



PART 27 MEASUREMENT REPORT

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

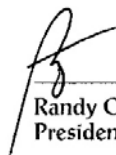
Date of Testing:
02/01/2022- 03/01/2022
Test Report Issue Date:
3/4/2022
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2202030012-02.A3L

FCC ID:	A3LSMS901E
Applicant Name:	Samsung Electronics Co., Ltd.

Application Type: Class II Permissive Change
Model: SM-S901E/DS
Additional Model(s): SM-S901E
EUT Type: Portable Handset
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part: 27
Test Procedure(s): ANSI C63.26-2015, KDB 648474 D03 v01r04
Class II Permissive Change: Please see FCC change document
Original Grant Date: 01/10/2022

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







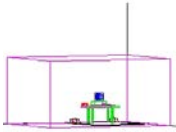
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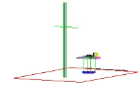
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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
NR Band n41 ANT F	100 MHz	$\pi/2$ BPSK	2546.0 - 2640.0	0.165	22.17	96M7G7D
		QPSK	2546.0 - 2640.0	0.167	22.23	96M7G7D
		16QAM	2546.0 - 2640.0	0.126	21.02	96M3W7D
	90 MHz	$\pi/2$ BPSK	2541.0 - 2645.0	0.178	22.50	86M1G7D
		QPSK	2541.0 - 2645.0	0.187	22.73	85M9G7D
		16QAM	2541.0 - 2645.0	0.122	20.87	86M1W7D
	80 MHz	$\pi/2$ BPSK	2536.0 - 2650.0	0.166	22.19	77M3G7D
		QPSK	2536.0 - 2650.0	0.163	22.13	77M2G7D
		16QAM	2536.0 - 2650.0	0.102	20.07	77M3W7D
	60 MHz	$\pi/2$ BPSK	2526.0 - 2660.0	0.150	21.76	57M2G7D
		QPSK	2526.0 - 2660.0	0.170	22.31	57M6G7D
		16QAM	2526.0 - 2660.0	0.112	20.48	57M5W7D
	50 MHz	$\pi/2$ BPSK	2521.0 - 2665.0	0.157	21.96	46M0G7D
		QPSK	2521.0 - 2665.0	0.163	22.12	46M0G7D
		16QAM	2521.0 - 2665.0	0.110	20.43	46M0W7D
	40 MHz	$\pi/2$ BPSK	2516.0 - 2670.0	0.161	22.06	45M8G7D
		QPSK	2516.0 - 2670.0	0.173	22.39	45M8G7D
		16QAM	2516.0 - 2670.0	0.107	20.30	45M8W7D
	30 MHz	$\pi/2$ BPSK	2511.0 - 2675.0	0.144	21.59	27M1G7D
		QPSK	2511.0 - 2675.0	0.168	22.26	28M0G7D
		16QAM	2511.0 - 2675.0	0.099	19.97	28M0W7D
	20 MHz	$\pi/2$ BPSK	2506.0 - 2680.0	0.133	21.24	18M1G7D
		QPSK	2506.0 - 2680.0	0.163	22.13	18M5G7D
		16QAM	2506.0 - 2680.0	0.092	19.64	18M4W7D

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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: A3LSMS901E**. 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 27.

Test Device Serial No.: 1755M, 2346V, 2226V, 1838M, 1863M, 0985M

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 (5GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer



2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 3.4 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

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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
-	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	E5515C	Wireless Communications Test Set	N/A			GB45360985
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201525694
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	7/20/2021	Biennial	7/20/2023	9203-2178
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	3164-10	Quad Ridge Horn 400MHz - 10000MHz	5/10/2021	Biennial	5/10/2023	00166283
ETS Lindgren	3816/2NM	LISN	7/9/2020	Biennial	7/9/2022	00114451
Keysight Technologies	N9030A	PXA Signal Analyzer	1/6/2022	Annual	1/6/2023	MY55410501
Keysight Technologies	N9038A	MXE EMI Receiver	1/21/2022	Annual	1/21/2023	MY51210133
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11403100002
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)	8/10/2021	Annual	8/10/2022	6262150000
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	5/25/2021	Annual	5/25/2022	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/25/2021	Annual	8/25/2022	103200
Sunol	JB6	LB6 Antenna	11/13/2020	Biennial	11/13/2022	A082816

Table 5-1. Test Equipment

Notes:

1. 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: A3LSMS901E
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Transmitter Conducted Output Power*	2.1046(a), 2.1046(c)	N/A	PASS	Section 7.2
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions (NR Band n41)	2.1051, 27.53(m)(4)	Undesirable emissions must meet the limits detailed in 27.53(m)(4)	PASS	Sections 7.4, 7.5
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
RADIATED	Equivalent Isotropic Radiated Power (NR Band n41)	27.50(h)(2)	≤ 2 Watts max. EIRP	PASS	Section 7.6
	Radiated Spurious Emissions (NR Band n41)	2.1053, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 7.7

Table 7-1. Summary of Test Results (FCC)

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 Conducted Power Output Data

§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.

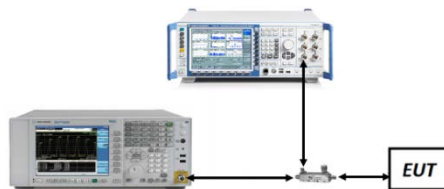






Figure 7-1. Test Instrument & Measurement Setup

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

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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.0	1 / 68	24.60
		518598	2593.0	273 / 0	24.50
		528000	2640.0	1 / 204	24.61
	QPSK	509202	2546.0	1 / 68	23.95
		518598	2593.0	1 / 136	24.53
		528000	2640.0	1 / 68	24.29
16-QAM	509202	2546.0	1 / 68	24.09	
90 MHz	π/2 BPSK	508200	2541.0	1 / 183	24.93
		518592	2593.0	1 / 61	24.60
		529002	2645.0	1 / 183	24.30
	QPSK	508200	2541.0	1 / 61	24.45
		518592	2593.0	1 / 122	24.44
		529002	2645.0	1 / 183	24.10
16-QAM	508200	2541.0	1 / 61	23.94	
80 MHz	π/2 BPSK	507204	2536.0	1 / 162	24.62
		518598	2593.0	1 / 54	23.33
		529998	2650.0	1 / 162	23.95
	QPSK	507204	2536.0	1 / 162	23.85
		518598	2593.0	1 / 54	24.53
		529998	2650.0	1 / 162	23.27
16-QAM	507204	2536.0	1 / 162	23.14	
60 MHz	π/2 BPSK	505200	2526.0	1 / 40	24.19
		518598	2593.0	1 / 40	24.01
		531996	2660.0	1 / 40	23.35
	QPSK	505200	2526.0	1 / 121	24.03
		518598	2593.0	1 / 40	23.59
		531996	2660.0	1 / 121	23.72
16-QAM	505200	2526.0	1 / 40	23.55	
50 MHz	π/2 BPSK	504204	2521.0	1 / 66	24.39
		518598	2593.0	1 / 33	24.25
		532998	2665.0	1 / 66	23.87
	QPSK	504204	2521.0	1 / 33	23.84
		518598	2593.0	1 / 66	24.12
		532998	2665.0	1 / 66	23.64
16-QAM	504204	2521.0	1 / 99	23.50	
40 MHz	π/2 BPSK	503202	2516.0	1 / 53	24.49
		518598	2593.0	1 / 26	24.32
		534000	2670.0	1 / 53	23.20
	QPSK	503202	2516.0	1 / 79	24.11
		518598	2593.0	1 / 26	24.36
		534000	2670.0	1 / 53	24.06
16-QAM	503202	2516.0	1 / 79	23.37	
30 MHz	π/2 BPSK	502203	2511.0	1 / 58	24.01
		518598	2593.0	1 / 19	23.78
		534999	2675.0	1 / 58	23.77
	QPSK	502203	2511.0	1 / 58	23.98
		518598	2593.0	1 / 19	24.02
		534999	2675.0	1 / 39	24.05
16-QAM	502203	2511.0	1 / 58	23.04	
20 MHz	π/2 BPSK	501204	2506.0	1 / 37	23.67
		518598	2593.0	1 / 13	23.47
		535998	2680.0	1 / 25	23.57
	QPSK	501204	2506.0	1 / 37	23.85
		518598	2593.0	1 / 25	23.53
		535998	2680.0	1 / 25	23.48
16-QAM	501204	2506.0	1 / 37	22.71	

Table 7-1. Conducted Power Output Data (n41 – Ant F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 14 of 61

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.0	1 / 204	20.84
		518598	2593.0	1 / 68	20.69
		528000	2640.0	1 / 68	20.41
	QPSK	509202	2546.0	1 / 204	20.86
		518598	2593.0	1 / 68	20.87
		528000	2640.0	1 / 68	20.57
	16-QAM	509202	2546.0	1 / 204	20.50
		518598	2593.0	1 / 68	20.56
		528000	2640.0	1 / 68	20.27



Table 7-2. Conducted Power Output Data (n41 – Ant B)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	510000	2550.0	1 / 204	17.38
		518598	2593.0	1 / 68	17.40
		528000	2640.0	1 / 68	16.54
	QPSK	510000	2550.0	1 / 204	17.46
		518598	2593.0	1 / 68	17.41
		528000	2640.0	1 / 68	16.67
	16-QAM	510000	2550.0	1 / 204	16.64
		518598	2593.0	1 / 68	16.73
		528000	2640.0	1 / 68	15.86

Table 7-3. Conducted Power Output Data (n41 – Ant D)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	510000	2550.0	1 / 68	18.25
		518598	2593.0	1 / 68	17.87
		528000	2640.0	1 / 68	17.05
	QPSK	510000	2550.0	1 / 68	18.60
		518598	2593.0	1 / 68	17.42
		528000	2640.0	1 / 68	17.28
	16-QAM	510000	2550.0	1 / 68	17.75
		518598	2593.0	1 / 68	17.07
		528000	2640.0	1 / 68	16.36

Table 7-4. Conducted Power Output Data (n41 – Ant E)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 15 of 61

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.

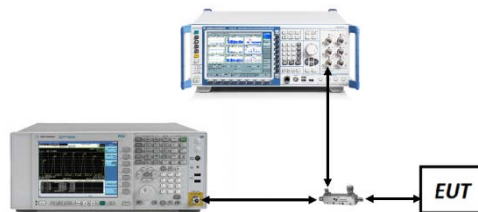


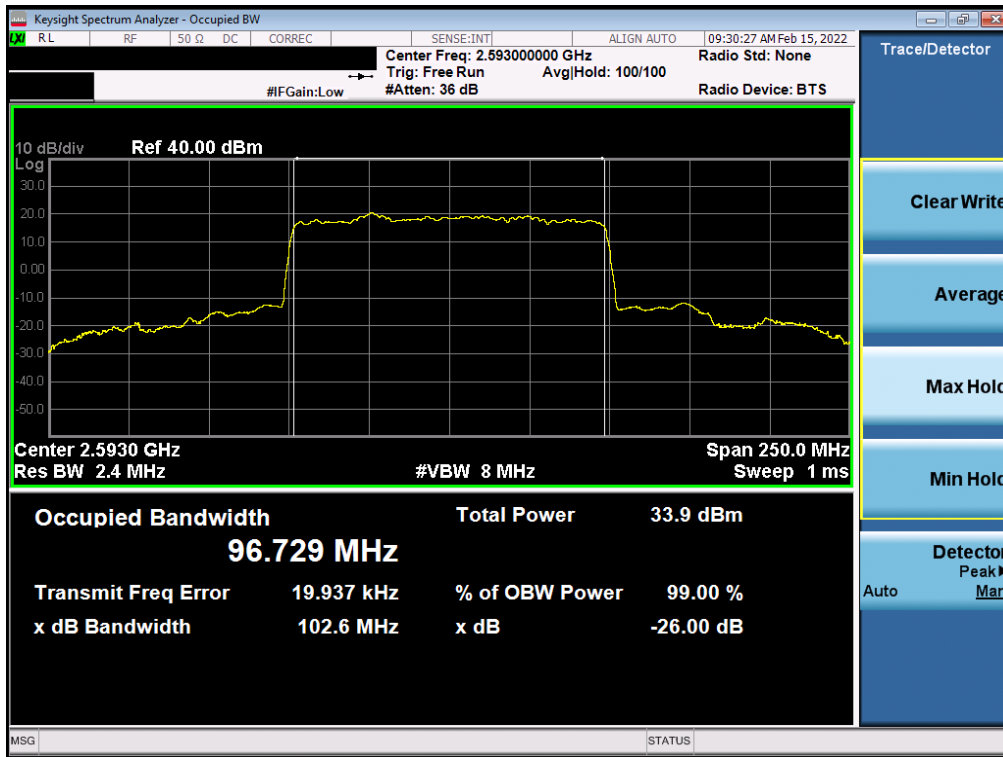
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

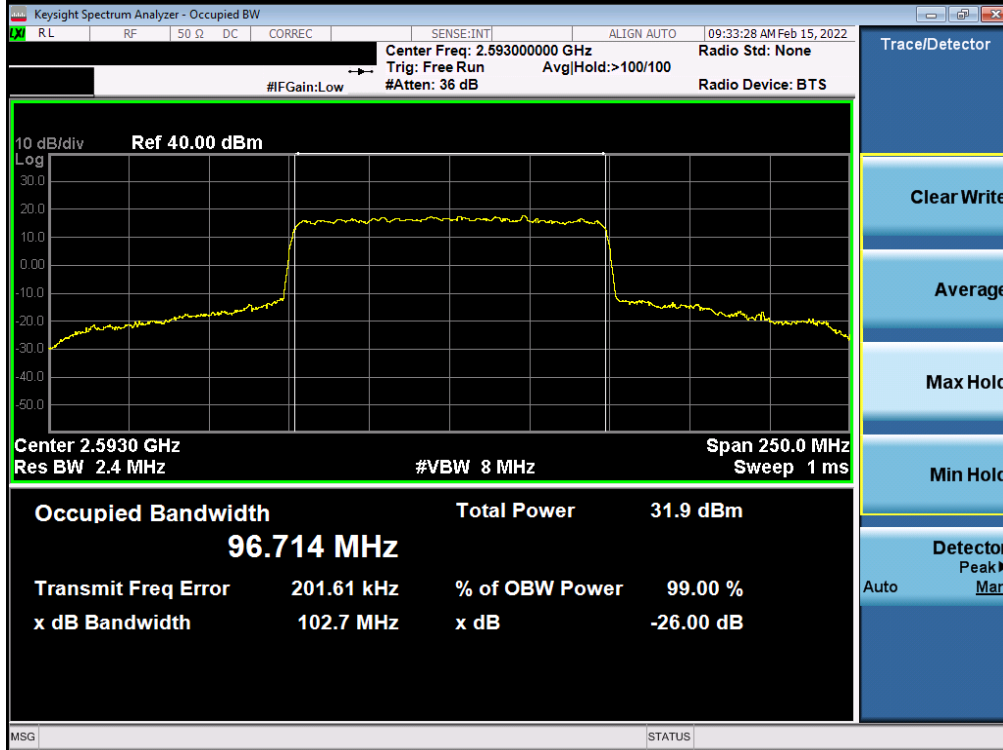
None.

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 16 of 61

NR Band n41

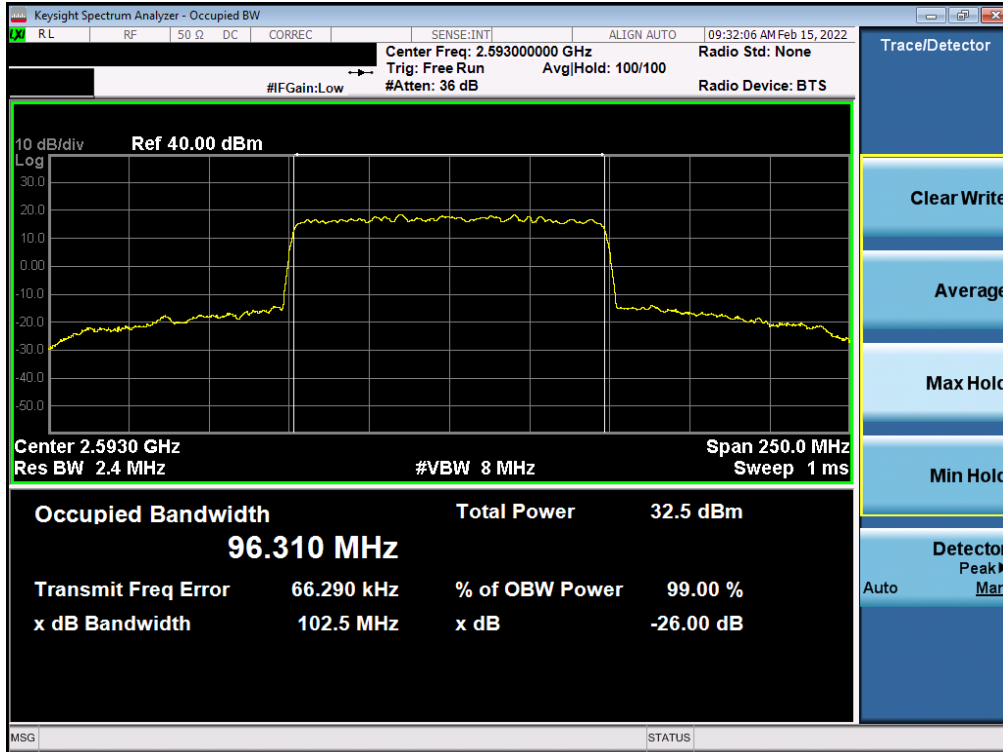


Plot 7-5. Occupied Bandwidth Plot (NR Band n41 - 100MHz $\pi/2$ BPSK - Full RB - Ant F)

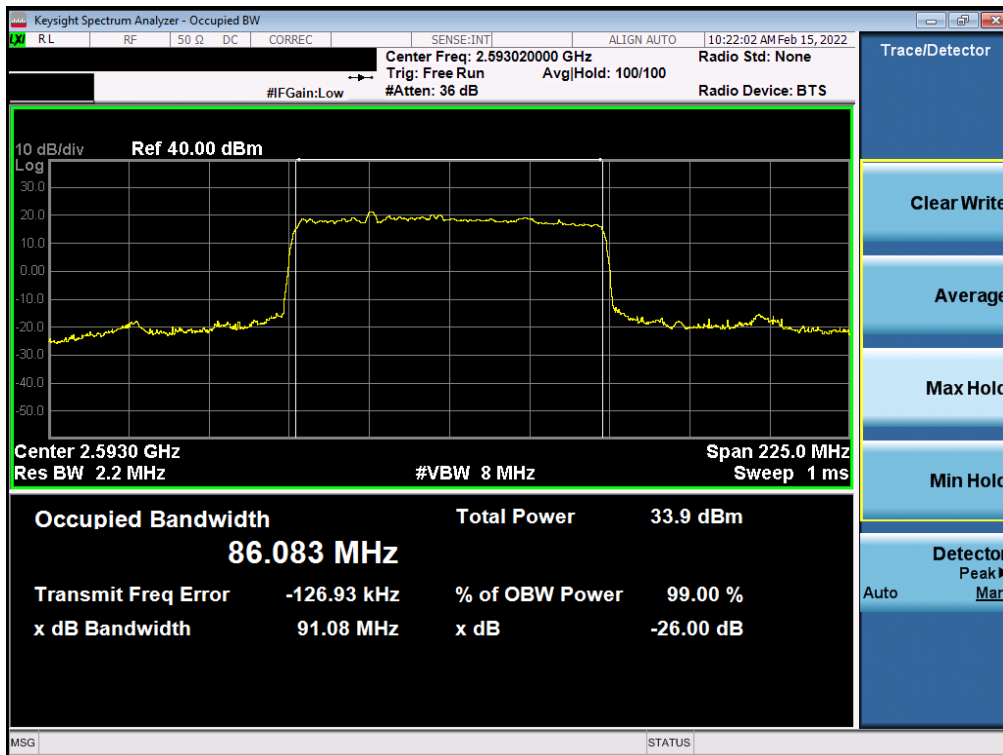


Plot 7-6. Occupied Bandwidth Plot (NR Band n41 - 100MHz QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 17 of 61

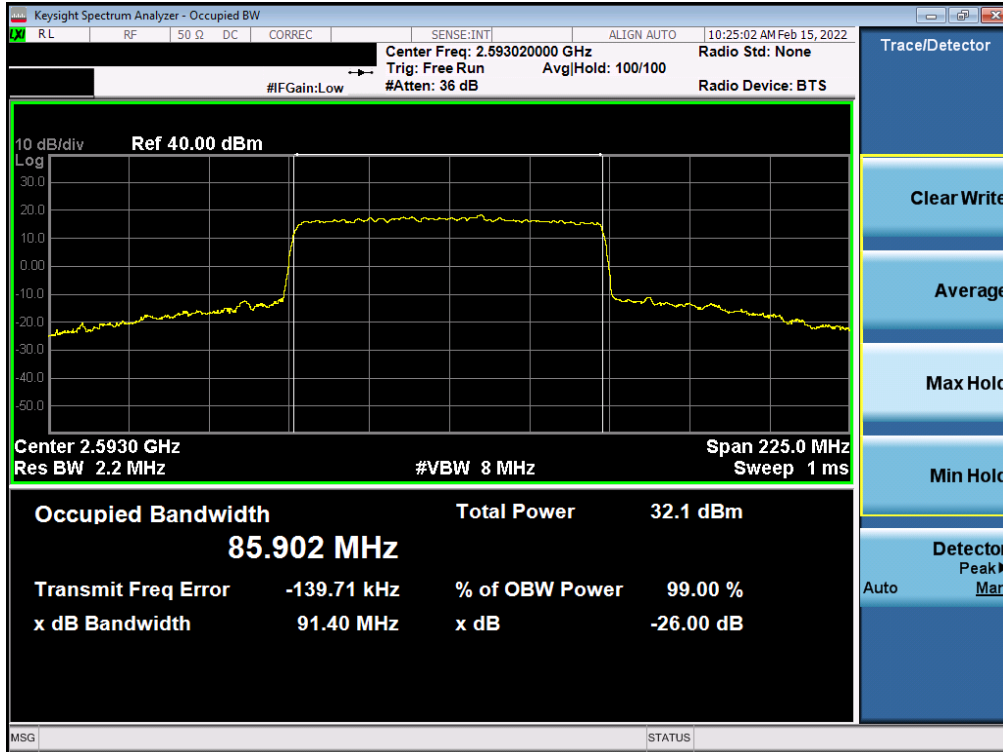


Plot 7-7. Occupied Bandwidth Plot (NR Band n41 - 100MHz 16-QAM - Full RB - Ant F)

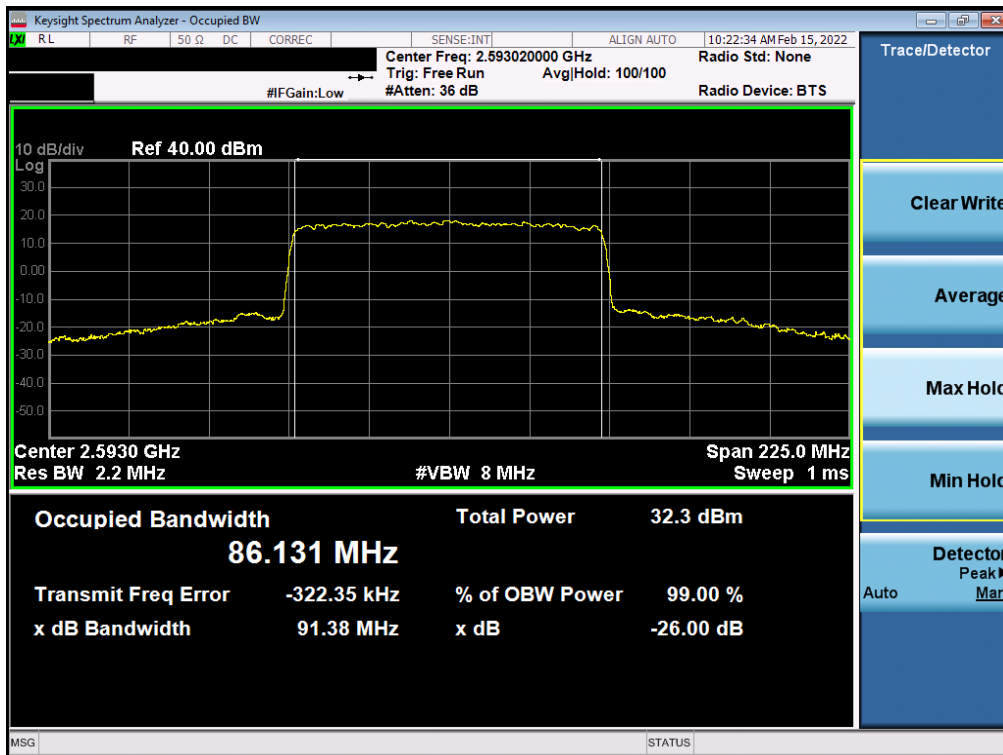


Plot 7-8. Occupied Bandwidth Plot (NR Band n41 - 90MHz $\pi/2$ BPSK - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 18 of 61

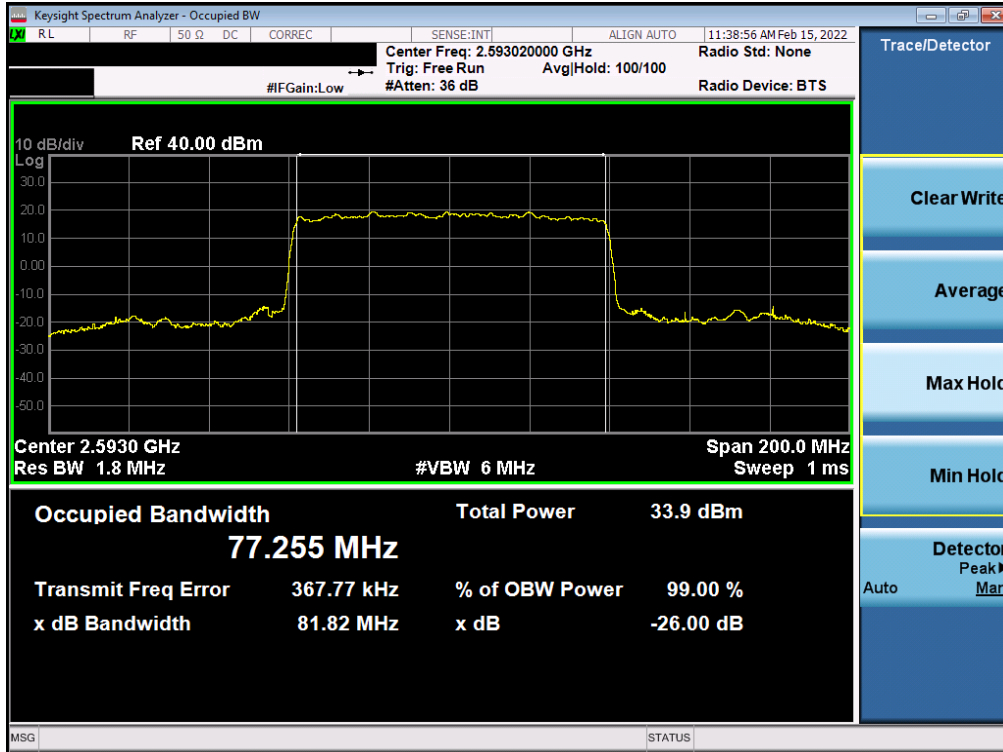


Plot 7-9. Occupied Bandwidth Plot (NR Band n41 - 90MHz QPSK - Full RB - Ant F)



Plot 7-10. Occupied Bandwidth Plot (NR Band n41 - 90MHz 16-QAM - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 19 of 61

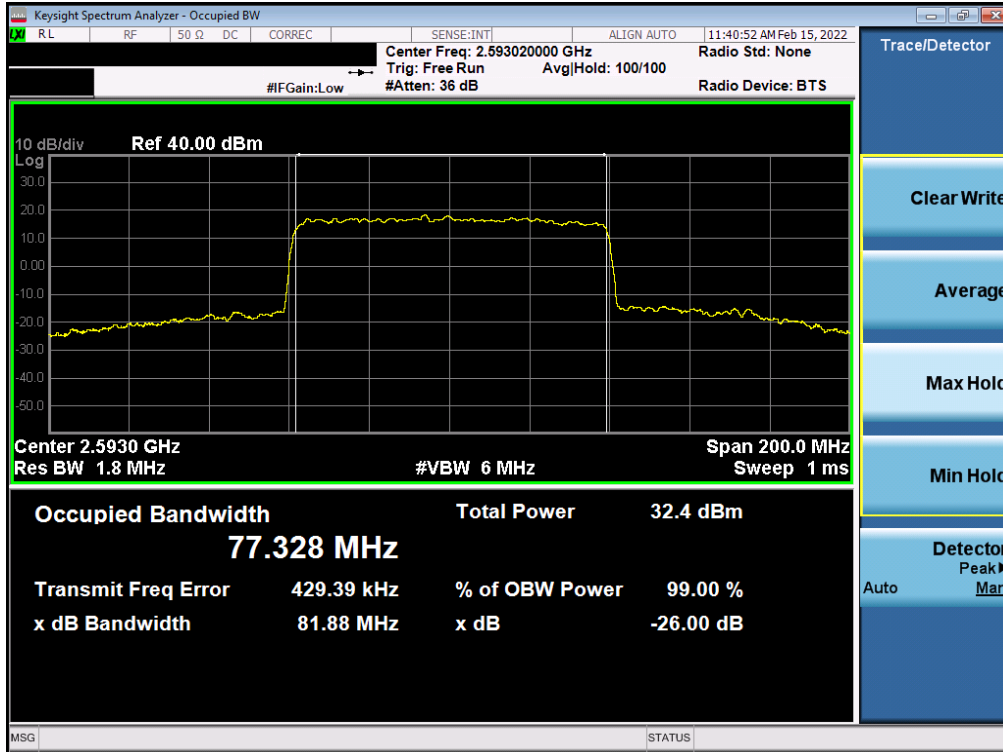


Plot 7-11. Occupied Bandwidth Plot (NR Band n41 - 80MHz $\pi/2$ BPSK - Full RB - Ant F)

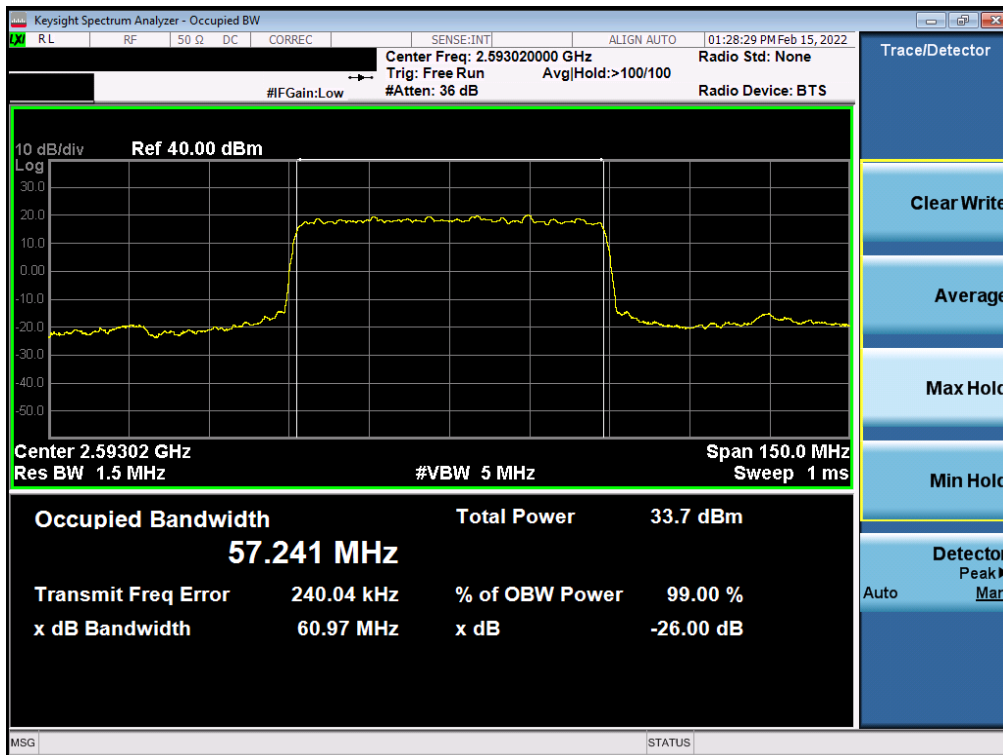


Plot 7-12. Occupied Bandwidth Plot (NR Band n41 - 80MHz QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 20 of 61

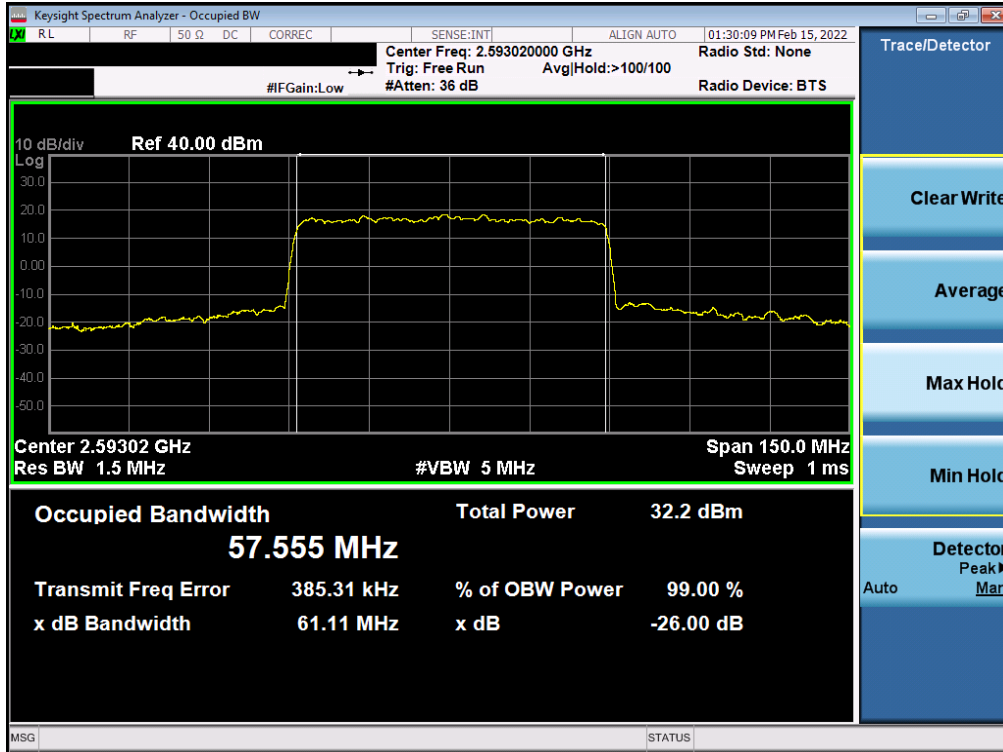


Plot 7-13. Occupied Bandwidth Plot (NR Band n41 - 80MHz 16-QAM - Full RB – Ant F)

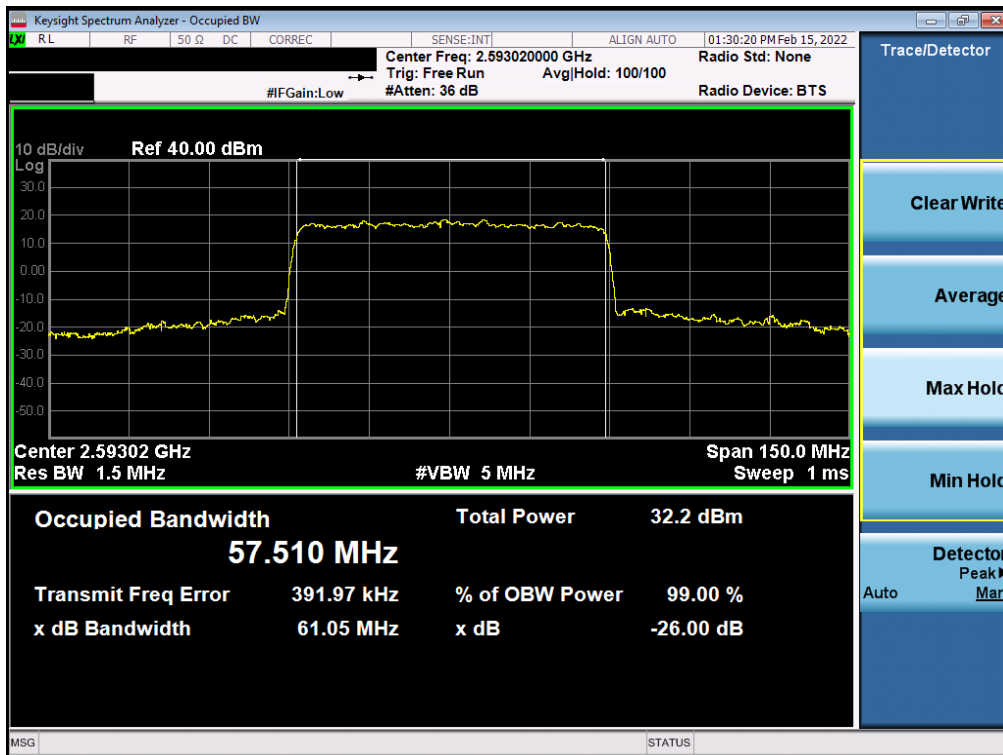


Plot 7-14. Occupied Bandwidth Plot (NR Band n41 - 60MHz $\pi/2$ BPSK - Full RB – Ant F)



FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 21 of 61

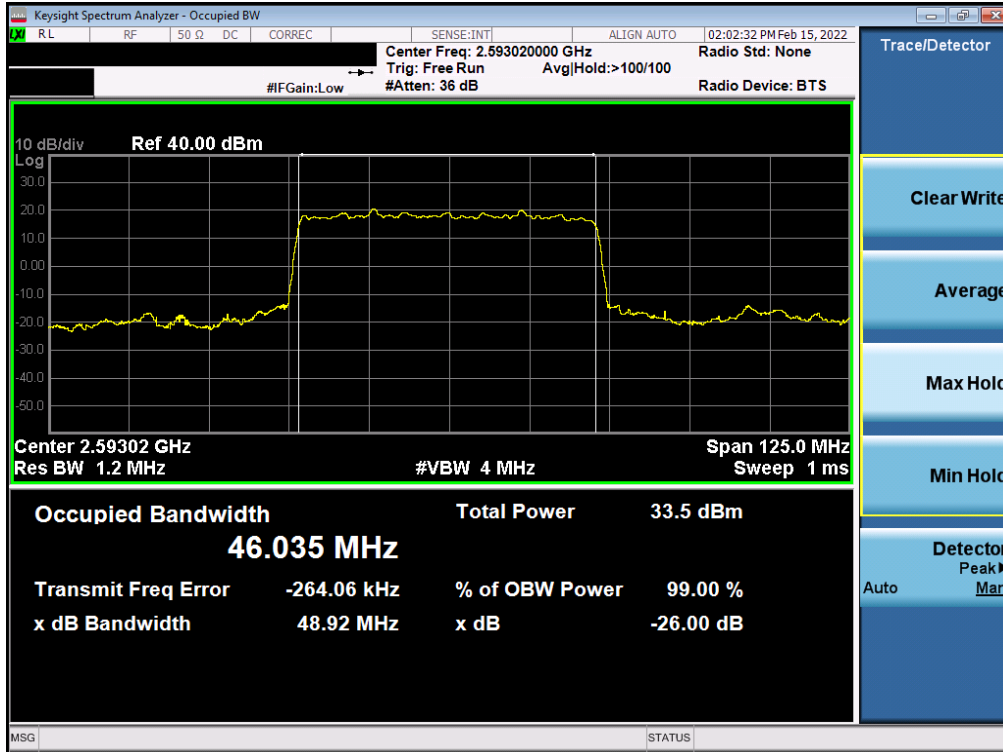


Plot 7-15. Occupied Bandwidth Plot (NR Band n41 - 60MHz QPSK - Full RB – Ant F)

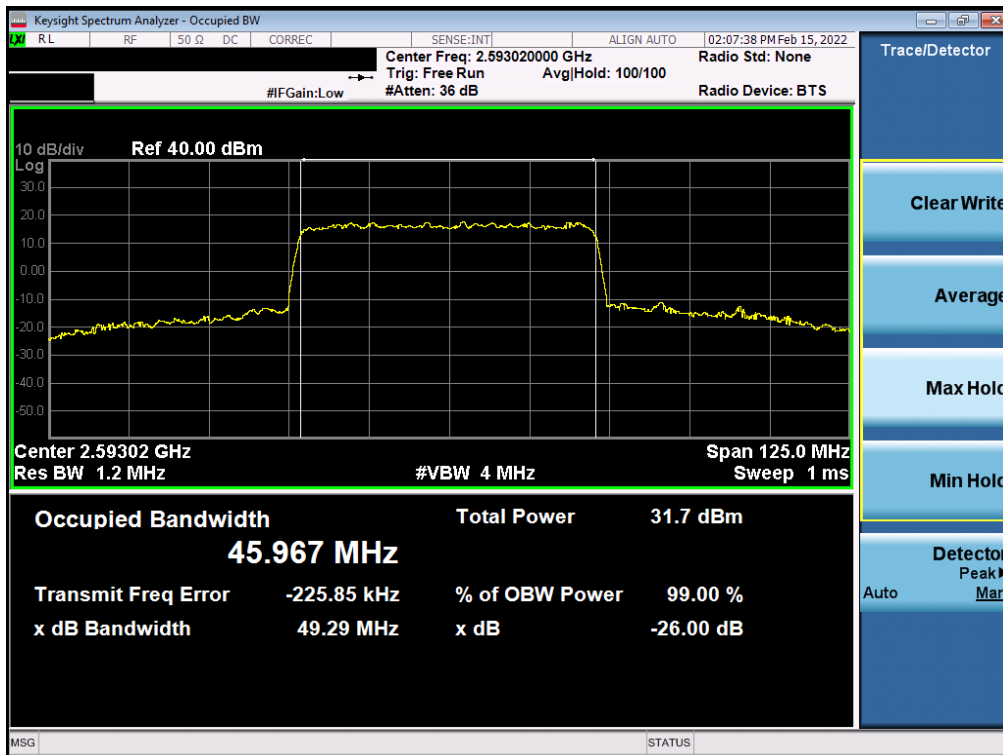


Plot 7-16. Occupied Bandwidth Plot (NR Band n41 - 60MHz 16-QAM - Full RB – Ant F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
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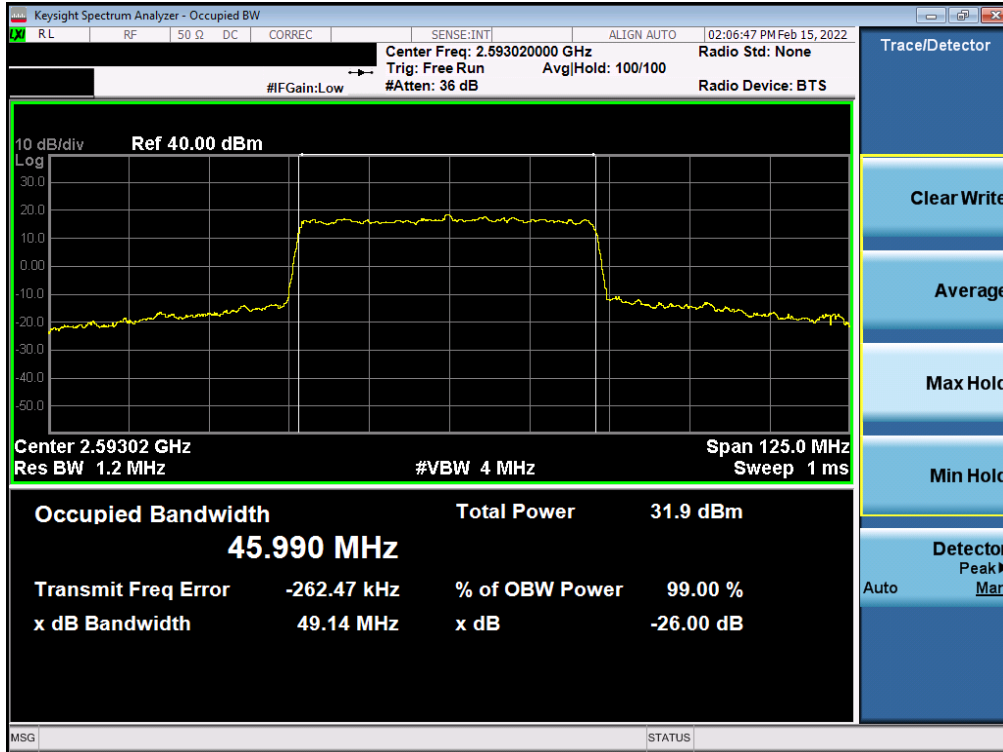


Plot 7-17. Occupied Bandwidth Plot (NR Band n41 - 50MHz $\pi/2$ BPSK - Full RB - Ant F)

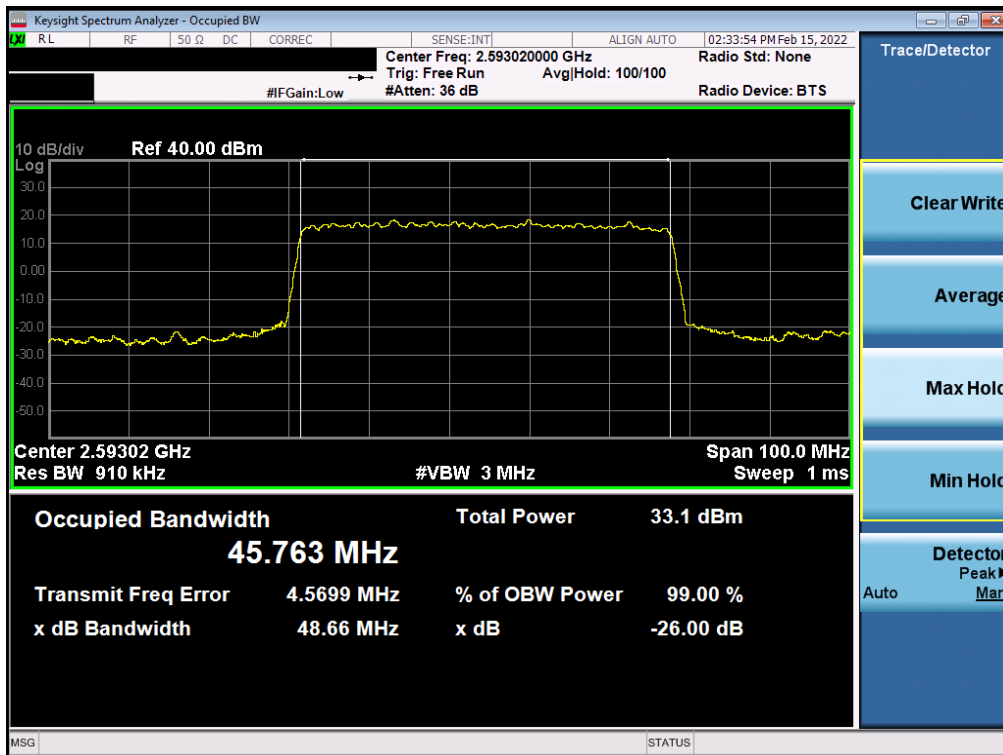


Plot 7-18. Occupied Bandwidth Plot (NR Band n41 - 50MHz QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 23 of 61

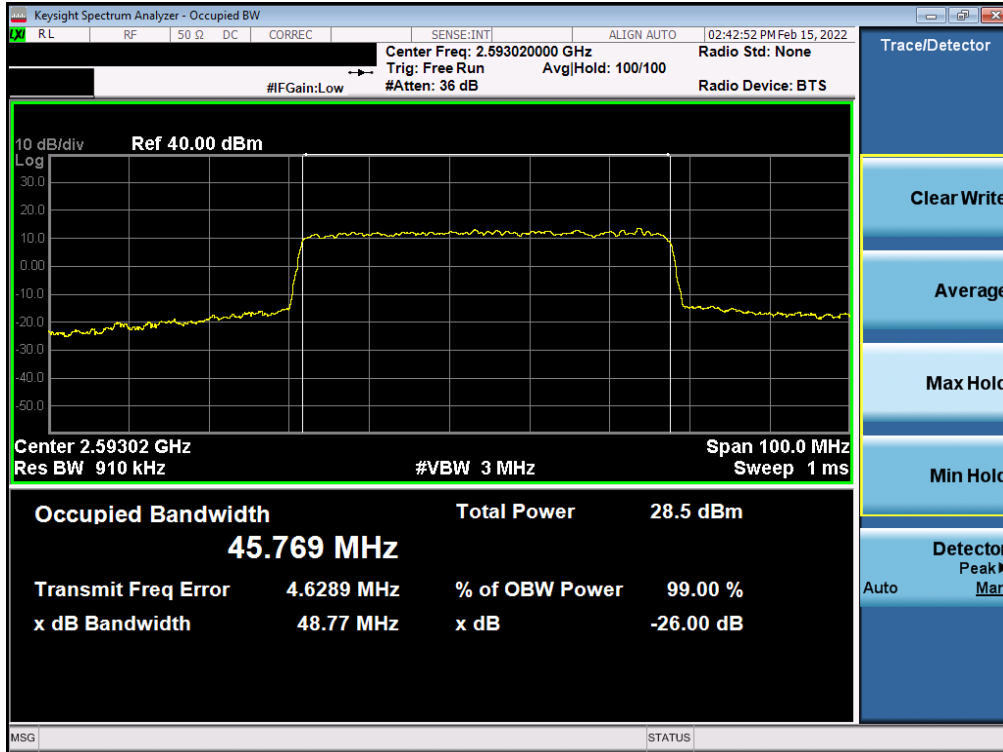


Plot 7-19. Occupied Bandwidth Plot (NR Band n41 - 50MHz 16-QAM - Full RB – Ant F)

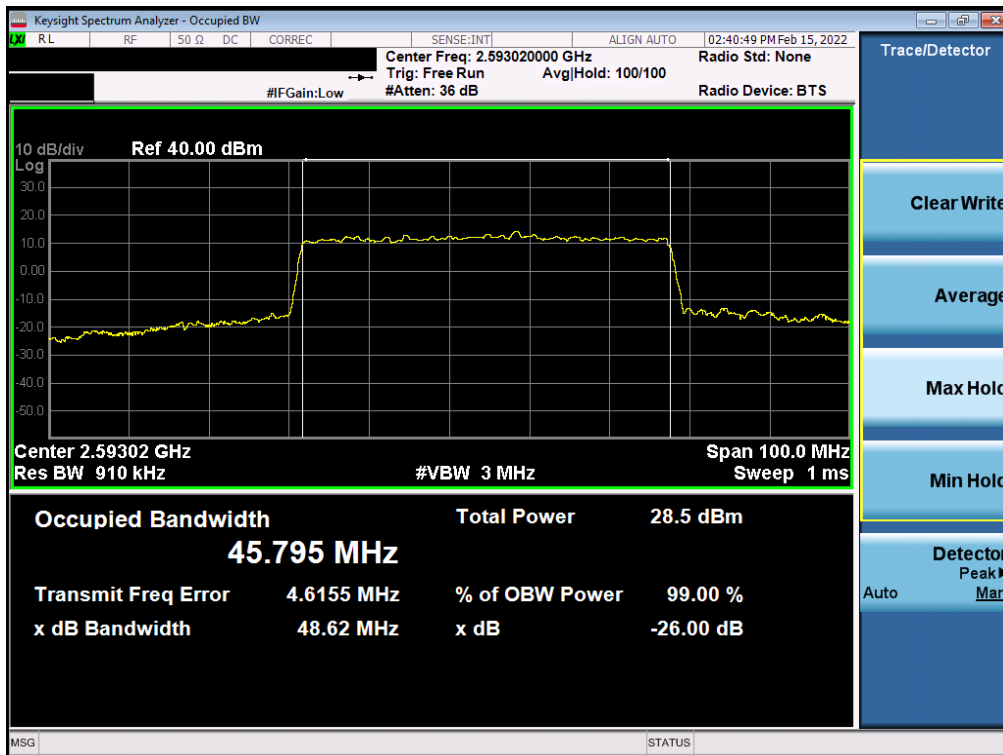


Plot 7-20. Occupied Bandwidth Plot (NR Band n41 - 40MHz $\pi/2$ BPSK - Full RB – Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 24 of 61

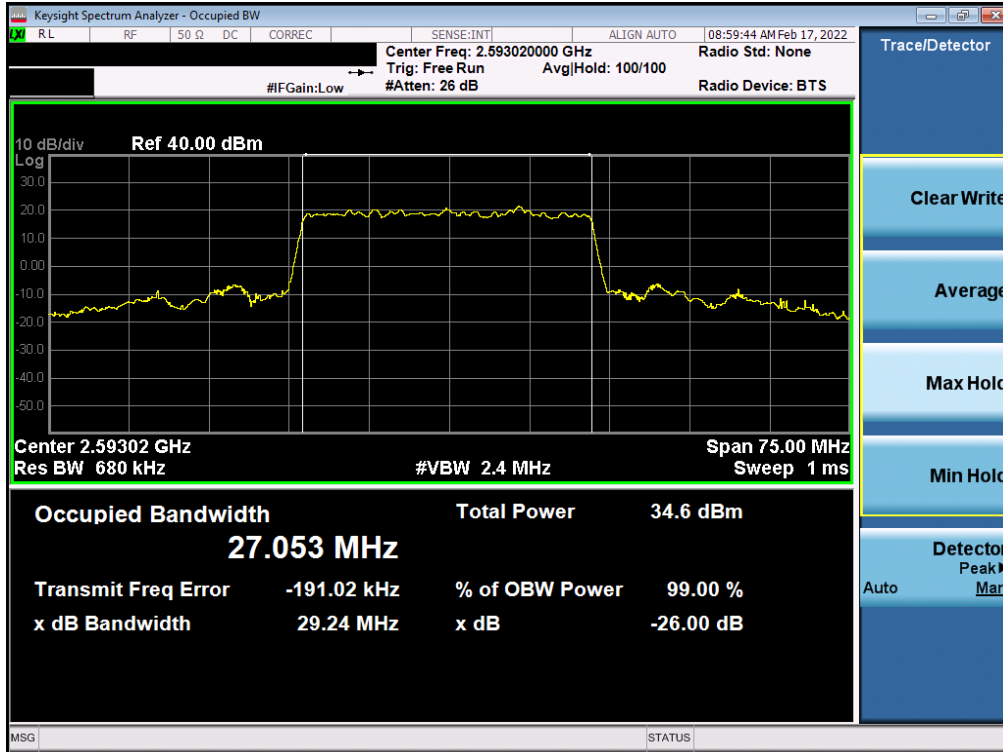


Plot 7-21. Occupied Bandwidth Plot (NR Band n41 - 40MHz QPSK - Full RB - Ant F)

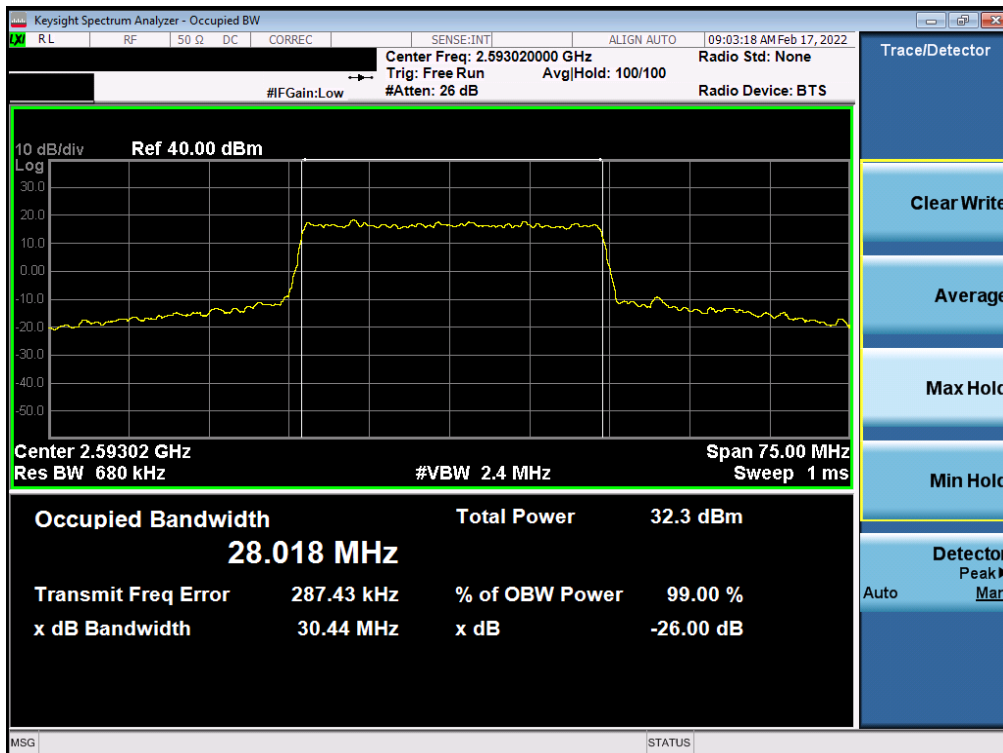


Plot 7-22. Occupied Bandwidth Plot (NR Band n41 - 40MHz 16-QAM - Full RB - Ant F)



FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 25 of 61

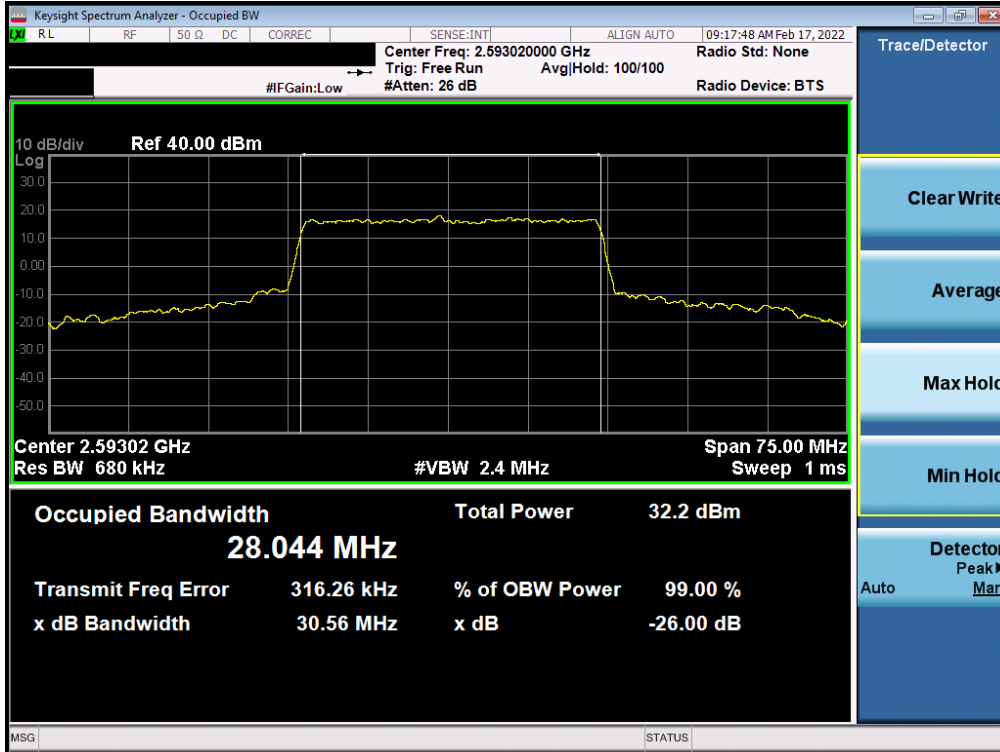


Plot 7-23. Occupied Bandwidth Plot (NR Band n41 - 30MHz $\pi/2$ BPSK - Full RB - Ant F)

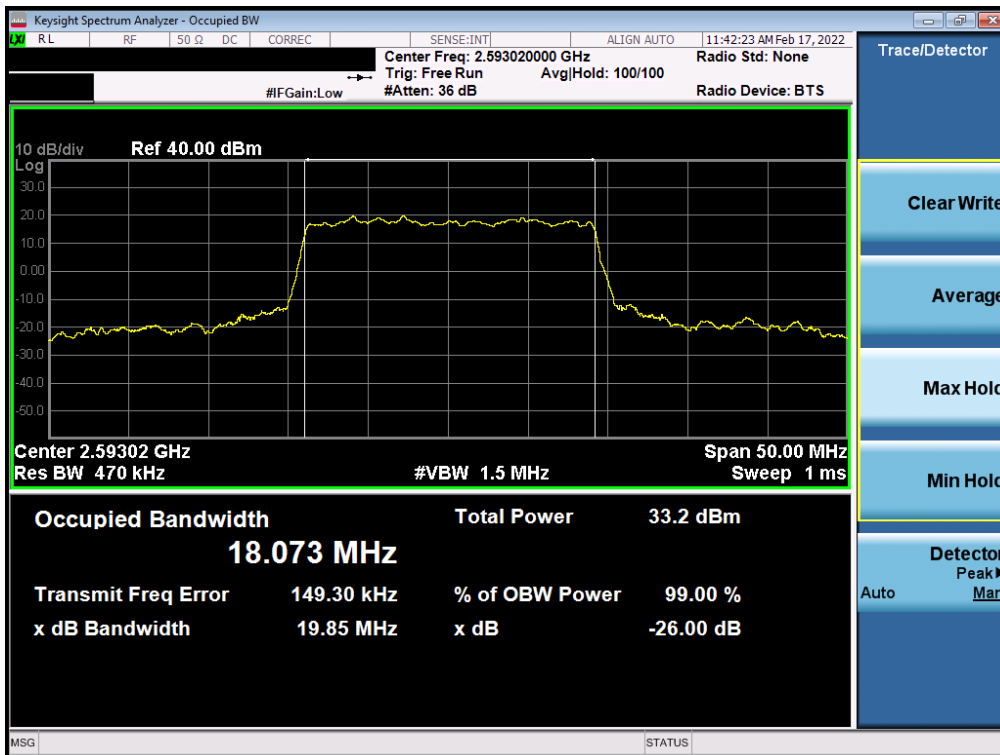


Plot 7-24. Occupied Bandwidth Plot (NR Band n41 - 30MHz QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 26 of 61

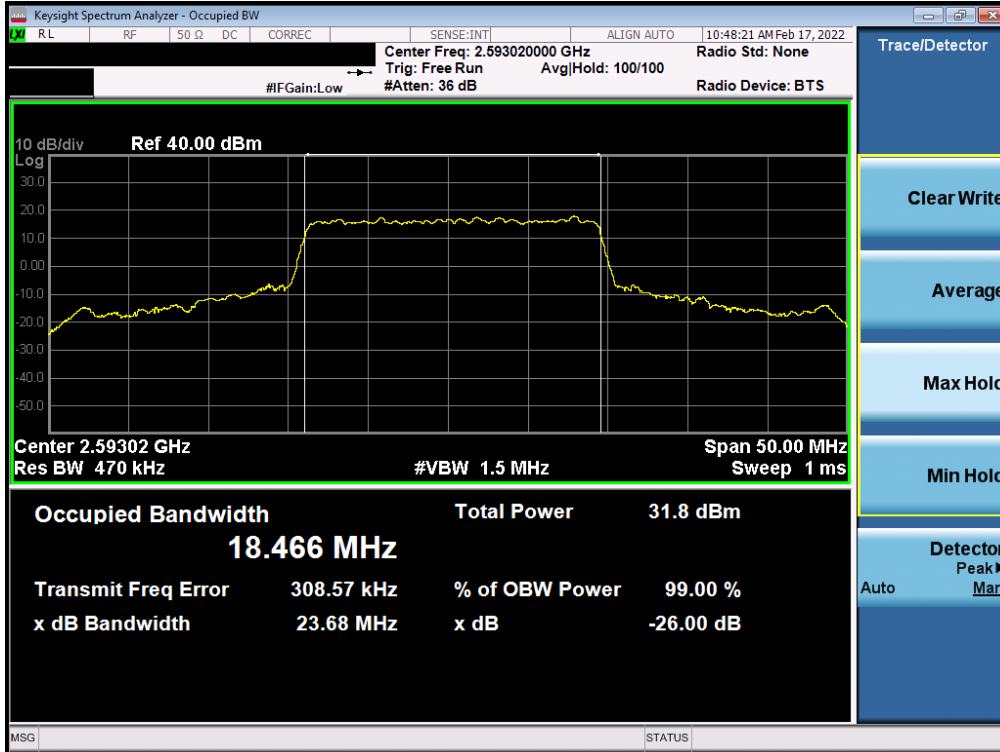


Plot 7-25. Occupied Bandwidth Plot (NR Band n41 - 30MHz 16-QAM - Full RB – Ant F)



Plot 7-26. Occupied Bandwidth Plot (NR Band n41 - 20MHz $\pi/2$ BPSK - Full RB – Ant F)



FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
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Plot 7-27. Occupied Bandwidth Plot (NR Band n41 - 20MHz QPSK - Full RB – Ant F)



Plot 7-28. Occupied Bandwidth Plot (NR Band n41 - 20MHz 16-QAM - Full RB – Ant F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset	Page 28 of 61	

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.

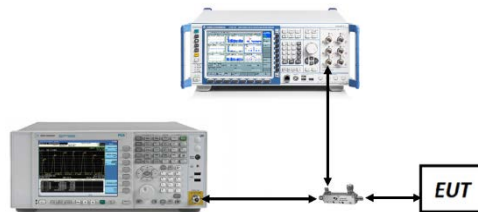




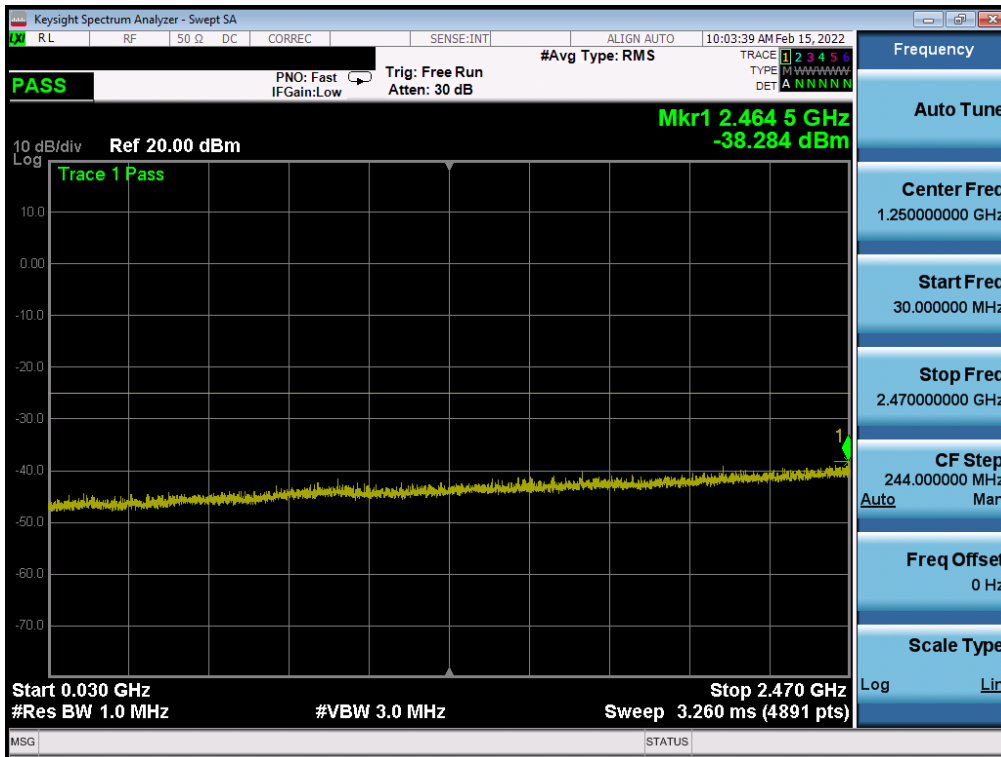
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

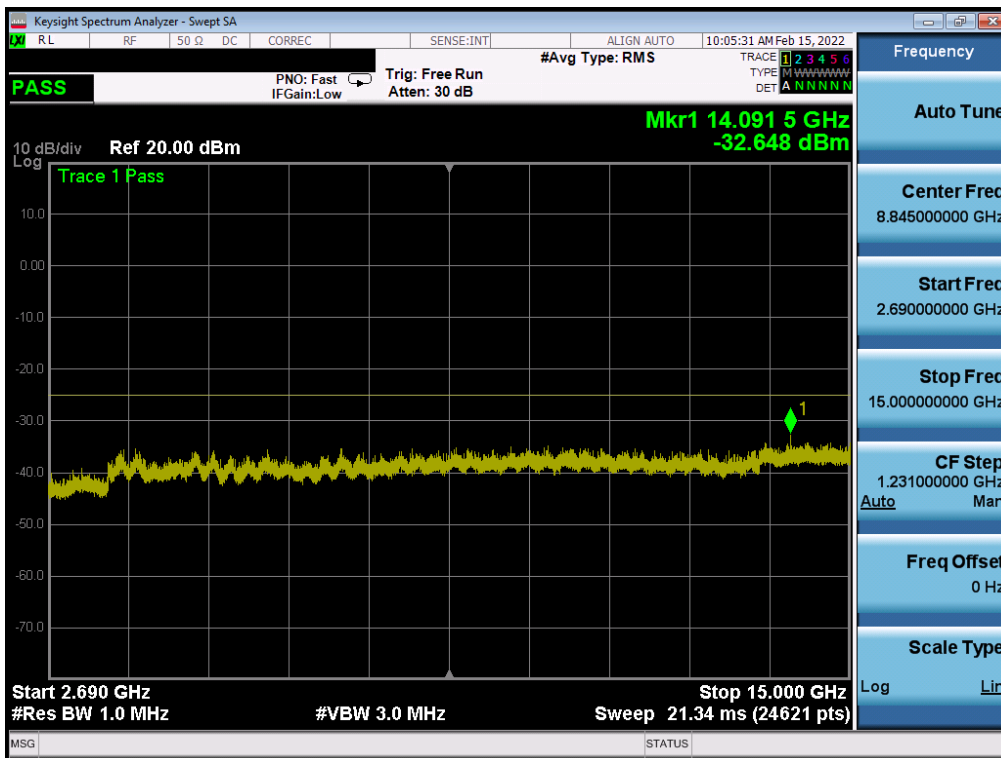
1. Per Part 27, RSS-195 and RSS-199, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution 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: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 29 of 61

NR Band n41

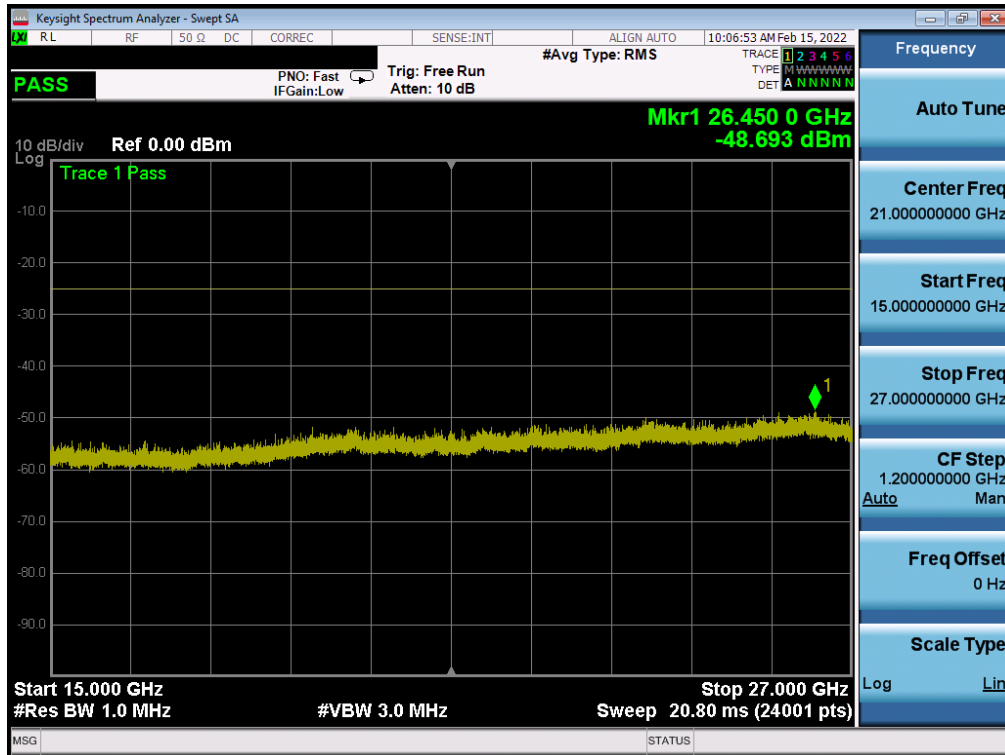


Plot 7-29. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel – Ant F)

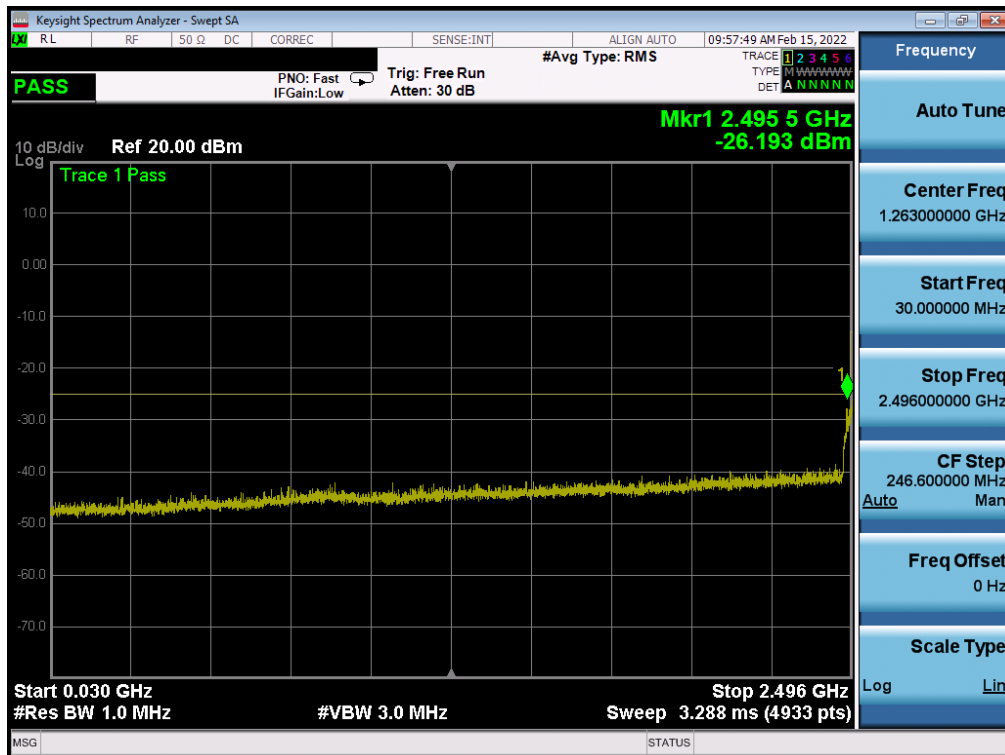


Plot 7-30. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel – Ant F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 30 of 61

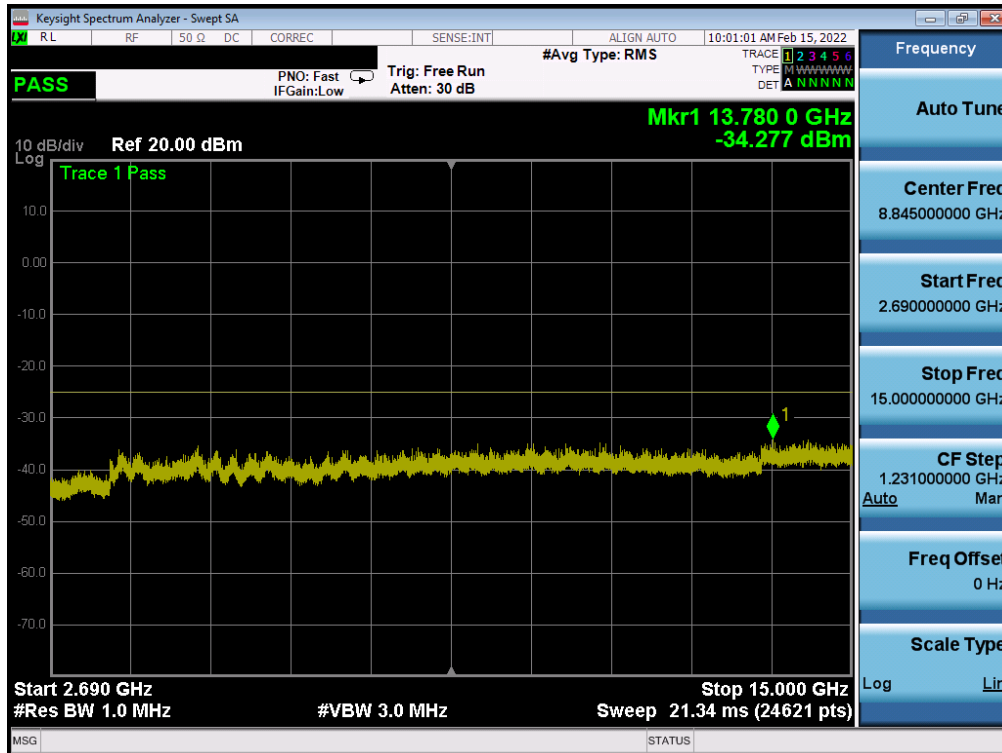


Plot 7-31. Conducted Spurios Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel – Ant F)

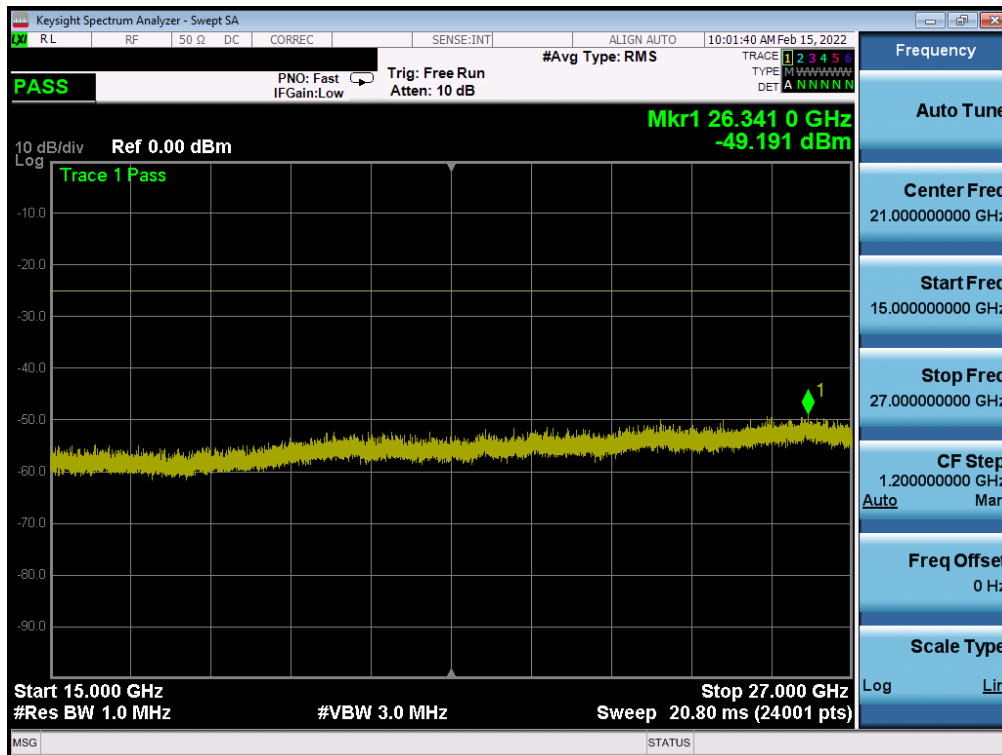


Plot 7-32. Conducted Spurios Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant F)



FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset	Page 31 of 61	

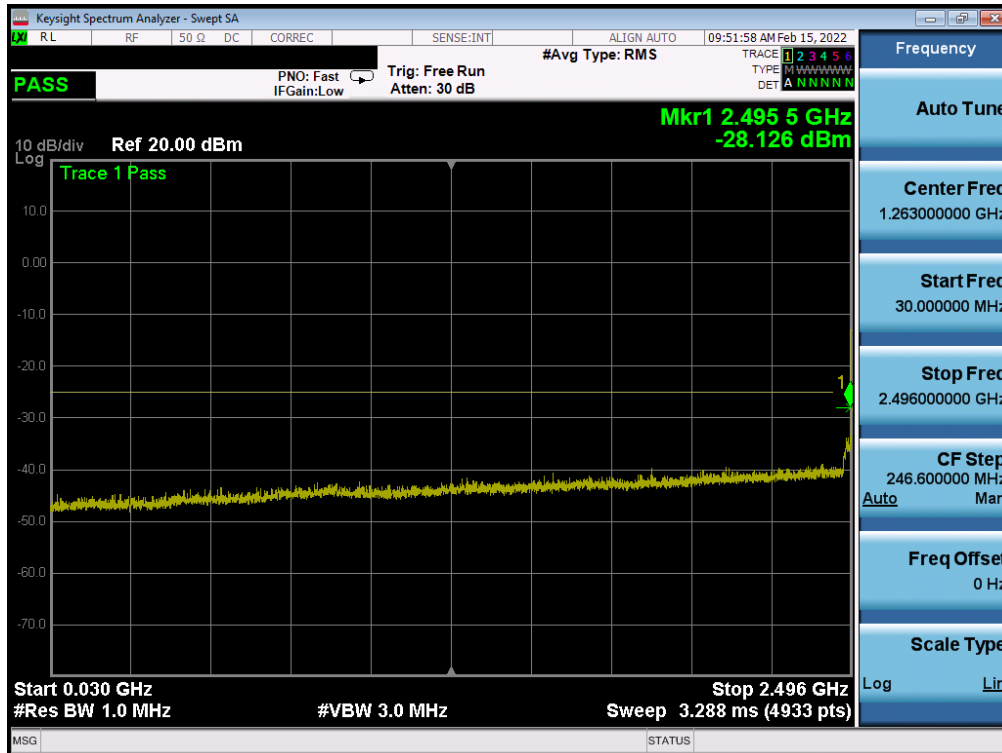


Plot 7-33. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant F)

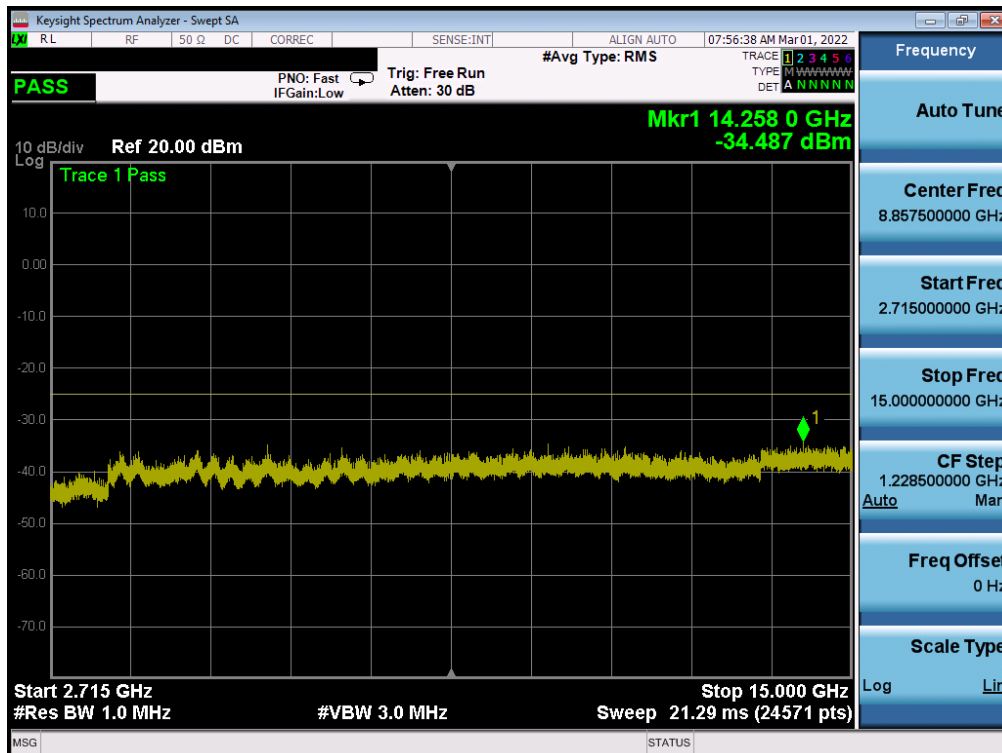


Plot 7-34. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel – Ant F)



FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 32 of 61

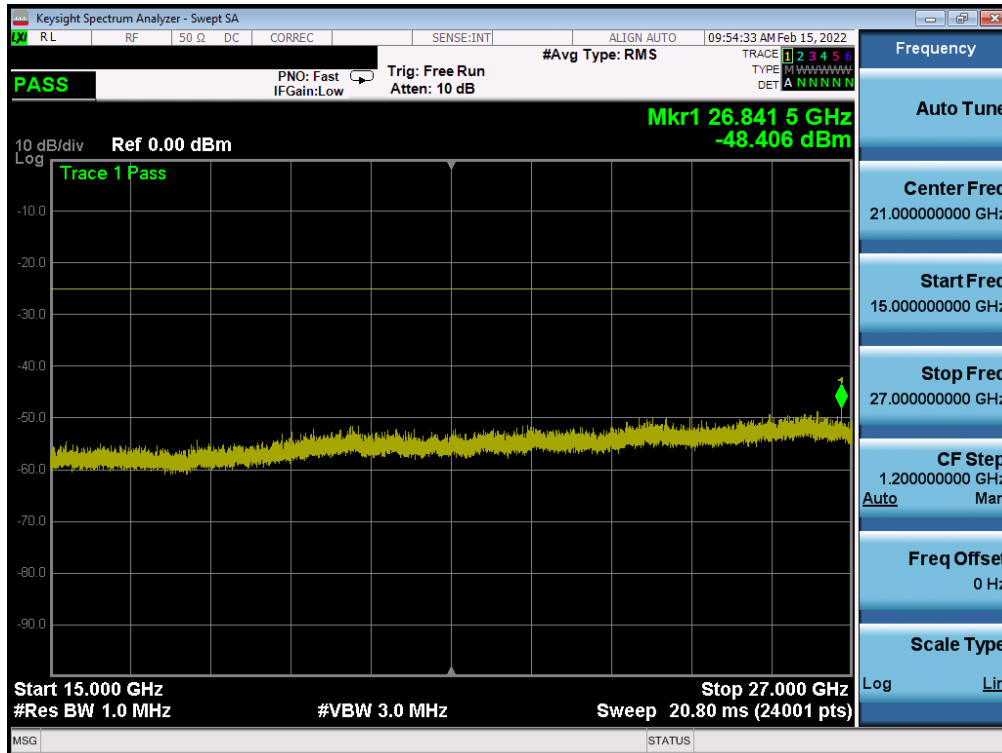


Plot 7-35. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel – Ant F)



Plot 7-36. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel – Ant F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 33 of 61



Plot 7-37. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel – Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 34 of 61

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.

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 x RBW
5. Detector = RMS
6. Number of sweep points \geq 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.

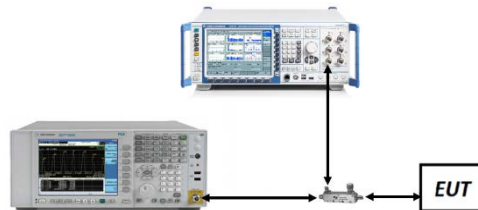




Figure 7-4. Test Instrument & Measurement Setup

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 35 of 61

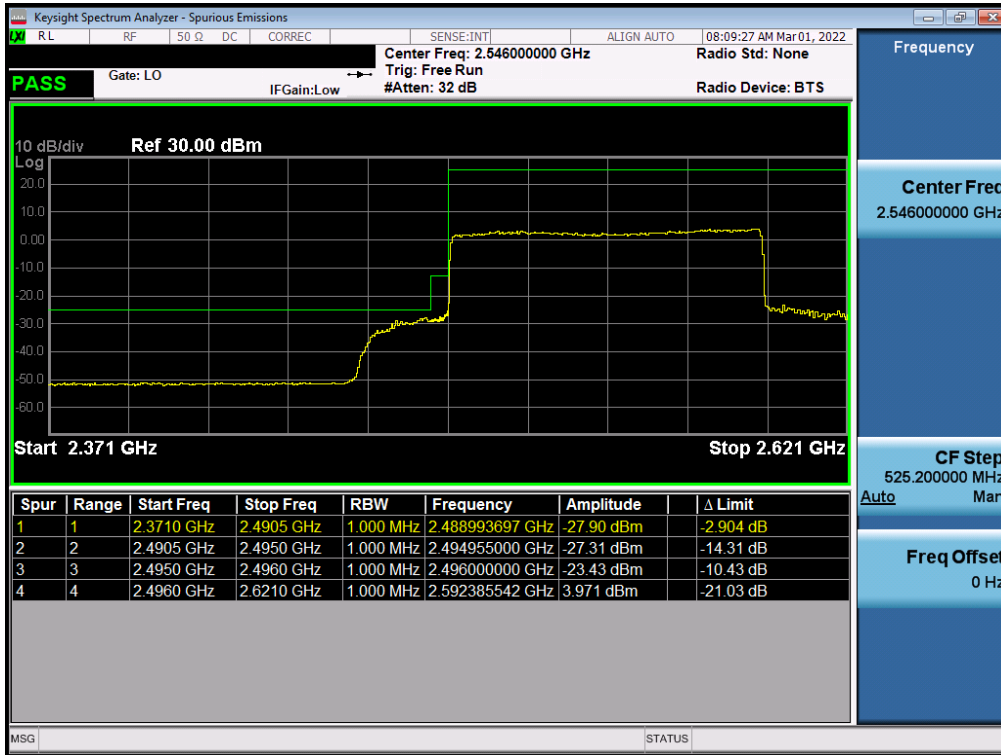
Test Notes

1. Per 27.53(a)(5) in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). 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 emissions are attenuated at least 26 dB below the transmitter power.

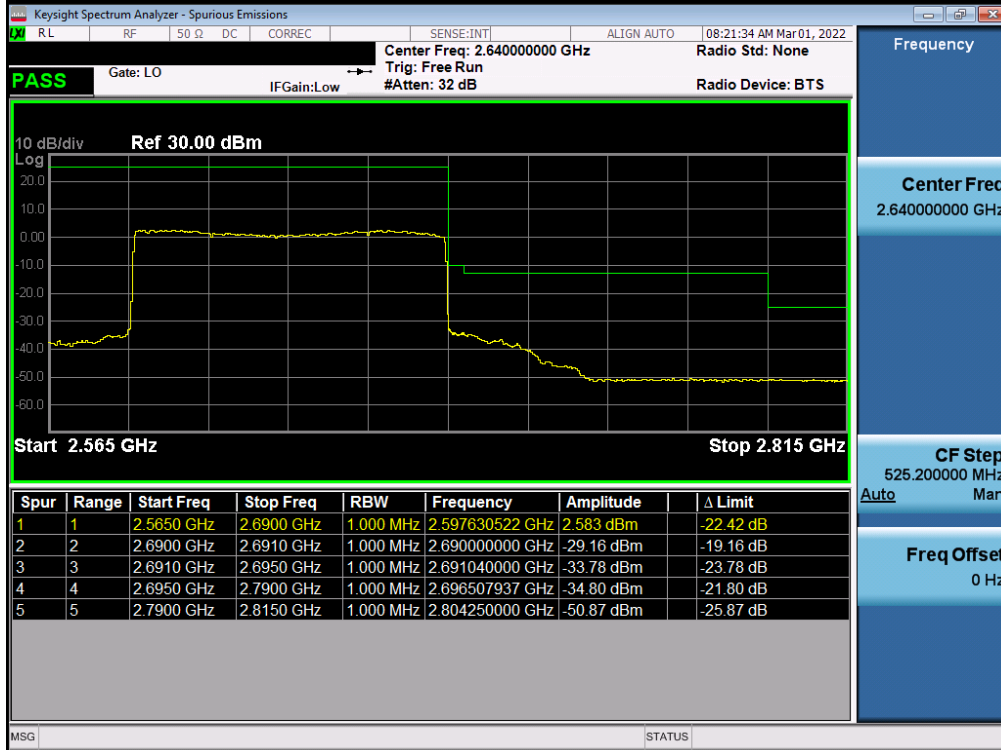
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
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NR Band n41

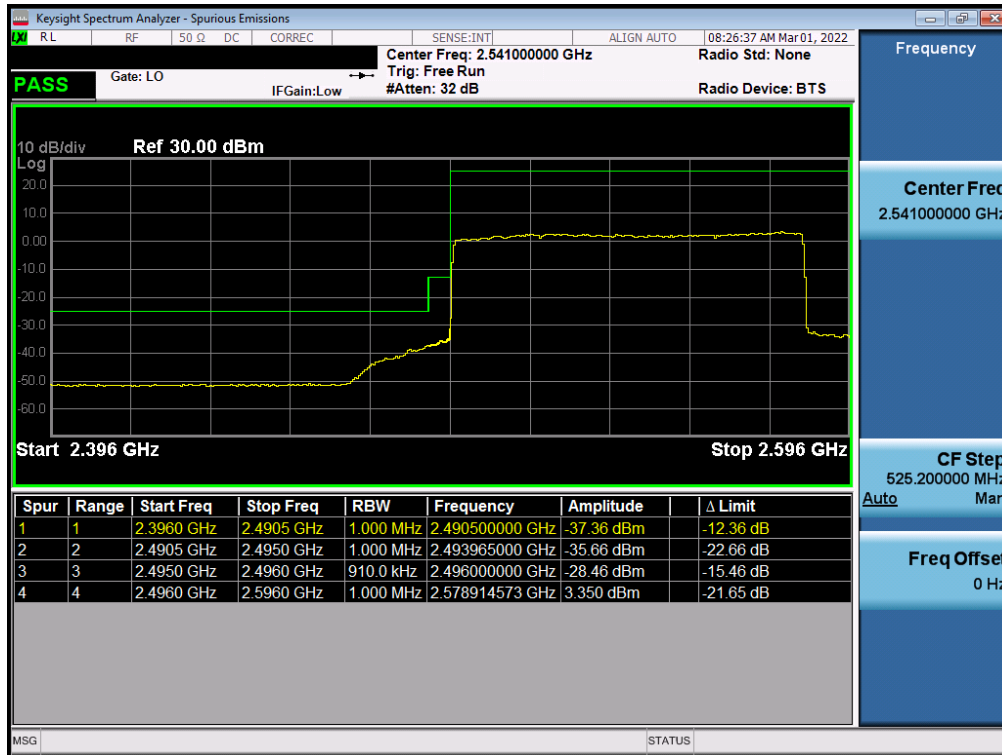


Plot 7-38. Lower ACP Plot (NR Band n41 - 100MHz CP-OFDM-QPSK – Full RB – Ant F)

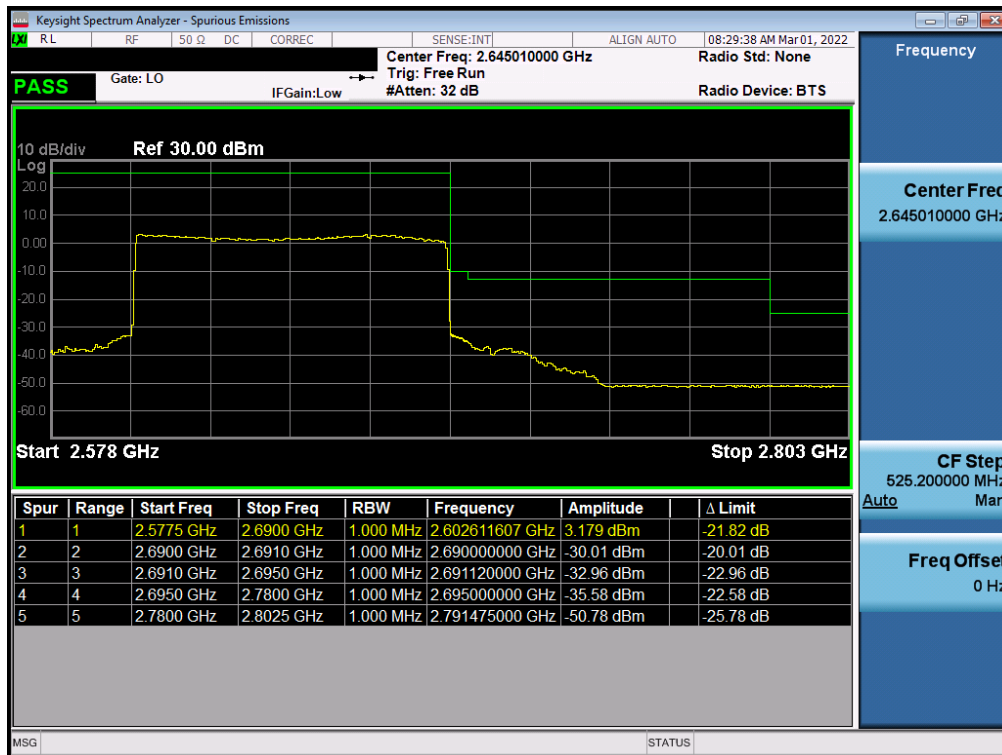


Plot 7-39. Upper ACP Plot (NR Band n41 - 100MHz CP-OFDM-QPSK – Full RB – Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 37 of 61

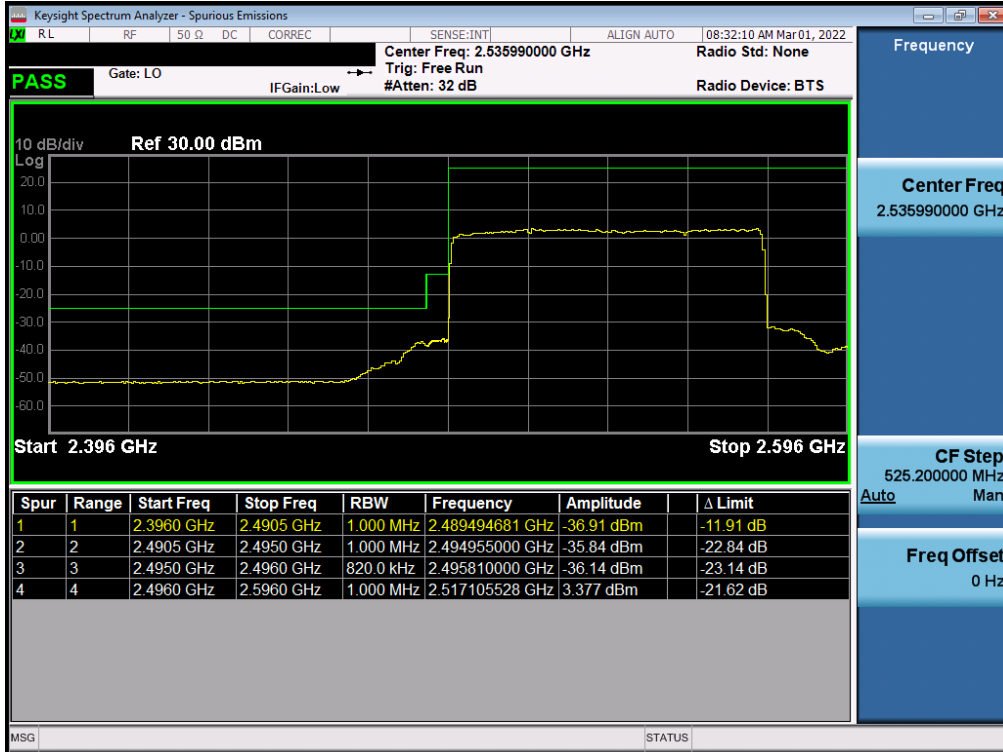


Plot 7-40. Lower ACP Plot (NR Band n41 - 90MHz CP-OFDM-QPSK - Full RB - Ant F)

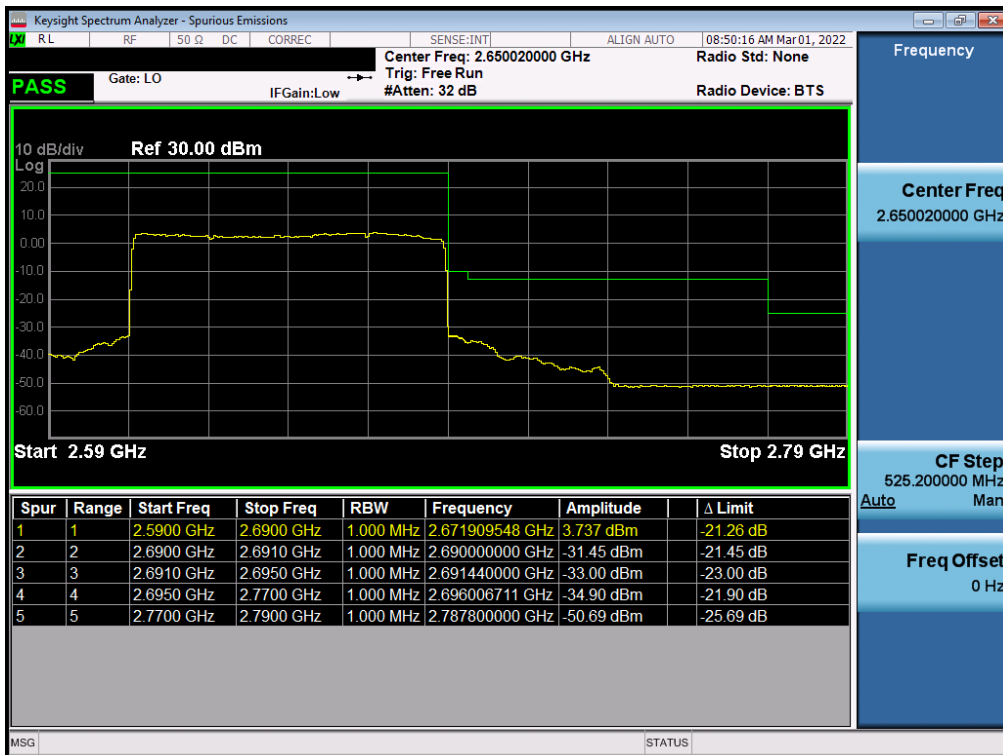


Plot 7-41. Upper ACP Plot (NR Band n41 - 90MHz CP-OFDM-QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 38 of 61

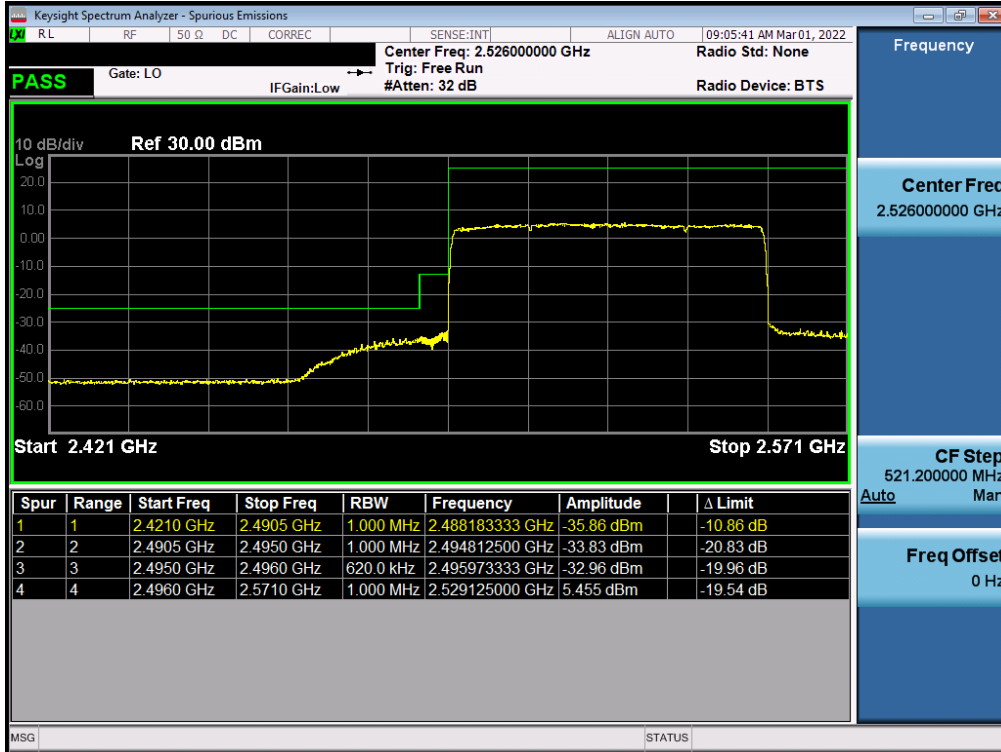


Plot 7-42. Lower ACP Plot (NR Band n41 - 80MHz CP-OFDM-QPSK - Full RB - Ant F)

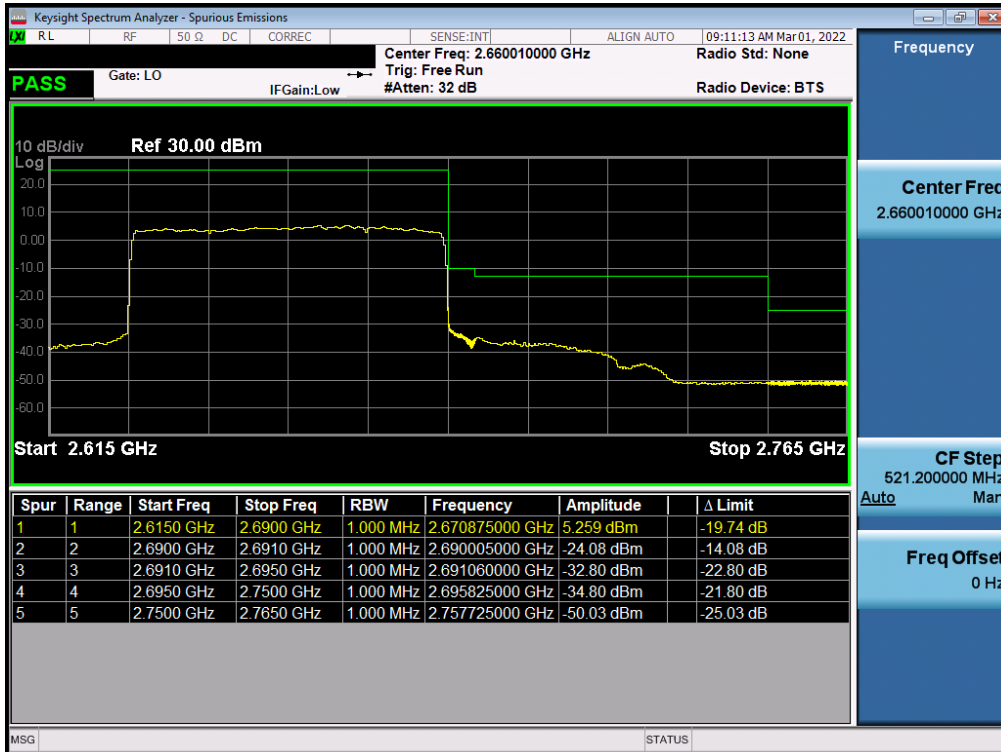


Plot 7-43. Upper ACP Plot (NR Band n41 - 80MHz CP-OFDM-QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 39 of 61

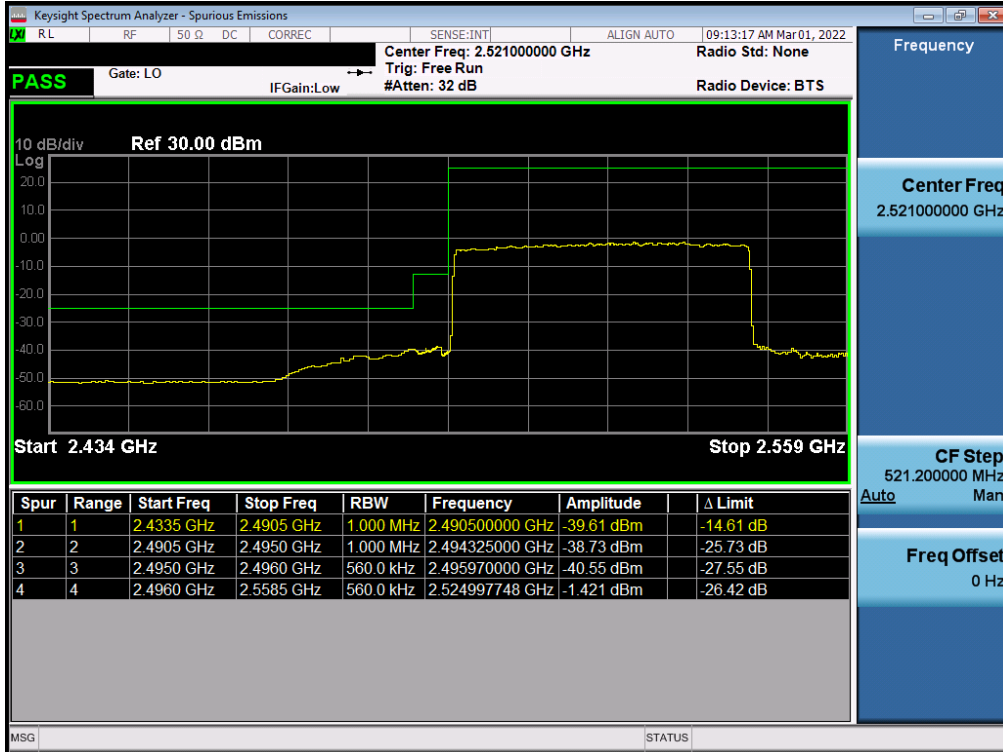


Plot 7-44. Lower ACP Plot (NR Band n41 - 60MHz CP-OFDM-QPSK - Full RB - Ant F)

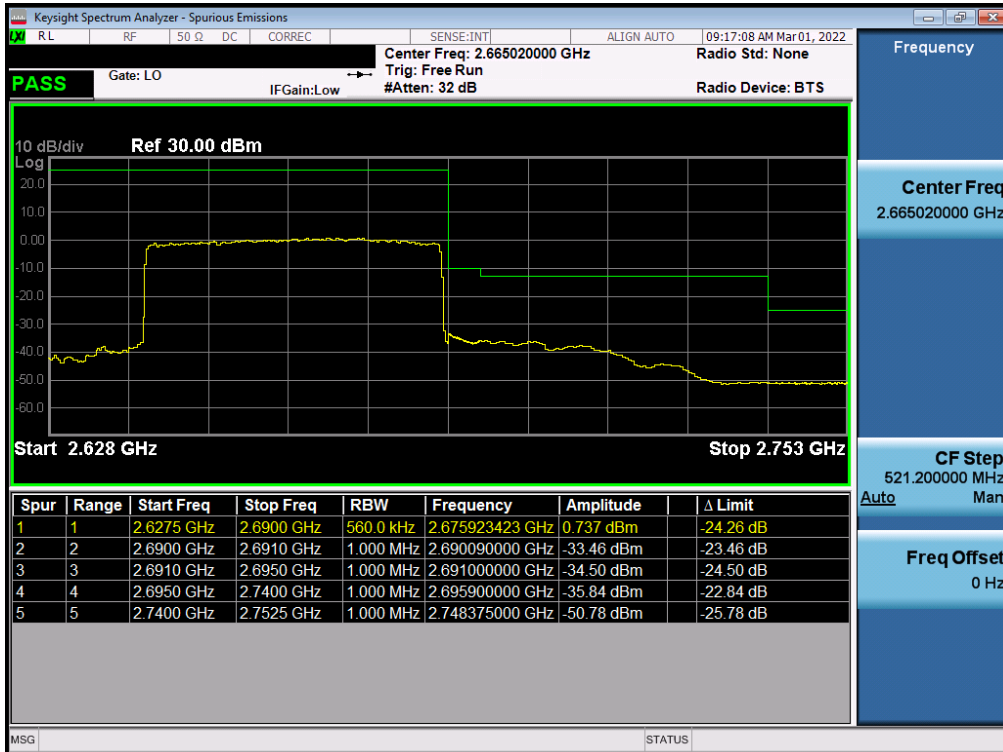


Plot 7-45. Upper ACP Plot (NR Band n41 - 60MHz CP-OFDM-QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 40 of 61

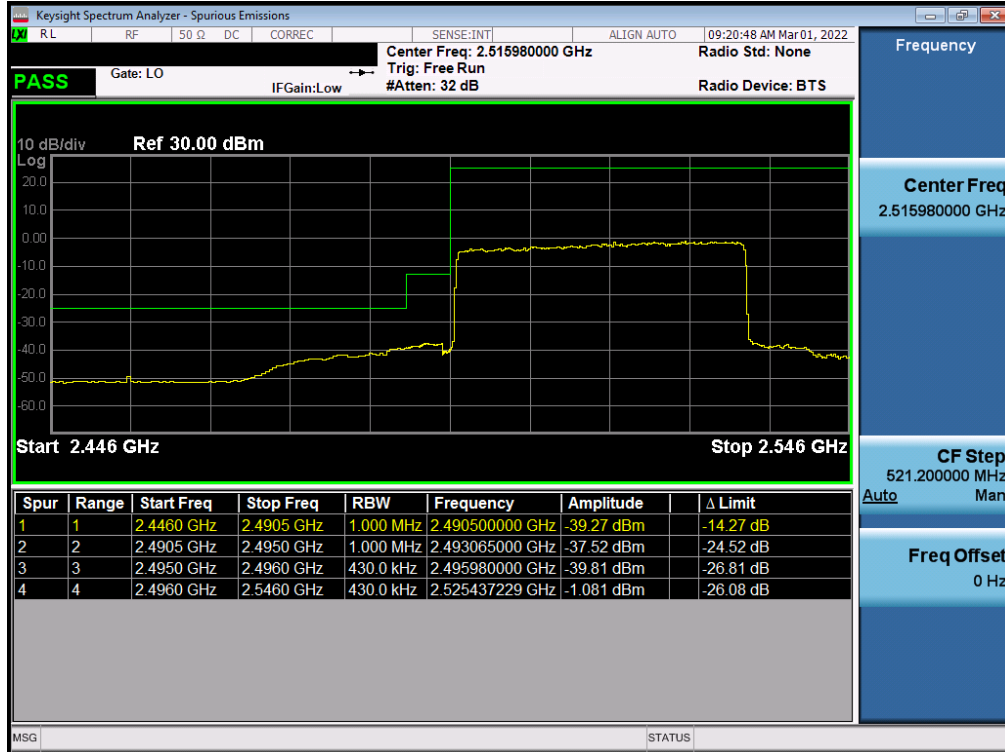


Plot 7-46. Lower ACP Plot (NR Band n41 - 50MHz CP-OFDM-QPSK - Full RB - Ant F)

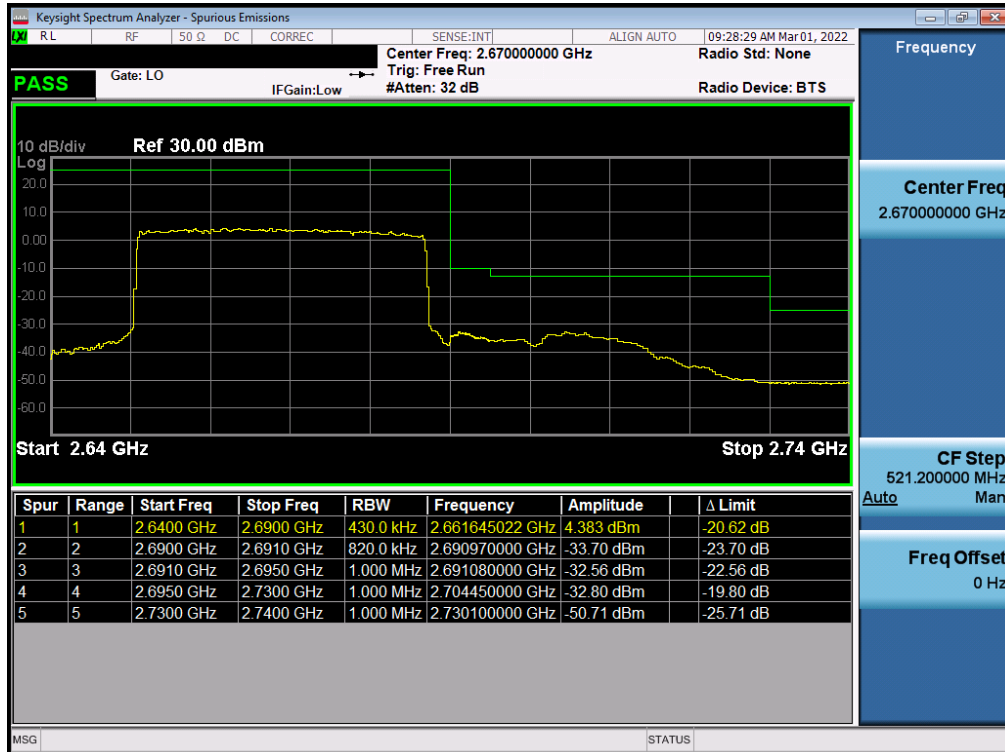


Plot 7-47. Upper ACP Plot (NR Band n41 - 50MHz CP-OFDM-QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 41 of 61

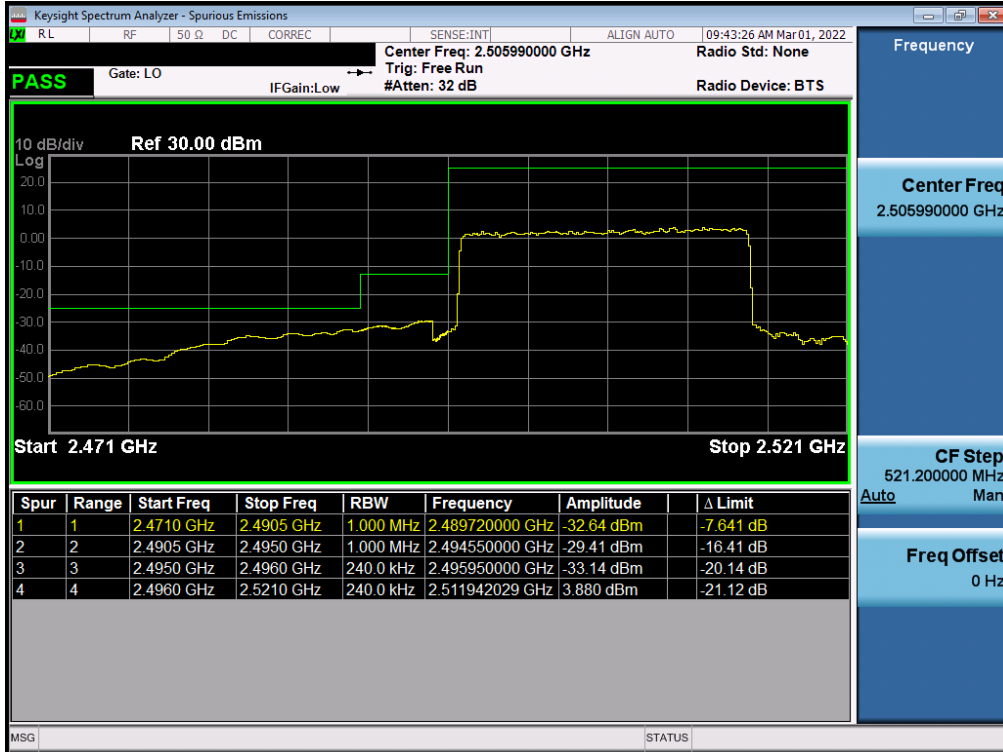


Plot 7-48. Lower ACP Plot (NR Band n41 - 40MHz CP-OFDM-QPSK - Full RB - Ant F)

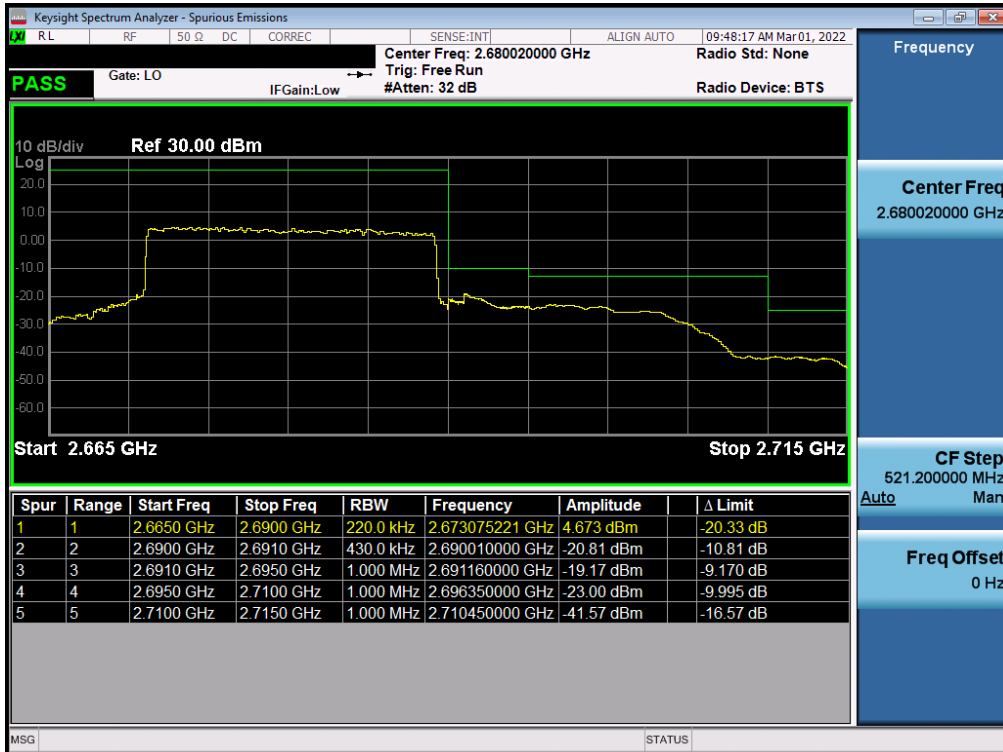


Plot 7-49. Upper ACP Plot (NR Band n41 - 40MHz CP-OFDM-QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 42 of 61



Plot 7-50. Lower ACP Plot (NR Band n41 - 20MHz CP-OFDM-QPSK - Full RB - Ant F)



Plot 7-51. Upper ACP Plot (NR Band n41 - 20MHz CP-OFDM-QPSK - Full RB - Ant F)

FCC ID: A3LSMS901E	PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset		Page 43 of 61

7.6 Radiated Power (EIRP)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) 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

FCC ID: A3LSMS901E	 PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
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Test Setup

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

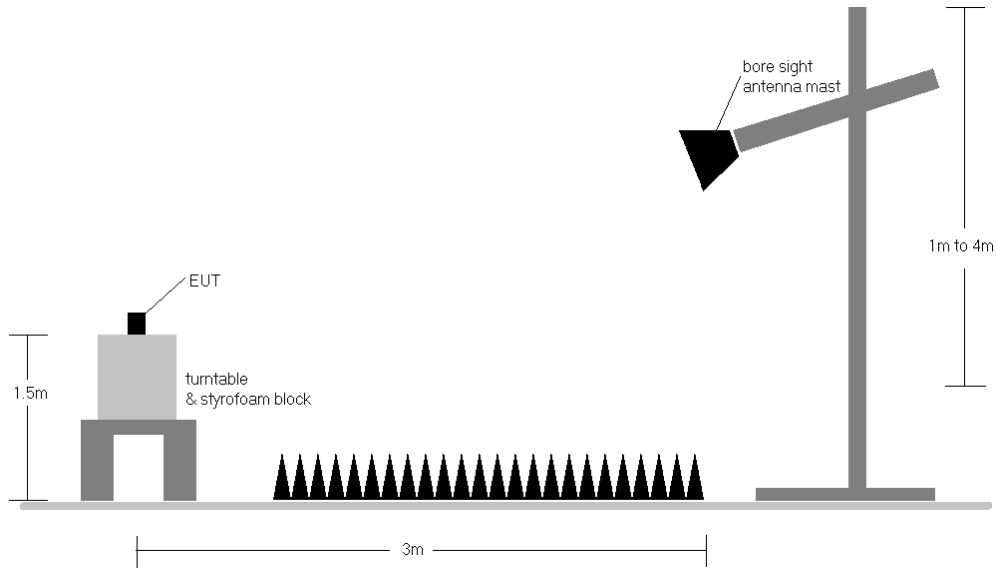




Figure 7-5. Radiated Test Setup >1GHz



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: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	 Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset	Page 45 of 61

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
100 MHz	π/2 BPSK	2546.0	V	108	35	9.40	1 / 68	12.77	22.17	0.165	33.01	-10.84
	π/2 BPSK	2593.0	V	148	351	9.46	1 / 136	11.42	20.88	0.123	33.01	-12.13
	π/2 BPSK	2640.0	V	103	354	9.50	1 / 136	10.60	20.10	0.102	33.01	-12.91
	QPSK	2546.0	V	108	35	9.40	1 / 68	12.83	22.23	0.167	33.01	-10.78
	QPSK	2593.0	V	148	351	9.46	1 / 136	11.69	21.15	0.130	33.01	-11.86
	QPSK	2640.0	V	103	354	9.50	1 / 136	10.61	20.11	0.103	33.01	-12.90
16-QAM	2546.0	V	108	35	9.40	1 / 68	11.62	21.02	0.126	33.01	-11.99	
90 MHz	π/2 BPSK	2541.0	V	108	35	9.46	1 / 183	13.05	22.50	0.178	33.01	-10.51
	π/2 BPSK	2593.0	V	148	351	9.46	1 / 61	11.52	20.98	0.125	33.01	-12.03
	π/2 BPSK	2645.0	V	103	354	9.51	1 / 183	10.29	19.80	0.095	33.01	-13.21
	QPSK	2541.0	V	108	35	9.46	1 / 61	13.27	22.73	0.187	33.01	-10.28
	QPSK	2593.0	V	148	351	9.46	1 / 122	11.60	21.06	0.128	33.01	-11.95
	QPSK	2645.0	V	103	354	9.51	1 / 183	10.41	19.92	0.098	33.01	-13.09
16-QAM	2541.0	V	108	35	9.46	1 / 61	11.41	20.87	0.122	33.01	-12.14	
80 MHz	π/2 BPSK	2536.0	V	108	35	9.49	1 / 162	12.70	22.19	0.166	33.01	-10.82
	π/2 BPSK	2593.0	V	148	351	9.46	1 / 54	10.25	19.71	0.093	33.01	-13.30
	π/2 BPSK	2650.0	V	103	354	9.52	1 / 162	9.93	19.45	0.088	33.01	-13.56
	QPSK	2536.0	V	108	35	9.49	1 / 162	12.64	22.13	0.163	33.01	-10.88
	QPSK	2593.0	V	148	351	9.46	1 / 54	11.69	21.15	0.130	33.01	-11.86
	QPSK	2650.0	V	103	354	9.52	1 / 162	9.57	19.09	0.081	33.01	-13.92
16-QAM	2536.0	V	108	35	9.49	1 / 162	10.58	20.07	0.102	33.01	-12.94	
60 MHz	π/2 BPSK	2526.0	V	108	35	9.52	1 / 40	12.24	21.76	0.150	33.01	-11.25
	π/2 BPSK	2593.0	V	148	351	9.46	1 / 40	10.93	20.39	0.109	33.01	-12.62
	π/2 BPSK	2660.0	V	103	354	9.50	1 / 40	9.35	18.85	0.077	33.01	-14.16
	QPSK	2526.0	V	108	35	9.52	1 / 121	12.80	22.31	0.170	33.01	-10.70
	QPSK	2593.0	V	148	351	9.46	1 / 40	10.75	20.21	0.105	33.01	-12.80
	QPSK	2660.0	V	103	354	9.50	1 / 121	10.04	19.54	0.090	33.01	-13.47
16-QAM	2526.0	V	108	35	9.52	1 / 40	10.96	20.48	0.112	33.01	-12.53	
50 MHz	π/2 BPSK	2521.0	V	108	35	9.51	1 / 66	12.45	21.96	0.157	33.01	-11.05
	π/2 BPSK	2593.0	V	148	351	9.46	1 / 33	11.17	20.63	0.116	33.01	-12.38
	π/2 BPSK	2665.0	V	103	354	9.51	1 / 66	9.86	19.37	0.086	33.01	-13.64
	QPSK	2521.0	V	108	35	9.51	1 / 33	12.60	22.12	0.163	33.01	-10.89
	QPSK	2593.0	V	148	351	9.46	1 / 66	11.28	20.74	0.119	33.01	-12.27
	QPSK	2665.0	V	103	354	9.51	1 / 66	9.95	19.46	0.088	33.01	-13.55
16-QAM	2521.0	V	108	35	9.51	1 / 99	10.91	20.43	0.110	33.01	-12.59	
40 MHz	π/2 BPSK	2516.0	V	108	35	9.52	1 / 53	12.54	22.06	0.161	33.01	-10.95
	π/2 BPSK	2593.0	V	148	351	9.46	1 / 26	11.23	20.69	0.117	33.01	-12.32
	π/2 BPSK	2670.0	V	103	354	9.52	1 / 53	9.18	18.70	0.074	33.01	-14.31
	QPSK	2516.0	V	108	35	9.52	1 / 79	12.87	22.39	0.173	33.01	-10.62
	QPSK	2593.0	V	148	351	9.46	1 / 26	11.52	20.98	0.125	33.01	-12.03
	QPSK	2670.0	V	103	354	9.52	1 / 53	10.36	19.88	0.097	33.01	-13.13
16-QAM	2516.0	V	108	35	9.52	1 / 79	10.78	20.30	0.107	33.01	-12.71	
30 MHz	π/2 BPSK	2511.0	V	108	35	9.54	1 / 58	12.04	21.59	0.144	33.01	-11.42
	π/2 BPSK	2593.0	V	148	351	9.46	1 / 19	10.70	20.16	0.104	33.01	-12.85
	π/2 BPSK	2675.0	V	103	354	9.52	1 / 58	9.75	19.27	0.084	33.01	-13.74
	QPSK	2511.0	V	108	35	9.54	1 / 58	12.72	22.26	0.168	33.01	-10.75
	QPSK	2593.0	V	148	351	9.46	1 / 19	11.18	20.64	0.116	33.01	-12.37
	QPSK	2675.0	V	103	354	9.52	1 / 39	10.35	19.87	0.097	33.01	-13.14
16-QAM	2511.0	V	108	35	9.54	1 / 58	10.43	19.97	0.099	33.01	-13.04	
20 MHz	π/2 BPSK	2506.0	V	108	35	9.54	1 / 37	11.69	21.24	0.133	33.01	-11.77
	π/2 BPSK	2593.0	V	148	351	9.46	1 / 13	10.38	19.85	0.096	33.01	-13.17
	π/2 BPSK	2680.0	V	103	354	9.51	1 / 25	9.55	19.06	0.081	33.01	-13.95
	QPSK	2506.0	V	108	35	9.54	1 / 37	12.58	22.13	0.163	33.01	-10.89
	QPSK	2593.0	V	148	351	9.46	1 / 25	10.69	20.15	0.104	33.01	-12.86
	QPSK	2680.0	V	103	354	9.51	1 / 25	9.79	19.30	0.085	33.01	-13.71
16-QAM	2506.0	V	108	35	9.54	1 / 37	10.10	19.64	0.092	33.01	-13.37	
100 MHz	QPSK (CP-OFDM)	2546.0	V	142	48	9.46	1 / 68	10.35	19.81	0.096	33.01	-13.20
	QPSK (Opposite Pol.)	2546.0	H	289	92	9.38	1 / 68	8.95	18.33	0.068	33.01	-14.68
	QPSK (WCP)	2546.0	V	399	145	9.46	1 / 204	7.14	16.60	0.046	33.01	-16.41

Table 7-2. EIRP Data (NR Band n41 – Ant F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
Test Report S/N: 1M2202030012-02.A3L	Test Dates: 02/01/2022- 03/01/2022	EUT Type: Portable Handset	Page 46 of 61	

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
100 MHz	$\pi/2$ BPSK	2546.0	V	124	83	9.40	1 / 136	10.26	19.66	0.092	33.01	-13.35
	$\pi/2$ BPSK	2593.0	V	142	79	9.46	1 / 204	11.93	21.39	0.138	33.01	-11.62
	$\pi/2$ BPSK	2640.0	V	108	81	9.50	1 / 136	12.47	21.97	0.157	33.01	-11.04
	QPSK	2546.0	V	124	83	9.40	1 / 136	10.47	19.87	0.097	33.01	-13.14
	QPSK	2593.0	V	142	79	9.46	1 / 204	11.75	21.21	0.132	33.01	-11.80
	QPSK	2640.0	V	108	81	9.50	1 / 136	12.46	21.96	0.157	33.01	-11.05
100 MHz	16-QAM	2640.0	V	108	81	9.50	1 / 136	11.67	21.17	0.131	33.01	-11.84
	QPSK (CP-OFDM)	2640.0	V	111	75	9.46	1 / 204	10.80	20.26	0.106	33.01	-12.75
	QPSK (Opposite Pol.)	2640.0	H	123	112	9.89	1 / 204	11.15	21.04	0.127	33.01	-11.97



Table 7-3. EIRP Data (NR Band n41 – SRS1 – Ant B)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
100 MHz	$\pi/2$ BPSK	2550.0	V	103	353	9.35	1 / 204	5.07	14.42	0.028	33.01	-18.59
	$\pi/2$ BPSK	2593.0	V	103	354	9.46	1 / 204	4.46	13.92	0.025	33.01	-19.09
	$\pi/2$ BPSK	2640.0	V	121	357	9.50	1 / 204	5.41	14.91	0.031	33.01	-18.10
	QPSK	2550.0	V	103	353	9.35	1 / 204	4.92	14.27	0.027	33.01	-18.74
	QPSK	2593.0	V	103	354	9.46	1 / 204	4.70	14.16	0.026	33.01	-18.85
	QPSK	2640.0	V	121	357	9.50	1 / 204	5.59	15.09	0.032	33.01	-17.92
100 MHz	16-QAM	2640.0	V	121	357	9.50	1 / 204	3.98	13.48	0.022	33.01	-19.53
	QPSK (CP-OFDM)	2640.0	V	116	356	9.46	1 / 136	3.72	13.18	0.021	33.01	-19.83
	QPSK (Opposite Pol.)	2640.0	H	186	41	9.46	1 / 204	4.64	14.10	0.026	33.01	-18.91

Table 7-4. EIRP Data (NR Band n41 – SRS2 – Ant D)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
100 MHz	$\pi/2$ BPSK	2550.0	H	115	130	9.38	1 / 68	8.63	18.01	0.063	33.01	-15.00
	$\pi/2$ BPSK	2593.0	H	139	126	9.49	1 / 68	6.03	15.52	0.036	33.01	-17.49
	$\pi/2$ BPSK	2640.0	H	143	135	9.89	1 / 68	2.22	12.11	0.016	33.01	-20.90
	QPSK	2550.0	H	115	130	9.38	1 / 68	8.61	17.99	0.063	33.01	-15.02
	QPSK	2593.0	H	139	126	9.49	1 / 68	6.19	15.68	0.037	33.01	-17.33
	QPSK	2640.0	H	143	135	9.89	1 / 68	2.44	12.33	0.017	33.01	-20.68
100 MHz	16-QAM	2550.0	H	115	130	9.38	1 / 68	7.51	16.89	0.049	33.01	-16.12
	QPSK (CP-OFDM)	2546.0	H	114	113	9.38	1 / 68	7.22	16.60	0.046	33.01	-16.41
	QPSK (Opposite Pol.)	2546.0	V	227	117	9.40	1 / 136	7.19	16.59	0.046	33.01	-16.42

Table 7-5. EIRP Data (NR Band n41 – SRS3 – Ant E)

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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.

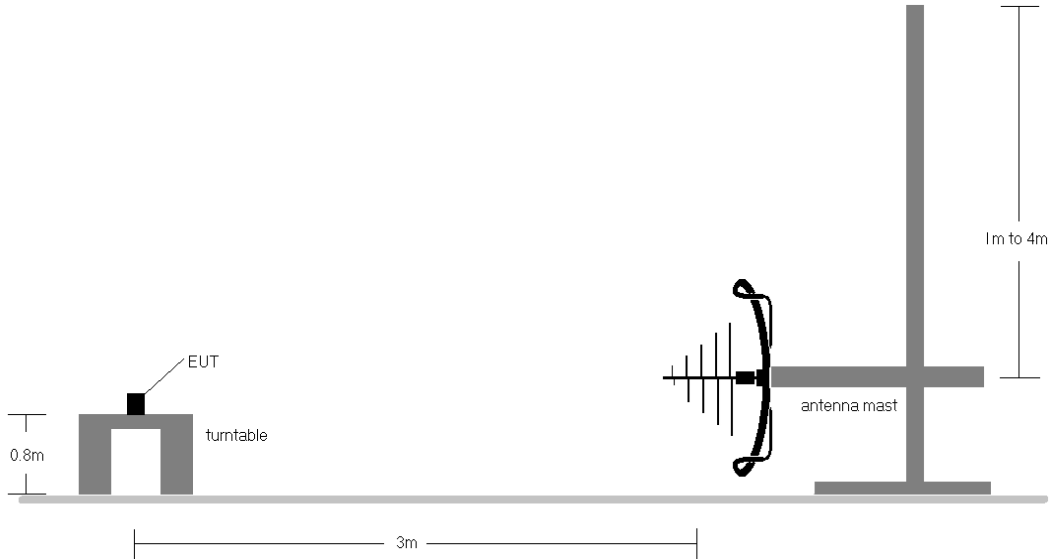


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

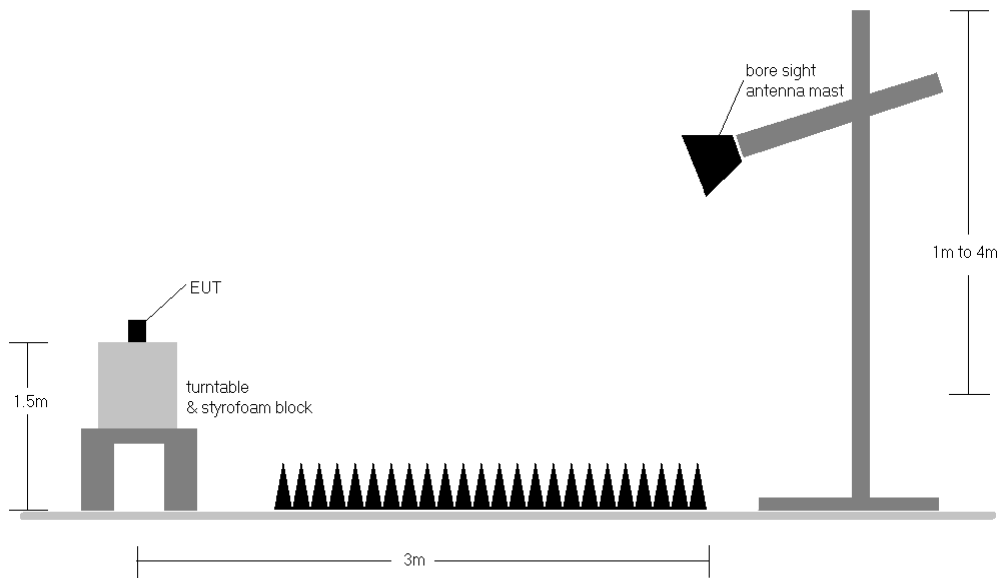




Figure 7-7. Test Instrument & Measurement Setup >1 GHz

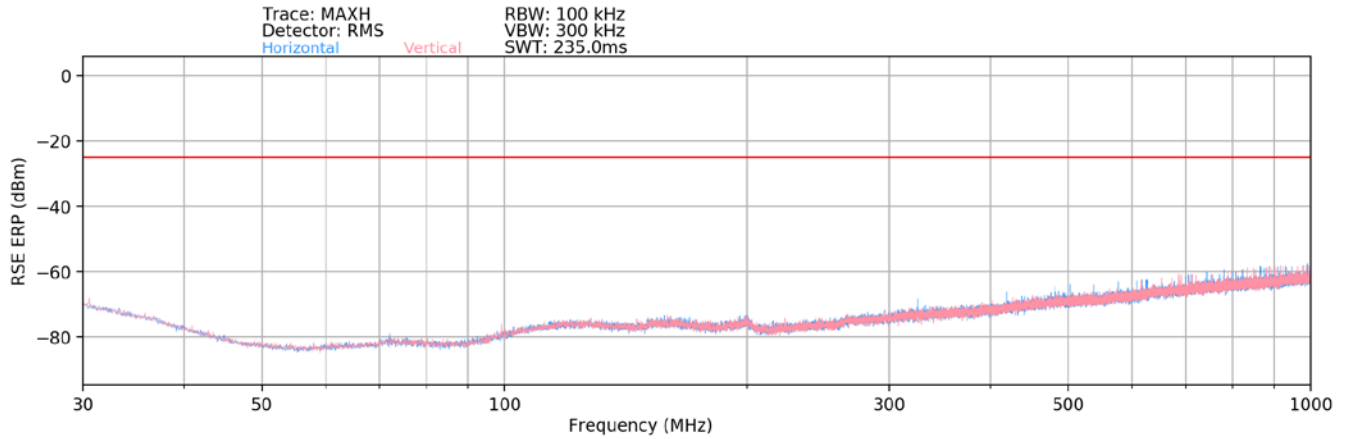
<p>FCC ID: A3LSMS901E</p>		<p>PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</p>	<p>Approved by: Technical Manager</p>
<p>Test Report S/N: 1M2202030012-02.A3L</p>	<p>Test Dates: 02/01/2022- 03/01/2022</p>	<p>EUT Type: Portable Handset</p>	<p>Page 49 of 61</p>

Test Notes

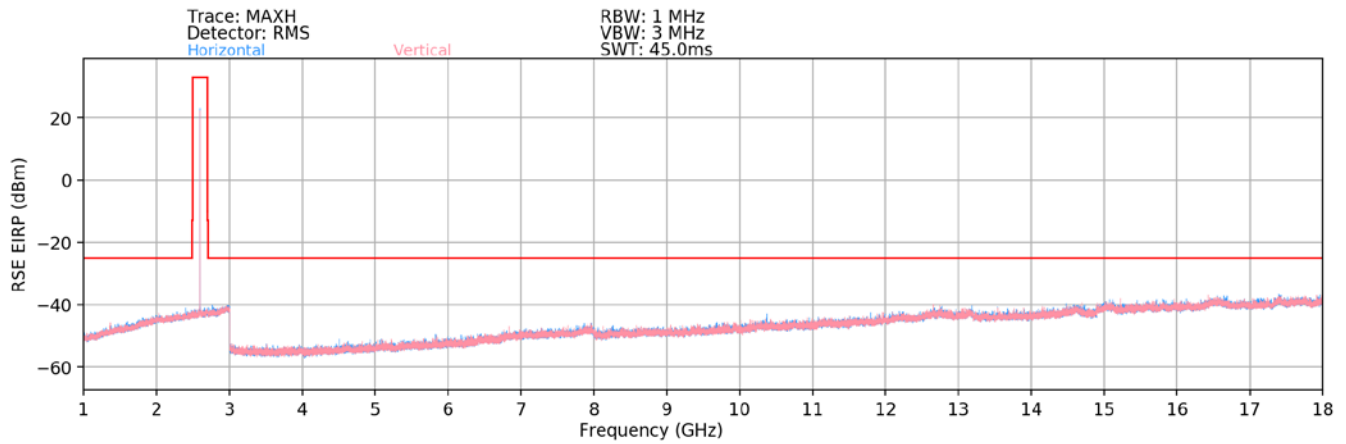
- 1) Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
 - a) $E(\text{dB}\mu\text{V}/\text{m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$
 - b) $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V}/\text{m}) + 20\log D - 104.8$; 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) 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.
- 8) 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 n41 – Ant F



Plot 7-52. Radiated Spurious Plot (NR Band n41 – Ant F)



Plot 7-53. Radiated Spurious Plot (NR Band n41 – Ant F)

Bandwidth (MHz):	100
Frequency (MHz):	2546.0
RB / Offset:	1 / 136

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]
5092.00	H	176	7	-70.16	7.93	44.77	-50.49	-25.00	-25.49
7638.00	H	154	32	-69.67	12.91	50.24	-45.02	-25.00	-20.02
10184.00	H	156	14	-65.48	15.76	57.28	-37.97	-25.00	-12.97
12730.00	H	150	44	-72.87	20.19	54.32	-40.94	-25.00	-15.94
15276.00	H	-	-	-74.10	22.39	55.29	-39.97	-25.00	-14.97
17822.00	H	-	-	-74.87	26.69	58.82	-36.43	-25.00	-11.43
20368.00	H	-	-	-58.33	2.10	50.77	-54.03	-25.00	-29.03

Table 7-6. Radiated Spurious Data (NR Band n41 – Low Channel – Ant F)

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Bandwidth (MHz):	100
Frequency (MHz):	2593.0
RB / Offset:	1 / 136

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]
5186.00	H	158	308	-69.16	7.75	45.59	-49.67	-25.00	-24.67
7779.00	H	142	30	-69.36	13.16	50.80	-44.46	-25.00	-19.46
10372.00	H	167	339	-70.92	16.36	52.44	-42.82	-25.00	-17.82
12965.00	H	-	-	-72.53	19.61	54.08	-41.18	-25.00	-16.18
15558.00	H	-	-	-74.30	23.42	56.12	-39.14	-25.00	-14.14
18151.00	H	-	-	-59.43	1.18	48.75	-56.05	-25.00	-31.05

Table 7-7. Radiated Spurious Data (NR Band n41 – Mid Channel – Ant F)

Bandwidth (MHz):	100
Frequency (MHz):	2640.0
RB / Offset:	1 / 136



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]
5280.00	H	224	318	-70.03	7.66	44.63	-50.63	-25.00	-25.63
7920.00	H	309	43	-71.18	14.37	50.19	-45.07	-25.00	-20.07
10560.00	H	110	12	-67.17	16.41	56.24	-39.02	-25.00	-14.02
13200.00	H	-	-	-73.85	20.06	53.21	-42.05	-25.00	-17.05
15840.00	H	-	-	-73.57	23.42	56.85	-38.40	-25.00	-13.40
18480.00	H	-	-	-59.02	1.13	49.11	-55.69	-25.00	-30.69

Table 7-8. Radiated Spurious Data (NR Band n41 – High Channel – Ant F)

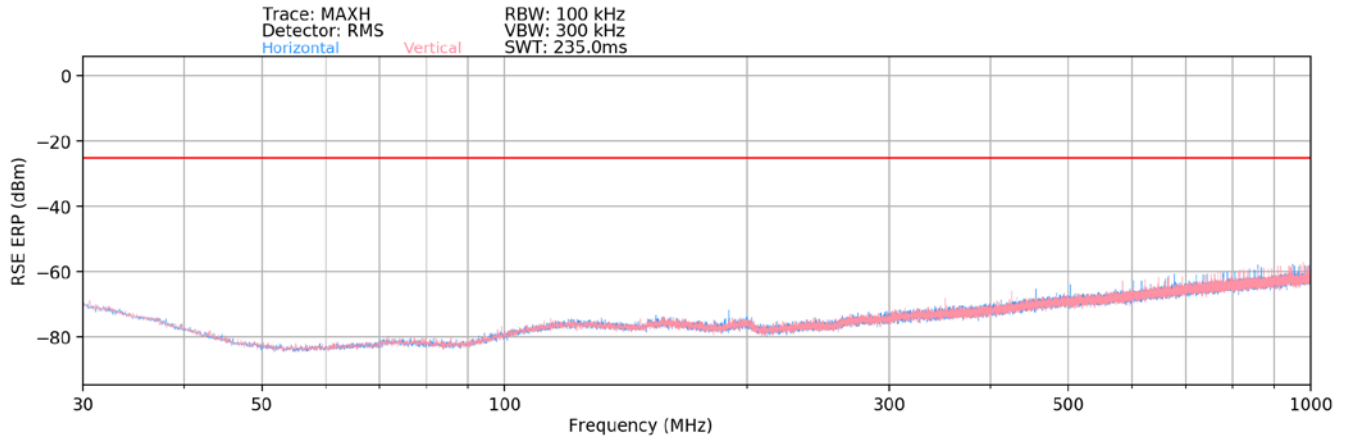
Case:	w/ Wireless Charging Pad
Bandwidth (MHz):	100
Frequency (MHz):	2546.0
RB / Offset:	1 / 136

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]
5092.00	H	-	-	-71.53	7.93	43.40	-51.86	-25.00	-26.86
7638.00	H	111	131	-71.51	12.91	48.40	-46.86	-25.00	-21.86
10184.00	H	385	56	-71.10	15.76	51.66	-43.59	-25.00	-18.59
12730.00	H	-	-	-74.02	20.19	53.17	-42.09	-25.00	-17.09
15276.00	H	-	-	-73.37	22.39	56.02	-39.24	-25.00	-14.24
17822.00	H	-	-	-74.66	26.69	59.03	-36.22	-25.00	-11.22

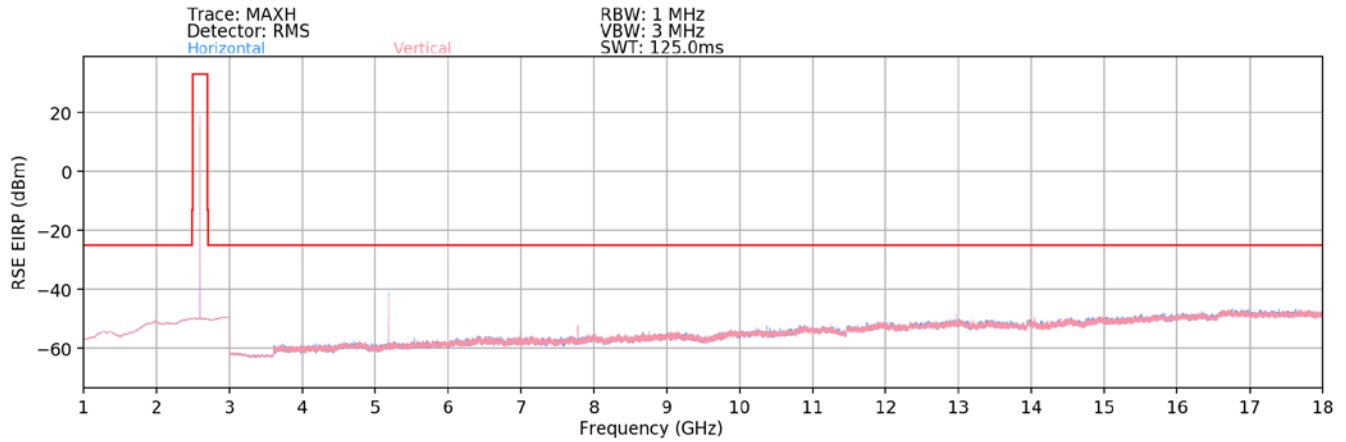
Table 7-9. Radiated Spurious Data with WCP (NR Band n41 – Ant F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
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NR Band n41 – SRS1 – Ant B



Plot 7-54. Radiated Spurious Plot (NR Band n41 – SRS1 – Ant B)



Plot 7-55. Radiated Spurious Plot (NR Band n41 – SRS1 – Ant B)

Bandwidth (MHz):	100
Frequency (MHz):	2546.0
RB / Offset:	1 / 136

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]
5092.00	H	114	60	-55.13	-5.06	46.81	-48.45	-25.00	-23.45
7638.00	H	282	63	-67.36	-1.73	37.91	-57.34	-25.00	-32.34
10184.00	H	264	357	-66.63	1.56	41.93	-53.32	-25.00	-28.32
12730.00	H	180	25	-70.16	4.66	41.50	-53.76	-25.00	-28.76
15276.00	H	-	-	-78.42	6.38	34.96	-60.30	-25.00	-35.30
17822.00	H	-	-	-82.15	9.21	34.06	-61.20	-25.00	-36.20
20368.00	H	-	-	-58.69	2.10	50.41	-54.39	-25.00	-29.39

Table 7-10. Radiated Spurious Data (NR Band n41 – Low Channel – SRS1 – Ant B)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
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Bandwidth (MHz):	100
Frequency (MHz):	2593.0
RB / Offset:	1 / 136

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]
5186.00	H	116	47	-53.55	-4.63	48.82	-46.44	-25.00	-21.44
7779.00	H	382	54	-67.21	-2.24	37.55	-57.71	-25.00	-32.71
10372.00	H	400	24	-72.61	1.50	35.89	-59.37	-25.00	-34.37
12965.00	H	239	43	-69.84	4.95	42.11	-53.15	-25.00	-28.15
15558.00	H	-	-	-78.02	6.19	35.17	-60.09	-25.00	-35.09
18151.00	H	-	-	-59.02	1.18	49.16	-55.64	-25.00	-30.64
20744.00	H	-	-	-58.28	2.73	51.45	-53.35	-25.00	-28.35

Table 7-11. Radiated Spurious Data (NR Band n41 – Mid Channel – SRS1 – Ant B)

Bandwidth (MHz):	100
Frequency (MHz):	2640.0
RB / Offset:	1 / 136



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]
5280.00	H	113	49	-56.72	-4.88	45.40	-49.86	-25.00	-24.86
7920.00	H	400	49	-70.48	-1.24	35.28	-59.98	-25.00	-34.98
10560.00	H	233	15	-73.23	2.02	35.79	-59.47	-25.00	-34.47
13200.00	H	232	31	-68.83	4.52	42.69	-52.56	-25.00	-27.56
15840.00	H	-	-	-78.96	7.53	35.57	-59.69	-25.00	-34.69
18480.00	H	-	-	-59.44	1.13	48.69	-56.11	-25.00	-31.11
21120.00	H	-	-	-59.84	2.78	49.94	-54.86	-25.00	-29.86

Table 7-12. Radiated Spurious Data (NR Band n41 – High Channel – SRS1 – Ant B)

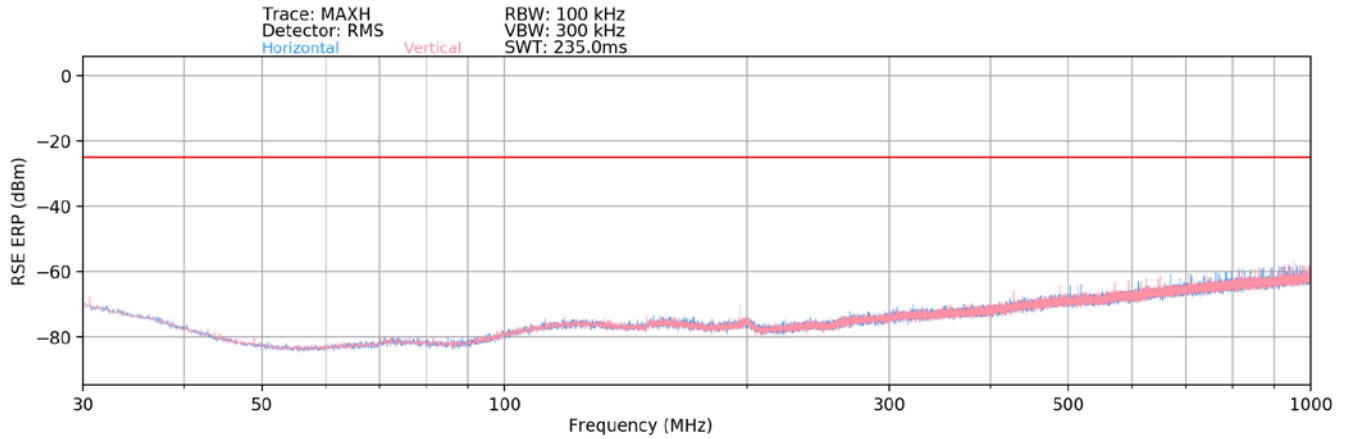
Case:	w/ Wireless Charging Pad
Bandwidth (MHz):	100
Frequency (MHz):	2593.0
RB / Offset:	1 / 136

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]
5186.00	H	350	61	-58.45	-4.63	43.92	-51.34	-25.00	-26.34
7779.00	H	252	10	-67.47	-2.24	37.29	-57.97	-25.00	-32.97
10372.00	H	146	343	-69.72	1.50	38.78	-56.48	-25.00	-31.48
12965.00	H	115	40	-73.83	4.95	38.12	-57.14	-25.00	-32.14
15558.00	H	-	-	-78.09	6.19	35.10	-60.16	-25.00	-35.16
18151.00	H	-	-	-60.01	1.18	48.17	-56.63	-25.00	-31.63
20744.00	H	-	-	-58.89	2.73	50.84	-53.96	-25.00	-28.96

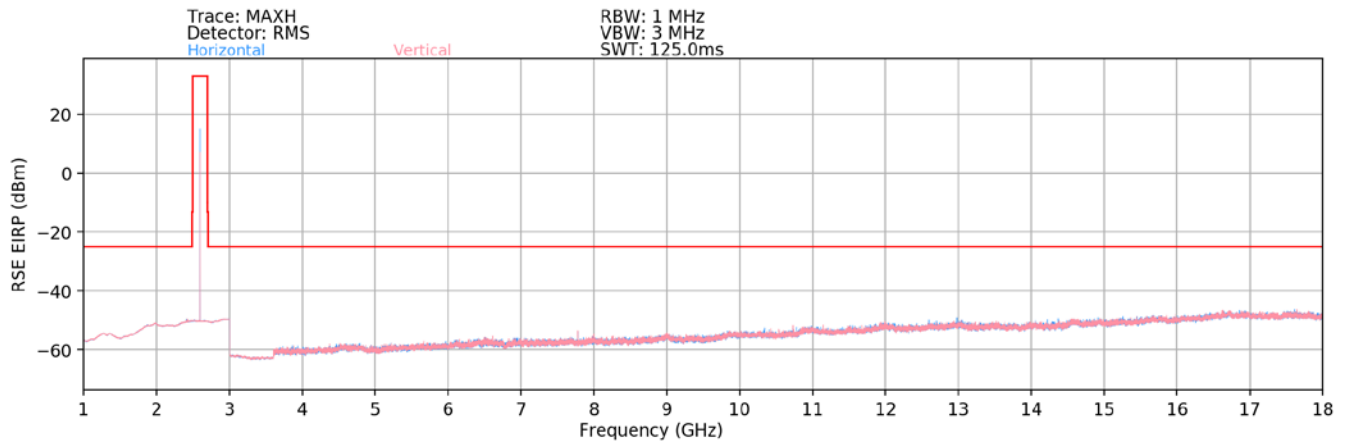
Table 7-13. Radiated Spurious Data with WCP (NR Band n41 – SRS1 – Ant B)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
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NR Band n41 – SRS2 – Ant D



Plot 7-56. Radiated Spurious Plot (NR Band n41 – SRS2 – Ant D)



Plot 7-57. Radiated Spurious Plot (NR Band n41 – SRS2 – Ant D)

Bandwidth (MHz):	100
Frequency (MHz):	2546.0
RB / Offset:	1 / 136

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]
5092.00	V	121	176	-75.25	4.45	36.20	-59.05	-25.00	-34.05
7638.00	V	133	171	-70.60	7.84	44.24	-51.01	-25.00	-26.01
10184.00	V	114	219	-72.97	11.03	45.06	-50.20	-25.00	-25.20
12730.00	V	114	175	-77.76	14.48	43.72	-51.54	-25.00	-26.54
15276.00	V	-	-	-78.57	15.94	44.37	-50.88	-25.00	-25.88
17822.00	V	-	-	-79.13	18.33	46.20	-49.06	-25.00	-24.06
20368.00	V	-	-	-57.30	2.10	51.80	-53.00	-25.00	-28.00

Table 7-14. Radiated Spurious Data (NR Band n41 – Low Channel – SRS2 – Ant D)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
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Bandwidth (MHz):	100
Frequency (MHz):	2593.0
RB / Offset:	1 / 136

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]
5186.00	V	181	177	-74.83	4.91	37.08	-58.18	-25.00	-33.18
7779.00	V	237	133	-70.17	7.30	44.13	-51.13	-25.00	-26.13
10372.00	V	190	219	-74.56	11.04	43.48	-51.78	-25.00	-26.78
12965.00	V	158	130	-78.11	14.49	43.38	-51.88	-25.00	-26.88
15558.00	V	-	-	-78.64	15.73	44.09	-51.17	-25.00	-26.17
18151.00	V	-	-	-58.55	1.18	49.63	-55.17	-25.00	-30.17
20744.00	V	-	-	-57.67	2.73	52.06	-52.74	-25.00	-27.74

Table 7-15. Radiated Spurious Data (NR Band n41 – Mid Channel – SRS2 – Ant D)

Bandwidth (MHz):	100
Frequency (MHz):	2640.0
RB / Offset:	1 / 136



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]
5280.00	V	-	-	-76.37	4.66	35.29	-59.97	-25.00	-34.97
7920.00	V	115	119	-73.81	8.30	41.49	-53.77	-25.00	-28.77
10560.00	V	195	216	-74.92	11.56	43.64	-51.62	-25.00	-26.62
13200.00	V	259	129	-76.62	14.06	44.44	-50.81	-25.00	-25.81
15840.00	V	-	-	-78.87	17.07	45.20	-50.06	-25.00	-25.06
18480.00	V	-	-	-59.06	1.13	49.07	-55.73	-25.00	-30.73
21120.00	V	-	-	-59.08	2.78	50.70	-54.10	-25.00	-29.10

Table 7-16. Radiated Spurious Data (NR Band n41 – High Channel – SRS2 – Ant D)

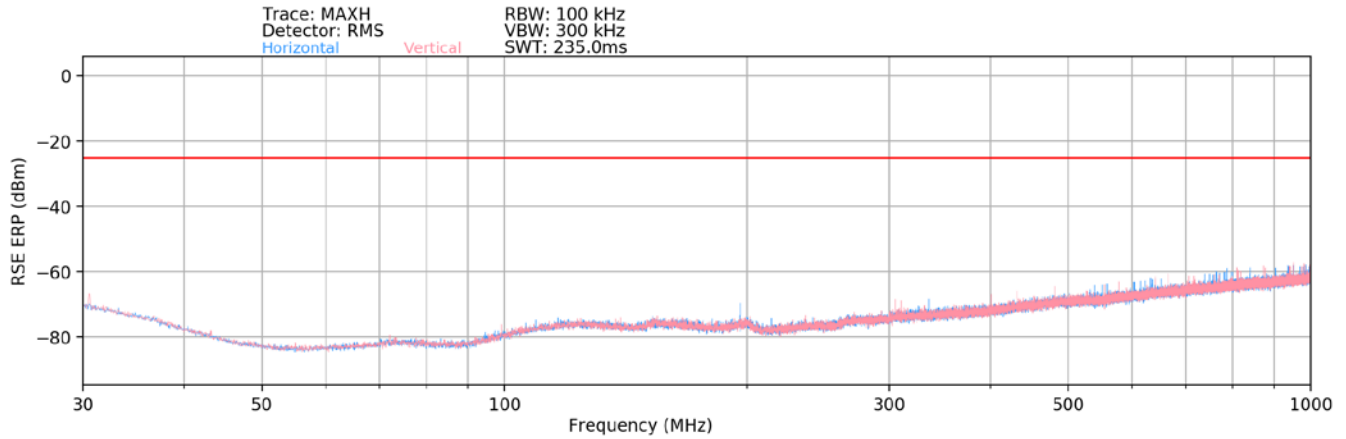
Case:	w/ Wireless Charging Pad
Bandwidth (MHz):	100
Frequency (MHz):	2546.0
RB / Offset:	1 / 136

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]
5092.00	V	177	24	-77.60	4.45	33.85	-61.40	-25.00	-36.40
7638.00	V	128	299	-72.47	7.84	42.37	-52.88	-25.00	-27.88
10184.00	V	135	354	-74.19	11.03	43.84	-51.42	-25.00	-26.42
12730.00	V	135	319	-77.33	14.48	44.15	-51.11	-25.00	-26.11
15276.00	V	-	-	-78.51	15.94	44.43	-50.82	-25.00	-25.82
17822.00	V	-	-	-79.05	18.33	46.28	-48.98	-25.00	-23.98
20368.00	V	-	-	-57.51	2.10	51.59	-53.21	-25.00	-28.21

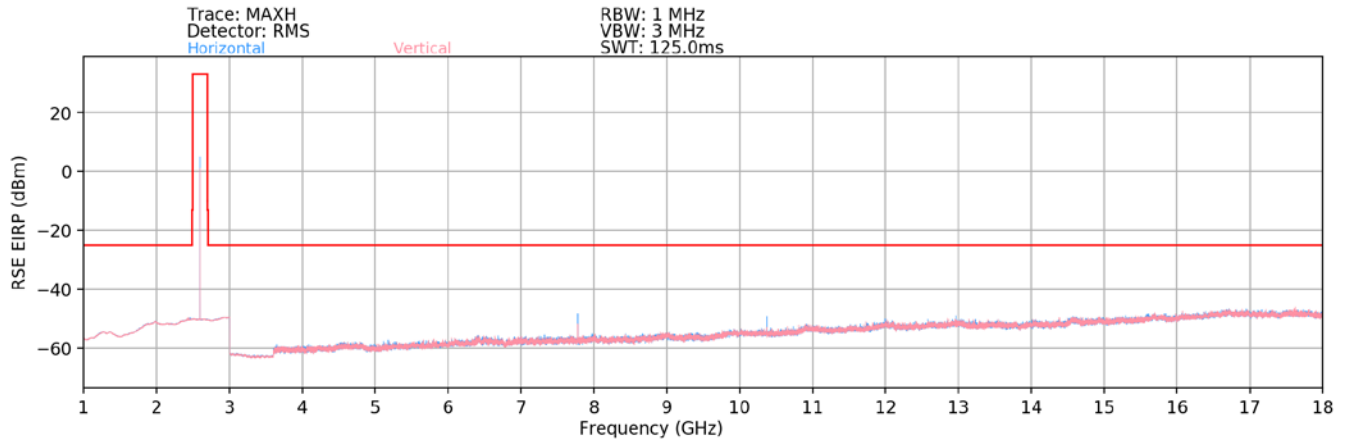
Table 7-17. Radiated Spurious Data with WCP (NR Band n41 – SRS2 – Ant D)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
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NR Band n41 – SRS3 – Ant E



Plot 7-58. Radiated Spurious Plot (NR Band n41 – SRS3 – Ant E)



Plot 7-59. Radiated Spurious Plot (NR Band n41 – SRS3 – Ant E)

Bandwidth (MHz):	100
Frequency (MHz):	2546.0
RB / Offset:	1 / 136

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]
5092.00	H	352	21	-75.73	-1.16	30.11	-65.15	-25.00	-40.15
7638.00	H	146	6	-68.47	3.10	41.63	-53.63	-25.00	-28.63
10184.00	H	246	338	-64.38	8.12	50.74	-44.52	-25.00	-19.52
12730.00	H	113	38	-70.39	10.17	46.78	-48.48	-25.00	-23.48
15276.00	H	-	-	-78.46	13.81	42.35	-52.91	-25.00	-27.91
17822.00	H	-	-	-79.13	15.89	43.76	-51.50	-25.00	-26.50
20368.00	H	-	-	-57.71	2.10	51.39	-53.41	-25.00	-28.41

Table 7-18. Radiated Spurious Data (NR Band n41 – Low Channel – SRS3 – Ant E)

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Bandwidth (MHz):	100
Frequency (MHz):	2593.0
RB / Offset:	1 / 136

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]
5186.00	H	179	8	-77.26	-0.77	28.97	-66.29	-25.00	-41.29
7779.00	H	139	6	-67.80	3.16	42.36	-52.90	-25.00	-27.90
10372.00	H	219	343	-71.41	7.01	42.60	-52.66	-25.00	-27.66
12965.00	H	134	33	-76.73	11.04	41.31	-53.95	-25.00	-28.95
15558.00	H	-	-	-80.26	14.06	40.80	-54.45	-25.00	-29.45
18151.00	H	-	-	-58.91	1.18	49.27	-55.53	-25.00	-30.53
20744.00	H	-	-	-57.44	2.73	52.29	-52.51	-25.00	-27.51

Table 7-19. Radiated Spurious Data (NR Band n41 – Mid Channel – SRS3 – Ant E)

Bandwidth (MHz):	100
Frequency (MHz):	2640.0
RB / Offset:	1 / 136



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]
5280.00	H	160	359	-75.26	-0.67	31.07	-64.19	-25.00	-39.19
7920.00	H	270	22	-68.98	3.25	41.27	-53.99	-25.00	-28.99
10560.00	H	210	343	-67.12	7.26	47.14	-48.12	-25.00	-23.12
13200.00	H	142	38	-75.18	11.20	43.02	-52.24	-25.00	-27.24
15840.00	H	-	-	-79.16	14.08	41.92	-53.34	-25.00	-28.34
18480.00	H	-	-	-57.95	1.13	50.18	-54.62	-25.00	-29.62
21120.00	H	-	-	-59.47	2.78	50.31	-54.49	-25.00	-29.49

Table 7-20. Radiated Spurious Data (NR Band n41 – High Channel – SRS3 – Ant E)

Case:	w/ Wireless Charging Pad
Bandwidth (MHz):	100
Frequency (MHz):	2546.0
RB / Offset:	1 / 136

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]
5092.00	H	131	337	-75.89	-1.16	29.95	-65.31	-25.00	-40.31
7638.00	H	153	323	-69.02	3.10	41.08	-54.18	-25.00	-29.18
10184.00	H	160	347	-69.52	8.12	45.60	-49.66	-25.00	-24.66
12730.00	H	220	22	-71.92	10.17	45.25	-50.01	-25.00	-25.01
15276.00	H	-	-	-78.78	13.81	42.03	-53.23	-25.00	-28.23
17822.00	H	-	-	-79.25	15.89	43.64	-51.62	-25.00	-26.62
20368.00	H	-	-	-57.49	2.10	51.61	-53.19	-25.00	-28.19

Table 7-21. Radiated Spurious Data with WCP (NR Band n41 – SRS3 – Ant E)

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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.

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.

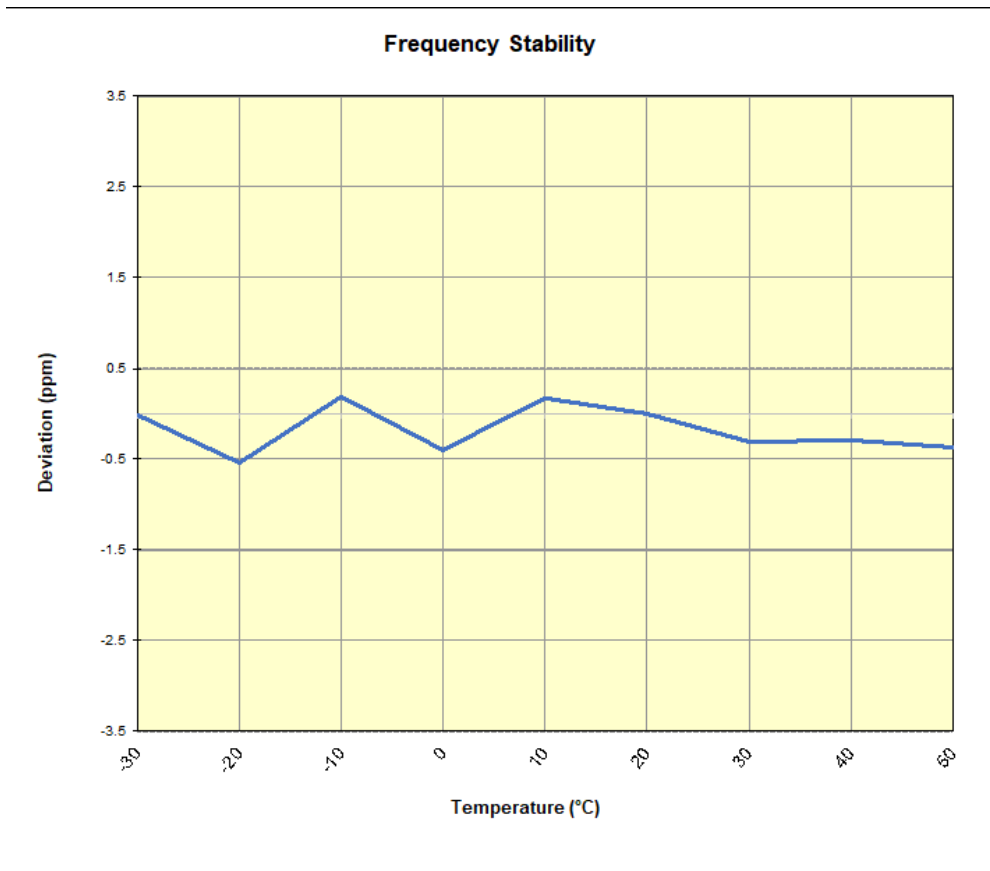
Test Notes

None

FCC ID: A3LSMS901E	 PCTEST Proud to be part of Element	PART 27 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Technical Manager
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NR Band n41					
Operating Frequency (Hz):		2,593,000,000			
Ref. Voltage (VDC):		4.40			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	- 30	2,592,972,345	-45	-0.0000017
		- 20	2,592,970,996	-1,394	-0.0000537
		- 10	2,592,972,862	472	0.0000182
		0	2,592,971,365	-1,025	-0.0000395
		+ 10	2,592,972,835	445	0.0000172
		+ 20 (Ref)	2,592,972,389	0	0.0000000
		+ 30	2,592,971,573	-816	-0.0000315
		+ 40	2,592,971,618	-771	-0.0000297
Battery Endpoint	3.85	+ 20	2,592,971,298	-1,092	-0.0000421

Table 7-22. NR Band n41 Frequency Stability Data





Plot 7-60. NR Band n41 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: A3LSMS901E** complies with all the requirements of Part 27 of the FCC rules.

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