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PART 27 MEASUREMENT REPORT

Applicant Name:

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

Date of Testing:

11/19/2021 - 12/02/2021 **Test Report Issue Date:** 12/16/2021 **Test Site/Location:** PCTEST Lab. Columbia, MD, USA **Test Report Serial No.:** 1M2109290114-04.A3L

FCC ID: APPLICANT:

A3LSMS901E

Samsung Electronics Co., Ltd.

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part: Test Procedure(s):

Certification SM-S901E/DS SM-S901E Portable Handset PCS Licensed Transmitter Held to Ear (PCE) 27 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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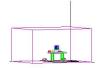


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				Ell		
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Max. Power [W]	Max. Power [dBm]	Emission Designator
		π/2 BPSK	1720.0 - 1770.0	0.205	23.12	18M0G7D
	20 MHz	QPSK	1720.0 - 1770.0	0.203	23.07	19M0G7D
		16QAM	1720.0 - 1770.0	0.170	22.30	19M0W7D
	15 MHz	π/2 BPSK	1717.5 - 1772.5	0.206	23.15	13M5G7D
		QPSK	1717.5 - 1772.5	0.201	23.03	14M0G7D
NR Band n66		16QAM	1717.5 - 1772.5	0.156	21.93	14M0W7D
ANT A	10 MHz	π/2 BPSK	1715.0 - 1775.0	0.193	22.86	9M04G7D
		QPSK	1715.0 - 1775.0	0.200	23.00	9M38G7D
-		16QAM	1715.0 - 1775.0	0.156	21.94	9M40W7D
		π/2 BPSK	1712.5 - 1777.5	0.201	23.03	4M54G7D
	5 MHz	QPSK	1712.5 - 1777.5	0.194	22.88	4M55G7D
		16QAM	1712.5 - 1777.5	0.160	22.04	4M53W7D

Overview Table (NR Band n66 (Ant A))

				EI		
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Max. Power [W]	Max. Power [dBm]	Emission Designator
		π/2 BPSK	1720.0 - 1770.0	0.106	20.25	17M9G7D
	20 MHz	QPSK	1720.0 - 1770.0	0.103	20.14	19M0G7D
		16QAM	1720.0 - 1770.0	0.081	19.11	19M0W7D
	15 MHz	π/2 BPSK	1717.5 - 1772.5	0.126	20.99	13M5G7D
		QPSK	1717.5 - 1772.5	0.100	20.02	14M0G7D
NR Band n66		16QAM	1717.5 - 1772.5	0.091	19.59	14M0W7D
ANT F		π/2 BPSK	1715.0 - 1775.0	0.135	21.29	9M03G7D
	10 MHz	QPSK	1715.0 - 1775.0	0.101	20.05	9M39G7D
_		16QAM	1715.0 - 1775.0	0.077	18.89	9M36W7D
		π/2 BPSK	1712.5 - 1777.5	0.137	21.36	4M56G7D
	5 MHz	QPSK	1712.5 - 1777.5	0.102	20.10	4M51G7D
		16QAM	1712.5 - 1777.5	0.082	19.14	4M52W7D

Overview Table (NR Band n66 (Ant F))

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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.: 1612M, 1122M, 1603M, 1604M

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 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

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

2.4 Software and Firmware

The test was conducted with firmware version S901EXXU1AUL2 installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

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 wooden turntable 80cm above the ground plane and 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. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then 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:

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

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

For fundamental radiated power measurements, the guidance of KDB 971168 D01 v03r01 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-E-2016.

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.

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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 (±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). Measurement antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description Cal Date Cal Interval C		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	MY54500644
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

Emission Designator

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 – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average 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 analzyer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So, 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 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):	LTE/NR/UL-CA

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
	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
CONDUCTED	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
CONDI	Conducted Band Edge / Spurious Emissions (NR Band n66)	2.1051, 27.53(h)	≥ 43 + 10 log (P[Watts]) dB of attenuation below transmitter power	PASS	Sections 7.4, 7.5
	Peak-to-Average Ratio (NR Band n66)	27.50(d)(5)	≤ 13 dB	PASS	Section 7.6
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block	PASS	Section 7.9
RADIATED	Equivalent Isotropic Radiated Power (NR Band n66)	27.50(d)(10)	≤ 1 Watt max. EIRP	PASS	Section 7.7
RADI	Radiated Spurious Emissions (NR Band n66)	2.1053, 27.53(h)	≥ 43 + 10 log (P[Watts]) dB of attenuation below transmitter power	PASS	Section 7.8

 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 shown in Section 7.0 were 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) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST EMC Software Tool v1.1.

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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 = $2 \times OBW$ to $3 \times OBW$
- 2. RBW = 1% to 5% of the OBW
- 3. Number of measurement points in sweep \geq 2 x span / 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

Test Note

Conducted power measurements are evaluated for simultaneous transmission of two LTE carriers operating in different bands (inter-band LTE ULCA). The powers were investigated while both bands are operating at their widest supported channel bandwidth.

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	PCC					SCC						
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	PCC Conducted Power [dBm]	SCC Conducted Power [dBm]	Inter-Band ULCA Total Tx. Power (dBm)
			QPSK	50/0				QPSK	100/0	22.77	18.50	24.15
			QPSK	1/0				QPSK	1/0	23.92	18.32	24.98
		Low	QPSK	1/25			Low	QPSK	1/50	23.87	18.56	24.99
			QPSK	1/49				QPSK	1/99	23.67	18.15	24.74
			16Q	1/0				16Q	100/0	23.28	18.44	24.51
			QPSK	50/0				QPSK	100/0	22.73	18.46	24.11
			QPSK	1/0				QPSK	1/0	23.79	18.31	24.87
B12	10	Mid	QPSK	1/25	B66	20	Mid	QPSK	1/50	23.73	18.66	24.91
			QPSK	1/49				QPSK	1/99	23.74	18.27	24.82
			16Q	1/0				16Q	1/50	22.99	18.54	24.32
			QPSK	50/0				QPSK	100/0	22.75	18.31	24.08
			QPSK	1/0				QPSK	1/0	23.77	18.37	24.87
		High	QPSK	1/25			High	QPSK	1/50	23.79	18.38	24.89
			QPSK	1/49				QPSK	1/99	23.74	18.55	24.89
			16Q	1/25				16Q	1/99	22.96	18.42	24.27

Table 7-2. Conducted Power Output Data (ULCA LTE Band 12 (Ant A) – Band 66 (Ant A))

		PCC					SCC					
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	Power	SCC Conducted Power [dBm]	Inter-Band ULCA Total Tx. Power (dBm)
			QPSK	100/0				QPSK	100/0	20.17	20.74	23.47
			QPSK	1/0				QPSK	1/0	20.36	21.43	23.94
		Low	QPSK	1/50			Low	QPSK	1/50	20.60	21.45	24.06
			QPSK	1/99				QPSK	1/99	20.23	21.30	23.81
			16Q	1/50				16Q	1/50	19.86	20.89	23.42
			QPSK	100/0				QPSK	100/0	19.73	20.74	23.27
			QPSK	1/0				QPSK	1/0	20.14	21.22	23.72
B4	20	Mid	QPSK	1/50	B2	20	Mid	QPSK	1/50	20.49	21.24	23.89
			QPSK	1/99				QPSK	1/99	19.80	21.33	23.64
			16Q	1/50				16Q	1/99	20.08	20.83	23.48
			QPSK	100/0				QPSK	100/0	19.70	20.71	23.24
			QPSK	1/0				QPSK	1/0	20.02	21.23	23.68
		High	QPSK	1/50			High	QPSK	1/50	20.07	21.31	23.74
			QPSK	1/99				QPSK	1/99	19.78	21.28	23.6
			16Q	1/50				16Q	1/50	19.52	20.82	23.23

Table 7-3. Conducted Power Output Data (ULCA LTE Band 4 (Ant A) – Band 2 (Ant F))

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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 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within
 - 1-5% of the 99% occupied bandwidth observed in Step 7

Test Setup

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



Figure 7-2. Test Instrument & Measurement Setup

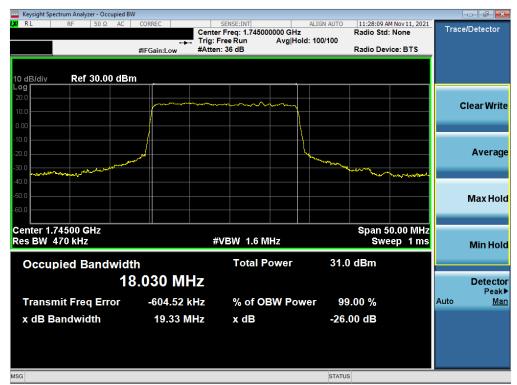
Test Notes

None.

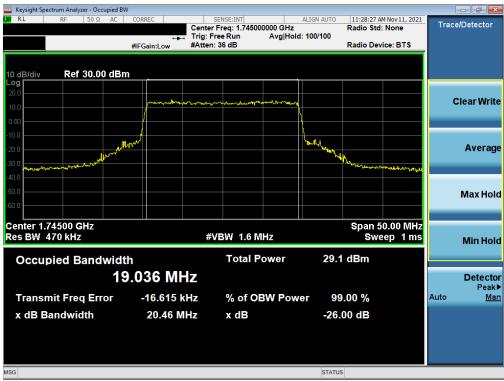
FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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NR Band n66 – ANT A



Plot 7-1. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz DFT's-OFDM BPSK - Full RB – ANT A)



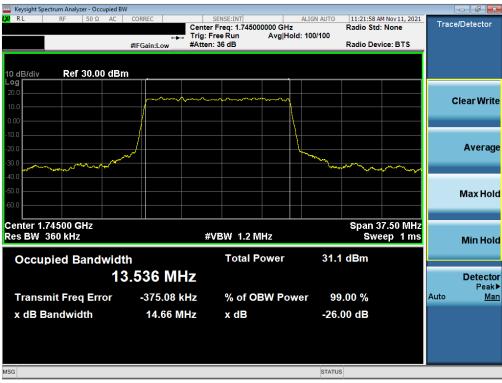
Plot 7-2. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB - ANT A)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupied					
LX RL RF 50 Ω AC	CORREC	SENSE:INT Center Freq: 1.74500 Trig: Free Run	ALIGN AUTO 0000 GHz Avg Hold: 100/100	11:28:46 AM Nov 11, 2021 Radio Std: None	Trace/Detector
	#IFGain:Low	#Atten: 36 dB		Radio Device: BTS	
10 dB/div Ref 30.00 dE	3m				
Log 20.0 10.0	Journey Lograd	hannan	-mm-martin		Clear Write
0.00 -10.0	لللمراد		h.tre		
-20.0 -30.0			Internet in the second se	hally	Average
-40.0					Max Hold
Center 1.74500 GHz Res BW 470 kHz		#VBW 1.6 M	Hz	Span 50.00 MHz Sweep 1 ms	Min Hold
Occupied Bandwid	dth	Total P	ower 28.3	dBm	
1	8.980 MH	z			Detector Peak►
Transmit Freq Error	-56.905 k	Hz % of OE	BW Power 99	.00 %	Auto <u>Man</u>
x dB Bandwidth	20.22 MI	Hz xdB	-26.	00 dB	
MSG			STATUS	3	

Plot 7-3. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 16QAM - Full RB – ANT A)



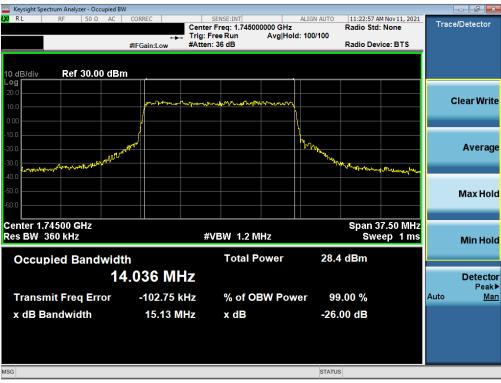
Plot 7-4. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)

FCC ID: A3LSMS901E	Post to be part of the element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager	
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🌉 Keysight Spectrum Analyzer - Oo										- 0 ×
LX/ RL RF 50 Ω	2 AC	CORREC		NSE:INT	0000 GHz	ALIGN AUTO	11:22:33 A Radio Std	M Nov 11, 2021	Trace	e/Detector
			📑 Trig: Fre	e Run		i: 100/100				
		#IFGain:Low	#Atten: 3	36 dB			Radio Dev	rice: BTS		
10 dB/div Ref 30.0	0 dBm									
20.0										
10.0		m	n-Auroral	manan	m				C	Clear Write
0.00					<u>ا</u>				_	
-10.0						}				
-20.0		الہ								Average
~~~	Martin					Mon Martin				
-30.0 -40.0							And and a second se	Montering		
-50.0										
										Max Hold
-60.0									_	_
Center 1.74500 GHz							Span 3	7.50 MHz		
Res BW 360 kHz			#VI	#VBW 1.2 MHz			Outpan dinta			Min Hold
				Total P	ower	20.4	9.1 dBm			
Occupied Band				TOLAT	ower	29.1	иыш			
	14.	041 M	HZ							Detector
Transmit Freq Er	ror	-84.762	kHz	% of O	BW Pow	er 99	.00 %		Auto	Peak▶ <u>Man</u>
x dB Bandwidth		15.21	MHz	x dB		-26	00 dB			
		10.2 11				20.				
							,			
MSG						STATUS				

Plot 7-5. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB – ANT A)



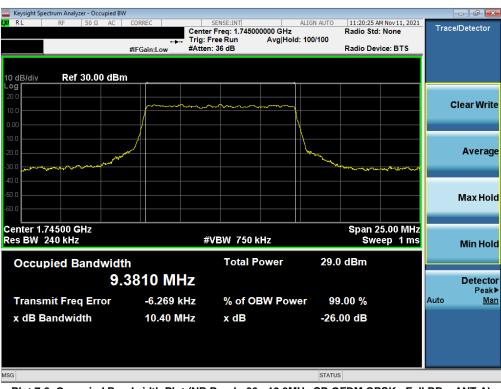
Plot 7-6. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 16QAM - Full RB - ANT A)

FCC ID: A3LSMS901E	PCTEST Poud to be part of @ element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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🔤 Keysight Spectrum Analyze												
LXIRL RF	50 Ω AC	CORR	EC		NSE:INT reg: <b>1.74500</b>	0000 GHz	ALIGN	AUTO	11:18:30 A Radio Std	M Nov 11, 2021	Trace	/Detector
			+	. Trig: Fre	e Run	Avg Ho	ld: 100/	100				
		#IFGa	ain:Low	#Atten: 3	6 dB				Radio Dev	ice: BTS		
10 dB/div Ref Log	30.00 d	Bm										
20.0				<u>م</u>								
10.0			~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~					C	lear Write
0.00		/									_	
-10.0		/										
-20.0												Average
	M	Mr Mr					- 10 M	w.				
-30.0 workwork for work	m							20 m	man and a start of the start of	man hann		
-50.0												
-60.0												Max Hold
-00.0											_	_
Center 1.74500 G	Hz								Span 2	5.00 MHz		
Res BW 240 kHz				#VE	3W 750 k	Hz			Swe	ep 1 ms		Min Hold
	o modu via	dtb			Total P	ower		24.4	dBm			
Occupied Ba					Total I	Ower		51.1	ubm			
	, c	9.044	11 MI	Z								Detector Peak▶
Transmit Freq	I Error	-1	82.97	Hz	% of O	<b>BW Pov</b>	ver	99	.00 %		Auto	Man
x dB Bandwid			9.684 M	<b>U</b> -	x dB			26 (	00 dB			
	un		9.004 W	ΠΖ	хив			-20.0	JU UB			
MSG								STATUS				

Plot 7-7. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz DFT-s-OFDM BPSK - Full RB – ANT A)



Plot 7-8. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB - ANT A)

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Keysight Spectrum Analyzer -						
RL RF 50	Ω AC	CORREC	SENSE:INT Center Freg: 1.7450	ALIGN AUTO	11:20:51 AM Nov 11, 2021 Radio Std: None	Trace/Detector
		- <b>-</b>	Trig: Free Run #Atten: 36 dB	Avg Hold: 100/100	Radio Device: BTS	
	.00 dBn	n				
<b>og</b> 20.0 10.0		Junka junina dela		mound		Clear Writ
0.00 10.0 20.0	Mulurular .	AVIN		- Mana		Averag
0.0 	were and the second sec				an a	Max Hol
enter 1.74500 GHz					Span 25.00 MHz	
es BW 240 kHz			#VBW 750	kHz	Sweep 1 ms	Min Hol
Occupied Bar	dwidt	h	Total F	Power 28.3	3 dBm	
	9.	3991 MH	Z			Detecto Peak
Transmit Freq E	rror	-24.467 kH	lz % of O	BW Power 99	0.00 %	Auto <u>Ma</u>
x dB Bandwidth		10.27 MH	lz xdB	-26.	00 dB	
G				STATU		

Plot 7-9. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 16QAM - Full RB - ANT A)



Plot 7-10. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)

FCC ID: A3LSMS901E	POIDE ST*	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager	
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Keysight Spectrum Analyzer - Occupied	BW				
RL RF 50Ω AC		SENSE:INT er Freg: 1.745000	ALIGN AUTO	11:04:48 AM Nov 11, 2 Radio Std: None	Trace/Detector
	🛶 Trig:	er Free Run Free Run En: 36 dB	Avg Hold: 100/100	Radio Std: None Radio Device: BTS	
0 dB/div Ref 30.00 dE	3m				
		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~		Clear Writ
				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Averag
					Max Hol
enter 1.745000 GHz es BW 120 kHz		VBW 1.2 MH	z	Span 12.50 M Sweep 1 n	
Occupied Bandwig	ith	Total Po	ower 28.9	dBm	
4	.5521 MHz				Detecto
Transmit Freq Error	-4.064 kHz	% of OE	W Power 99	.00 %	Auto <u>Ma</u>
x dB Bandwidth	5.362 MHz	x dB	-26.	00 dB	
G			STATUS		

Plot 7-11. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM QPSK - Full RB – ANT A)



Plot 7-12. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 16QAM - Full RB - ANT A)

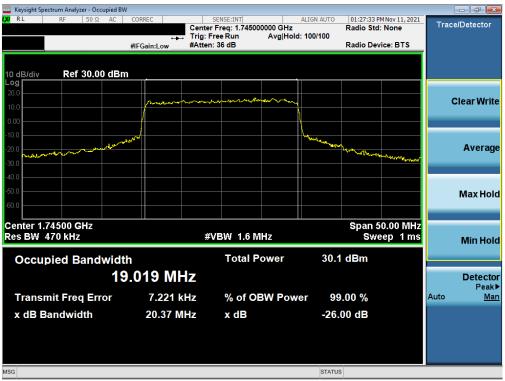
FCC ID: A3LSMS901E	Pot to be part of & element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 19 of 87	
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# NR Band n66 – ANT F

🔤 Keysight Spectrum Analyze	er - Occupied BV	V						
LXIRL RF	50 Ω AC	CORREC	SENSE:INT		IGN AUTO 01:26:07 Radio St	PM Nov 11, 2021	Trace/E	Detector
		+	Trig: Free Run	Avg Hold: 1	00/100			
		#IFGain:Low	#Atten: 36 dB		Radio De	vice: BTS		
10 dB/div Ref 3	30.00 dBn	n						
20.0			ᠰᢧᡨ᠕ᡟ᠆᠋ᢙᠬ᠋ᢧᡟ᠇᠋ᢧ᠇ᡀ᠇ᡀᢇᠬᡏ	M.A				
10.0		preventer		In a market with the second se			Cle	ear Write
0.00								
-10.0								
-20.0		and the second s		<b>\.</b>				Average
-30.0	which had	<b>~</b>			Jahan Haller and management	mon when we		
-40.0								
-50.0							Ν	/lax Hold
-60.0								nux noru
Center 1.74500 GI Res BW 470 kHz	Hz		#VBW 1.6	MUZ		50.00 MHz eep 1 ms		
Kes DW 470 KH2			#4044 1.0	IVINZ	5₩	eep mis	1	Min Hold
Occupied Ba	andwidt	h	Total	Power	30.9 dBm			
		7.884 MI	47					Detector
		.004 Mi	12					Peak►
Transmit Freq	Error	-517.98	kHz % of (	DBW Power	99.00 %		Auto	<u>Man</u>
x dB Bandwid	th	19.07 N	lHz x dB		-26.00 dB			
MSG					STATUS			

Plot 7-13. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)



Plot 7-14. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB - ANT F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager	
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Keysight Spectrum Analyze	r - Occup	pied BW									
RL RF	50 Ω	AC	CORREC		SENSE:INT		ALIGN AUTO		M Nov 11, 2021	Tree	e/Detector
		#	#IFGain:Low	🛶 Trig: F	Freq: 1.7450 ree Run : 36 dB		d: 100/100	Radio Std Radio Dev		TTAC	erDelector
0 dB/div <b>Ref 3</b>	0.00	dBm									
			monunter	╱═╾╍╼╘┶╌╍╬┎╿┝╍╱╒	www.	^{wnw} heter ^{to} and the state				(	Clear Writ
0.00 0.0 0.0 0.0	Wayer (	J. And S. C. Market	^				www.auriardy	And the second	WWW WWW		Averag
).0  .0  .0											Max Ho
enter 1.74500 GH es BW 470 kHz	lz			#	VBW 1.6 I	MHz			0.00 MHz ep 1 ms		Min Ho
Occupied Ba	ndv	vidth			Total I	Power	29.4	dBm			
			967 N	۱Hz							Detect
<b>Transmit Freq</b>	Erro	r	8.127	7 kHz	% of C	BW Pow	ver 99	.00 %		Auto	M
x dB Bandwidt	th		20.34	MHz	x dB		-26.	00 dB			
3							STATUS	5			

Plot 7-15. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 16QAM - Full RB – ANT F)

Keysight Spectrum Analyzer - Occupied	BW				
<b>LXI</b> R L RF 50 Ω AC	CORREC			PM Nov 11, 2021	Trace/Detector
	Cent	er Freq: 1.745000000 GHz Free Run Avg Hold:	Radio St	d: None	Trace/Delector
		en: 36 dB		evice: BTS	
· · · · · · · · · · · · · · · · · · ·	an ouncou				
10 dB/div Ref 30.00 dE	3m				
20.0					
		m			Clear Write
10.0					
0.00					
-10.0					
-20.0		<u> </u>	~~~~~~		Average
-30.0			a que C	man	Ŭ
-40.0					
-50.0					Max Hold
-60.0					
Center 1.74500 GHz				37.50 MHz	
Res BW 360 kHz		#VBW 1.2 MHz	Sv	veep 1 ms	Min Hold
Occupied Bandwid	ith	Total Power	31.0 dBm		
1	3.527 MHz				Detector
					Peak►
Transmit Freq Error	-360.06 kHz	% of OBW Powe	r 99.00 %		Auto <u>Man</u>
x dB Bandwidth	14.56 MHz	x dB	-26.00 dB		
	14.50 MHZ	Xub	-20.00 UB		
MSG			STATUS		
	water all the Direct (NID				

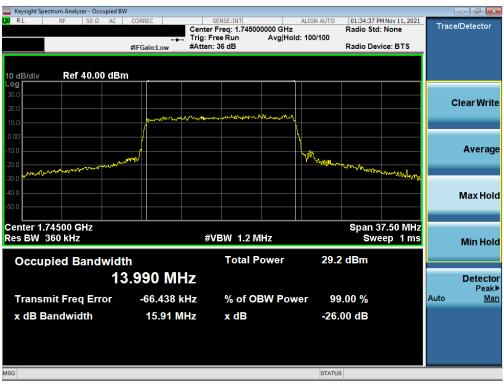
Plot 7-16. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)

FCC ID: A3LSMS901E	POIDE ST*	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager	
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🔤 Keysight Spectrum Analyzer - Occupied E	3W				
L <mark>X/</mark> RL RF 50Ω AC	CORREC	SENSE:INT Center Freg: 1.74500	ALIGN AUTO	01:34:28 PM Nov 11, 2021 Radio Std: None	Trace/Detector
		Trig: Free Run	Avg Hold: 100/100		
	#IFGain:Low	#Atten: 36 dB		Radio Device: BTS	
10 dB/div Ref 40.00 dB	m				
30.0					
					Clear Write
20.0	mar	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Ranson and		
10.0			1		
0.00					_
-10.0					Average
-20.0				mm mm	
-30.0				M. market	
-40.0					Max Hold
-50.0					
Center 1.74500 GHz Res BW 360 kHz		#VBW 1.2 №		Span 37.50 MHz	
Res BW JOU KHZ		#VDVV 1.2 IV		Sweep 1 ms	Min Hold
Occupied Bandwid	th	Total P	ower 29.8	3 dBm	
	4.049 MH				Detector
	4.049 IVIN	Z			Detector Peak▶
Transmit Freq Error	-66.055 kl	Hz % of Ol	BW Power 99	9.00 %	Auto <u>Man</u>
x dB Bandwidth	15.25 MI	Hz xdB	26	00 dB	
	13.23 Mi		-20.		
MSG			STATU	S	

Plot 7-17. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB - ANT F)



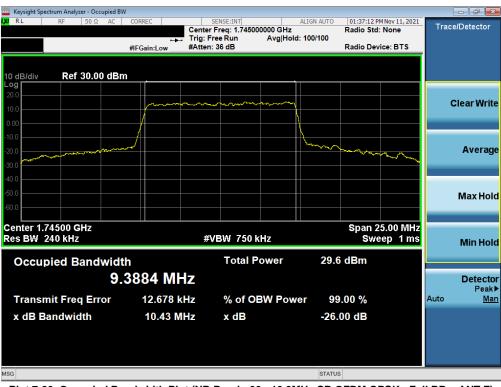
Plot 7-18. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 16QAM - Full RB - ANT F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager	
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Keysight Spectrum Analyze											
RL RF	50Ω A	AC COR	REC		NSE:INT rea: 1.7450	00000 GH-	ALIGN AUT	01:36:28	PM Nov 11, 2021	Trac	e/Detector
		што	⊶ Gain:Low		e Run		old: 100/100	)	vice: BTS		
		#IFC	ain:Low	#Atten.				Radio De	VICE. DT3		
0 dB/div Ref 3	30.00 c	ıвт									
20.0											<b>0</b> 1
0.0											Clear Writ
0.00							\				
0.0		/					1				
20.0											Averag
0.0	m n	مسمسمهم					~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\sim\sim\sim$		
0.0											
0.0											
50.0											Max Hol
enter 1.74500 Gl	Hz								25.00 MHz		
tes BW 240 kHz				#V	BW 750	kHz		Sw	eep 1 ms		Min Hol
Occupied Ba	andw	idth			Total I	Power	3	0.7 dBm			
Occupica De											
		9.02	82 MI	ĦΖ							Detecto Peak
Transmit Freq	Error		177.98	kHz	% of O	BW Po	wer	99.00 %		Auto	Ma
x dB Bandwid			9.821 N		x dB			26.00 dB			
	ui		9.0211	INZ	хub		-2	0.00 UB			
G							ST	ATUS			

Plot 7-19. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)



Plot 7-20. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB - ANT F)

FCC ID: A3LSMS901E	Pout to be part of @ element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager	
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Keysight Spectrum Analyzer										
KIRL RF	50 Ω AC	CORREC	Cente	SENSE:INT r Freq: 1.7450	00000 GHz	ALIGN AUTO	01:37:30 P Radio Std	MNov 11, 2021	Trace	e/Detector
		#IFGain:Low	Trig: F	Free Run 1: 36 dB		d: 100/100	Radio Dev			
		#IFGaIN:LOW	#Atter	1. 00 0.5			Radio Dev	ice. D13		
10 dB/div Ref 3	0.00 dBr	20								
	0.00 UBI	<u> </u>								
20.0										Clear Writ
10.0		Januar J	Mallaconara	~~~lu~~bd~~m~~					``	
0.00										
10.0						<b>N</b>				
20.0	Married Bally	p.m/m/				Martin an	Jul man	win a		Averag
30.0 <b></b>								Ind all the		
40.0										
50.0										Max Hol
60.0										
Center 1.74500 GH	-						Enon 1	5.00 MHz		
les BW 240 kHz	2		#	VBW 750	kHz			ep 1 ms		Min Hol
Occupied Ba	ndwid	th		Total F	ower	29.1	dBm			
	9.	3613	ИНz							Detecto
Tranomit Frag	Error	24 77	8 kHz	% of O	BW Pow	00	.00 %		Auto	Peak Ma
Transmit Freq					BWFOW				Auto	IVIA
x dB Bandwidt	h	10.2	) MHz	x dB		-26.	00 dB			
SG						STATUS	5			

Plot 7-21. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 16QAM - Full RB – ANT F)



Plot 7-22. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)

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Keysight Spectrum Analyzer - Occupied BV	V					- d	X
RL RF 50Ω AC	CORREC	SENSE:INT ter Freg: 1.7450		AUTO 01:43:01 F Radio Std	MNov 11, 2021	Trace/Detect	or
	Trig:	: Free Run en: 36 dB	Avg Hold: 100				
0 dB/div Ref 30.00 dBr	n						
20.0						ClearW	/rit
				Mar Martin	- man	Aver	ag
0.0 0.0 0.0						Max H	lo
enter 1.745000 GHz es BW 120 kHz		VBW 1.2 M	Hz		12.50 MHz eep 1 ms	Min H	ю
Occupied Bandwidt	'n	Total F	Power	28.9 dBm			
	5137 MHz					Dete	cto
Transmit Freq Error	-5.411 kHz	% of O	BW Power	99.00 %			Ma
x dB Bandwidth	5.321 MHz	x dB		-26.00 dB			
G				STATUS			

Plot 7-23. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM QPSK - Full RB - ANT F)



Plot 7-24. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 16QAM - Full RB - ANT F)

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# 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 18GHz (separated into at least two plots per channel)
- 2. RBW ≥ 100kHz
- 3. VBW  $\geq$  3 x RBW
- 4. Detector = RMS
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

#### Test Setup

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



Figure 7-3. Test Instrument & Measurement Setup

#### Test Notes

- 1. Per Part 27 and RSS-139, 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 and a resolution bandwidth of 1MHz for measurements above 1GHz.
- 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.
- 3. Spurious emissions measurements are included in this section to address compliance of the LTE ULCA capability. The EUT was set to transmit at the widest bandwidth and on the middle channel of each band.

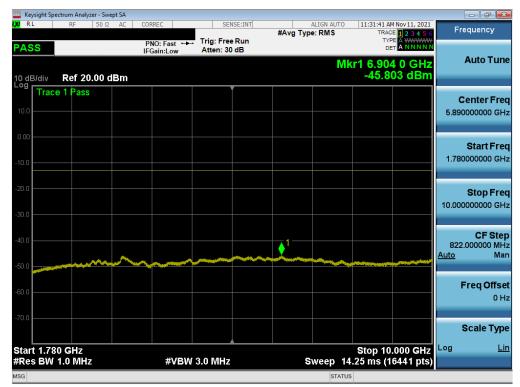
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# NR Band n66 – ANT A

	ctrum Analy												
(RL	RF	50 Ω	AC	CORREC			NSE:INT	#Avg Ty	ALIGN AUTO	TRA	M Nov 11, 2021	Fr	requency
PASS				PNO: Fa	ast ⊶⊷ .ow	Atten: 30							Auto Tune
0 dB/div	Ref 20	).00 di	Bm						М	kr1 1.70 -46.	9 5 GHz 45 dBm		Auto Tune
Trac	e 1 Pass											(	Center Free
10.0												870	0.000000 MH
0.00													
40.0												30	Start Free 0.000000 MH
10.0													
20.0													Stop Fre
30.0												1.71	0000000 GH
													CF Ste
40.0											1	168 Auto	3.000000 MH Ma
50.0						مەدىيىتىرىلە تورىلە	and the second second second					Auto	in a
60.0	**************************************	********	Managara da Man Managara da Managara da Mana	ter de la construction de la									Freq Offse
													0 H
70.0													Scale Type
										04			Li
Start 0.03 Res BW		z		\$	¢VBW	3.0 MHz			Sweep :	Stop 1. 2.240 ms (	7100 GHz (3361 pts)	LUg	
ISG									STATU	IS			

Plot 7-25. Conducted Spurious Plot (NR Band n66 -20MHz - 1 RB - Low Channel - ANT A)



Plot 7-26. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Low Channel – ANT A)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	ctrum Analyzer - Swe										
L <mark>XI</mark> RL	RF 50 Ω	AC CO	RREC	SEI	SE:INT	#Avg Typ	ALIGN AUTO e: RMS		M Nov 11, 2021	Freq	uency
PASS			NO: Fast ↔ Gain:Low	Trig: Free Atten: 10				TY	PE A WWWWW		_
		IF	Gain:Low	Atten. It	ub		M	kr1 17.52	15647	A	uto Tune
10 dB/div Log	Ref 0.00 dB	m						-58.7	46 dBm		_
Trace	e 1 Pass									<b>C</b> a	nter Freq
-10.0											00000 GHz
-20.0											start Freq
											00000 GHz
-30.0											
-40.0											
											Stop Freq
-50.0										20.0000	00000 0112
											CF Step
-60.0					-						00000 GHz
-70.0										<u>Auto</u>	Man
										_	
-80.0										Fr	e <b>q Offset</b> 0 Hz
											0 H2
-90.0										50	ale Type
Start 10.0								Stop 20	.000 GHz	Log	Lin
#Res BW	1.0 MHz		#VBW	/ 3.0 MHz		S		25.33 ms (2	20001 pts)		
MSG							STAT	TUS			

Plot 7-27. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Low Channel - ANT A)



Plot 7-28. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Mid Channel – ANT A)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	ctrum Analyzer - Sw									
LXI RL	RF 50 Ω	AC C	ORREC	SE	NSE:INT	#Avg Typ	ALIGN AUTO		MNov 11, 2021	Frequency
PASS			PNO: Fast ↔ FGain:Low	Trig: Fre Atten: 3		#*** <b>9</b> **}P		TYP		
10 dB/div Log	Ref 20.00 c	lBm					Mł	(r1 5.98) -45.6	6 0 GHz 53 dBm	Auto Tune
10.0	e 1 Pass									Center Freq 5.89000000 GHz
-10.0										Start Freq 1.780000000 GHz
-20.0										<b>Stop Freq</b> 10.000000000 GHz
-40.0		<u>~~</u>			1			alibert Manual, og russisk		CF Step 822.000000 MHz <u>Auto</u> Man
-60.0										<b>Freq Offset</b> 0 Hz
-70.0										Scale Type
Start 1.78 #Res BW			#VBM	/ 3.0 MHz		s	weep 14	Stop 10 .25 ms <u>(</u> 1	.000 GHz 6441 pts)	
MSG							STATUS			

Plot 7-29. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Mid Channel - ANT A)



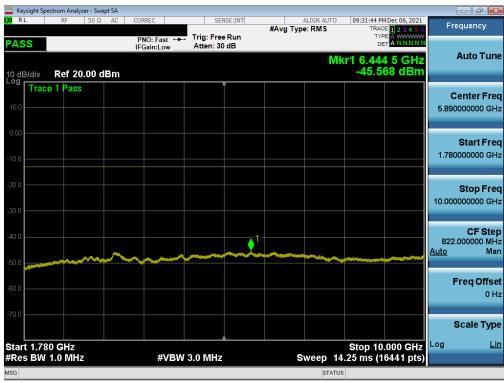
Plot 7-30. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Mid Channel - ANT A)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	ectrum Analyzer - Sv										
LXI RL	RF 50 S	2 AC	CORREC	SE	NSE:INT	#Avg Typ	ALIGN AUTO		Dec 06, 2021	Freq	uency
PASS			PNO: Fast + IFGain:Low	Trig: Fre Atten: 30		#C19 19P		TYP			
10 dB/div Log	Ref 20.00	dBm					MI	(r1 1.650 -49.78	0 GHz 34 dBm	A	uto Tune
10.0	e 1 Pass										n <b>ter Freq</b> 00000 MHz
-10.0											<b>tart Freq</b> 00000 MHz
-20.0											<b>top Freq</b> 00000 GHz
-40.0									¹	168.00 <u>Auto</u>	<b>CF Step</b> 00000 MHz Man
-60.0			1614-1-160 <u>0-1</u> 51614-16-16-16-16-16-16-16-16-16-16-16-16-16-	And an and a second	1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -			and an		Fr	e <b>q Offset</b> 0 Hz
-70.0											ale Type
Start 0.03 #Res BW			#VB	W 3.0 MHz			Sween 2	Stop 1.7 2.240 ms (3	100 GHz 3361 nts)	Log	Lin
MSG							STATUS		566 F p(5)		

Plot 7-31. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - High Channel - ANT A)



Plot 7-32. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - High Channel – ANT A)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	nt Spectrur	m Analyzer		: SA										
LXU RL		RF !	50 Ω	AC	CORREC		SEI	SE:INT	#Avg Typ	ALIGN AUT e: RMS		1 PM Dec 06, 2021 RACE 1 2 3 4 5 6	Fr	equency
PASS					PNO: F IFGain:I	ast ↔ _ow_	Trig: Free Atten: 10							
10 dB/di	iv R	ef 0.00	) dBr	n						М	kr1 17.5 -58	09 0 GHz 731 dBm		Auto Tune
	race 1	Pass											c	enter Freq
-10.0													15.000	0000000 GHz
-20.0														
													40.000	Start Freq
-30.0													10.000	000000 GHZ
-40.0														Stop Freq
													20.000	0000000 GHz
-50.0										1				
-60.0										and the second sec			1.000	CF Step
-70.0			, <b>1</b> 940 - 1940										<u>Auto</u>	Man
10.0														Freq Offset
-80.0													· ·	0 Hz
-90.0														
													:	Scale Type
Start 1											Stop	20.000 GHZ	Log	Lin
#Res E	SW 1.0	MHz				#VBW	3.0 MHz		S	_	_	(20001 pts)		
MSG										STA	TUS			

Plot 7-33. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - High Channel - ANT A)

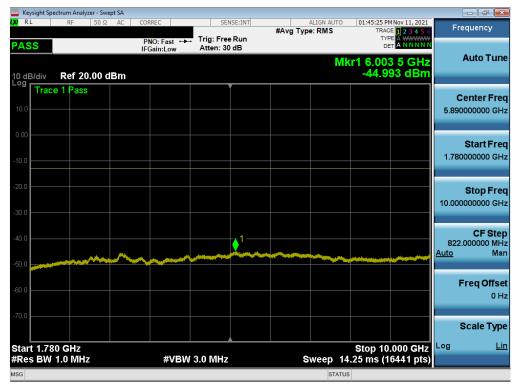
FCC ID: A3LSMS901E	PCTEST. Proud to be part of @ element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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# NR Band n66 – ANT F

Keysight Spectrum Analyzer -										
🗶 RL RF 50	Ω AC CORR	EC	SENS	E:INT	#Avg Type	ALIGN AUTO : RMS		Nov 11, 2021	Frequ	iency
PASS	PN0 IFGa		Trig: Free Atten: 30		•		TYP	E A WWWWW T A N N N N N		
10 dB/div Ref 20.00	) dBm					Mk	r1 1.709 -47.9	95 GHz 96 dBm	Αι	ito Tune
Trace 1 Pass			Ĭ						Cer	iter Freq
10.0									870.00	0000 MHz
0.00										
										art Freq
-10.0									30.00	
-20.0									S	op Freq
-30.0										0000 GHz
-30.0										
-40.0								1	168.00	CF Step
-50.0			مىلى مەرىپىيەر تىرىنى مەرىپىرىسىيەر يېرىسىيەر يېرىسىيەر يېرىسىيەر يېرىسىيەر يېرىسىيەر يېرىسىيەر يېرىسى يېرىسى			مى ئىلتىرىدۇرىرىرى بىرىنىدىرى	الاستان وريندر والاريد		<u>Auto</u>	Mar
an a far a sea far an		*****	an a						Fre	q Offset
-60.0										0 Hz
-70.0										
										ale Type
Start 0.0300 GHz #Res BW 1.0 MHz		#VBW 3.	0 MHz			Sween _2	Stop 1.7	'100 GHz 3361 pts)	Log	Lin
MSG DW TROTHINZ			w 191112			STATUS		5001 pts)		

Plot 7-34. Conducted Spurious Plot (NR Band n66 -20MHz - 1 RB - Low Channel - ANT F)



Plot 7-35. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Low Channel - ANT F)

FCC ID: A3LSMS901E	PCTEST* Proud to be part of @ element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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MRL       RF       SO Q       AC       CORREC       SENSERNT       ALIGN AUTO       DU SISSH PMNV 11,2021         MARS       THACE       DASS       DASS       THACE       DASS       DASS <th< th=""><th></th><th>ctrum Analyzer ·</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th<>		ctrum Analyzer ·										
PASS       PNO: fast	LXI RL	RF 5	OΩ AC	CORREC	SE	NSE:INT					Fre	quency
Import Prezent         Center Freq           100         Trace 1 Pass	PASS						#AY9 19P		TYI Di			
Trace 1 Pass       Center Freq         100       Start Freq         200       Start Freq         300       Start Freq         400       Start Freq         500       Stop Freq         600       Center Stop Stop Stop 20.000 GHz         700       Stop Stop 20.000 GHz         800       Stop Stop 20.000 GHz         900       Stop Stop 20.000 GHz         Start 10.000 GHz       WDW 3.0 MHz         WDW 3.0 MHz       Sweep 25.33 ms (20001 pts)	10 dB/div	Ref 0.00	dBm					Mkr	1 18.29 -57.9	5 5 GHz 40 dBm		Auto Tune
30.0       Start Freq         40.0       Stop Freq         50.0       Stop Freq         50.0       Image: Stop Freq         0       Image: Stop Freq         0       Image: Stop Freq         0       Image: Stop Freq         0.0       Image: Stop Freq         0.0       Image: Stop Freq         0.0       Image: Stop Freq         0.0       Image: Stop Freq	Trace	e 1 Pass										
Start 10.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz #VBW 3.0 MHz #VBW 3.0 MHz Start 10.000 GHz #VBW 3.0 MHz Start 10.000 GHz #VBW 3.0 MHz Start 10.000 GHz But for the start of the												•
300         1.00000000 GHz           700         1.0000000 GHz           800         1.0000000 GHz           900         1.0000000 GHz           Start 10.000 GHz         Stop 20.000 GHz           #Res BW 1.0 MHz         #VBW 3.0 MHz												
800     Freq Offset       900     Start 10.000 GHz       #Res BW 1.0 MHz     #VBW 3.0 MHz   Stop 25.33 ms (20001 pts)				h alfe alte da e para stad an alfe a gling get get get								000000 GHz
Start 10.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 25.33 ms (20001 pts)	-80.0										F	-
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 25.33 ms (20001 pts)												
				#VE	W 3.0 MHz		s	weep 25	Stop 20 5.33 ms (2	.000 GHz 0001 pts)	Log	

Plot 7-36. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Low Channel - ANT F)



Plot 7-37. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Mid Channel – ANT F)

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	ectrum Analyzer - S	Swept SA									×
LXI RL	RF 50	Ω AC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO		Nov 11, 2021	Frequency	
PASS			PNO: Fast ++- IFGain:Low	Trig: Free Atten: 30				TYF			
			IFGain:Low	Atten: 30	ub		MI	(r1 6.46 [,]		Auto Tu	ne
10 dB/div Log	Ref 20.00	dBm						-44.9	95 dBm		
Trac	e 1 Pass									Center Fr	ea
10.0										5.890000000 G	
0.00										Start Fr	-
-10.0										1.780000000 G	
-10.0											
-20.0										Stop Fr	-
										10.000000000 G	
-30.0											
(0.0										CF St	ep
-40.0					<b>1</b>					822.000000 M Auto M	IHz Ian
-50.0	-		~~~~	and the second						Auto M	an
										Freq Offs	e ot
-60.0											Hz
-70.0										Scale Ty	pe
										-	
Start 1.78 #Res BW			#\/B\M	3.0 MHz			ween 1/	Stop 10	.000 GHz 6441 pts)	Log <u>l</u>	<u>Lin</u>
MSG			#VDVV	5.0 19112			statu:		otter proj		
							onaro				

Plot 7-38. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Mid Channel - ANT F)



Plot 7-39. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - Mid Channel – ANT F)

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🔤 Keysight Spectrum Analyzer - Swept SA					
<b>LX/</b> RL RF 50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	01:48:00 PM Nov 11, 2021 TRACE 1 2 3 4 5 6	Frequency
PASS	PNO: Fast ↔ IFGain:Low	Trig: Free Run Atten: 30 dB	mitig type. tillo		
10 dB/div Ref 20.00 dBm			M	kr1 1.616 5 GHz -49.816 dBm	Auto Tune
10.0					Center Freq 870.000000 MHz
-10.0					Start Freq 30.000000 MHz
-20.0					<b>Stop Freq</b> 1.710000000 GHz
-40.0					CF Step 168.000000 MHz <u>Auto</u> Man
-60.0	n an				<b>Freq Offset</b> 0 Hz
-70.0					Scale Type
Start 0.0300 GHz #Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep	Stop 1.7100 GHz 2.240 ms (3361 pts)	Log <u>Lin</u>
MSG			STATU		

Plot 7-40. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - High Channel - ANT F)



Plot 7-41. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - High Channel – ANT F)

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M         RL         RF         50 Ω         AC         CORREC         SENSE:INT         ALION AUTO         01:48:28 PM Nov 11; 2021         Frequency           PASS         PNO: Fast IFGain:Low         Trig: Free Run Atten: 10 dB         #Avg Type: RMS         TRACE         12:3:4:5 G         TYPE         TYPE         Auto Tu           10 dB/div         Ref         0.00 dBm         -577.923 dBm         Auto Tu         Auto Tu         Center F         15.00000000 00         15.000000000 00         15.000000000 00         15.000000000 00         15.000000000 00         15.000000000 00         15.000000000 00         15.000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.000000000 00         15.000000000 00         15.0000000000 00         15.000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.0000000000 00         15.000000000000000<
PASS PNO: Fast +
10 dB/div Ref 0.00 dBm -57.923 dBm Center F
Trace 1 Pass Center F
-10.0
-20.0
Start F 10.00000000000000000000000000000000000
-30.0
-40.0 Stop F
20.00000000 0
-50.0
60.0 CF St 1,00000000 0
-80.0 Freq Off
Start 10.000 GHz         Stop 20.000 GHz         Log           #Res BW 1.0 MHz         #VBW 3.0 MHz         Sweep 25.33 ms (20001 pts)         Log
MSG STATUS

Plot 7-42. Conducted Spurious Plot (NR Band n66 - 20MHz - 1 RB - High Channel - ANT F)

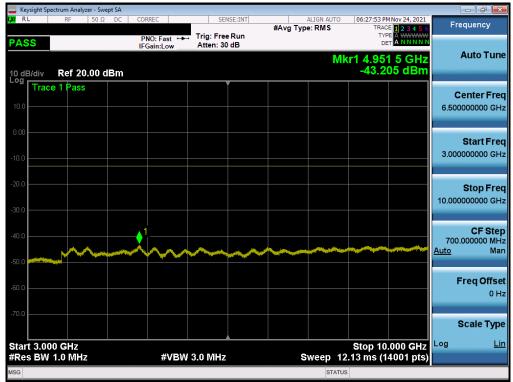
FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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## ULCA LTE Band 12 – Band 66

Y RI			ous Emissions					
		¥F 50 Ω	DC CORREC		SENSE:INT Freq: 707.500000   Free Run	ALIGN AUTO	06:27:32 PM Nov 24, 2021 Radio Std: None	Frequency
PASS	s		IFGain:Lo		n: 30 dB		Radio Device: BTS	
10 dB/	/div	Ref 30.00	dBm					
20.0			1					Center Fre
10.0								707.500000 MH
								707.500000 WIF
0.00								
10.0								
20.0 —								
30.0 —			-					
40.0								
-50.0								
.en n 🔤		an an an air air air an			a gaine and a strike a superficter	densisian in the landshirt of	the second s	
Start	30 MHz	Z					Stop 3 GHz	
			Stop Freg	RBW	Frequency	Amplitude		157.500000 MH
			Stop Freq 699.00 MHz	RBW	Frequency 695,00000 MHz	Amplitude	Stop 3 GHz	157.500000 MH
Spur	Range	Start Freq		1.000 MHz	695.000000 MHz	-55.46 dBm	∆ Limit	157.500000 MH <u>Auto</u> Ma
<b>Spur</b> 1 2	Range	Start Freq 30.000 MHz	699.00 MHz	1.000 MHz 1.000 MHz	695.000000 MHz	-55.46 dBm 23.16 dBm	Δ Limit -42.46 dB	Freq Offs
<b>Spur</b> 1 2 3	Range 1 2 3 4	<b>Start Freq</b> <b>30.000 MHz</b> 699.00 MHz 716.00 MHz 1.7100 GHz	699.00 MHz 716.00 MHz 1.7100 GHz 1.7800 GHz	1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz	695.000000 MHz 707.613333 MHz 1.415032520 GHz 1.744883333 GHz	-55.46 dBm 23.16 dBm -50.60 dBm 12.06 dBm	Δ Limit -42.46 dB -1.840 dB -37.60 dB -12.94 dB	157.500000 MH <u>Auto</u> Ma
Start Spur 1 2 3 4 5	Range 1 2 3	<b>Start Freq</b> <b>30.000 MHz</b> 699.00 MHz 716.00 MHz	699.00 MHz 716.00 MHz 1.7100 GHz	1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz	695.000000 MHz 707.613333 MHz 1.415032520 GHz	-55.46 dBm 23.16 dBm -50.60 dBm 12.06 dBm	Δ Limit -42.46 dB -1.840 dB -37.60 dB	157.500000 Mł <u>Auto</u> Ma <b>Freq Offs</b>
<b>Spur</b> 1 2 3 4	Range 1 2 3 4	<b>Start Freq</b> <b>30.000 MHz</b> 699.00 MHz 716.00 MHz 1.7100 GHz	699.00 MHz 716.00 MHz 1.7100 GHz 1.7800 GHz	1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz	695.000000 MHz 707.613333 MHz 1.415032520 GHz 1.744883333 GHz	-55.46 dBm 23.16 dBm -50.60 dBm 12.06 dBm	Δ Limit -42.46 dB -1.840 dB -37.60 dB -12.94 dB	157.500000 MH <u>Auto</u> Ma Freq Offs

Plot 7-43. Conducted Spurious Plot (ULCA LTE B12 - B66)



Plot 7-44. Conducted Spurious Plot (ULCA LTE B12 - B66)

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Keysight Spe	ectrum Analyz	ter - Swep	ot SA										
LXI RL	RF	50 Ω	DC	CORREC			NSE:INT	#Avg Ty	ALIGN AUT pe: RMS	TRA	M Nov 24, 2021 CE 1 2 3 4 5 6	Fr	equency
PASS	Ref 20	00 di	Bm	PNO: Fa IFGain:L	ast ↔ .ow	Trig: Free Atten: 30				Mkr1 19. -39.7	583 GHz 19 dBm		Auto Tune
Log	e 1 Pass												enter Freq 0000000 GHz
-10.0												10.000	Start Freq
-20.0												20.000	<b>Stop Fred</b> 0000000 GH2
-40.0		and the second	-	~~ <b>.</b> ~~	~	an a		<b>1</b> 25.000000000000000000000000000000000000			1	1.000 <u>Auto</u>	CF Step 0000000 GH: Mar
-60.0												F	F <b>req Offse</b> 0 Ha
-70.0													Scale Type
Start 10.0 #Res BW				#	≠vbw	3.0 MHz			Sweep	Stop 20 16.67 ms (1	).000 GHz  0001 pts)	Log	<u>Lin</u>
MSG									STA	TUS			

Plot 7-45. Conducted Spurious Plot (ULCA LTE B12 – B66)

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## 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 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.

# 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 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 <u>≥</u> 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

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#### Test Notes

Per 27.53(h) 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.

Per 27.53(g) for operations in the 663 - 698 MHz and 698 – 746MHz bands, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

Per 27.53(c)(5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c)(4) is 65 + 10  $\log_{10}(P) = -35$ dBm in a 6.25kHz bandwidth.

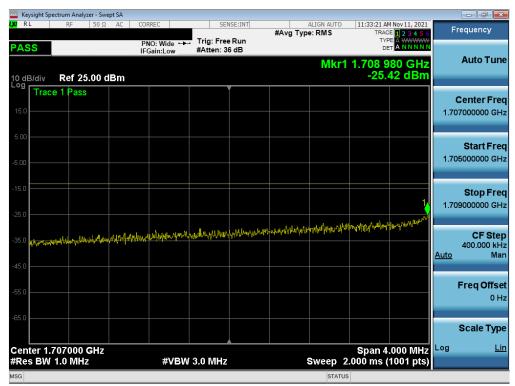
FCC ID: A3LSMS901E	PCTEST Proud to be part of @ element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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## NR Band n66 – ANT A



Plot 7-46. Lower Band Edge Plot (NR Band n66 - 20.0MHz - Full RB - ANT A)



Plot 7-47. Lower Extended Band Edge Plot (NR Band n66 – 20.0MHz - Full RB – ANT A)

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	Spectrum An	alyzer - Swe	ept SA									E	
LXU RL	RF	50 Ω	AC	CORREC		SE	NSE:INT	#Avg Typ	ALIGN AUTO		M Nov 11, 2021	Fred	quency
PASS				PNO: IFGain	Fast ⊶⊶ :Low	Trig: Fre #Atten: 3				TY			
10 dB/div	Ref :	25.00 c	iBm						Mk	1 1.780 -29.	05 GHz 84 dBm	Α	uto Tune
Log Tra	ce 1 Pa	SS											e <b>nter Freq</b> 00000 GHz
-5.00			m	- Nu	www.ww	· · · · · · · · · · · · · · · · · · ·							Start Freq 00000 GHz
-15.0							1						Stop Freq 00000 GHz
-35.0	when						Mullin	Wyrona				5.0 <u>Auto</u>	CF Step 00000 MHz Man
-55.0									- whynnedow	an a	nmm	Fr	r <b>eq Offset</b> 0 Hz
-65.0													cale Type
Center 1 #Res BM					#VBW	820 kHz			Sweep '	Span 5 1.000 ms (	0.00 MHz (1001 pts)	Log	<u>Lin</u>
MSG									STATU				

Plot 7-48. Upper Band Edge Plot (NR Band n66 - 20.0MHz - Full RB - ANT A)



Plot 7-49. Upper Extended Band Edge Plot (NR Band n66 - 20.0MHz - Full RB - ANT A)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	ctrum Analyzer - Si										
LXI RL	RF 50 9	Ω AC CC	ORREC	SEI	NSE:INT	#Avg Typ	ALIGN AUTO		MNov 11, 2021	Frequ	iency
PASS			NO: Wide ↔ Gain:Low	. Trig: Free #Atten: 3		- //		DE		Δι	ito Tune
10 dB/div Log	Ref 25.00	dBm					Mkr1 1	.709 96: -28.	2 5 GHz 18 dBm		
Trace	e 1 Pass				Í					Cer	iter Freq
15.0										1.71000	0000 GHz
5.00					parma	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man	m		6	art Freq
-5.00											0000 GHz
					-						
-15.0											t <b>op Freq</b> 0000 GHz
-25.0				(	1						
-35.0								ļ,	n.n.		CF Step
-45.0				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					where the second	<u>Auto</u>	Man
······	man									Fre	q Offset
-55.0											0 Hz
-65.0										Sci	ale Type
Center 1.7	1000 CH-							Enon 2	7.50 MHz		Lin
#Res BW			#VBW	620 kHz			Sweep 1	oo0 ms (	7.50 MH2 1001 pts)		
MSG							STATUS	3			

Plot 7-50. Lower Band Edge Plot (NR Band n66 - 15.0MHz - Full RB - ANT A)



Plot 7-51. Lower Extended Band Edge Plot (NR Band n66 – 15.0MHz - Full RB – ANT A)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	ectrum Analyz	er - Swep	ot SA										7 ×
X/RL	RF	50 Ω	AC	CORREC		SEI	NSE:INT	#Avg Ty	ALIGN AUTO		M Nov 11, 2021	Frequen	су
PASS				PNO: W IFGain:L	ide ⊶⊶ .ow	Trig: Fre #Atten: 3				TY			
10 dB/div Log	Ref 25	.00 di	Bm						Mkr1	1.780 03 -32.	7 5 GHz 83 dBm	Auto	Tune
15.0 Trac	e 1 Pass											Center 1.78000000	
5.00		ᡐ᠕᠕	~~~~ _l u	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						<b>Start</b> 1.76125000	
-15.0												<b>Stop</b> 1.79875000	
-35.0	m						1 Without the second	m				CF 3.75000 <u>Auto</u>	<b>Step</b> 0 MH: Mar
-45.0										hora dana	and an your of the second s	Freq C	Offse 0 Ha
-65.0												Scale	Туре
Center 1. #Res BW				;	≠vbw	620 kHz			Sweep	Span 3 1.000 ms (	7.50 MHz (1001 pts)	Log	Lin
MSG									STATU	JS			

Plot 7-52. Upper Band Edge Plot (NR Band n66 - 15.0MHz - Full RB - ANT A)



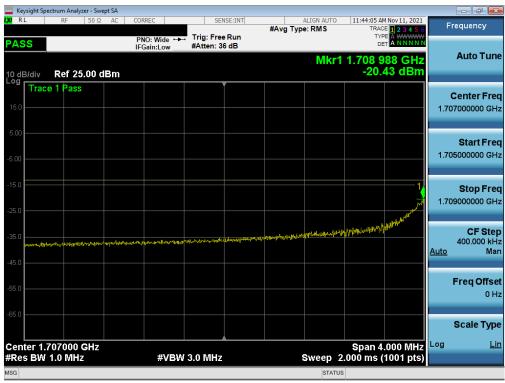
Plot 7-53. Upper Extended Band Edge Plot (NR Band n66 - 15.0MHz - Full RB - ANT A)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	oectrum Analyzer	- Swept SA								
LXI RL	RF	50 <u>Ω</u> AC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO		M Nov 11, 2021	Frequency
PASS			PNO: Wide ↔↔ IFGain:Low	Trig: Free #Atten: 36				TY		
10 dB/div Log	Ref 25.0	00 dBm					Mkr	1 1.709 9 -28.	25 GHz 50 dBm	Auto Tune
Trac	e 1 Pass			Ì						Center Freq
15.0										1.710000000 GHz
5.00						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Start Freq
-5.00										1.697500000 GHz
-15.0					]					Stop Freq
-25.0					1			_		1.722500000 GHz
-35.0				/						CF Step
-45.0				www.					Maria	2.500000 MHz <u>Auto</u> Man
00.000	m	mm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<b>v</b>						Freq Offset
-55.0										0 Hz
-65.0										Scale Type
Center 1	.71000 GH	z						Span 2	5.00 MHz	
#Res BW			#VBW	430 kHz			Sweep	1.000 ms (	1001 pts)	
MSG							STATU	JS		

Plot 7-54. Lower Band Edge Plot (NR Band n66 - 10.0MHz - Full RB - ANT A)



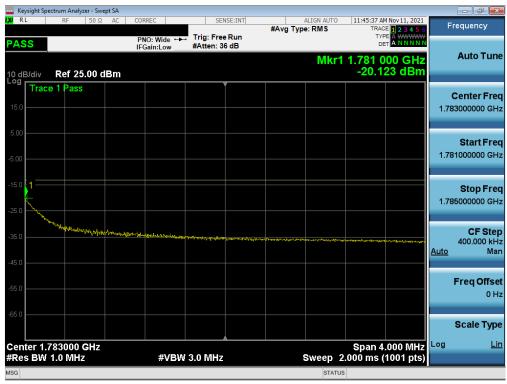
Plot 7-55. Lower Extended Band Edge Plot (NR Band n66 – 10.0MHz - Full RB – ANT A)

FCC ID: A3LSMS901E	Post of Beinered	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	pectrum Analy												- 6
RL	RF	50 Ω	AC	CORREC	de⊶⊶	SE	e Run	#Avg T	ALIGN AUTO	TRAC	M Nov 11, 2021 DE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N	Fr	equency
ASS	Ref 25	.00 di	Зm	IFGain:L		#Atten: 3			Mkr1	1.780 (	)25 GHz 00 dBm		Auto Tur
29 Trac 5.0	ce 1 Pass												Center Fro
		~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						1.76	<b>Start Fr</b> 7500000 G
i.0 i.0							L					1.79	Stop Fr 2500000 G
.0												2 <u>Auto</u>	CF St 2.500000 M N
							~~~			- Marken	um		Freq Offs 0
	.78000 G					430 kHz				Span 2	5.00 MHz		Scale Ty
	120 kHz			#	VBW 4	FOU KHZ			Sweep 1		(1001 pts)		

Plot 7-56. Upper Band Edge Plot (NR Band n66 - 10.0MHz - Full RB - ANT A)



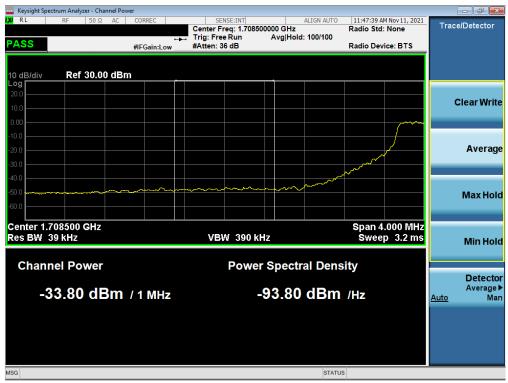
Plot 7-57. Upper Extended Band Edge Plot (NR Band n66 - 10.0MHz - Full RB - ANT A)

FCC ID: A3LSMS901E	PCTEST Proud to be part of @ element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Keysight S	pectrum Analyzer	- Swept SA									
XU RL	RF	50Ω AC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO		M Nov 11, 2021	Fr	equency
PASS			PNO: Wide ↔ IFGain:Low	Trig: Free #Atten: 36		"a)p		TYI Di			
10 dB/div Log	Ref 25.0	10 dBm					Mkr1 1	709 98. 25.	7 5 GHz 45 dBm		Auto Tune
15.0	ce 1 Pass										Center Fred 0000000 GHz
-5.00							~^^~~^^			1.70	<b>Start Fred</b> 3750000 GH:
-15.0					1					1.71	<b>Stop Fred</b> 6250000 GH:
-35.0				N						1 <u>Auto</u>	<b>CF Stej</b> .250000 MH Mar
-55.0	m	~~~~	markan b	~~							FreqOffse 0 H
-65.0											Scale Type
Center 1 #Res BW	.710000 G 62 kHz	HZ	#VBW	220 kHz			Sweep 1	Span 1 .400 ms (	2.50 MHz 1001 pts)	Log	Lir
MSG							STATUS				

Plot 7-58. Lower Band Edge Plot (NR Band n66 - 5.0MHz - Full RB - ANT A)



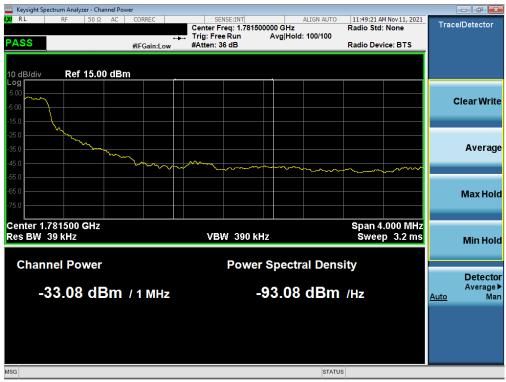
Plot 7-59. Lower Extended Band Edge Plot (NR Band n66 – 5.0MHz - Full RB – ANT A)

FCC ID: A3LSMS901E	POIL to be part of the element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Keysight Spec	trum Analyz	er - Swep	ot SA										
XI RL	RF	50 Ω	AC	CORREC			NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Nov 11, 2021	Fr	equency
PASS				PNO: W IFGain:L	ide ⊶⊶ .ow	Trig: Fre #Atten: 3				DE			
10 dB/div	Ref 25	.00 dl	Bm						Mkr1 1	.780 01: -24.	2 5 GHz 78 dBm		Auto Tun
.og Trace	1 Pass												Center Fre
15.0												1.78	0000000 GH
5.00	~~~~	<u> </u>	www	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~							
F 00												1.77	Start Fre ⊰3750000 GH
5.00													
15.0													Stop Fre
25.0							1					1.78	6250000 GH
													CF Ste
35.0	/						· · ·					1 <u>Auto</u>	.250000 MH Ma
45.0							~~~	pround	$\sim\sim\sim$	$\sim$			
55.0											man		FreqOffse ∂⊢
65.0													
													Scale Typ
Center 1.7		GHz							_	Span 1	2.00 1911 12	Log	Li
Res BW (	52 kHz			#	¢γΒ₩	220 kHz			Sweep 1	_	1001 pts)		
									STATU	3			

Plot 7-60. Upper Band Edge Plot (NR Band n66 - 5.0MHz - Full RB - ANT A)



Plot 7-61. Upper Extended Band Edge Plot (NR Band n66 – 5.0MHz - Full RB – ANT A)

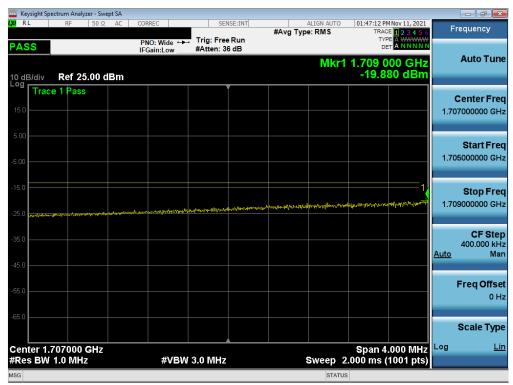
FCC ID: A3LSMS901E		PARI 27 MEASUREMENT REPORT AND AND A		Approved by: Technical Manager
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## NR Band n66 – ANT F



Plot 7-62. Lower Band Edge Plot (NR Band n66 - 20.0MHz - Full RB - ANT F)



Plot 7-63. Lower Extended Band Edge Plot (NR Band n66 – 20.0MHz - Full RB – ANT F)

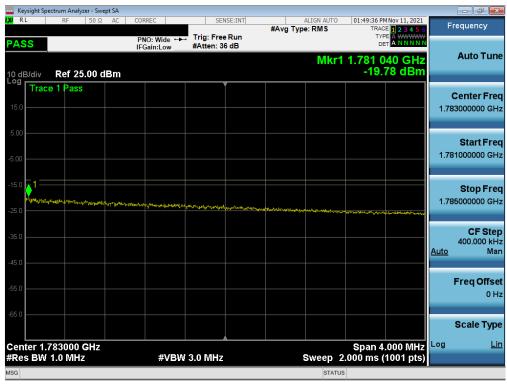
FCC ID: A3LSMS901E	Pout to be part of @ element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	ctrum Analyzer -										
LXI RL	RF 5	0Ω AC	CORREC		NSE:INT	#Avg Ty	ALIGN AUTO pe: RMS	TRAC	MNov 11, 2021	Frequenc	y
PASS			PNO: Fast + IFGain:Low	Trig: Fre #Atten: 3			Mice	DE		Auto 1	Tune
10 dB/div Log	Ref 25.0	0 dBm					IVIKI	-25.	05 GHz 78 dBm		
Trace	e 1 Pass				Ĭ					Center	
15.0										1.78000000	) GHz
5.00		of downline of	m	marian						Start	Free
-5.00										1.755000000	
-15.0					1					<b>Stop</b> 1.80500000	
-25.0	wayer				Marry Marry						
-35.0						- twee when the second	and a second and a s			5.000000 Auto	Step 0 MH Mar
-45.0								Norman Marken			
-55.0									and a survey	Freq O	0 Hi
-65.0											
										Scale	Туре
Center 1.7 #Res BW :			#VB	W 820 kHz			Sweep 1	Span 5	0.00 MHz	Log	Lin
MSG	240 MH2		#VD	W 020 KH2			SWEED		roor pts)		

Plot 7-64. Upper Band Edge Plot (NR Band n66 - 20.0MHz - Full RB - ANT F)



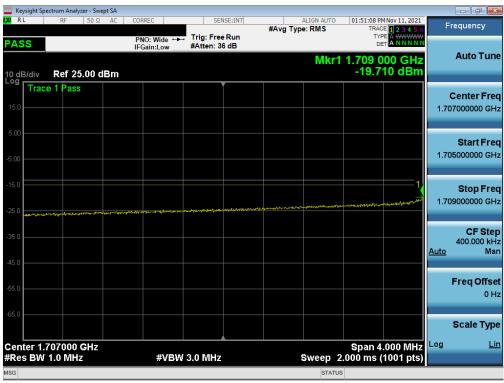
Plot 7-65. Upper Extended Band Edge Plot (NR Band n66 - 20.0MHz - Full RB - ANT F)

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🔤 Keysight Spectrum Analyzer -					
LXIRL RF 5	50 Ω AC CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	01:50:58 PM Nov 11, 2021 TRACE 1 2 3 4 5 6	Frequency
PASS	PNO: Wide ↔ IFGain:Low	Trig: Free Run #Atten: 36 dB	- //	TYPE A WWWW DET A N N N N N	Auto Tune
10 dB/div Ref 25.0	0 dBm			-26.72 dBm	
15.0					Center Freq 1.710000000 GHz
-5.00			the contraction of the contracti	m	<b>Start Freq</b> 1.691250000 GHz
-15.0		1			<b>Stop Freq</b> 1.728750000 GHz
-35.0	and warmen and the second	mander		howand	<b>CF Step</b> 3.750000 MHz <u>Auto</u> Man
-55.0					<b>Freq Offset</b> 0 Hz
-65.0					Scale Type
Center 1.71000 GHz #Res BW 180 kHz		620 kHz	Sweep 1	Span 37.50 MHz .000 ms (1001 pts)	Log <u>Lin</u>
MSG			STATUS		

Plot 7-66. Lower Band Edge Plot (NR Band n66 - 15.0MHz - Full RB - ANT F)



Plot 7-67. Lower Extended Band Edge Plot (NR Band n66 – 15.0MHz - Full RB – ANT F)

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	ectrum Analyze											
L <mark>XI</mark> RL	RF	50 Ω AC	COR	REC	SE	NSE:INT	#Avg Typ	ALIGN AUTO		MNov 11, 2021	Freque	ency
PASS				O: Wide ↔ ain:Low	Trig: Fre #Atten: 3		0 ,		TYI Di	7 5 GHz	Aut	o Tune
10 dB/div Log	Ref 25.	00 dBm	า						-27.	57 dBm		
15.0	e 1 Pass										Cent 1.780000	<b>er Freq</b> 000 GHz
-5.00		m		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							<b>Sta</b> 1.761250	a <b>rt Freq</b> 000 GHz
-15.0						1					<b>Sto</b> 1.798750	o <b>p Freq</b> 000 GHz
-35.0	m					hanne	horanda	mmm	Anna anna			<b>CF Step</b> 000 MHz Man
-45.0										W.M. J.	Fred	<b>Offset</b> 0 Hz
-65.0												le Type
Center 1. #Res BW		lz		#VBV	V 620 kHz			Sweep 1	Span 3 .000 ms (	7.50 MHz 1001 pts)	Log	Lin
MSG								STATUS	6			

Plot 7-68. Upper Band Edge Plot (NR Band n66 - 15.0MHz - Full RB - ANT F)



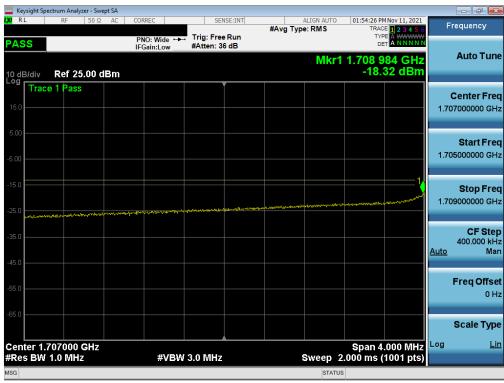
Plot 7-69. Upper Extended Band Edge Plot (NR Band n66 – 15.0MHz - Full RB – ANT F)

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🔤 Keysight Spectrum Analyzer - Swept SA						
LX RL RF 50Ω AC	CORREC	SENSE:INT	ALI #Avg Type: F		M Nov 11, 2021	Frequency
PASS		Free Run en: 36 dB	0 //	Mkr1 1.709 9		Auto Tune
10 dB/div Ref 25.00 dBm				-27.	13 dBm	
15.0						Center Freq 1.710000000 GHz
-5.00						<b>Start Freq</b> 1.697500000 GHz
-15.0						<b>Stop Freq</b> 1.722500000 GHz
-35.0	www.men				horand	<b>CF Step</b> 2.500000 MHz <u>Auto</u> Man
-55.0						<b>Freq Offset</b> 0 Hz
-65.0						Scale Type
Center 1.71000 GHz #Res BW 120 kHz	#VBW 430 k	Hz	Sv	2 Span veep 1.000 ms (	5.00 MHz 1001 pts)	Log <u>Lin</u>
MSG				STATUS		

Plot 7-70. Lower Band Edge Plot (NR Band n66 - 10.0MHz - Full RB - ANT F)



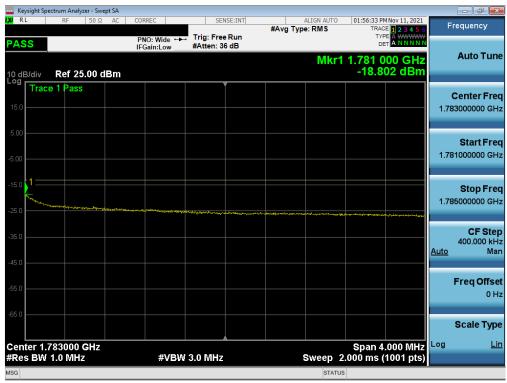
Plot 7-71. Lower Extended Band Edge Plot (NR Band n66 – 10.0MHz - Full RB – ANT F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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	ectrum Analyz	zer - Swep	ot SA										
LXU RL	RF	50 Ω	AC	CORREC		SEI	NSE:INT	#Avg Typ	ALIGN AUTO		MNov 11, 2021	Fr	equency
PASS				PNO: W IFGain:L	ide ⊶⊷ ₋ow	Trig: Free #Atten: 3				TY			
10 dB/div Log	Ref 25	.00 di	Bm						Mkr1	1.780 1 -26.	00 GHz 45 dBm		Auto Tune
15.0 Trac	e 1 Pass												enter Freq
-5.00		~~~	~~~~~	~~~~	~~~~							1.767	Start Freq 500000 GHz
-15.0							1					1.792	Stop Freq 500000 GHz
-35.0	~~/						hand	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	how he had he ha	~~~		2 <u>Auto</u>	<b>CF Step</b> 500000 MHz Man
-55.0										- Write		ľ	F <b>req Offset</b> 0 Hz
-65.0													Scale Type
Center 1. #Res BW				;	#VBW	430 kHz			Sweep 1	Span 2 .000 ms (	5.00 MHz 1001 pts)	Log	Lin
MSG									STATUS				

Plot 7-72. Upper Band Edge Plot (NR Band n66 - 10.0MHz - Full RB - ANT F)



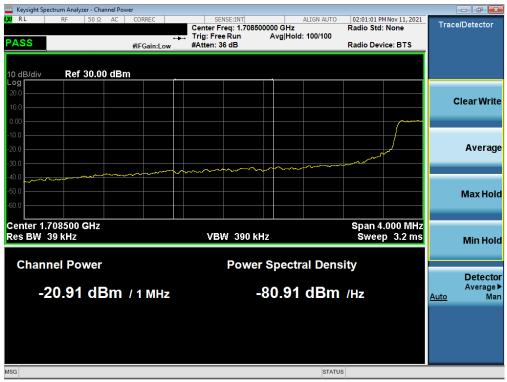
Plot 7-73. Upper Extended Band Edge Plot (NR Band n66 – 10.0MHz - Full RB – ANT F)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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		um Analyzer - S	Swept SA									[	- • •
L <mark>XI</mark> RL		RF 50	Ω AC	CORREC		SEI	SE:INT	#Ava Tvp	ALIGN AUTO		MNov 11, 2021	Fre	quency
PAS	S			PNO: W IFGain:L	ide ⊶⊶ .ow	Trig: Free #Atten: 3				TY			
10 dB Log r	/div	Ref 25.00	dBm						Mkr1 1	.709 98 -24.	7 5 GHz 27 dBm	ľ í	Auto Tune
	Trace 1	Pass										с	enter Freq
15.0 -												1.710	000000 GHz
5.00													
							,	$\sim$	~~~~~				Start Freq 750000 GHz
-5.00 -													
-15.0													Stop Freq
-25.0 -							<u>}</u>				Į	1.716	250000 GHz
						كرمسهم					m		CF Step
-35.0 -		h	som	-								1.: <u>Auto</u>	250000 MHz Man
-40.0 -	m	~~											
-55.0													req Offset 0 Hz
-65.0 -													
												S	Scale Type
		0000 GH	z							Span 1	2.00 1911 12	Log	Lin
#Res	BW 62	2 KHZ		#	≠vBW ∶	220 kHz			Sweep 1		1001 pts)		
Mag									STATU	3			

Plot 7-74. Lower Band Edge Plot (NR Band n66 - 5.0MHz - Full RB - ANT F)



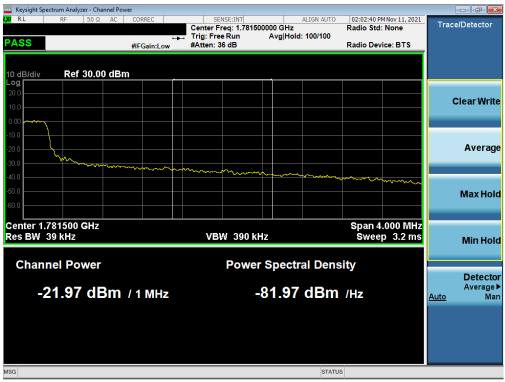
Plot 7-75. Lower Extended Band Edge Plot (NR Band n66 – 5.0MHz - Full RB – ANT F)

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	pectrum Analyz	er - Swept	SA										
KN RL	RF	50 <u>Ω</u>	AC CC	RREC		SE	NSE:INT	#Avg Typ	ALIGN AUTO		MNov 11, 2021	Fr	equency
PASS				NO: Wi Gain:Lo	de ⊶⊶ ow	Trig: Fre #Atten: 3		• ,		TY			
10 dB/div	Ref 25	.00 dB	m						Mkr1 ′	1.780 01: -26.	2 5 GHz 05 dBm		Auto Tune
Log Tra	ce 1 Pass												<b>Center Freq</b> 0000000 GHz
-5.00		~~~~~	non for the sources	<b>^</b>	~~~~							1.77	Start Fred 3750000 GHz
-15.0							1					1.78	Stop Fred 6250000 GH2
-35.0	Varrad .						m		www.	4.		Auto ¹	<b>CF Step</b> .250000 MH Mar
-45.0											m		Freq Offse 0 Ha
-65.0													Scale Type
	.780000 ( 62 kHz	GHz		#	VBW	220 kHz			Sweep	Span 1 1.400 m <u>s (</u>	2.50 MHz 1001 pts)	Log	Lin
MSG									STATU				

Plot 7-76. Upper Band Edge Plot (NR Band n66 - 5.0MHz - Full RB - ANT F)



Plot 7-77. Upper Extended Band Edge Plot (NR Band n66 – 5.0MHz - Full RB – ANT F)

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## 7.6 Peak-Average Ratio

### **Test Overview**

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

### Test Procedure Used

KDB 971168 D01 v03r01 - Section 5.7.1

### Test Settings

- 1. The signal analyzer's CCDF measurement profile is enabled
- 2. Frequency = carrier center frequency
- 3. Measurement BW ≥ OBW or specified reference bandwidth
- 4. The signal analyzer was set to collect one million samples to generate the CCDF curve
- 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

#### Test Setup

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



Figure 7-5. Test Instrument & Measurement Setup

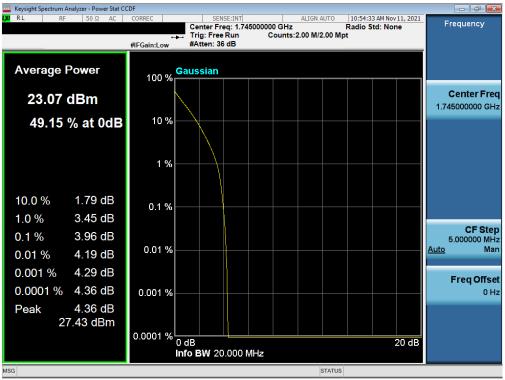
#### Test Notes

None.

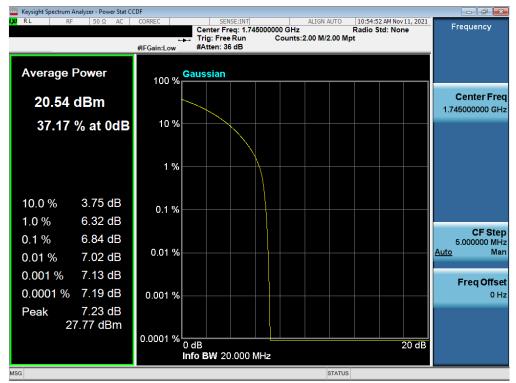
FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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## NR Band n66 – ANT A





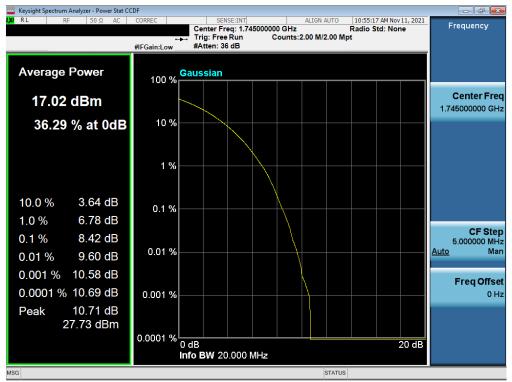


#### Plot 7-79. PAR Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB - ANT A)

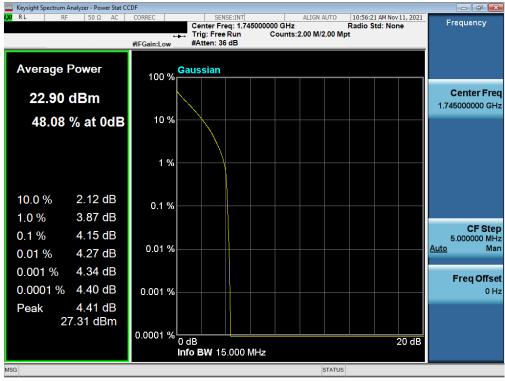
FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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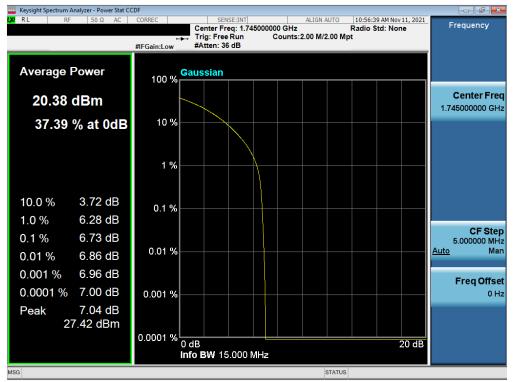
Plot 7-80. PAR Plot (NR Band n66 - 20.0MHz CP-OFDM 256-QAM - Full RB - ANT A)



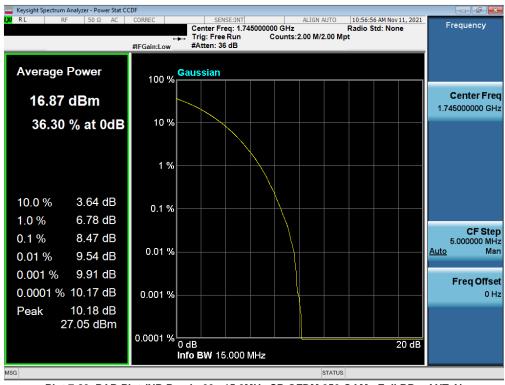
Plot 7-81. PAR Plot (NR Band n66 - 15.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)

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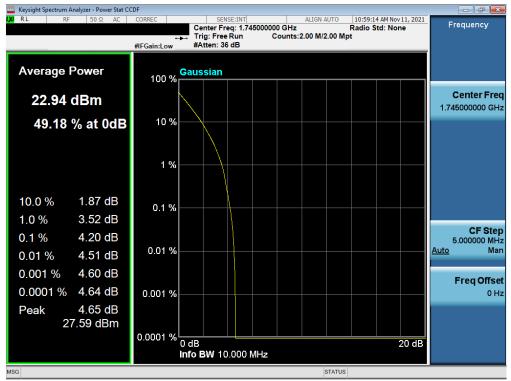
Plot 7-82. PAR Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB - ANT A)



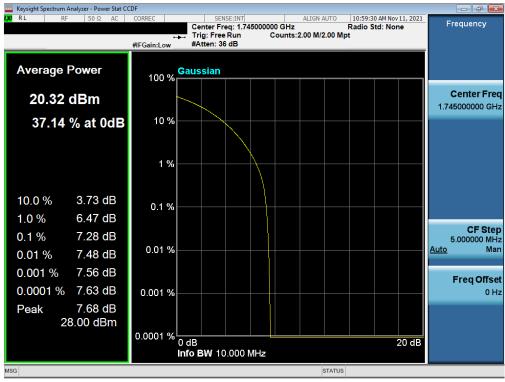
Plot 7-83. PAR Plot (NR Band n66 - 15.0MHz CP-OFDM 256-QAM - Full RB – ANT A)

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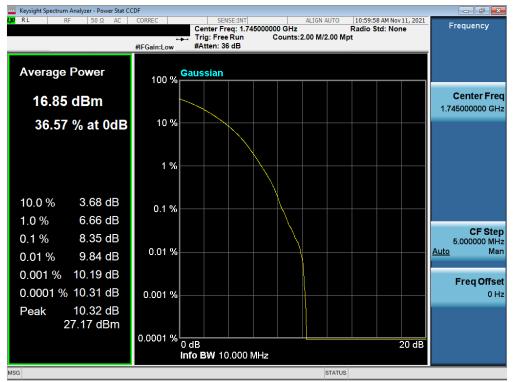
Plot 7-84. PAR Plot (NR Band n66 - 10.0MHz DFT-s-OFDM BPSK - Full RB - ANT A)



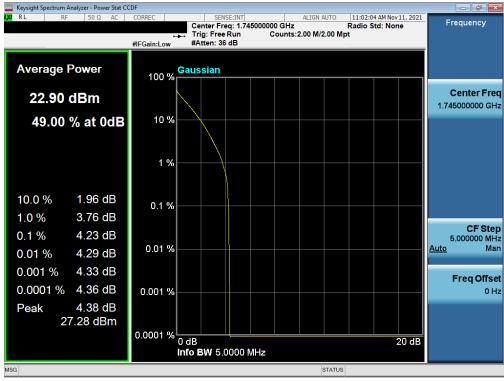
Plot 7-85. PAR Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB - ANT A)

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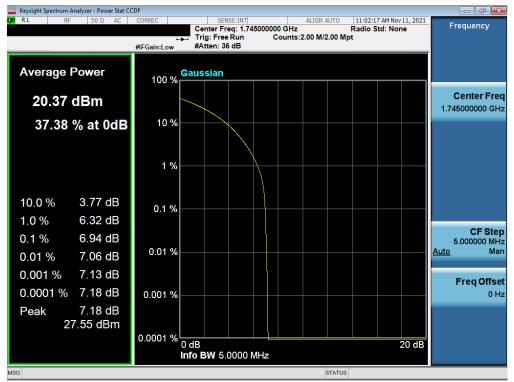
Plot 7-86. PAR Plot (NR Band n66 - 10.0MHz CP-OFDM 256-QAM - Full RB - ANT A)



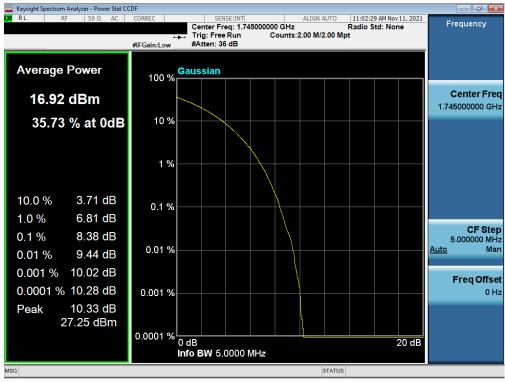
Plot 7-87. PAR Plot (NR Band n66 - 5.0MHz DFT-s-OFDM BPSK - Full RB – ANT A)

FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Plot 7-88. PAR Plot (NR Band n66 - 5.0MHz CP-OFDM QPSK - Full RB - ANT A)

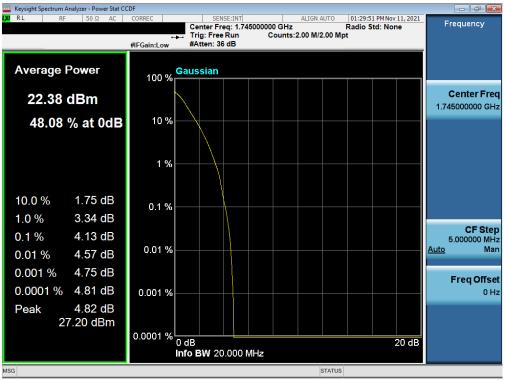


Plot 7-89. PAR Plot (NR Band n66 - 5.0MHz CP-OFDM 256-QAM - Full RB – ANT A)

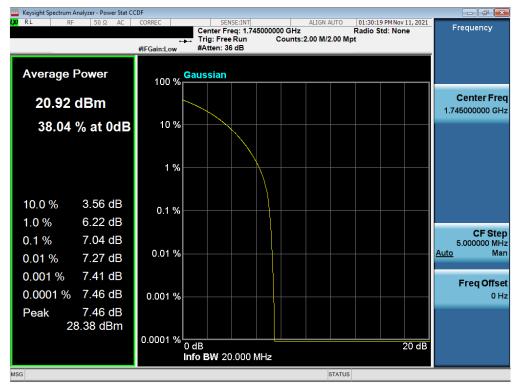
FCC ID: A3LSMS901E		PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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## NR Band n66 – ANT F



Plot 7-90. PAR Plot (NR Band n66 - 20.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)

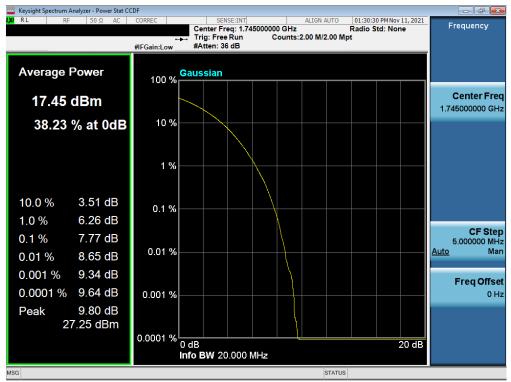


#### Plot 7-91. PAR Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB - ANT F)

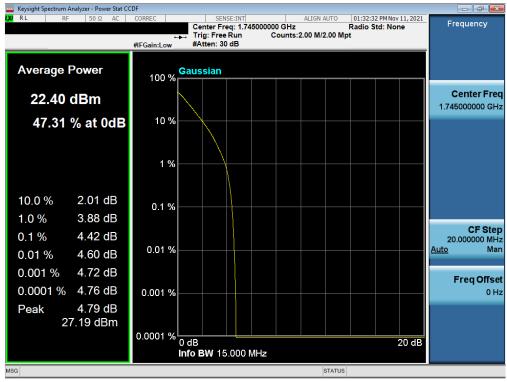
FCC ID: A3LSMS901E	PCTEST* Proud to be part of @elitement	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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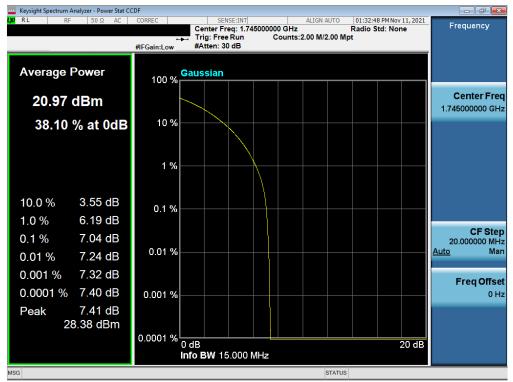
Plot 7-92. PAR Plot (NR Band n66 - 20.0MHz CP-OFDM 256-QAM - Full RB - ANT F)



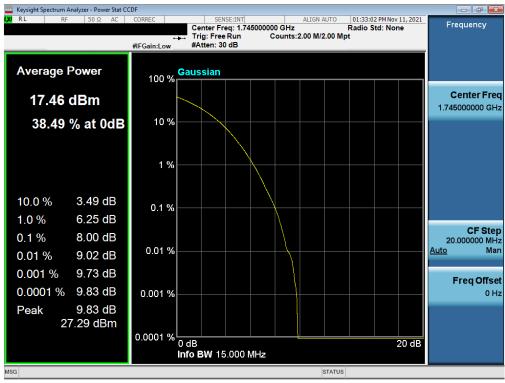
Plot 7-93. PAR Plot (NR Band n66 - 15.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)

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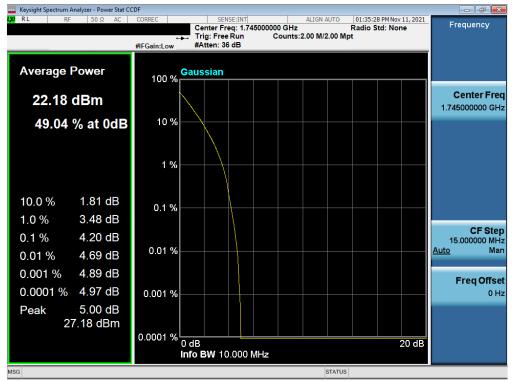
Plot 7-94. PAR Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB - ANT F)



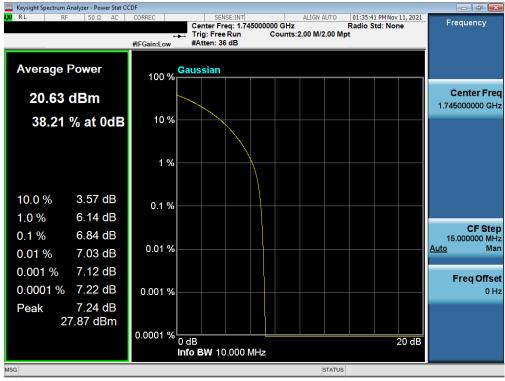
Plot 7-95. PAR Plot (NR Band n66 - 15.0MHz CP-OFDM 256-QAM - Full RB - ANT F)

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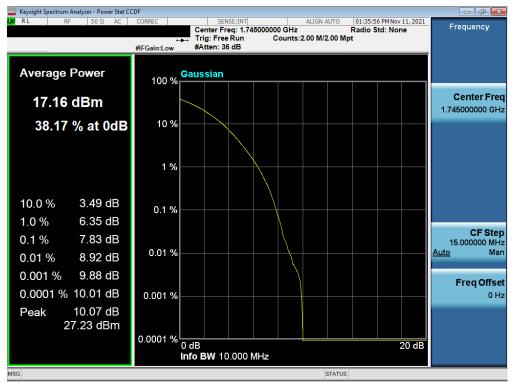
Plot 7-96. PAR Plot (NR Band n66 - 10.0MHz DFT-s-OFDM BPSK - Full RB - ANT F)



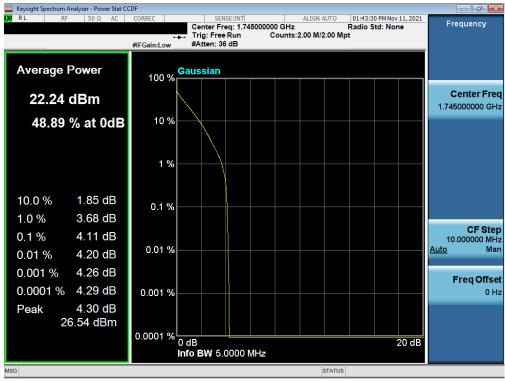
Plot 7-97. PAR Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB - ANT F)

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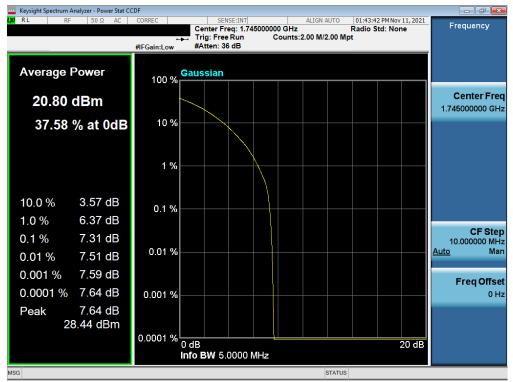
Plot 7-98. PAR Plot (NR Band n66 - 10.0MHz CP-OFDM 256-QAM - Full RB - ANT F)



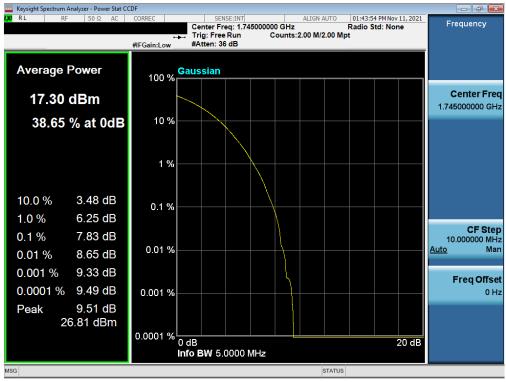
Plot 7-99. PAR Plot (NR Band n66 - 5.0MHz DFT-s-OFDM BPSK - Full RB – ANT F)

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Plot 7-100. PAR Plot (NR Band n66 - 5.0MHz CP-OFDM QPSK - Full RB - ANT F)



Plot 7-101. PAR Plot (NR Band n66 - 5.0MHz CP-OFDM 256-QAM - Full RB - ANT F)

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# 7.7 Radiated Power (ERP/EIRP)

## **Test Overview**

Effective Radiated Power (ERP) and 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 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

### Test Settings

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

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## Test Setup

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

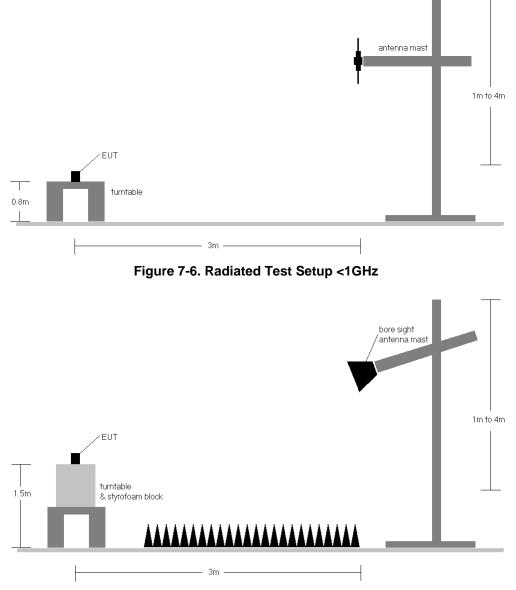


Figure 7-7. Radiated Test Setup >1GHz

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### 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.

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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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
	π/2 BPSK	1720.0	V	100	310	9.33	1 / 26	13.79	23.12	0.205	30.00	-6.88
	π/2 BPSK	1745.0	V	101	315	9.03	1 / 26	13.64	22.67	0.185	30.00	-7.33
	π/2 BPSK	1770.0	V	104	314	9.10	1 / 26	13.81	22.91	0.195	30.00	-7.09
20 MHz	QPSK	1720.0	V	100	310	9.33	1 / 26	13.74	23.07	0.203	30.00	-6.93
	QPSK	1745.0	V	101	315	9.03	1 / 26	13.62	22.65	0.184	30.00	-7.35
	QPSK	1770.0	V	104	314	9.10	1 / 26	13.80	22.90	0.195	30.00	-7.10
	16-QAM	1720.0	V	100	310	9.33	1 / 26	12.97	22.30	0.170	30.00	-7.70
	π/2 BPSK	1717.5	V	100	310	9.38	1 / 58	13.77	23.15	0.206	30.00	-6.85
	π/2 BPSK	1745.0	V	101	315	9.03	1 / 58	13.71	22.75	0.188	30.00	-7.25
	π/2 BPSK	1772.5	V	104	314	9.11	1 / 58	13.78	22.89	0.195	30.00	-7.11
15 MHz	QPSK	1717.5	V	100	310	9.38	1 / 58	13.66	23.03	0.201	30.00	-6.97
	QPSK	1745.0	V	101	315	9.03	1 / 58	13.91	22.94	0.197	30.00	-7.06
	QPSK	1772.5	V	104	314	9.11	1 / 58	13.77	22.89	0.194	30.00	-7.11
	16-QAM	1717.5	V	100	310	9.38	1 / 58	12.55	21.93	0.156	30.00	-8.07
	π/2 BPSK	1715.0	V	100	310	9.42	1 / 13	13.44	22.86	0.193	30.00	-7.14
	π/2 BPSK	1745.0	V	101	315	9.03	1 / 38	13.62	22.66	0.184	30.00	-7.34
	π/2 BPSK	1775.0	V	104	314	9.13	1 / 26	13.68	22.81	0.191	30.00	-7.19
10 MHz	QPSK	1715.0	V	100	310	9.42	1 / 13	13.58	23.00	0.200	30.00	-7.00
	QPSK	1745.0	V	101	315	9.03	1 / 38	13.75	22.78	0.190	30.00	-7.22
	QPSK	1775.0	V	104	314	9.13	1 / 26	13.50	22.64	0.183	30.00	-7.36
	16-QAM	1715.0	V	100	310	9.42	1 / 13	12.52	21.94	0.156	30.00	-8.06
	π/2 BPSK	1712.5	V	100	310	9.47	1/6	13.56	23.03	0.201	30.00	-6.97
	π/2 BPSK	1745.0	V	101	315	9.03	1 / 18	13.55	22.58	0.181	30.00	-7.42
	π/2 BPSK	1777.5	V	104	314	9.15	1/6	13.60	22.75	0.188	30.00	-7.25
5 MHz	QPSK	1712.5	V	100	310	9.47	1/6	13.41	22.88	0.194	30.00	-7.12
	QPSK	1745.0	V	101	315	9.03	1 / 18	13.79	22.82	0.192	30.00	-7.18
	QPSK	1777.5	V	104	314	9.15	1/6	13.62	22.77	0.189	30.00	-7.23
	16-QAM	1712.5	V	100	310	9.47	1/6	12.57	22.04	0.160	30.00	-7.96
	QPSK (CP-OFDM)	1720.0	V	122	323	9.10	1 / 26	12.24	21.34	0.136	30.00	-8.66
20 MHz	QPSK (Opposite Pol.)	1720.0	Н	282	181	9.39	1 / 26	13.55	22.94	0.197	30.00	-7.06
	QPSK (WCP)	1720.0	V	124	281	9.10	1 / 26	11.62	20.72	0.118	30.00	-9.28

Table 7-4. EIRP Data (NR Band n66 – ANT A)

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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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
	π/2 BPSK	1720.0	V	139	49	9.33	1 / 79	10.56	19.89	0.098	30.00	-10.11
	π/2 BPSK	1745.0	V	135	44	9.03	1 / 79	11.22	20.25	0.106	30.00	-9.75
	π/2 BPSK	1770.0	V	133	35	9.10	1 / 26	9.83	18.93	0.078	30.00	-11.07
20 MHz	QPSK	1720.0	V	139	49	9.33	1 / 79	10.55	19.88	0.097	30.00	-10.12
	QPSK	1745.0	V	135	44	9.03	1 / 79	11.11	20.14	0.103	30.00	-9.86
	QPSK	1770.0	V	133	35	9.10	1 / 26	9.66	18.76	0.075	30.00	-11.24
	16-QAM	1720.0	V	139	49	9.33	1 / 79	9.78	19.11	0.081	30.00	-10.89
	π/2 BPSK	1717.5	V	139	49	9.38	1 / 58	11.56	20.93	0.124	30.00	-9.07
	π/2 BPSK	1745.0	V	135	44	9.03	1 / 58	11.96	20.99	0.126	30.00	-9.01
	π/2 BPSK	1772.5	V	133	35	9.11	1 / 58	11.02	20.13	0.103	30.00	-9.87
15 MHz	QPSK	1717.5	V	139	49	9.38	1 / 58	10.64	20.02	0.100	30.00	-9.98
	QPSK	1745.0	V	135	44	9.03	1 / 58	10.82	19.85	0.097	30.00	-10.15
	QPSK	1772.5	V	133	35	9.11	1 / 58	9.72	18.83	0.076	30.00	-11.17
	16-QAM	1745.0	V	135	44	9.03	1 / 58	10.56	19.59	0.091	30.00	-10.41
	π/2 BPSK	1715.0	V	139	49	9.42	1 / 38	11.45	20.87	0.122	30.00	-9.13
	π/2 BPSK	1745.0	V	135	44	9.03	1 / 38	12.26	21.29	0.135	30.00	-8.71
	π/2 BPSK	1775.0	V	133	35	9.13	1 / 26	10.90	20.03	0.101	30.00	-9.97
10 MHz	QPSK	1715.0	V	139	49	9.42	1 / 38	10.57	19.99	0.100	30.00	-10.01
	QPSK	1745.0	V	135	44	9.03	1 / 38	11.01	20.05	0.101	30.00	-9.95
	QPSK	1775.0	V	133	35	9.13	1 / 26	9.44	18.57	0.072	30.00	-11.43
	16-QAM	1745.0	V	135	44	9.03	1 / 38	9.86	18.89	0.077	30.00	-11.11
	π/2 BPSK	1712.5	V	139	49	9.47	1 / 18	11.29	20.76	0.119	30.00	-9.24
	π/2 BPSK	1745.0	V	135	44	9.03	1 / 18	12.33	21.36	0.137	30.00	-8.64
	π/2 BPSK	1777.5	V	133	35	9.15	1 / 18	11.03	20.18	0.104	30.00	-9.82
5 MHz	QPSK	1712.5	V	139	49	9.47	1 / 18	10.63	20.10	0.102	30.00	-9.90
	QPSK	1745.0	V	135	44	9.03	1 / 18	11.03	20.06	0.101	30.00	-9.94
	QPSK	1777.5	V	133	35	9.15	1 / 18	9.57	18.72	0.074	30.00	-11.28
	16-QAM	1745.0	V	135	44	9.03	1 / 18	10.11	19.14	0.082	30.00	-10.86
	QPSK (CP-OFDM)	1745.0	V	135	44	9.03	1 / 79	9.81	18.84	0.077	30.00	-11.16
20 MHz	QPSK (Opposite Pol.)	1745.0	Н	174	33	9.48	1 / 79	9.97	19.45	0.088	30.00	-10.55
	QPSK (WCP)	1745.0	V	132	154	9.03	1 / 79	9.06	18.09	0.064	30.00	-11.91

Table 7-5. EIRP Data (NR Band n66 – ANT F)

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### 7.8 Radiated Spurious Emissions Measurements

### **Test Overview**

Radiated spurious emissions 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 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

ANSI/TIA-603-E-2016 - Section 2.2.12

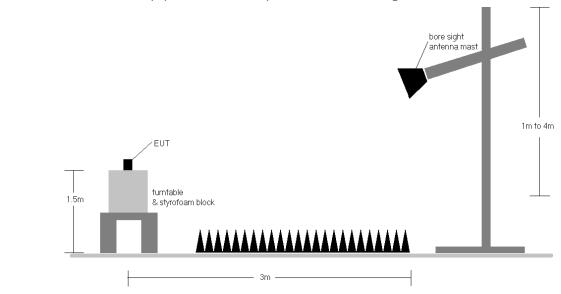
#### Test Settings

- 1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
- 2. VBW  $\geq$  3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points  $\geq$  2 x 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 7-8. Test Instrument & Measurement Setup

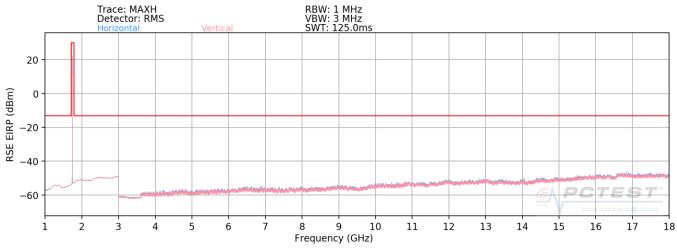
### Test Notes

- Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
   a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b) EIRP (dBm) = E(dBµV/m) + 20logD 104.8; where D is the measurement distance in meters.
- 2) 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.
- 9) Spurious emissions measurements are included in this section to address compliance of the LTE ULCA capability. The EUT was set to transmit at the widest bandwidth and on the middle channel of each band.

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### NR Band n66 – ANT A





Bandwidth (MHz):		20							
Frequency (MHz):	1720								
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]
3440.0	Н	-	-	-77.70	4.00	33.30	-61.95	-13.00	-48.95
5160.0	Н	-	-	-79.17	6.13	33.96	-61.30	-13.00	-48.30
6880.0	Н	-	-	-80.39	9.27	35.88	-59.37	-13.00	-46.37

Table 7-6. Radiated Spurious Data (NR Band n66 – Low Channel – ANT A)

Bandwidth (MHz):		20							
Frequency (MHz):		1745							
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]
3490.0	Н	-	-	-78.25	3.69	32.44	-62.82	-13.00	-49.82
5235.0	Н	-	-	-79.01	6.14	34.13	-61.13	-13.00	-48.13
6980.0	Н	-	-	-79.37	8.20	35.83	-59.43	-13.00	-46.43

Table 7-7. Radiated Spurious Data (NR Band n66 – Mid Channel – ANT A)

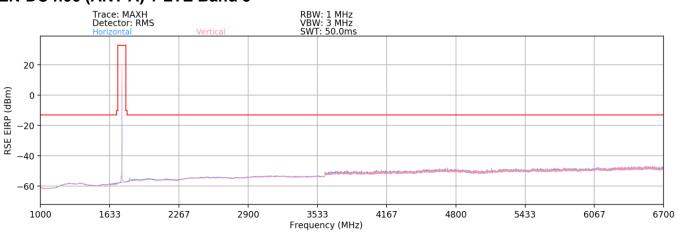
Bandwidth (MHz):		20							
Frequency (MHz):		1770							
RB / Offset:		1 / 53							
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3540.0	Н	-	-	-78.04	3.67	32.63	-62.63	-13.00	-49.63
5310.0	Н	-	-	-79.03	6.30	34.27	-60.99	-13.00	-47.99
7080.0	Н	-	-	-79.23	8.39	36.16	-59.09	-13.00	-46.09

### Table 7-8. Radiated Spurious Data (NR Band n66 – High Channel – ANT A)

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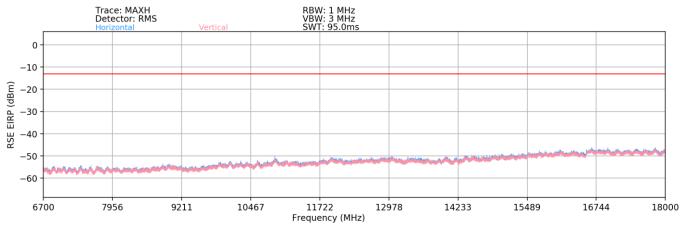
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## EN-DC n66 (ANT A) + LTE Band 5





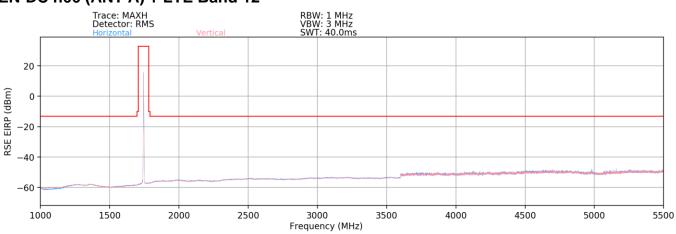
Plot 7-104. Radiated Spurious Plot (EN-DC n66 (ANT A) + B5)

Bandwidth (MHz):		20 & 10							
Frequency (MHz):		1745 & 836.5							
RB / Offset:	1 / 53 & 1 / 25								
Mode:		EN-DC							
Anchor Band:	and: 5								
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]
2653.5	V	-	-	-77.52	10.63	40.11	-55.15	-13.00	-42.15
3562.0	V	-	-	-77.00	11.82	41.82	-53.43	-13.00	-40.43
4470.5	V	-	-	-78.77	13.23	41.46	-53.80	-13.00	-40.80

Table 7-9. Radiated Spurious Data (EN-DC n66 (ANT A) + B5)

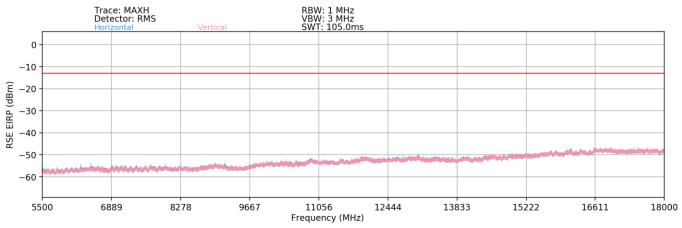
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### EN-DC n66 (ANT A) + LTE Band 12







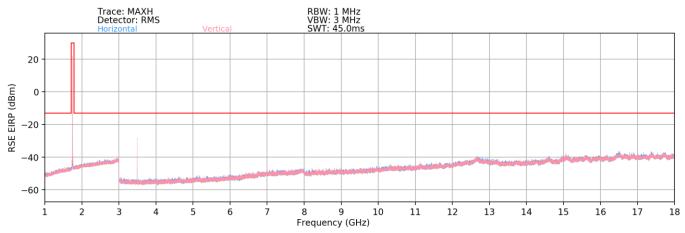
Bandwidth (MHz):	20 & 10								
Frequency (MHz):	1745 & 707.5								
RB / Offset:	1 / 53 & 1 / 25								
Mode:		EN-DC							
Anchor Band:		12							
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
2782.5	V	-	-	-77.78	10.47	39.69	-55.57	-13.00	-42.57
3820.0	V	-	-	-78.69	12.36	40.67	-54.59	-13.00	-41.59
				-79.04	13.92	41.88	-53.38	-13.00	-40.38

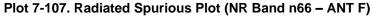
Table 7-10. Radiated Spurious Data (EN-DC n66 (ANT A) + B12)

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### NR Band n66 – ANT F





Bandwidth (MHz):		20							
Frequency (MHz):	1720								
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]
3440.0	Н	195	30	-52.10	5.63	60.53	-34.73	-13.00	-21.73
5160.0	Н	-	-	-79.29	7.64	35.35	-59.90	-13.00	-46.90
6880.0	Н	-	-	-79.92	11.50	38.58	-56.68	-13.00	-43.68
8600.0	Н	-	-	-81.02	13.80	39.78	-55.47	-13.00	-42.47
10320.0	Н	- diatad Spu	-	- <mark>81</mark> .51	16.55	42.04	-53.22	-13.00	-40.22

Table 7-11. Radiated Spurious Data (NR Band n66 – Low Channel – ANT F)

Bandwidth (MHz):		20							
Frequency (MHz):		1745							
RB / Offset:	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]
3490.0	Н	187	21	-50.31	5.49	62.18	-33.07	-13.00	-20.07
5235.0	Н	-	-	-79.04	7.43	35.39	-59.86	-13.00	-46.86
6980.0	Н	-	-	-79.74	11.36	38.62	-56.64	-13.00	-43.64
8725.0	Н	-	-	-80.73	13.50	39.77	-55.49	-13.00	-42.49
10470.0	Н	-	-	-81.85	17.16	42.31	-52.94	-13.00	-39.94

Table 7-12. Radiated Spurious Data (NR Band n66 – Mid Channel – ANT F)

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Bandwidth (MHz):		20					
Frequency (MHz):		1770					
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]
3540.0	Н	226	38	-50.49	5.45	61.96	-33.30
5310.0	Н	288	341	-76.49	7.67	38.18	-57.07
7080.0	H	-	-	-79.94	11.88	38.94	-56.32
7080.0 8850.0	H H	-	-	-79.94 -80.71	11.88 13.50	38.94 39.79	-56.32 -55.47

Table 7-13. Radiated Spurious Data (NR Band n66 – High Channel – ANT F)

Limit

[dBm]

-13.00

-13.00

-13.00

-13.00

-13.00

Margin

[dB]

-20.30

-44.07

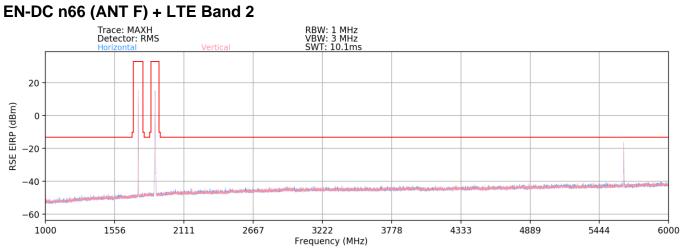
-43.32

-42.47

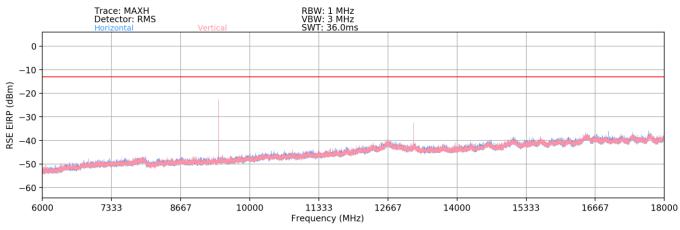
-40.30

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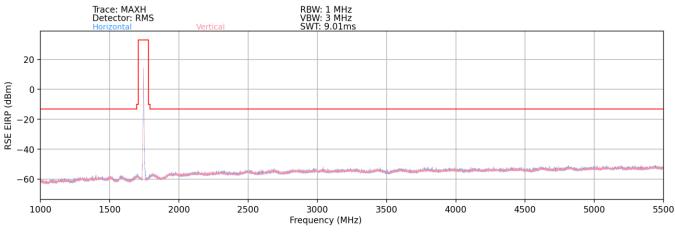
Bandwidth (MHz):		20 & 20							
Frequency (MHz):	1745 & 1880								
RB / Offset:		1 / 53 & 1 / 50							
Mode:		EN-DC							
Anchor Band:		2							
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1475.0	V	-	-	-76.67	7.81	38.14	-57.12	-13.00	-44.12
1610.0	V	-	-	-76.87	8.42	38.55	-56.71	-13.00	-43.71
2015.0	V	-	-	-77.21	11.30	41.09	-54.17	-13.00	-41.17
3490.0	V	243	146	-73.59	13.17	46.58	-48.68	-13.00	-35.68
5640.3	V	112	21	-52.79	18.37	72.58	-22.68	-13.00	-9.68
9400.0	V	114	5	-58.37	24.46	73.09	-22.16	-13.00	-9.16
5400.0									

#### Table 7-14. Radiated Spurious Data (EN-DC n66 (ANT F) + B2)

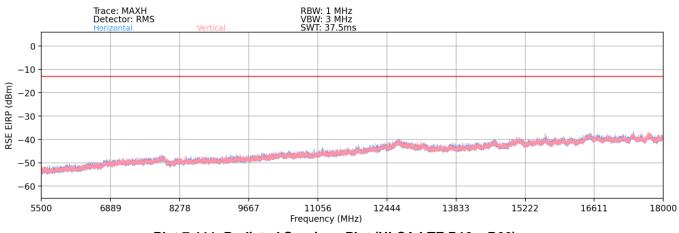
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# LTE ULCA: Band 12 (ANT A) - Band 66 (ANT A)







Plot 7-111. Radiated Spurious Plot (ULCA LTE B12 – 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]
1367.5	V	-	-	-76.19	-2.68	28.13	-67.12
1367.5 2405.0	V V	-	-	-76.19 -77.70	-2.68 2.14	28.13 31.44	-67.12 -63.82
	-	- - -	-				
2405.0	V		- - - -	-77.70	2.14	31.44	-63.82
2405.0 2782.5	V V	-		-77.70 -77.96	2.14 3.14	31.44 32.18	-63.82 -63.08

Table 7-15. Radiated Spurious Data (ULCA LTE B12 – B66)

Limit

[dBm]

-13.00

-13.00

-13.00

-13.00

-13.00

-13.00

Margin

[dB]

-54.12

-50.82

-50.08

-48.44

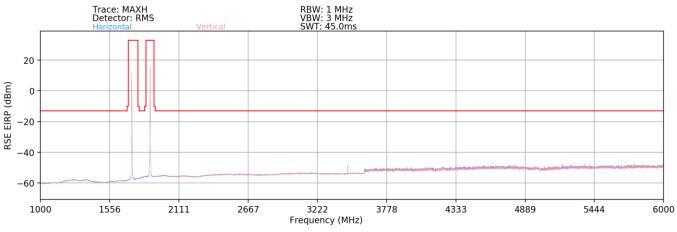
-48.24

-34.74

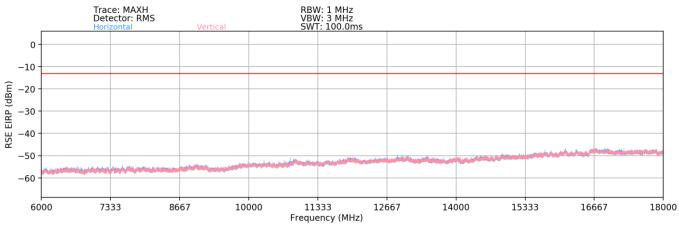
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# LTE ULCA: Band 4 (ANT A) – Band 2 (ANT F)







Plot 7-113. Radiated Spurious Plot (ULCA LTE B4 – B2)

PCC Bandwidth (MHz):		20							
PCC Frequency (MHz):	1732.5								
PCC RB / Offset:	1 / 50								
SCC Bandwidth (MHz):	20								
SCC Frequency (MHz):	1880.0								
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]
1585.0	Н	-	-	-76.49	5.44	35.95	-59.31	-13.00	-46.31
2027.5	Н	-	-	-76.78	9.28	39.50	-55.75	-13.00	-42.75
2175.0	Н	-	-	-76.72	9.27	39.55	-55.70	-13.00	-42.70
3465.0	Н	229	15	-69.18	11.36	49.18	-46.08	-13.00	-33.08
5197.5	Н	- 7 16 Dod	-	-78.50	14.58	43.08	-52.17	-13.00	-39.17

#### Table 7-16. Radiated Spurious Data (ULCA LTE B4 – B2)

FCC ID: A3LSMS901E	PCTEST Proud to be part of the element	PART 27 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager	
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### 7.9 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 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### 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

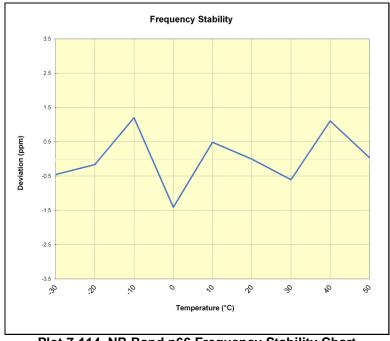
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# Frequency Stability / Temperature Variation

NR Band n66					
	Operating Frequency (Hz):		1,745,000,000		
	Ref. Voltage (VDC):		4.39		
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.39	- 30	1,745,088,234	-788	-0.0000452
		- 20	1,745,088,736	-286	-0.0000164
		- 10	1,745,091,125	2,103	0.0001205
		0	1,745,086,562	-2,459	-0.0001409
		+ 10	1,745,089,871	849	0.0000487
		+ 20 (Ref)	1,745,089,022	0	0.0000000
		+ 30	1,745,087,965	-1,057	-0.0000606
		+ 40	1,745,090,958	1,936	0.0001110
		+ 50	1,745,089,089	67	0.000039
Battery Endpoint	3.40	+ 20	1,745,089,200	178	0.0000102

Table 7-17. NR Band n66 Frequency Stability Data



Plot 7-114. NR Band n66 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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