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PART 22 MEASUREMENT REPORT

Applicant Name:
Samsung Electronics Co., Ltd.
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Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
09/06/2022 – 12/14/2022
Test Report Issue Date:
02/24/2023
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2212080136-01-R1.A3L

FCC ID:	**A3LSMS911JPN**
Applicant Name:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model(s):	SC-51D, SCG19
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part:	22
Test Procedure(s):	ANSI C63.26-2015, KDB 648474 D03 v01r04

Note: This revised Test Report (S/N: 1M2212080136-01-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

TABLE OF CONTENTS

PART 22 MEASUREMENT REPORT

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
GSM/GPRS	N/A	GMSK	824.2 - 848.8	0.977	29.90	1.604	32.05	243KGXW
EDGE	N/A	8-PSK	824.2 - 848.8	0.257	24.10	0.422	26.25	237KG7W
WCDMA	N/A	Spread Spectrum	826.4 - 846.6	0.154	21.88	0.253	24.03	4M17F9W
LTE Band 26/5	15MHz (Band 26 only)	QPSK	831.5 - 841.5	0.161	22.08	0.265	24.23	13M6G7D
		16QAM	831.5 - 841.5	0.129	21.12	0.212	23.27	13M6W7D
	10 MHz	QPSK	829.0 - 844.0	0.171	22.34	0.281	24.49	9M05G7D
		16QAM	829.0 - 844.0	0.139	21.44	0.228	23.59	9M05W7D
	5 MHz	QPSK	826.5 - 846.5	0.167	22.23	0.274	24.38	4M55G7D
		16QAM	826.5 - 846.5	0.140	21.48	0.230	23.63	4M54W7D
	3 MHz	QPSK	825.5 - 847.5	0.163	22.13	0.268	24.28	2M72G7D
		16QAM	825.5 - 847.5	0.129	21.10	0.212	23.25	2M72W7D
	1.4 MHz	QPSK	824.7 - 848.3	0.158	21.98	0.259	24.13	1M11G7D
		16QAM	824.7 - 848.3	0.126	20.99	0.206	23.14	1M12W7D
NR Band n5	20 MHz	π/2 BPSK	834.0 - 839.0	0.107	20.28	0.175	22.43	18M0G7D
		QPSK	834.0 - 839.0	0.101	20.05	0.166	22.20	18M9G7D
		16QAM	834.0 - 839.0	0.087	19.39	0.143	21.54	18M9W7D
	15 MHz	π/2 BPSK	831.5 - 841.5	0.111	20.45	0.182	22.60	13M5G7D
		QPSK	831.5 - 841.5	0.110	20.40	0.180	22.55	14M2G7D
		16QAM	831.5 - 841.5	0.090	19.56	0.148	21.71	14M2W7D
	10 MHz	π/2 BPSK	829.0 - 844.0	0.107	20.28	0.175	22.43	9M05G7D
		QPSK	829.0 - 844.0	0.102	20.07	0.167	22.22	9M37G7D
		16QAM	829.0 - 844.0	0.085	19.30	0.140	21.45	9M36W7D
	5 MHz	π/2 BPSK	826.5 - 846.5	0.103	20.12	0.169	22.27	4M54G7D
		QPSK	826.5 - 846.5	0.100	19.99	0.164	22.14	4M54G7D
		16QAM	826.5 - 846.5	0.082	19.16	0.135	21.31	4M51W7D

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 Element Test Location

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.

- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS911JPN**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 22.

Test Device Serial No.: 1050M, 1066M, 1048M, 1062M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 Software and Firmware

Testing was performed on device(s) using software/firmware version S911USQU0AVJM installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the "American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services" (ANSI C63.26-2015) were used in the measurement of the EUT**.**

Deviation from Measurement Procedure……..……..None

3.2 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated power measurements, substitution method is used per the guidance of ANSI C63.26-2015. For emissions below 1GHz, a half-wave dipole is substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_{d\ [dBm]} = P_{g\ [dBm]} - \text{cable loss}_{\ [dB]} + \text{antenna gain}_{\ [dBd/dBi]};$$

where P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_{g\ [dBm]}$ – cable loss $_{[dB]}$.

For radiated spurious emissions measurements, the field strength conversion method is used per the formulas in Section 5.2.7 of ANSI C63.26-2015. Field Strength (EIRP) is calculated using the following formulas:

$$E_{[dB\mu V/m]} = \text{Measured amplitude level}_{[dBm]} + 107 + \text{Cable Loss}_{[dB]} + \text{Antenna Factor}_{[dB/m]}$$

And

$$EIRP_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8;$$ where D is the measurement distance in meters.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26-2015.

4.0 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 uncertainty shown below 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.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	AP2	EMC Cable and Switch System	8/11/2022	Annual	8/11/2023	AP2
-	AP1	EMC Cable and Switch System	8/15/2022	Annual	8/15/2023	AP1
-	ETS	EMC Cable and Switch System	8/11/2022	Annual	8/11/2023	ETS
-	LTx1	Licensed Transmitter Cable Set	7/29/2022	Annual	7/29/2023	LTx1
-	LTx2	Licensed Transmitter Cable Set	8/15/2022	Annual	8/15/2023	LTx2
-	LTx3	Licensed Transmitter Cable Set	8/15/2022	Annual	8/15/2023	LTx3
-	LTx4	Licensed Transmitter Cable Set	7/29/2022	Annual	7/29/2023	LTx4
-	LTx5	Licensed Transmitter Cable Set	7/29/2022	Annual	7/29/2023	LTx5
Agilent	E5515C	Wireless Communications Test Set	N/A			GB45360985
Agilent	E5515C	Wireless Communications Test Set	N/A			GB46310798
Anritsu	MT8820C	Radio Communication Analyzer	N/A			6201300731
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201381794
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6200901190
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201525694
Com-Power	AL-130R	Active Loop Antenna	1/19/2022	Biennial	1/19/2024	121085
Emco	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
Espec	ESX-2CA	Environmental Chamber	5/25/2022	Biennial	5/25/2024	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/20/2021	Biennial	4/20/2023	00125518
ETS Lindgren	3164-10	Quad Ridge Horn 400MHz - 10000MHz	5/10/2021	Biennial	5/10/2023	00166283
ETS Lindgren	3816/2NM	LISN	8/11/2022	Biennial	8/11/2024	00114451
Keysight Technologies	N9020A	MXA Signal Analyzer	3/15/2022	Annual	3/15/2023	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	8/18/2022	Annual	8/18/2023	MY49430494
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	2/14/2022	Annual	2/14/2023	MY52350166
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11403100002
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			836371/0079
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			833855/0010
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			107826
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			109892
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			836536/0005
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			100976
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/29/2022	Annual	8/29/2023	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/25/2022	Annual	8/25/2023	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	3/28/2022	Annual	3/28/2023	101716
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and Spectrum Analyzer	4/14/2022	Annual	4/14/2023	103187

Table 5-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

6.0 SAMPLE CALCULATIONS

GSM Emission Designator

Emission Designator = 250KGXW
GSM BW = 250 kHz
G = Phase Modulation
X = Cases not otherwise covered
W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 250KG7W
EDGE BW = 250 kHz
G = Phase Modulation
7 = Quantized/Digital Info
W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M16F9W
WCDMA BW = 4.16 MHz
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 8M62G7D
LTE BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D
LTE BW = 8.45 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

The receive spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 3700.40 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm – (-24.80) = 50.3 dBc.

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMS911JPN

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

Mode(s): GSM/GPRS/WCDMA/NR/LTE

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Transmitter Conducted Output Power	2.1046(a), 2.1046(c)	RSS-Gen(6.12)	N/A	PASS	Section 7.2
	Occupied Bandwidth	2.1049(h)	RSS-Gen(6.7)	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions	2.1051, 22.917(a)	RSS-Gen(6.13), RSS-132(5.5)	≥ 43 + 10 log (P[Watts]) dB of attenuation below transmitter power	PASS	Sections 7.4, 7.5
	Frequency Stability	2.1055, 22.355	RSS-Gen(6.11), RSS-132(5.3)	The carrier frequency of the transmitter must be maintained within the 2.5ppm	PASS	Section 7.7
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power	22.913(a)(5)	RSS-Gen(6.12), RSS-132(5.4)	< 7 Watts max. ERP	PASS	Section 7.6
	Radiated Spurious Emissions	2.1053, 22.917(a)	RSS-Gen(7.3), RSS-132(5.6)	> 43 + 10 log10 (P[Watts]) for all out-of-band emissions	PASS	Section 7.7

* The only transmitter output conducted powers included in this report are those where the Pmax value, per the tune-up document, is higher than any of the DSI power levels. For the remaining conducted power measurements, see the **RF Exposure Report**.

Table 7-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
4) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool v1.1.

7.2 Conducted Power Output Data

Test Overview

All 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 Procedure Used

ANSI C63.26-2015 – Section 5.2

Test Settings

1. Detector = RMS
2. Trace mode = trace average for continuous emissions, max hold for pulse emissions
3. Sweep time = auto couple
4. The trace was allowed to stabilize
5. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. Conducted power measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.

2. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz.

3. All other conducted power measurements are contained in the RF exposure report for this filing.

NR (SCS 15kHz)						LTE						NR Conducted Power [dBm]	LTE Conducted Power [dBm]	EN-DC Total Tx. Power [dBm]
NR Band	NR Bandwidth [MHz]	NR Channel	NR Frequency [MHz]	Mod.	NR RB#/Offset	LTE Band	LTE Bandwidth [MHz]	LTE Channel	LTE Frequency [MHz]	Mod.	LTE RB#/Offset			
n5 ANT A	20	Mid	836.5	QPSK	100/0	B2 ANT A	20	Mid	1880	QPSK	100/0	20.03	22.21	24.27
				QPSK	100/0					QPSK	1/50	19.04	22.93	24.42
				QPSK	1/53					QPSK	100/0	19.79	22.21	24.18
				QPSK	1/53					QPSK	1/50	18.88	22.78	24.26
				16Q	1/53					16Q	1/50	20.23	22.46	24.50

Table 7-2. Conducted Max Powers (EN-DC Combo NR n5 – LTE B2)

7.3 Occupied Bandwidth

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 – Section 5.4.4

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB 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 ≥ 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

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-2. Test Instrument & Measurement Setup

Test Notes

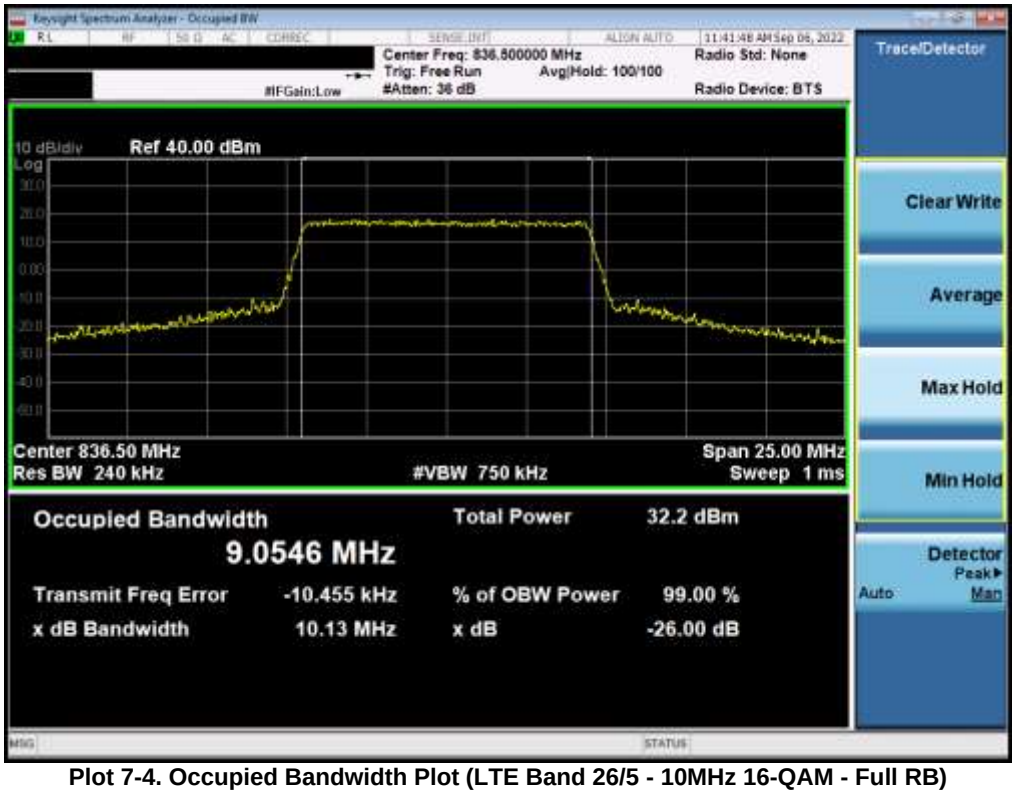
None.

LTE Band 26/5

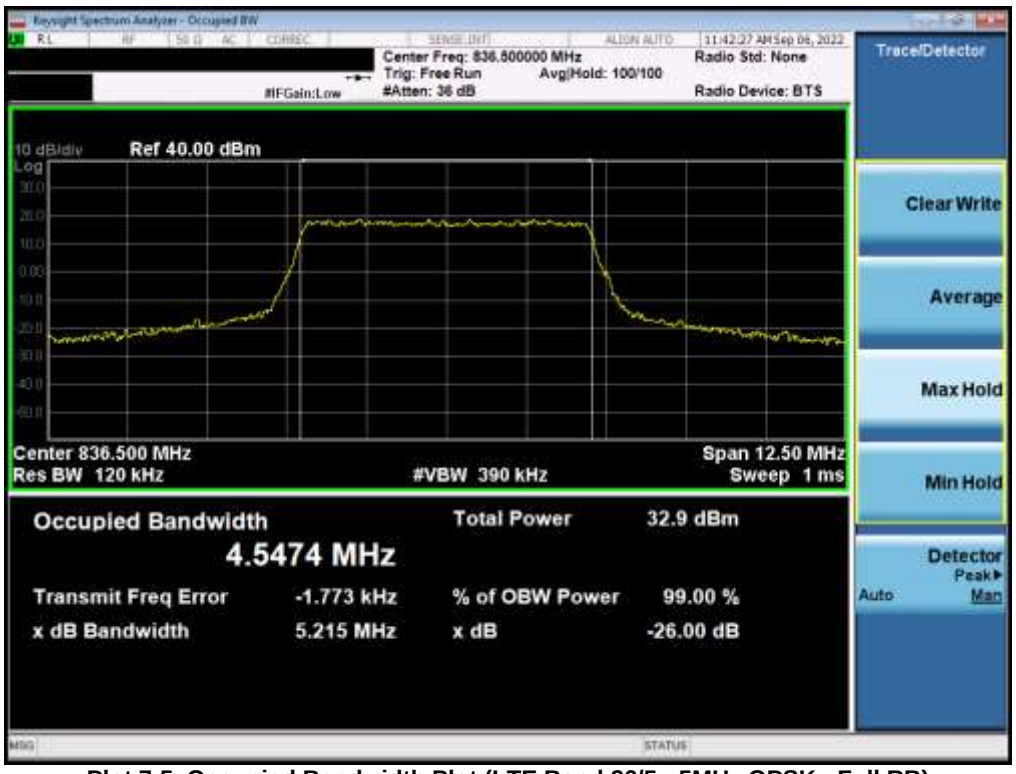
Plot 7-1. Occupied Bandwidth Plot (LTE Band 26 - 15MHz QPSK - Full RB)

Plot 7-2. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 16-QAM - Full RB)

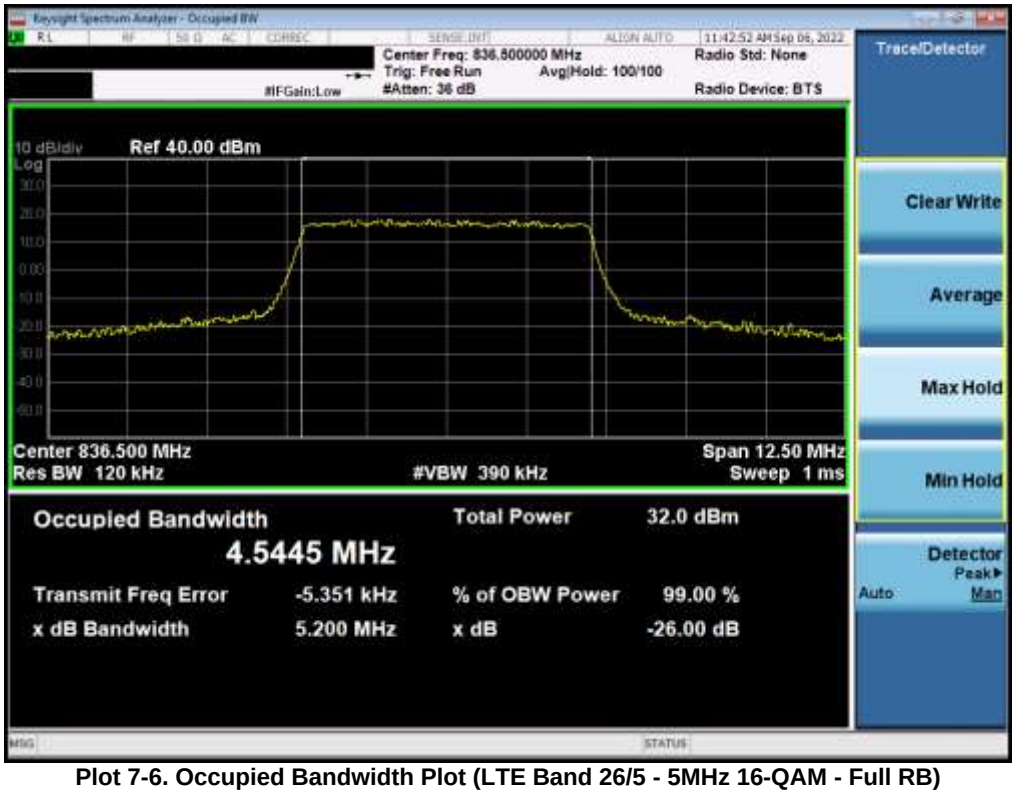
Plot 7-3. Occupied Bandwidth Plot (LTE Band 26/5 - 10MHz QPSK - Full RB)



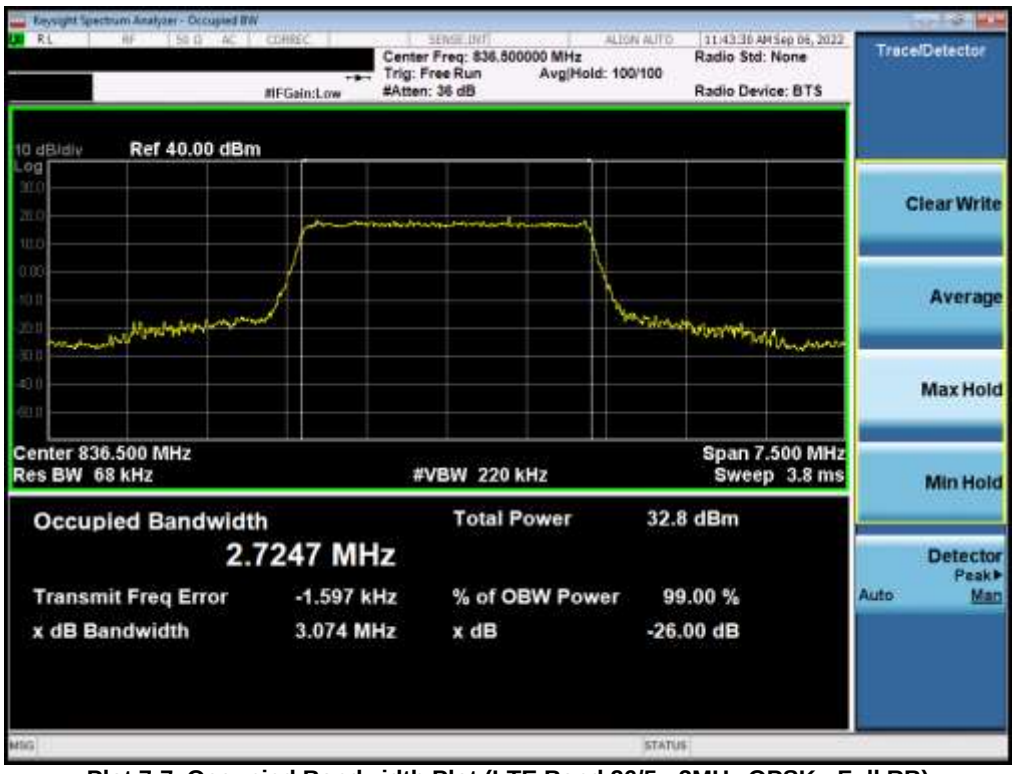
Plot 7-4. Occupied Bandwidth Plot (LTE Band 26/5 - 10MHz 16-QAM - Full RB)



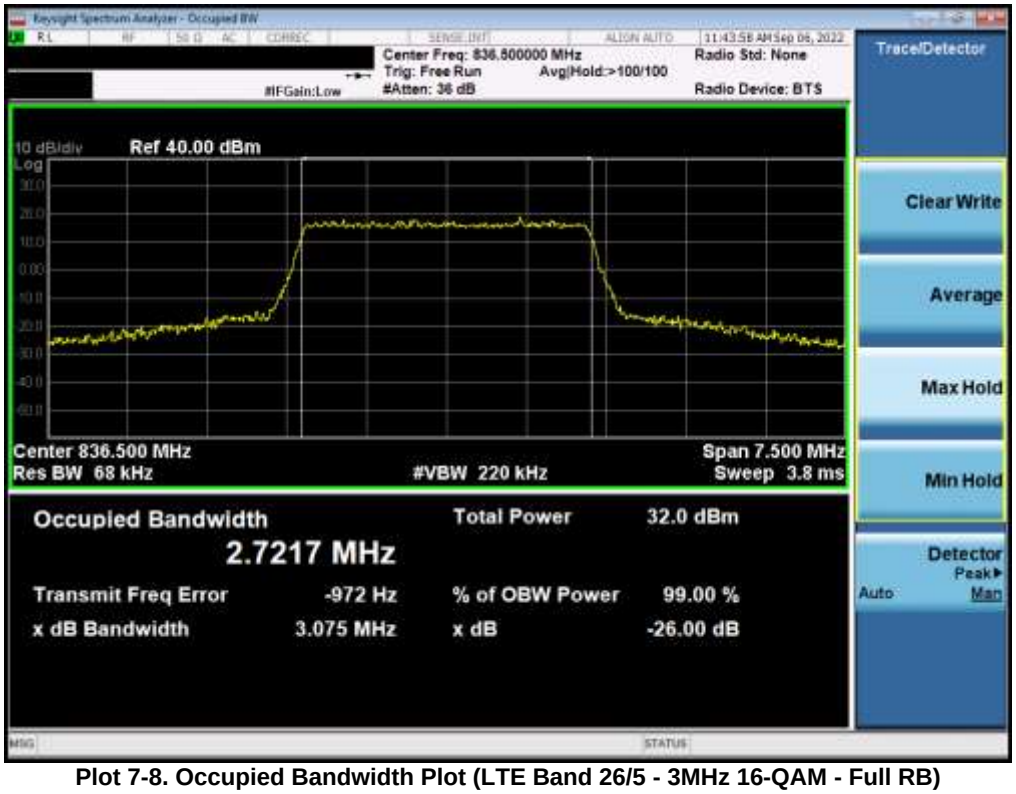
Plot 7-5. Occupied Bandwidth Plot (LTE Band 26/5 - 5MHz QPSK - Full RB)



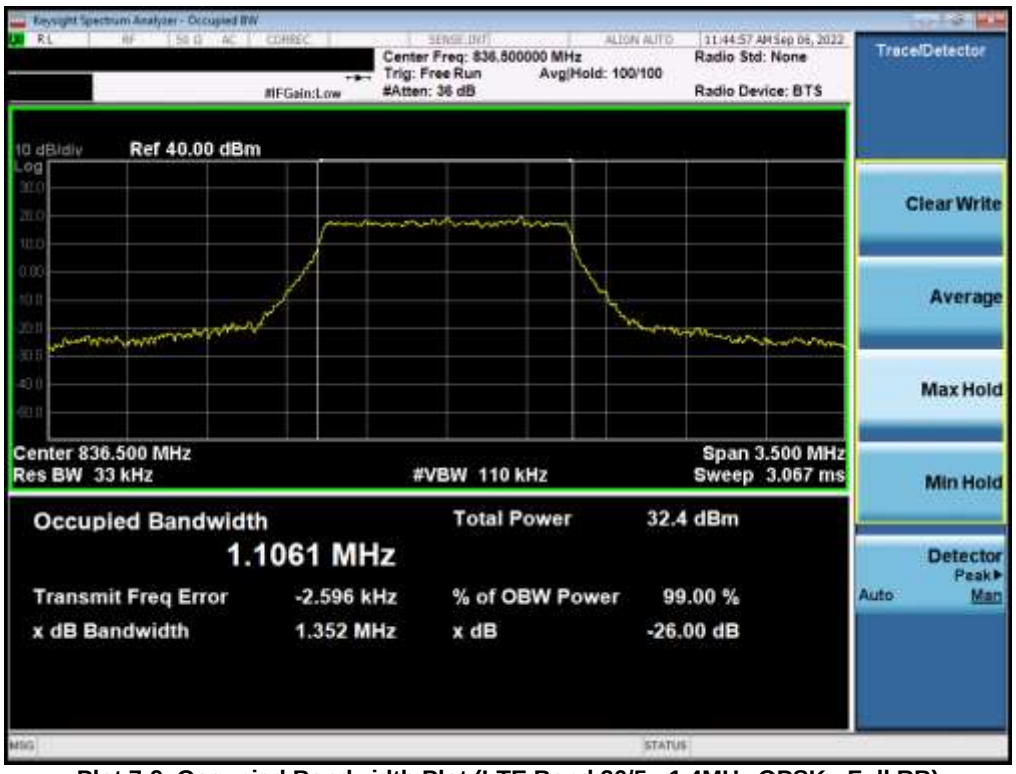
Plot 7-6. Occupied Bandwidth Plot (LTE Band 26/5 - 5MHz 16-QAM - Full RB)



Plot 7-7. Occupied Bandwidth Plot (LTE Band 26/5 - 3MHz QPSK - Full RB)



Plot 7-8. Occupied Bandwidth Plot (LTE Band 26/5 - 3MHz 16-QAM - Full RB)



Plot 7-9. Occupied Bandwidth Plot (LTE Band 26/5 - 1.4MHz QPSK - Full RB)

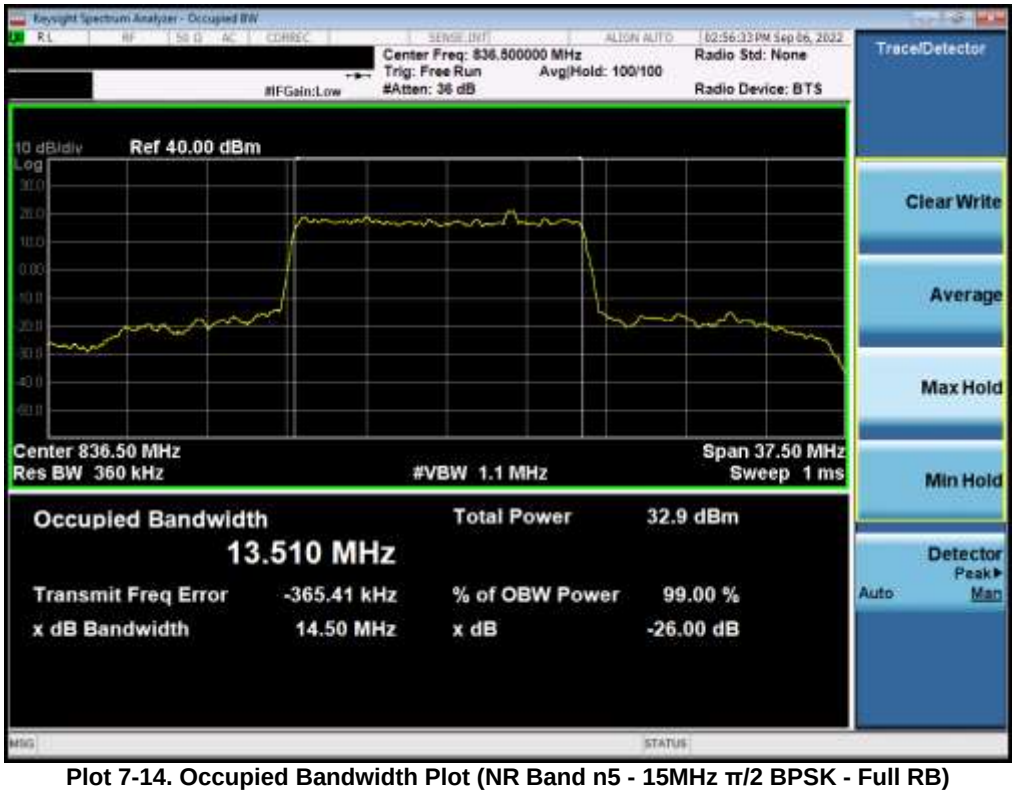
Plot 7-10. Occupied Bandwidth Plot (LTE Band 26/5 - 1.4MHz 16-QAM - Full RB)

NR Band n5

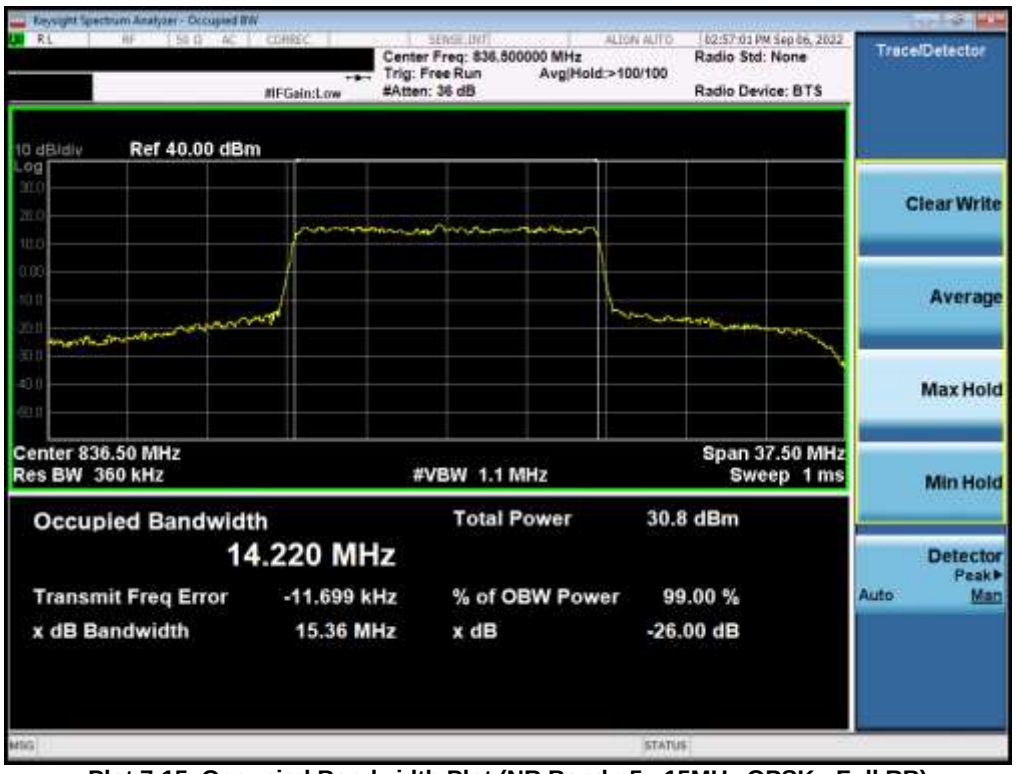
Plot 7-11. Occupied Bandwidth Plot (NR Band n5 - 20MHz π/2 BPSK - Full RB)

Plot 7-12. Occupied Bandwidth Plot (NR Band n5 - 20MHz QPSK - Full RB)

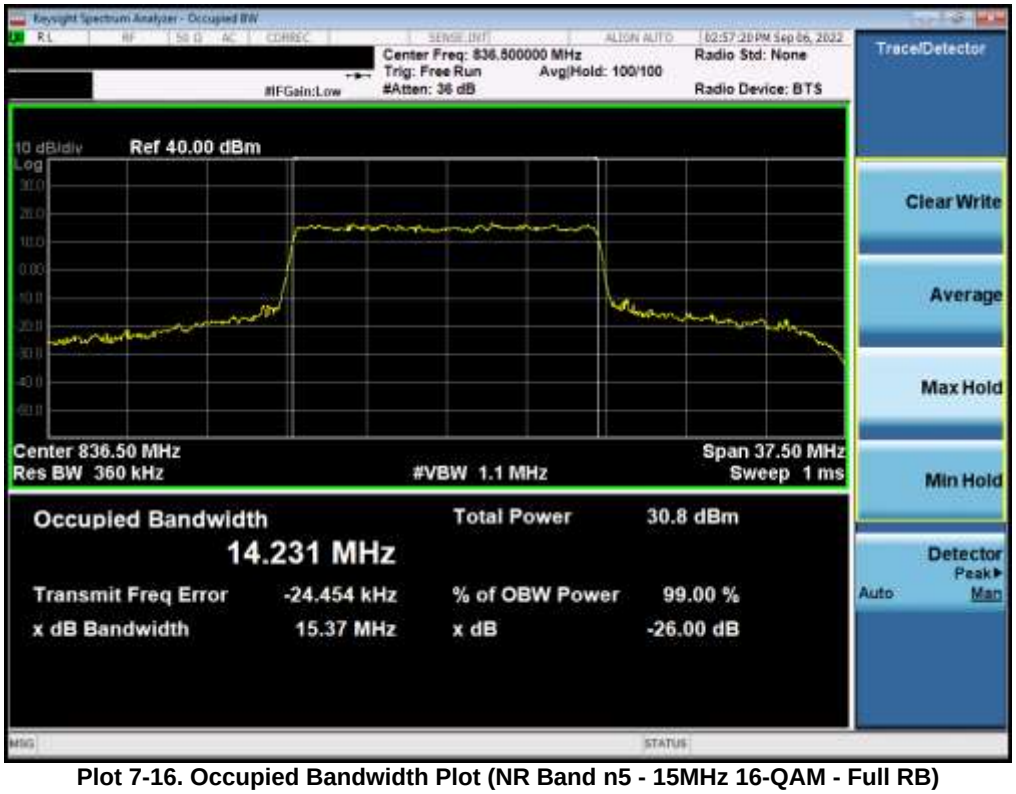
Plot 7-13. Occupied Bandwidth Plot (NR Band n5 - 20MHz 16-QAM - Full RB)



Plot 7-14. Occupied Bandwidth Plot (NR Band n5 - 15MHz π/2 BPSK - Full RB)



Plot 7-15. Occupied Bandwidth Plot (NR Band n5 - 15MHz QPSK - Full RB)



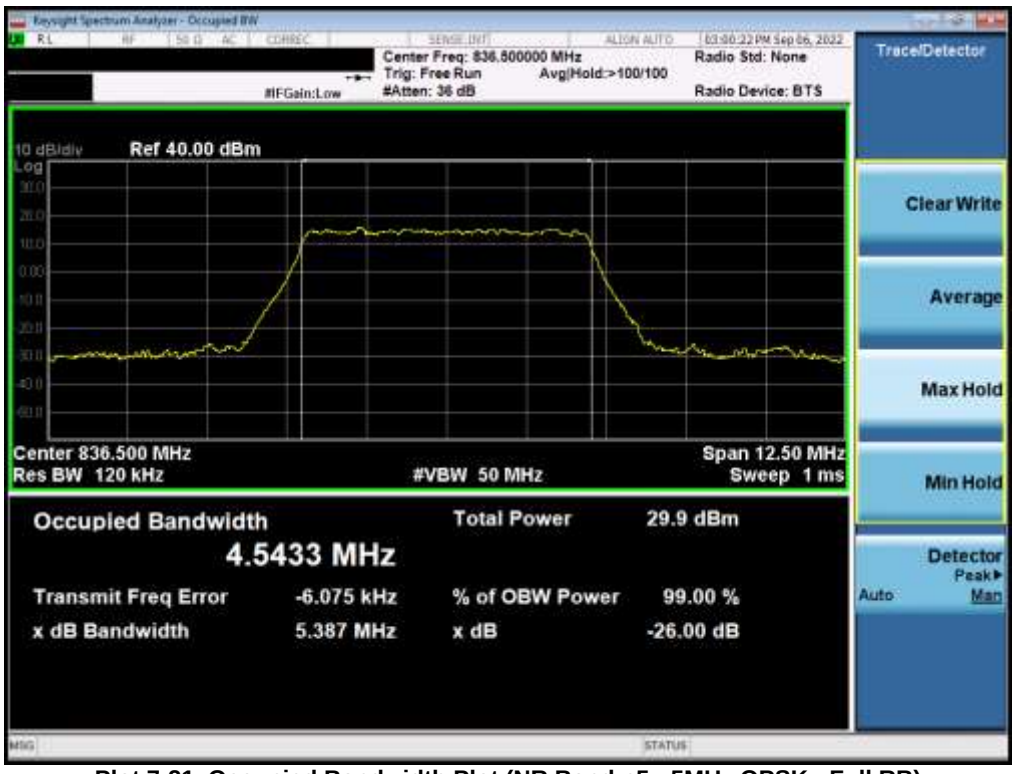
Plot 7-16. Occupied Bandwidth Plot (NR Band n5 - 15MHz 16-QAM - Full RB)

Plot 7-17. Occupied Bandwidth Plot (NR Band n5 - 10MHz π/2 BPSK - Full RB)

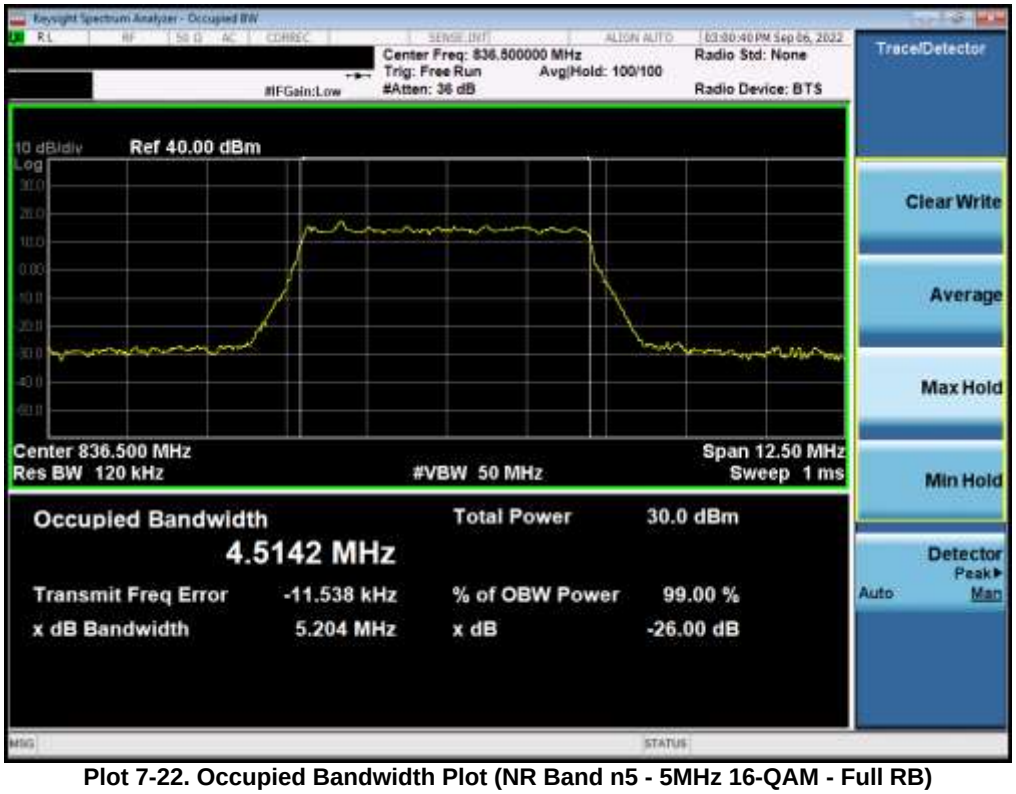
Plot 7-18. Occupied Bandwidth Plot (NR Band n5 - 10MHz QPSK - Full RB)

Plot 7-19. Occupied Bandwidth Plot (NR Band n5 - 10MHz 16-QAM - Full RB)

Plot 7-20. Occupied Bandwidth Plot (NR Band n5 - 5MHz π/2 BPSK - Full RB)



Plot 7-21. Occupied Bandwidth Plot (NR Band n5 - 5MHz QPSK - Full RB)



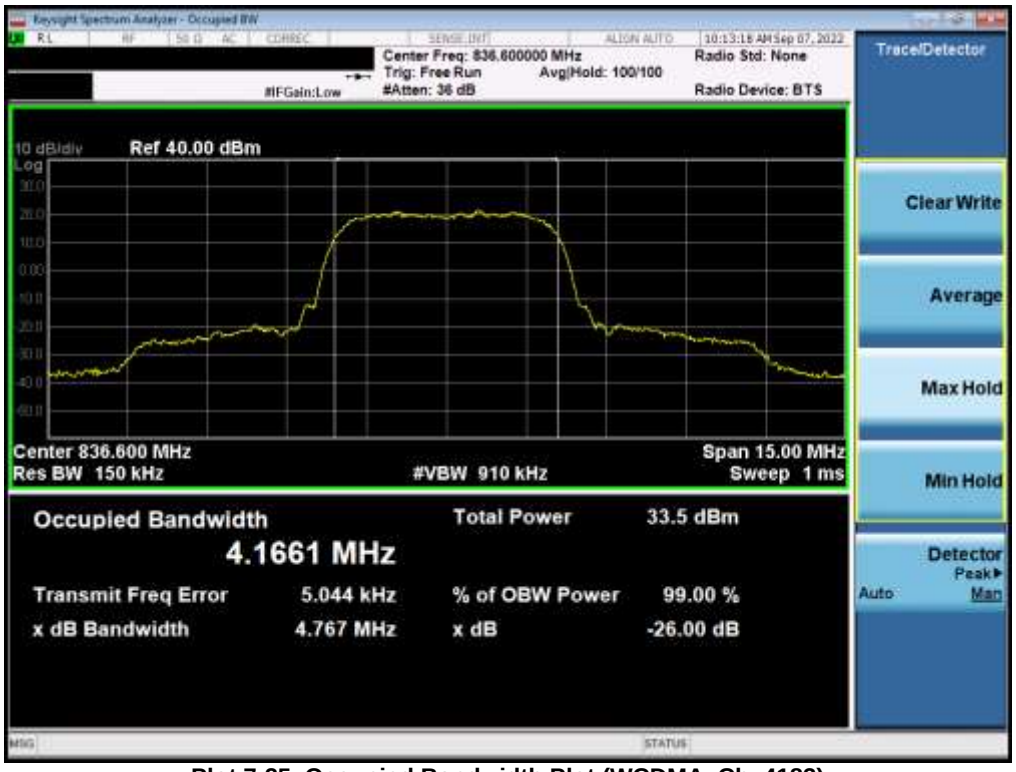
Plot 7-22. Occupied Bandwidth Plot (NR Band n5 - 5MHz 16-QAM - Full RB)

GPRS Cell

Plot 7-23. Occupied Bandwidth Plot (GPRS, Ch. 190)

Plot 7-24. Occupied Bandwidth Plot (EDGE, Ch. 190)

WCDMA Cell



Plot 7-25. Occupied Bandwidth Plot (WCDMA, Ch. 4183)

7.4 Spurious and Harmonic Emissions at Antenna Terminal

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 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.

The minimum permissible attenuation level of any spurious emission is 43 + 10 $log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.4

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-3. Test Instrument & Measurement Setup

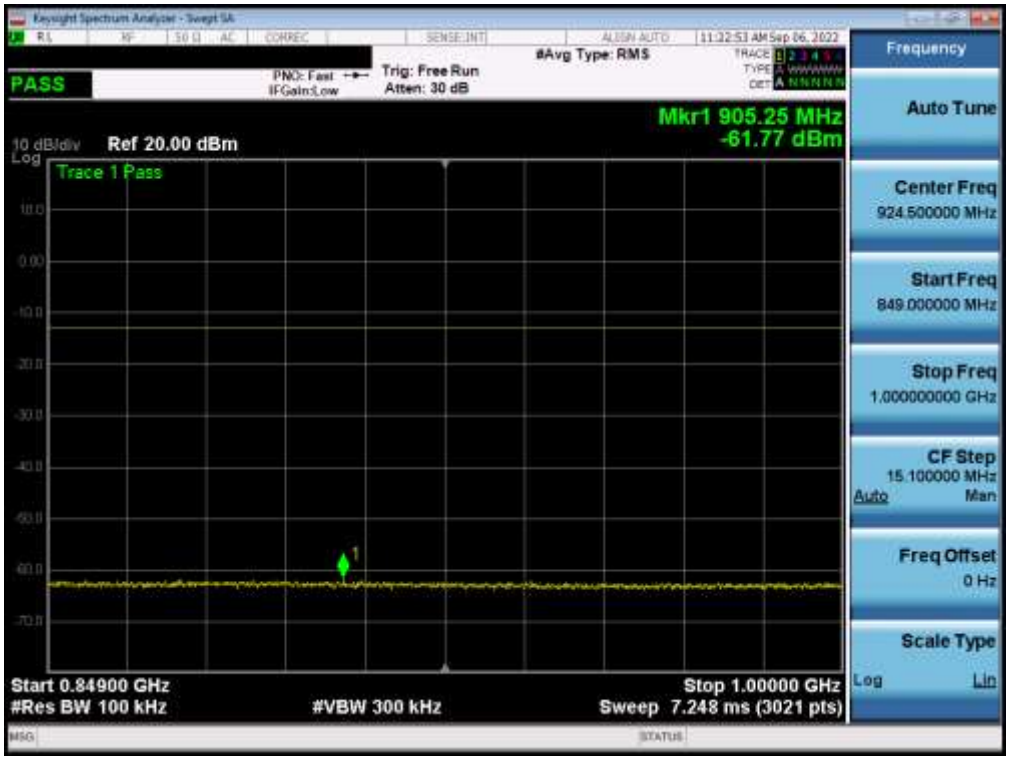
Test Notes

1. Per Part 22, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, 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. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

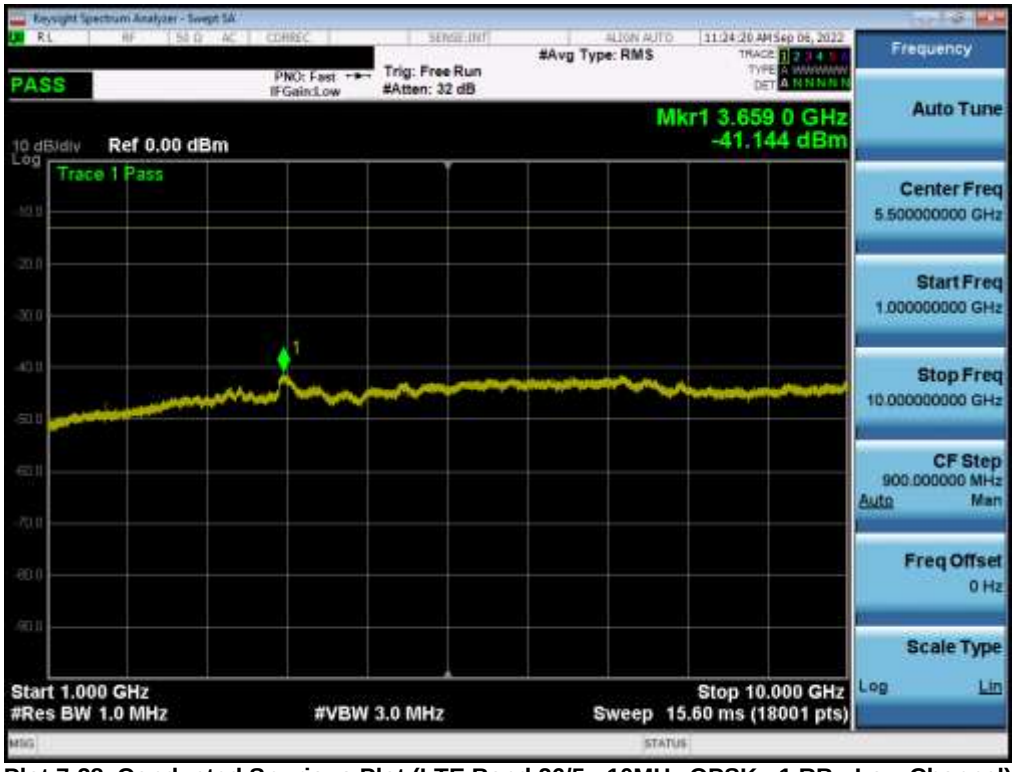
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

LTE Band 26/5

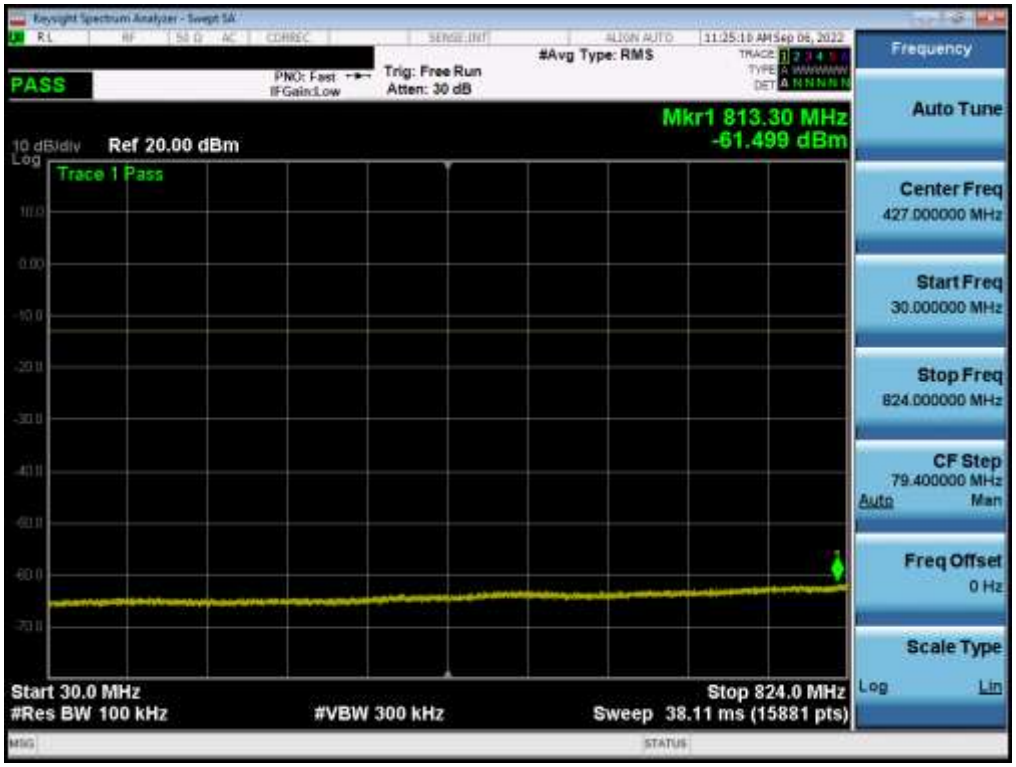
Plot 7-26. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK – 1 RB - Low Channel)



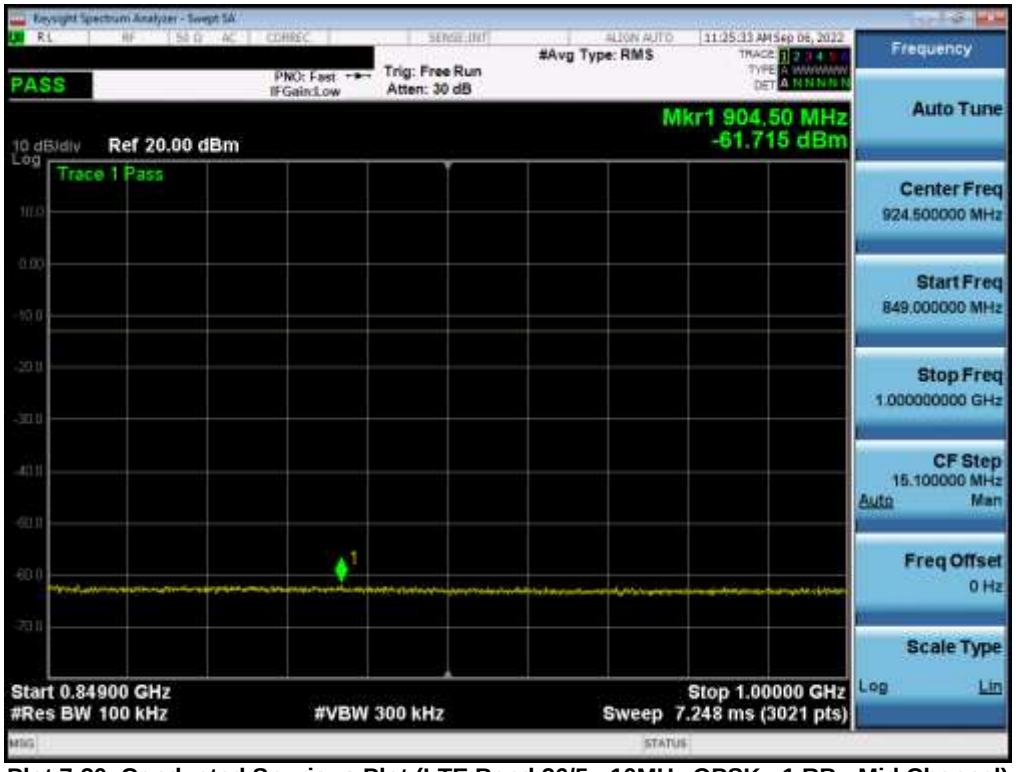
Plot 7-27. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Low Channel)



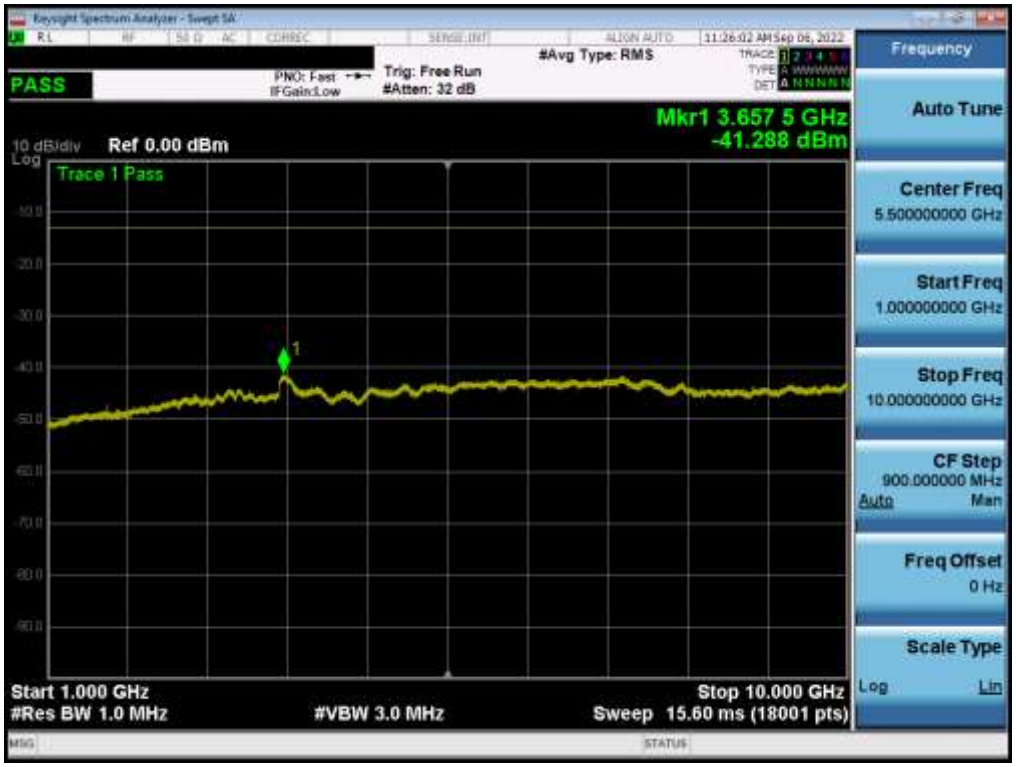
Plot 7-28. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Low Channel)



Plot 7-29. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Mid Channel)

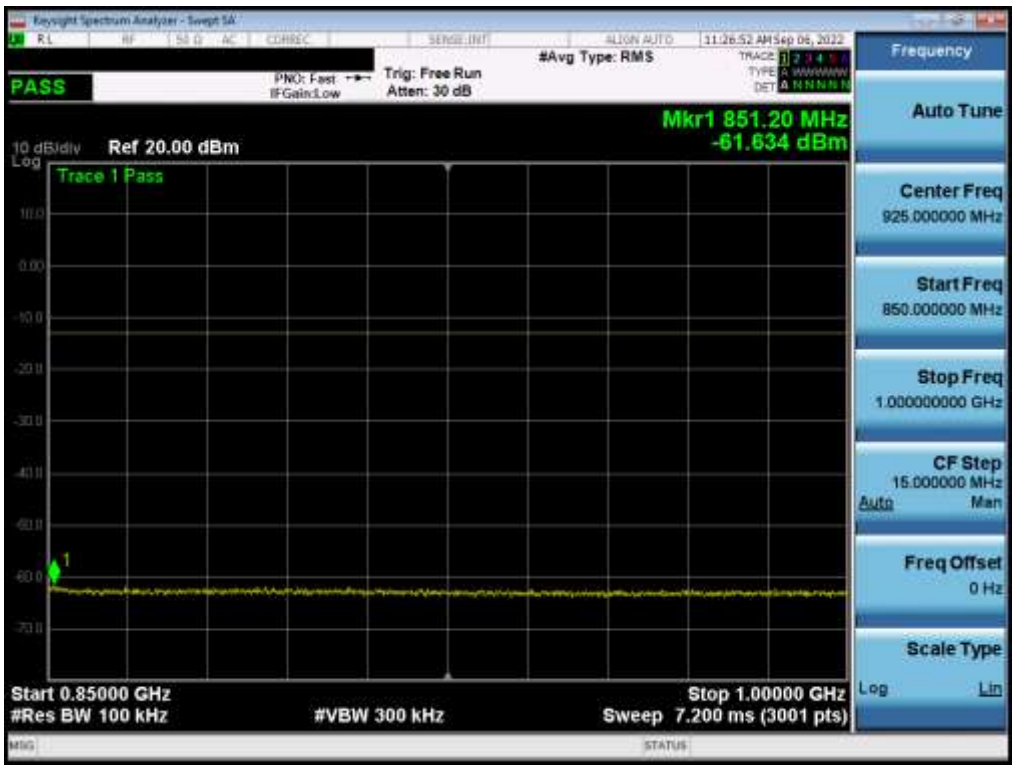


Plot 7-30. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Mid Channel)

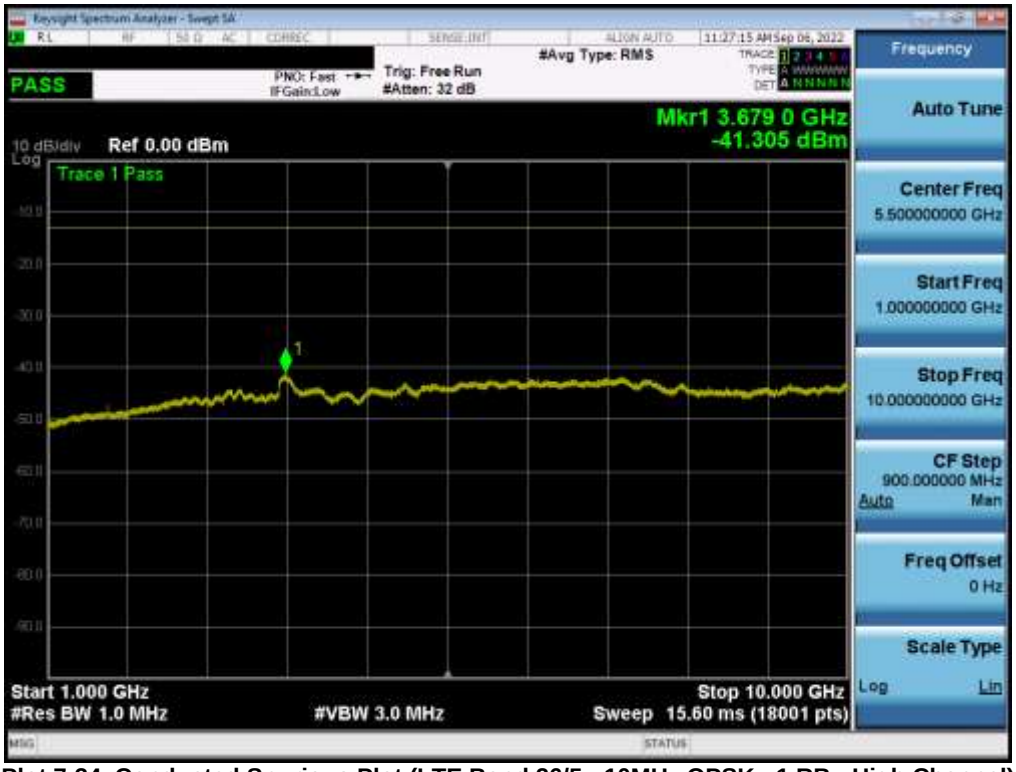


Plot 7-31. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Mid Channel)

Plot 7-32. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - High Channel)

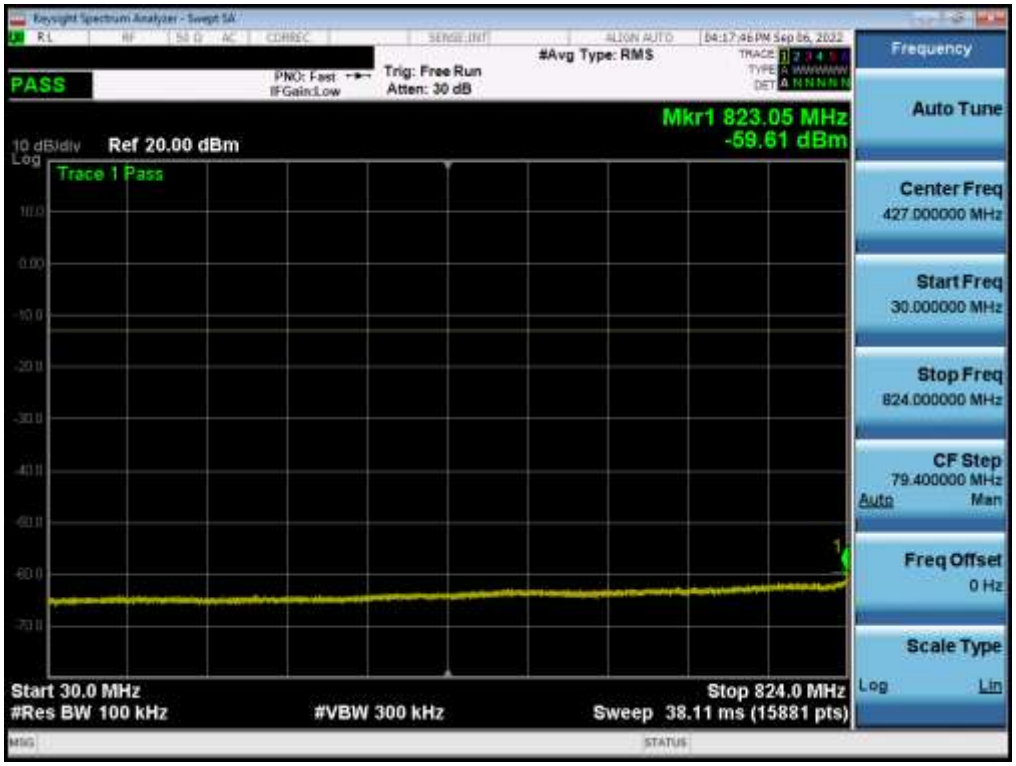


Plot 7-33. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - High Channel)

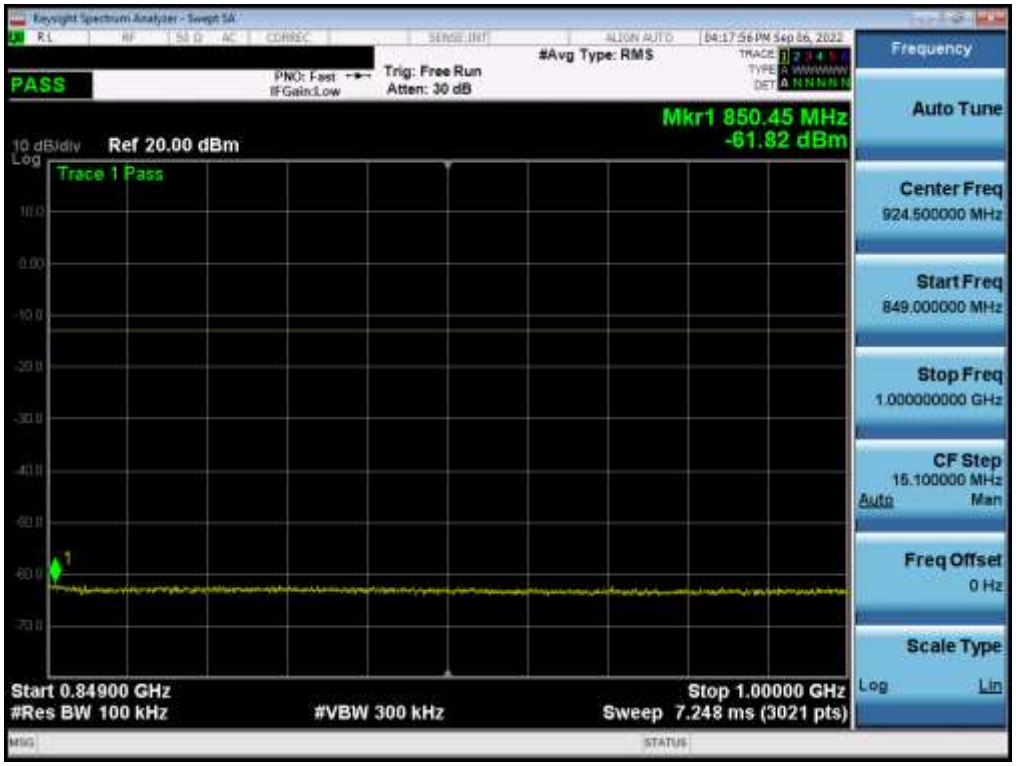


Plot 7-34. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - High Channel)

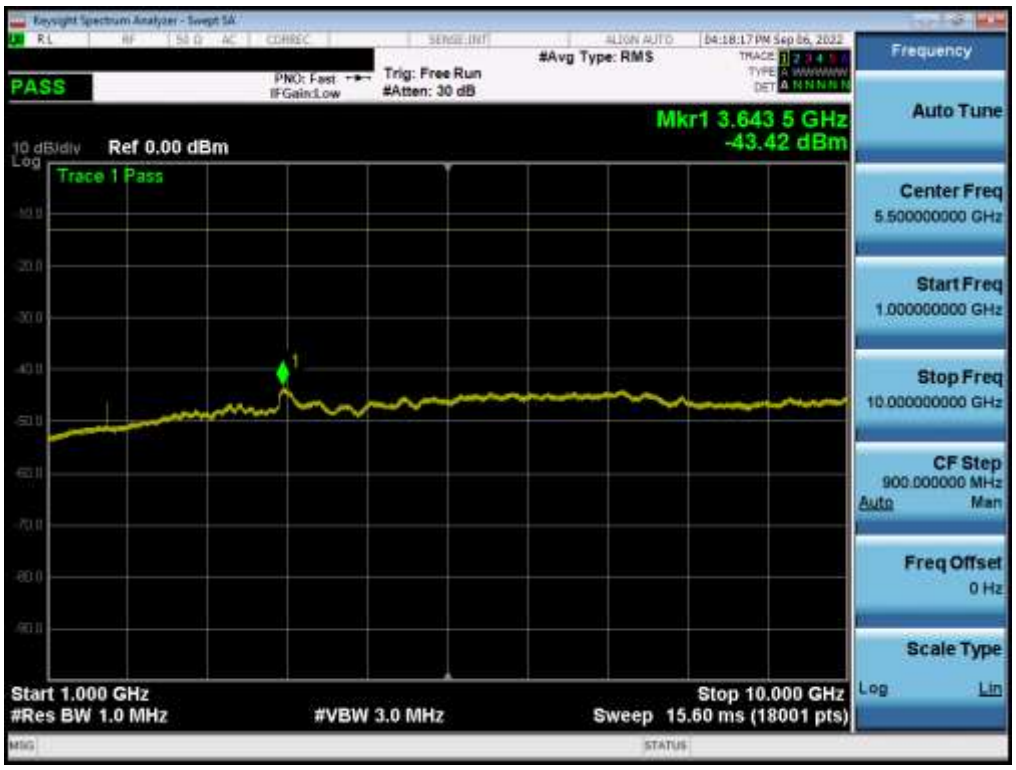
NR Band n5



Plot 7-35. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Low Channel)

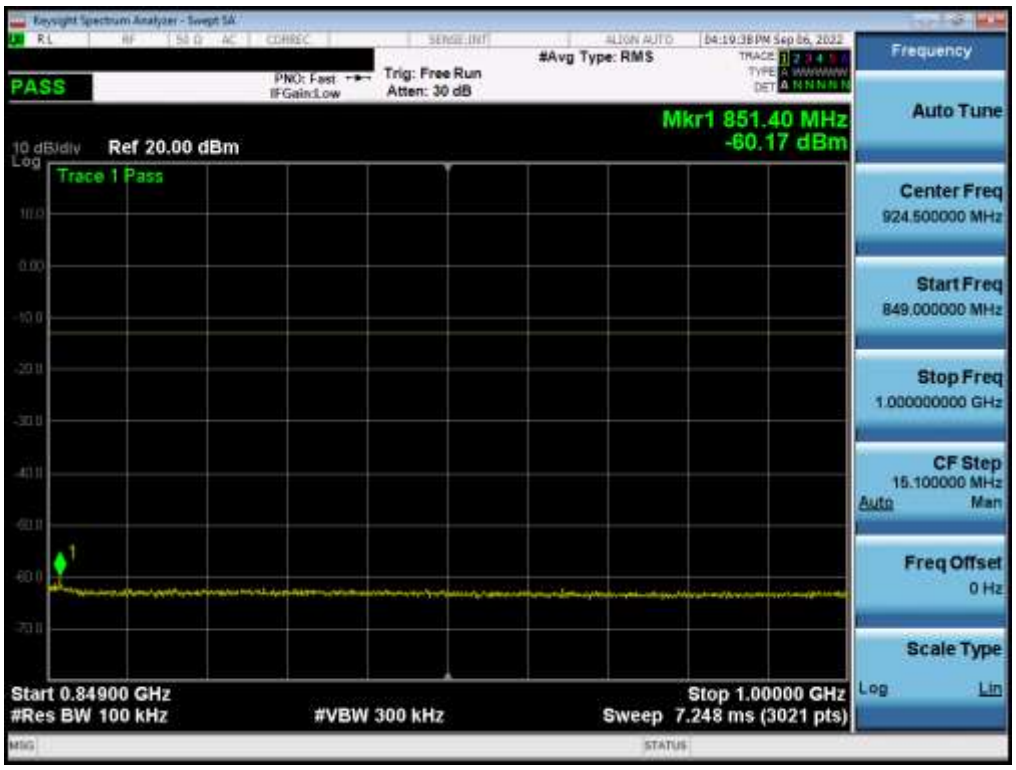


Plot 7-36. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Low Channel)

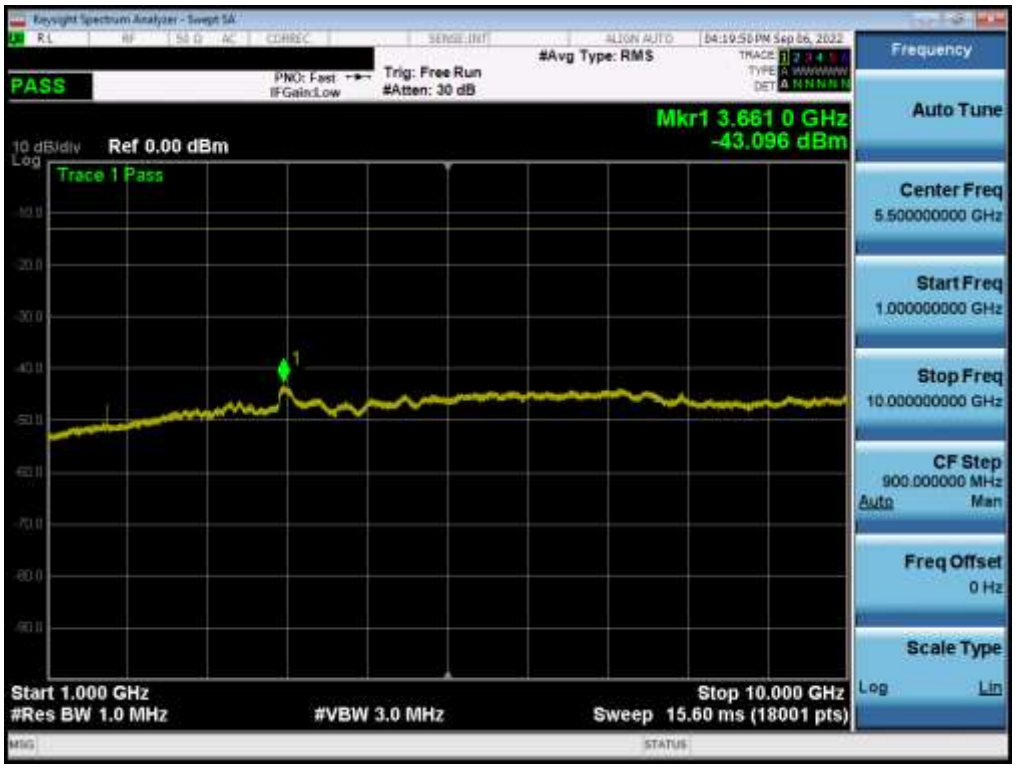


Plot 7-37. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Low Channel)

Plot 7-38. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)

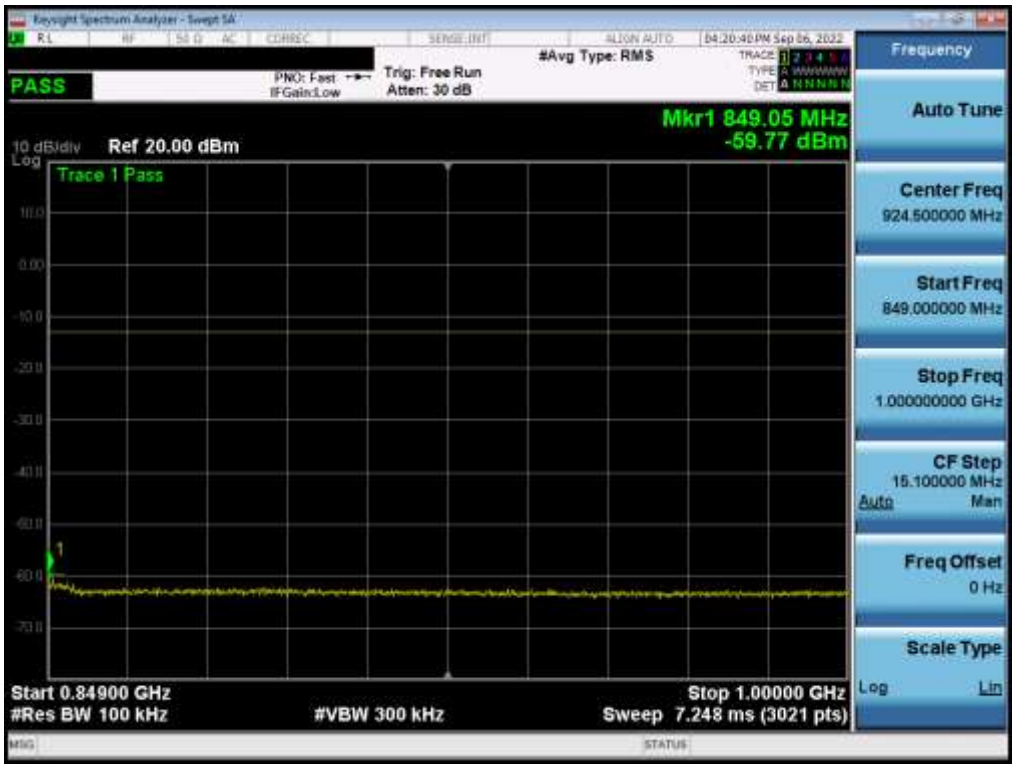


Plot 7-39. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)

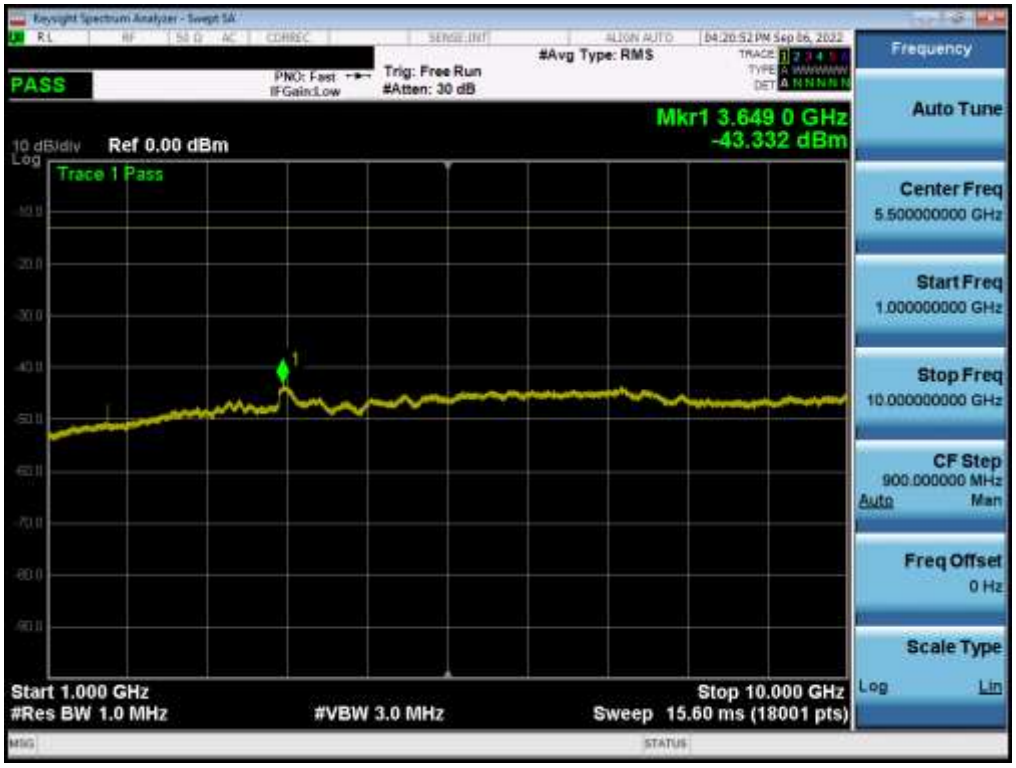


Plot 7-40. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)

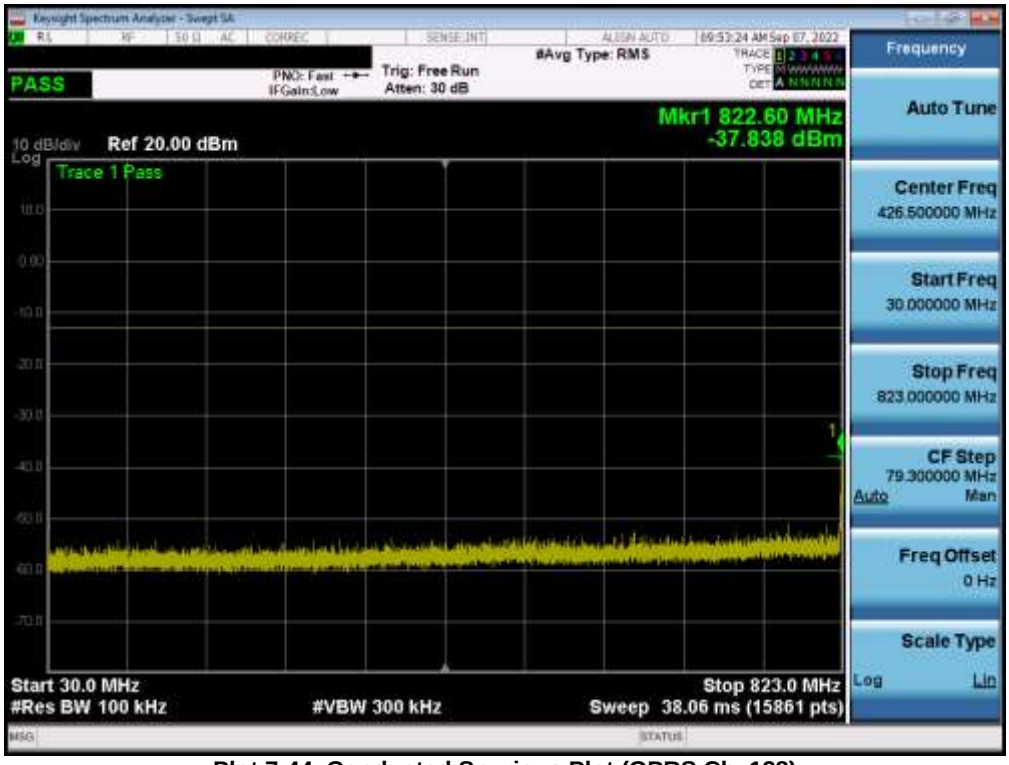
Plot 7-41. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - High Channel)



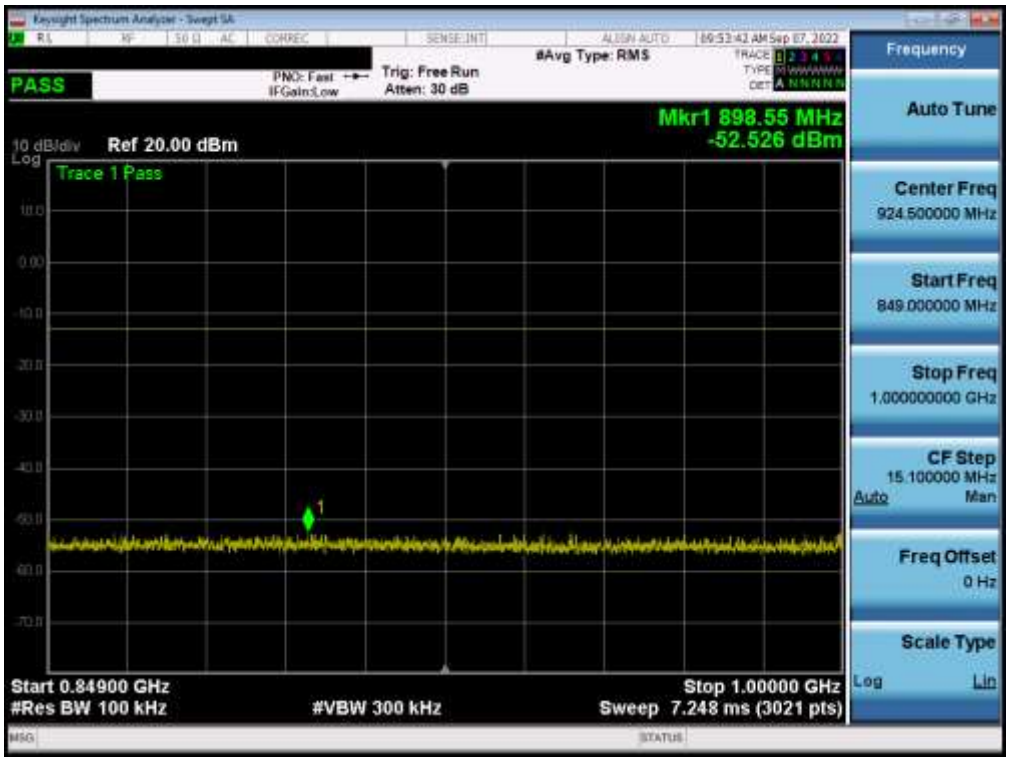
Plot 7-42. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - High Channel)



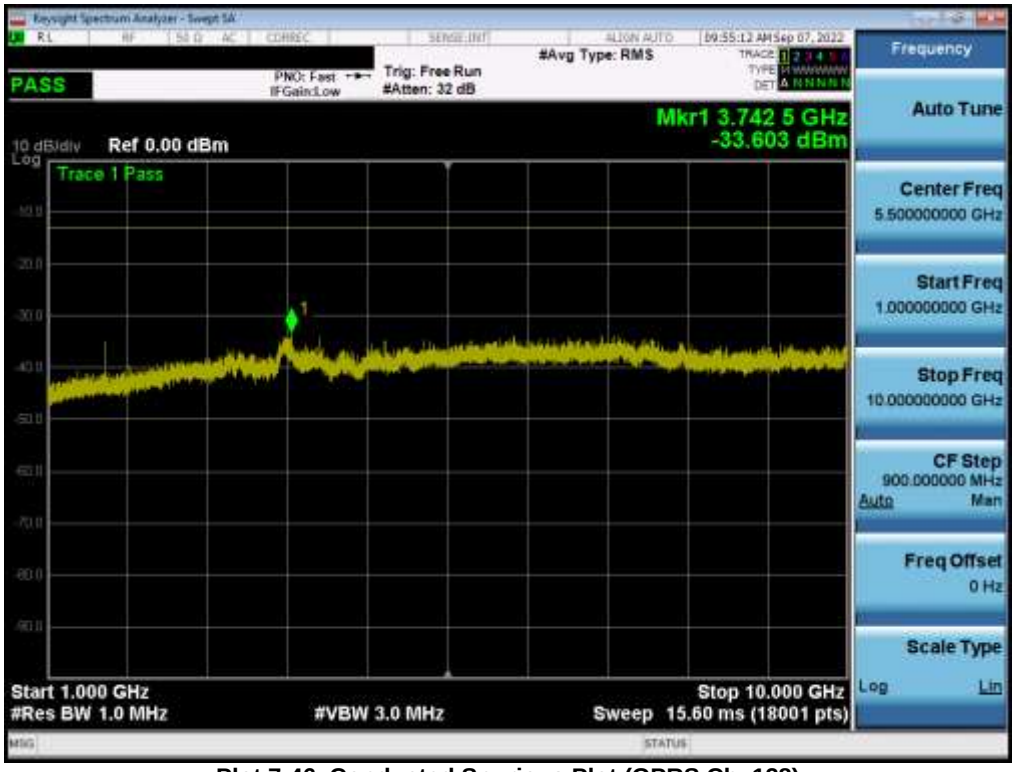
Plot 7-43. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - High Channel)



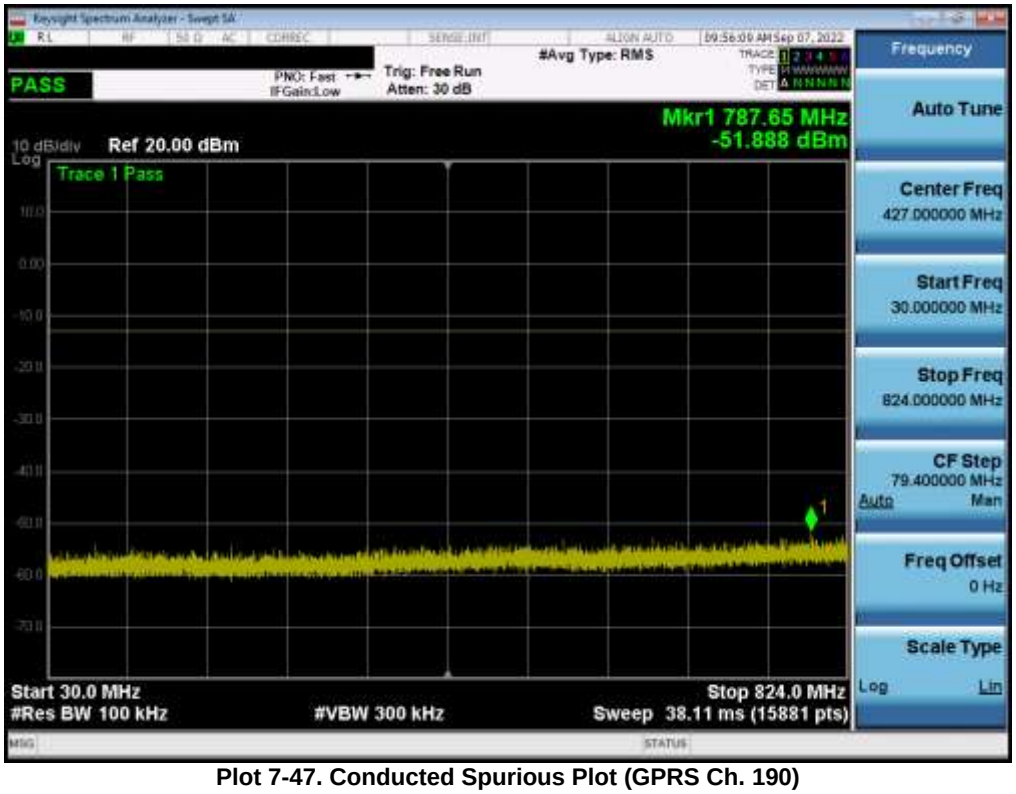
Plot 7-44. Conducted Spurious Plot (GPRS Ch. 128)



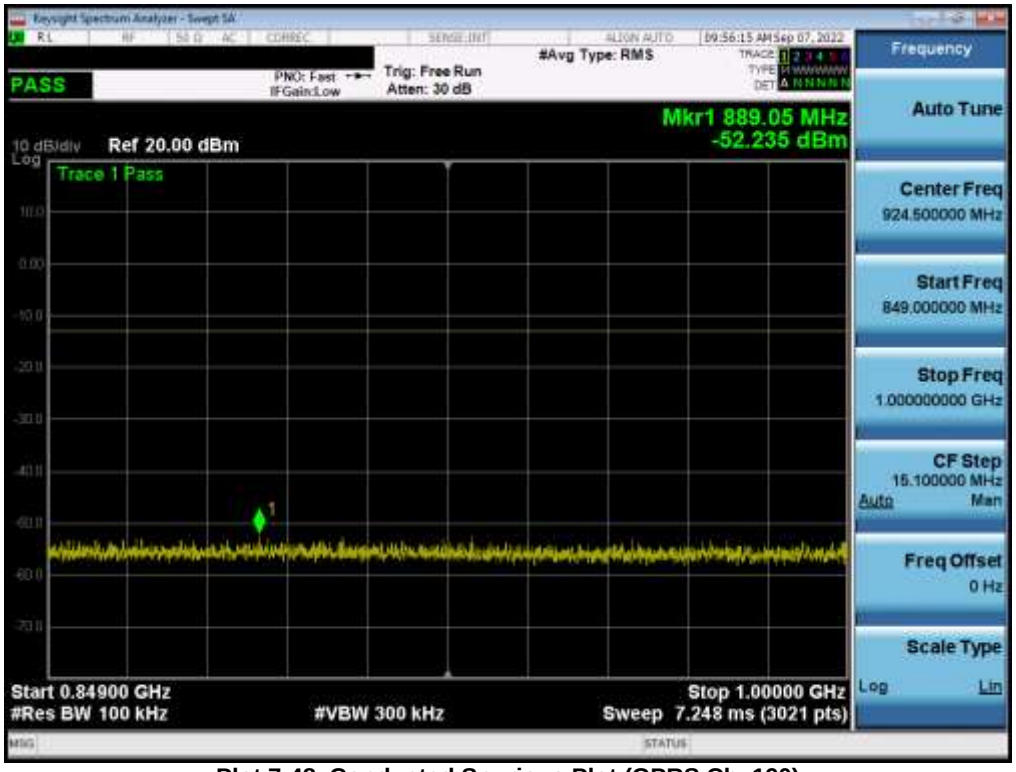
Plot 7-45. Conducted Spurious Plot (GPRS Ch. 128)



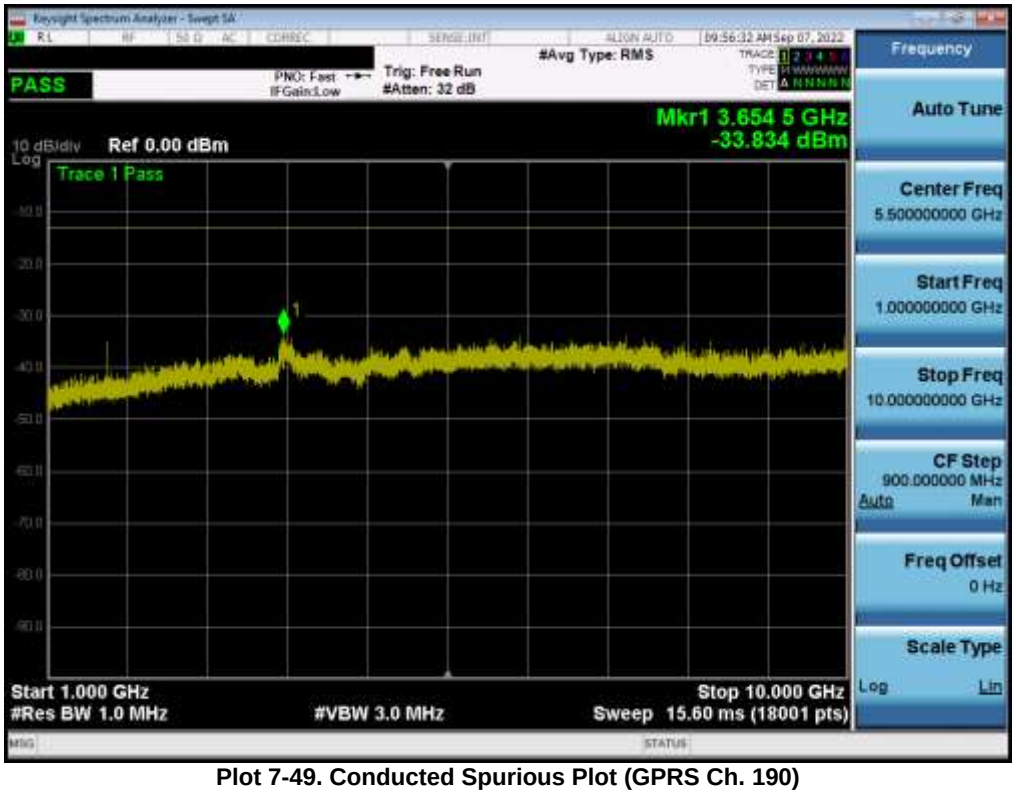
Plot 7-46. Conducted Spurious Plot (GPRS Ch. 128)



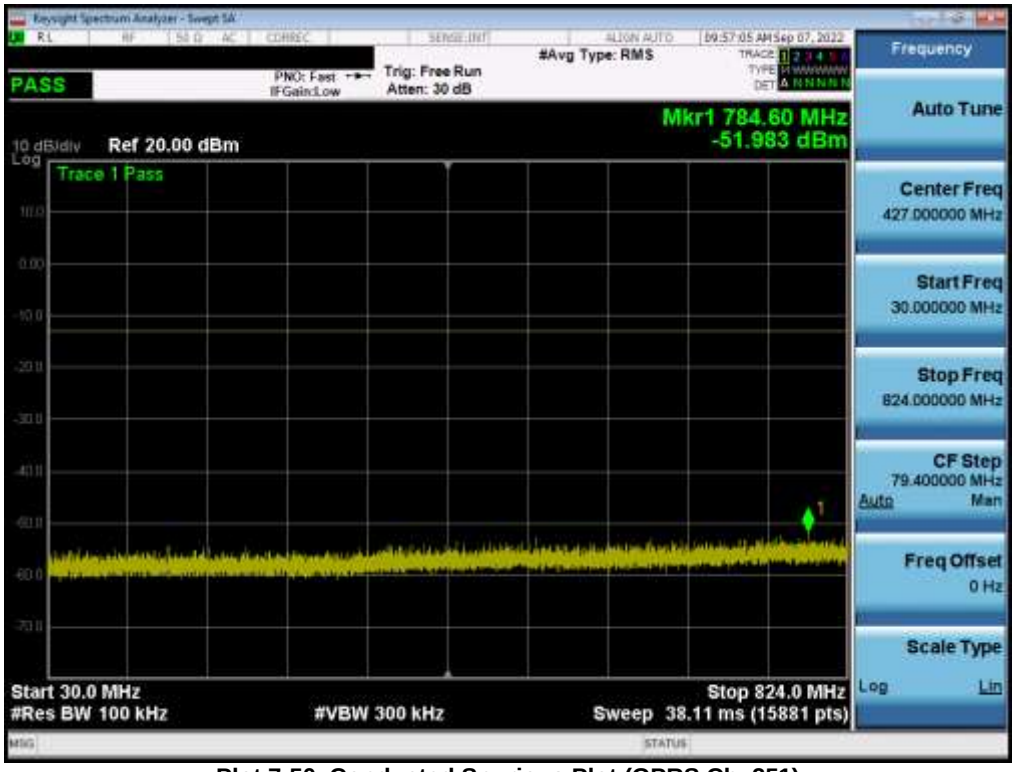
Plot 7-47. Conducted Spurious Plot (GPRS Ch. 190)



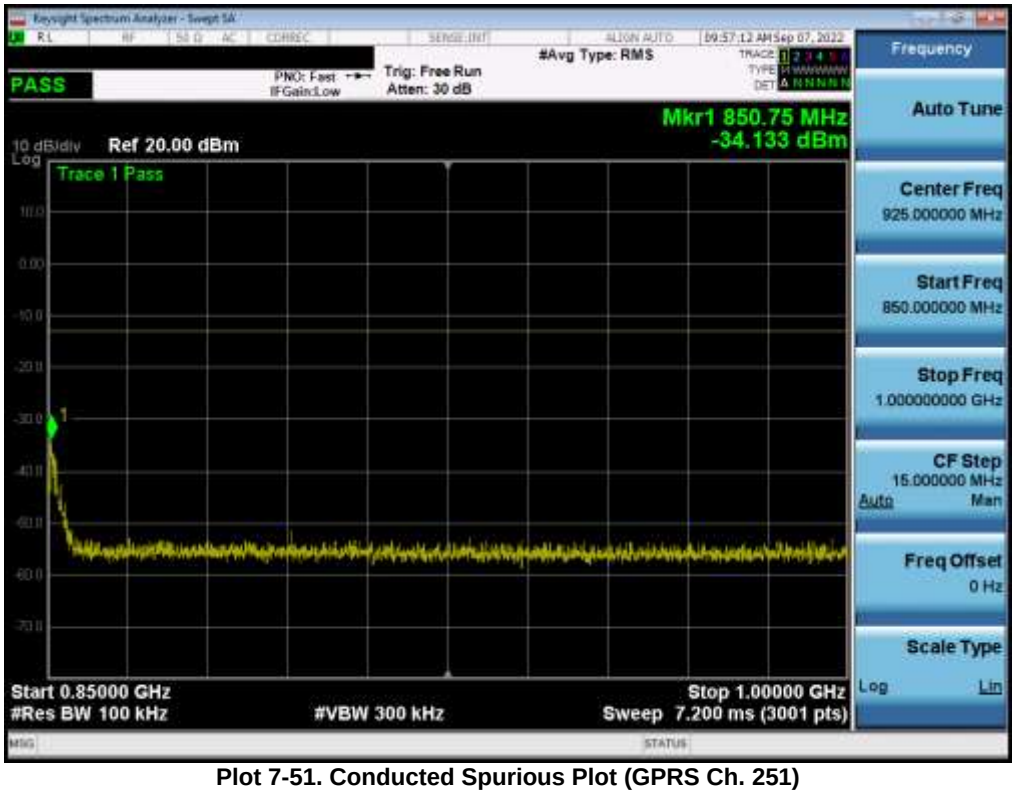
Plot 7-48. Conducted Spurious Plot (GPRS Ch. 190)



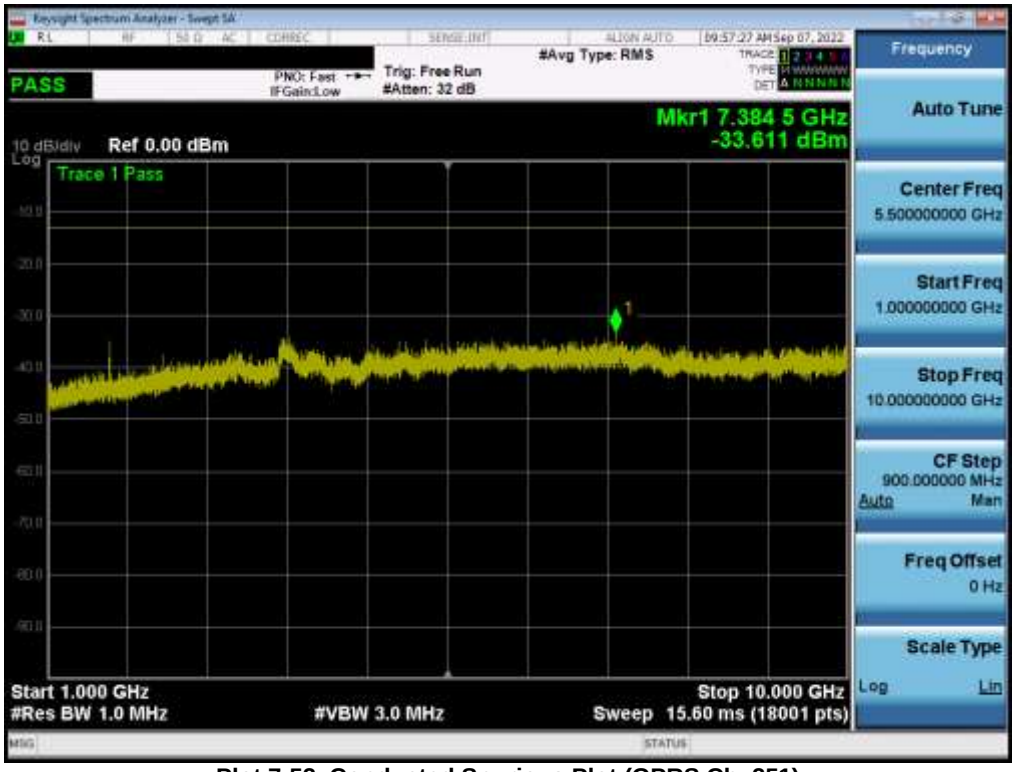
Plot 7-49. Conducted Spurious Plot (GPRS Ch. 190)



Plot 7-50. Conducted Spurious Plot (GPRS Ch. 251)

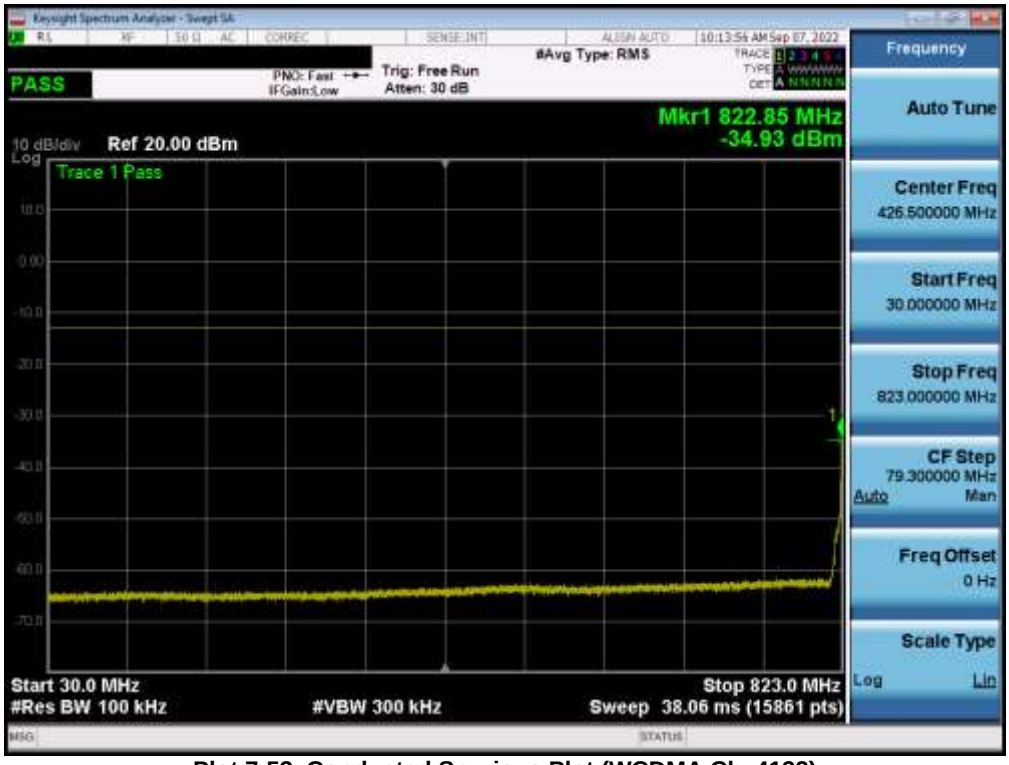


Plot 7-51. Conducted Spurious Plot (GPRS Ch. 251)

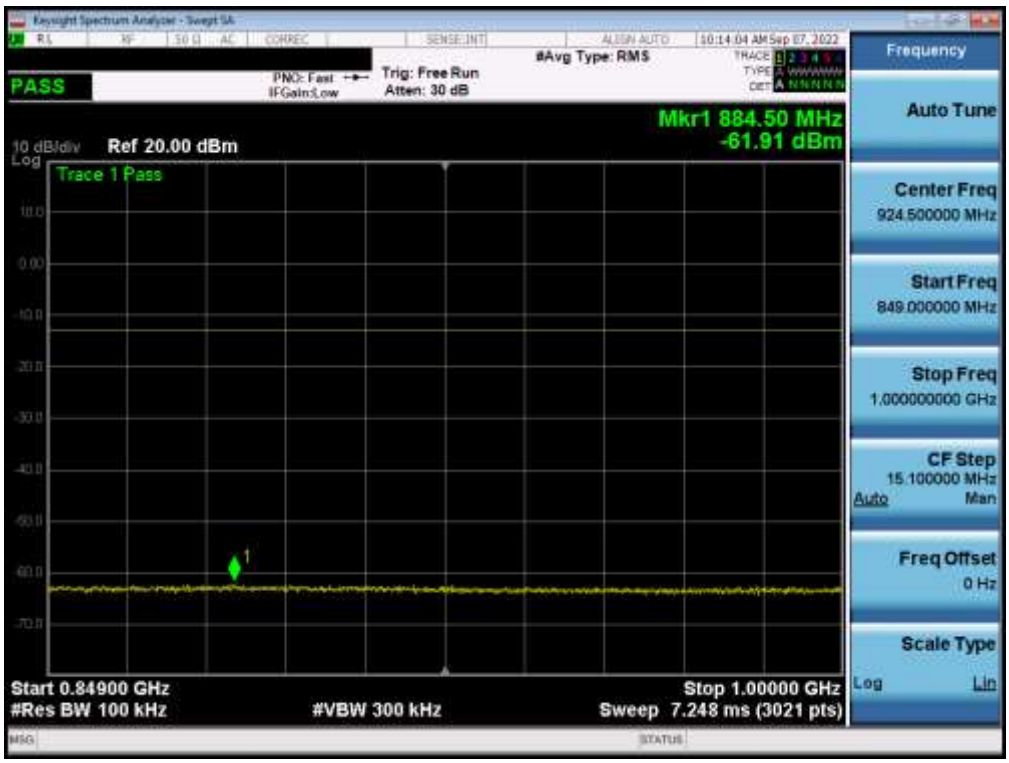


Plot 7-52. Conducted Spurious Plot (GPRS Ch. 251)

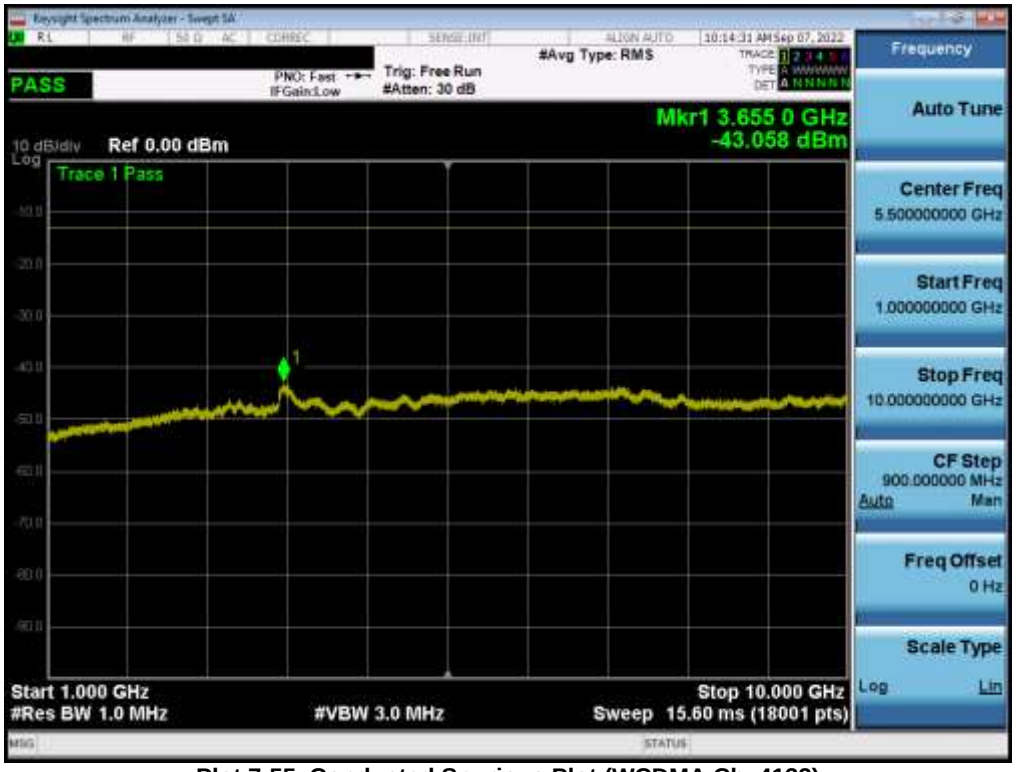
WCDMA Cell



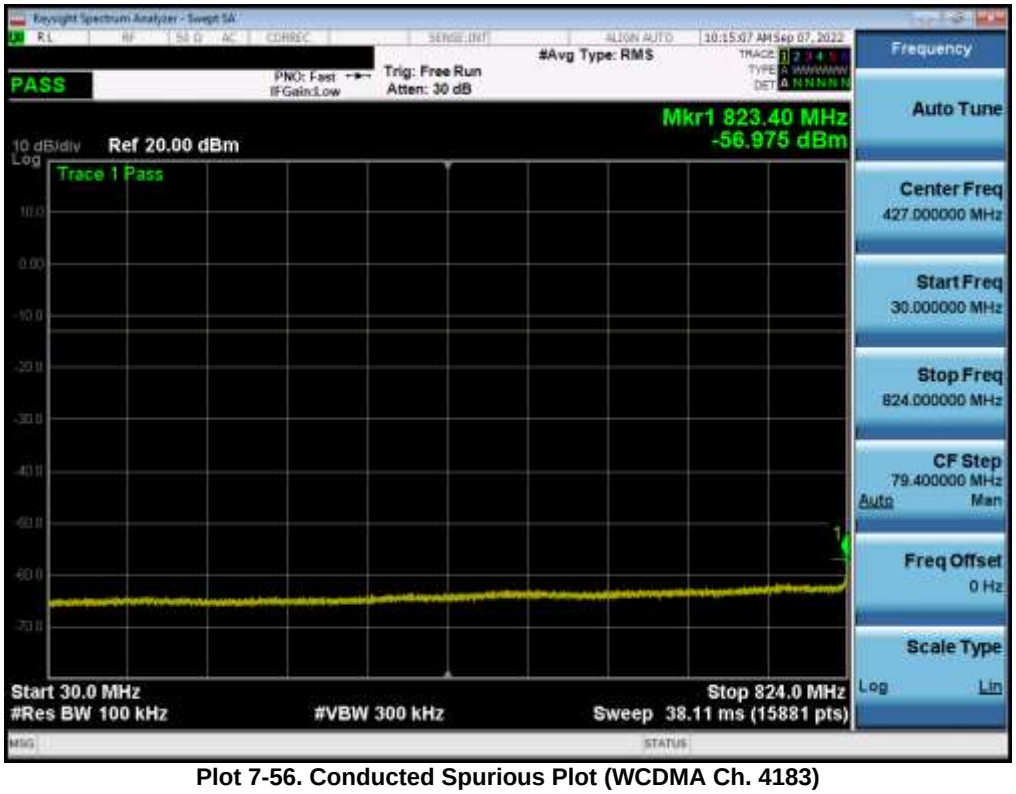
Plot 7-53. Conducted Spurious Plot (WCDMA Ch. 4132)



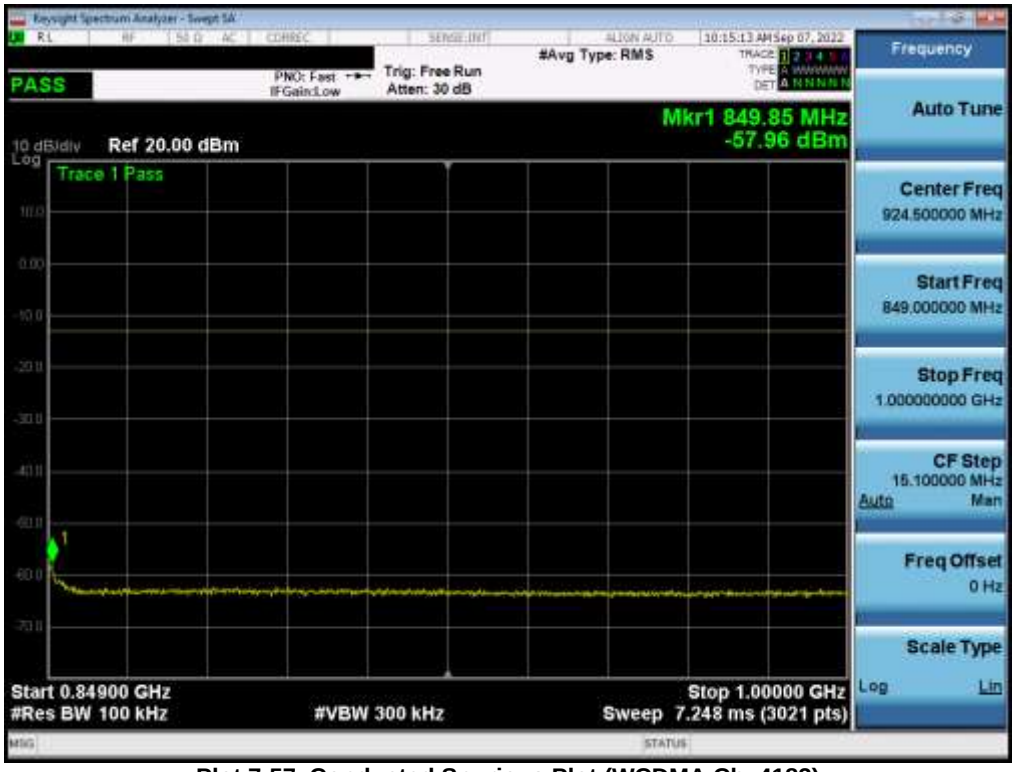
Plot 7-54. Conducted Spurious Plot (WCDMA Ch. 4132)



Plot 7-55. Conducted Spurious Plot (WCDMA Ch. 4132)



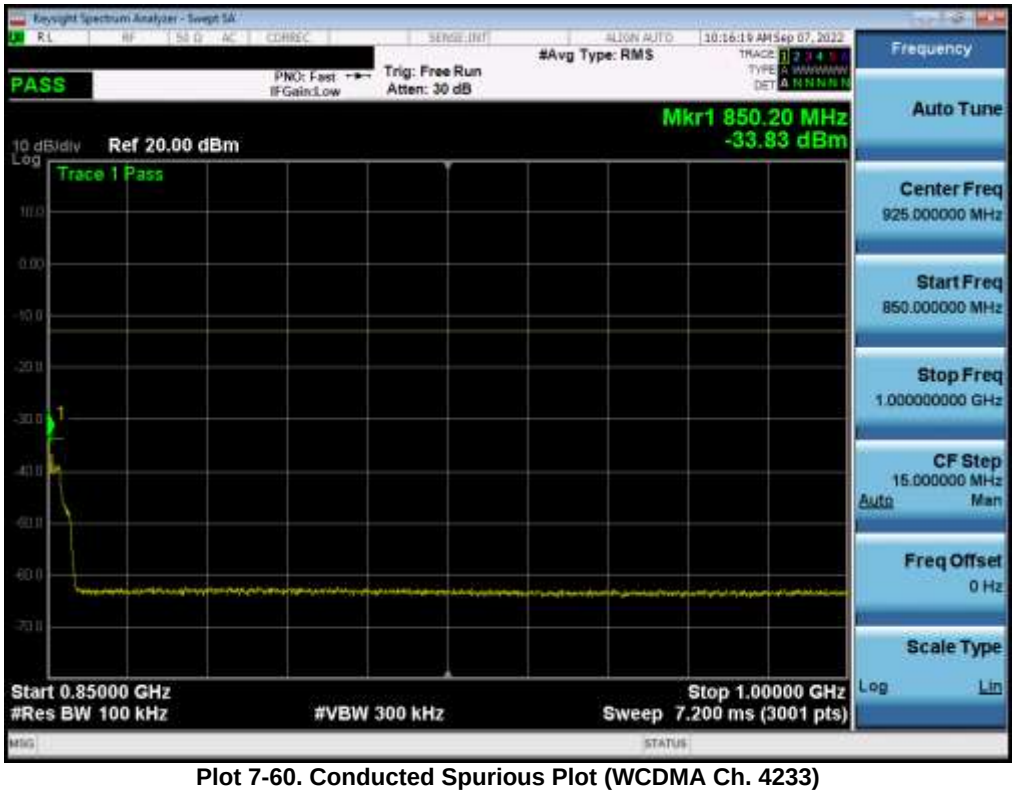
Plot 7-56. Conducted Spurious Plot (WCDMA Ch. 4183)



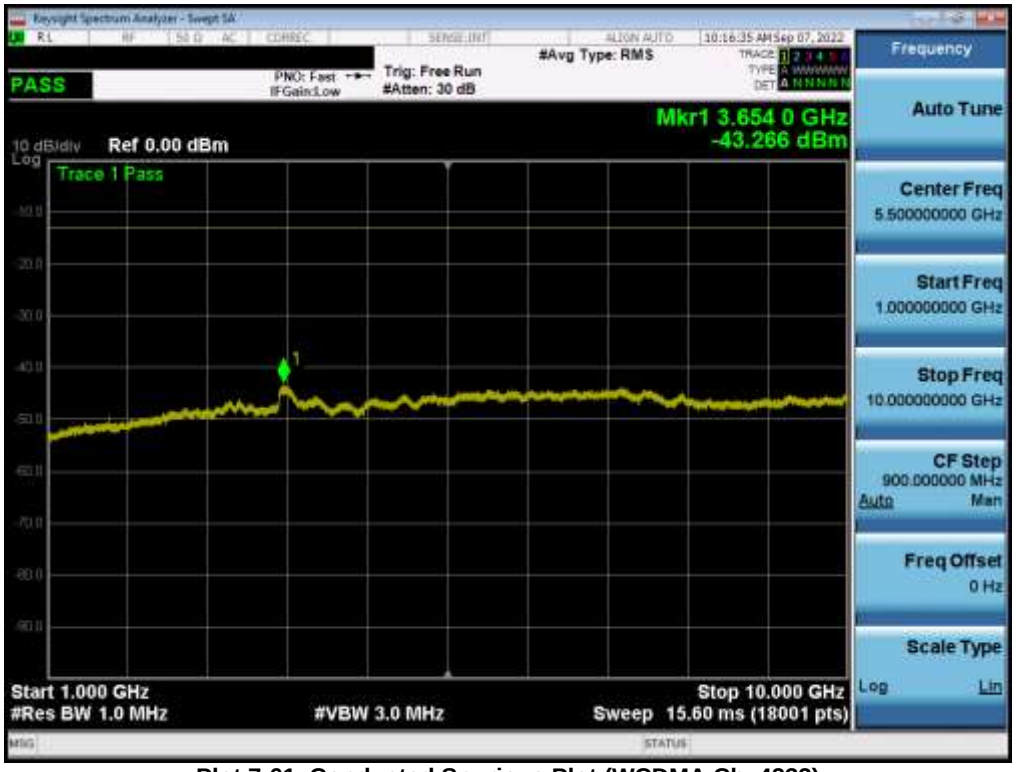
Plot 7-57. Conducted Spurious Plot (WCDMA Ch. 4183)

Plot 7-58. Conducted Spurious Plot (WCDMA Ch. 4183)

Plot 7-59. Conducted Spurious Plot (WCDMA Ch. 4233)



Plot 7-60. Conducted Spurious Plot (WCDMA Ch. 4233)



Plot 7-61. Conducted Spurious Plot (WCDMA Ch. 4233)

7.5 Band Edge Emissions at Antenna Terminal

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 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.

The minimum permissible attenuation level of any spurious emission is 43 + 10 $log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.3

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 ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

1. Per 22.917(b) and RSS-132(5.5), 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 to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

LTE Band 26/5

Plot 7-62. Lower Band Edge Plot (LTE Band 26 - 15MHz QPSK – Full RB)

Plot 7-63. Upper Band Edge Plot (LTE Band 26 - 15MHz QPSK – Full RB)

Plot 7-64. Lower Band Edge Plot (LTE Band 26/5 - 10MHz QPSK – Full RB)

Plot 7-65. Upper Band Edge Plot (LTE Band 26/5 - 10MHz QPSK – Full RB)

Plot 7-66. Lower Band Edge Plot (LTE Band 26/5 - 5MHz QPSK – Full RB)

Plot 7-67. Upper Band Edge Plot (LTE Band 26/5 - 5MHz QPSK – Full RB)

Plot 7-68. Lower Band Edge Plot (LTE Band 26/5 - 3MHz QPSK – Full RB)

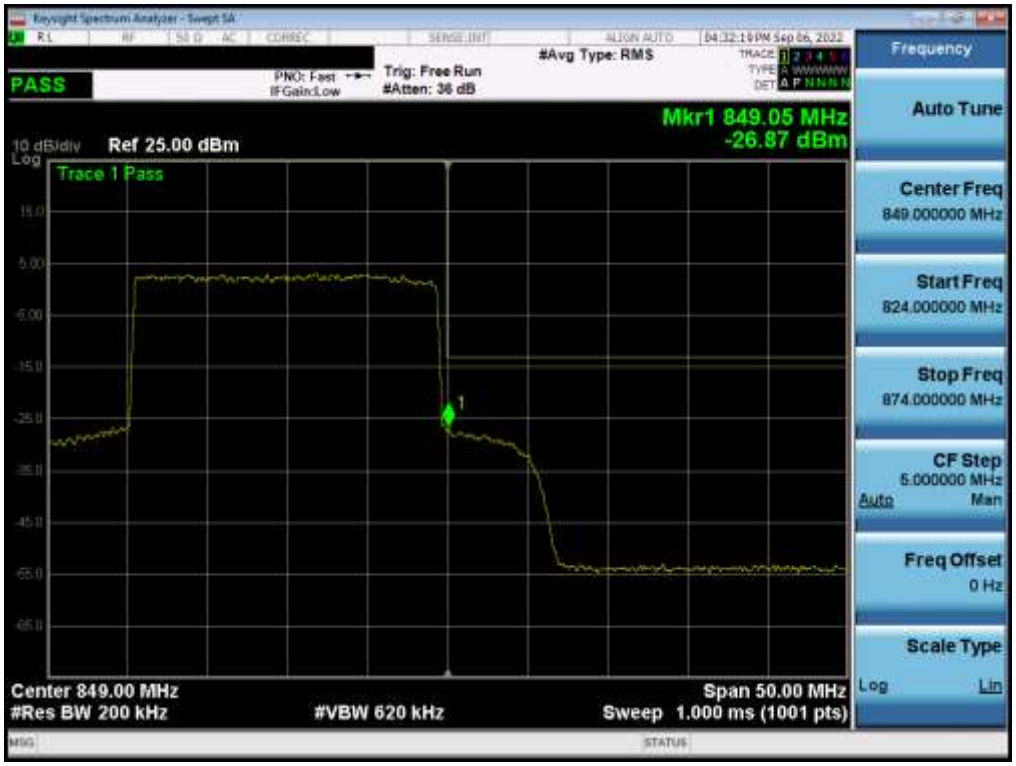
Plot 7-69. Upper Band Edge Plot (LTE Band 26/5 - 3MHz QPSK – Full RB)

Plot 7-70. Lower Band Edge Plot (LTE Band 26/5 – 1.4MHz QPSK – Full RB)

Plot 7-71. Upper Band Edge Plot (LTE Band 26/5 – 1.4MHz QPSK – Full RB)

NR Band n5

Plot 7-72. Lower Band Edge Plot (NR Band n5 – 20.0MHz - Full RB)



Plot 7-73. Upper Band Edge Plot (NR Band n5 – 20.0MHz - Full RB)

Plot 7-74. Lower Band Edge Plot (NR Band n5 – 15.0MHz - Full RB)

Plot 7-75. Upper Band Edge Plot (NR Band n5 – 15.0MHz - Full RB)

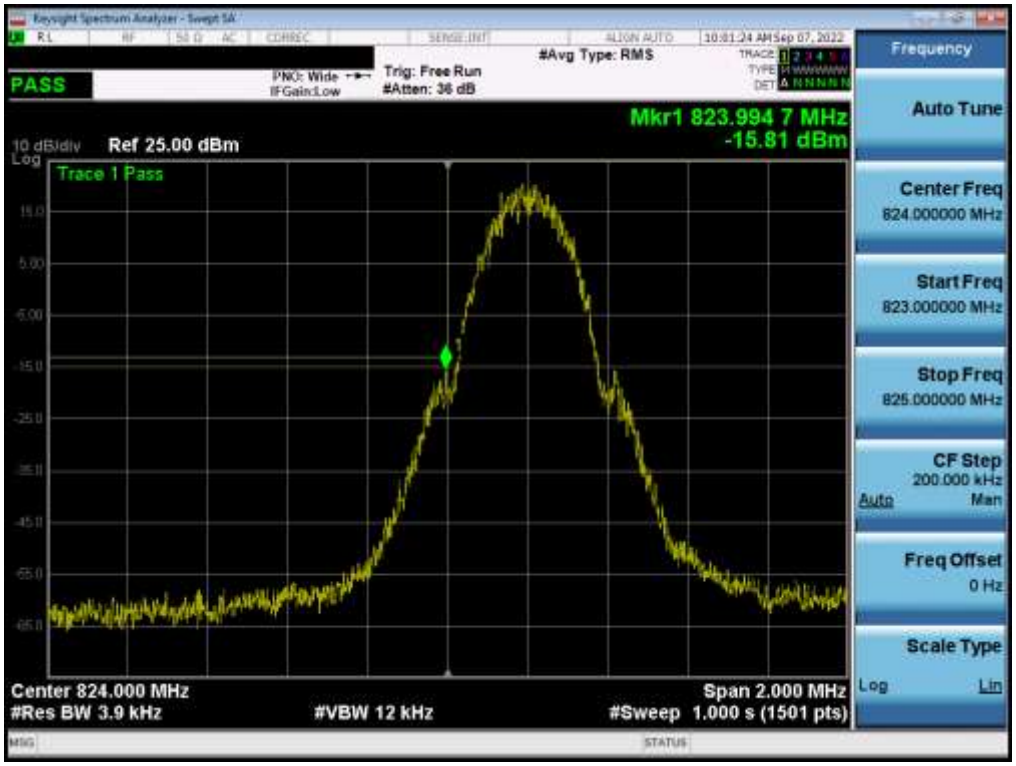
Plot 7-76. Lower Band Edge Plot (NR Band n5 – 10.0MHz - Full RB)

Plot 7-77. Upper Band Edge Plot (NR Band n5 – 10.0MHz - Full RB)

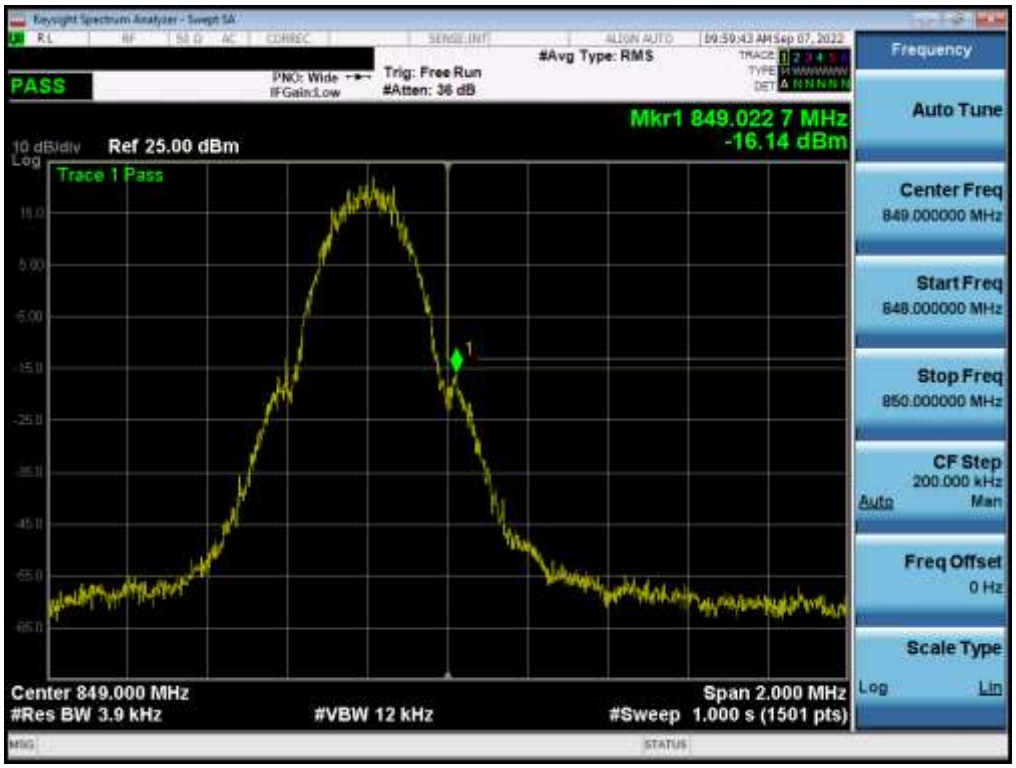
Plot 7-78. Lower Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)

Plot 7-79. Upper Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)

GSM/GPRS Cell



Plot 7-80. Lower Band Edge Plot (GPRS Cell – Ch. 128)



Plot 7-81. Upper Band Edge Plot (GPRS Cell – Ch. 251)

WCDMA Cell

Plot 7-82. Lower Band Edge Plot (WCDMA Cell – Ch. 4132)

Plot 7-83. Upper Band Edge Plot (WCDMA Cell – Ch. 4233)

7.6 Radiated Power (ERP)

Test Overview

Effective Radiated Power (ERP) measurements are performed using the substitution method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 – Section 5.2.4.4

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
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". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration.
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

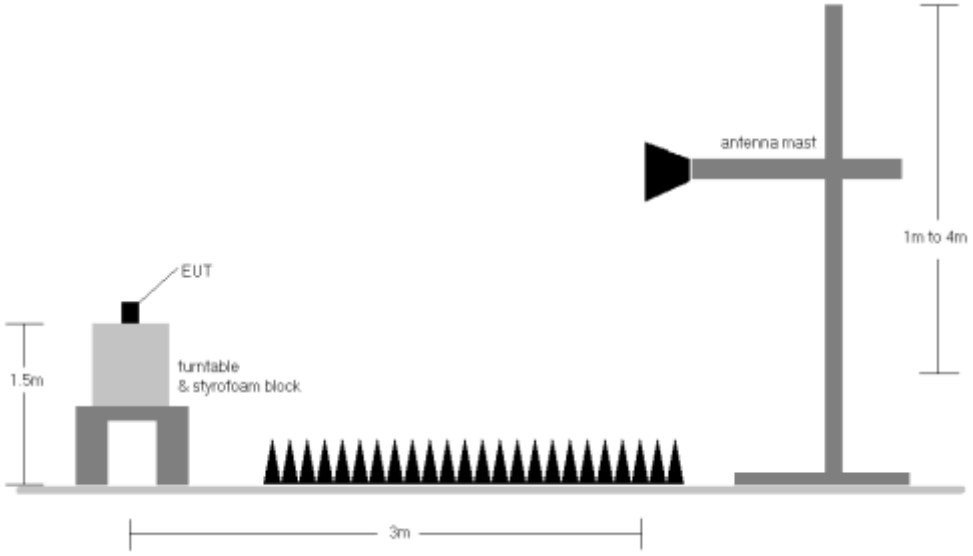


Figure 7-5. Radiated Test Setup < 1GHz

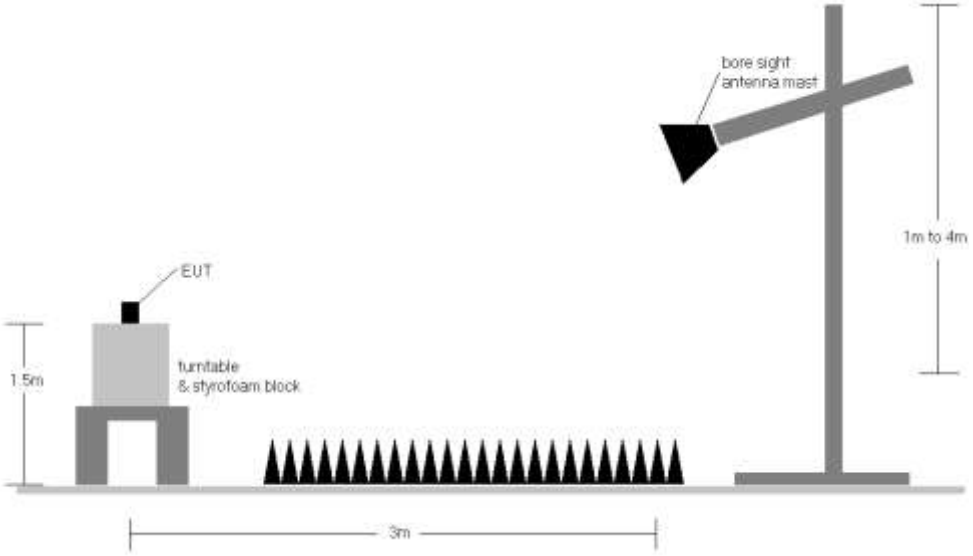


Figure 7-6. Radiated Test Setup > 1GHz

Test Notes

1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers are reported in GPRS mode while transmitting with one slot active.

2) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest powers are reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to “1”.

3) The EUT was tested in three orthogonal planes 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 tables below.

4) This unit was tested with its standard battery.

5) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
15MHz (Band 26 only)	QPSK	831.5	V	153	238	1.29	1 / 37	22.94	**22.08**	0.161	38.45	-16.37	**24.23**	0.266	40.61	-16.38
	QPSK	836.5	V	146	218	1.31	1 / 37	22.89	22.05	0.160	38.45	-16.40	24.20	0.263	40.61	-16.41
	QPSK	841.5	V	133	227	1.33	1 / 0	22.15	21.33	0.136	38.45	-17.12	23.48	0.223	40.61	-17.12
	16-QAM	831.5	V	153	238	1.29	1 / 37	21.98	21.12	0.129	38.45	-17.33	23.27	0.212	40.61	-17.34
10 MHz	QPSK	829.0	V	153	238	1.27	1 / 25	23.21	**22.34**	0.171	38.45	-16.11	**24.49**	0.281	40.61	-16.12
	QPSK	836.5	V	146	218	1.31	1 / 25	22.98	22.14	0.164	38.45	-16.31	24.29	0.268	40.61	-16.32
	QPSK	844.0	V	133	227	1.35	1 / 49	22.41	21.60	0.145	38.45	-16.85	23.75	0.237	40.61	-16.85
	16-QAM	829.0	V	153	238	1.27	1 / 25	22.31	21.44	0.139	38.45	-17.01	23.59	0.228	40.61	-17.02
5 MHz	QPSK	826.5	V	153	238	1.26	1 / 12	23.08	22.19	0.166	38.45	-16.26	24.34	0.272	40.61	-16.27
	QPSK	836.5	V	146	218	1.31	1 / 12	23.07	**22.23**	0.167	38.45	-16.22	**24.38**	0.274	40.61	-16.23
	QPSK	846.5	V	133	227	1.36	1 / 24	22.43	21.63	0.146	38.45	-16.82	23.78	0.239	40.61	-16.82
	16-QAM	826.5	V	153	238	1.26	1 / 12	22.36	21.48	0.140	38.45	-16.97	23.63	0.230	40.61	-16.98
3 MHz	QPSK	825.5	V	153	238	1.26	1 / 14	23.02	**22.13**	0.163	38.45	-16.32	**24.28**	0.268	40.61	-16.33
	QPSK	836.5	V	146	218	1.31	1 / 7	22.95	22.11	0.162	38.45	-16.34	24.26	0.267	40.61	-16.35
	QPSK	847.5	V	133	227	1.36	1 / 7	22.26	21.47	0.140	38.45	-16.98	23.62	0.230	40.61	-16.99
	16-QAM	825.5	V	153	238	1.26	1 / 14	22.00	21.10	0.129	38.45	-17.35	23.25	0.212	40.61	-17.35
1.4 MHz	QPSK	824.7	V	153	238	1.25	1 / 3	22.87	**21.98**	0.158	38.45	-16.47	**24.13**	0.259	40.61	-16.48
	QPSK	836.5	V	146	218	1.31	1 / 5	22.73	21.89	0.155	38.45	-16.56	24.04	0.254	40.61	-16.57
	QPSK	848.3	V	133	227	1.37	1 / 3	22.09	21.31	0.135	38.45	-17.15	23.46	0.222	40.61	-17.15
	16-QAM	824.7	V	153	238	1.25	1 / 3	21.89	20.99	0.126	38.45	-17.46	23.14	0.206	40.61	-17.46
10MHz	QPSK (Opposite Pol.)	829.0	H	400	277	1.27	1 / 25	17.34	16.46	0.044	38.45	-21.99	18.61	0.073	40.61	-22.00
	QPSK (WCP)	829.0	V	150	257	1.27	1 / 25	17.89	17.01	0.050	38.45	-21.44	19.16	0.082	40.61	-21.45

Table 7-3. ERP Data (LTE Band 26/5)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	834.0	V	142	233	6.15	1 / 79	15.93	19.93	0.098	38.45	-18.52	22.06	0.162	40.61	-18.52
	π/2 BPSK	836.5	V	138	231	6.18	1 / 26	16.09	20.12	0.103	38.45	-18.33	22.27	0.169	40.61	-18.34
	π/2 BPSK	839.0	V	137	230	6.30	1 / 79	16.13	**20.28**	0.107	38.45	-18.17	**22.43**	0.175	40.61	-18.17
	QPSK	834.0	V	142	233	6.15	1 / 79	15.84	19.84	0.096	38.45	-18.61	21.99	0.158	40.61	-18.61
	QPSK	836.5	V	138	231	6.18	1 / 26	15.93	19.96	0.099	38.45	-18.49	22.11	0.163	40.61	-18.50
	QPSK	839.0	V	137	230	6.30	1 / 79	15.90	20.05	0.101	38.45	-18.40	22.20	0.166	40.61	-18.40
	16-QAM	839.0	V	137	230	6.30	1 / 79	15.24	19.39	0.087	38.45	-19.06	21.54	0.143	40.61	-19.06
15 MHz	π/2 BPSK	831.5	V	142	233	6.13	1 / 20	16.11	20.09	0.102	38.45	-18.36	22.24	0.167	40.61	-18.37
	π/2 BPSK	836.5	V	138	231	6.18	1 / 39	16.42	**20.45**	0.111	38.45	-18.00	**22.60**	0.182	40.61	-18.01
	π/2 BPSK	841.5	V	137	230	6.33	1 / 39	15.96	20.15	0.103	38.45	-18.31	22.30	0.170	40.61	-18.31
	QPSK	831.5	V	142	233	6.13	1 / 20	16.00	19.98	0.100	38.45	-18.47	22.13	0.163	40.61	-18.48
	QPSK	836.5	V	138	231	6.18	1 / 39	16.37	20.40	0.110	38.45	-18.05	22.55	0.180	40.61	-18.06
	QPSK	841.5	V	137	230	6.33	1 / 20	15.85	20.03	0.101	38.45	-18.43	22.18	0.166	40.61	-18.43
	16-QAM	841.5	V	137	230	6.33	1 / 39	15.39	19.56	0.090	38.45	-18.89	21.71	0.148	40.61	-18.90
10 MHz	π/2 BPSK	829.0	V	142	233	6.10	1 / 26	15.83	19.78	0.095	38.45	-18.67	21.93	0.156	40.61	-18.67
	π/2 BPSK	836.5	V	138	231	6.18	1 / 26	16.25	**20.28**	0.107	38.45	-18.18	**22.43**	0.175	40.61	-18.18
	π/2 BPSK	844.0	V	137	230	6.36	1 / 13	15.93	20.14	0.103	38.45	-18.31	22.29	0.169	40.61	-18.32
	QPSK	829.0	V	142	233	6.10	1 / 26	15.92	19.87	0.097	38.45	-18.58	22.02	0.159	40.61	-18.59
	QPSK	836.5	V	138	231	6.18	1 / 39	15.94	19.97	0.099	38.45	-18.48	22.12	0.163	40.61	-18.49
	QPSK	844.0	V	137	230	6.36	1 / 13	15.86	20.07	0.102	38.45	-18.38	22.22	0.167	40.61	-18.39
	16-QAM	844.0	V	137	230	6.36	1 / 13	15.10	19.30	0.085	38.45	-19.15	21.45	0.140	40.61	-19.16
5 MHz	π/2 BPSK	829.0	V	142	233	6.07	1 / 18	15.91	19.83	0.096	38.45	-18.62	21.98	0.158	40.61	-18.63
	π/2 BPSK	836.5	V	138	231	6.18	1 / 6	16.09	**20.12**	0.103	38.45	-18.33	**22.27**	0.169	40.61	-18.33
	π/2 BPSK	844.0	V	137	230	6.36	1 / 6	15.28	19.51	0.089	38.45	-18.94	21.66	0.147	40.61	-18.95
	QPSK	829.0	V	142	233	6.07	1 / 12	15.86	19.79	0.095	38.45	-18.66	21.94	0.156	40.61	-18.67
	QPSK	836.5	V	138	231	6.18	1 / 18	15.96	19.99	0.100	38.45	-18.46	22.14	0.164	40.61	-18.47
	QPSK	844.0	V	137	230	6.36	1 / 6	15.10	19.34	0.086	38.45	-19.12	21.49	0.141	40.61	-19.12
	16-QAM	836.5	V	138	231	6.18	1 / 6	15.13	19.16	0.082	38.45	-19.29	21.31	0.135	40.61	-19.30
20 MHz	QPSK (CP-OFDM)	839.0	V	137	230	6.15	1/79	14.67	**18.67**	0.074	38.45	-19.78	20.82	0.121	40.61	-19.78
	QPSK (Opposite Pol.)	839.0	H	204	284	6.80	1/26	14.88	19.53	0.090	38.45	-18.92	21.68	0.147	40.61	-18.92
	QPSK (WCP)	839.0	V	137	230	6.15	1/53	6.78	10.78	0.012	38.45	-27.67	12.93	0.020	40.61	-27.67

Table 7-4. ERP Data (NR Band n5)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	V	141	232	30.80	1.25	**29.90**	**0.977**	38.45	-8.55	**32.05**	**1.604**	40.61	-8.56
836.60	GPRS850	V	127	258	29.03	1.31	28.19	0.659	38.45	-10.26	30.34	1.082	40.61	-10.27
848.80	GPRS850	V	124	240	29.12	1.37	28.34	0.682	38.45	-10.11	30.49	1.119	40.61	-10.12
824.20	GPRS850	H	400	263	24.92	1.25	24.02	0.252	38.45	-14.43	26.17	0.414	40.61	-14.44
824.20	EDGE850	V	141	232	25.00	1.25	**24.10**	0.257	38.45	-14.35	**26.25**	**0.422**	40.61	-14.36
824.20	GPRS850 (WCP)	V	144	236	26.38	1.25	25.48	0.353	38.45	-12.97	27.63	0.580	40.61	-12.98

Table 7-5. ERP Data (GPRS Cell)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	V	156.00	247.00	22.77	1.26	**21.88**	**0.154**	38.45	-16.57	**24.03**	**0.253**	40.61	-16.58
836.60	WCDMA850	V	133.00	238.00	21.74	1.31	20.90	0.123	38.45	-17.55	23.05	0.202	40.61	-17.56
846.60	WCDMA850	V	134.00	243.00	21.28	1.36	20.49	0.112	38.45	-17.96	22.64	0.184	40.61	-17.97
826.40	WCDMA850	H	231.00	278.00	18.44	1.26	17.55	0.057	38.45	-20.90	19.70	0.093	40.61	-20.91
826.40	WCDMA850 (WCP)	V	146.00	260.00	18.06	1.26	17.17	0.052	38.45	-21.28	19.32	0.086	40.61	-21.29

Table 7-6. ERP Data (WCDMA Cell)

7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 – Section 5.5.4

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

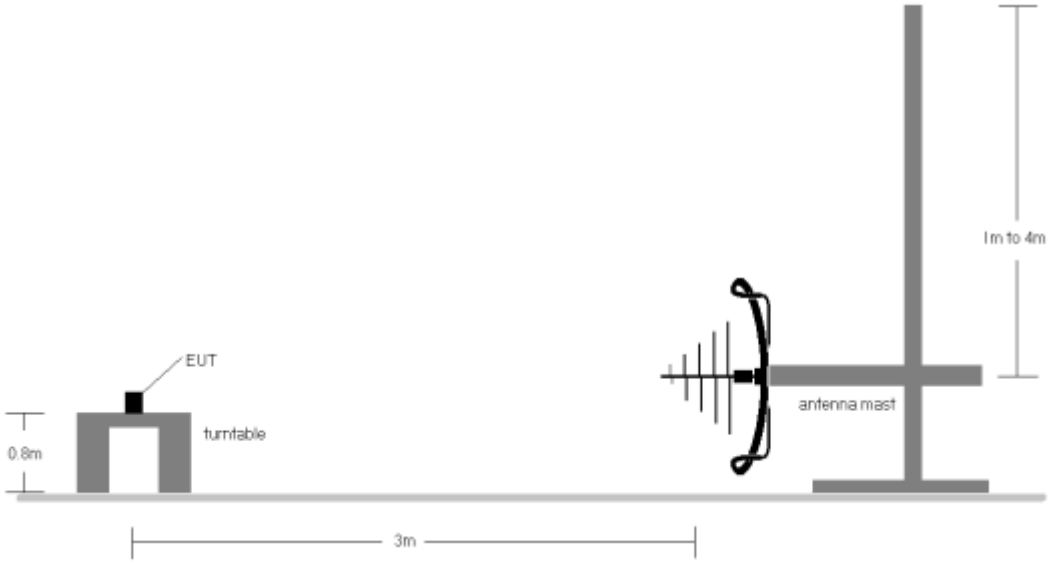


Figure 7-7. Test Instrument & Measurement Setup < 1GHz

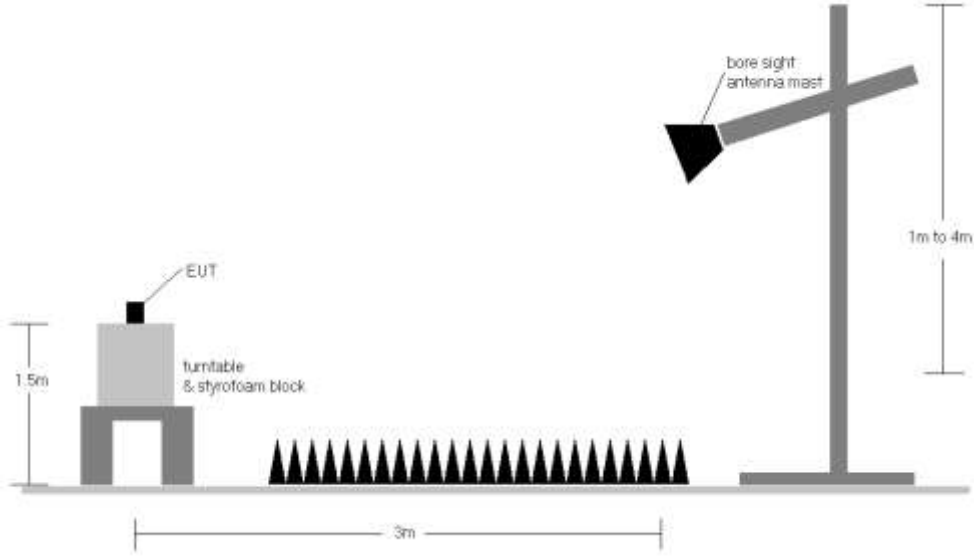


Figure 7-8. Test Instrument & Measurement Setup > 1GHz

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
   a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b) EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers are reported in GPRS mode while transmitting with one slot active.

3) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest powers are reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to “1”.

4) The EUT was tested in three orthogonal planes 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 tables below.

5) This unit was tested with its standard battery.

6) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

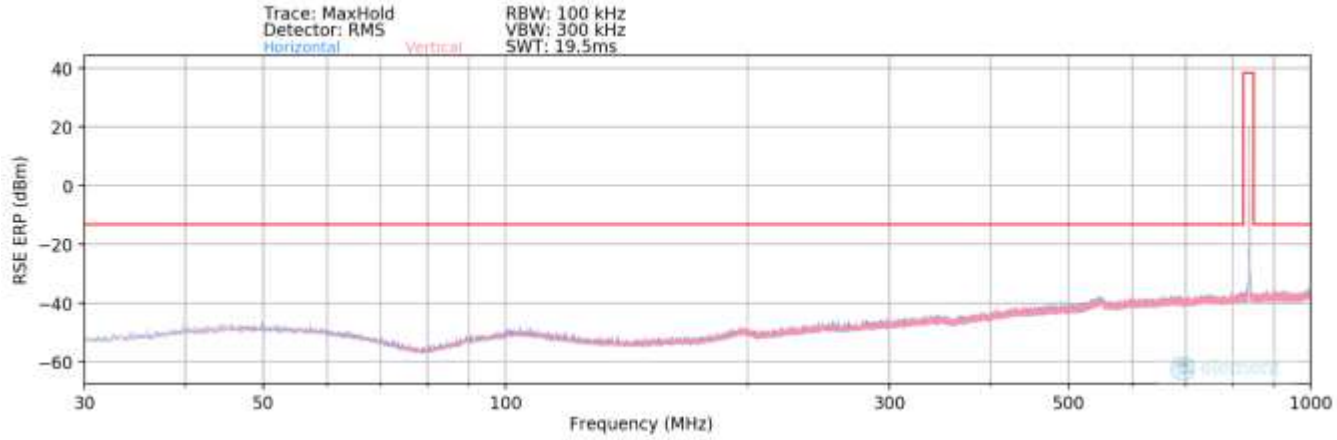
7) Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1-meter test distance with the application of a distance correction factor.

8) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

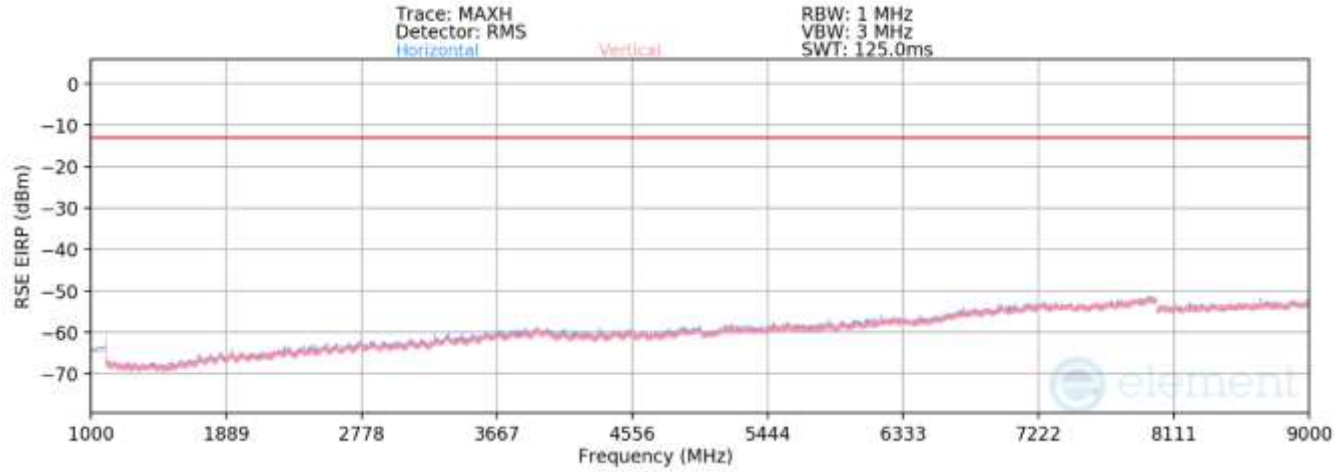
9) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

10) Spurious emissions shown in this section are measured while operating in EN-DC mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor). Spurious emissions from the NR carrier device are subject to the rules under which the NR carrier operates. Spurious emissions caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

LTE Band 26/5



Plot 7-84. Radiated Spurious Plot (LTE Band 26/5 – Below 1GHz)



Plot 7-85. Radiated Spurious Plot (LTE Band 26/5 – Above 1GHz)

Bandwidth (MHz):	10
Frequency (MHz):	836.5
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
464.08	H	-	-	-79.29	18.02	45.73	-49.53	-13.00	-36.53
549.36	H	-	-	-78.44	19.68	48.24	-47.02	-13.00	-34.02
864.16	H	-	-	-80.02	24.76	51.74	-43.52	-13.00	-30.52

Table 7-7. Radiated Spurious Data (LTE Band 26/5 – Below 1GHz)

Bandwidth (MHz):	10
Frequency (MHz):	829
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1658.00	H	101	218	-73.47	-7.67	25.86	-69.40	-13.00	-56.40
2487.00	H	-	-	-76.98	-4.23	25.79	-69.47	-13.00	-56.47
3316.00	H	-	-	-76.96	-0.82	29.22	-66.04	-13.00	-53.04
4145.00	H	-	-	-77.88	0.75	29.87	-65.38	-13.00	-52.38
4974.00	H	-	-	-77.79	1.57	30.78	-64.48	-13.00	-51.48
5803.00	H	-	-	-78.72	4.09	32.37	-62.89	-13.00	-49.89

Table 7-8. Radiated Spurious Data (LTE Band 26/5 – Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	836.5
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.00	H	103	239	-73.88	-7.63	25.49	-69.76	-13.00	-56.76
2509.50	H	-	-	-76.24	-4.17	26.59	-68.67	-13.00	-55.67
3346.00	H	-	-	-76.36	-0.95	29.69	-65.56	-13.00	-52.56
4182.50	H	-	-	-77.02	0.38	30.36	-64.89	-13.00	-51.89
5019.00	H	-	-	-77.68	1.28	30.60	-64.65	-13.00	-51.65
5855.50	H	-	-	-78.93	4.36	32.43	-62.82	-13.00	-49.82

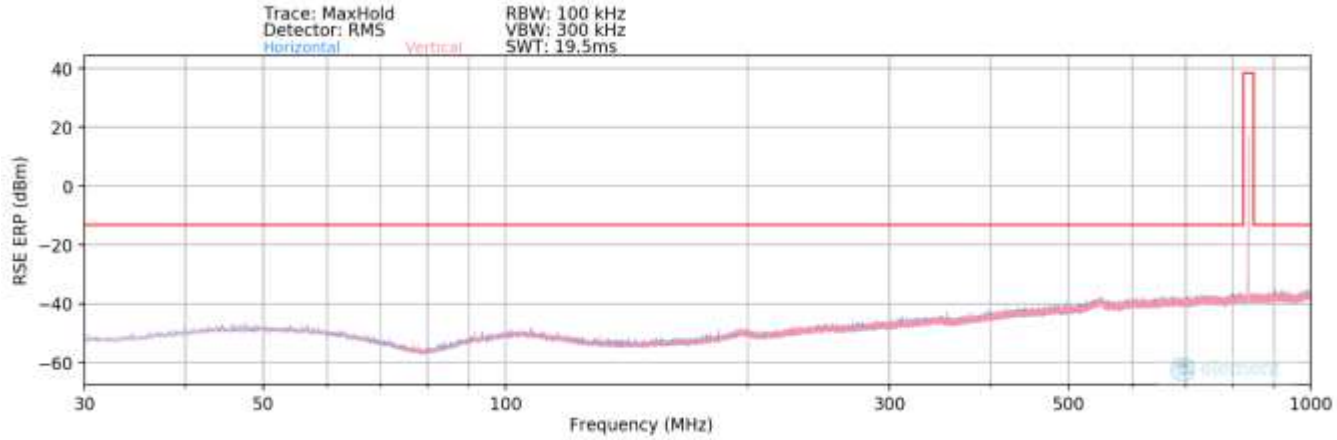
Table 7-9. Radiated Spurious Data (LTE Band 26/5 – Mid Channel)

Bandwidth (MHz):	10
Frequency (MHz):	844
RB / Offset:	1 / 25

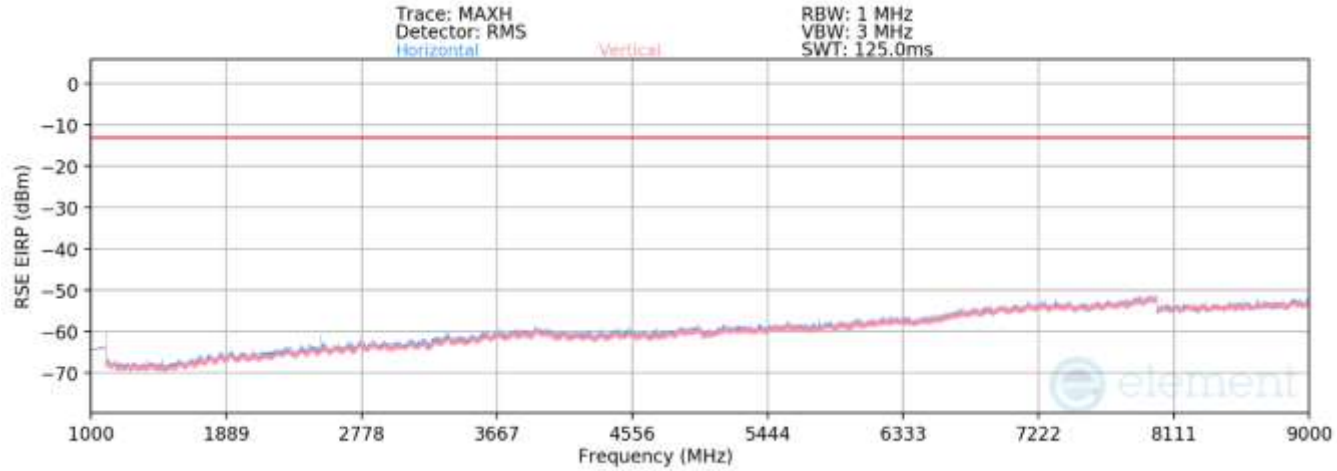
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1688.00	H	107	210	-74.06	-7.50	25.44	-69.82	-13.00	-56.82
2532.00	H	-	-	-75.65	-4.17	27.18	-68.08	-13.00	-55.08
3376.00	H	-	-	-77.16	-1.05	28.79	-66.46	-13.00	-53.46
4220.00	H	-	-	-77.52	0.51	29.99	-65.27	-13.00	-52.27
5064.00	H	-	-	-77.55	1.63	31.08	-64.18	-13.00	-51.18
5908.00	H	-	-	-79.36	4.07	31.71	-63.54	-13.00	-50.54

Table 7-10. Radiated Spurious Data (LTE Band 26/5 – High Channel)

NR Band n5



Plot 7-86. Radiated Spurious Plot (NR Band n5 – Below 1GHz)



Plot 7-87. Radiated Spurious Plot (NR Band n5 – Above 1GHz)

Bandwidth (MHz):	20
Frequency (MHz):	836.5
RB / Offset:	1/53
Mode:	Stand Alone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
285.46	V	-	-	-81.77	14.50	39.73	-55.53	-13.00	-42.53
548.00	V	-	-	-79.13	19.65	47.52	-47.74	-13.00	-34.74
909.14	V	-	-	-81.34	25.13	50.79	-44.47	-13.00	-31.47

Table 7-11. Radiated Spurious Data (NR Band n5 – Below 1GHz)

Bandwidth (MHz):	20
Frequency (MHz):	834
RB / Offset:	1 / 53
Mode:	Stand Alone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1668.00	V	-	-	-75.00	-7.65	24.35	-70.91	-13.00	-57.91
2502.00	V	400	0	-76.02	-4.17	26.81	-68.45	-13.00	-55.45
3336.00	V	-	-	-75.78	-0.86	30.36	-64.90	-13.00	-51.90
4170.00	V	-	-	-76.96	0.56	30.60	-64.66	-13.00	-51.66
5004.00	V	-	-	-77.16	1.23	31.07	-64.18	-13.00	-51.18
5838.00	V	-	-	-78.33	4.15	32.82	-62.43	-13.00	-49.43

Table 7-12. Radiated Spurious Data (NR Band n5 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	836.5
RB / Offset:	1 / 53
Mode:	Stand Alone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.00	V	397	3	-74.78	-7.63	24.59	-70.66	-13.00	-57.66
2509.50	V	400	30	-69.50	-4.17	33.33	-61.93	-13.00	-48.93
3346.00	V	-	-	-75.92	-0.95	30.13	-65.12	-13.00	-52.12
4182.50	V	-	-	-76.48	0.38	30.90	-64.35	-13.00	-51.35
5019.00	V	-	-	-77.02	1.28	31.26	-63.99	-13.00	-50.99
5855.50	V	-	-	-78.47	4.36	32.89	-62.36	-13.00	-49.36

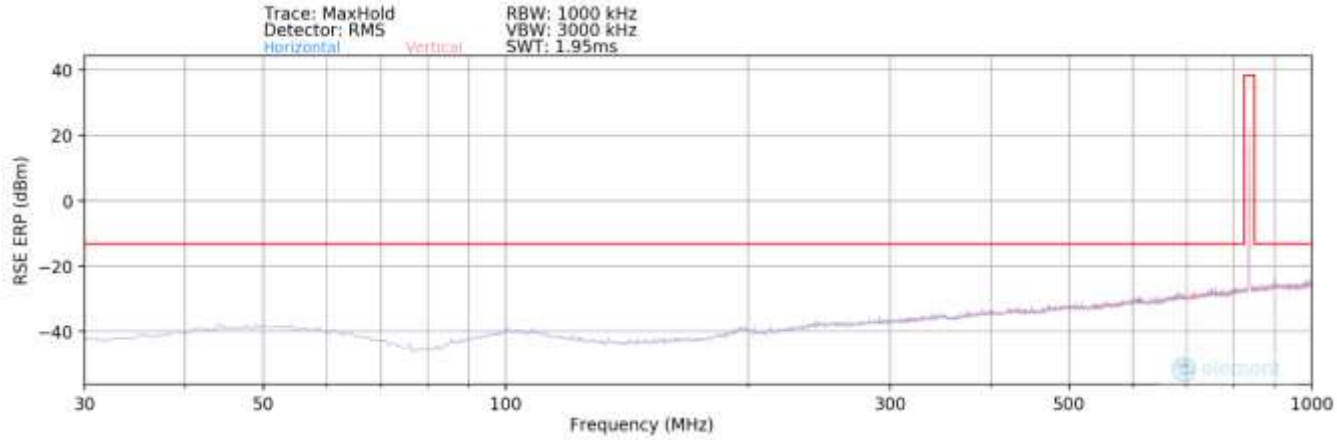
Table 7-13. Radiated Spurious Data (NR Band n5 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	839
RB / Offset:	1 / 53
Mode:	Stand Alone

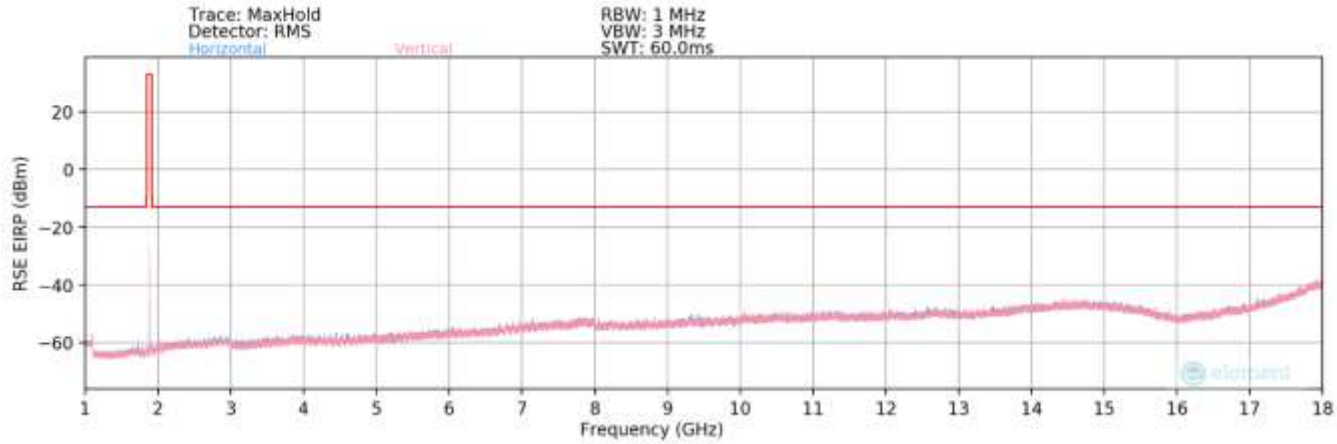
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1678.00	V	-	-	-75.38	-7.57	24.05	-71.21	-13.00	-58.21
2517.00	V	399	20	-75.42	-4.18	27.40	-67.86	-13.00	-54.86
3356.00	V	-	-	-75.96	-1.00	30.04	-65.22	-13.00	-52.22
4195.00	V	-	-	-76.25	0.26	31.01	-64.25	-13.00	-51.25
5034.00	V	-	-	-76.84	1.50	31.66	-63.60	-13.00	-50.60
5873.00	V	-	-	-78.62	4.29	32.67	-62.58	-13.00	-49.58

Table 7-14. Radiated Spurious Data (NR Band n5 – High Channel)

EN-DC NR n5 – LTE Band 2



Plot 7-88. Radiated Spurious Plot (NR n5 – Band 2 – Below 1GHz)



Plot 7-89. Radiated Spurious Plot (NR n5 – Band 2 – Above 1GHz)

Bandwidth (MHz):	20 / 20
Frequency (MHz):	836.5 / 1880
RB / Offset:	1/53 / 1/50
Mode:	EN-DC
Anchor Band:	B2

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
207.00	V	-	-	-72.68	11.97	46.29	-48.97	-13.00	-35.97
422.50	V	-	-	-71.38	17.77	53.39	-41.86	-13.00	-28.86
621.00	V	-	-	-72.53	20.99	55.46	-39.80	-13.00	-26.80

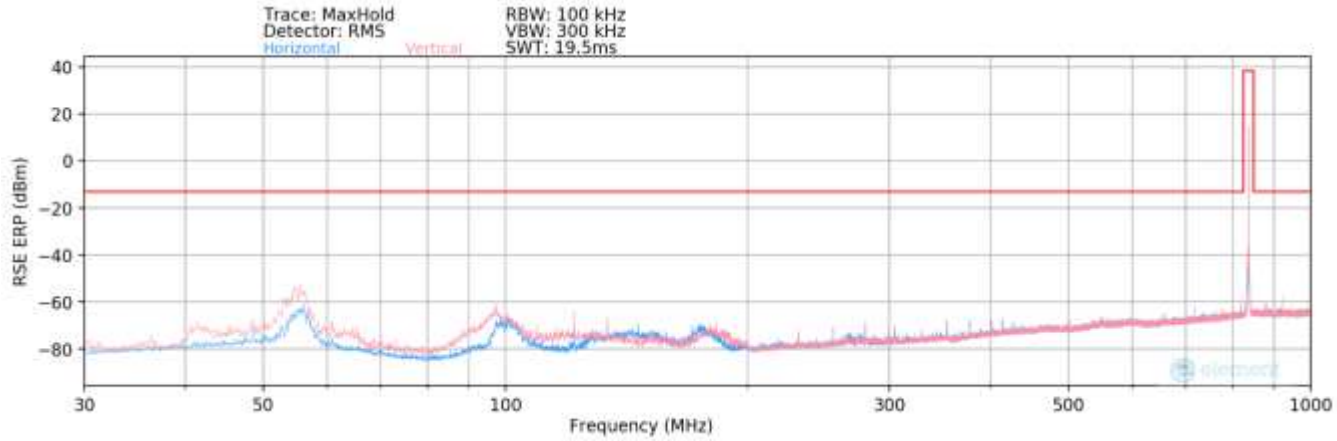
Table 7-15. Radiated Spurious Data (NR n5 – Band 2 – Below 1GHz)

Bandwidth (MHz):	20 / 20
Frequency (MHz):	836.5 / 1880
RB / Offset:	1/53 / 1/50
Mode:	EN-DC
Anchor Band:	B2

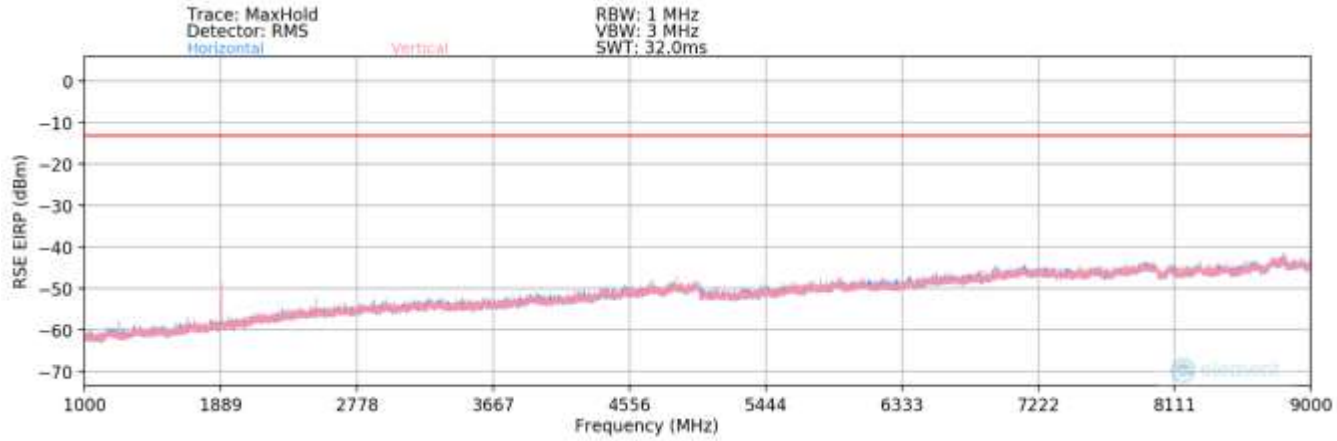
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1250.50	H	-	-	-74.75	-9.05	23.20	-72.05	-13.00	-59.05
1486.00	H	-	-	-74.49	-9.19	23.32	-71.94	-13.00	-58.94
2923.50	H	100	44	-74.93	-3.56	28.51	-66.75	-13.00	-53.75
3553.00	H	104	36	-76.07	-0.88	30.05	-65.21	-13.00	-52.21
4596.50	H	-	-	-77.35	0.36	30.01	-65.25	-13.00	-52.25

Table 7-16. Radiated Spurious Data (NR n5 – Band 2)

GSM/GPRS Cell



Plot 7-90. Radiated Spurious Plot (GPRS Cell – Below 1GHz)



Plot 7-91. Radiated Spurious Plot (GPRS Cell – Above 1GHz)

Mode:	GPRS 1 Tx Slot
Channel:	190
Frequency (MHz):	836.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
55.30	V	204	244	-49.02	18.89	76.87	-18.38	-13.00	-5.38
97.20	V	120	46	-51.36	16.39	72.03	-23.22	-13.00	-10.22
121.60	V	152	50	-54.35	15.06	67.71	-27.55	-13.00	-14.55
279.60	V	150	46	-70.36	18.74	55.38	-39.88	-13.00	-26.88
716.00	V	149	286	-75.30	27.20	58.90	-36.36	-13.00	-23.36
921.60	V	291	353	-69.91	30.19	67.28	-27.98	-13.00	-14.98

Table 7-17. Radiated Spurious Data (GPRS Cell – Below 1GHz)

Mode:	GPRS 1 Tx Slot
Channel:	128
Frequency (MHz):	824.2

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1648.40	V	178	209	-63.51	-0.19	43.30	-51.96	-13.00	-38.96
2472.60	V	178	226	-68.41	4.06	42.65	-52.61	-13.00	-39.61
3296.80	V	-	-	-70.59	6.52	42.93	-52.33	-13.00	-39.33
4121.00	V	-	-	-71.40	8.22	43.82	-51.44	-13.00	-38.44
4945.20	V	-	-	-71.57	9.68	45.11	-50.14	-13.00	-37.14

Table 7-18. Radiated Spurious Data (GPRS Cell – Low Channel)

Mode:	GPRS 1 Tx Slot
Channel:	190
Frequency (MHz):	836.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.20	V	202	201	-63.24	0.43	44.19	-51.06	-13.00	-38.06
2509.80	V	197	205	-69.46	4.12	41.66	-53.59	-13.00	-40.59
3346.40	V	-	-	-71.44	6.61	42.17	-53.09	-13.00	-40.09
4183.00	V	-	-	-71.83	8.25	43.42	-51.83	-13.00	-38.83
5019.60	V	-	-	-72.07	10.69	45.62	-49.64	-13.00	-36.64

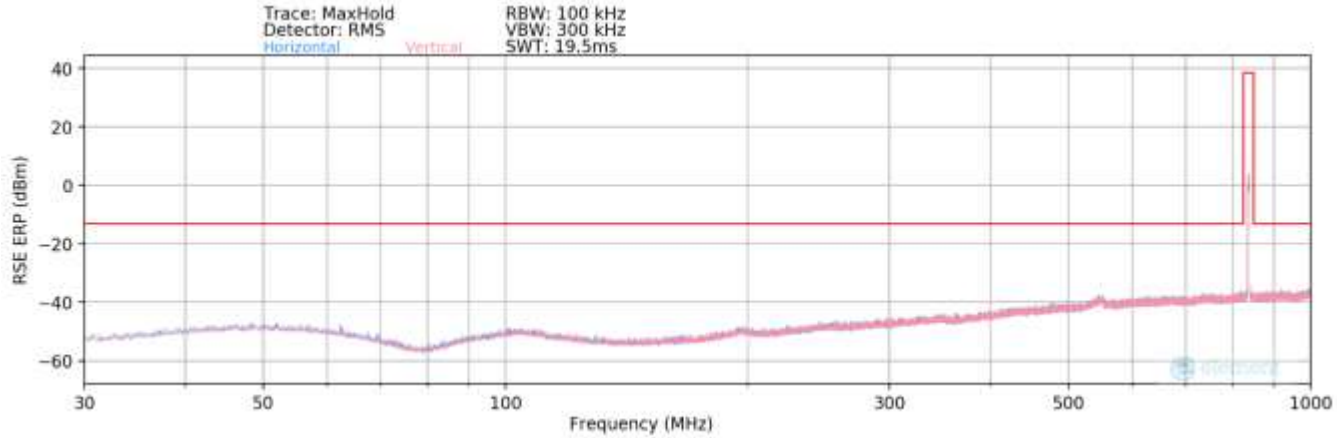
Table 7-19. Radiated Spurious Data (GPRS Cell – Mid Channel)

Mode:	GPRS 1 Tx Slot
Channel:	251
Frequency (MHz):	848.8

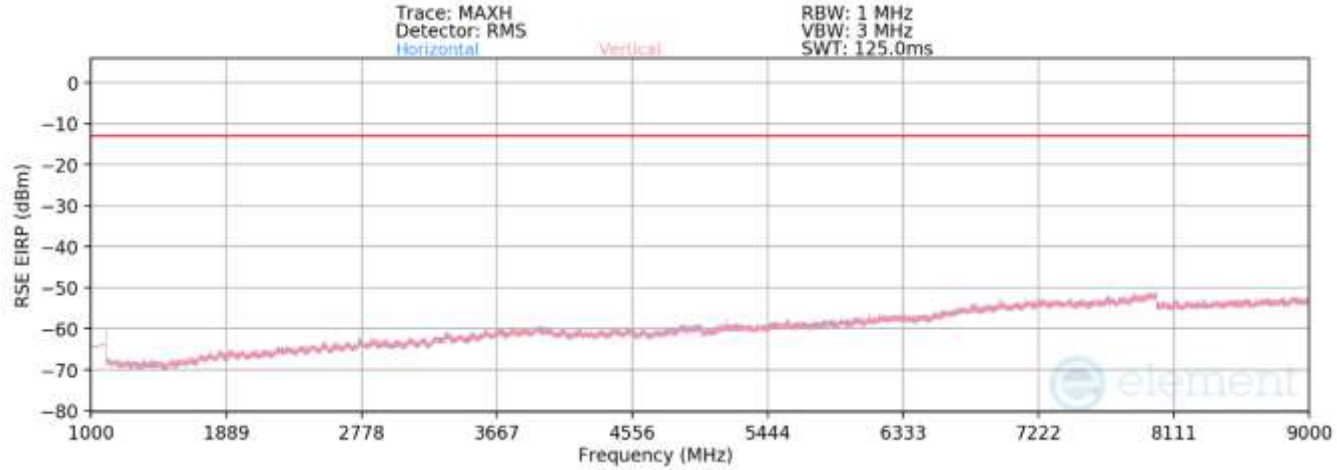
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1697.60	V	133	212	-63.86	0.67	43.81	-51.45	-13.00	-38.45
2546.40	V	133	203	-67.92	4.39	43.47	-51.78	-13.00	-38.78
3395.20	V	-	-	-70.89	6.40	42.51	-52.75	-13.00	-39.75
4244.00	V	-	-	-71.90	8.60	43.70	-51.56	-13.00	-38.56
5092.80	V	-	-	-71.97	10.20	45.23	-50.03	-13.00	-37.03

Table 7-20. Radiated Spurious Data (GPRS Cell – High Channel)

WCDMA Cell



Plot 7-92. Radiated Spurious Plot (WCDMA Cell – Below 1GHz)



Plot 7-93. Radiated Spurious Plot (WCDMA Cell – Above 1GHz)

Mode:	WCDMA RMC
Channel:	4183
Frequency (MHz):	836.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
444.36	V	-	-	-79.20	17.80	45.60	-49.65	-13.00	-36.65
560.99	V	-	-	-78.75	19.92	48.17	-47.08	-13.00	-34.08
911.04	V	-	-	-80.27	25.15	51.88	-43.38	-13.00	-30.38

Table 7-21. Radiated Spurious Data (WCDMA Cell – Below 1GHz)

Mode:	WCDMA RMC
Channel:	4132
Frequency (MHz):	826.4

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1652.80	H	-	-	-74.53	-7.74	24.73	-70.53	-13.00	-57.53
2479.20	H	-	-	-75.47	-4.28	27.25	-68.01	-13.00	-55.01
3305.60	H	-	-	-77.12	-0.86	29.02	-66.24	-13.00	-53.24
4132.00	H	-	-	-77.22	0.75	30.53	-64.73	-13.00	-51.73
4958.40	H	-	-	-77.15	1.32	31.17	-64.09	-13.00	-51.09

Table 7-22. Radiated Spurious Data (WCDMA Cell – Low Channel)

Mode:	WCDMA RMC
Channel:	4183
Frequency (MHz):	836.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.20	H	-	-	-75.22	-7.63	24.15	-71.10	-13.00	-58.10
2509.80	H	-	-	-75.82	-4.17	27.01	-68.25	-13.00	-55.25
3346.40	H	-	-	-75.72	-0.95	30.33	-64.93	-13.00	-51.93
4183.00	H	-	-	-76.33	0.38	31.05	-64.21	-13.00	-51.21
5019.60	H	-	-	-77.06	1.29	31.23	-64.03	-13.00	-51.03

Table 7-23. Radiated Spurious Data (WCDMA Cell – Mid Channel)

Mode:	WCDMA RMC
Channel:	4233
Frequency (MHz):	846.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1693.20	H	-	-	-75.56	-7.35	24.09	-71.17	-13.00	-58.17
2539.80	H	-	-	-74.96	-4.13	27.91	-67.35	-13.00	-54.35
3386.40	H	-	-	-76.97	-0.86	29.17	-66.09	-13.00	-53.09
4233.00	H	-	-	-77.05	0.48	30.43	-64.83	-13.00	-51.83
5079.60	H	-	-	-77.25	1.84	31.59	-63.67	-13.00	-50.67

Table 7-24. Radiated Spurious Data (WCDMA Cell – High Channel)

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

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

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22 and RSS-132, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.

Test Procedure Used

ANSI C63.26-2015 – Section 5.6

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.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

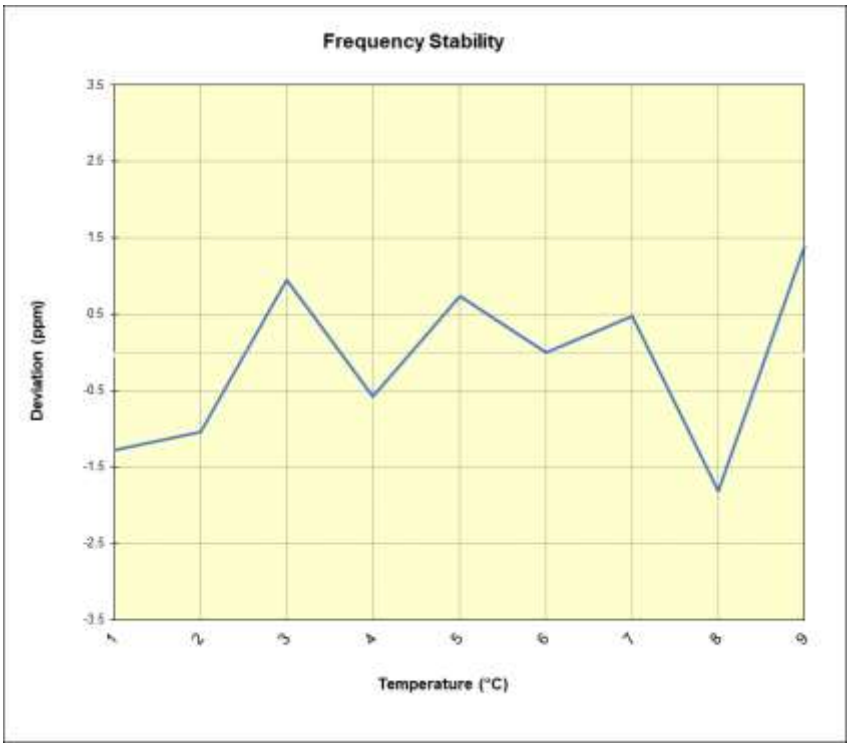
None

LTE Band 26/5

Operating Frequency (Hz):	836,500,000
Ref. Voltage (VDC):	4.35
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.35	- 30	836,499,558	-1,071	-0.0001280
		- 20	836,499,761	-868	-0.0001038
		- 10	836,501,428	799	0.0000955
		0	836,500,154	-475	-0.0000568
		+ 10	836,501,249	620	0.0000741
		+ 20 (Ref)	836,500,629	0	0.0000000
		+ 30	836,501,031	402	0.0000481
		+ 40	836,499,116	-1,513	-0.0001809
		+ 50	836,501,791	1,162	0.0001389
Battery Endpoint	3.69	+ 20	836,500,522	-107	-0.0000128

Table 7-25. LTE Band 26/5 Frequency Stability Data



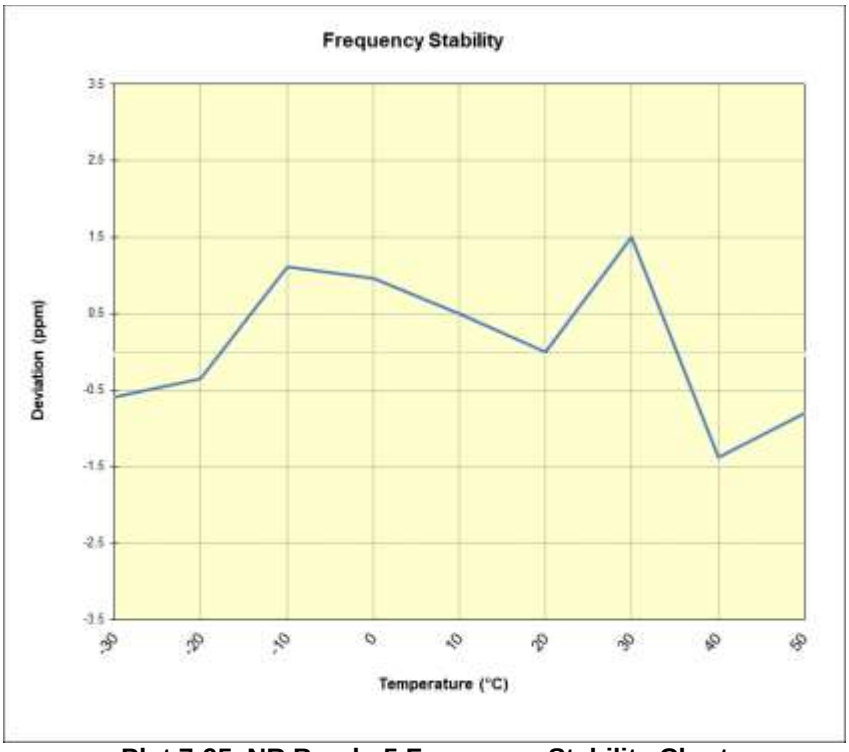
Plot 7-94. LTE Band 26/5 Frequency Stability Chart

NR Band n5

Operating Frequency (Hz):	836,500,000
Ref. Voltage (VDC):	4.35
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.35	- 30	836,589,783	-492	-0.0000588
		- 20	836,589,982	-293	-0.0000350
		- 10	836,591,211	936	0.0001119
		0	836,591,084	809	0.0000967
		+ 10	836,590,698	423	0.0000506
		+ 20 (Ref)	836,590,275	0	0.0000000
		+ 30	836,591,537	1,262	0.0001509
		+ 40	836,589,124	-1,151	-0.0001376
		+ 50	836,589,608	-667	-0.0000797
Battery Endpoint	3.69	+ 20	836,589,132	-1,143	-0.0001366

Table 7-26. NR Band n5 Frequency Stability Data



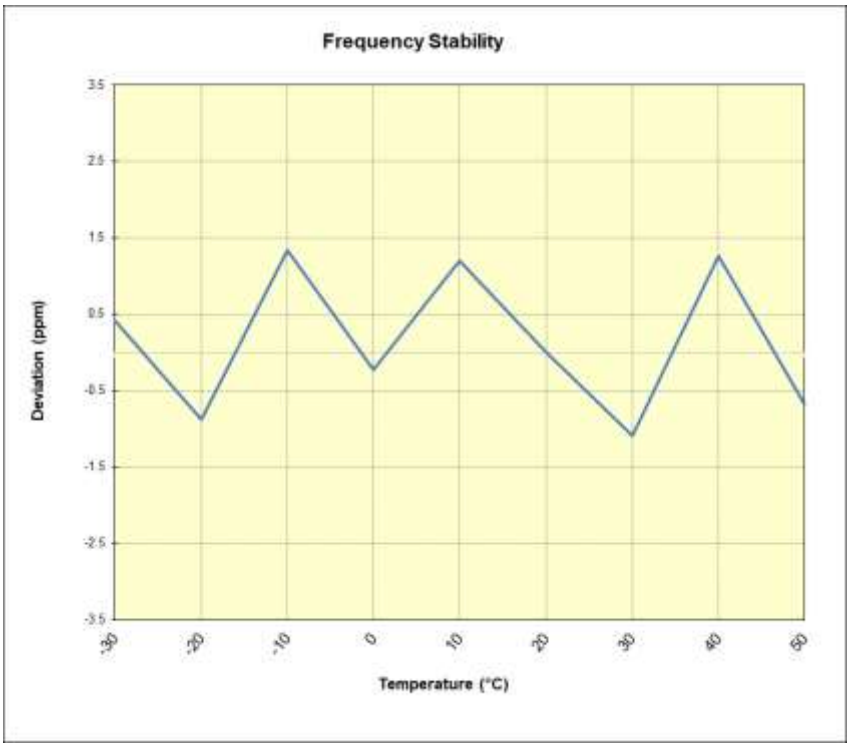
Plot 7-95. NR Band n5 Frequency Stability Chart

GSM/GPRS Cellular

Operating Frequency (Hz):	836,600,000
Ref. Voltage (VDC):	4.35
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.35	- 30	836,594,981	355	0.0000424
		- 20	836,593,899	-727	-0.0000869
		- 10	836,595,745	1,119	0.0001338
		0	836,594,439	-187	-0.0000224
		+ 10	836,595,629	1,003	0.0001199
		+ 20 (Ref)	836,594,626	0	0.0000000
		+ 30	836,593,712	-914	-0.0001093
		+ 40	836,595,688	1,062	0.0001269
		+ 50	836,594,062	-564	-0.0000674
Battery Endpoint	3.69	+ 20	836,593,157	-1,469	-0.0001756

Table 7-27. GSM/GPRS Cell Frequency Stability Data



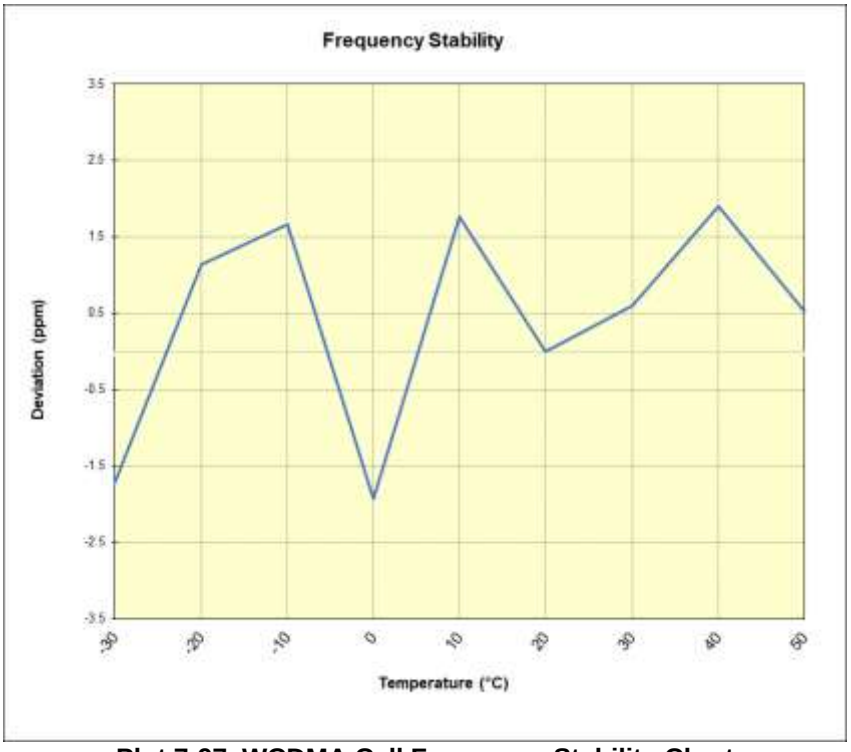
Plot 7-96. GSM/GPRS Cell Frequency Stability Chart

WCDMA Cellular

Operating Frequency (Hz):	836,600,000
Ref. Voltage (VDC):	4.35
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.35	- 30	836,595,868	-1,440	-0.0001721
		- 20	836,598,261	953	0.0001139
		- 10	836,598,704	1,396	0.0001669
		0	836,595,702	-1,606	-0.0001920
		+ 10	836,598,781	1,473	0.0001761
		+ 20 (Ref)	836,597,308	0	0.0000000
		+ 30	836,597,810	502	0.0000600
		+ 40	836,598,898	1,590	0.0001901
		+ 50	836,597,751	443	0.0000530
Battery Endpoint	3.69	+ 20	836,595,379	-1,929	-0.0002306

Table 7-28. WCDMA Cell Frequency Stability Data



Plot 7-97. WCDMA Cell Frequency Stability Chart

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMS911JPN** complies with all the requirements of Part 22 of the FCC rules.