

FCC Sub6 REPORT

Certification

Applicant Name:
 SAMSUNG Electronics Co., Ltd.

Date of Issue:
 October 17, 2023

Address:
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 Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Location:
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 Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-2310-FC071

FCC ID: A3LSMS926B

APPLICANT: SAMSUNG Electronics Co., Ltd.

Model(s): SM-S926B/DS
 Additional Model(s): SM-S926B
 EUT Type: Mobile phone
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 FCC Rule Part(s): §22

Main 1 Ant

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max. Power (W)	Max. Power (dBm)
Sub6 n5 (5)	826.5 – 846.5	4M50G7D	PI/2 BPSK	0.039	15.95
		4M53G7D	QPSK	0.039	15.92
		4M51W7D	16QAM	0.031	14.91
		4M50W7D	64QAM	0.022	13.37
		4M55W7D	256QAM	0.014	11.44
Sub6 n5 (10)	829.0 – 844.0	8M98G7D	PI/2 BPSK	0.039	15.90
		8M99G7D	QPSK	0.039	15.89
		9M00W7D	16QAM	0.031	14.93
		8M98W7D	64QAM	0.022	13.47
		9M07W7D	256QAM	0.014	11.50
Sub6 n5 (15)	831.5 – 841.5	13M5G7D	PI/2 BPSK	0.040	16.01
		13M5G7D	QPSK	0.040	15.99
		13M5W7D	16QAM	0.031	14.95
		13M5W7D	64QAM	0.022	13.45
		13M5W7D	256QAM	0.015	11.62
Sub6 n5 (20)	834.0 – 839.0	18M0G7D	PI/2 BPSK	0.042	16.25
		18M0G7D	QPSK	0.041	16.12
		18M2W7D	16QAM	0.032	15.09
		17M9W7D	64QAM	0.024	13.72
		18M0W7D	256QAM	0.015	11.72

Sub 1 Ant

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max. Power (W)	Max. Power (dBm)
Sub6 n5 (5)	826.5 – 846.5	4M51G7D	PI/2 BPSK	0.094	19.73
		4M53G7D	QPSK	0.092	19.65
		4M50W7D	16QAM	0.074	18.68
		4M55W7D	64QAM	0.051	17.05
		4M52W7D	256QAM	0.033	15.22
Sub6 n5 (10)	829.0 – 844.0	9M16G7D	PI/2 BPSK	0.089	19.50
		9M03G7D	QPSK	0.089	19.49
		8M98W7D	16QAM	0.070	18.45
		9M02W7D	64QAM	0.050	16.96
		9M10W7D	256QAM	0.031	14.94
Sub6 n5 (15)	831.5 – 841.5	13M5G7D	PI/2 BPSK	0.088	19.43
		13M5G7D	QPSK	0.087	19.39
		13M6W7D	16QAM	0.070	18.42
		13M6W7D	64QAM	0.049	16.86
		13M6W7D	256QAM	0.031	14.96
Sub6 n5 (20)	834.0 – 839.0	18M2G7D	PI/2 BPSK	0.089	19.48
		18M2G7D	QPSK	0.088	19.43
		18M2W7D	16QAM	0.069	18.36
		18M2W7D	64QAM	0.050	16.97
		18M2W7D	256QAM	0.031	14.98

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.
HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)

Report No.: HCT-RF-2310-FC071

REVIEWED BY



Report prepared by : Jae Ryang Do
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

Test Report Statement:

The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA.

The report shall not be reproduced except in full(only partly) without approval of the laboratory.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2310-FC071	October 17, 2023	- First Approval Report

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMS926B
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§22
EUT Type:	Mobile phone
Model(s):	SM-S926B/DS
Additional Model(s):	SM-S926B
SCS(kHz):	15
Bandwidth(MHz):	5, 10, 15, 20
Waveform:	CP-OFDM, DFT-S-OFDM
Modulation:	DFT-S-OFDM: PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM
Tx Frequency:	826.5 MHz – 846.5 MHz (Sub6 n5(5 MHz)) 829.0 MHz – 844.0 MHz (Sub6 n5(10 MHz)) 831.5 MHz – 841.5 MHz (Sub6 n5(15 MHz)) 834.0 MHz – 839.0 MHz (Sub6 n5(20 MHz))
Date(s) of Tests:	August 31, 2023 ~ October 14, 2023
Serial number:	Radiated: R3CW70NE1JK Conducted: R3CW70NDTRM(Main 1 ANT), R3CW70NE6SR(Sub 1 ANT)

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE, Sub6.

It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80/160 MHz), WIFI 6E, Bluetooth, BT LE, NFC, UWB, WPT.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.**

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- N/A (See SAR Report)
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-E-2016 Clause 2.2.17.

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5 % of the expected OBW, not to exceed 1 MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points > 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Note

1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
2. A half wave dipole is then substituted in place of the EUT. For emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

$$P_d \text{ (dBm)} = P_g \text{ (dBm)} - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value.
These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration
4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

3.3 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

Test Settings

1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $> 2 \times$ span / RBW
5. Detector = Peak
6. Trace mode = Max Hold
7. The trace was allowed to stabilize
8. Test channel : Low/ Middle/ High
9. Frequency range : We are performed all frequency to 10th harmonics from 9 kHz.

Test Note

1. Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data
3. For spurious emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated. The spurious emissions is calculated by the following formula;

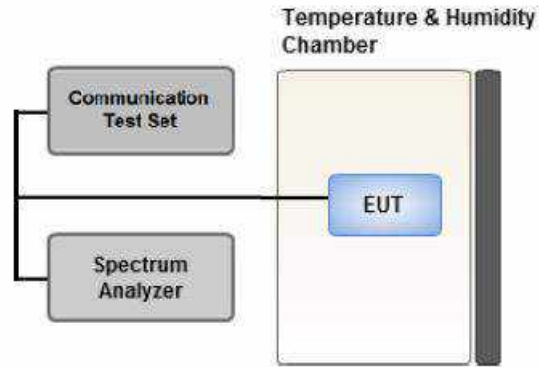
$$\text{Result (dBm)} = P_g \text{ (dBm)} - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

Where: P_g is the generator output power into the substitution antenna.

If the fundamental frequency is below 1 GHz, RF output power has been converted to EIRP.

$$\text{EIRP (dBm)} = \text{ERP (dBm)} + 2.15 \text{ dB}$$

3.4 PEAK- TO- AVERAGE RATIO



Test setup

① CCDF Procedure for PAPR

Test Settings

1. Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Set the measurement interval as follows:
 - for continuous transmissions, set to 1 ms,
 - or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
4. Record the maximum PAPR level associated with a probability of 0.1 %.

② Alternate Procedure for PAPR

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as P_{Pk} .

Use one of the applicable procedures presented 5.2(ANSI C63.26-2015) to measure the total average power and record as P_{Avg} . Determine the P.A.R. from:

$$P.A.R. (dB) = P_{Pk} (dBm) - P_{Avg} (dBm) \quad (P_{Avg} = \text{Average Power} + \text{Duty cycle Factor})$$

Test Settings(Peak Power)

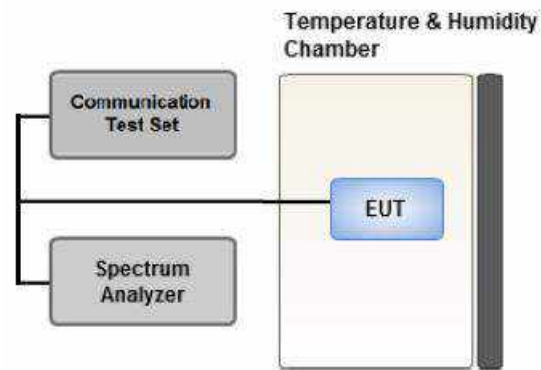
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW $\geq 3 \times$ RBW.

1. Set the RBW \geq OBW.
2. Set VBW $\geq 3 \times$ RBW.
3. Set span $\geq 2 \times$ OBW.
4. Sweep time $\geq 10 \times$ (number of points in sweep) \times (transmission symbol period).
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the peak amplitude level.

Test Settings(Average Power)

1. Set span to $2 \times$ to $3 \times$ the OBW.
2. Set RBW \geq OBW.
3. Set VBW $\geq 3 \times$ RBW.
4. Set number of measurement points in sweep $\geq 2 \times$ span / RBW.
5. Sweep time:
Set $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ for single sweep (automation-compatible) measurement. The transmission period is the (on + off) time.
6. Detector = power averaging (rms).
7. Set sweep trigger to "free run."
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. (To accurately determine the average power over the on and off period of the transmitter, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.)
9. Use the peak marker function to determine the maximum amplitude level.
10. Add $[10 \log (1/\text{duty cycle})]$ to the measured maximum power level to compute the average power during continuous transmission. For example, add $[10 \log (1/0.25)] = 6$ dB if the duty cycle is a constant 25 %.

3.5 OCCUPIED BANDWIDTH.



Test setup

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.

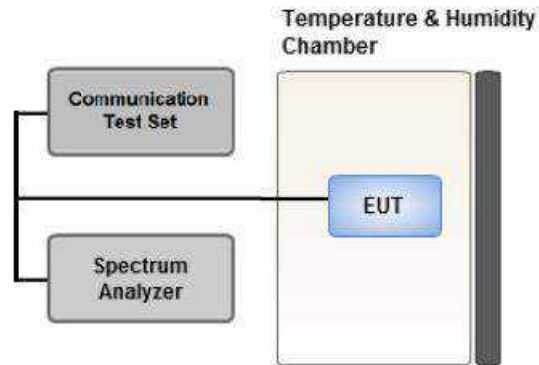
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5 % of the expected OBW
3. VBW \geq 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5 % of the 99 % occupied bandwidth observed in Step 7

3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

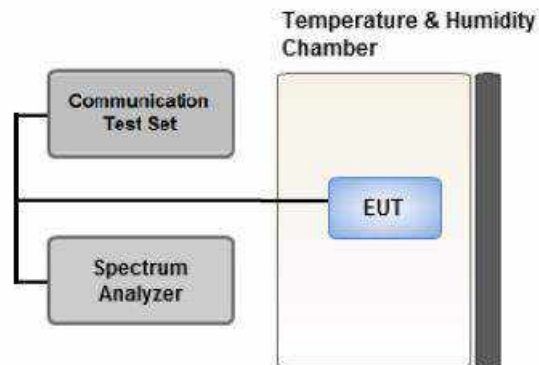
Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

1. RBW = 1 MHz
2. VBW \geq 3 MHz
3. Detector = RMS
4. Trace Mode = trace average
5. Sweep time = auto
6. Number of points in sweep \geq 2 x Span / RBW

3.7 BAND EDGE



Test setup

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points $\geq 2 \times \text{Span}/\text{RBW}$
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Notes

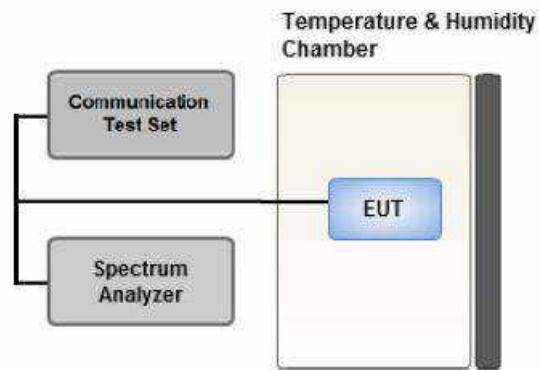
According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

All measurements were done at 2 channels (low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

Where Margin < 1 dB the emission level is either corrected by $10 \log(1 \text{ MHz}/\text{RB})$ or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge.

3.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015.

The frequency stability of the transmitter is measured by:

1. Temperature:

The temperature is varied from -30 °C to +50 °C in 10 °C increments using an environmental chamber.

2. Primary Supply Voltage:

- Unless otherwise specified, vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.

- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature

(20 °C to provide a reference).

2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

3.9 WORST CASE(RADIATED TEST)

- Waveform : All Waveform of operation were investigated and the worst case configuration results are reported.
(Worst case: DFT-S-OFDM)
- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
Mode: NSA. SA
Worst case: SA
Mode : Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc)
Worst case : Stand alone
- We were performed the RSE test in condition of co-location.
Mode : Stand alone, Simultaneous transmission scenarios
Worst case : Stand alone
- Radiated Spurious emissions are measured while operating in EN-DC mode with Sub 6 NR carrier as well as an LTE carrier (anchor).
All EN-DC mode of operation (=anchor) were investigated and the test results were measured No Peak Found.
The test results which are attenuated more than 20 dB below the permissible value, so it was not reported.
- All RB sizes, offsets of operation were investigated and the worst case configuration results are reported.
Please refer to the table below.
- In the case of radiated spurious emissions, all bandwidth of operation was investigated and the worst case bandwidth results are reported.
(Worst case : 20 MHz(Main 1 Ant), 5 MHz(Sub 1 Ant))
- SM-S926B/DS & additional models were tested and the worst case results are reported.
(Worst case : SM-S926B/DS)

[Main 1 Ant Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	See Section 8.1		Z
Radiated Spurious Emissions	PI/2 BPSK	See Section 8.1		Z

[Sub 1 Ant Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Radiated Power	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	See Section 8.1		X
Radiated Spurious Emissions	PI/2 BPSK	See Section 8.1		Z

3.10 WORST CASE(CONDUCTED TEST)

- Waveform : All Waveform of operation were investigated and the worst case configuration results are reported.

(Worst case: DFT-S-OFDM)

- Modulation : All Modulation of operation were investigated and the worst case configuration results are reported.

(Worst case: PI/2 BPSK)

- All modes of operation were investigated and the worst case configuration results are reported.

Mode: NSA, SA

Worst case: SA

- All RB sizes, offsets of operation were investigated and the worst case configuration results are reported.

Please refer to the table below.

- SM-S926B/DS & additional models were tested and the worst case results are reported.

(Worst case : SM-S926B/DS)

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth Peak- to- Average Ratio	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	5, 10, 15, 20	Mid	Full RB	0
Band Edge	PI/2 BPSK	5	Low	1	0
			High	1	24
		10	Low	1	0
			High	1	51
		15	Low	1	0
			High	1	78
		20	Low	1	0
			High	1	105
		5, 10, 15, 20	Low, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	PI/2 BPSK	5, 10, 15, 20	Low, Mid, High	1	1

4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacture	Serial No.	Due to Calibration	Calibration Interval
Precision Dipole Antenna	UHAP	Schwarzbeck	01273	03/27/2024	Biennial
Precision Dipole Antenna	UHAP	Schwarzbeck	01274	03/27/2024	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	02289	03/21/2024	Biennial
Horn Antenna(1~18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1299	04/27/2025	Biennial
Horn Antenna(15~40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Horn Antenna(15~40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Loop Antenna(9 kHz~30 MHz)	FMZB1513	Rohde & Schwarz	1513-175	01/16/2025	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/09/2025	Biennial
Hybrid Antenna	VULB9160	Schwarzbeck	760	02/24/2025	Biennial
RF Switching System	FBSR-06B (1G HPF + LNA)	T&M SYSTEM	F3L1	05/22/2024	Annual
RF Switching System	FBSR-06B (3G HPF + LNA)	T&M SYSTEM	F3L2	05/22/2024	Annual
RF Switching System	FBSR-06B (6G HPF + LNA)	T&M SYSTEM	F3L3	05/22/2024	Annual
RF Switching System	FBSR-06B (LNA)	T&M SYSTEM	F3L4	05/22/2024	Annual
Power Amplifier	CBL18265035	CERNEK	22966	12/01/2023	Annual
Power Amplifier	CBL26405040	CERNEK	25956	03/02/2024	Annual
DC Power Supply	E3632A	Hewlett Packard	MY40004427	08/25/2024	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	03/02/2024	Annual
Chamber	SU-642	ESPEC	93008124	02/22/2024	Annual
Signal Analyzer(10 Hz~26.5 GHz)	N9020A	Agilent	MY51110063	04/11/2024	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/19/2024	Annual
Spectrum Analyzer(10 Hz~40 GHz)	FSV40	REOHDE & SCHWARZ	101436	02/22/2024	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/10/2024	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287701	05/22/2024	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/23/2024	Annual
SIGNAL GENERATOR (100 kHz~40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	06/22/2024	Annual
Signal Analyzer(5 Hz~40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/24/2024	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/19/2024	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

Note:

1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
2. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (\pm dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.90 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.16 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.57 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (Above 40 GHz)	5.52 (Confidence level about 95 %, $k=2$)

6. SUMMARY OF TEST RESULTS

6.1 Test Condition: Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §22.917(a)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§2.1046	N/A	<u>See Note1</u>
Frequency stability / variation of ambient temperature	§2.1055, §22.355	< 2.5 ppm	PASS

Note:

1. See SAR Report
2. Conducted tests were tested using 5G Wireless Tester.

6.2 Test Condition: Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§22.913(a)(5)	< 7 Watts max. ERP	PASS
Radiated Spurious and Harmonic Emissions	§2.1053, §22.917(a)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

Note:

1. Radiated tests were tested using 5G Wireless Tester.

7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

Ch./ Freq.		Measured Level(dBm)	Substitute Level(dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
channel	Freq.(MHz)						W	dBm
128	824.20	-21.37	38.40	-10.61	0.95	H	0.483	26.84

$$\text{ERP} = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
- 2) During the test, the turn table is rotated until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

7.2 EIRP Sample Calculation

Ch./ Freq.		Measured Level(dBm)	Substitute Level(dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
channel	Freq.(MHz)						W	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	H	0.456	26.59

$$\text{EIRP} = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
- 2) During the test, the turn table is rotated until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

7.3. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W

GSM BW = 249 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

PSK Modulation

Emission Designator = 4M48G7D

LTE BW = 4.48 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

QAM Modulation

Emission Designator = 4M48W7D

LTE BW = 4.48 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

8. TEST DATA(Main 1 Ant)

8.1 EFFECTIVE RADIATED POWER

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP		RB	
									W	W dBm	Size	Offset
826.5	Sub6 n5/ 5 MHz [15 kHz]	PI/2 BPSK	-33.55	27.35	-10.05	1.39	H	< 7.00	0.039	15.91	1	12
		QPSK	-33.58	27.32	-10.05	1.39	H		0.039	15.88		
		16-QAM	-34.65	26.25	-10.05	1.39	H		0.030	14.81		
		64-QAM	-36.19	24.71	-10.05	1.39	H		0.021	13.27		
		256-QAM	-38.09	22.81	-10.05	1.39	H		0.014	11.37		
836.5		PI/2 BPSK	-34.43	26.86	-10.05	1.40	H		0.035	15.41	1	1
		QPSK	-34.45	26.84	-10.05	1.40	H		0.035	15.39		
		16-QAM	-35.46	25.83	-10.05	1.40	H		0.027	14.38		
		64-QAM	-36.95	24.34	-10.05	1.40	H		0.019	12.89		
		256-QAM	-38.87	22.42	-10.05	1.40	H		0.013	10.97		
846.5		PI/2 BPSK	-34.27	27.41	-10.05	1.41	H		0.039	15.95	1	12
		QPSK	-34.30	27.38	-10.05	1.41	H		0.039	15.92		
		16-QAM	-35.31	26.37	-10.05	1.41	H		0.031	14.91		
		64-QAM	-36.85	24.83	-10.05	1.41	H		0.022	13.37		
		256-QAM	-38.78	22.90	-10.05	1.41	H		0.014	11.44		

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP		RB	
									W	W	dBm	Size
829.0	Sub6 n5/ 10 MHz [15 kHz]	PI/2 BPSK	-33.68	27.34	-10.05	1.39	H	< 7.00	0.039	15.90	1	50
		QPSK	-33.69	27.33	-10.05	1.39	H		0.039	15.89		
		16-QAM	-34.65	26.37	-10.05	1.39	H		0.031	14.93		
		64-QAM	-36.11	24.91	-10.05	1.39	H		0.022	13.47		
		256-QAM	-38.08	22.94	-10.05	1.39	H		0.014	11.50		
836.5		PI/2 BPSK	-34.32	26.97	-10.05	1.40	H		0.036	15.52	1	26
		QPSK	-34.33	26.96	-10.05	1.40	H		0.036	15.51		
		16-QAM	-35.46	25.83	-10.05	1.40	H		0.027	14.38		
		64-QAM	-36.90	24.39	-10.05	1.40	H		0.020	12.94		
		256-QAM	-38.88	22.41	-10.05	1.40	H		0.012	10.96		
844.0	PI/2 BPSK	-34.28	27.20	-10.05	1.41	H	0.037	15.74	1	26		
	QPSK	-34.30	27.18	-10.05	1.41	H	0.037	15.72				
	16-QAM	-35.34	26.14	-10.05	1.41	H	0.029	14.68				
	64-QAM	-36.82	24.66	-10.05	1.41	H	0.021	13.20				
	256-QAM	-38.76	22.72	-10.05	1.41	H	0.013	11.26				

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP		RB	
									W	W	dBm	Size
831.5	Sub6 n5/ 15 MHz [15 kHz]	PI/2 BPSK	-33.68	27.45	-10.05	1.39	H	< 7.00	0.040	16.01	1	39
		QPSK	-33.70	27.43	-10.05	1.39	H		0.040	15.99		
		16-QAM	-34.74	26.39	-10.05	1.39	H		0.031	14.95		
		64-QAM	-36.24	24.89	-10.05	1.39	H		0.022	13.45		
		256-QAM	-38.07	23.06	-10.05	1.39	H		0.015	11.62		
836.5		PI/2 BPSK	-34.28	27.01	-10.05	1.40	H		0.036	15.56	1	39
		QPSK	-34.43	26.86	-10.05	1.40	H		0.035	15.41		
		16-QAM	-35.38	25.91	-10.05	1.40	H		0.028	14.46		
		64-QAM	-36.79	24.50	-10.05	1.40	H		0.020	13.05		
		256-QAM	-38.79	22.50	-10.05	1.40	H		0.013	11.05		
841.5		PI/2 BPSK	-34.22	27.20	-10.05	1.41	H		0.037	15.74	1	1
		QPSK	-34.27	27.15	-10.05	1.41	H		0.037	15.69		
		16-QAM	-35.20	26.22	-10.05	1.41	H		0.030	14.76		
		64-QAM	-36.86	24.56	-10.05	1.41	H		0.020	13.10		
		256-QAM	-38.75	22.67	-10.05	1.41	H		0.013	11.21		

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP		RB	
									W	W	dBm	Size
834.0	Sub6 n5/ 20 MHz [15 kHz]	PI/2 BPSK	-33.52	27.69	-10.05	1.39	H	< 7.00	0.042	16.25	1	53
		QPSK	-33.65	27.56	-10.05	1.39	H		0.041	16.12		
		16-QAM	-34.68	26.53	-10.05	1.39	H		0.032	15.09		
		64-QAM	-36.05	25.16	-10.05	1.39	H		0.024	13.72		
		256-QAM	-38.05	23.16	-10.05	1.39	H		0.015	11.72		
836.5		PI/2 BPSK	-34.35	26.94	-10.05	1.40	H		0.035	15.49	1	53
		QPSK	-34.36	26.93	-10.05	1.40	H		0.035	15.48		
		16-QAM	-35.38	25.91	-10.05	1.40	H		0.028	14.46		
		64-QAM	-36.78	24.51	-10.05	1.40	H		0.020	13.06		
		256-QAM	-38.69	22.60	-10.05	1.40	H		0.013	11.15		
839.0		PI/2 BPSK	-34.21	27.24	-10.05	1.40	H		0.038	15.79	1	53
		QPSK	-34.37	27.08	-10.05	1.40	H		0.037	15.63		
		16-QAM	-35.35	26.10	-10.05	1.40	H		0.029	14.65		
		64-QAM	-36.81	24.64	-10.05	1.40	H		0.021	13.19		
		256-QAM	-38.67	22.78	-10.05	1.40	H		0.014	11.33		

8.2 RADIATED SPURIOUS EMISSIONS

- NR Band: N5
- Bandwidth: 20 MHz
- Modulation: PI/2 BPSK
- Distance: 3 meters
- SCS: 15 kHz

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit (dBm)	RB	
									Size	Offset
166800 (834.0)	1 668.00	-56.93	9.20	-66.07	2.04	H	-58.91	-13.00	1	53
	2 502.00	-53.81	10.30	-58.75	2.47	H	-50.92	-13.00		
	3 336.00	-59.52	10.90	-61.99	2.90	H	-53.99	-13.00		
	4 170.00	-61.69	11.30	-60.80	3.26	H	-52.76	-13.00		
	5 004.00	-60.53	10.70	-55.38	3.61	H	-48.29	-13.00		
167300 (836.5)	1 673.00	-57.35	9.20	-66.53	2.03	H	-59.36	-13.00	1	53
	2 509.50	-53.80	10.30	-58.33	2.50	H	-50.53	-13.00		
	3 346.00	-60.84	10.95	-63.73	2.89	H	-55.67	-13.00		
	4 182.50	-61.48	11.30	-61.33	3.30	H	-53.33	-13.00		
	5 019.00	-62.64	10.70	-57.58	3.55	H	-50.43	-13.00		
167800 (839.0)	1 678.00	-57.18	9.20	-66.39	2.03	H	-59.22	-13.00	1	53
	2 517.00	-54.26	10.30	-58.51	2.51	H	-50.72	-13.00		
	3 356.00	-60.90	11.00	-63.55	2.91	H	-55.46	-13.00		
	4 195.00	-61.75	11.25	-61.60	3.30	H	-53.65	-13.00		
	5 034.00	-60.91	10.70	-56.40	3.58	H	-49.28	-13.00		

8.3 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
Sub6 n5	5 MHz	836.5	BPSK	25	0	4.31
			QPSK			5.36
			16-QAM			6.19
			64-QAM			6.36
			256-QAM			6.35
	10 MHz		BPSK	50		4.30
			QPSK			5.38
			16-QAM			6.12
			64-QAM			6.37
			256-QAM			6.45
	15 MHz		BPSK	75		4.32
			QPSK			5.44
			16-QAM			6.08
			64-QAM			6.44
			256-QAM			6.49
	20 MHz		BPSK	100		4.58
			QPSK			5.42
			16-QAM			6.20
			64-QAM			6.43
			256-QAM			6.41

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 70 ~ 89.

8.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Sub6 n5	5 MHz	836.5	BPSK	25	0	4.4974
			QPSK			4.5314
			16-QAM			4.5136
			64-QAM			4.5039
			256-QAM			4.5483
	10 MHz		BPSK	50		8.9791
			QPSK			8.9881
			16-QAM			8.9951
			64-QAM			8.9749
			256-QAM			9.0718
	15 MHz		BPSK	75		13.504
			QPSK			13.493
			16-QAM			13.468
			64-QAM			13.452
			256-QAM			13.487
	20 MHz		BPSK	100		17.970
			QPSK			17.953
			16-QAM			18.165
			64-QAM			17.926
			256-QAM			17.950

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 50 ~ 69.

8.5 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
Sub6 n5	5	826.5	9.4377	30.815	-74.360	-43.545	-13.00
		836.5	8.2493	30.815	-74.515	-43.700	
		846.5	6.0015	30.815	-74.680	-43.865	
	10	829.0	3.7707	30.200	-74.220	-44.020	
		836.5	3.8186	30.200	-74.540	-44.340	
		844.0	8.3066	30.815	-74.720	-43.905	
	15	831.5	9.4242	30.815	-73.831	-43.016	
		836.5	4.8874	30.200	-73.627	-43.427	
		841.5	8.2996	30.815	-73.679	-42.864	
	20	834.0	4.0095	30.200	-74.998	-44.798	
		836.5	4.0499	30.200	-74.472	-44.272	
		839.0	8.0349	30.815	-74.551	-43.736	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 114 ~ 125.
2. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
3. Factor(dB) = Cable Loss + Ext. Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 – 1	27.494
1 – 5	30.200
5 – 10	30.815
10 – 15	31.340
15 – 20	31.713
Above 20	32.355

8.6 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 90 ~ 113.

8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

- ▣ BandWidth: 5 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
836.5	100 %	+20(Ref)	836 500 004	0.0	0.000 000	0.000
	100 %	-30	836 500 006	2.1	0.000 000	0.002
	100 %	-20	836 500 005	1.1	0.000 000	0.001
	100 %	-10	836 500 007	2.6	0.000 000	0.003
	100 %	0	836 500 001	-2.7	0.000 000	-0.003
	100 %	+10	836 500 004	0.0	0.000 000	0.000
	100 %	+30	836 500 006	1.8	0.000 000	0.002
	100 %	+40	836 500 004	0.2	0.000 000	0.000
	100 %	+50	836 500 002	-1.7	0.000 000	-0.002
	Batt. Endpoint	+20	836 500 006	1.7	0.000 000	0.002

- ▣ BandWidth: 10 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
836.5	100 %	+20(Ref)	836 500 000	0.0	0.000 000	0.000
	100 %	-30	836 500 002	1.9	0.000 000	0.002
	100 %	-20	836 500 000	-0.1	0.000 000	0.000
	100 %	-10	836 499 999	-1.3	0.000 000	-0.002
	100 %	0	836 500 003	2.4	0.000 000	0.003
	100 %	+10	836 500 001	0.9	0.000 000	0.001
	100 %	+30	836 499 998	-2.0	0.000 000	-0.002
	100 %	+40	836 500 000	-0.8	0.000 000	-0.001
	100 %	+50	836 500 002	1.7	0.000 000	0.002
	Batt. Endpoint	+20	836 500 005	4.6	0.000 001	0.005

- ▣ BandWidth: 15 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
836.5	100 %	+20(Ref)	836 500 001	0.0	0.000 000	0.000
	100 %	-30	836 500 002	0.6	0.000 000	0.001
	100 %	-20	836 500 002	1.2	0.000 000	0.001
	100 %	-10	836 500 003	2.1	0.000 000	0.002
	100 %	0	836 500 000	-0.8	0.000 000	-0.001
	100 %	+10	836 500 002	0.9	0.000 000	0.001
	100 %	+30	836 500 001	0.0	0.000 000	0.000
	100 %	+40	836 500 000	-1.5	0.000 000	-0.002
	100 %	+50	836 500 003	1.9	0.000 000	0.002
	Batt. Endpoint	+20	836 500 002	1.1	0.000 000	0.001

- ▣ BandWidth: 20 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
836.5	100 %	+20(Ref)	836 500 000	0.0	0.000 000	0.000
	100 %	-30	836 500 001	0.4	0.000 000	0.000
	100 %	-20	836 500 001	0.2	0.000 000	0.000
	100 %	-10	836 500 000	-0.1	0.000 000	0.000
	100 %	0	836 500 002	2.0	0.000 000	0.002
	100 %	+10	836 500 000	-0.1	0.000 000	0.000
	100 %	+30	836 500 009	8.6	0.000 001	0.010
	100 %	+40	836 499 999	-1.2	0.000 000	-0.001
	100 %	+50	836 500 002	1.3	0.000 000	0.002
	Batt. Endpoint	+20	836 500 003	2.4	0.000 000	0.003

9. TEST DATA(Sub 1 Ant)

9.1 EFFECTIVE RADIATED POWER

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP		RB	
									W	W dBm	Size	Offset
826.5	Sub6 n5/ 5 MHz [15 kHz]	PI/2 BPSK	-30.35	30.55	-10.05	1.39	H	< 7.00	0.081	19.11	1	1
		QPSK	-30.36	30.54	-10.05	1.39	H		0.081	19.10		
		16-QAM	-31.40	29.50	-10.05	1.39	H		0.064	18.06		
		64-QAM	-32.85	28.05	-10.05	1.39	H		0.046	16.61		
		256-QAM	-34.84	26.06	-10.05	1.39	H		0.029	14.62		
836.5		PI/2 BPSK	-30.47	30.82	-10.05	1.40	H		0.086	19.37	1	12
		QPSK	-30.57	30.72	-10.05	1.40	H		0.085	19.27		
		16-QAM	-31.56	29.73	-10.05	1.40	H		0.067	18.28		
		64-QAM	-33.04	28.25	-10.05	1.40	H		0.048	16.80		
		256-QAM	-34.99	26.30	-10.05	1.40	H		0.031	14.85		
846.5		PI/2 BPSK	-30.49	31.19	-10.05	1.41	H		0.094	19.73	1	1
		QPSK	-30.57	31.11	-10.05	1.41	H		0.092	19.65		
		16-QAM	-31.54	30.14	-10.05	1.41	H		0.074	18.68		
		64-QAM	-33.17	28.51	-10.05	1.41	H		0.051	17.05		
		256-QAM	-35.00	26.68	-10.05	1.41	H		0.033	15.22		

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP		RB	
									W	W	dBm	Size
829.0	Sub6 n5/ 10 MHz [15 kHz]	PI/2 BPSK	-30.34	30.68	-10.05	1.39	H	< 7.00	0.084	19.24	1	1
		QPSK	-30.39	30.63	-10.05	1.39	H		0.083	19.19		
		16-QAM	-31.47	29.55	-10.05	1.39	H		0.065	18.11		
		64-QAM	-32.87	28.15	-10.05	1.39	H		0.047	16.71		
		256-QAM	-34.70	26.32	-10.05	1.39	H		0.031	14.88		
836.5		PI/2 BPSK	-30.60	30.69	-10.05	1.40	H		0.084	19.24	1	1
		QPSK	-30.65	30.64	-10.05	1.40	H		0.083	19.19		
		16-QAM	-31.60	29.69	-10.05	1.40	H		0.067	18.24		
		64-QAM	-33.25	28.04	-10.05	1.40	H		0.046	16.59		
		256-QAM	-35.11	26.18	-10.05	1.40	H		0.030	14.73		
844.0	PI/2 BPSK	-30.52	30.96	-10.05	1.41	H	0.089	19.50	1	26		
	QPSK	-30.53	30.95	-10.05	1.41	H	0.089	19.49				
	16-QAM	-31.57	29.91	-10.05	1.41	H	0.070	18.45				
	64-QAM	-33.06	28.42	-10.05	1.41	H	0.050	16.96				
	256-QAM	-35.08	26.40	-10.05	1.41	H	0.031	14.94				

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP		RB	
									W	W	dBm	Size
831.5	Sub6 n5/ 15 MHz [15 kHz]	PI/2 BPSK	-30.34	30.79	-10.05	1.39	H	< 7.00	0.086	19.35	1	1
		QPSK	-30.36	30.77	-10.05	1.39	H		0.086	19.33		
		16-QAM	-31.33	29.80	-10.05	1.39	H		0.069	18.36		
		64-QAM	-32.92	28.21	-10.05	1.39	H		0.048	16.77		
		256-QAM	-34.76	26.37	-10.05	1.39	H		0.031	14.93		
836.5		PI/2 BPSK	-30.50	30.79	-10.05	1.40	H		0.086	19.34	1	39
		QPSK	-30.58	30.71	-10.05	1.40	H		0.084	19.26		
		16-QAM	-31.57	29.72	-10.05	1.40	H		0.067	18.27		
		64-QAM	-33.00	28.29	-10.05	1.40	H		0.048	16.84		
		256-QAM	-35.04	26.25	-10.05	1.40	H		0.030	14.80		
841.5	PI/2 BPSK	-30.53	30.89	-10.05	1.41	H	0.088	19.43	1	39		
	QPSK	-30.57	30.85	-10.05	1.41	H	0.087	19.39				
	16-QAM	-31.54	29.88	-10.05	1.41	H	0.070	18.42				
	64-QAM	-33.10	28.32	-10.05	1.41	H	0.049	16.86				
	256-QAM	-35.00	26.42	-10.05	1.41	H	0.031	14.96				

Freq (MHz)	Mod/ Bandwidth [SCS (kHz)]	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP		RB	
									W	W	dBm	Size
834.0	Sub6 n5/ 20 MHz [15 kHz]	PI/2 BPSK	-30.38	30.83	-10.05	1.39	H	< 7.00	0.087	19.39	1	1
		QPSK	-30.40	30.81	-10.05	1.39	H		0.086	19.37		
		16-QAM	-31.41	29.80	-10.05	1.39	H		0.069	18.36		
		64-QAM	-32.80	28.41	-10.05	1.39	H		0.050	16.97		
		256-QAM	-34.81	26.40	-10.05	1.39	H		0.031	14.96		
836.5		PI/2 BPSK	-30.49	30.80	-10.05	1.40	H		0.086	19.35	1	1
		QPSK	-30.50	30.79	-10.05	1.40	H		0.086	19.34		
		16-QAM	-31.50	29.79	-10.05	1.40	H		0.068	18.34		
		64-QAM	-33.09	28.20	-10.05	1.40	H		0.047	16.75		
		256-QAM	-34.94	26.35	-10.05	1.40	H		0.031	14.90		
839.0		PI/2 BPSK	-30.52	30.93	-10.05	1.40	H		0.089	19.48	1	53
		QPSK	-30.57	30.88	-10.05	1.40	H		0.088	19.43		
		16-QAM	-31.67	29.78	-10.05	1.40	H		0.068	18.33		
		64-QAM	-33.16	28.29	-10.05	1.40	H		0.048	16.84		
		256-QAM	-35.02	26.43	-10.05	1.40	H		0.031	14.98		

9.2 RADIATED SPURIOUS EMISSIONS

- NR Band: N5
- Bandwidth: 5 MHz
- Modulation: PI/2 BPSK
- Distance: 3 meters
- SCS: 15 kHz

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit (dBm)	RB	
									Size	Offset
165300 (826.5)	1 653.00	-54.02	9.20	-62.93	2.03	H	-55.76	-13.00	1	1
	2 479.50	-41.11	10.20	-44.36	2.45	V	-36.61	-13.00		
	3 306.00	-60.77	10.90	-62.81	2.92	H	-54.83	-13.00		
	4 132.50	-60.11	11.30	-59.96	3.25	H	-51.91	-13.00		
	4 959.00	-61.56	10.90	-57.27	3.58	H	-49.95	-13.00		
167300 (836.5)	1 673.00	-55.56	9.20	-64.74	2.03	H	-57.57	-13.00	1	12
	2 509.50	-42.55	10.30	-47.08	2.50	V	-39.28	-13.00		
	3 346.00	-61.12	10.95	-64.01	2.89	H	-55.95	-13.00		
	4 182.50	-61.11	11.30	-60.96	3.30	H	-52.96	-13.00		
	5 019.00	-61.32	10.70	-56.26	3.55	H	-49.11	-13.00		
169300 (846.5)	1 693.00	-56.65	9.40	-65.27	2.00	V	-57.87	-13.00	1	1
	2 539.50	-41.58	10.30	-46.41	2.52	H	-38.63	-13.00		
	3 386.00	-59.01	11.00	-61.49	2.94	V	-53.43	-13.00		
	4 232.50	-60.88	11.20	-59.96	3.28	V	-52.04	-13.00		
	5 079.00	-60.83	10.70	-55.67	3.61	V	-48.58	-13.00		

9.3 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
Sub6 n5	5 MHz	836.5	BPSK	25	0	5.97
			QPSK			5.98
			16-QAM			6.49
			64-QAM			6.62
			256-QAM			6.33
	10 MHz		BPSK	50		5.38
			QPSK			5.73
			16-QAM			6.29
			64-QAM			6.46
			256-QAM			6.42
	15 MHz		BPSK	75		4.63
			QPSK			5.60
			16-QAM			6.35
			64-QAM			6.39
			256-QAM			6.81
	20 MHz		BPSK	100		5.66
			QPSK			5.84
			16-QAM			6.22
			64-QAM			6.36
			256-QAM			6.69

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 147 ~ 166.

9.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Sub6 n5	5 MHz	836.5	BPSK	25	0	4.5087
			QPSK			4.5296
			16-QAM			4.5023
			64-QAM			4.5486
			256-QAM			4.5171
	10 MHz		BPSK	50		9.1620
			QPSK			9.0293
			16-QAM			8.9828
			64-QAM			9.0149
			256-QAM			9.1027
	15 MHz		BPSK	75		13.458
			QPSK			13.496
			16-QAM			13.618
			64-QAM			13.629
			256-QAM			13.619
	20 MHz		BPSK	100		18.172
			QPSK			18.163
			16-QAM			18.147
			64-QAM			18.192
			256-QAM			18.151

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 127 ~ 146.

9.5 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
Sub6 n5	5	826.5	9.9556	30.815	-75.362	-44.547	-13.00
		836.5	6.0065	30.815	-74.256	-43.441	
		846.5	8.2557	30.815	-75.231	-44.416	
	10	829.0	9.7527	30.815	-75.191	-44.376	
		836.5	7.1331	30.815	-74.852	-44.037	
		844.0	8.0314	30.815	-75.053	-44.238	
	15	831.5	8.2797	30.815	-74.447	-43.632	
		836.5	5.7393	30.815	-75.430	-44.615	
		841.5	8.2607	30.815	-75.005	-44.190	
	20	834.0	8.8500	30.815	-74.719	-43.904	
		836.5	8.5877	30.815	-74.649	-43.834	
		839.0	4.5758	30.200	-75.237	-45.037	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 191 ~ 202.
2. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
3. Factor(dB) = Cable Loss + Ext. Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 – 1	27.494
1 – 5	30.200
5 – 10	30.815
10 – 15	31.340
15 – 20	31.713
Above 20	32.355

9.6 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 167 ~ 190.

9.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

- ▣ BandWidth: 5 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
836.5	100 %	+20(Ref)	836 500 000	0.0	0.000 000	0.000
	100 %	-30	836 500 002	1.2	0.000 000	0.001
	100 %	-20	836 500 002	1.6	0.000 000	0.002
	100 %	-10	836 500 001	0.7	0.000 000	0.001
	100 %	0	836 500 001	0.1	0.000 000	0.000
	100 %	+10	836 500 002	1.1	0.000 000	0.001
	100 %	+30	836 500 001	0.5	0.000 000	0.001
	100 %	+40	836 500 001	0.6	0.000 000	0.001
	100 %	+50	836 500 000	-0.4	0.000 000	0.000
	Batt. Endpoint	+20	836 500 001	0.7	0.000 000	0.001

- ▣ BandWidth: 10 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
836.5	100 %	+20(Ref)	836 500 000	0.0	0.000 000	0.000
	100 %	-30	836 500 001	0.3	0.000 000	0.000
	100 %	-20	836 500 001	0.8	0.000 000	0.001
	100 %	-10	836 500 001	0.5	0.000 000	0.001
	100 %	0	836 500 000	-0.3	0.000 000	0.000
	100 %	+10	836 500 001	0.4	0.000 000	0.000
	100 %	+30	836 500 000	0.2	0.000 000	0.000
	100 %	+40	836 500 001	0.9	0.000 000	0.001
	100 %	+50	836 500 001	0.8	0.000 000	0.001
	Batt. Endpoint	+20	836 500 000	-0.4	0.000 000	0.000

- ▣ BandWidth: 15 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ Deviation Limit: ± 0.000 25 % or 2.5 ppm

Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
836.5	100 %	+20(Ref)	836 500 000	0.0	0.000 000	0.000
	100 %	-30	836 500 000	0.0	0.000 000	0.000
	100 %	-20	836 500 001	0.7	0.000 000	0.001
	100 %	-10	836 500 000	0.6	0.000 000	0.001
	100 %	0	836 500 000	0.2	0.000 000	0.000
	100 %	+10	836 500 001	1.1	0.000 000	0.001
	100 %	+30	836 499 999	-0.8	0.000 000	-0.001
	100 %	+40	836 500 000	0.4	0.000 000	0.000
	100 %	+50	836 500 000	-0.2	0.000 000	0.000
	Batt. Endpoint	+20	836 500 001	0.8	0.000 000	0.001

- ▣ BandWidth: 20 MHz
- ▣ Voltage(100 %): 3.880 VDC
- ▣ Batt. Endpoint: 3.300 VDC
- ▣ Deviation Limit: ± 0.000 25 % or 2.5 ppm

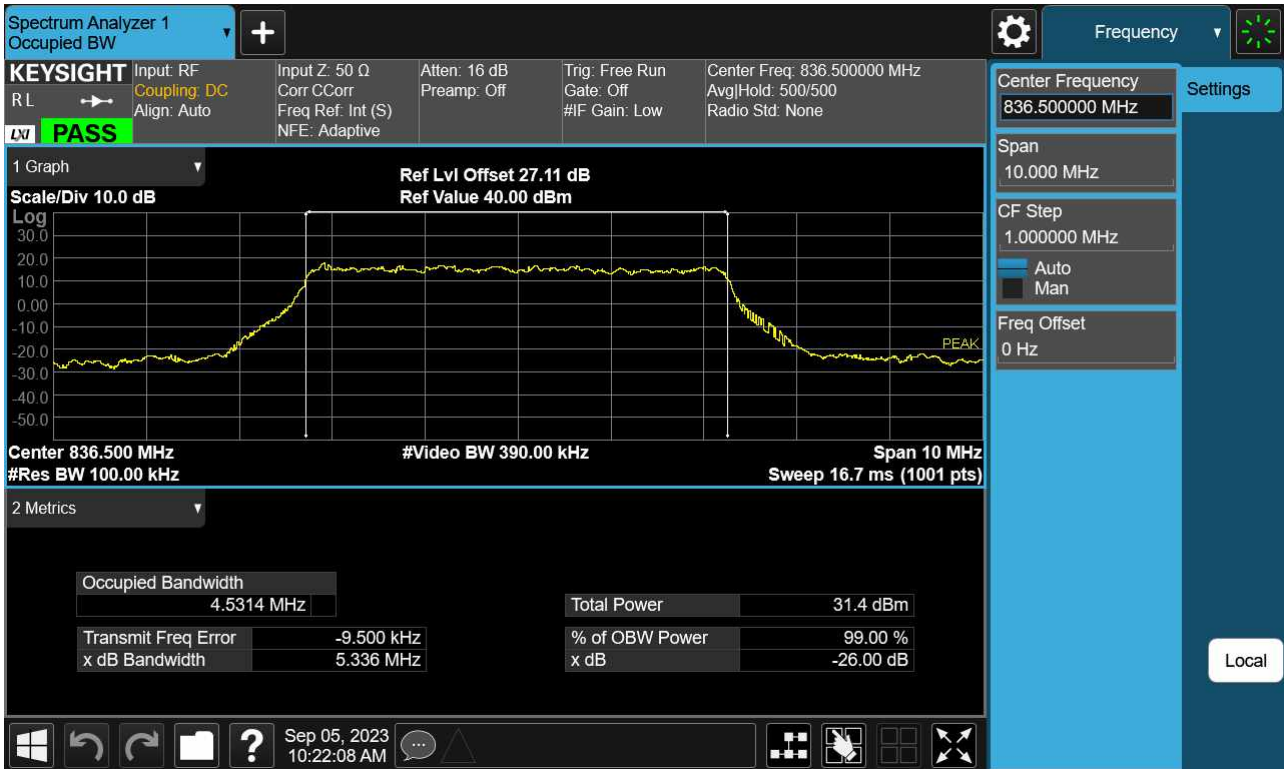
Test. Frequency (MHz)	Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
836.5	100 %	+20(Ref)	836 500 000	0.0	0.000 000	0.000
	100 %	-30	836 499 999	-0.9	0.000 000	-0.001
	100 %	-20	836 499 999	-0.6	0.000 000	-0.001
	100 %	-10	836 499 998	-1.5	0.000 000	-0.002
	100 %	0	836 500 000	0.4	0.000 000	0.000
	100 %	+10	836 500 000	0.2	0.000 000	0.000
	100 %	+30	836 500 000	-0.2	0.000 000	0.000
	100 %	+40	836 500 000	0.1	0.000 000	0.000
	100 %	+50	836 500 000	0.3	0.000 000	0.000
	Batt. Endpoint	+20	836 500 001	1.0	0.000 000	0.001

10. TEST PLOTS(Main 1 Ant)

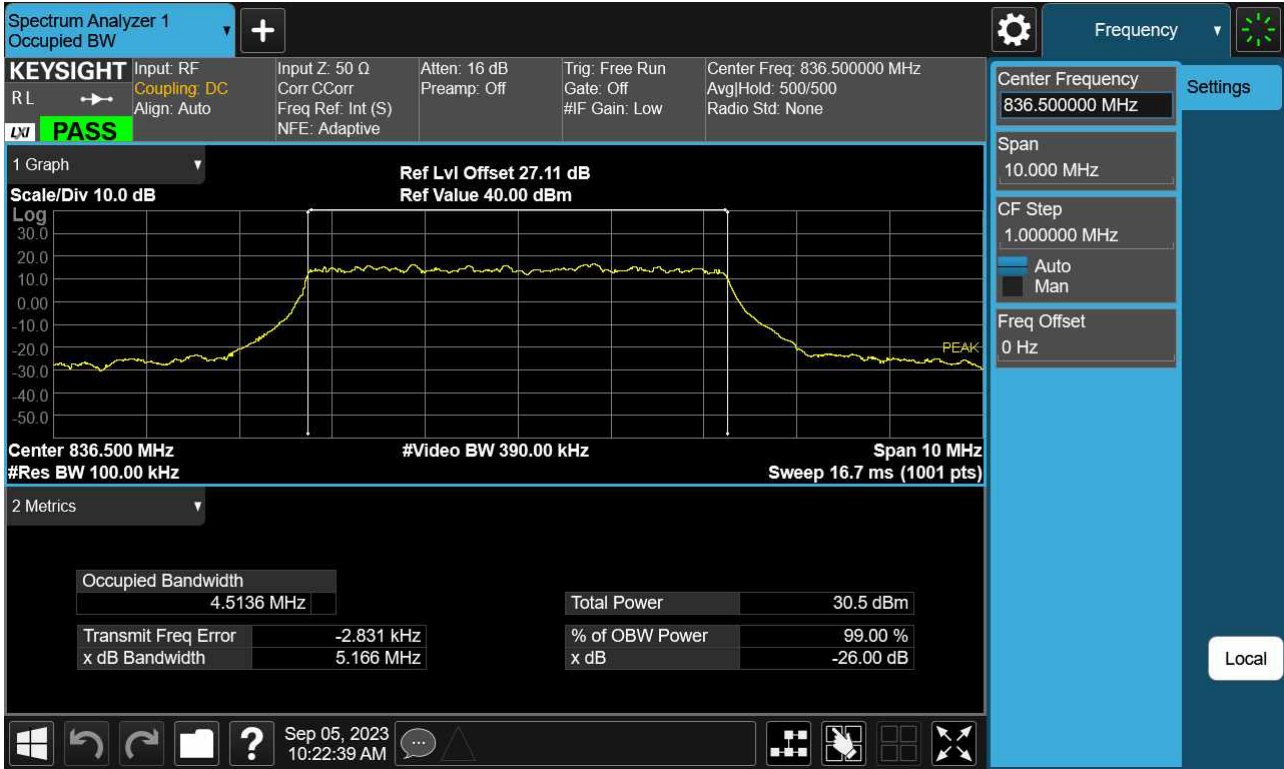
Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 BPSK_Full RB_0)



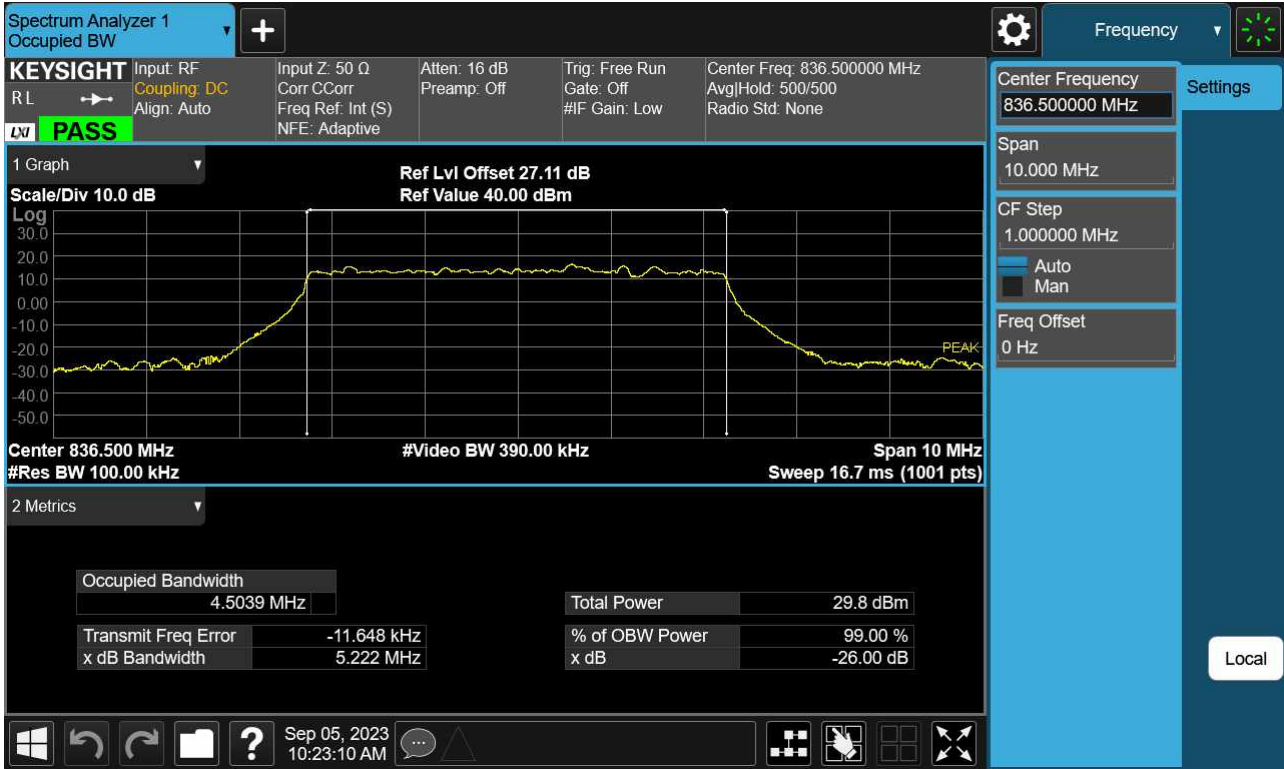
Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 QPSK_ Full RB _0)



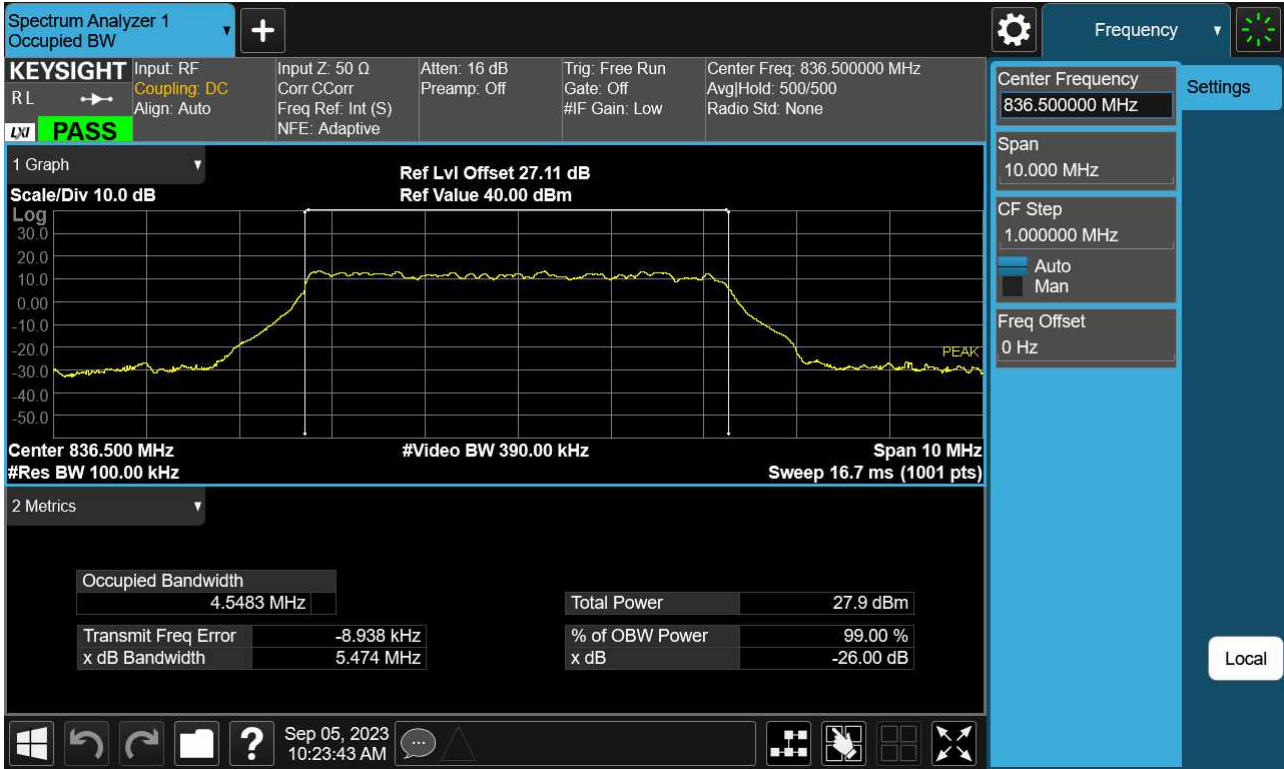
Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 16QAM_ Full RB _0)



Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 64QAM_ Full RB _0)



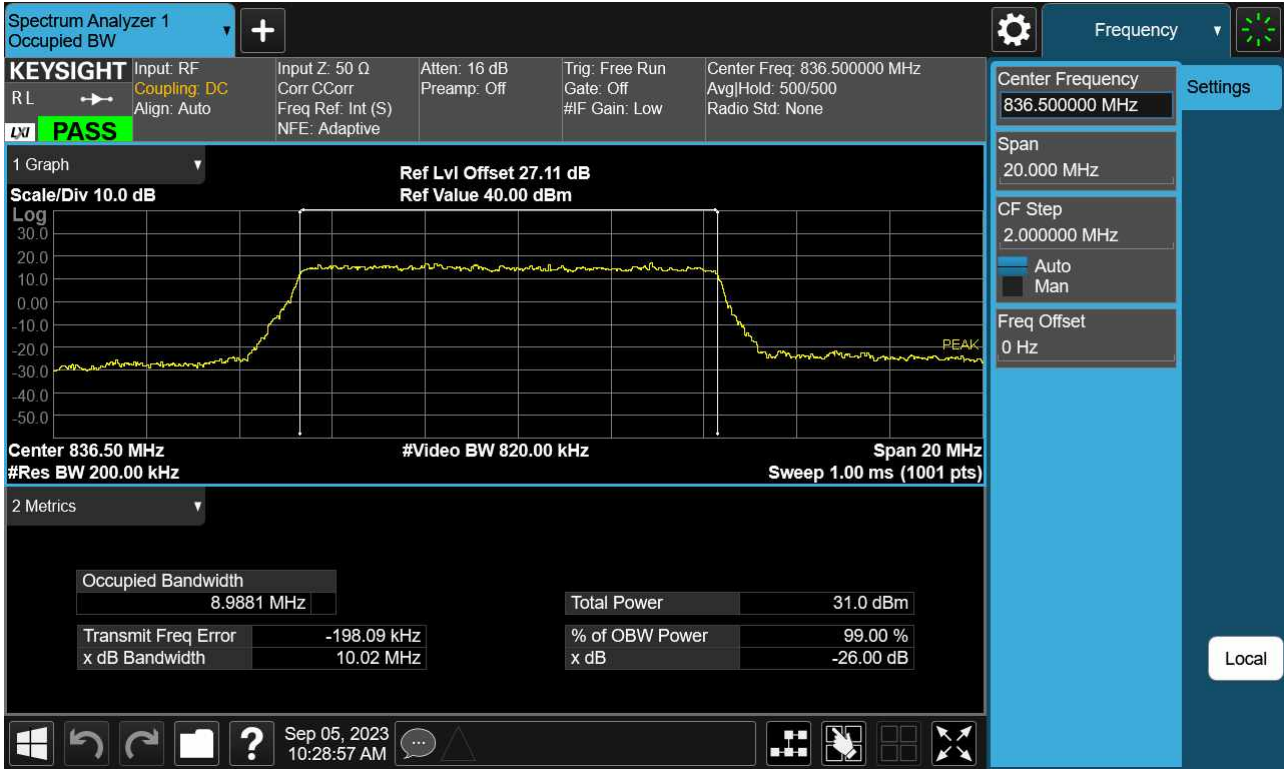
Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 256QAM_ Full RB _0)



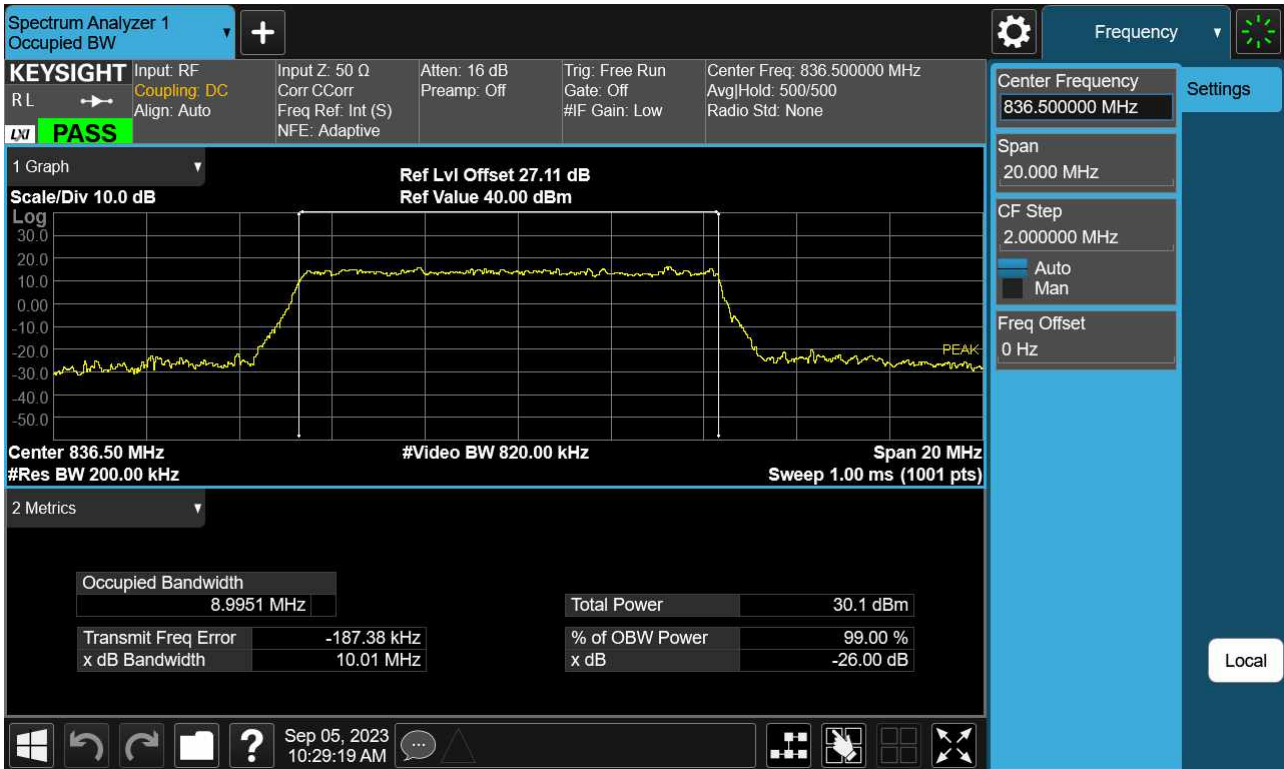
Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 BPSK_ Full RB _0)



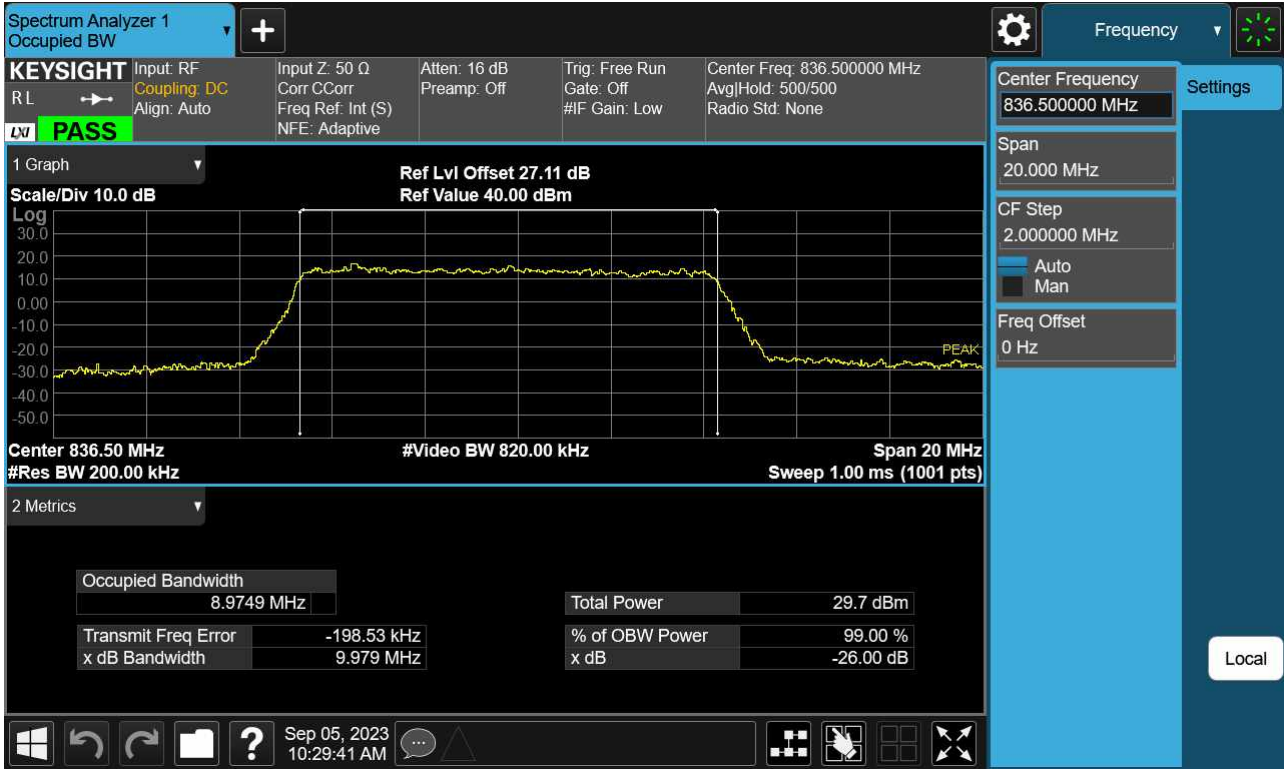
Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 QPSK_ Full RB _0)



Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 16QAM_ Full RB_0)



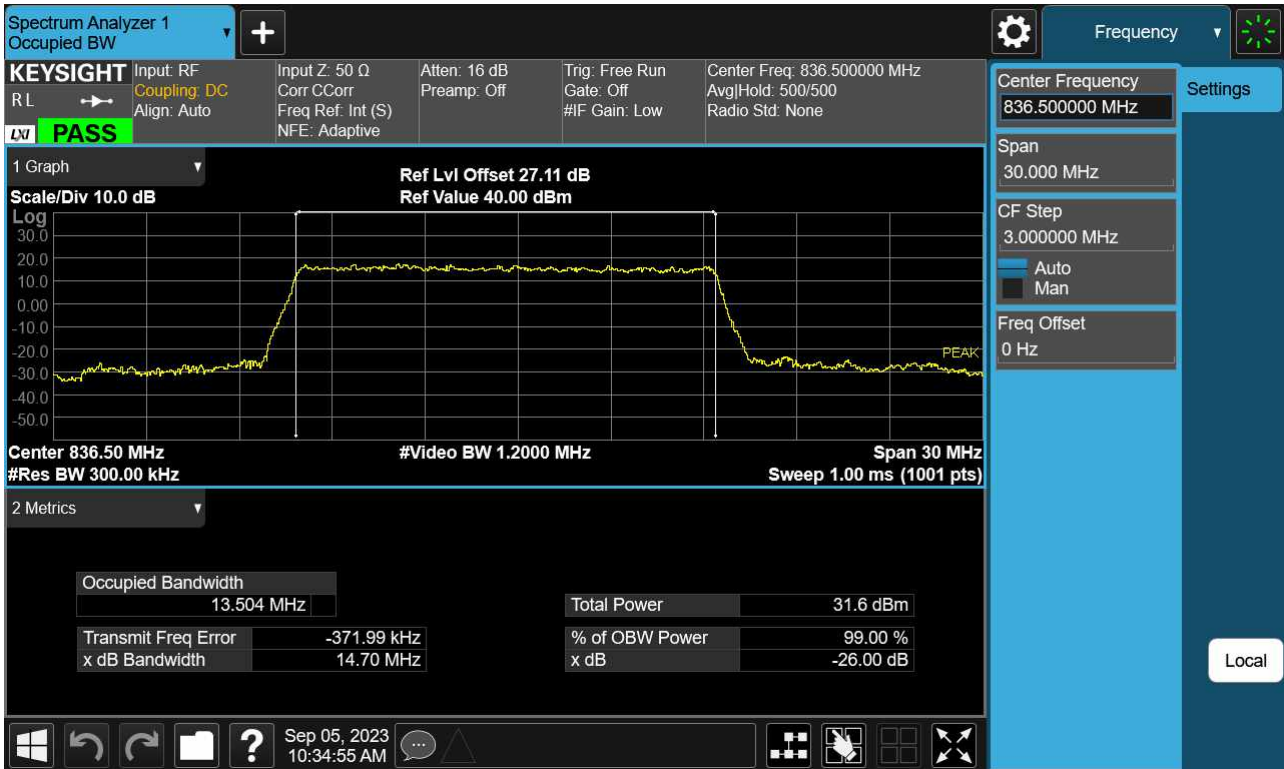
Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 64QAM_ Full RB _0)



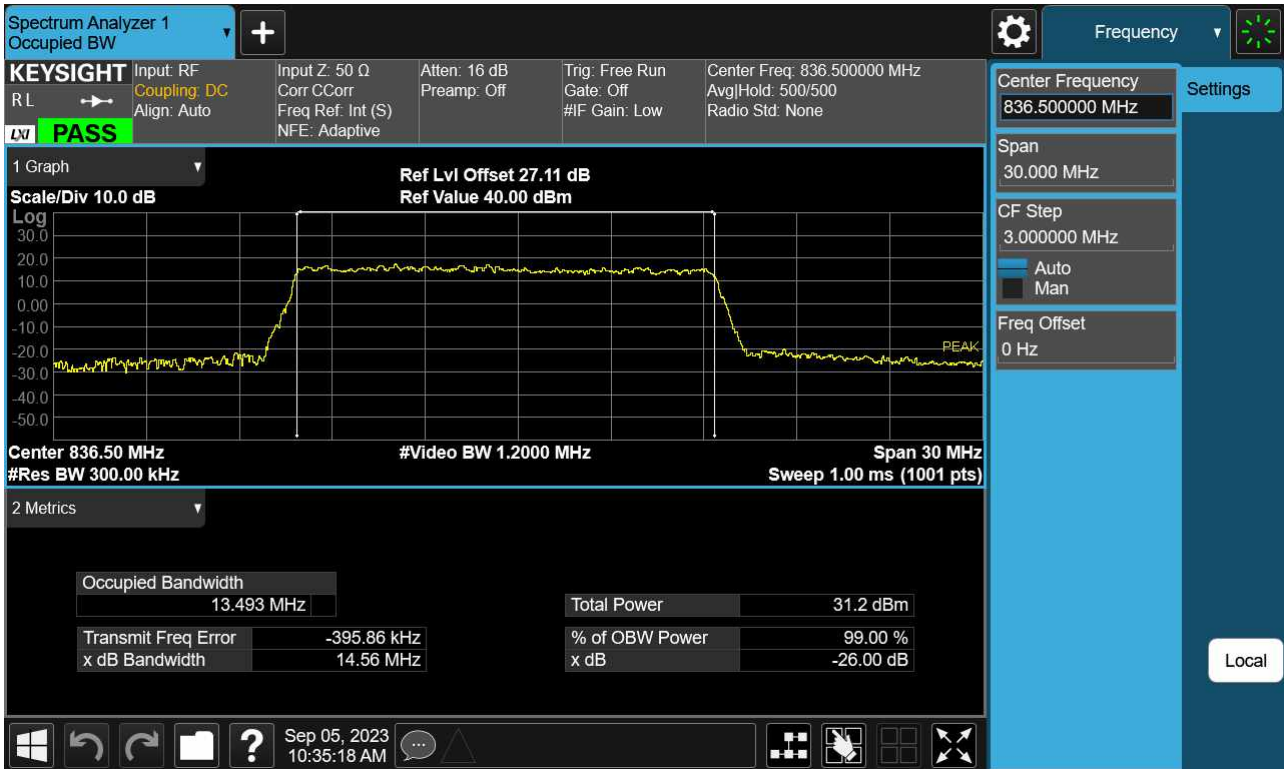
Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 256QAM_ Full RB _0)



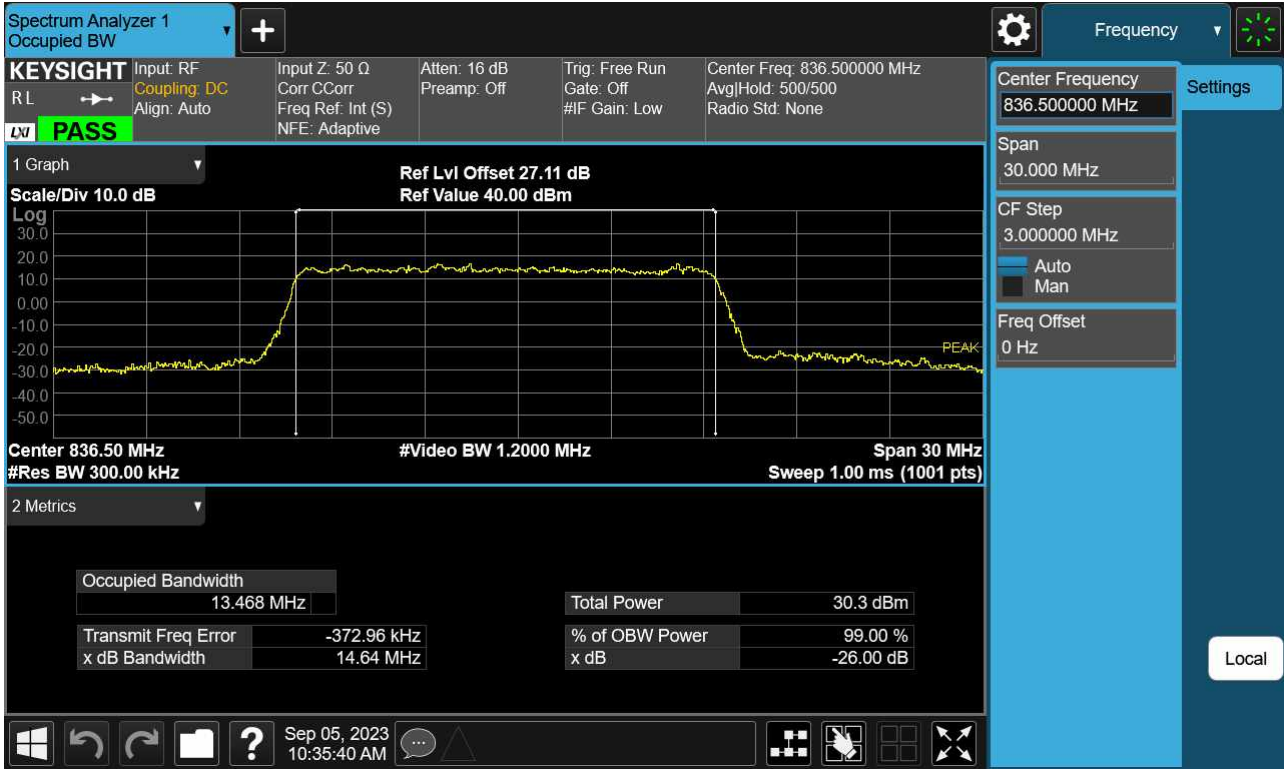
Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 BPSK_ Full RB _0)



Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 QPSK_ Full RB _0)



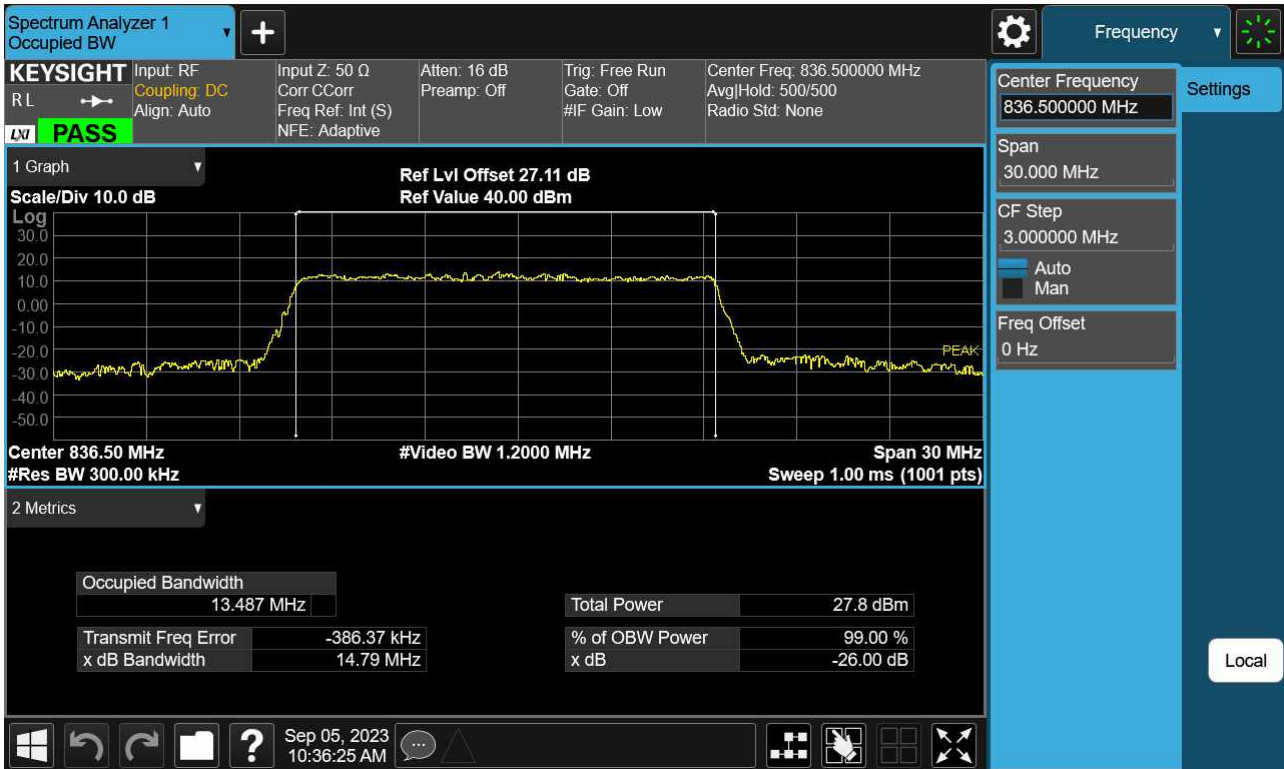
Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 16QAM_ Full RB_0)



Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 64QAM_ Full RB_0)



Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 256QAM_ Full RB _0)



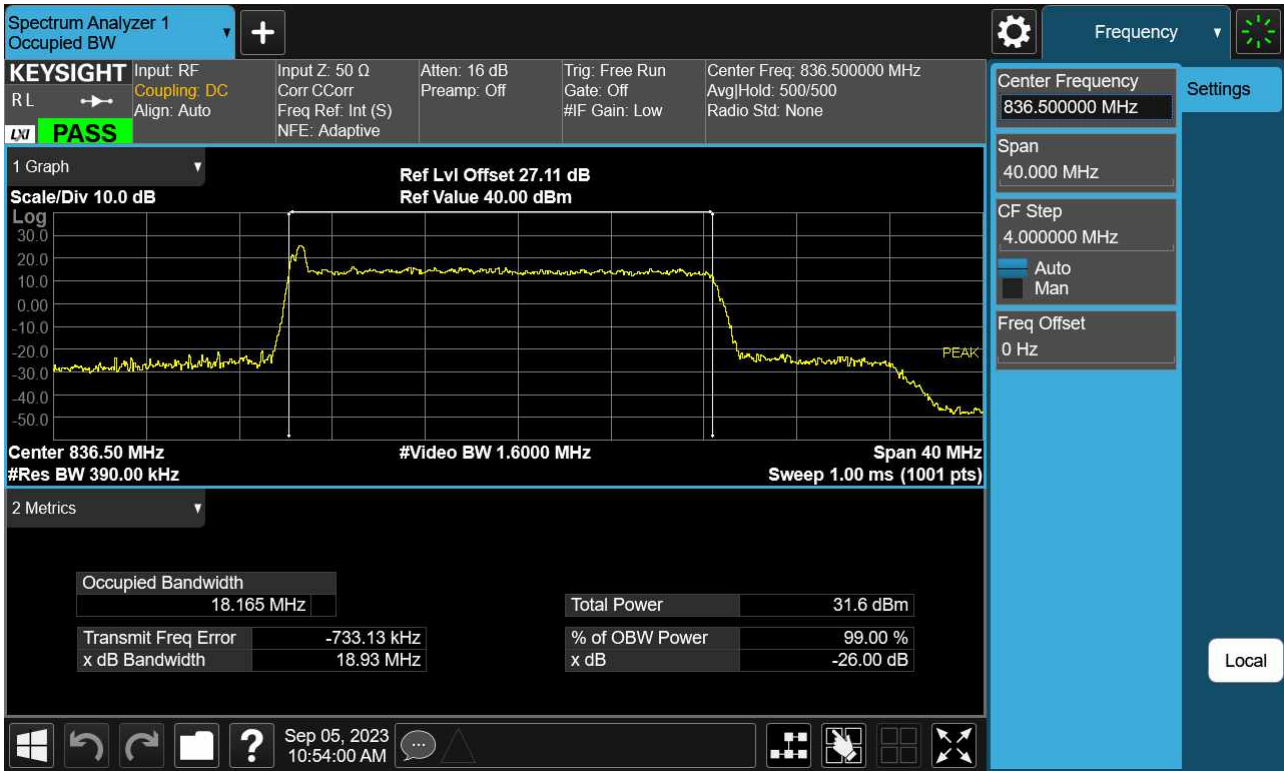
Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 BPSK_ Full RB _0)



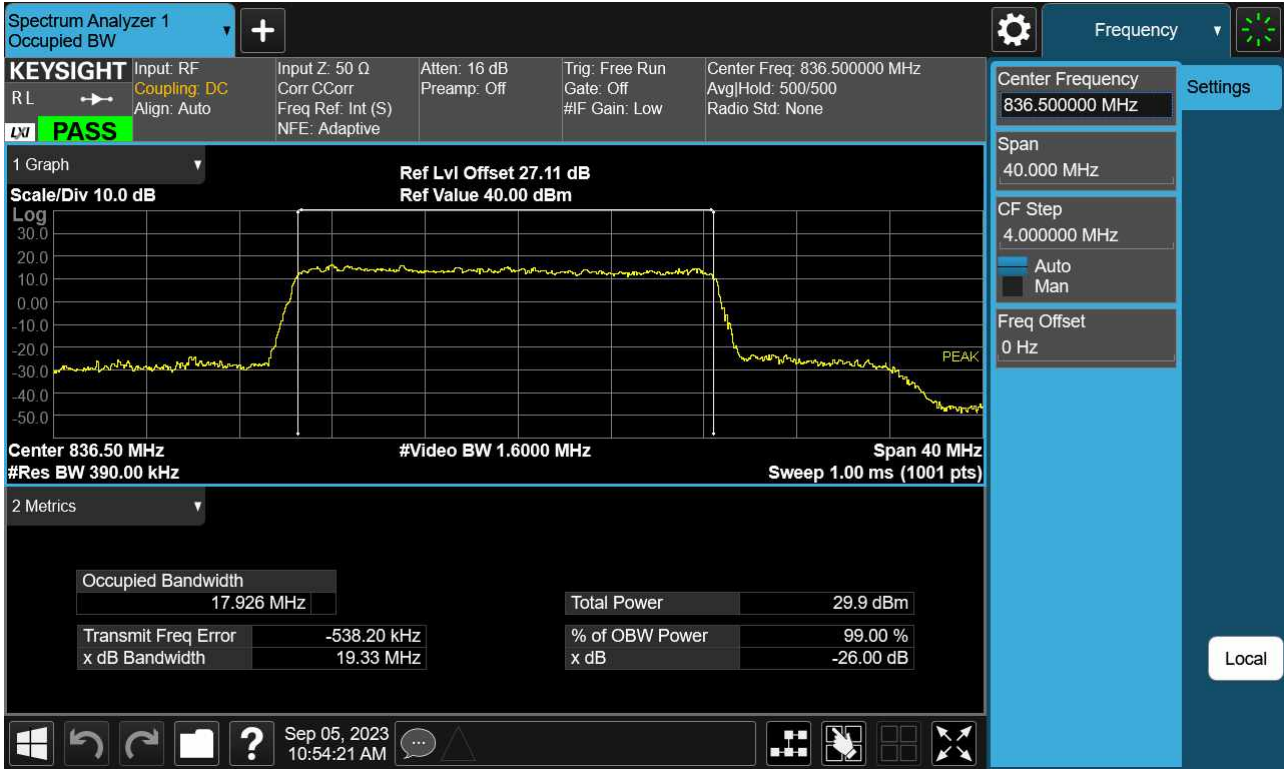
Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 QPSK_ Full RB _0)



Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 16QAM_ Full RB_0)



Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 64QAM_ Full RB_0)



Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 256QAM_ Full RB _0)



Sub6 n5. PAR Plot (5 M BW_Ch.167300_BPSK_Full RB_0)



Sub6 n5. PAR Plot (5 M BW_Ch. 167300_QPSK_Full RB _0)



Sub6 n5. PAR Plot (5 M BW_Ch. 167300_16QAM_Full RB_0)



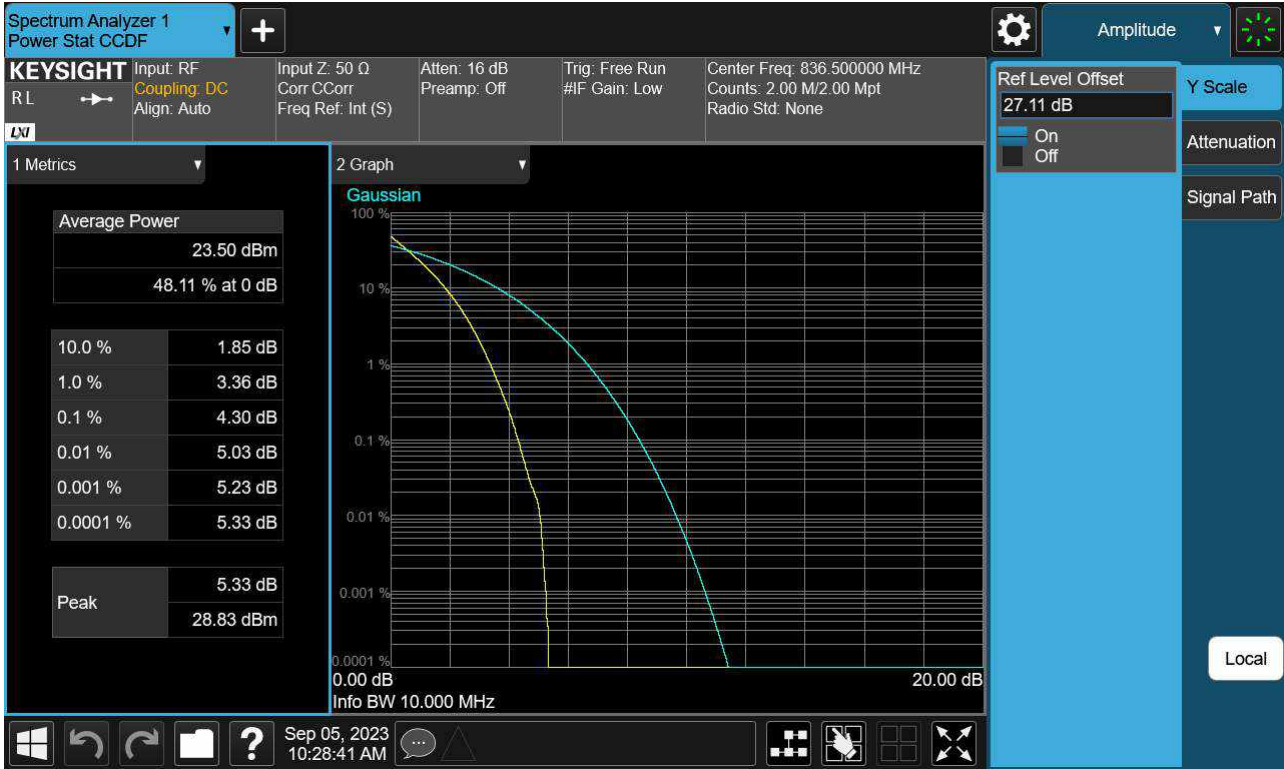
Sub6 n5. PAR Plot (5 M BW_Ch. 167300_64QAM_Full RB_0)



Sub6 n5. PAR Plot (5 M BW_Ch. 167300_256QAM_Full RB_0)



Sub6 n5. PAR Plot (10 M BW_Ch. 167300_BPSK_Full RB_0)



Sub6 n5. PAR Plot (10 M BW_Ch. 167300_QPSK_Full RB_0)



Sub6 n5. PAR Plot (10 M BW_Ch. 167300_16QAM_Full RB_0)



Sub6 n5. PAR Plot (10 M BW_Ch. 167300_64QAM_Full RB_0)



Sub6 n5. PAR Plot (10 M BW_Ch. 167300_256QAM_Full RB _0)



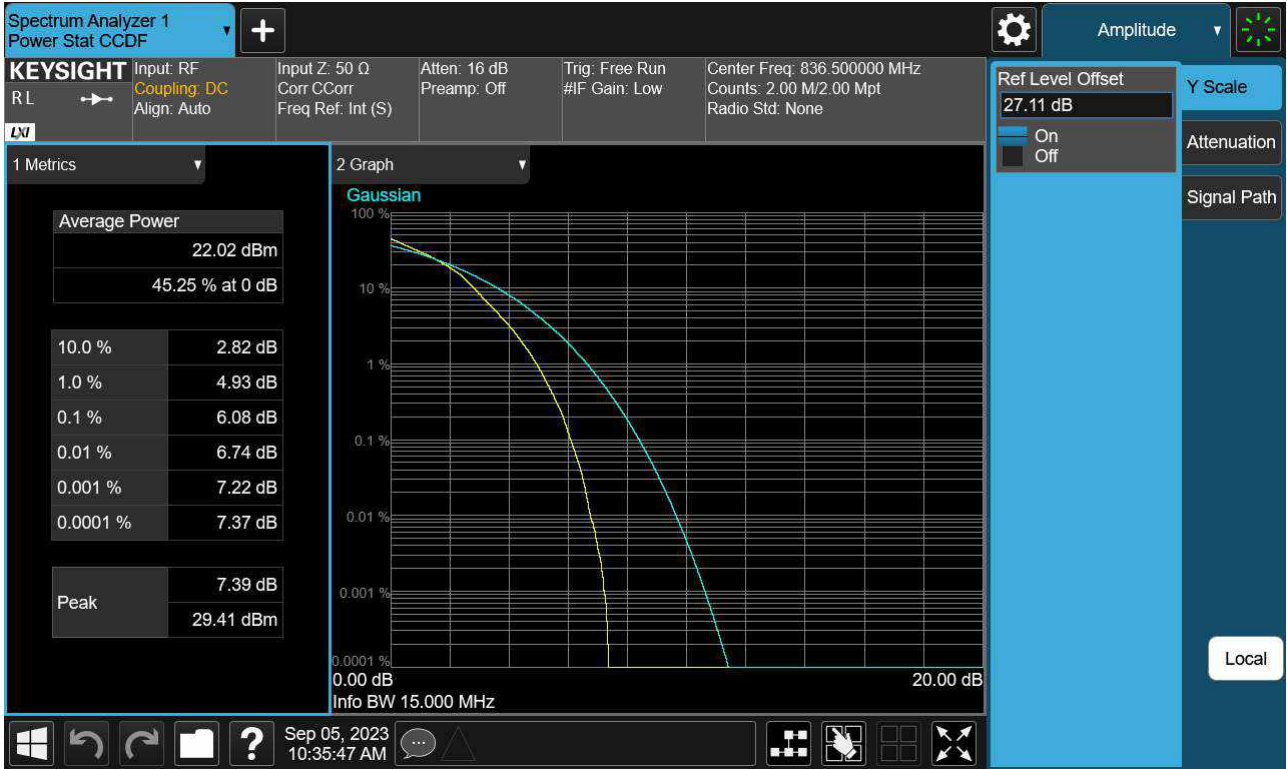
Sub6 n5. PAR Plot (15 M BW_Ch. 167300_BPSK_Full RB_0)



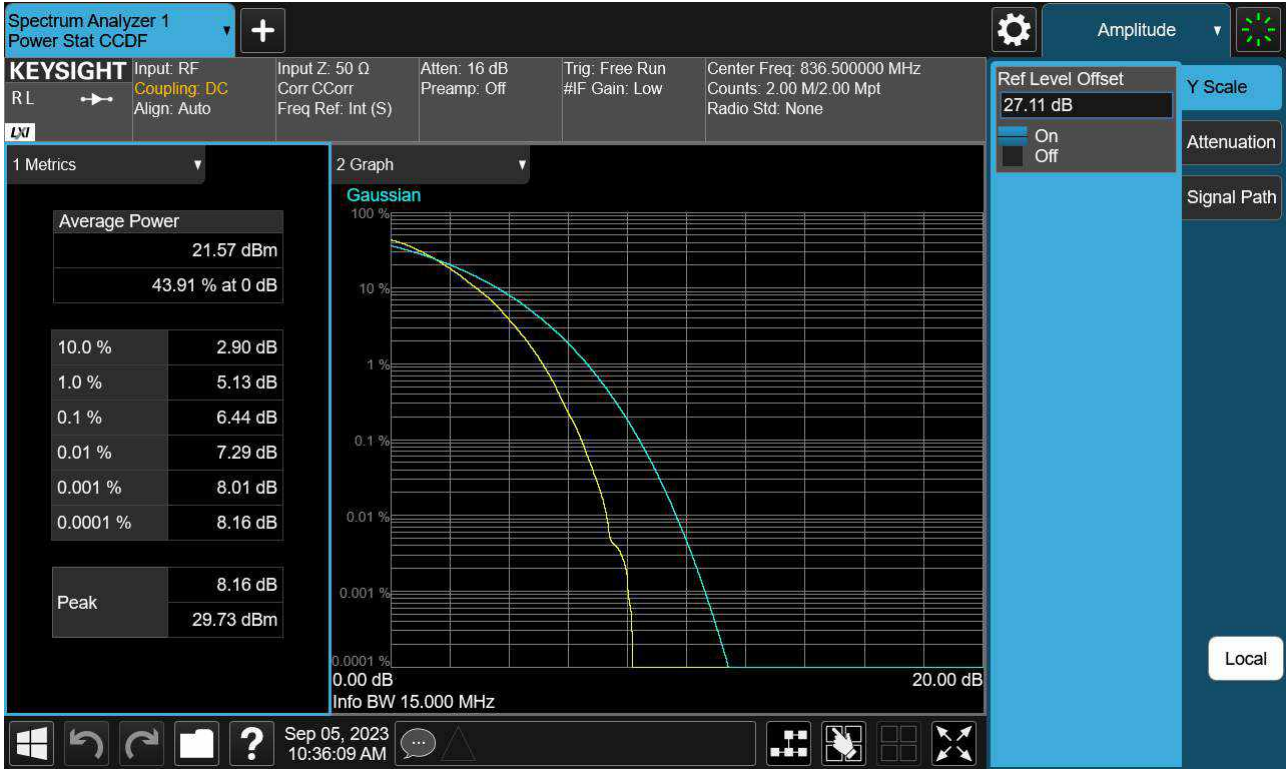
Sub6 n5. PAR Plot (15 M BW_Ch. 167300_QPSK_Full RB_0)



Sub6 n5. PAR Plot (15 M BW_Ch. 167300_16QAM_Full RB_0)



Sub6 n5. PAR Plot (15 M BW_Ch. 167300_64QAM_Full RB_0)



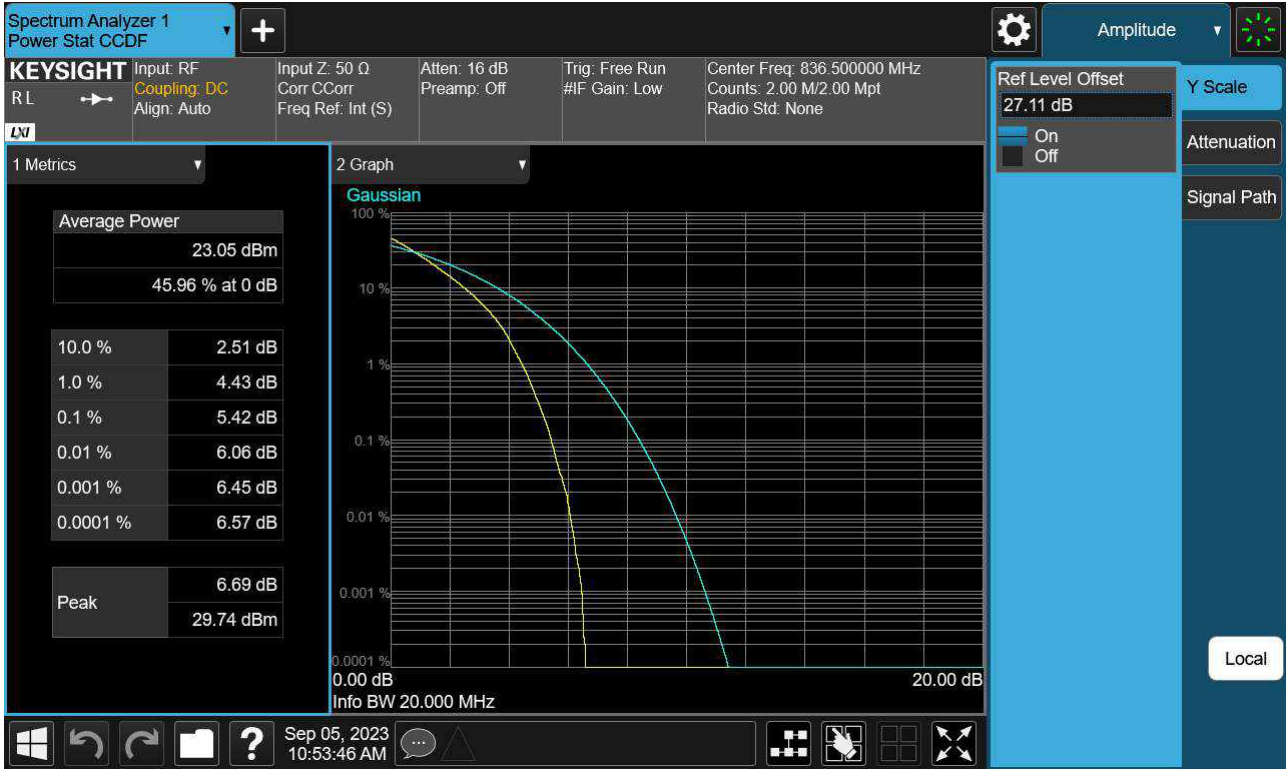
Sub6 n5. PAR Plot (15 M BW_Ch. 167300_256QAM_Full RB _0)



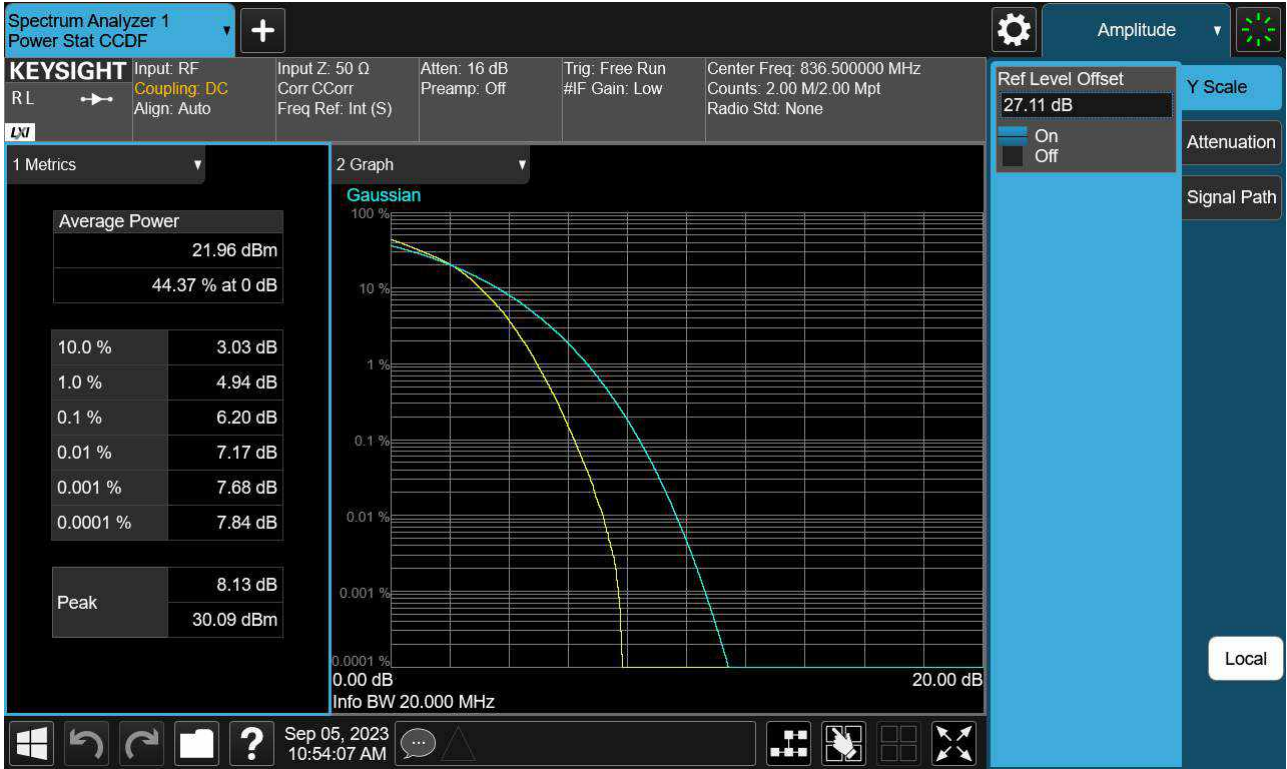
Sub6 n5. PAR Plot (20 M BW_Ch. 167300_BPSK_Full RB_0)



Sub6 n5. PAR Plot (20 M BW_Ch. 167300_QPSK_Full RB _0)



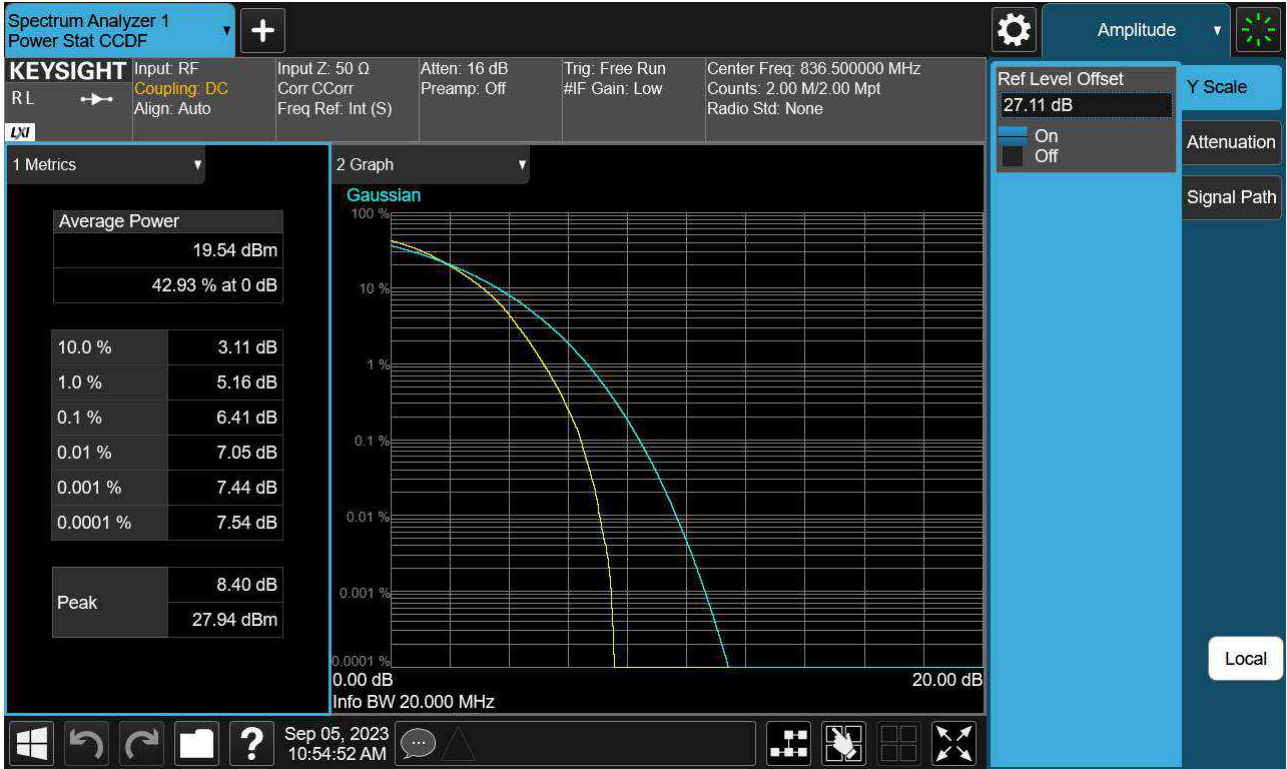
Sub6 n5. PAR Plot (20 M BW_Ch. 167300_16QAM_Full RB_0)



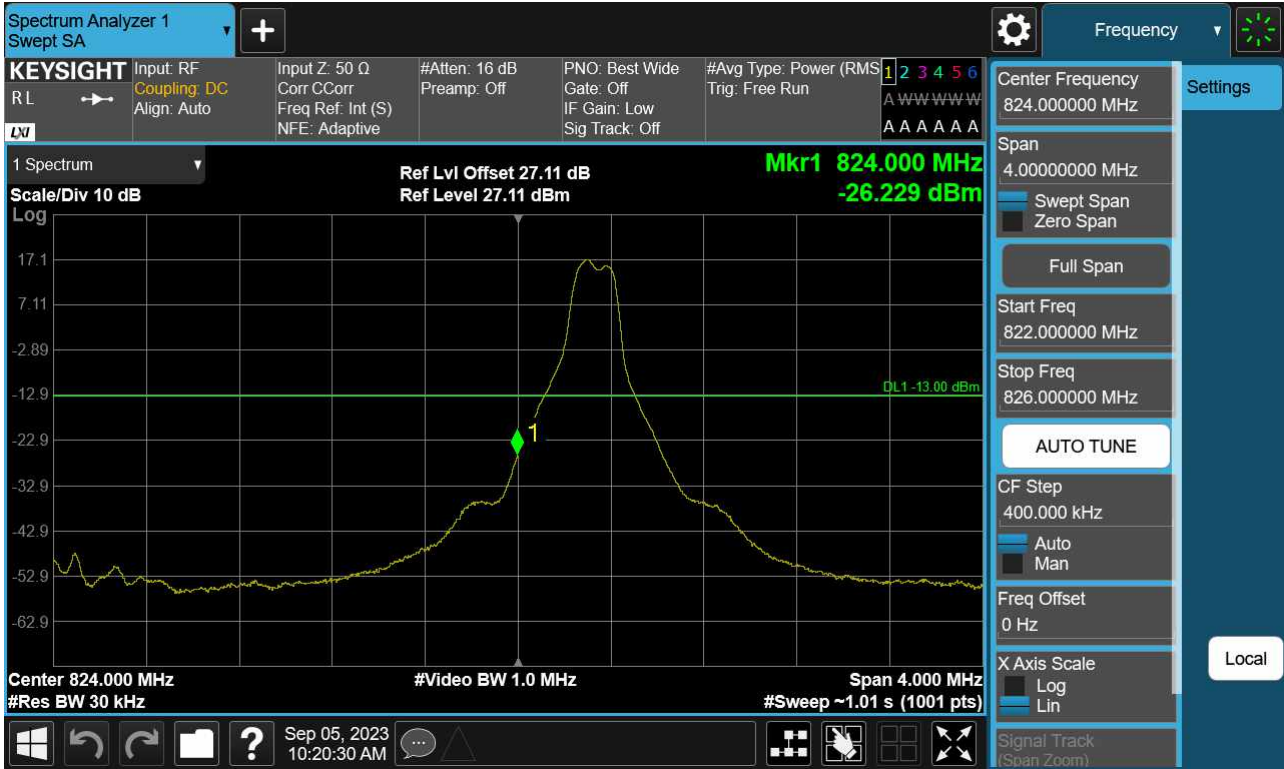
Sub6 n5. PAR Plot (20 M BW_Ch. 167300_64QAM_Full RB_0)



Sub6 n5. PAR Plot (20 M BW_Ch. 167300_256QAM_Full RB _0)



Sub6 n5. Lower Band Edge Plot (5 M BW Ch.165300 BPSK_RB1_Offset 0)



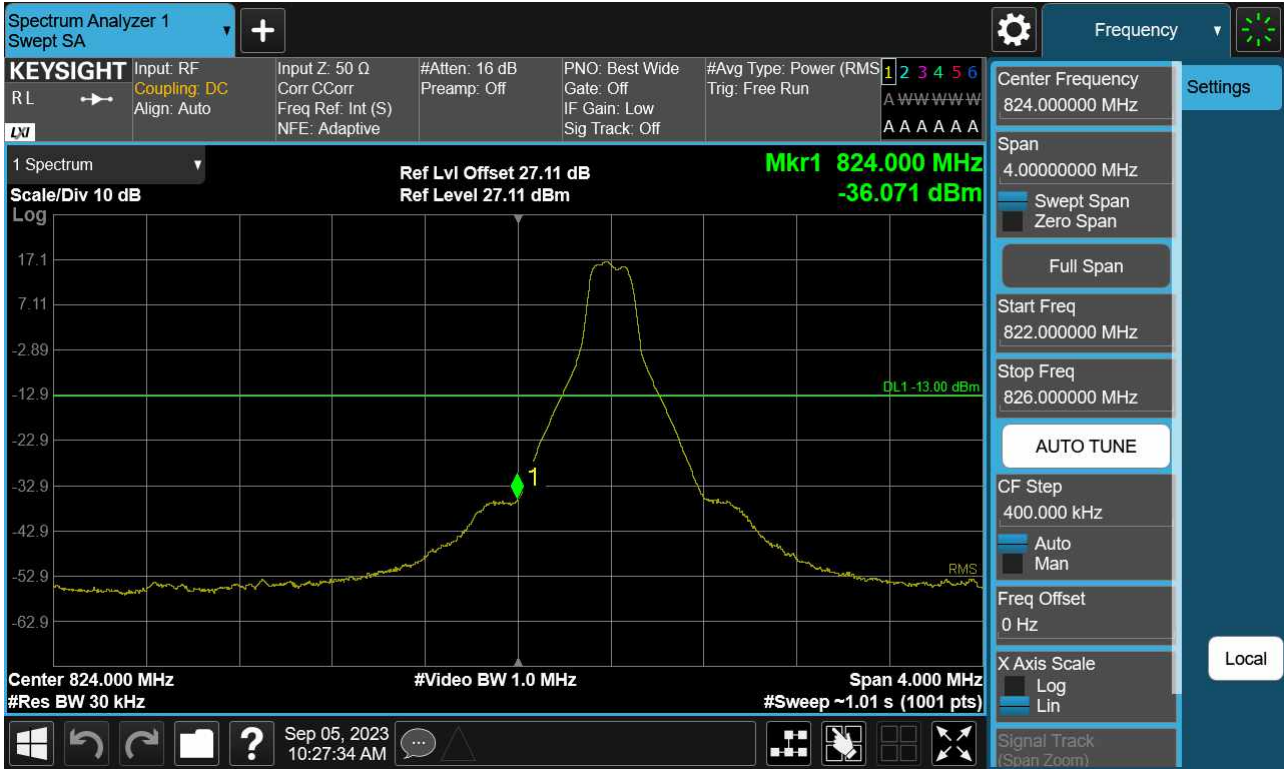
Sub6 n5. Lower Band Edge Plot (5 M BW Ch.165300 BPSK_RB25_Offset 0)



Sub6 n5. Lower Extended Band Edge Plot (5 M BW Ch.165300 BPSK_RB25_0)



Sub6 n5. Lower Band Edge Plot (10 M BW Ch.165800 BPSK_RB1_Offset 0)



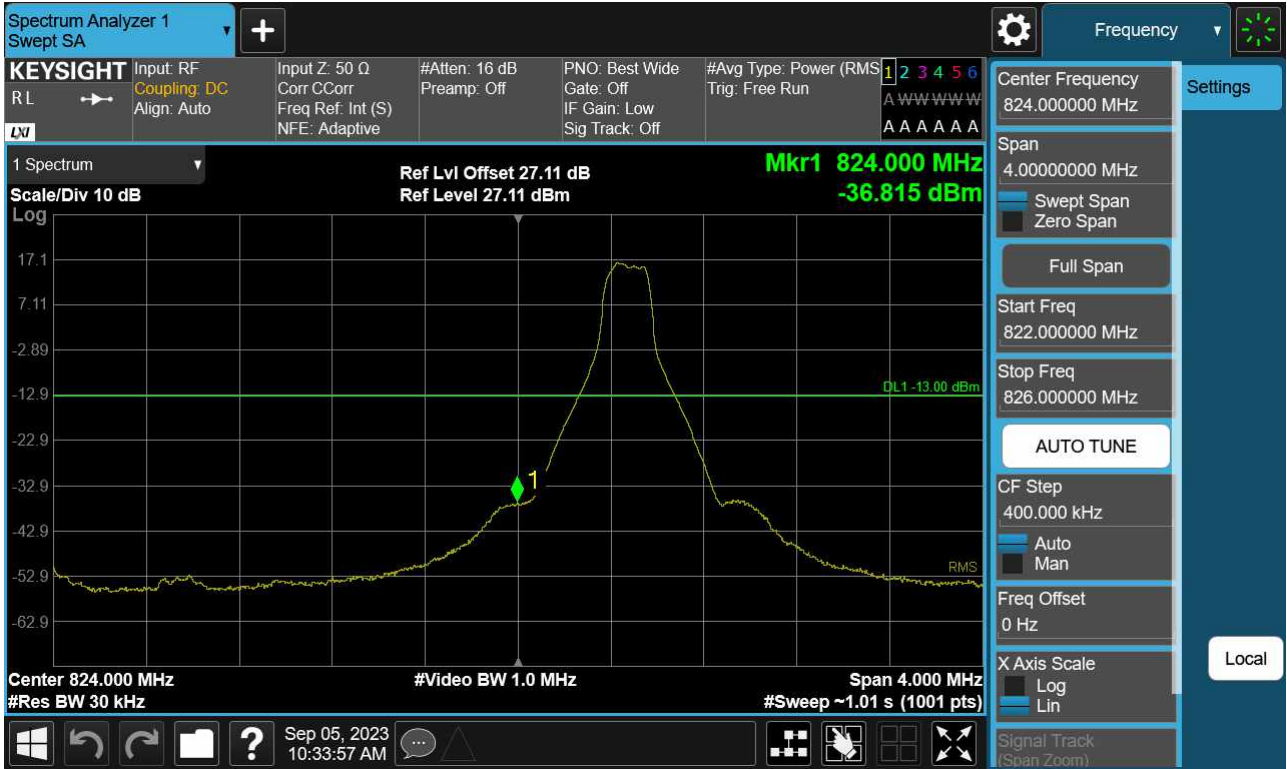
Sub6 n5. Lower Band Edge Plot (10 M BW Ch.165800 BPSK_RB50_Offset 0)



Sub6 n5. Lower Extended Band Edge Plot (10 M BW Ch.165800 BPSK_RB50_0)



Sub6 n5. Lower Band Edge Plot (15 M BW Ch.166300 BPSK_RB1_Offset 0)



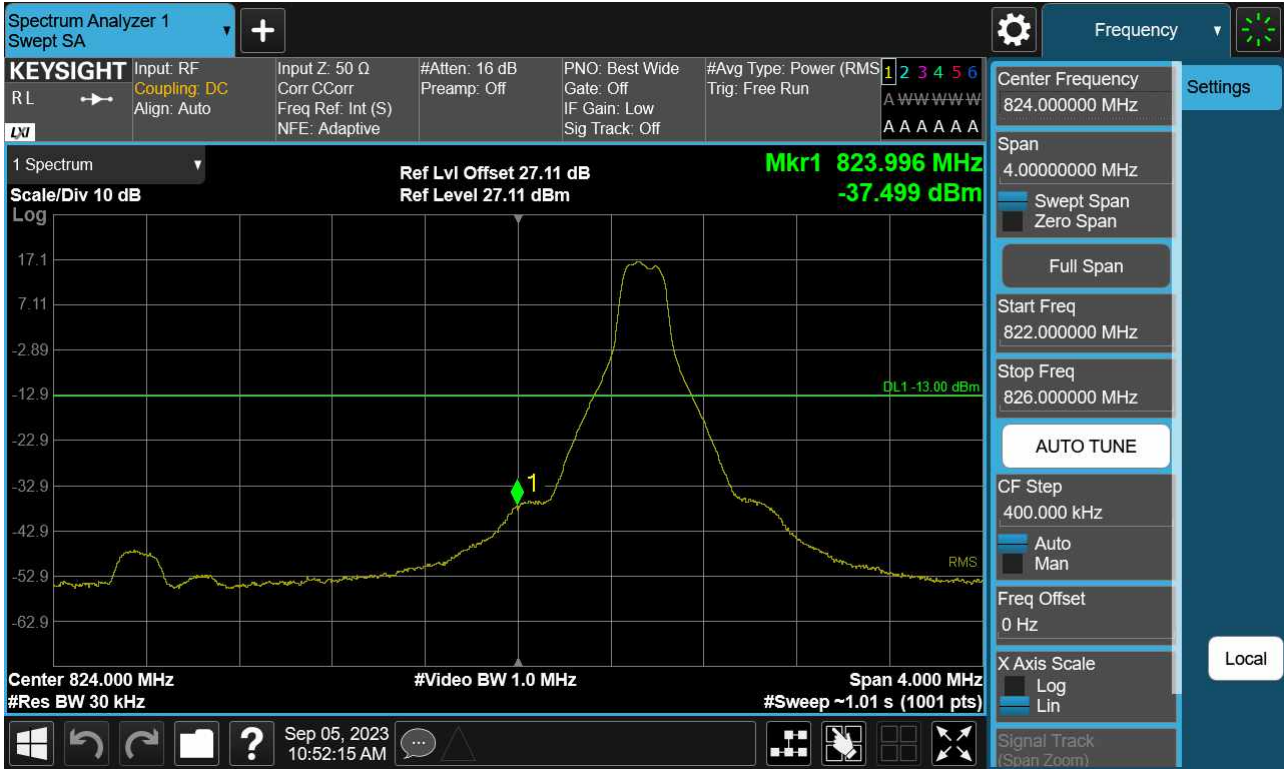
Sub6 n5. Lower Band Edge Plot (15 M BW Ch.166300 BPSK_RB75_Offset 0)



Sub6 n5. Lower Extended Band Edge Plot (15 M BW Ch.166300 BPSK_RB75_0)



Sub6 n5. Lower Band Edge Plot (20 M BW Ch.166800 BPSK_RB1_Offset 0)



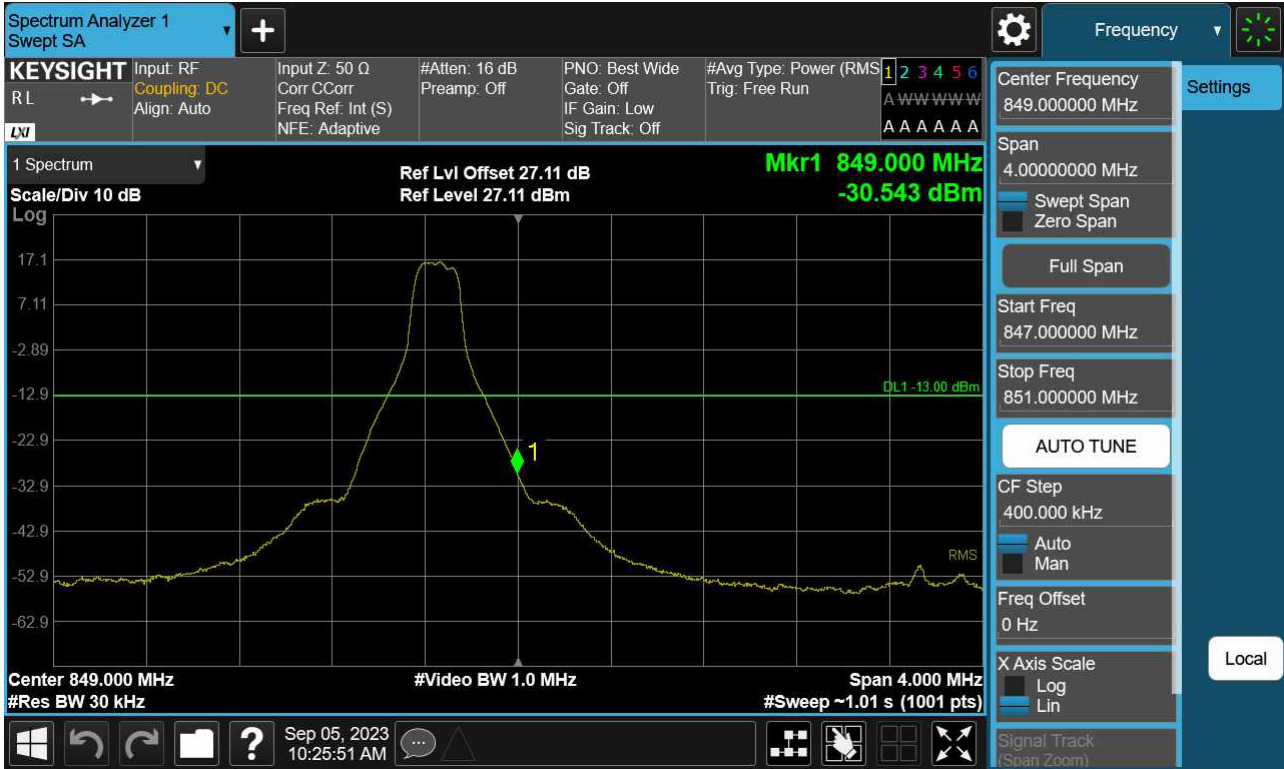
Sub6 n5. Lower Band Edge Plot (20 M BW Ch.166800 BPSK_RB100_Offset 0)



Sub6 n5. Lower Extended Band Edge Plot (20 M BW Ch.166800 BPSK_RB100_0)



Sub6 n5. Upper Band Edge Plot (5 M BW Ch.169300 BPSK_RB1_Offset 24)



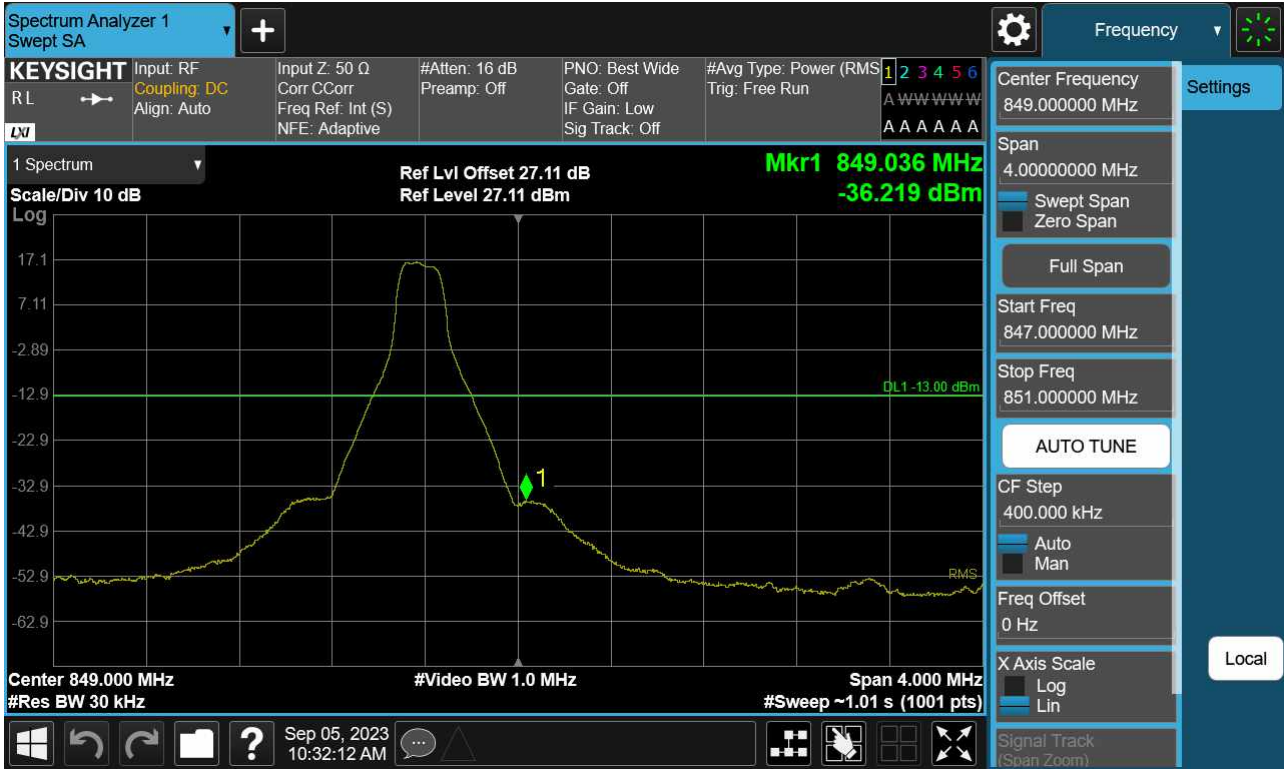
Sub6 n5. Upper Band Edge Plot (5 M BW Ch.169300 BPSK_RB25_Offset 0)



Sub6 n5. Upper Extended Band Edge Plot (5 M BW Ch.169300 BPSK_RB25_0)



Sub6 n5. Upper Band Edge Plot (10 M BW Ch.168800 BPSK_RB1_Offset 51)



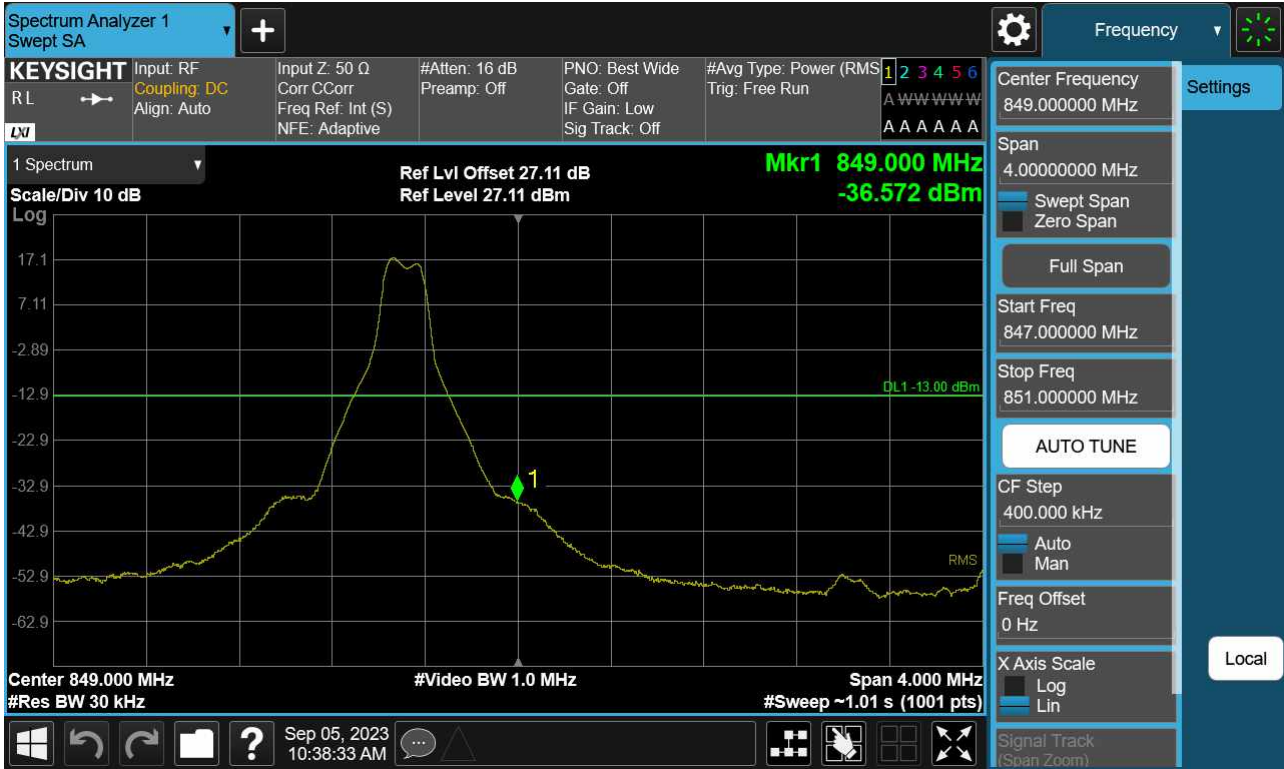
Sub6 n5. Upper Band Edge Plot (10 M BW Ch.168800 BPSK_RB50_Offset 0)



Sub6 n5. Upper Extended Band Edge Plot (10 M BW Ch.168800 BPSK_RB50_0)



Sub6 n5. Upper Band Edge Plot (15 M BW Ch.168300 BPSK_RB1_Offset 78)



Sub6 n5. Upper Band Edge Plot (15 M BW Ch.168300 BPSK_RB75_Offset 0)



Sub6 n5. Upper Extended Band Edge Plot (15 M BW Ch.168300 BPSK_RB75_0)



Sub6 n5. Upper Band Edge Plot (20 M BW Ch.167800 BPSK_RB1_Offset 105)



Sub6 n5. Upper Band Edge Plot (20 M BW Ch.167800 BPSK_RB100_Offset 0)



Sub6 n5. Upper Extended Band Edge Plot (20 M BW Ch.167800 BPSK_RB100_0)



Sub6 n5. Conducted Spurious Plot (165300ch_5 MHz_BPSK_RB 1_1)



Sub6 n5. Conducted Spurious Plot (167300ch_5 MHz_BPSK_RB 1_1)



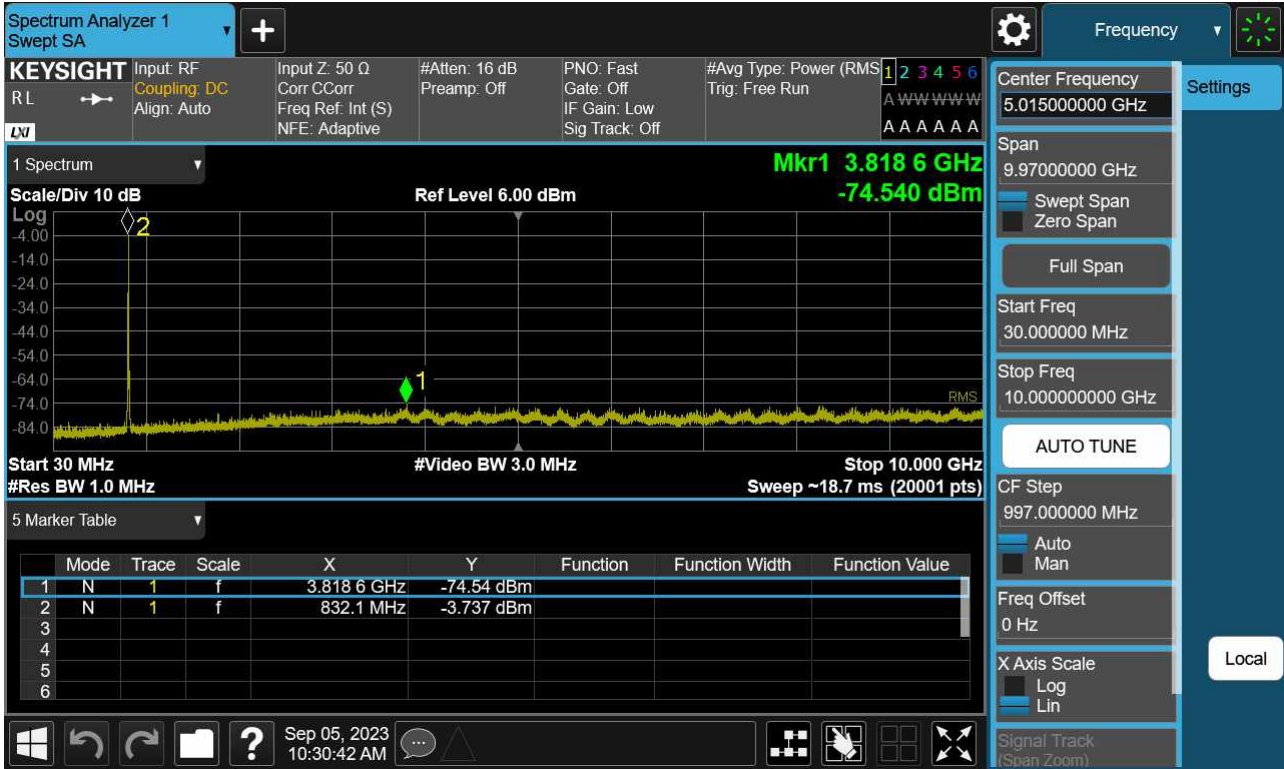
Sub6 n5. Conducted Spurious Plot (169300ch_5 MHz_BPSK_RB 1_1)



Sub6 n5. Conducted Spurious Plot (165800ch_10 MHz_BPSK_RB 1_1)



Sub6 n5. Conducted Spurious Plot (167300ch_10 MHz_BPSK_RB 1_1)



Sub6 n5. Conducted Spurious Plot (168800ch_10 MHz_BPSK_RB 1_1)



Sub6 n5. Conducted Spurious Plot (166300ch_15 MHz_BPSK_RB 1_1)

