.005 μ s

- **Min detectable signal**

- Narrower events than the POI event can be detected but may move too quickly for the sample rate of the analyzer. In this case, the analyzer would still see the event and can capture it, but it will move too quickly to be captured fully, so the amplitude will not be reflected accurately. In many cases, the user is more interested to know if something is there, not so much what the amplitude is, so min detectable can be good enough.



- **Density display**

- Every pixel of the screen displays a color that is percentage of time where there is some RF energy detected in that pixel.

The Building and Display of the Hit Map

- Each FFT's values are placed in the Hit Map
- Each FFT's Hit Map updates the cumulative Hit Map for the acquisition time (50ms default)
- High bins hits are shown in "Hot" colors (red), low density bins in "Cold" colors (dark blue).
- Bins with no Hits, are shown as transparent (screen background of black or white)

Spectrum Trace
Swept acquisitions

Hitmap
of each FFT

Hitmap
Frame

Hitmap
Colors
(simplified)

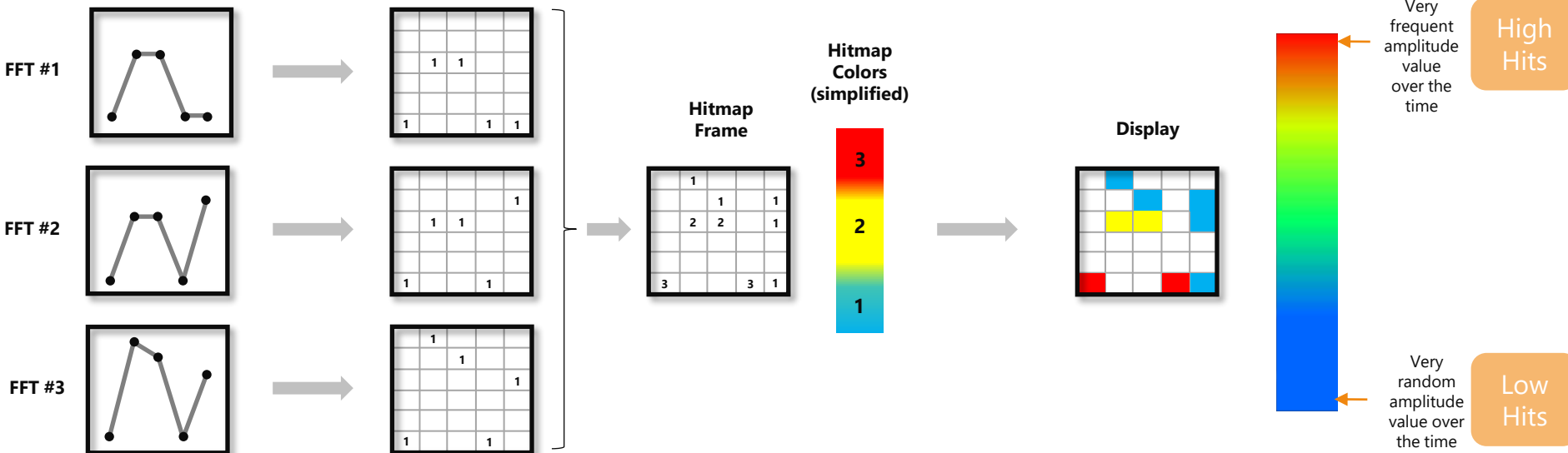
Display

Very
frequent
amplitude
value
over the
time

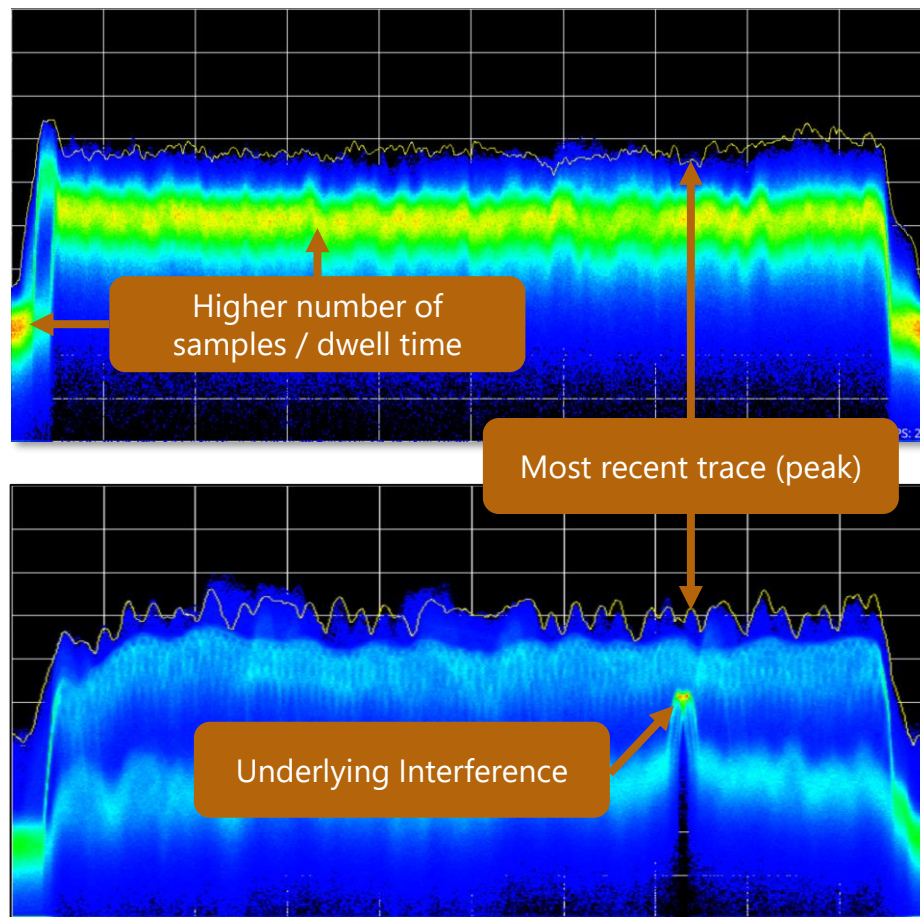
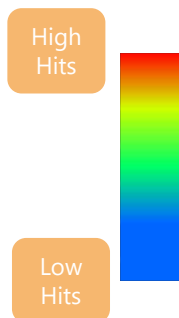
High
Hits

Very
random
amplitude
value over
the time

Low
Hits



- The density display communicates signal dwell time during an acquisition.

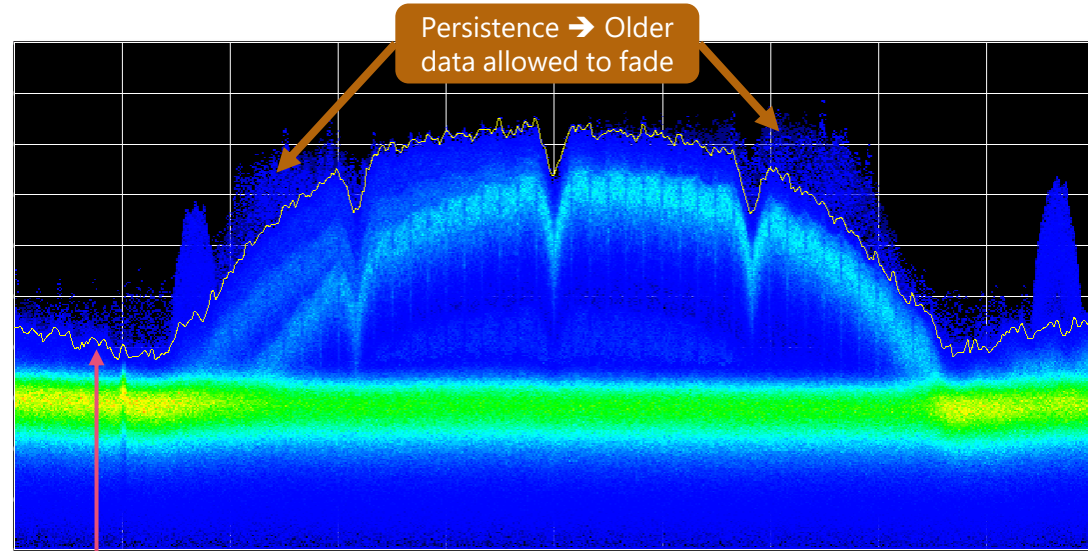


- Underlying interferers are easily seen.
- Individual traces can also be displayed for the most current acquisition (both images show a peak trace).
 - Up to 6 traces can be displayed.

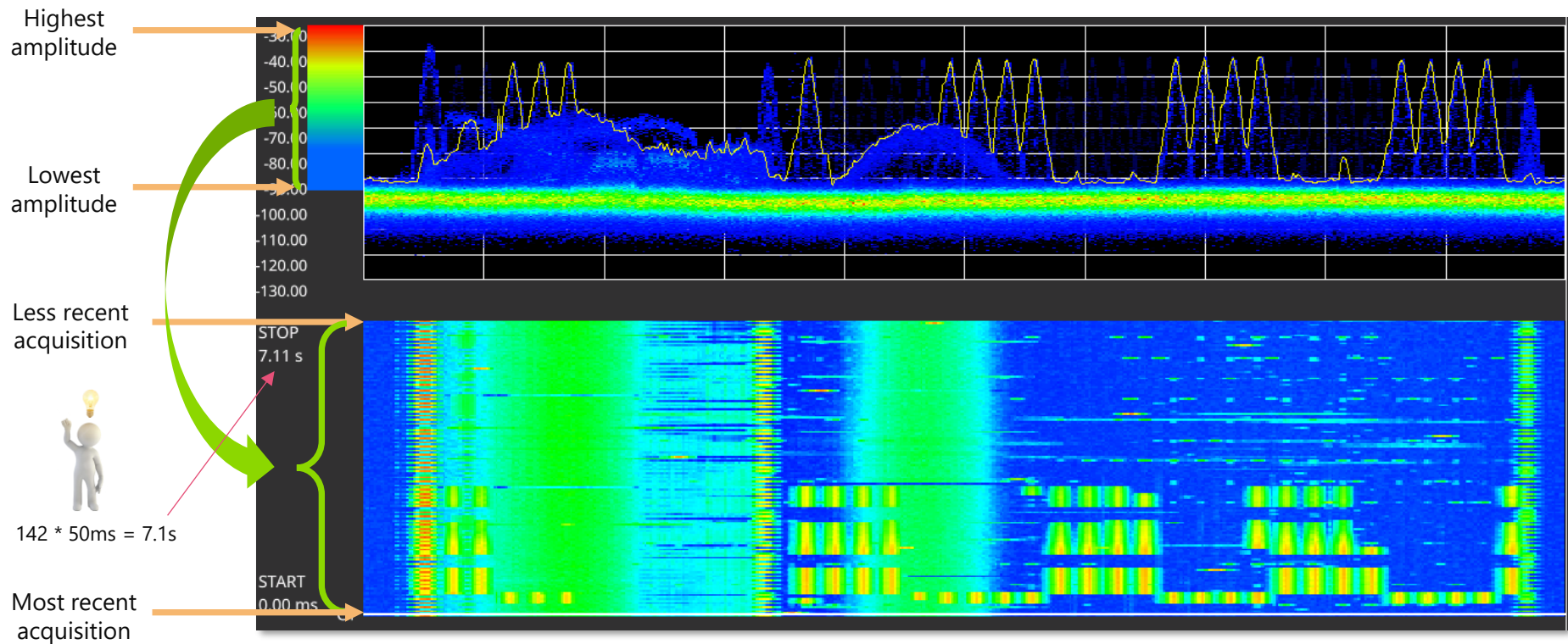
- Persistence is a way to help the human eye follow the progression of a signal.
- The Hit Map is updated and displayed after each acquisition.
- A bin with data may be overwritten with new data.
- A bin with no new data is allowed to fade over time if there is no new data for that bin.
 - Persistence is adjustable:
 - Variable or Infinite
 - Persistence time : tunable from 0ms to 10s



- Acquisition time is adjustable from 50ms to 5000ms (yellow trace)

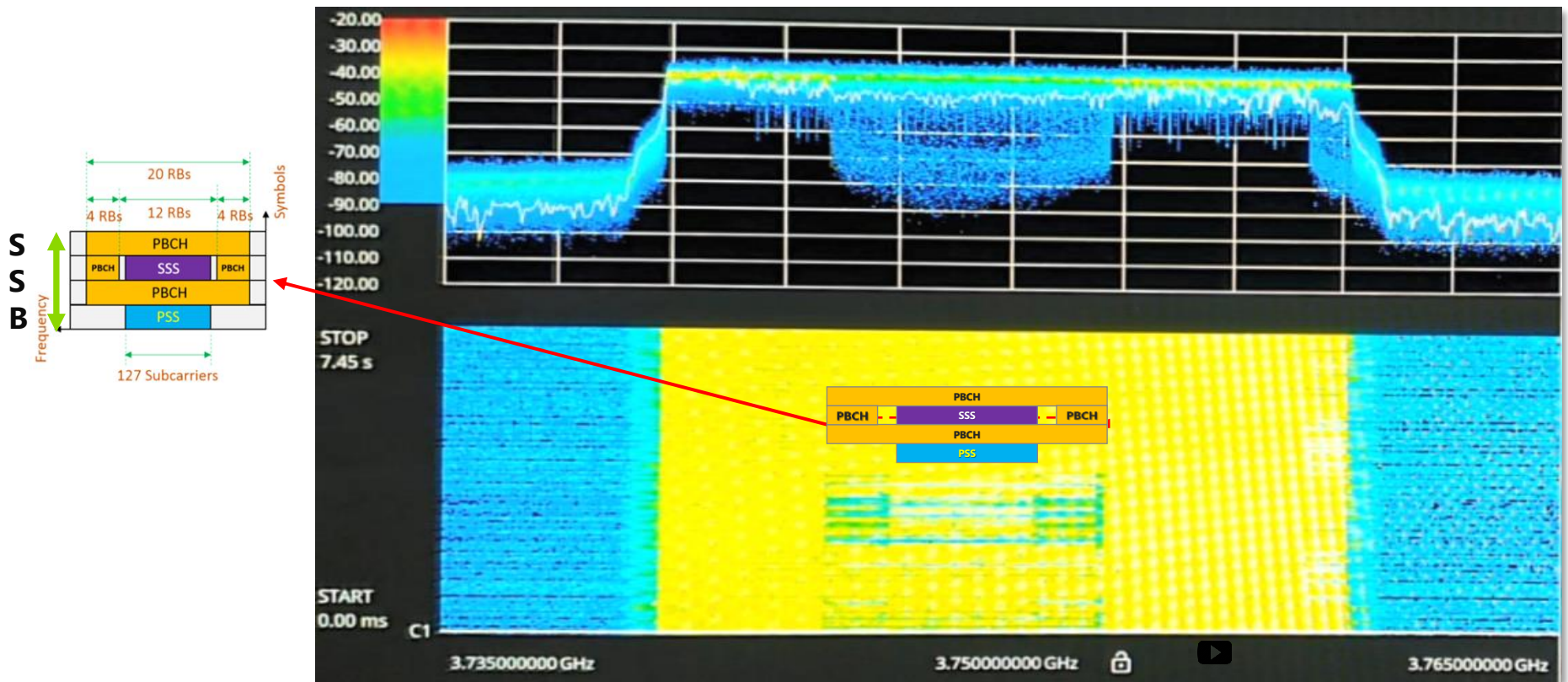


- Like in SPA mode, it is possible to display the spectrogram.
 - The spectrogram is built upon the stacking of the amplitudes of every yellow traces (142).



RTSA & Spectrogram on a 5G carrier

Sample detector vs Peak detector → SSB displayed



5. Interférence Hunting

Anritsu Advancing beyond

Application Note

Interference Hunting with the
Field Master™ MS2080A Option 24

<https://www.anritsu.com/en-US/test-measurement/support/downloads/application-notes/dwl20898>

Interference finding tools

- MS2090A offers classic way of interference finding
 - Interference map /polar
 - MA2700A+directional antenna
 - Mobile interference hunting system



Locate the interferer -0024 Interference Hunter

Interference Hunter option is available in Swept Spectrum and RTSA mode (if the RTSA option is installed)



1. Use Interference Hunter swept spectrum mode when wide frequency sweeps are required



2. If the instrument has Interference Hunter option and RTSA option, and the frequency of the signal of interest has already been identified, the RTSA mode offers faster measurement response.
Sweep span is limited by the option bandwidth.

Locate the interferer -0024 Interference Hunter

MS2090A option 0024 Interference Hunter includes features specifically designed to help in the Locate phase of an interference hunt:



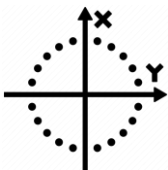
1. Fast audio tone (the Wooooo sound)
 1. Tone changes in pitch relative to channel power signal strength.



2. AM/FM audio demodulation
 1. Listen to sound of interfering signal.



3. Interference mapping (Triangulation)
 1. Geolocate source of interfering signal.



4. Polar diagrams
 1. Identify location of multiple sources of interference

MA2700A Interference Hunter

Add the MA2700A Handheld Interference Hunter for best solution



1. Integrated eCompass
2. Integrated 10 dB pre-amplifier
3. Designed for a wide range of Anritsu antennas
4. Compatible with 2000-17XX-R Band Pass Filters



MS2090A –Interference mapping

**2000-14XX-R
Yagi antenna**

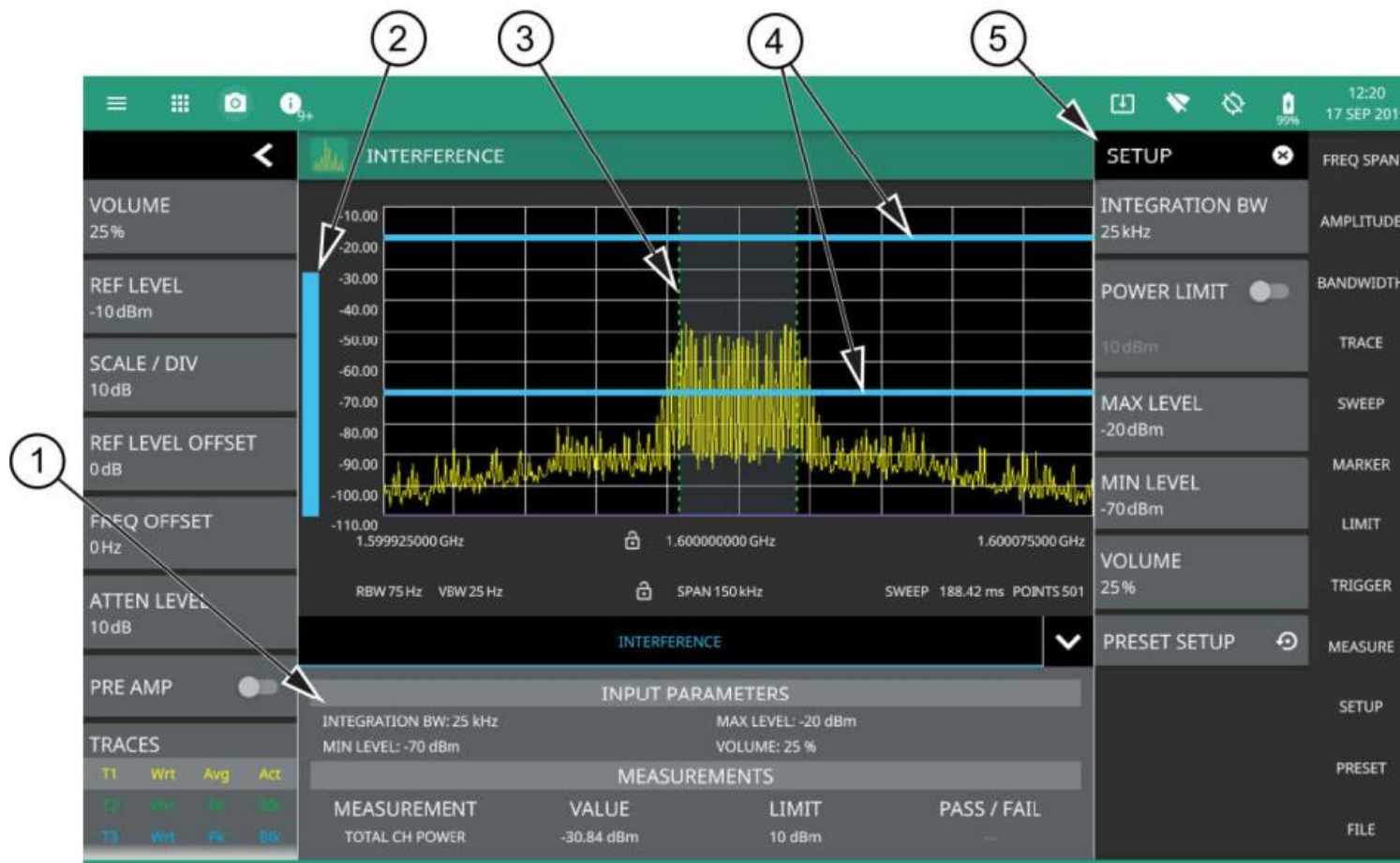
**MA2700A
Interference Hunter**

**2000-2053-R
Shoulder Harness**

**MS2090A with
Option -0024**

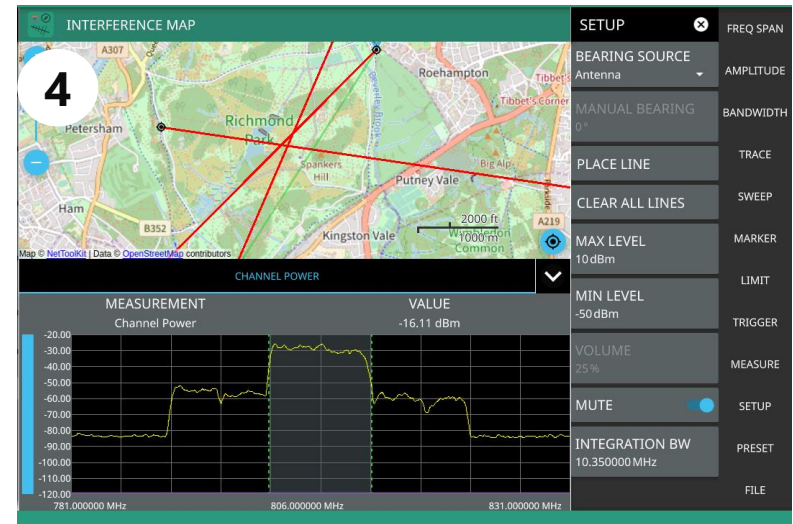
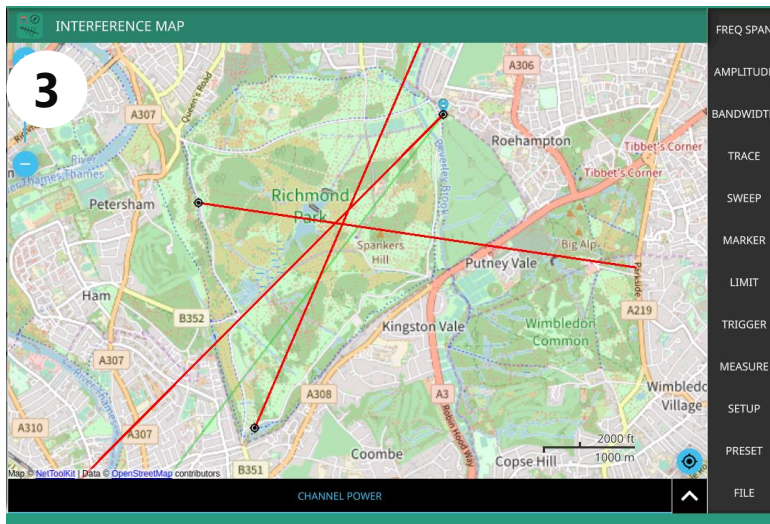
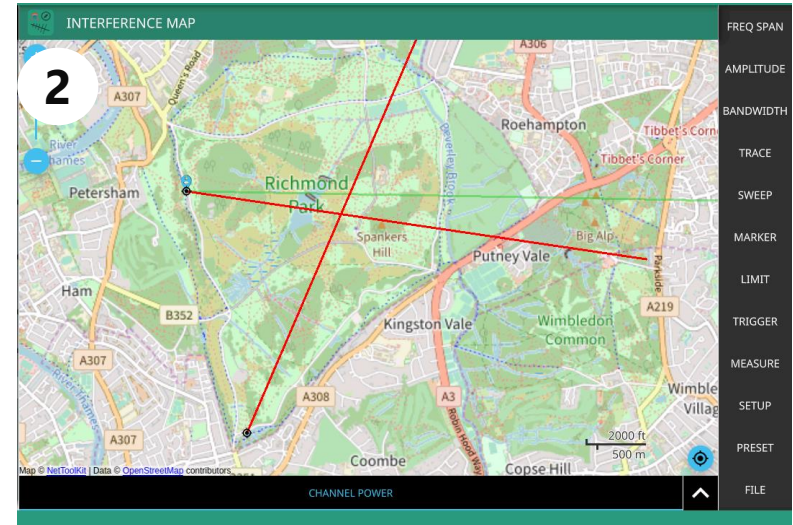
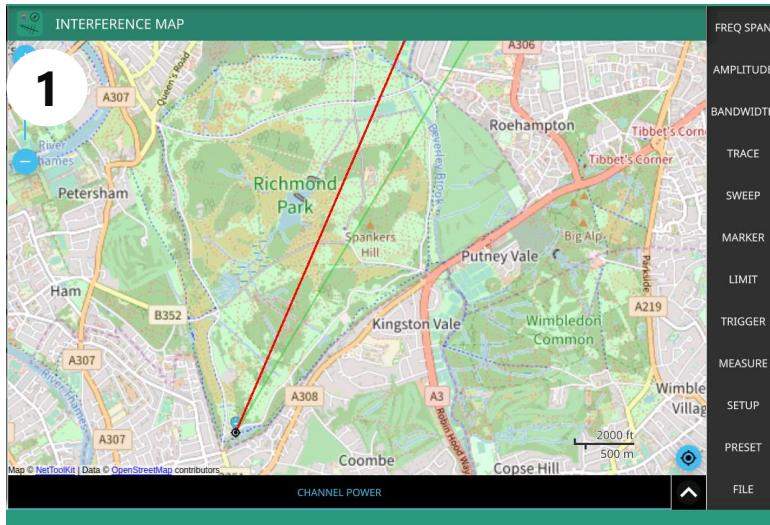


Interference (Option 24)

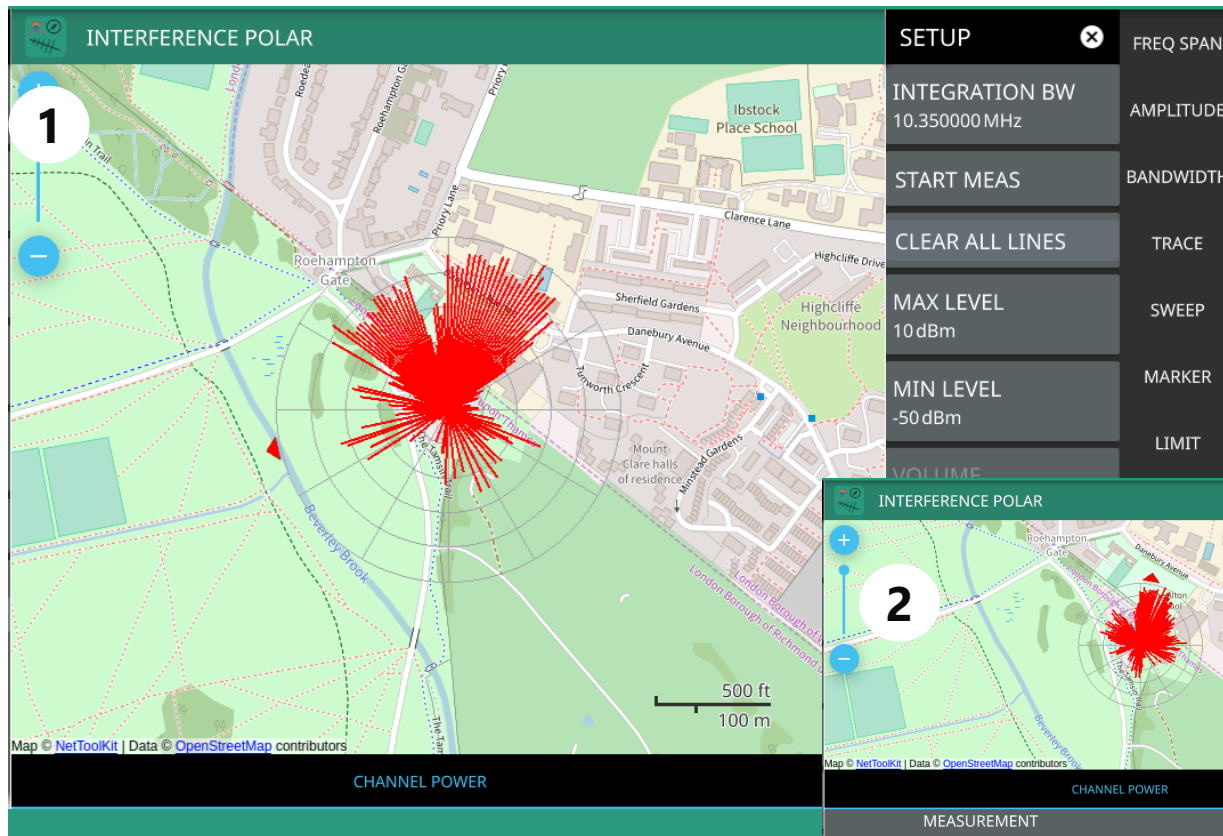


1. Interference setup parameters and measurement results are shown in a table at the bottom of the display.
2. A vertical bar corresponds to the received signal strength within the integration bandwidth.
3. Dashed vertical lines and a shaded region define the received channel integration bandwidth.
4. Horizontal blue lines define the audio response range for the measurement.
5. All signal power measurement parameters are set via the SETUP menu.

MS2090A –Interference mapping

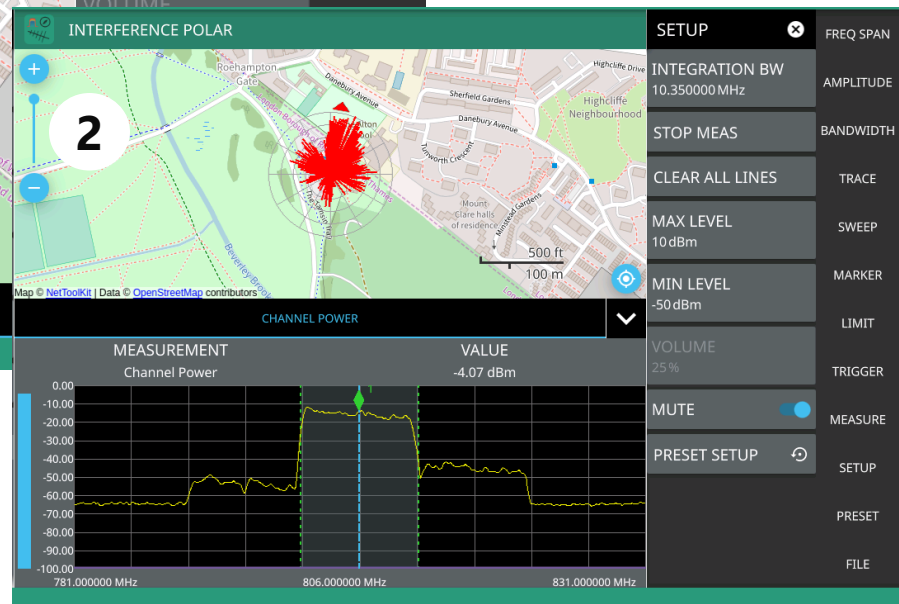


MS2090A – Polar plot

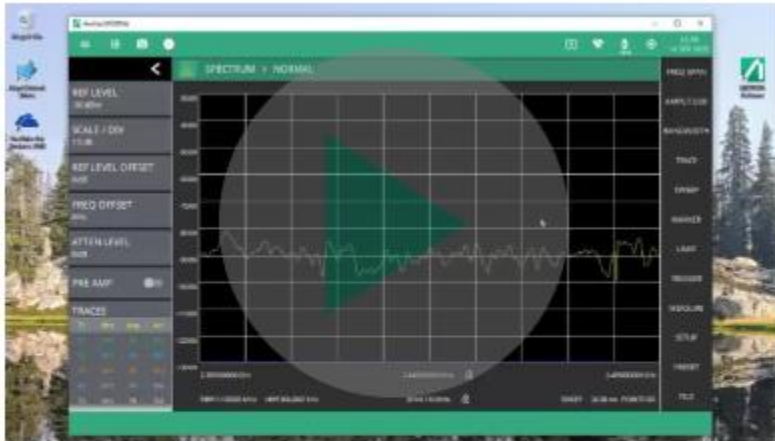


Polar plot highlights the presence of 2 transmitters in different directions

Use the split screen to view channel power and confirm frequency of transmitter under investigation.



6. Other useful tips



<https://www.youtube.com/watch?v=OzHBkqjzO4E>

Field Master Pro MS2090A PC Control Software

Field Master Pro PC Software

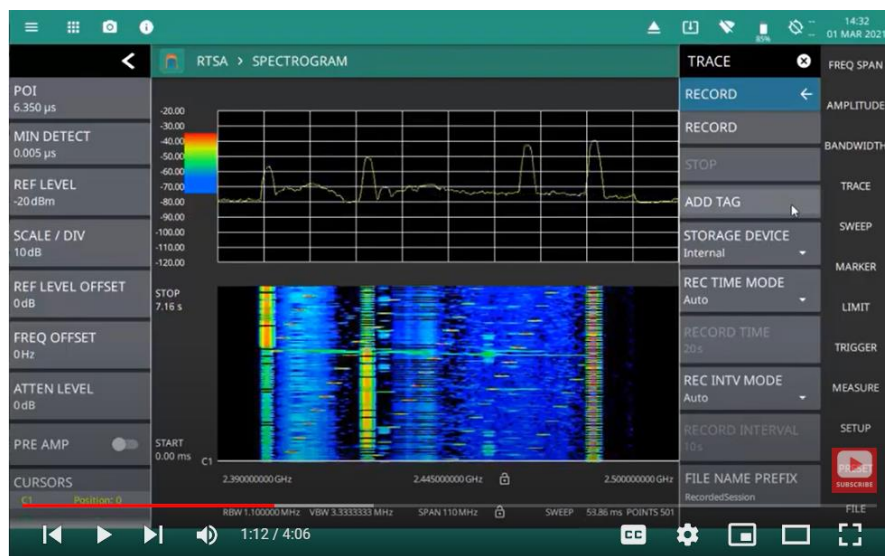
Remote user interface for the MS2090A. Connect to any MS2090A on the network by entering the IP address. Download and install on any PC using Windows 7, 8.1, or 10.

Drivers Software Downloads | exe 152.7 MB | Version: V2022.9.2 | 1/17/2023

<https://www.anritsu.com/en-us/test-measurement/support/downloads?model=MS2090A>

Record and Playback

Field Master Pro MS2090A Record Sample Data Setup Demo



Video Request Field Master Pro MS2090A Playback Tools Demo

Field Master Pro MS2090A Playback Sample Data Demo



Field Master Pro MS2090A Playback Tools Demo

https://www.youtube.com/watch?v=THOd4BO9Vaw&list=PLPZEMP4_R4QdRyMiLmWxVZrIhsPUrL7hF&index=8

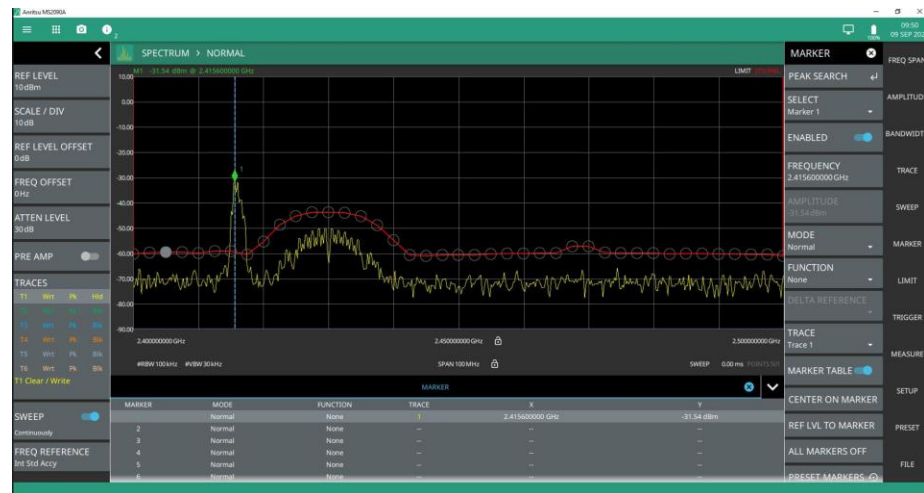
https://www.youtube.com/watch?v=Sv8lwMcaJKI&list=PLPZEMP4_R4QdRyMiLmWxVZrIhsPUrL7hF&index=9

Save on Event to capture intermittent interfering signals

Save On Event in Spectrum Analyzer mode (with and without Spectrogram)

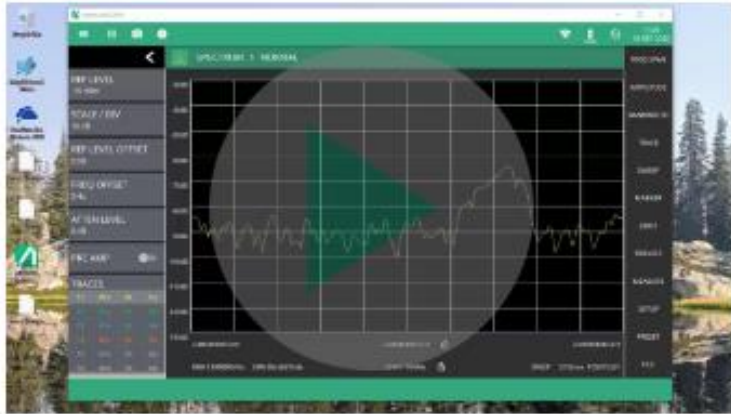


**Save on Event to capture
intermittent interfering signals**



https://www.youtube.com/watch?v=qXNr_3l578w

Saving and Recalling Files



<https://www.youtube.com/watch?v=m1y1FDaURYc>

Saving and Recalling Files Field Master Pro with PC Software

