

PART 22 MEASUREMENT REPORT

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


Date of Testing:
11/15/2021 - 12/03/2021
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2110010116-02.A3L

FCC ID:	A3LSMS906E
Applicant Name:	Samsung Electronics Co., Ltd.

Application Type: Certification
Model: SM-S906E/DS
Additional Model(s): SM-S906E
EUT Type: Portable Handset
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part: 22
Test Procedure(s): ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01, KDB 648474 D03 v01r04

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.


Randy Ortanez
President







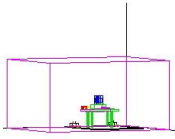
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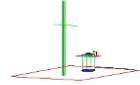
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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
NR Band n5	20 MHz	$\pi/2$ BPSK	834.0 - 839.0	0.064	18.08	0.106	20.23	18M0G7D
		QPSK	834.0 - 839.0	0.064	18.09	0.106	20.24	19M0G7D
		16QAM	834.0 - 839.0	0.053	17.26	0.087	19.41	19M0W7D
	15 MHz	$\pi/2$ BPSK	831.5 - 841.5	0.063	18.02	0.104	20.17	13M5G7D
		QPSK	831.5 - 841.5	0.063	17.96	0.103	20.11	14M2G7D
		16QAM	831.5 - 841.5	0.058	17.62	0.095	19.77	14M2W7D
	10 MHz	$\pi/2$ BPSK	829.0 - 844.0	0.062	17.93	0.102	20.08	9M02G7D
		QPSK	829.0 - 844.0	0.058	17.64	0.095	19.79	9M38G7D
		16QAM	829.0 - 844.0	0.047	16.73	0.077	18.88	9M37W7D
	5 MHz	$\pi/2$ BPSK	826.5 - 846.5	0.064	18.09	0.106	20.24	4M53G7D
		QPSK	826.5 - 846.5	0.061	17.85	0.100	20.00	4M51G7D
		16QAM	826.5 - 846.5	0.062	17.93	0.102	20.08	4M51W7D

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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 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility 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 PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST 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.
- PCTEST 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).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS906E**. 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.: 3715R, 3723R, 3892R

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (FR1), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5 & 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB



2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. 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 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-E-2016) and “Measurement Guidance for Certification of Licensed Digital Transmitters” (KDB 971168 D01 v03r01) 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/TIA-603-E-2016. 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 $P_g [dBm] - \text{cable loss} [dB]$.

For radiated spurious emissions measurements and calculations, conversion method is used per the formulas in KDB 971168 Section 5.8.4. 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

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

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/TIA-603-E-2016.

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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 (\pm dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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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	3/4/2021	Annual	3/4/2022	AP2
-	AP1	EMC Cable and Switch System	3/9/2021	Annual	3/9/2022	AP1
-	ETS	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	ETS
-	LTx1	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx1
-	LTx2	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx2
Agilent	N9030A	50GHz PXA Signal Analyzer	1/20/2021	Annual	1/20/2022	US51350301
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201381794
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Espec	ESX-2CA	Environmental Chamber	8/27/2020	Annual	8/27/2022	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/20/2021	Biennial	4/20/2023	00125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
Keysight Technologies	N9020A	MXA Signal Analyzer	12/22/2020	Annual	12/22/2021	MYS4500644
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	7/21/2021	Annual	7/21/2022	MY49430494
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			100976
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/3/2021	Annual	8/3/2022	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	4/30/2021	Annual	4/30/2022	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	1/21/2021	Annual	1/21/2022	101716
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and Spectrum Analyzer	2/10/2021	Annual	2/10/2022	103187
Sunol	JB6	LB6 Antenna	11/13/2020	Biennial	11/13/2022	A082816

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.

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6.0 SAMPLE CALCULATIONS

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

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7.0 TEST RESULTS

7.1 Summary



Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMS906E
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): NR/LTE

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Transmitter Conducted Output Power	2.1046	N/A	PASS	See RF Exposure Report
	ULCA Conducted Output Power	2.1046	N/A	PASS	Section 7.2
	Occupied Bandwidth	2.1049	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions	2.1051, 22.917(a)	> 43 + 10log ₁₀ (P[Watts]) at Band Edge and for all out-of-band emissions	PASS	Sections 7.4, 7.5
	Frequency Stability	2.1055, 22.355	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power	22.913(a)(5)	< 7 Watts max. ERP	PASS	Section 7.6
	Radiated Spurious Emissions	2.1053, 22.917(a)	> 43 + 10 log ₁₀ (P[Watts]) for all out-of-band emissions	PASS	Section 7.7

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 PCTEST EMC Software Tool v1.0.

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7.2 ULCA Conducted Output Power

§2.1046

Test Overview

The EUT is set up to transmit at maximum power for LTE. All power levels 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

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Span = 2 x OBW to 3 x OBW
2. RBW = 1% to 5% of the OBW
3. Number of measurement points in sweep $\geq 2 \times \text{span} / \text{RBW}$
4. Sweep = auto-couple (less than transmission burst duration)
5. Detector = RMS (power)
6. Trigger was set to enable power measurements only on full power bursts
7. Trace was allowed to stabilize
8. Spectrum analyzer's "Channel Power" function was used to compute the power by integrating the spectrum across the OBW of the signal

Test Setup

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

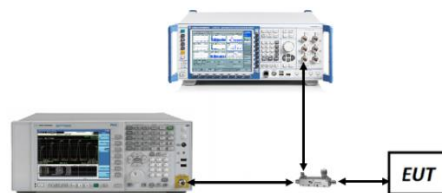






Figure 7-1. Test Instrument & Measurement Setup

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PCC					SCC					PCC Conducted Power [dBm]	SCC Conducted Power [dBm]	Inter-Band ULCA Total Tx. Power (dBm)
PCC Band	PCC Bandwidth [MHz]	PCC (UL) channel	Mod.	PCC UL RB#/Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) channel	Mod.	SCC UL RB#/Offset			
B5	10	Low	QPSK	50 / 0	B66	20	Low	QPSK	100 / 0	23.75	22.10	26.01
			QPSK	1 / 0				24.67	22.76	26.83		
			QPSK	1 / 25				24.76	22.23	26.69		
			QPSK	1 / 49				24.66	22.80	26.84		
			16Q	1 / 25				24.17	21.67	26.11		
			16Q	1 / 99				24.17	21.67	26.11		
		Mid	QPSK	50 / 0			QPSK	100 / 0	23.56	22.02	25.87	
			QPSK	1 / 0			QPSK	1 / 0	24.70	22.19	26.63	
			QPSK	1 / 25			QPSK	1 / 50	24.67	22.61	26.77	
			QPSK	1 / 49			QPSK	1 / 99	24.51	22.36	26.58	
			16Q	1 / 0			16Q	1 / 50	24.31	21.92	26.29	
			16Q	1 / 99			16Q	1 / 99	24.18	21.87	26.19	
		High	QPSK	50 / 0			QPSK	100 / 0	23.52	22.04	25.85	
			QPSK	1 / 0			QPSK	1 / 0	24.55	22.63	26.71	
			QPSK	1 / 25			QPSK	1 / 50	24.51	22.54	26.65	
			QPSK	1 / 49			QPSK	1 / 99	24.54	22.81	26.77	
			16Q	1 / 0			16Q	1 / 99	24.18	21.87	26.19	
			16Q	1 / 99			16Q	1 / 99	24.18	21.87	26.19	

Table 7-2. Conducted Power Output Data (ULCA LTE Band 5 – Band 66)

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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

KDB 971168 D01 v03r01 – Section 4.2

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 $\geq 3 \times$ 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.

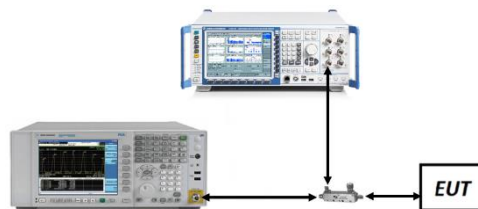


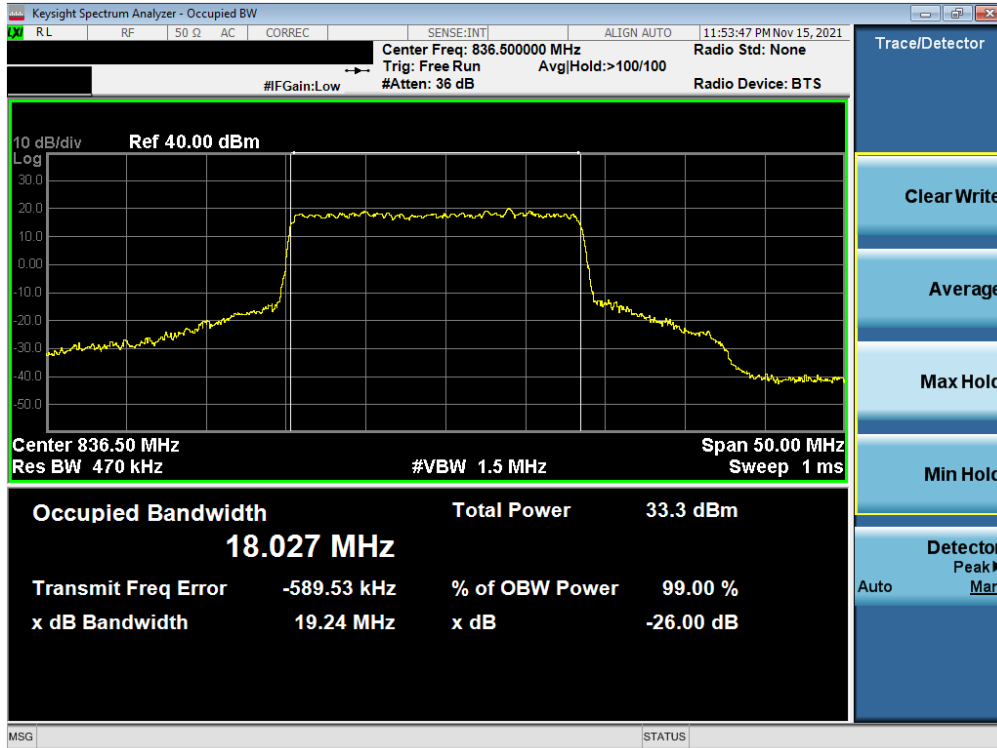
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

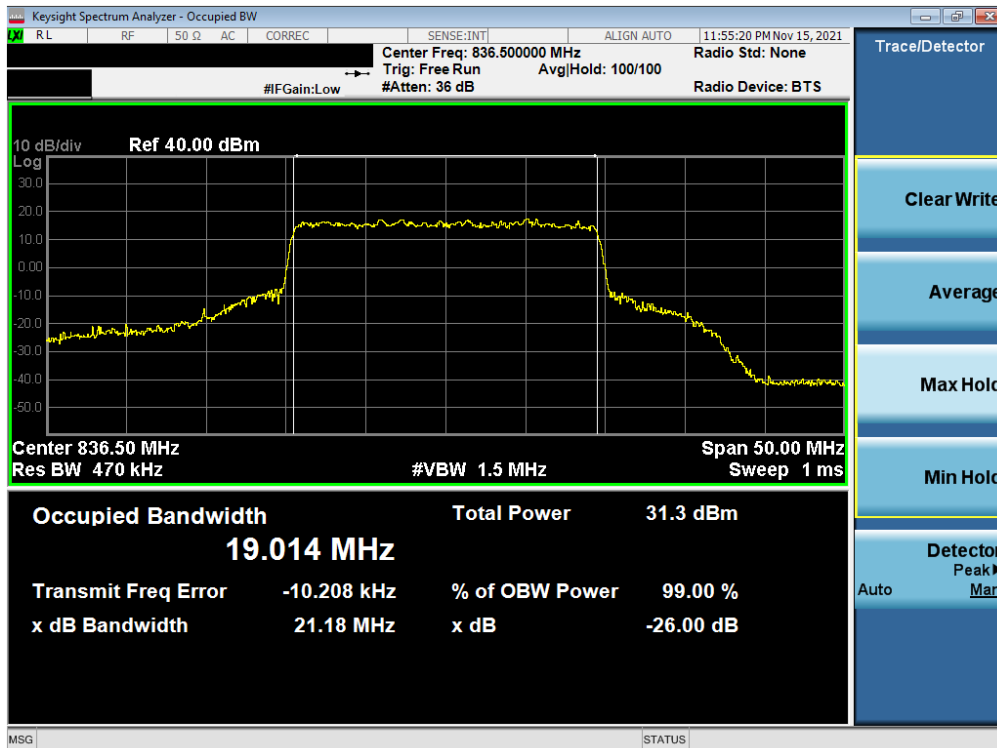
None.

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NR Band n5

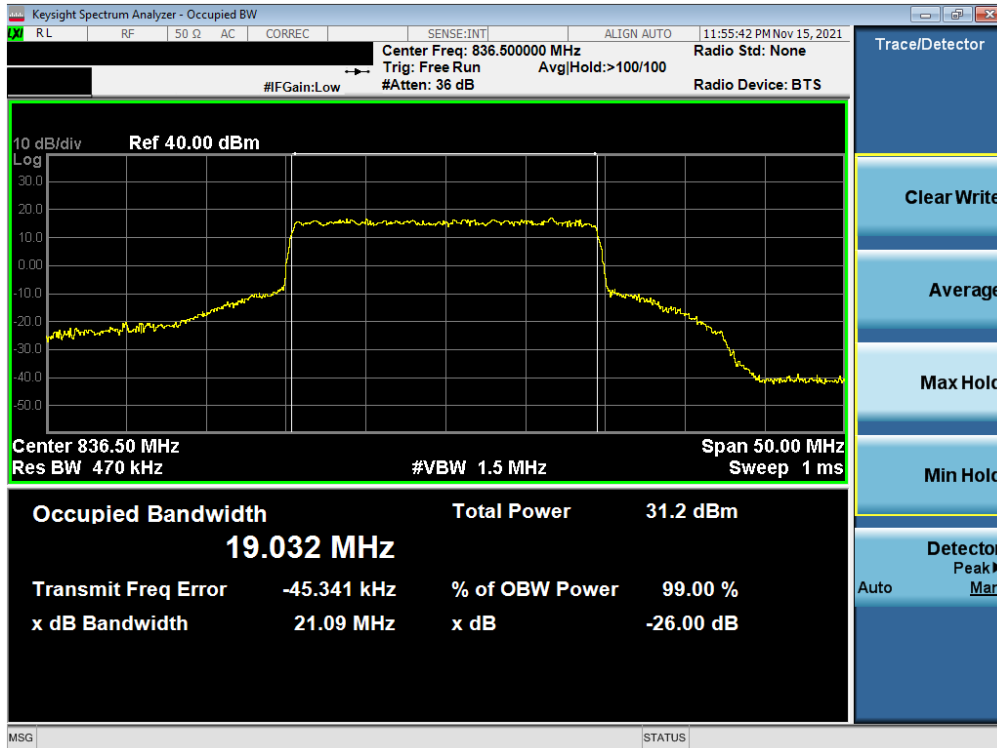


Plot 7-1. Occupied Bandwidth Plot (NR Band n5 - 20MHz $\pi/2$ BPSK - Full RB)

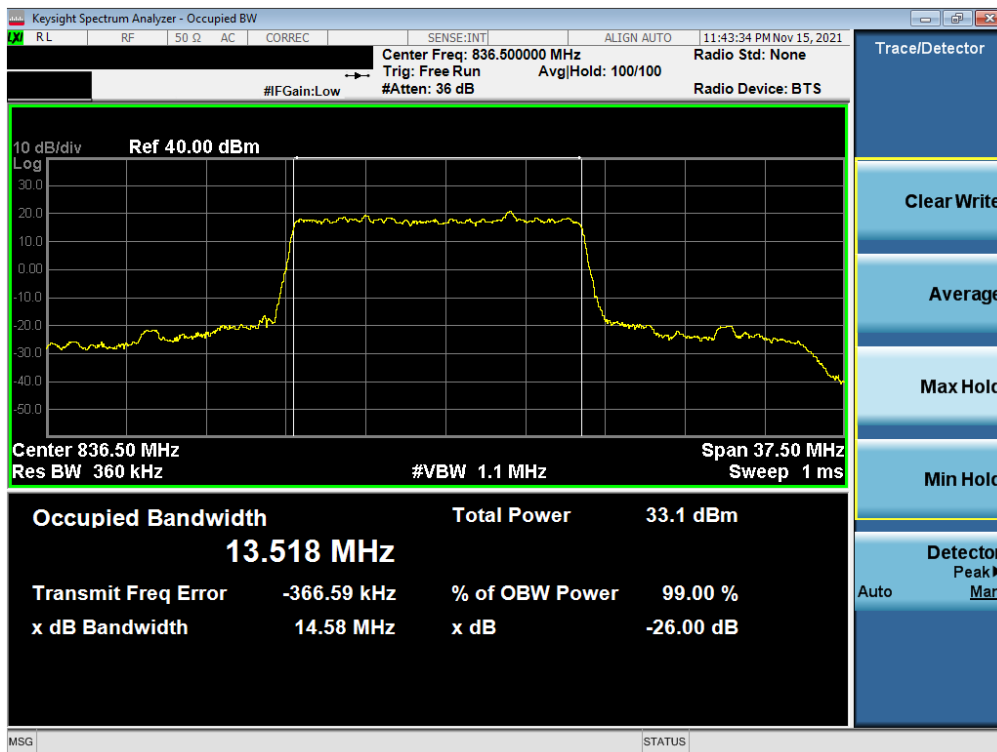


Plot 7-2. Occupied Bandwidth Plot (NR Band n5 - 20MHz QPSK - Full RB)

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Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 14 of 46

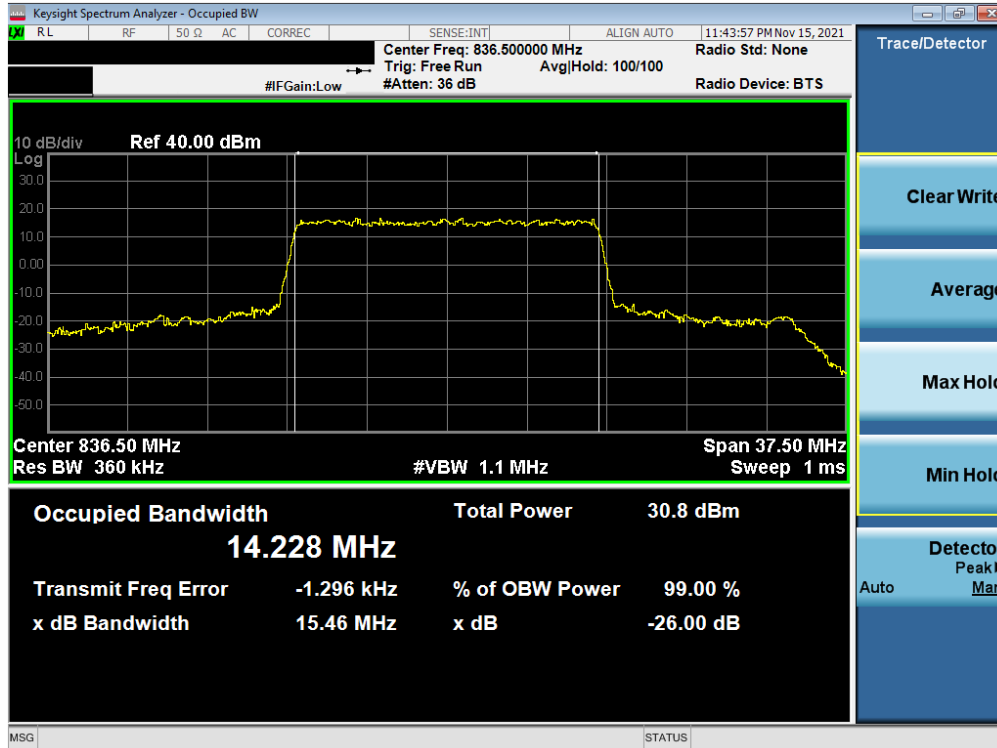


Plot 7-3. Occupied Bandwidth Plot (NR Band n5 - 20MHz 16-QAM - Full RB)

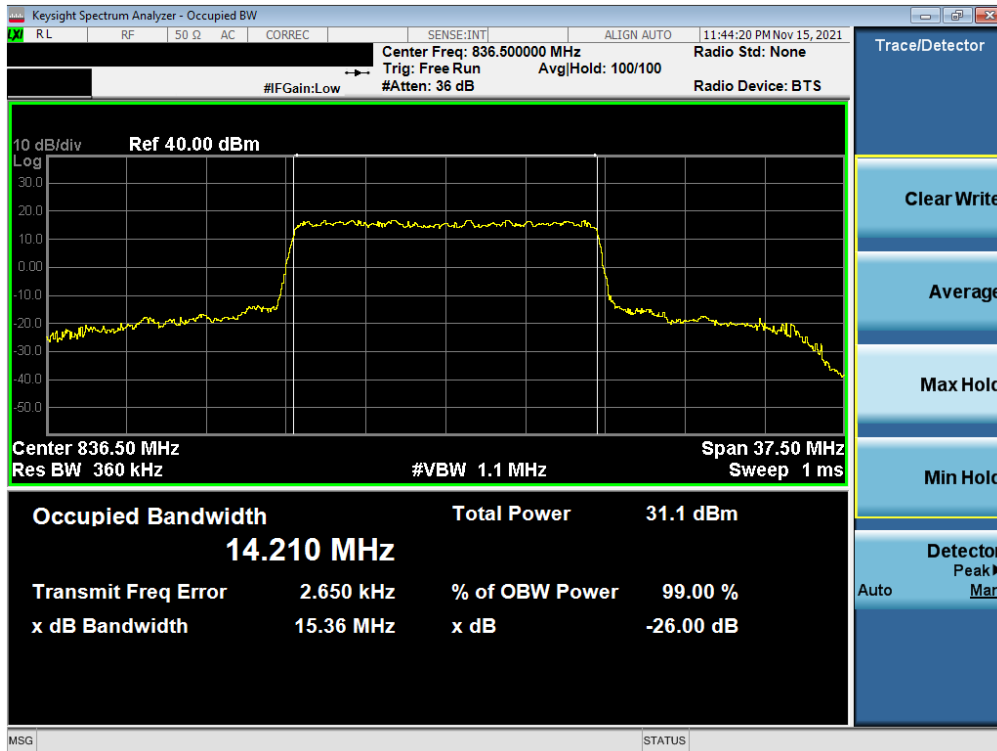


Plot 7-4. Occupied Bandwidth Plot (NR Band n5 - 15MHz $\pi/2$ BPSK - Full RB)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 15 of 46

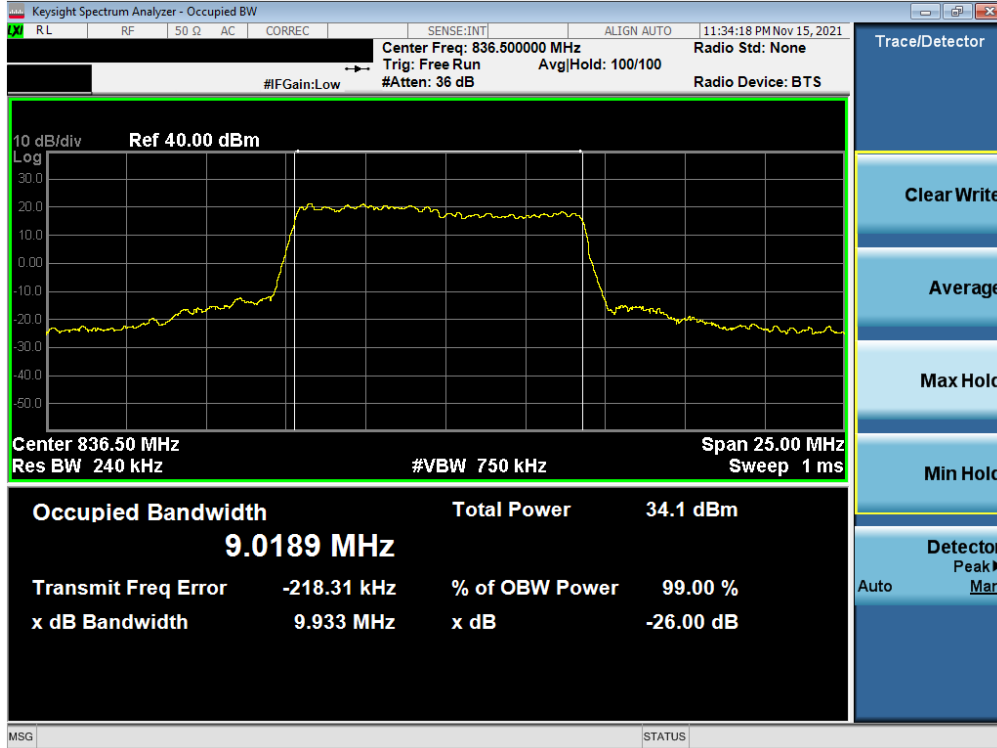


Plot 7-5. Occupied Bandwidth Plot (NR Band n5 - 15MHz QPSK - Full RB)

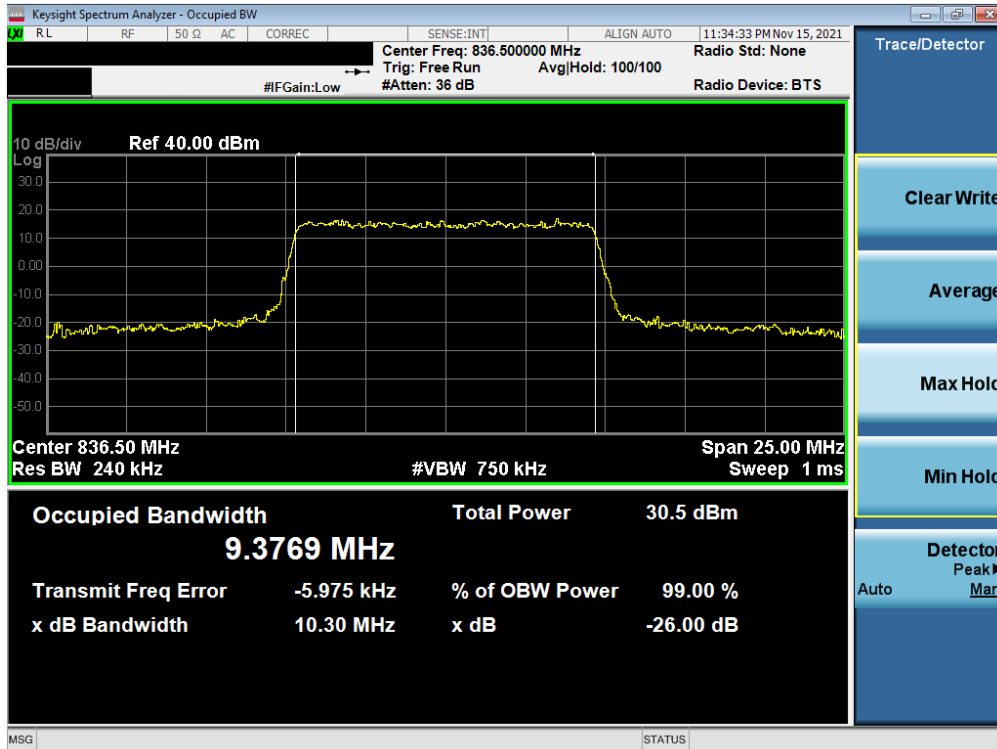


Plot 7-6. Occupied Bandwidth Plot (NR Band n5 - 15MHz 16-QAM - Full RB)




FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M21100116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset	Page 16 of 46

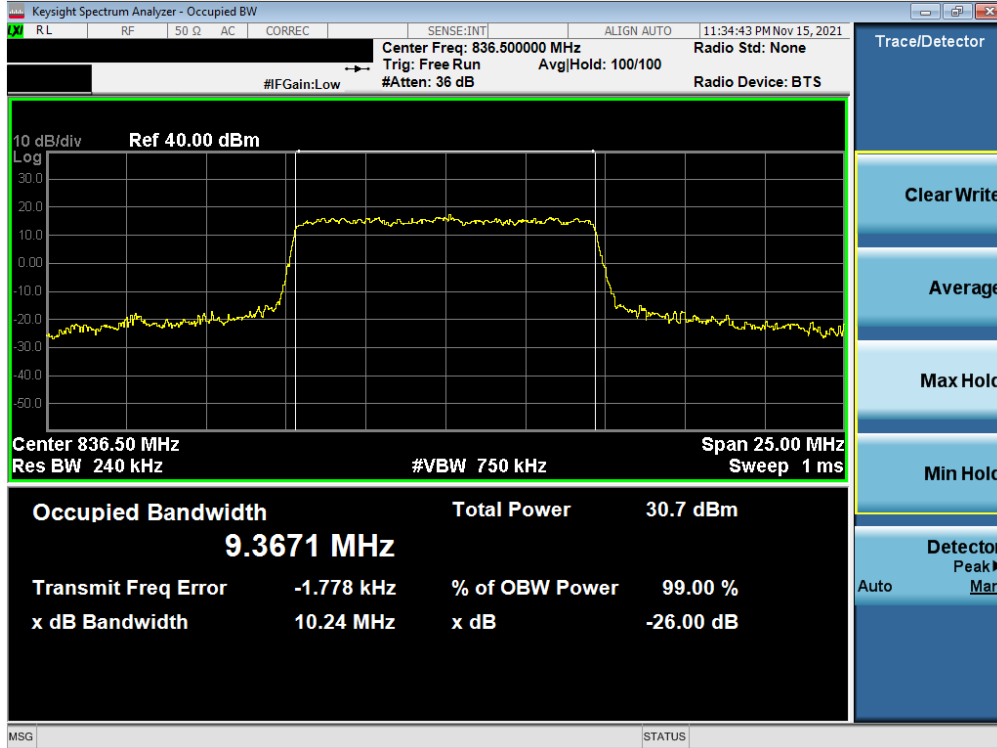


Plot 7-7. Occupied Bandwidth Plot (NR Band n5 - 10MHz $\pi/2$ BPSK - Full RB)

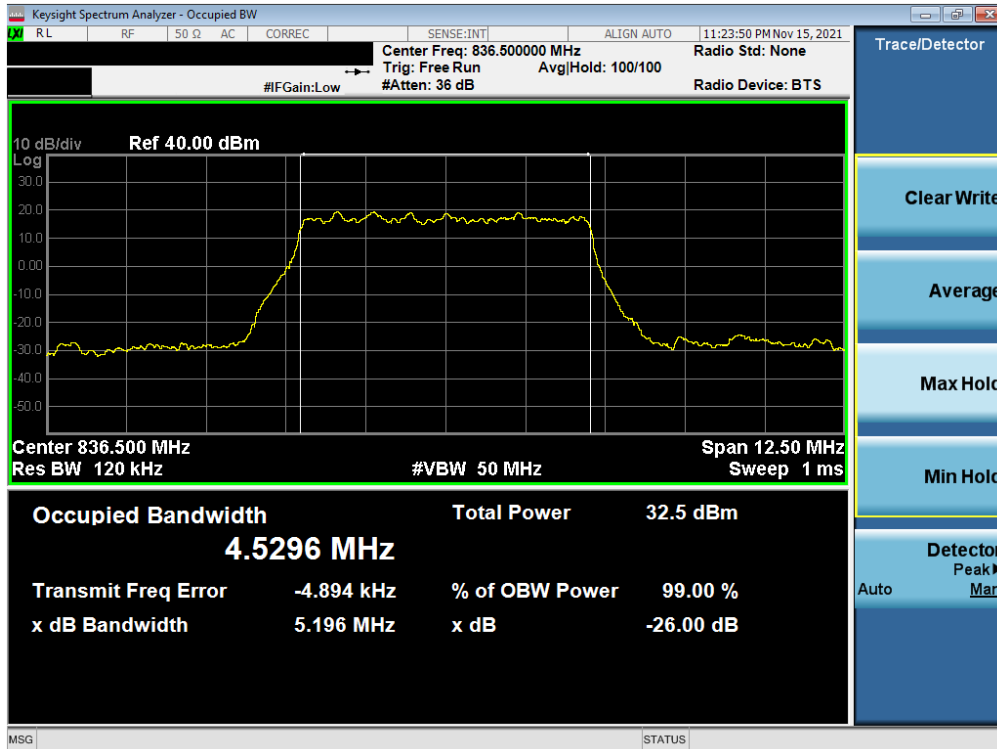


Plot 7-8. Occupied Bandwidth Plot (NR Band n5 - 10MHz QPSK - Full RB)

FCC ID: A3LSMS906E	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 17 of 46

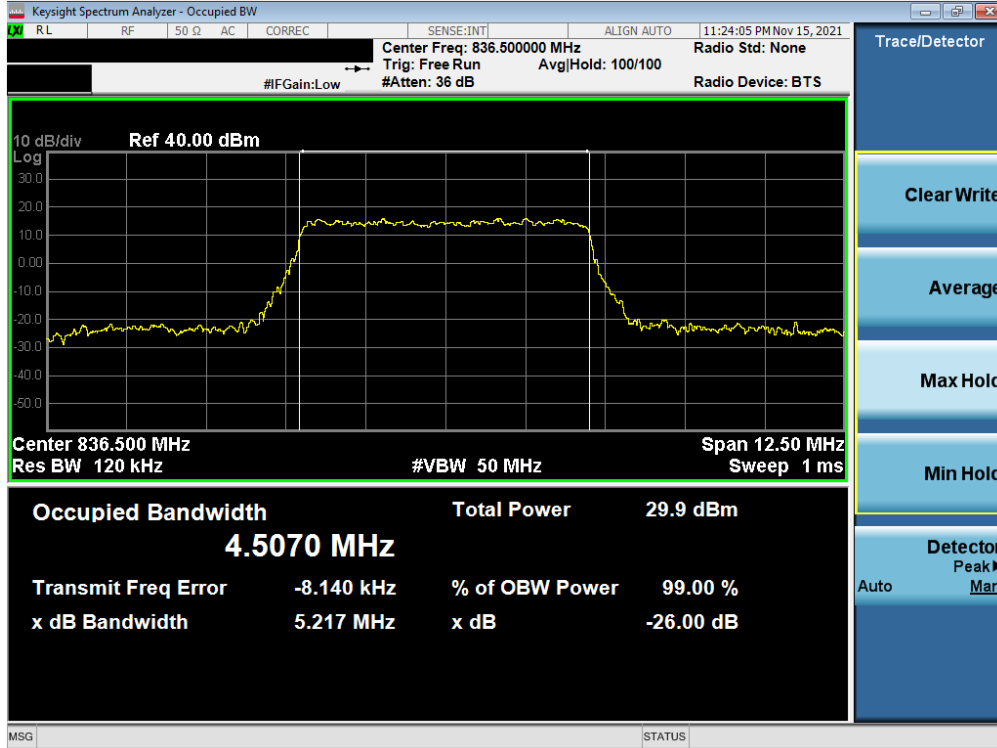


Plot 7-9. Occupied Bandwidth Plot (NR Band n5 - 10MHz 16-QAM - Full RB)

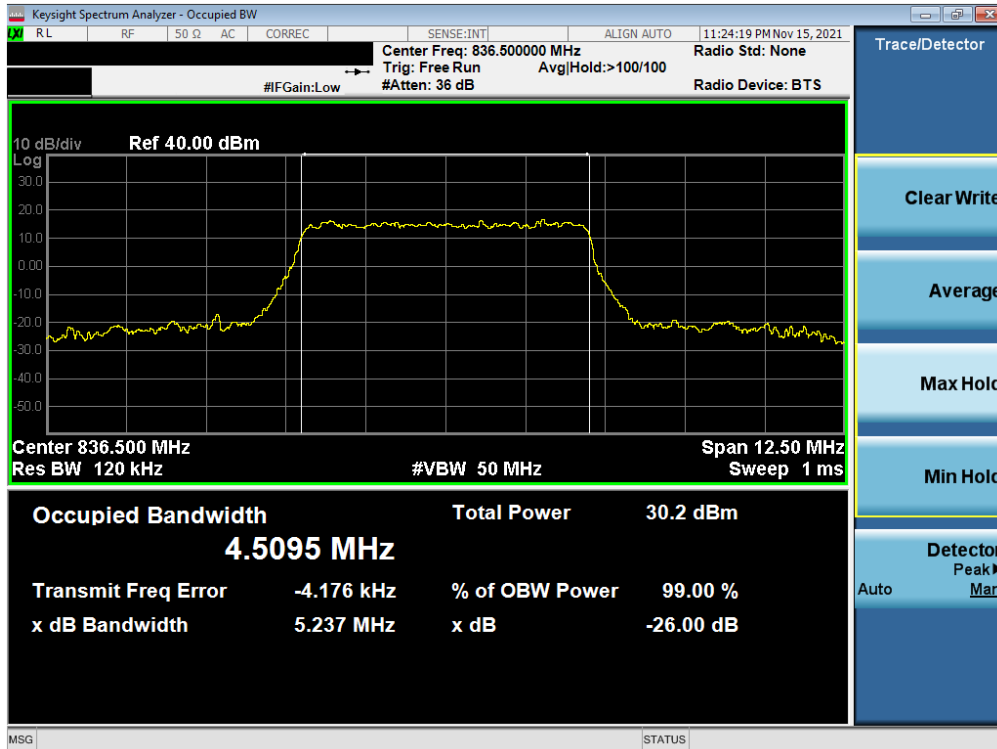


Plot 7-10. Occupied Bandwidth Plot (NR Band n5 - 5MHz $\pi/2$ BPSK - Full RB)




FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset	Page 18 of 46



Plot 7-11. Occupied Bandwidth Plot (NR Band n5 - 5MHz QPSK - Full RB)



Plot 7-12. Occupied Bandwidth Plot (NR Band n5 - 5MHz 16-QAM - Full RB)

FCC ID: A3LSMS906E	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 19 of 46

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

KDB 971168 D01 v03r01 – Section 6.0

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.

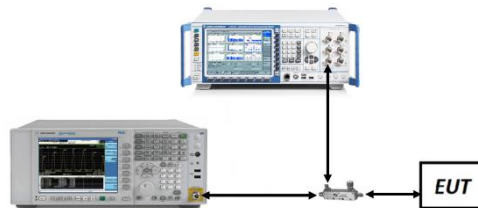




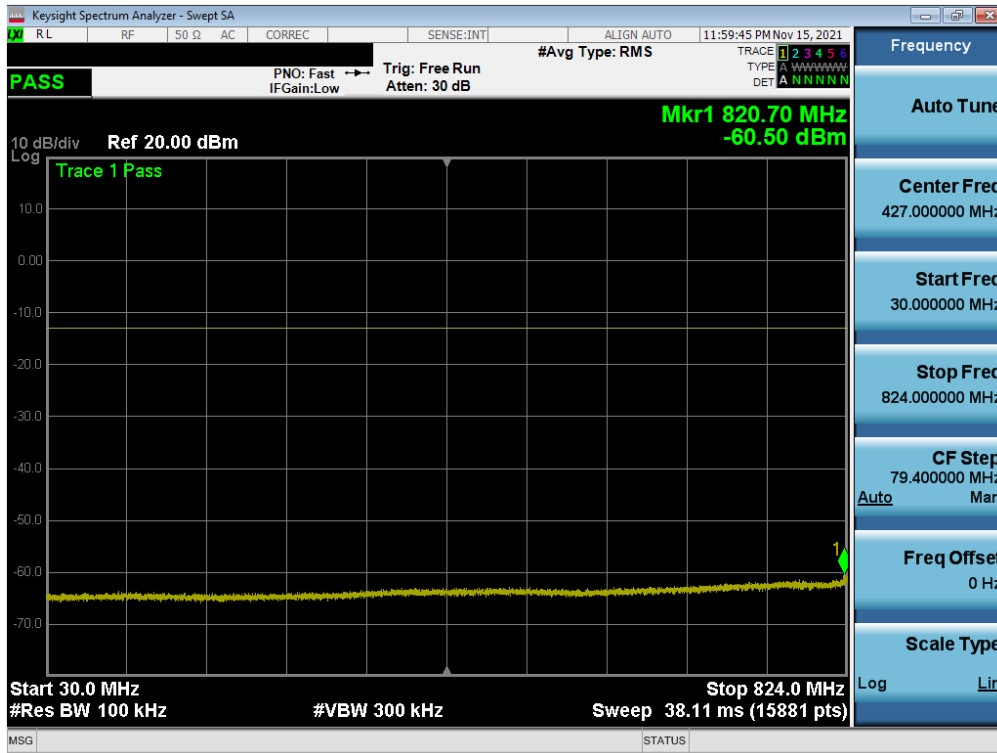
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

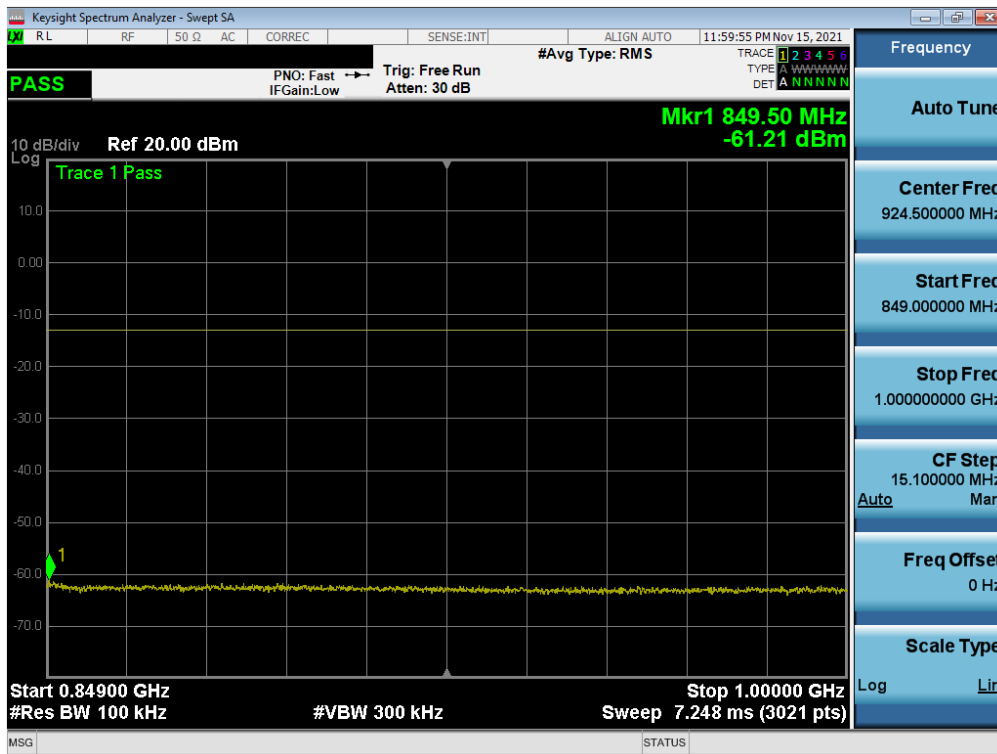
1. Per Part 22 and RSS-132, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth 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.

FCC ID: A3LSMS906E	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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NR Band n5

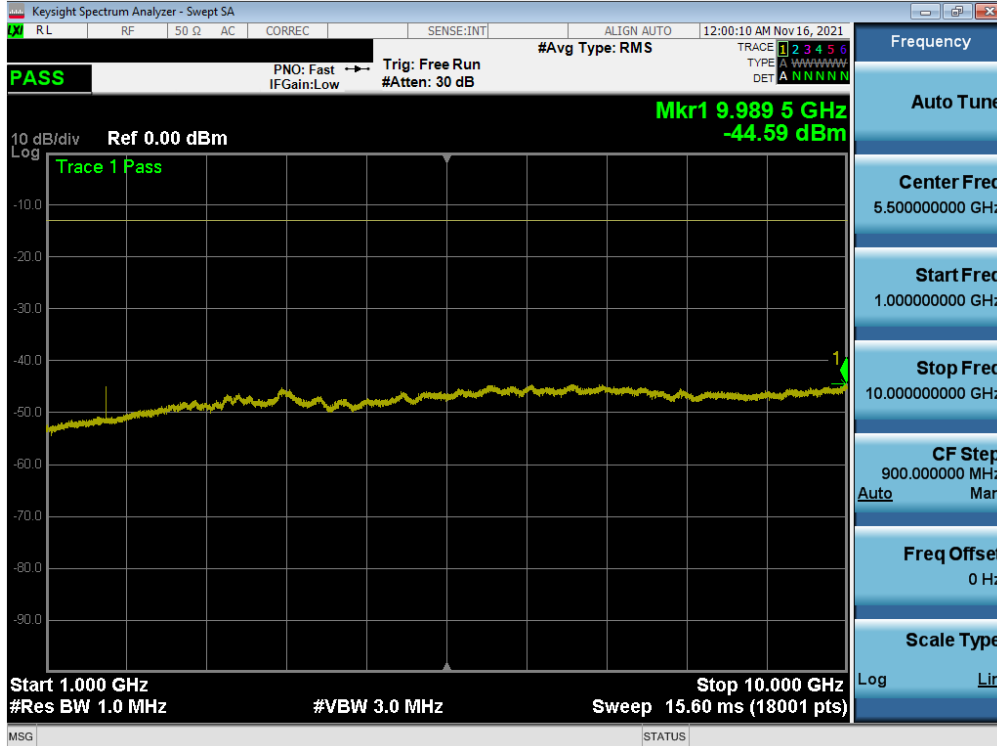


Plot 7-13. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Low Channel)

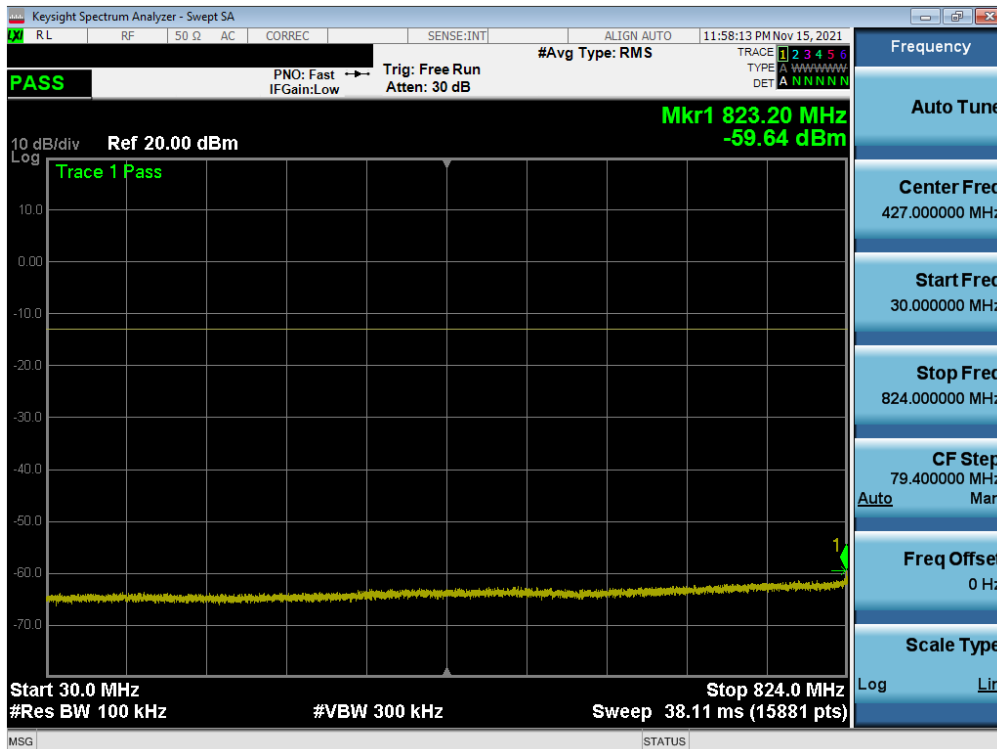


Plot 7-14. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Low Channel)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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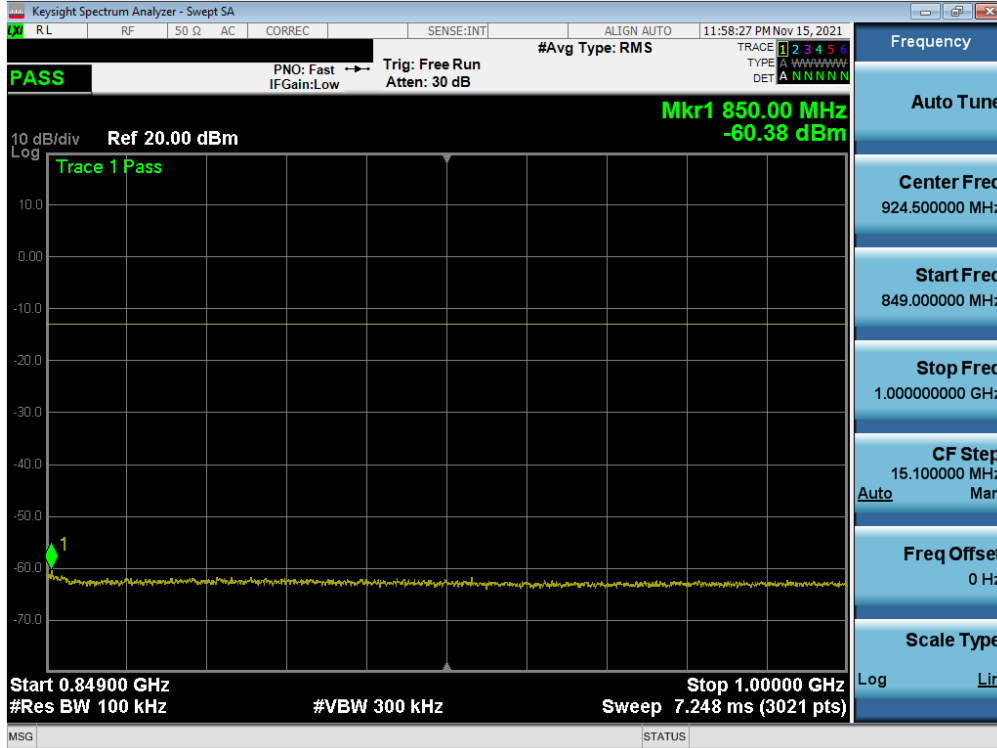


Plot 7-15. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Low Channel)

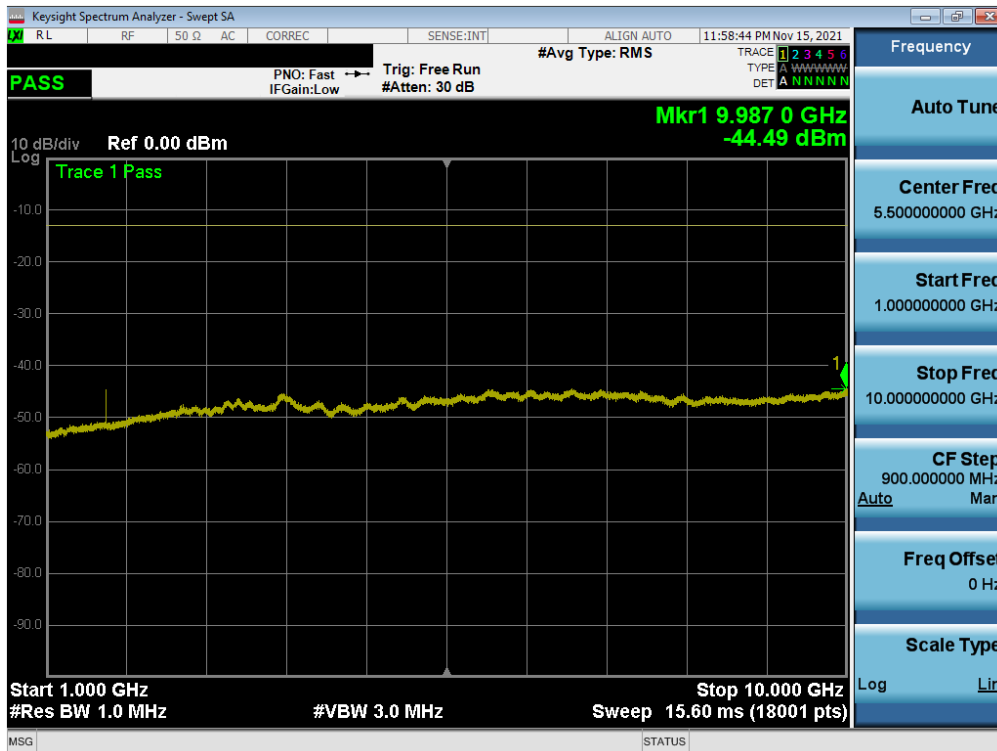


Plot 7-16. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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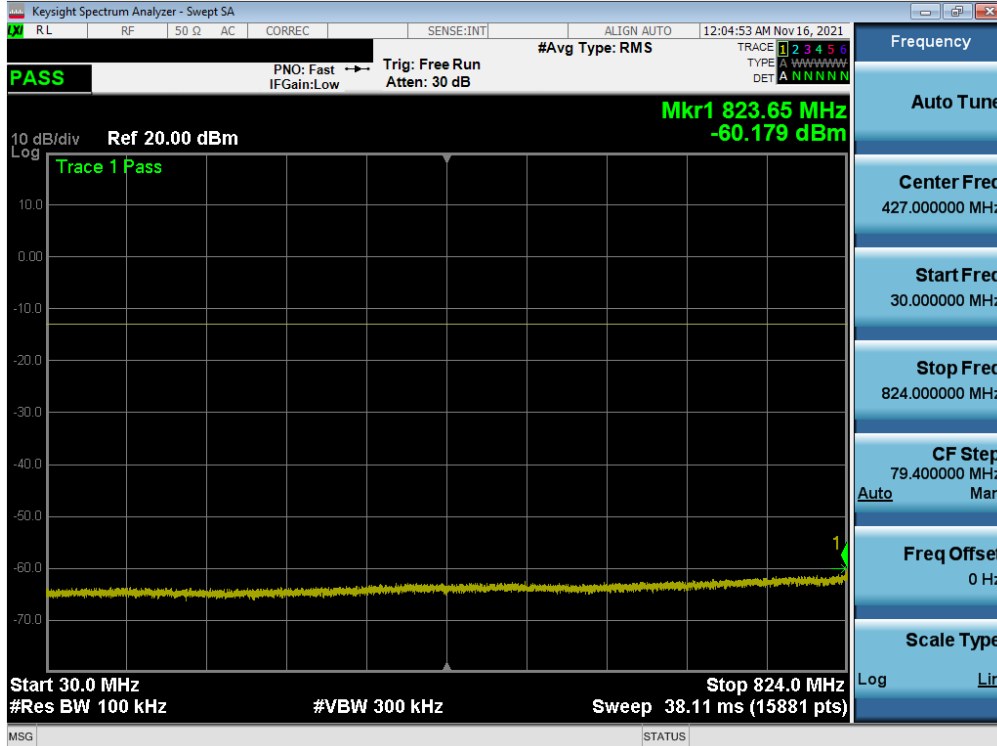


Plot 7-17. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)

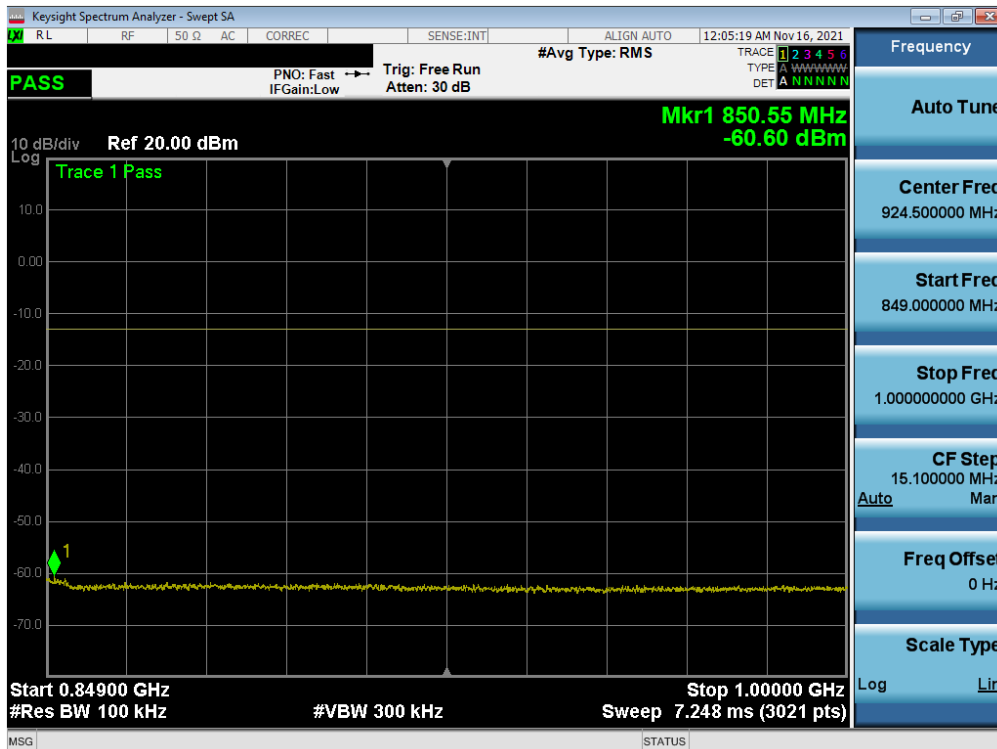


Plot 7-18. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 23 of 46

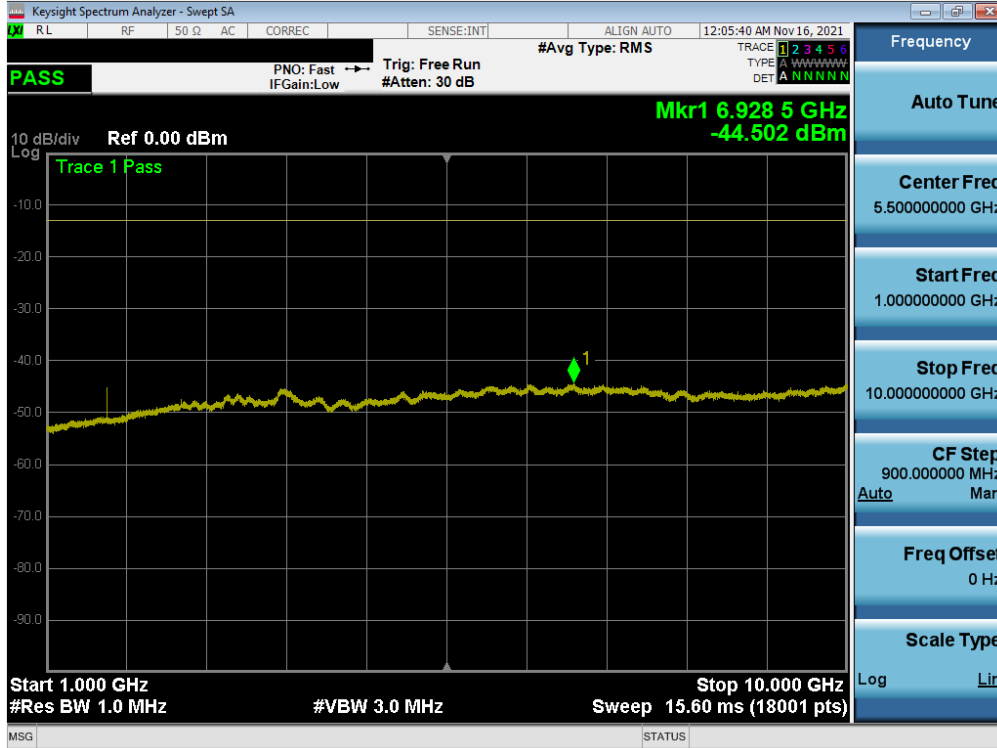


Plot 7-19. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - High Channel)






Plot 7-20. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - High Channel)

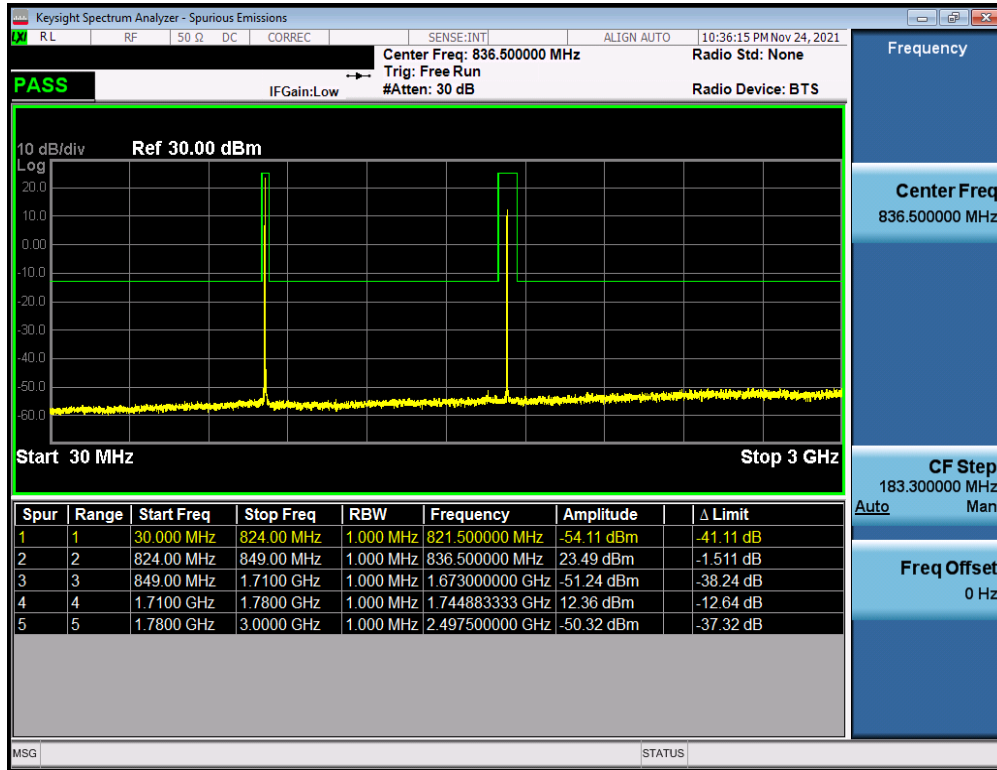
FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 24 of 46



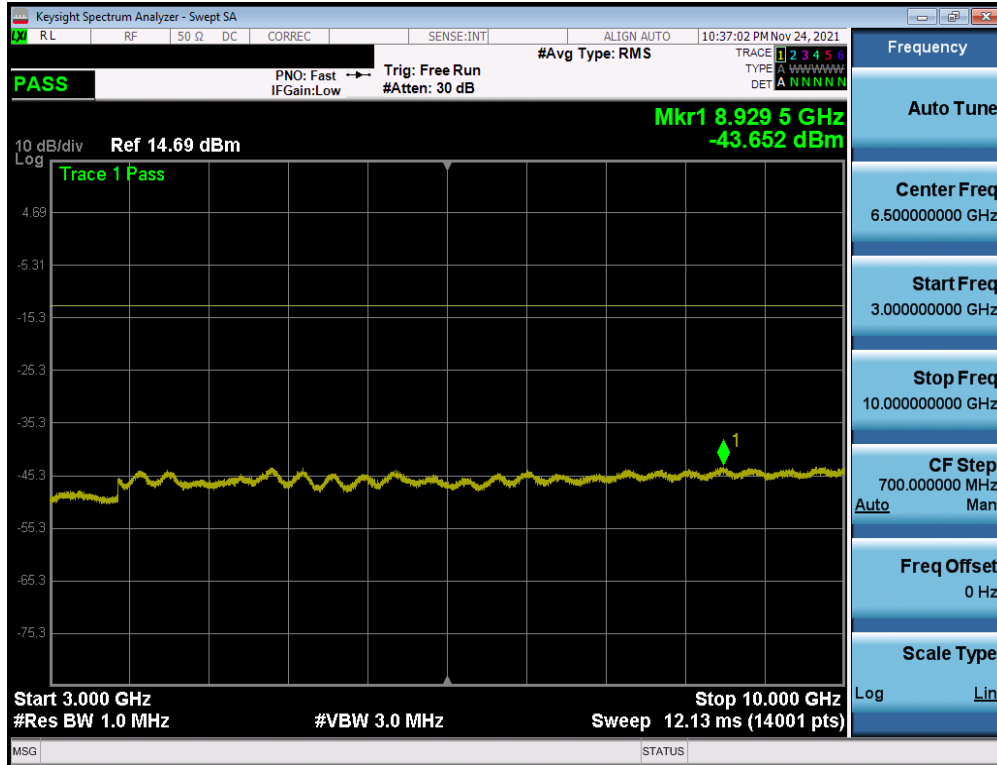
Plot 7-21. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - High Channel)

FCC ID: A3LSMS906E	 PCTEST Proud to be part of 	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 25 of 46

ULCA LTE Band 5 – Band 66

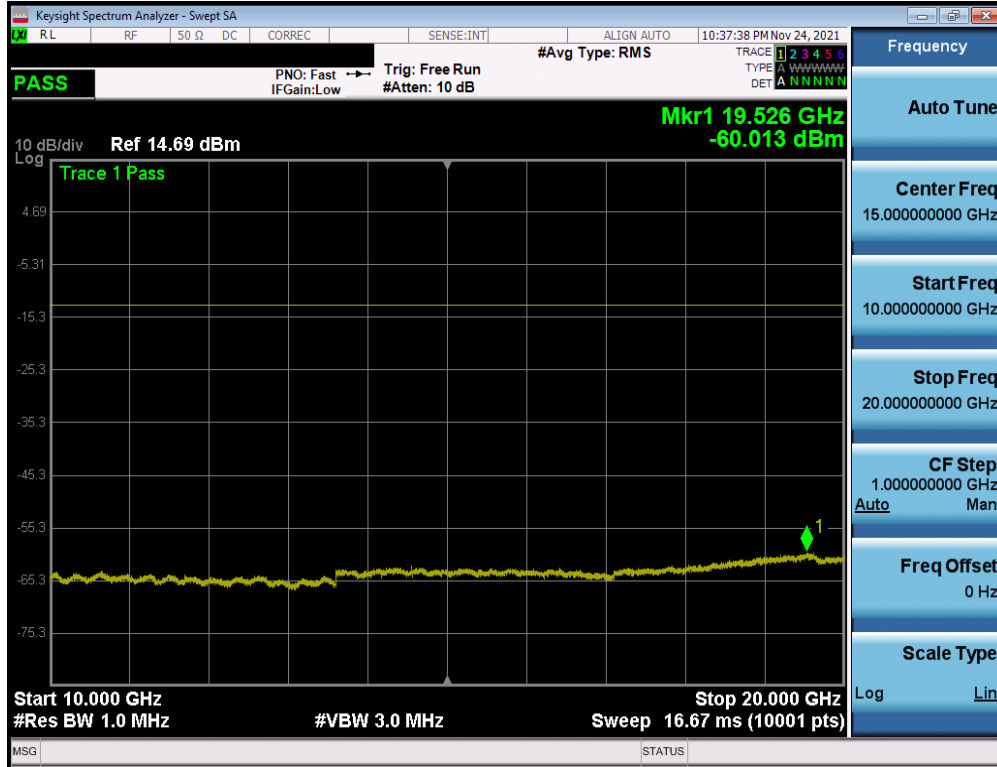


Plot 7-22. Conducted Spurious Plot (ULCA LTE B5 – B66)



Plot 7-23. Conducted Spurious Plot (ULCA LTE B5– B66)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Plot 7-24. Conducted Spurious Plot (ULCA LTE B5 – B66)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 27 of 46

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 $43 + 10 \log_{10}(P_{\text{Watts}})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

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. $RBW \geq 1\%$ of the emission bandwidth
4. $VBW \geq 3 \times RBW$
5. Detector = RMS
6. Number of sweep points $\geq 2 \times \text{Span}/RBW$
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.

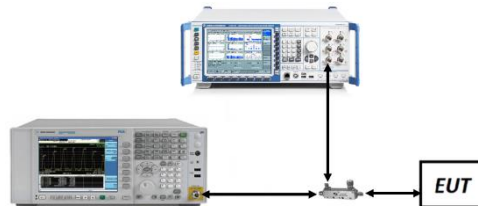






Figure 7-4. Test Instrument & Measurement Setup

FCC ID: A3LSMS906E	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 28 of 46

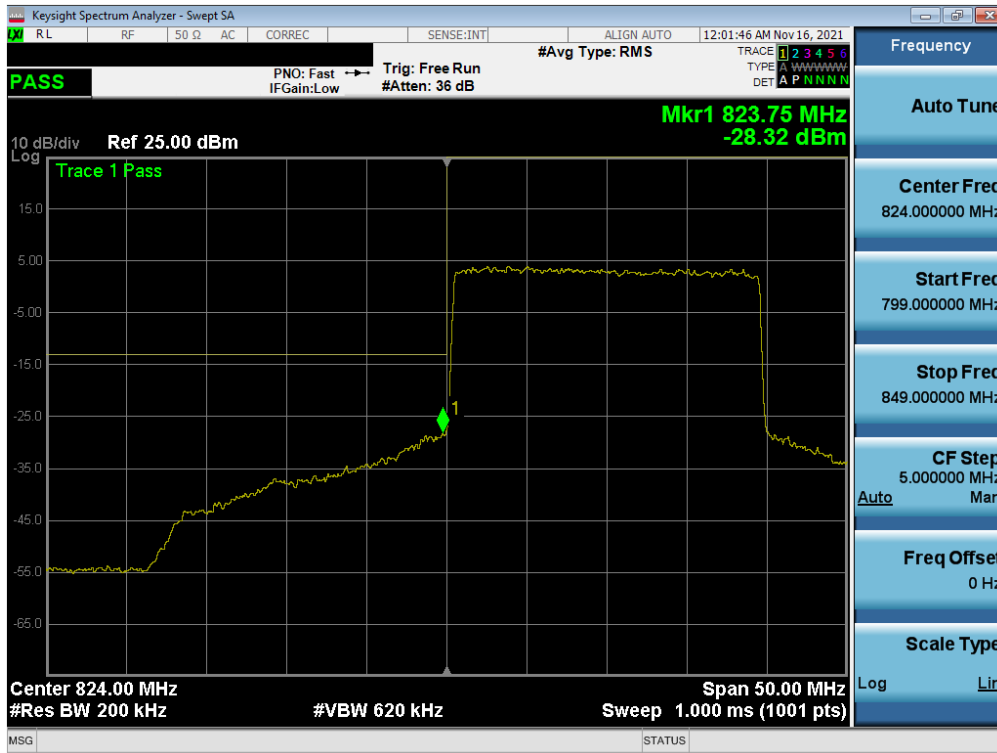
Test Notes

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.

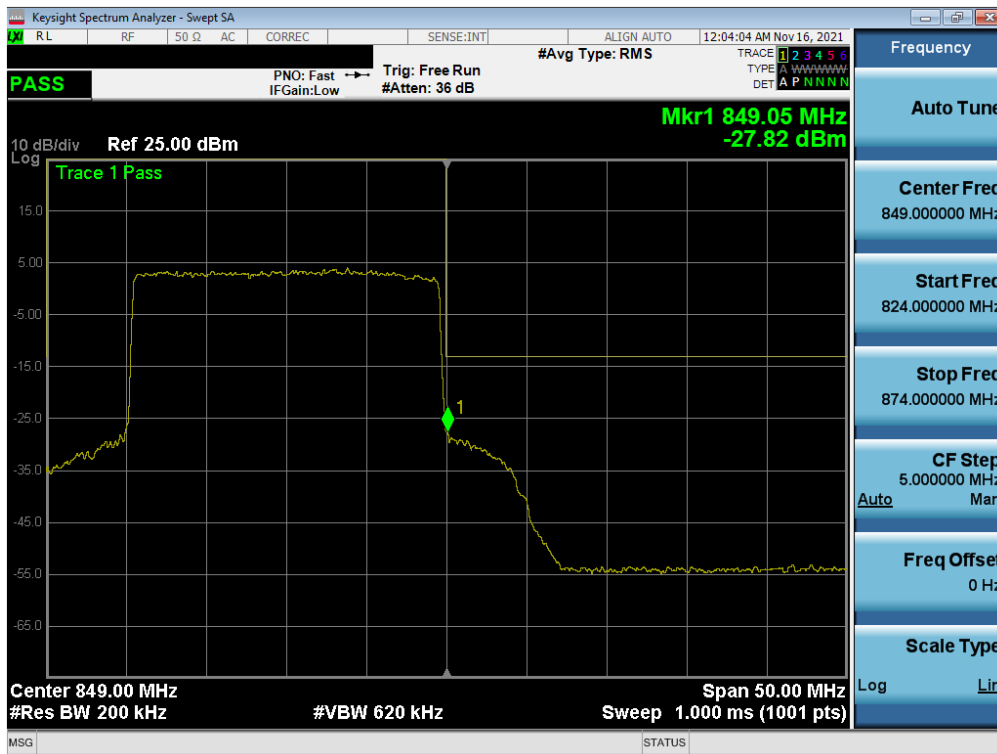
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

FCC ID: A3LSMS906E	 PART 22 MEASUREMENT REPORT 		Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset	Page 29 of 46

NR Band n5



Plot 7-25. Lower Band Edge Plot (NR Band n5 – 20.0MHz - Full RB)



Plot 7-26. Upper Band Edge Plot (NR Band n5 – 20.0MHz - Full RB)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Plot 7-27. Lower Band Edge Plot (NR Band n5 – 15.0MHz - Full RB)

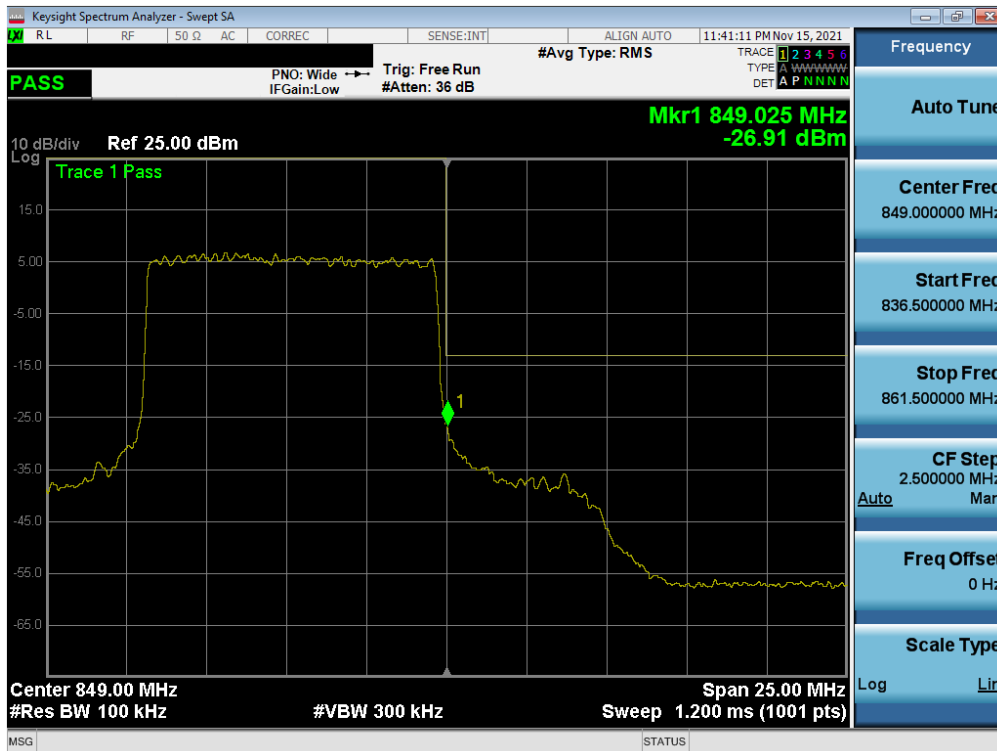


Plot 7-28. Upper Band Edge Plot (NR Band n5 – 15.0MHz - Full RB)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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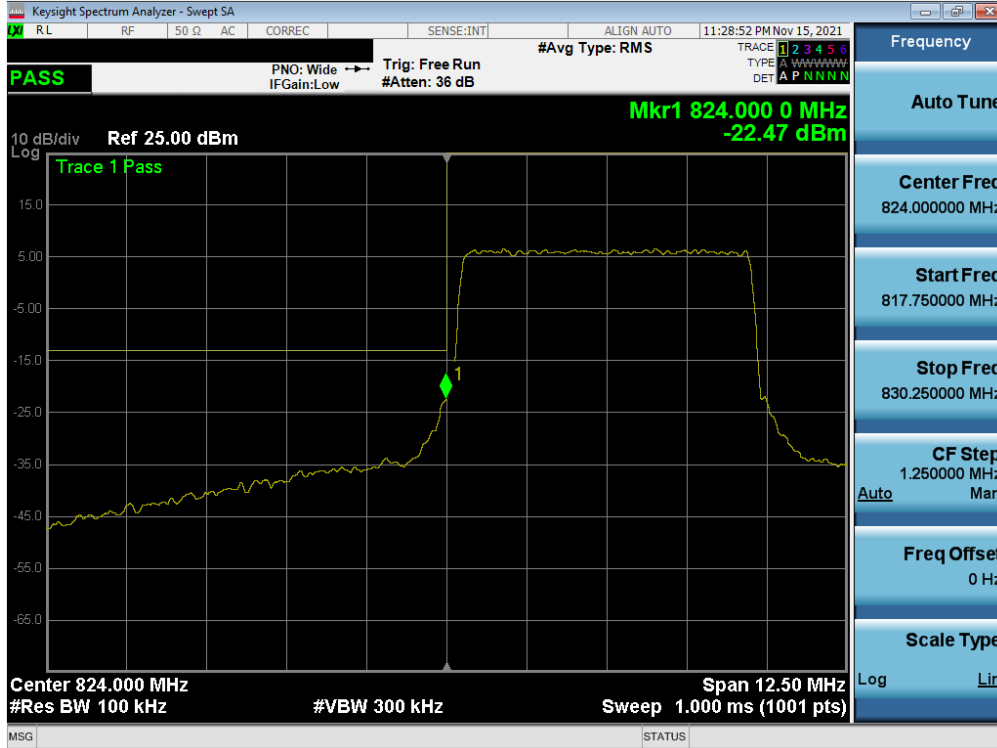


Plot 7-29. Lower Band Edge Plot (NR Band n5 – 10.0MHz - Full RB)



Plot 7-30. Upper Band Edge Plot (NR Band n5 – 10.0MHz - Full RB)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Plot 7-31. Lower Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)



Plot 7-32. Upper Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)

FCC ID: A3LSMS906E	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2110010116-02.A3L	Test Dates: 11/15/2021 - 12/03/2021	EUT Type: Portable Handset		Page 33 of 46

7.6 Radiated Power (ERP)

Test Overview

Effective Radiated Power (ERP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz 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

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 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. 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 \geq 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points \geq 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

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Test Setup

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

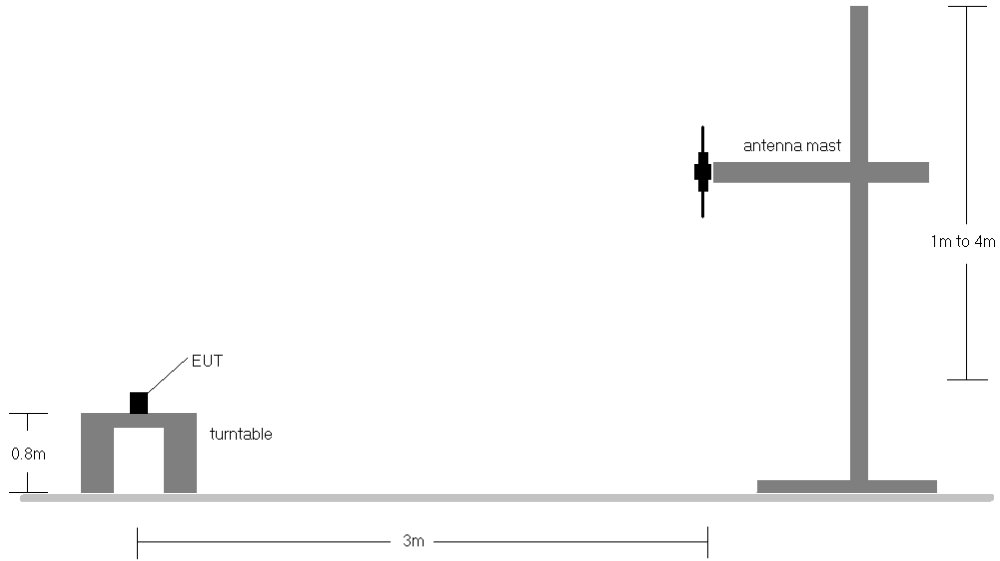


Figure 7-5. Radiated Test Setup <1GHz



Test Notes

- 1) 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.
- 2) This unit was tested with its standard battery.
- 3) 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.

FCC ID: A3LSMS906E		PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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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	138	259	6.15	1 / 79	14.08	18.08	0.064	38.45	-20.37	20.23	0.106	40.61	-20.37
	π/2 BPSK	836.5	V	149	252	6.18	1 / 53	13.92	17.95	0.062	38.45	-20.50	20.10	0.102	40.61	-20.51
	π/2 BPSK	839.0	V	145	282	6.30	1 / 53	13.82	17.97	0.063	38.45	-20.48	20.12	0.103	40.61	-20.48
	QPSK	834.0	V	138	259	6.15	1 / 79	14.09	18.09	0.064	38.45	-20.36	20.24	0.106	40.61	-20.36
	QPSK	836.5	V	149	252	6.18	1 / 53	13.83	17.86	0.061	38.45	-20.59	20.01	0.100	40.61	-20.60
	QPSK	839.0	V	145	282	6.30	1 / 53	13.90	18.05	0.064	38.45	-20.40	20.20	0.105	40.61	-20.40
15 MHz	16-QAM	834.0	V	138	259	6.15	1 / 79	13.26	17.26	0.053	38.45	-21.19	19.41	0.087	40.61	-21.19
	π/2 BPSK	831.5	V	138	259	6.13	1 / 0	14.05	18.02	0.063	38.45	-20.43	20.17	0.104	40.61	-20.44
	π/2 BPSK	836.5	V	149	252	6.18	1 / 0	13.87	17.90	0.062	38.45	-20.55	20.05	0.101	40.61	-20.55
	π/2 BPSK	841.5	V	145	282	6.33	1 / 0	13.71	17.89	0.061	38.45	-20.56	20.04	0.101	40.61	-20.57
	QPSK	831.5	V	138	259	6.13	1 / 0	13.99	17.96	0.063	38.45	-20.49	20.11	0.103	40.61	-20.49
	QPSK	836.5	V	149	252	6.18	1 / 0	13.79	17.82	0.061	38.45	-20.63	19.97	0.099	40.61	-20.64
10 MHz	QPSK	841.5	V	145	282	6.33	1 / 0	13.77	17.95	0.062	38.45	-20.50	20.10	0.102	40.61	-20.50
	16-QAM	831.5	V	138	259	6.13	1 / 0	13.64	17.62	0.058	38.45	-20.83	19.77	0.095	40.61	-20.84
	π/2 BPSK	829.0	V	138	259	6.10	25 / 0	13.98	17.93	0.062	38.45	-20.52	20.08	0.102	40.61	-20.53
	π/2 BPSK	836.5	V	149	252	6.18	25 / 0	13.62	17.65	0.058	38.45	-20.80	19.80	0.095	40.61	-20.81
	π/2 BPSK	844.0	V	145	282	6.36	1 / 0	13.55	17.76	0.060	38.45	-20.70	19.91	0.098	40.61	-20.70
	QPSK	829.0	V	138	259	6.10	25 / 0	13.42	17.37	0.055	38.45	-21.08	19.52	0.090	40.61	-21.08
5 MHz	QPSK	836.5	V	149	252	6.18	25 / 0	12.90	16.93	0.049	38.45	-21.52	19.08	0.081	40.61	-21.53
	QPSK	844.0	V	145	282	6.36	1 / 0	13.43	17.64	0.058	38.45	-20.81	19.79	0.095	40.61	-20.82
	16-QAM	844.0	V	145	282	6.36	1 / 0	12.53	16.73	0.047	38.45	-21.72	18.88	0.077	40.61	-21.72
	π/2 BPSK	829.0	V	138	259	6.07	1 / 0	14.17	18.09	0.064	38.45	-20.36	20.24	0.106	40.61	-20.36
	π/2 BPSK	836.5	V	149	252	6.18	1 / 0	13.85	17.88	0.061	38.45	-20.57	20.03	0.101	40.61	-20.58
	π/2 BPSK	844.0	V	145	282	6.38	1 / 24	13.45	17.68	0.059	38.45	-20.77	19.83	0.096	40.61	-20.78
20 MHz	QPSK	829.0	V	138	259	6.07	1 / 0	13.92	17.85	0.061	38.45	-20.61	20.00	0.100	40.61	-20.61
	QPSK	836.5	V	149	252	6.18	1 / 0	13.72	17.75	0.060	38.45	-20.70	19.90	0.098	40.61	-20.71
	QPSK	844.0	V	145	282	6.38	1 / 24	13.52	17.75	0.060	38.45	-20.70	19.90	0.098	40.61	-20.70
	16-QAM	829.0	V	138	259	6.07	1 / 0	14.00	17.93	0.062	38.45	-20.52	20.08	0.102	40.61	-20.53
20 MHz	QPSK (CP-OFDM)	834.0	V	138	235	6.15	1 / 79	12.52	16.52	0.045	38.45	-21.93	18.67	0.074	40.61	-21.93
	QPSK (Opposite Pol.)	834.0	H	217	279	6.73	1 / 26	13.34	17.92	0.062	38.45	-20.53	20.07	0.102	40.61	-20.54
	QPSK (WCP)	834.0	V	134	309	6.15	1 / 26	10.38	14.38	0.027	38.45	-24.07	16.53	0.045	40.61	-24.07

Table 7-3. ERP Data (NR Band n5)

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7.7 Radiated Spurious Emissions Measurements

Test Overview



Radiated spurious emissions measurements are performed using the field strength conversion method described in KDB 971168 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole 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

KDB 971168 D01 v03r01 – Section 5.8

Test Settings

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

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Test Setup

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

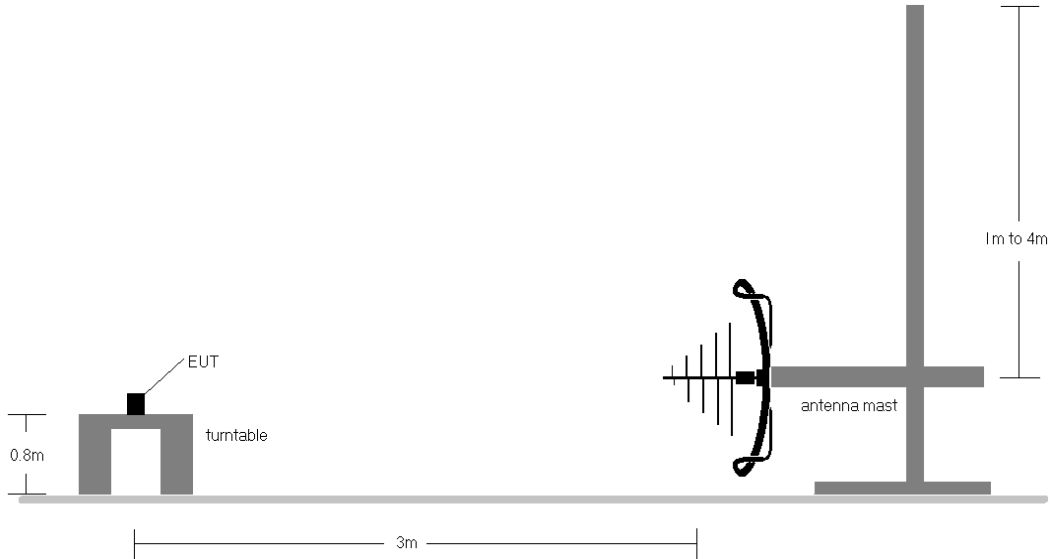


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

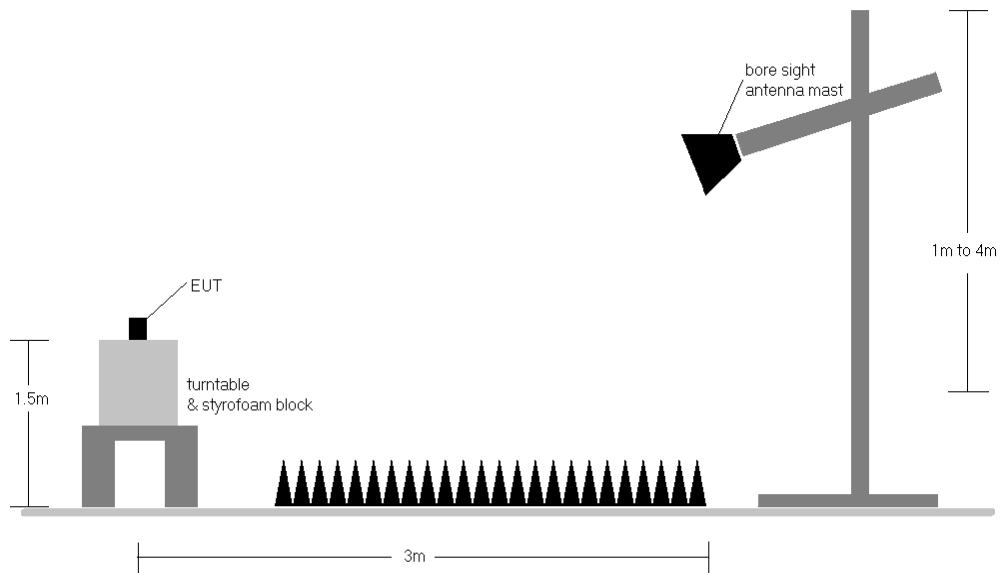




Figure 7-7. Test Instrument & Measurement Setup >1 GHz

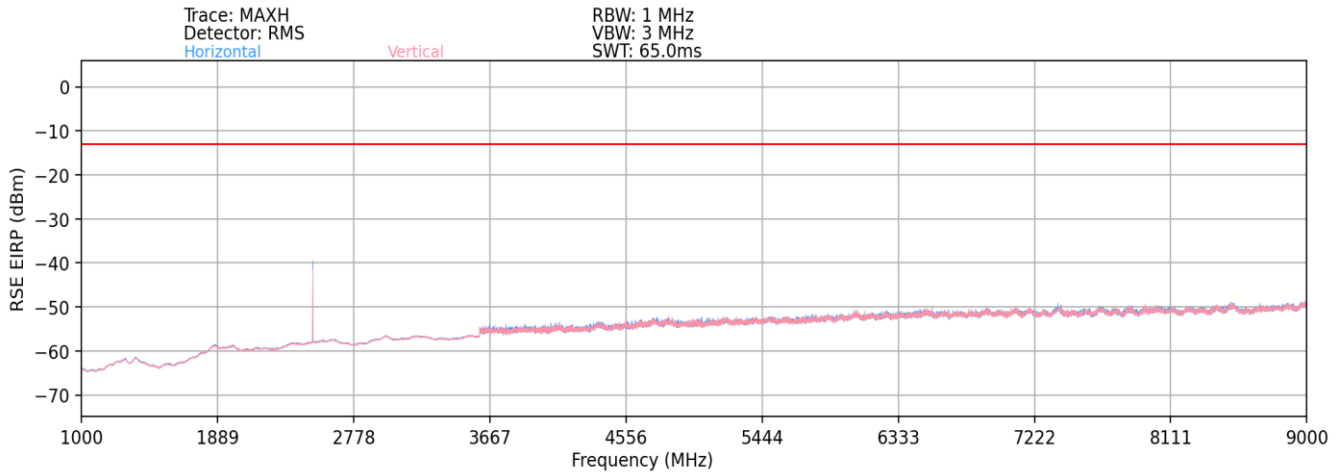
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Test Notes

- 1) Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
 - a) $E(\text{dB}\mu\text{V}/\text{m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$
 - b) $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V}/\text{m}) + 20\log D - 104.8$; where D is the measurement distance in meters.
- 2) 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.
- 3) This unit was tested with its standard battery.
- 4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 5) 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.
- 6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 7) ULCA spurious emissions 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.
- 8) 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.
- 9) 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, is subject to the rules under which the NR carrier operates. Spurious emission caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

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NR Band n5



Plot 7-33. Radiated Spurious Plot (NR Band n5)

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	H	-	-	-76.79	-2.27	27.94	-67.31	-13.00	-54.31
2502.00	H	116	18	-51.65	2.15	57.50	-37.76	-13.00	-24.76
3336.00	H	-	-	-78.08	3.27	32.19	-63.07	-13.00	-50.07
4170.00	H	-	-	-78.87	4.36	32.49	-62.77	-13.00	-49.77
5004.00	H	-	-	-79.20	5.77	33.57	-61.69	-13.00	-48.69

Table 7-4. 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	H	-	-	-76.06	-2.16	28.78	-66.48	-13.00	-53.48
2509.50	H	122	17	-50.12	2.23	59.11	-36.15	-13.00	-23.15
3346.00	H	-	-	-77.89	3.26	32.37	-62.89	-13.00	-49.89
4182.50	H	-	-	-79.52	4.46	31.94	-63.32	-13.00	-50.32
5019.00	H	-	-	-79.50	5.89	33.39	-61.87	-13.00	-48.87

Table 7-5. Radiated Spurious Data (NR Band n5 – Mid Channel)

FCC ID: A3LSMS906E	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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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	H	-	-	-77.05	-2.04	27.91	-67.35	-13.00	-54.35
2517.00	H	163	19	-49.30	2.41	60.11	-35.15	-13.00	-22.15
3356.00	H	-	-	-77.59	3.22	32.63	-62.63	-13.00	-49.63
4195.00	H	-	-	-77.90	4.31	33.41	-61.84	-13.00	-48.84
5034.00	H	-	-	-79.41	5.87	33.46	-61.80	-13.00	-48.80

Table 7-6. Radiated Spurious Data (NR Band n5 – High Channel)

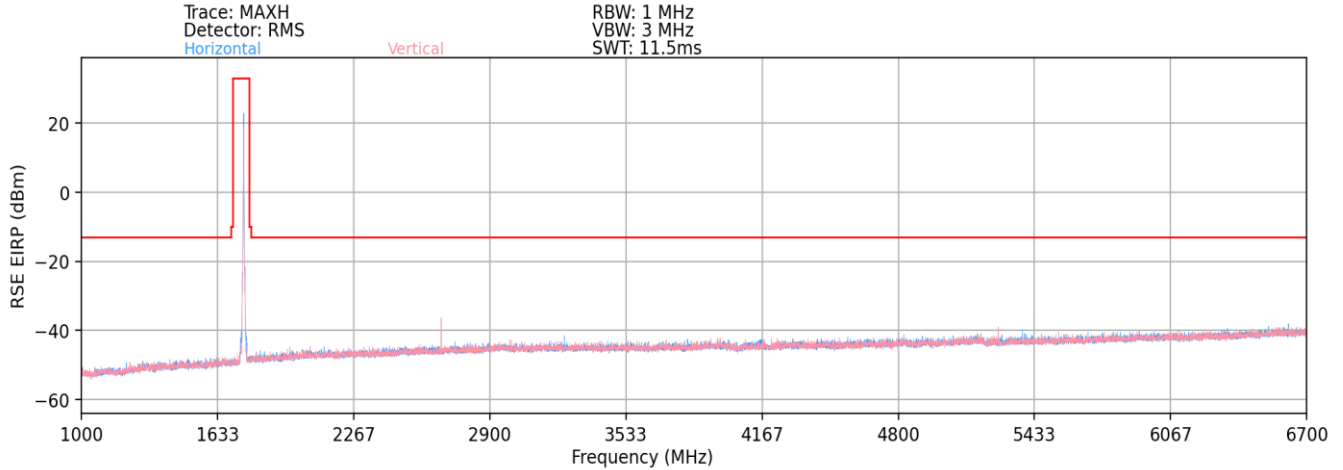
Case:	w/ Wireless Charging Pad
Bandwidth (MHz):	20
Frequency (MHz):	839
RB / Offset:	1 / 53

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	H	-	-	-80.24	-0.82	25.94	-69.31	-13.00	-56.31
2517.00	H	339	56	-54.06	3.20	56.14	-39.12	-13.00	-26.12
3356.00	H	-	-	-76.16	5.00	35.84	-59.42	-13.00	-46.42
4195.00	H	-	-	-76.73	5.70	35.97	-59.28	-13.00	-46.28
5034.00	H	-	-	-79.18	6.86	34.68	-60.58	-13.00	-47.58

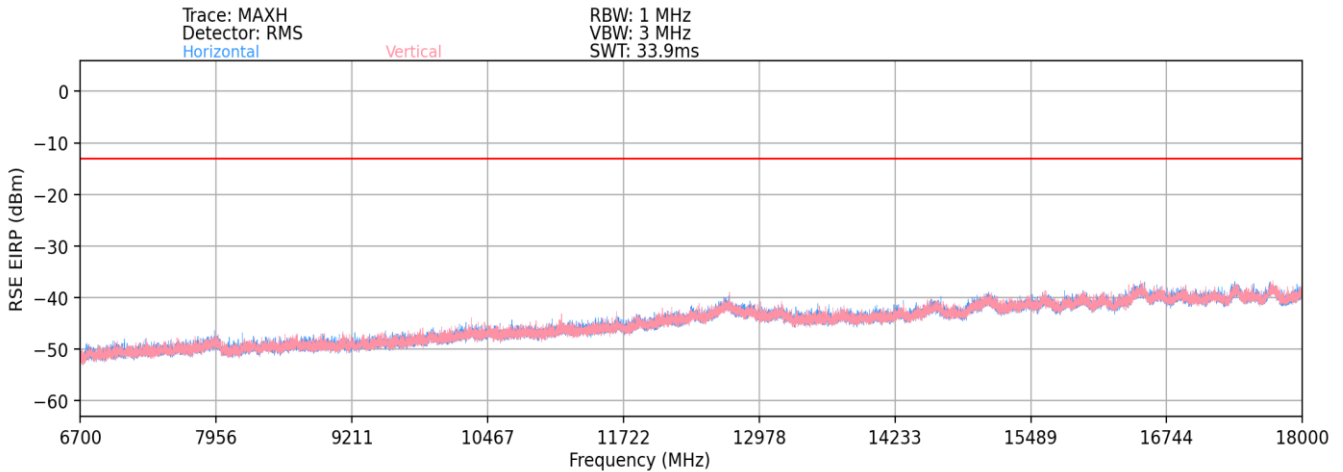
Table 7-7. Radiated Spurious Data with WCP (NR Band n5)

FCC ID: A3LSMS906E	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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EN-DC NR Band n5 + Band 66



Plot 7-34. Radiated Spurious Plot (EN-DC NR Band n5 + Band 66)





Plot 7-35. Radiated Spurious Plot (EN-DC NR Band n5 + Band 66)

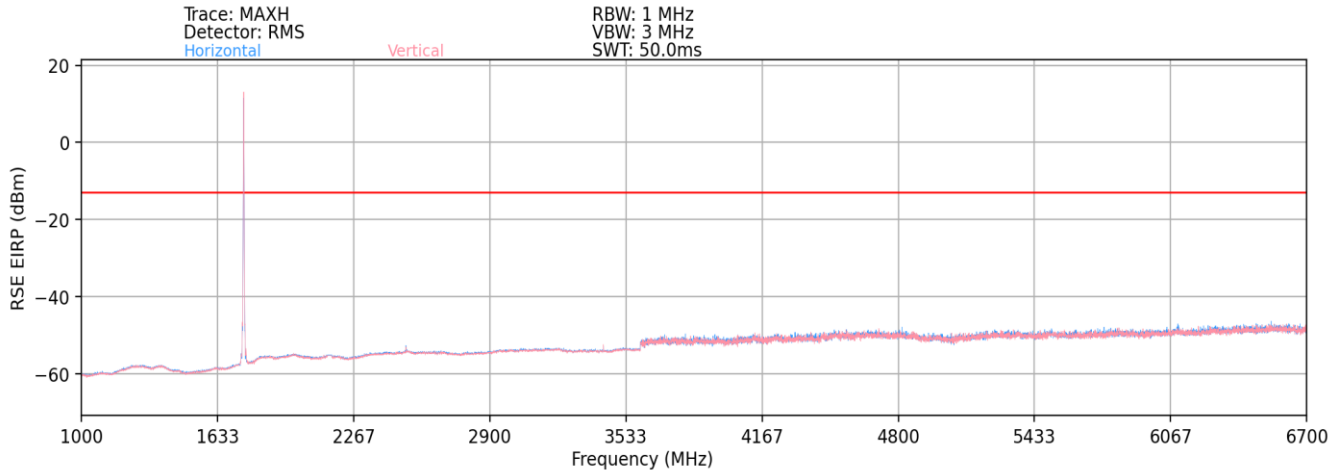
Bandwidth (MHz):	20/20
Frequency (MHz):	836.5MHz & 1745
RB / Offset:	1/53 & 1/50
Mode:	EN-DC
Anchor Band:	LTE Band 66

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]
2407.63	V	-	-	-79.56	11.83	39.27	-55.99	-13.00	-42.99
2673.50	V	153	317	-64.09	12.68	55.59	-39.67	-13.00	-26.67
2797.50	V	-	-	-79.35	12.82	40.47	-54.79	-13.00	-41.79
5265.24	V	102	354	-75.31	17.55	49.24	-46.02	-13.00	-33.02
6287.50	V	-	-	-81.28	19.07	44.79	-50.46	-13.00	-37.46
6431.50	V	-	-	-81.50	19.55	45.05	-50.21	-13.00	-37.21

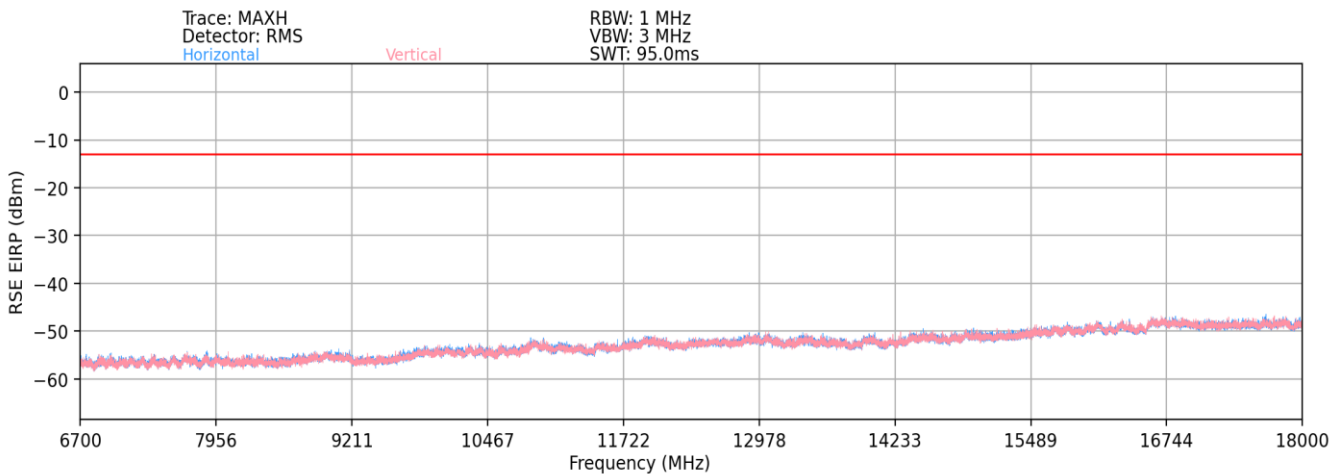
Table 7-8. Radiated Spurious Data (EN-DC NR Band n5 + Band 66)

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LTE ULCA: Band 5 – Band 66



Plot 7-36. Radiated Spurious Plot (ULCA LTE B5 – B66)





Plot 7-37. Radiated Spurious Plot (ULCA LTE B5 – B66)

PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	707.5
PCC RB / Offset:	1/25
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	1745.0
SCC RB / Offset:	1/50

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]
1037.50	V	-	-	-68.73	6.00	44.27	-50.99	-13.00	-37.99
2075.00	V	-	-	-69.33	12.77	50.44	-44.82	-13.00	-31.82
2452.50	V	-	-	-69.99	14.03	51.04	-44.22	-13.00	-31.22
3490.00	V	-	-	-70.71	16.21	52.50	-42.76	-13.00	-29.76
4197.50	V	-	-	-71.93	17.30	52.37	-42.89	-13.00	-29.89

Table 7-9. Radiated Spurious Data (ULCA LTE B12 – B66)

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7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. 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 $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

Test Procedure Used

ANSI/TIA-603-E-2016

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

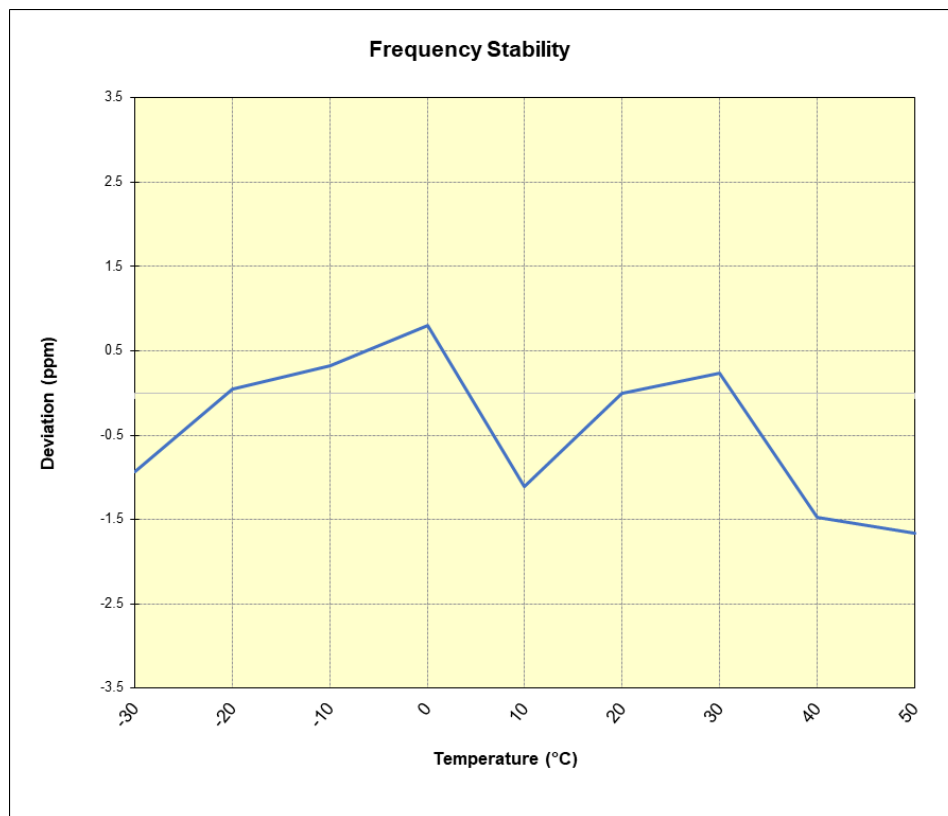
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NR Band n5

Operating Frequency (Hz):	836,500,000
Ref. Voltage (VDC):	4.43
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.43	- 30	836,588,660	-783	-0.0000936
		- 20	836,589,482	38	0.0000046
		- 10	836,589,710	266	0.0000319
		0	836,590,113	670	0.0000801
		+ 10	836,588,515	-928	-0.0001110
		+ 20 (Ref)	836,589,443	0	0.0000000
		+ 30	836,589,636	193	0.0000230
		+ 40	836,588,206	-1,238	-0.0001479
Battery Endpoint	3.36	+ 20	836,589,022	-421	-0.0000503

Table 7-10. NR Band n5 Frequency Stability Data





Plot 7-38. NR Band n5 Frequency Stability Chart

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the Samsung **Portable Handset** **FCC ID: A3LSMS906E** complies with all the requirements of Part 22 of the FCC rules.

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