

PART 22 MEASUREMENT REPORT

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

Date of Testing:
 09/08/2023 - 11/2/2023
Test Report Issue Date:
 11/3/2023
Test Site/Location:
 Element lab., Columbia, MD, USA
Test Report Serial No.:
 1M2309070101-01.A3L

FCC ID:	A3LSMA156M
Applicant Name:	Samsung Electronics Co., Ltd.

Application Type: Certification
Model: SM-A156M/DSN
Additional Model(s): SM-A156M/N
EUT Type: Portable Handset
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part: 22
Test Procedure(s): ANSI C63.26-2015

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

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



RJ Ortanez
Executive Vice President



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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
GSM/GPRS	N/A	GMSK	824.2 - 848.8	0.678	28.31	1.112	30.46	248KGXW
EDGE	N/A	8-PSK	824.2 - 848.8	0.151	21.78	0.247	23.93	249KG7W
WCDMA	N/A	Spread Spectrum	826.4 - 846.6	0.089	19.51	0.146	21.66	4M17F9W
LTE Band 26/5	15MHz (Band 26 only)	QPSK	831.5 - 841.5	0.086	19.33	0.141	21.48	13M5G7D
		16QAM	831.5 - 841.5	0.076	18.79	0.124	20.94	13M4W7D
	10 MHz	QPSK	829.0 - 844.0	0.087	19.38	0.142	21.53	9M02G7D
		16QAM	829.0 - 844.0	0.076	18.79	0.124	20.94	8M98W7D
	5 MHz	QPSK	826.5 - 846.5	0.086	19.33	0.141	21.48	4M51G7D
		16QAM	826.5 - 846.5	0.078	18.91	0.128	21.06	4M48W7D
	3 MHz	QPSK	825.5 - 847.5	0.081	19.11	0.134	21.26	2M69G7D
		16QAM	825.5 - 847.5	0.076	18.80	0.124	20.95	2M70W7D
	1.4 MHz	QPSK	824.7 - 848.3	0.084	19.22	0.137	21.37	1M10G7D
		16QAM	824.7 - 848.3	0.073	18.65	0.120	20.80	1M10W7D
	20 MHz	$\pi/2$ BPSK	834.0 - 839.0	0.085	19.29	0.139	21.44	17M9G7D
		QPSK	834.0 - 839.0	0.085	19.28	0.139	21.43	19M0G7D
16QAM		834.0 - 839.0	0.073	18.64	0.120	20.79	19M0W7D	
15 MHz	$\pi/2$ BPSK	831.5 - 841.5	0.083	19.17	0.135	21.32	13M5G7D	
	QPSK	831.5 - 841.5	0.085	19.31	0.140	21.46	14M2G7D	
10 MHz	16QAM	831.5 - 841.5	0.075	18.74	0.123	20.89	14M2W7D	
	$\pi/2$ BPSK	829.0 - 844.0	0.082	19.16	0.135	21.31	9M04G7D	
	QPSK	829.0 - 844.0	0.087	19.38	0.142	21.53	9M33G7D	
5 MHz	16QAM	829.0 - 844.0	0.077	18.86	0.126	21.01	9M33W7D	
	$\pi/2$ BPSK	826.5 - 846.5	0.088	19.44	0.144	21.59	4M52G7D	
	QPSK	826.5 - 846.5	0.086	19.36	0.142	21.51	4M50G7D	
		16QAM	826.5 - 846.5	0.078	18.95	0.129	21.10	4M52W7D

EUT Overview

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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 Element Test Location

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

1.3 Test Facility / Accreditations

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

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMA156M**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 22.

Test Device Serial No.: 0447M, 0441M, 0443M, 1958M

2.2 Device Capabilities

This device contains the following capabilities:

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

2.3 Test Configuration

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

2.4 Software and Firmware

Testing was performed on device(s) using software/firmware version A156EDXU0AWI4 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 “American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services” (ANSI C63.26-2015) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

3.2 Radiated Power and Radiated Spurious Emissions

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

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

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

$$P_d [dBm] = P_g [dBm] - \text{cable loss} [dB] + \text{antenna gain} [dBd/dBi];$$

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

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

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

And

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

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

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

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4.0 MEASUREMENT UNCERTAINTY

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

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

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5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
-	LTX4	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX4
-	LTX5	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX5
Anritsu	MT8821C	Radio Communication Analyzer	N/A			620152694
Com-Power	AL-130R	9kHz - 30MHz Loop Antenna	1/18/2022	Biennial	1/19/2024	121085
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
EMCO	3116	Horn Antenna (18-40GHz)	7/5/2023	Biennial	7/5/2025	9203-2178
Keysight Technologies	N9030A	PXA Signal Analyzer (3Hz-26.5GHz)	8/7/2023	Annual	8/7/2024	MY54490576
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MY52350166
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	9/28/2022	Biennial	9/28/2024	101058
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	9/25/2023	Annual	9/25/2024	100342
Rohde & Schwarz	ESW44	EMI Test Receiver (2Hz-44GHz)	3/1/2023	Annual	3/1/2024	101716
Rohde & Schwarz	VULB9162	Bi-Log Antenna	2/21/2023	Biennial	2/21/2025	00301
Sunol	DRH-118	Horn Antenna (1-18GHz)	2/14/2022	Biennial	2/14/2024	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	8/30/2022	Biennial	8/30/2024	A051107

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

GSM Emission Designator

Emission Designator = 250KGXW

GSM BW = 250 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 250KG7W

EDGE BW = 250 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M16F9W

WCDMA BW = 4.16 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

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Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

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

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7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMA156M
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): GSM/GPRS/EDGE/WCDMA/LTE/NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.2
	Conducted Band Edge / Spurious Emissions	2.1051, 22.917(a)	$\geq 43 + 10 \log(P[\text{Watts}])$ dB of attenuation below transmitter power	PASS	Sections 7.3, 7.4
	Frequency Stability	2.1055, 22.355	The carrier frequency of the transmitter must be maintained within the 2.5ppm	PASS	Section 7.7
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power	22.913(a)(5)	< 7 Watts max. ERP	PASS	Section 7.5
	Radiated Spurious Emissions	2.1053, 22.917(a)	$> 43 + 10 \log_{10}(P[\text{Watts}])$ for all out-of-band emissions	PASS	Section 7.6

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst-case emissions.
- 2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool v1.2.2.

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7.2 Occupied Bandwidth

Test Overview

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

Test Procedure Used

ANSI C63.26-2015 – Section 5.4.4

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW \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.

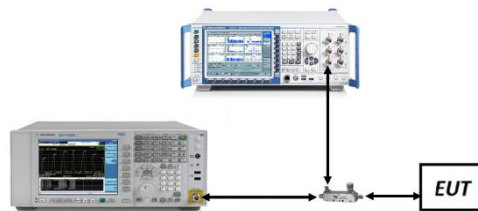


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

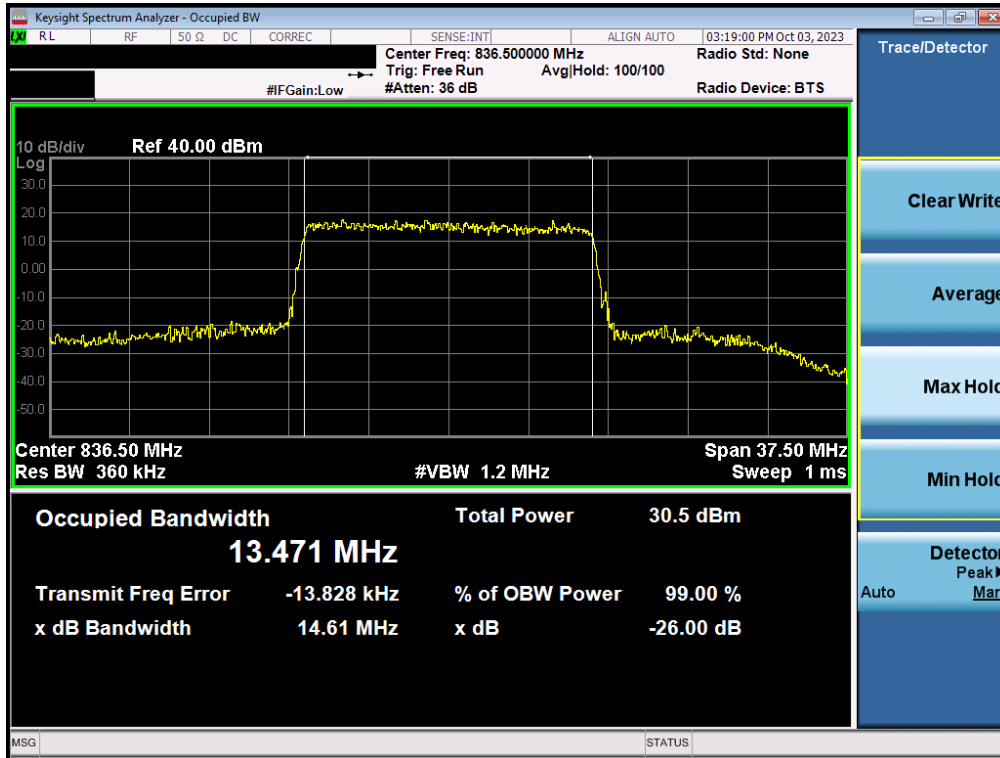
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Mode	Bandwidth	Modulation	OBW [MHz]
GSM-Cell	250kHz	GMSK	0.25
	250kHz	8-PSK	0.25
WCDMA-Cell	5MHz	Spread Spectrum	4.17
LTE-B26-5	15MHz (B26 Only)	QPSK	13.47
		16QAM	13.39
	10MHz	QPSK	9.02
		16QAM	8.98
	5MHz	QPSK	4.51
		16QAM	4.48
	3MHz	QPSK	2.69
		16QAM	2.70
1.4MHz	QPSK	1.10	
	16QAM	1.10	
NR-n5	20MHz	BPSK	17.94
		QPSK	18.98
		16QAM	19.00
	15MHz	BPSK	13.51
		QPSK	14.18
		16QAM	14.20
	10MHz	BPSK	9.04
		QPSK	9.33
		16QAM	9.33
	5MHz	BPSK	4.52
		QPSK	4.50
		16QAM	4.52

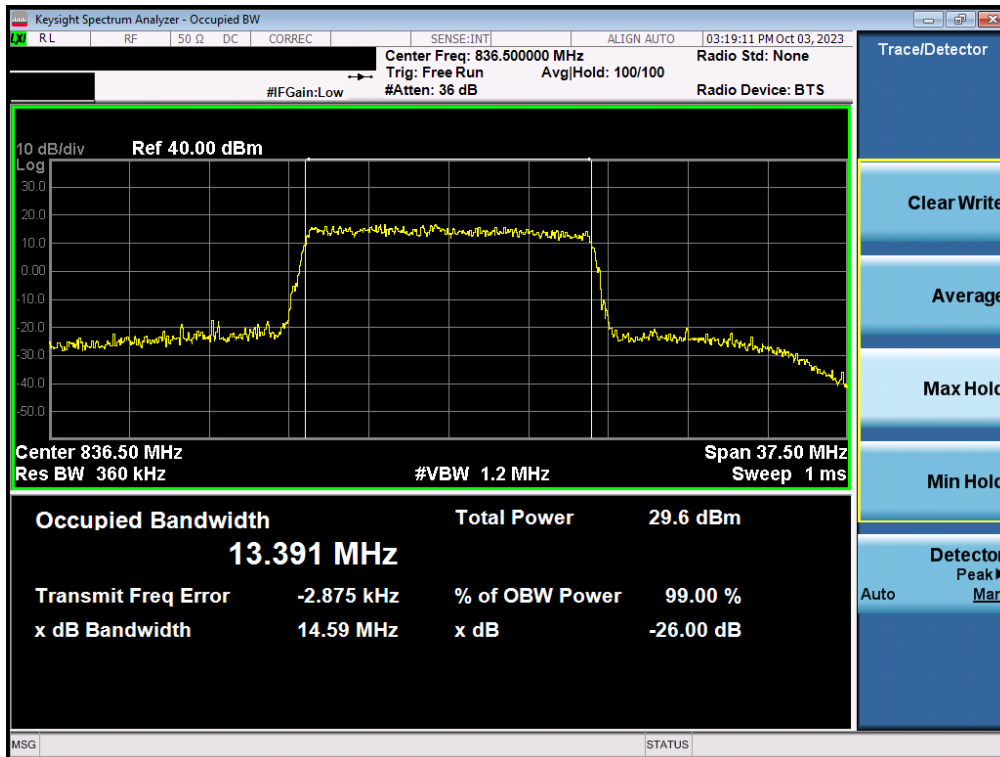
Table 7-2. Summary of Occupied Bandwidth Test Results

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LTE Band 26/5

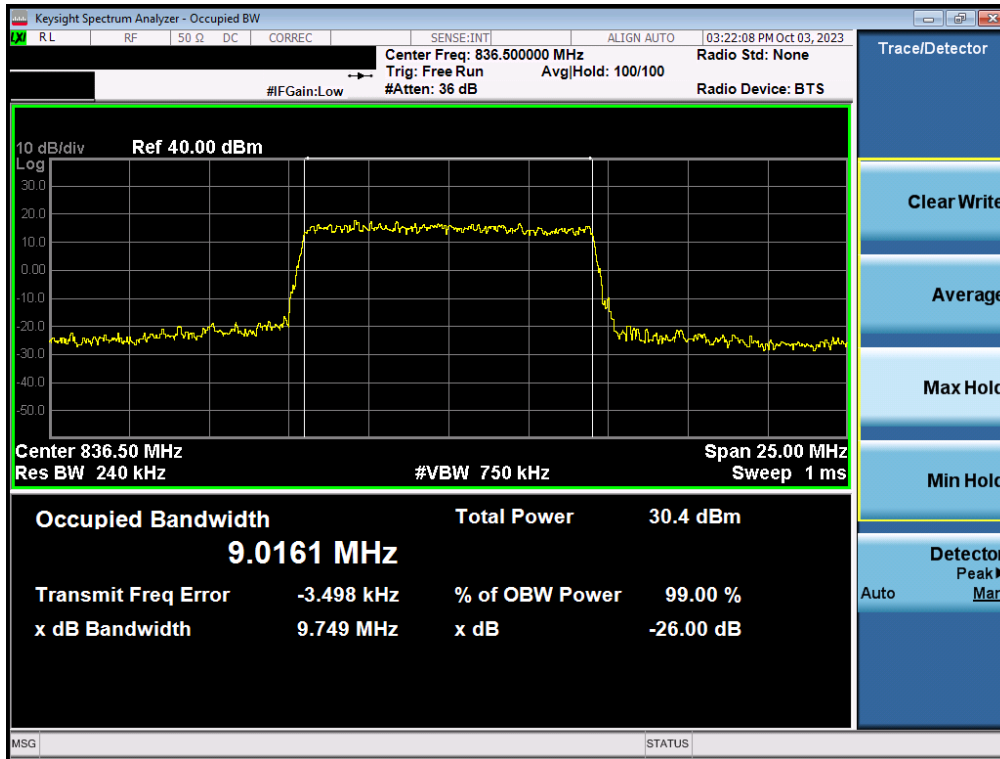


Plot 7-1. Occupied Bandwidth Plot (LTE Band 26 - 15MHz QPSK - Full RB)

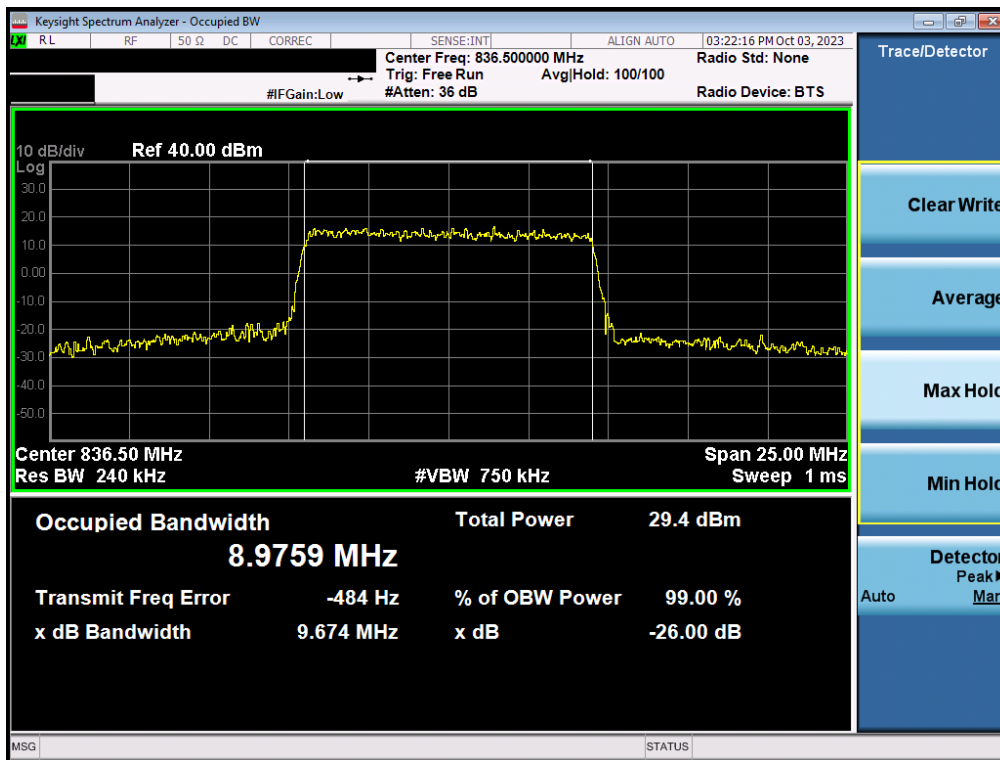


Plot 7-2. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 16-QAM - Full RB)

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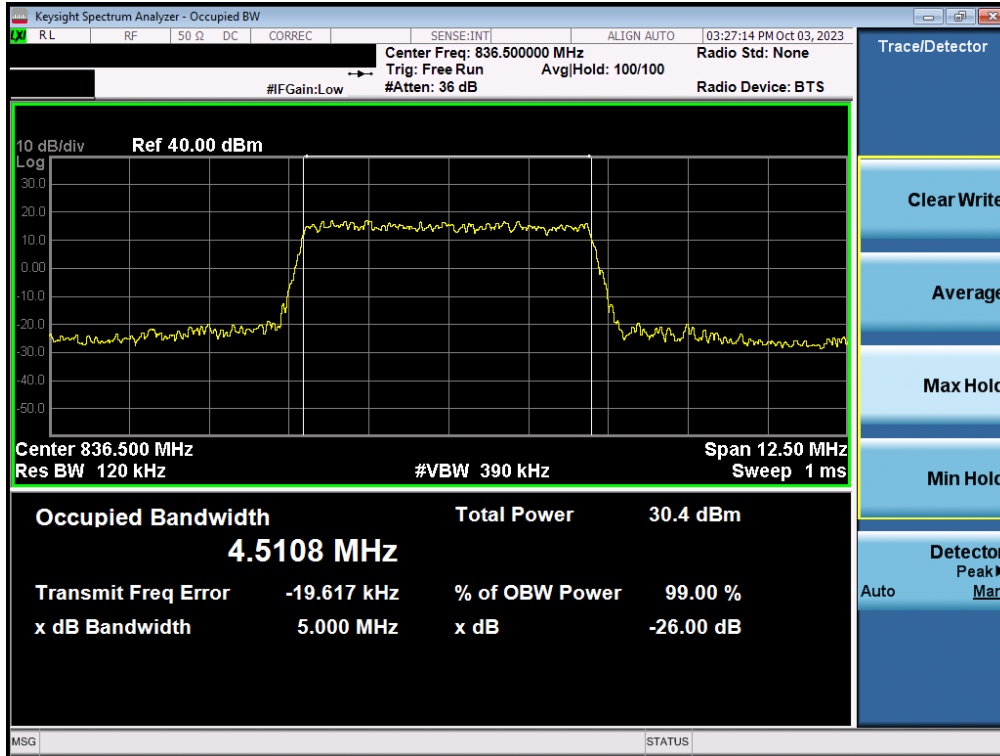


Plot 7-3. Occupied Bandwidth Plot (LTE Band 26/5 - 10MHz QPSK - Full RB)

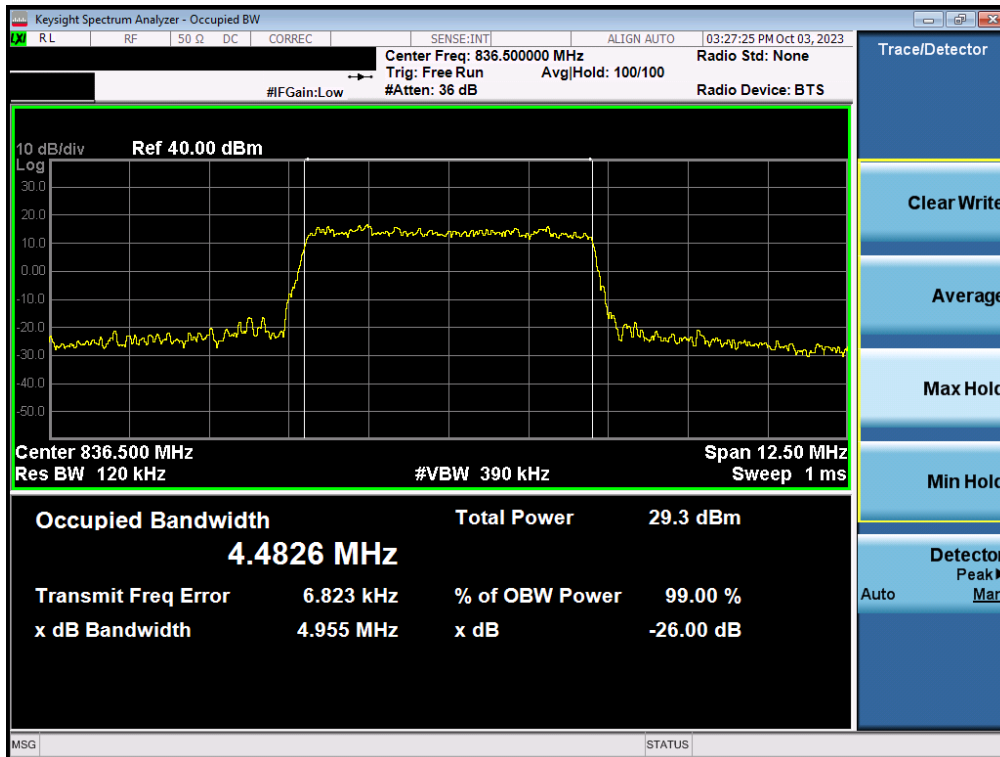


Plot 7-4. Occupied Bandwidth Plot (LTE Band 26/5 - 10MHz 16-QAM - Full RB)

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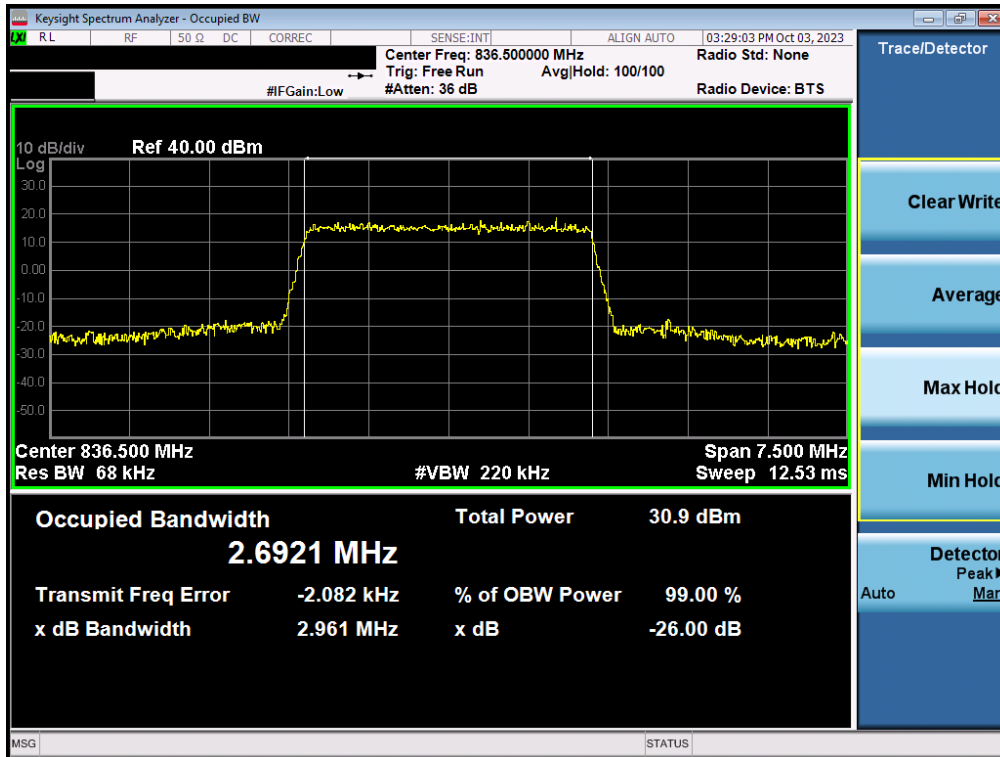


Plot 7-5. Occupied Bandwidth Plot (LTE Band 26/5 - 5MHz QPSK - Full RB)

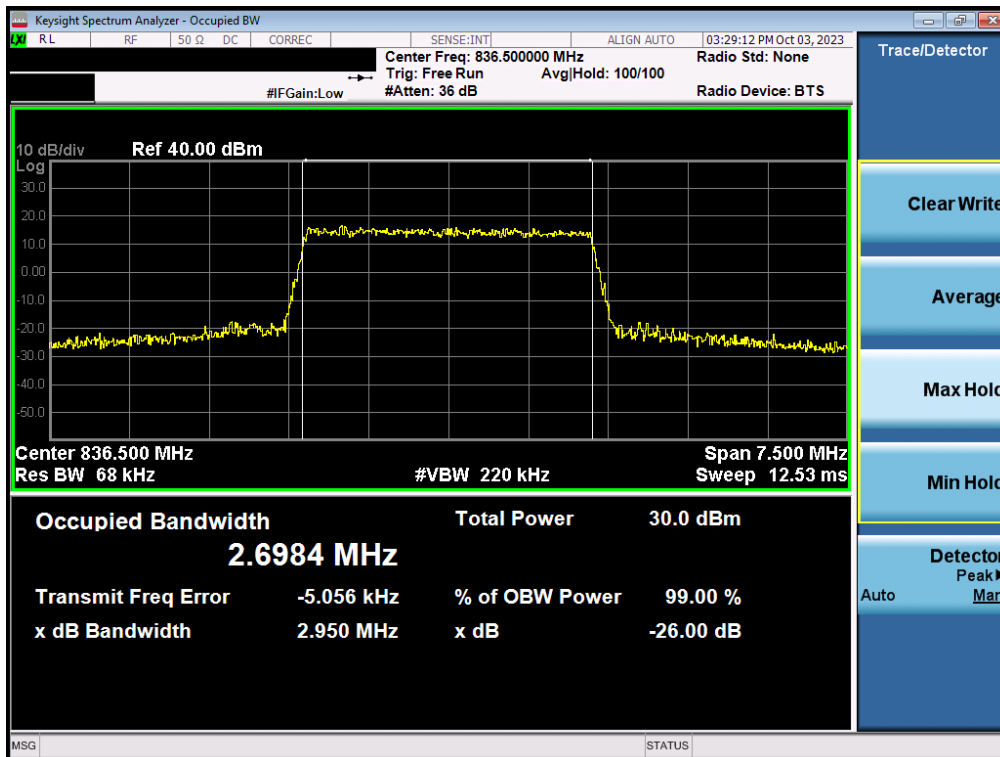


Plot 7-6. Occupied Bandwidth Plot (LTE Band 26/5 - 5MHz 16-QAM - Full RB)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 16 of 65

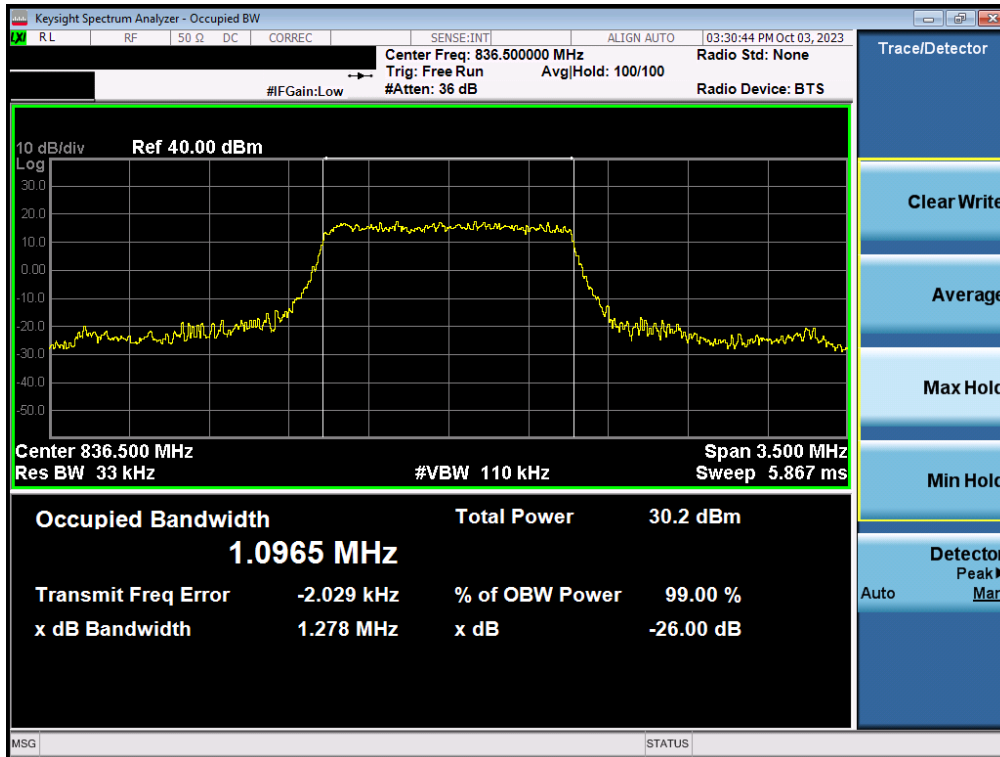


Plot 7-7. Occupied Bandwidth Plot (LTE Band 26/5 - 3MHz QPSK - Full RB)

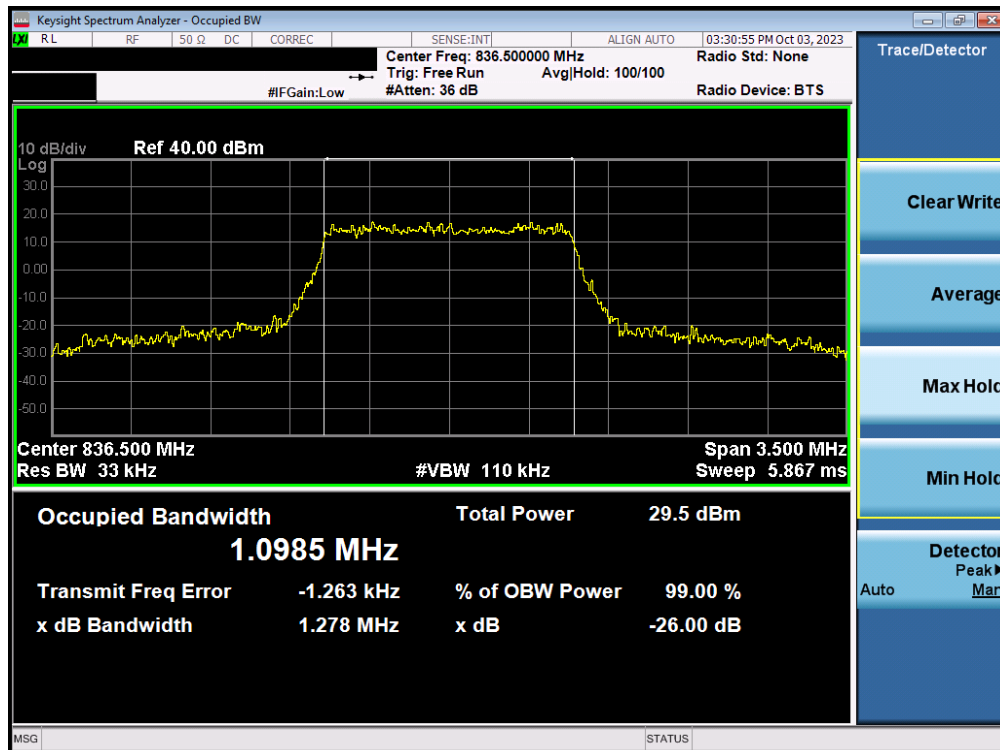


Plot 7-8. Occupied Bandwidth Plot (LTE Band 26/5 - 3MHz 16-QAM - Full RB)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 17 of 65



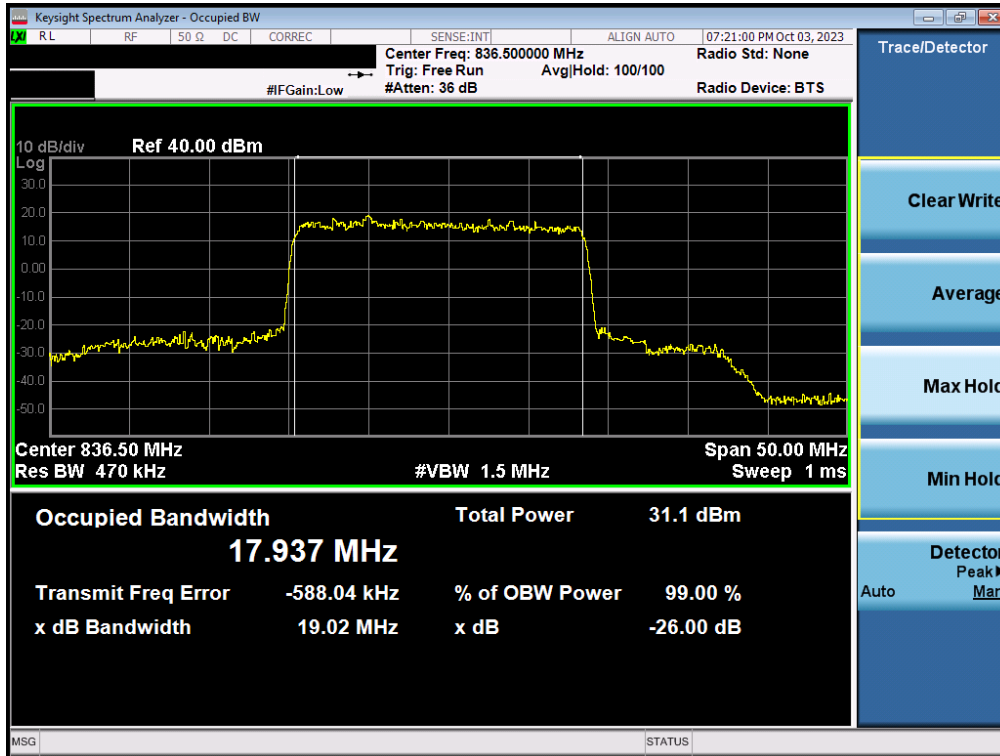
Plot 7-9. Occupied Bandwidth Plot (LTE Band 26/5 - 1.4MHz QPSK - Full RB)



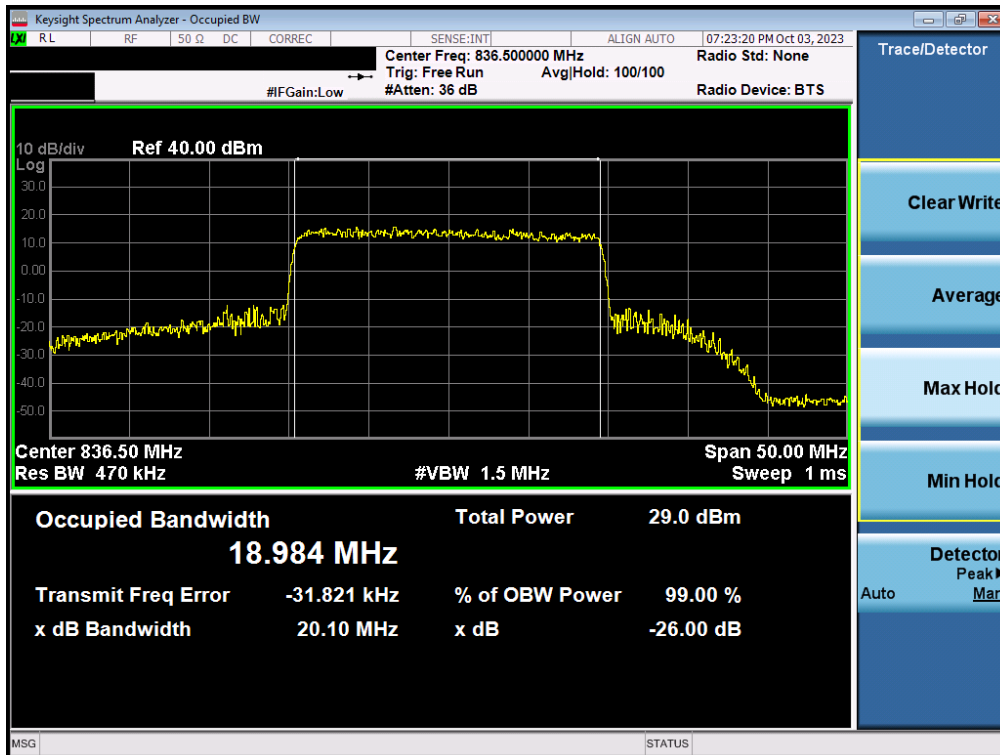
Plot 7-10. Occupied Bandwidth Plot (LTE Band 26/5 - 1.4MHz 16-QAM - Full RB)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 18 of 65

NR Band n5

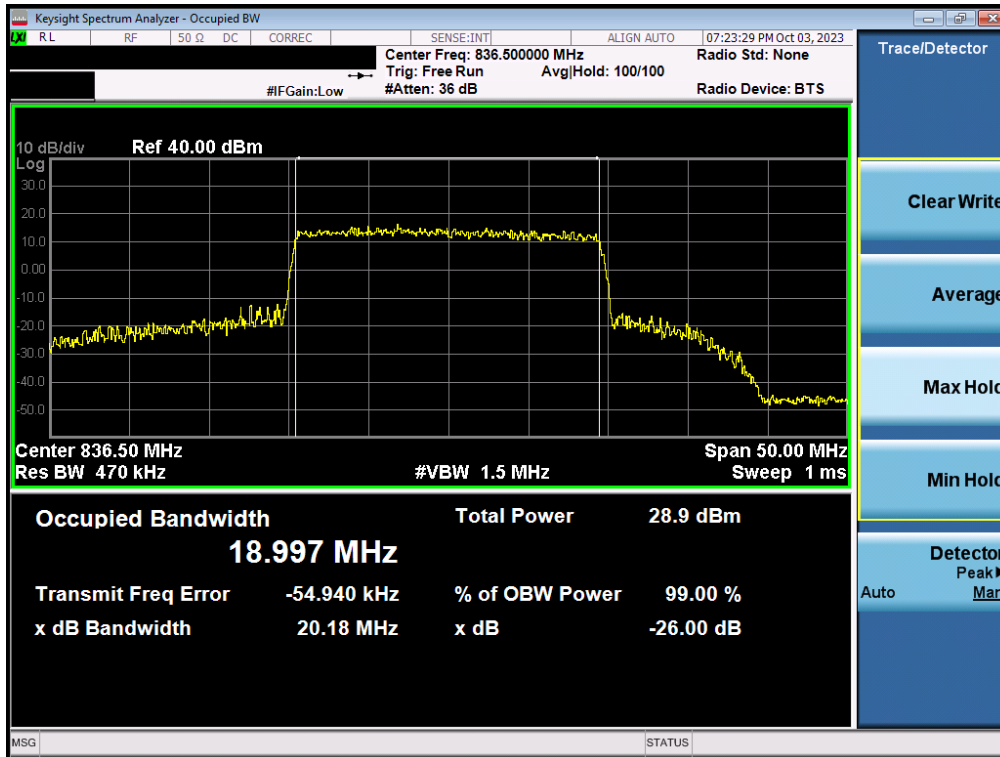


Plot 7-11. Occupied Bandwidth Plot (NR Band n5 - 20MHz $\pi/2$ BPSK - Full RB)

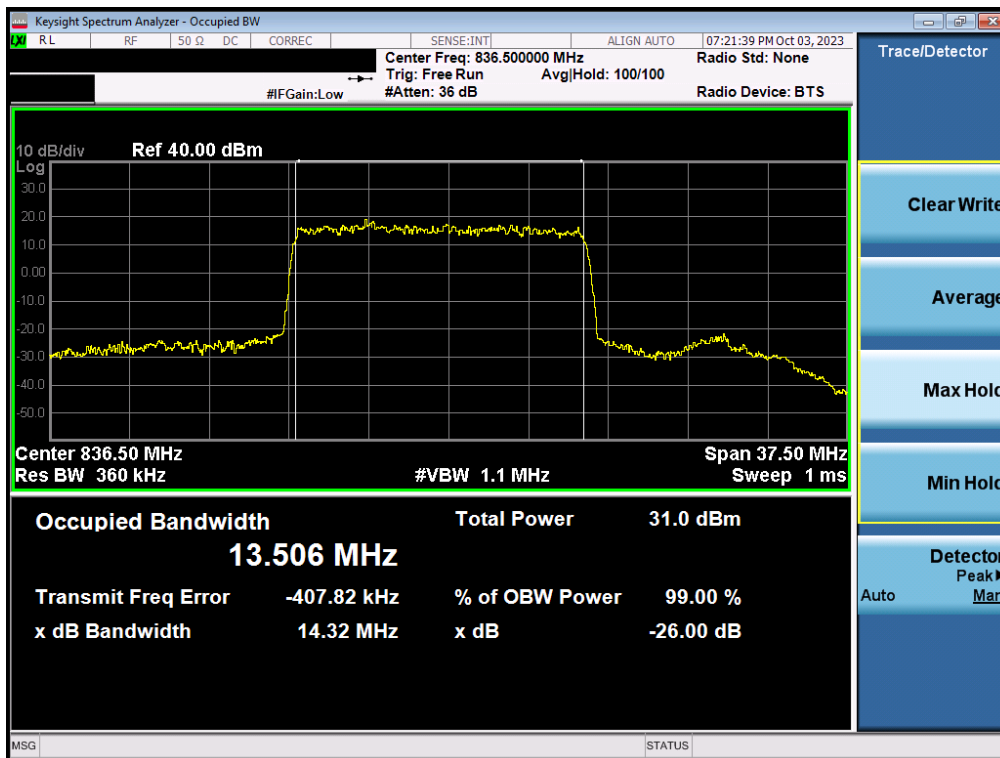


Plot 7-12. Occupied Bandwidth Plot (NR Band n5 - 20MHz QPSK - Full RB)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 19 of 65



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

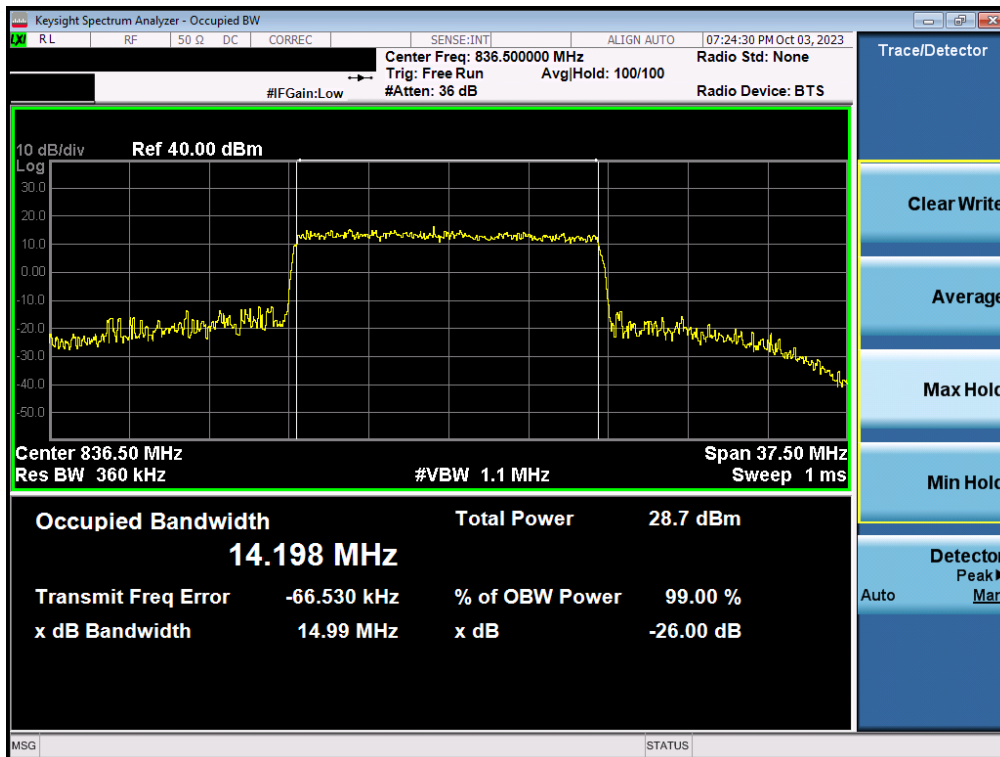


Plot 7-14. Occupied Bandwidth Plot (NR Band n5 - 15MHz $\pi/2$ BPSK - Full RB)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 20 of 65

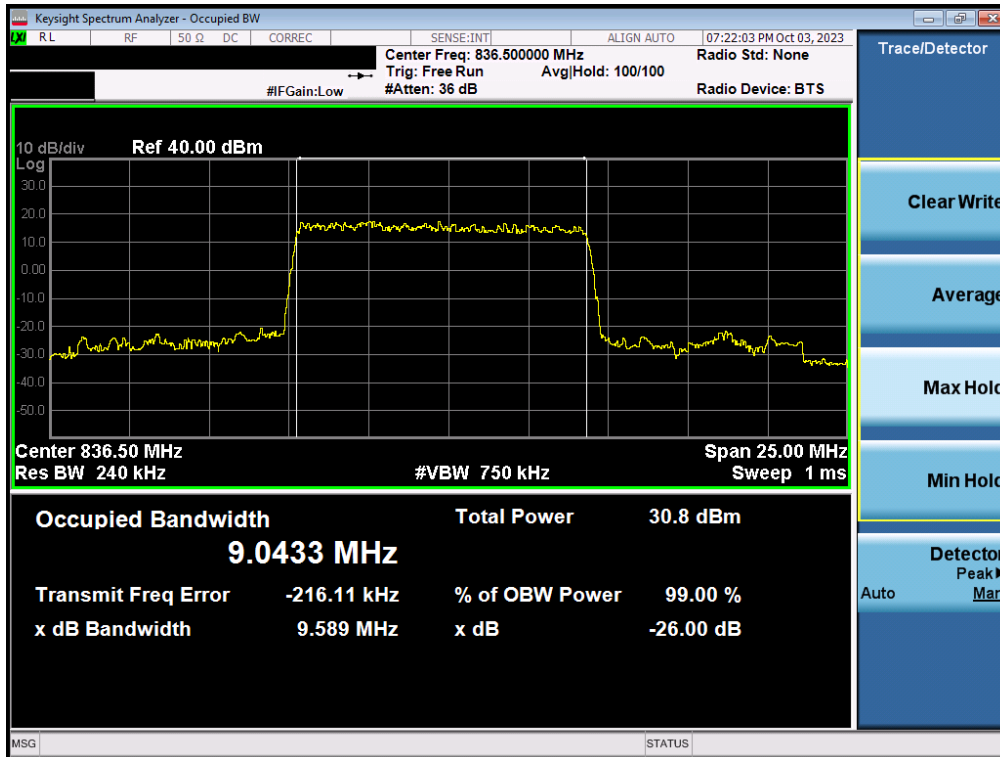


Plot 7-15. Occupied Bandwidth Plot (NR Band n5 - 15MHz QPSK - Full RB)

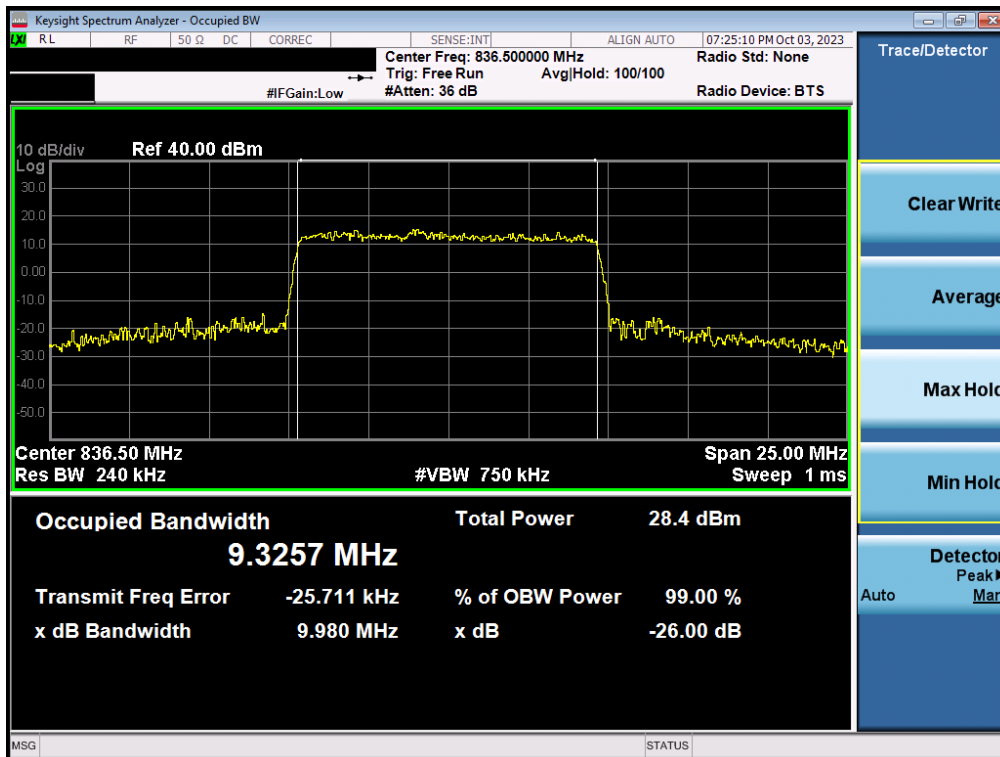


Plot 7-16. Occupied Bandwidth Plot (NR Band n5 - 15MHz 16-QAM - Full RB)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 21 of 65

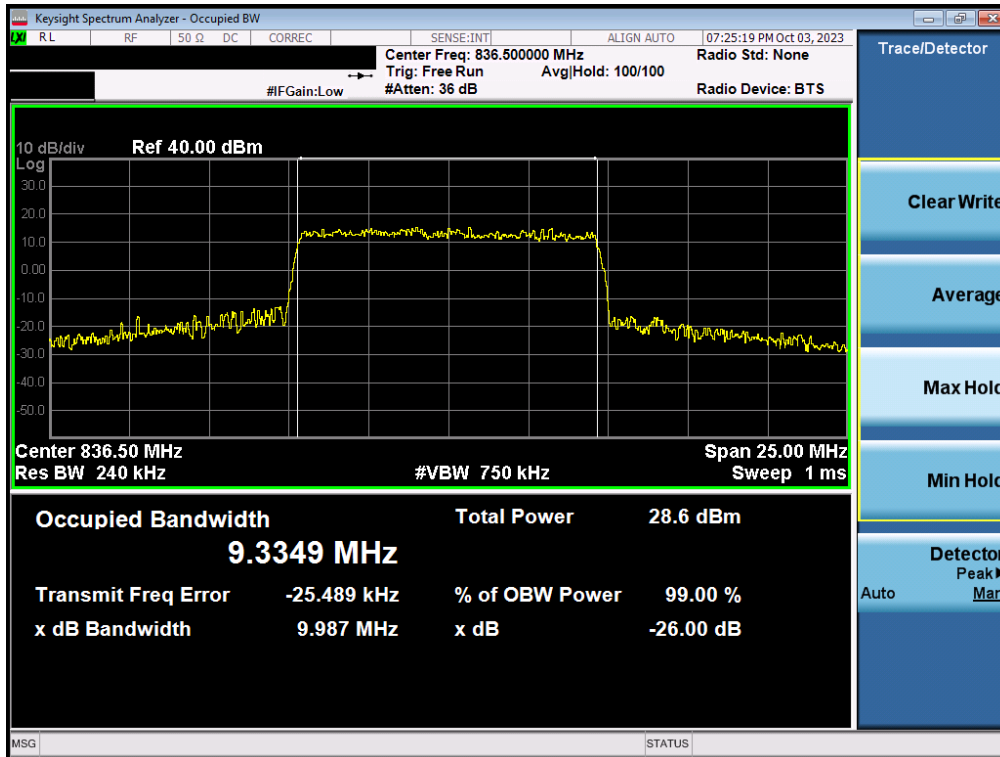


Plot 7-17. Occupied Bandwidth Plot (NR Band n5 - 10MHz $\pi/2$ BPSK - Full RB)

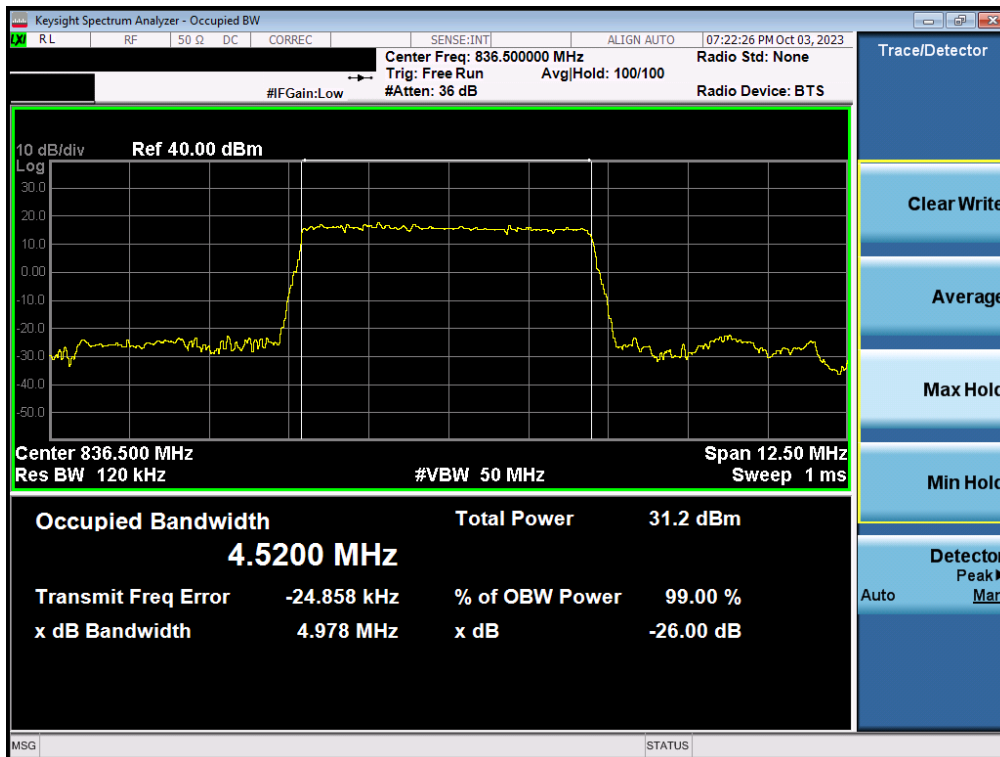


Plot 7-18. Occupied Bandwidth Plot (NR Band n5 - 10MHz QPSK - Full RB)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 22 of 65

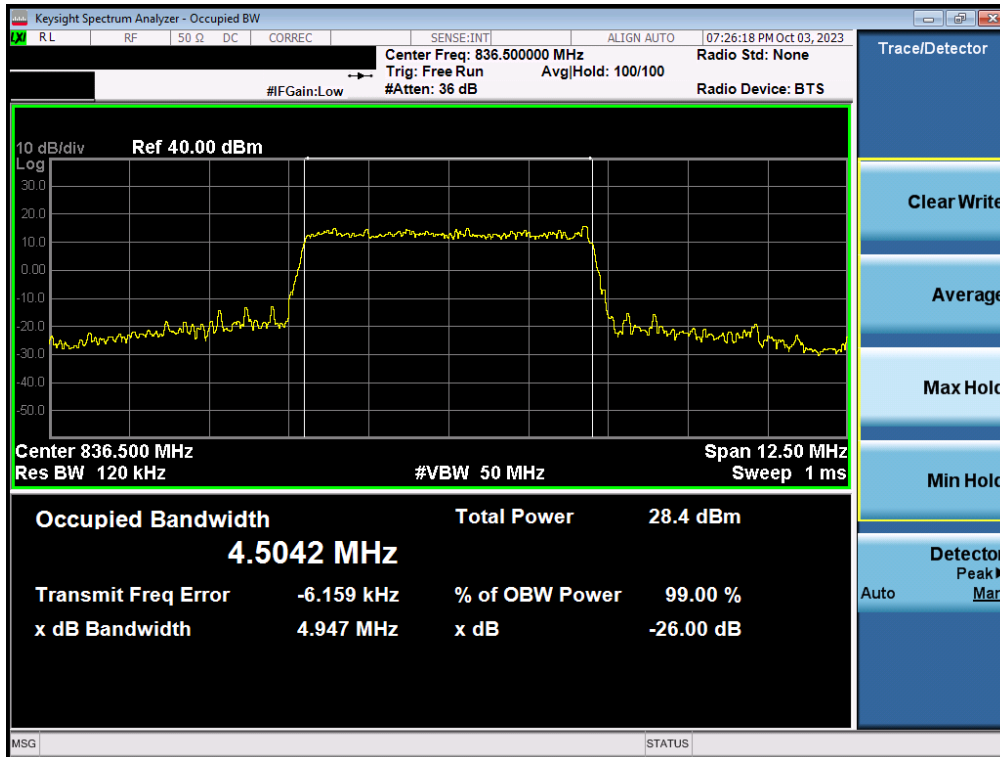


Plot 7-19. Occupied Bandwidth Plot (NR Band n5 - 10MHz 16-QAM - Full RB)

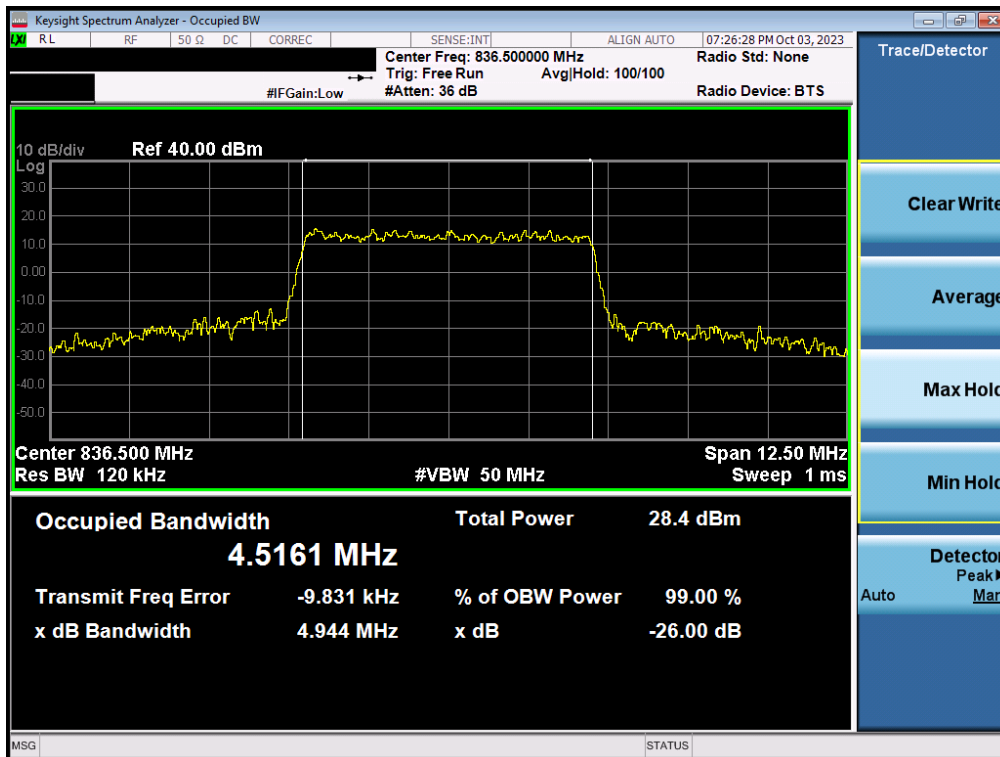


Plot 7-20. Occupied Bandwidth Plot (NR Band n5 - 5MHz $\pi/2$ BPSK - Full RB)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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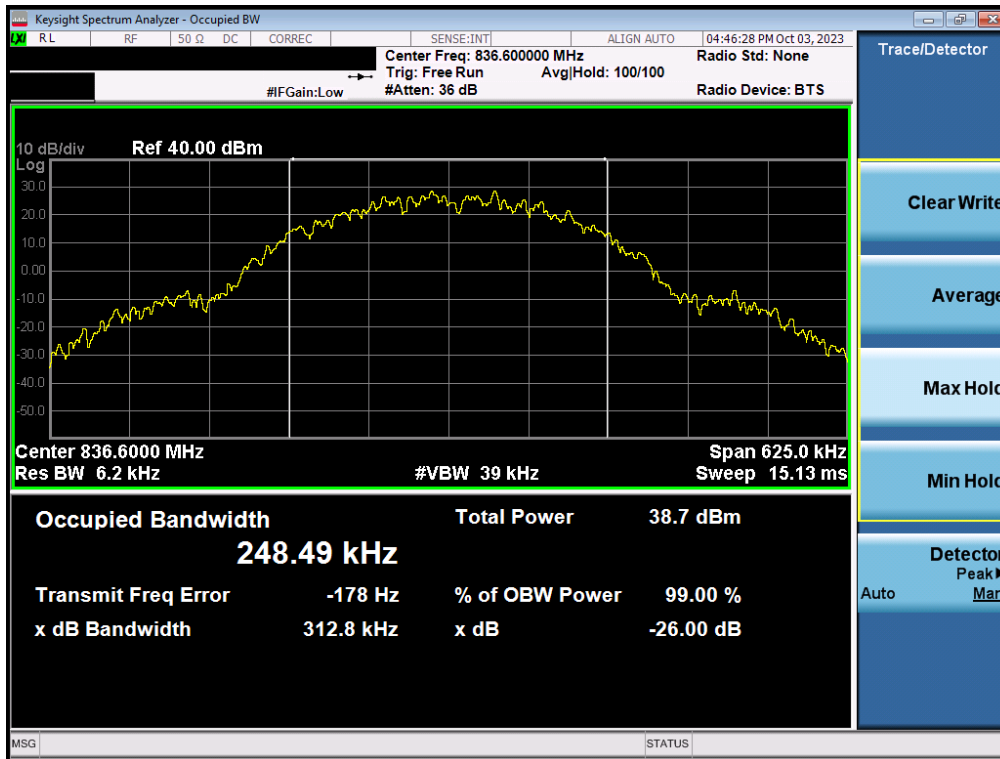
Plot 7-21. Occupied Bandwidth Plot (NR Band n5 - 5MHz QPSK - Full RB)



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

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 24 of 65

GPRS Cell



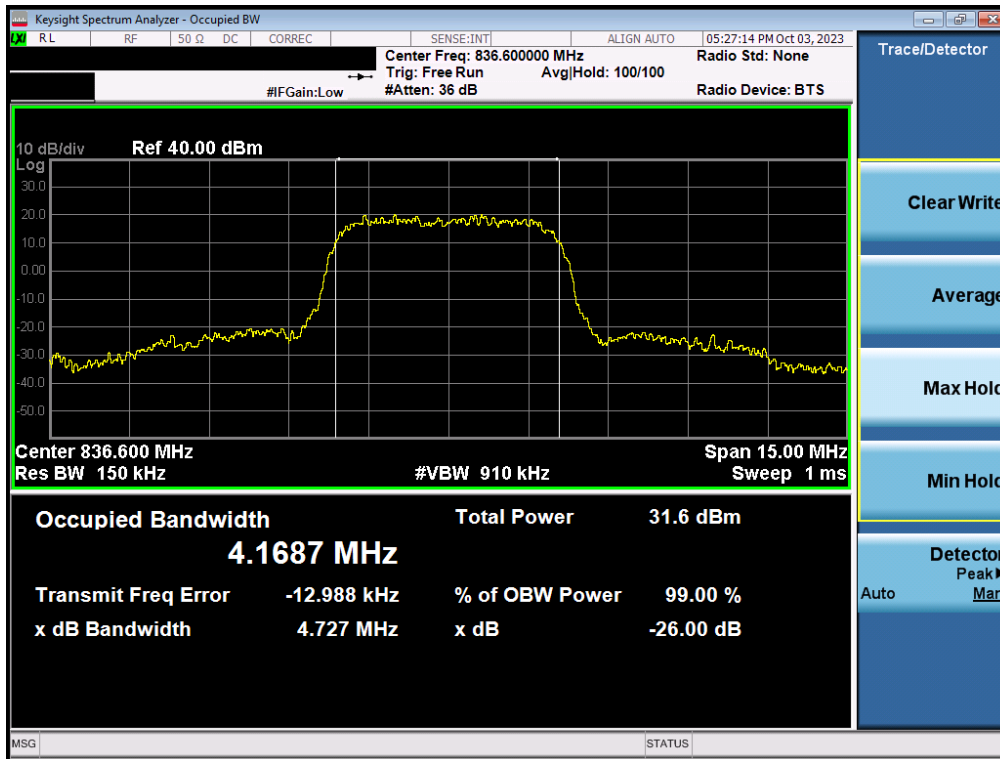
Plot 7-23. Occupied Bandwidth Plot (GPRS, Ch. 190)



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

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 25 of 65

WCDMA Cell



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

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 26 of 65

7.3 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

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

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

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.4

Test Settings

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

Test Setup

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

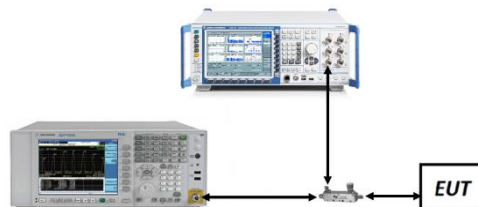


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

1. Per Part 22, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission is attenuated at least 26 dB below the transmitter power.
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g., CP-OFDM and DFT-s-OFDM) were investigated to determine the worst-case configuration. All modes of operation were investigated, and the worst-case configuration results are reported in this section.

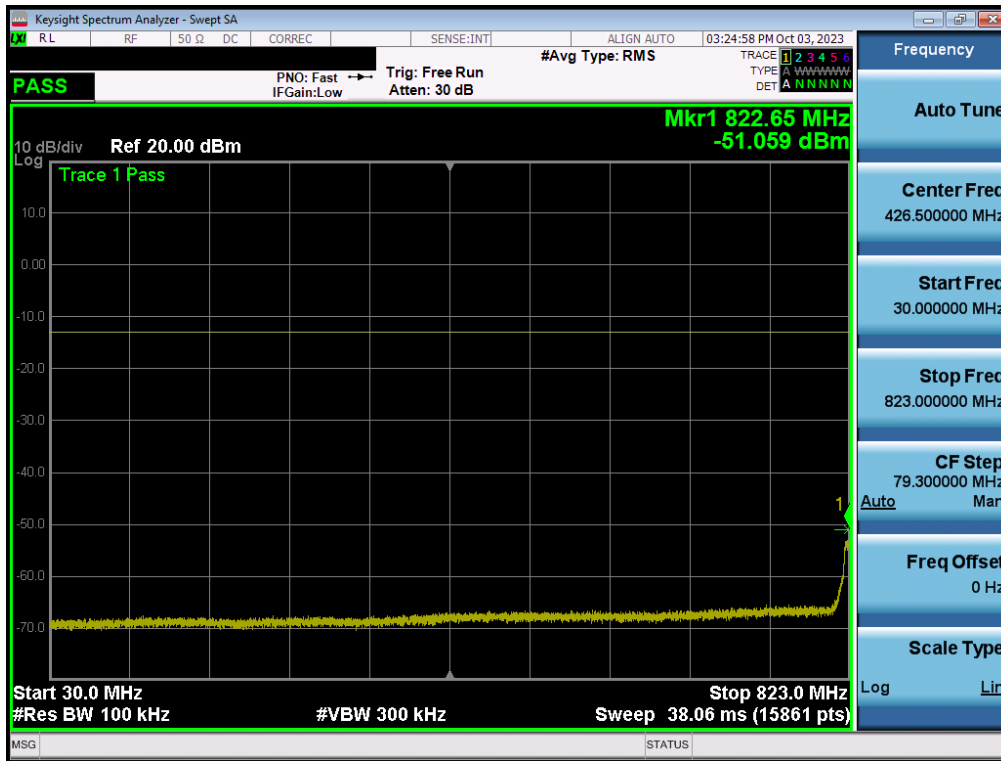
FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 27 of 65

Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
GSM-Cell	250 kHz	Low	30.0 - 823.0	-49.83	-13.00	-36.83
			849.0 - 1000.0	-53.97	-13.00	-40.97
			1000.0 - 10000.0	-33.46	-13.00	-20.46
		Mid	30.0 - 824.0	-52.19	-13.00	-39.19
			849.0 - 1000.0	-53.61	-13.00	-40.61
			1000.0 - 10000.0	-32.78	-13.00	-19.78
		High	30.0 - 824.0	-53.26	-13.00	-40.26
			850.0 - 1000.0	-43.69	-13.00	-30.69
			1000.0 - 10000.0	-32.32	-13.00	-19.32
WCDMA-Cell	5 MHz	Low	30.0 - 823.0	-31.73	-13.00	-18.73
			849.0 - 1000.0	-65.44	-13.00	-52.44
			1000.0 - 10000.0	-47.56	-13.00	-34.56
		Mid	30.0 - 824.0	-58.76	-13.00	-45.76
			849.0 - 1000.0	-59.54	-13.00	-46.54
			1000.0 - 10000.0	-47.46	-13.00	-34.46
		High	30.0 - 824.0	-64.59	-13.00	-51.59
			850.0 - 1000.0	-32.02	-13.00	-19.02
			1000.0 - 10000.0	-47.19	-13.00	-34.19
LTE-B26-5	10 MHz	Low	30.0 - 823.0	-51.06	-13.00	-38.06
			849.0 - 1000.0	-62.18	-13.00	-49.18
			1000.0 - 10000.0	-46.67	-13.00	-33.67
		Mid	30.0 - 824.0	-52.81	-13.00	-39.81
			849.0 - 1000.0	-54.89	-13.00	-41.89
			1000.0 - 10000.0	-47.31	-13.00	-34.31
		High	30.0 - 824.0	-59.51	-13.00	-46.51
			850.0 - 1000.0	-51.30	-13.00	-38.30
			1000.0 - 10000.0	-47.23	-13.00	-34.23
NR-n5	20 MHz	Low	30.0 - 823.0	-48.38	-13.00	-35.38
			849.0 - 1000.0	-59.59	-13.00	-46.59
			1000.0 - 10000.0	-47.56	-13.00	-34.56
		Mid	30.0 - 824.0	-48.18	-13.00	-35.18
			849.0 - 1000.0	-49.88	-13.00	-36.88
			1000.0 - 10000.0	-47.19	-13.00	-34.19
		High	30.0 - 824.0	-54.60	-13.00	-41.60
			850.0 - 1000.0	-50.63	-13.00	-37.63
			1000.0 - 10000.0	-47.31	-13.00	-34.31

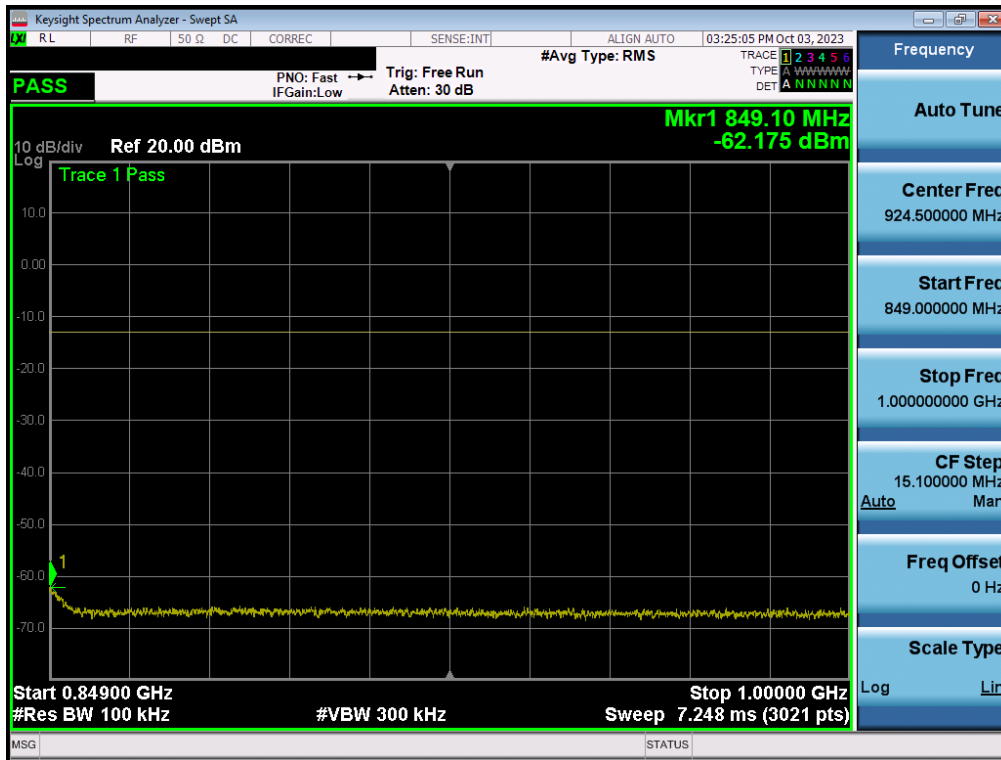
Table 7-3. Summary of Conducted Spurious Emissions Test Results

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 28 of 65

LTE Band 26/5



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



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

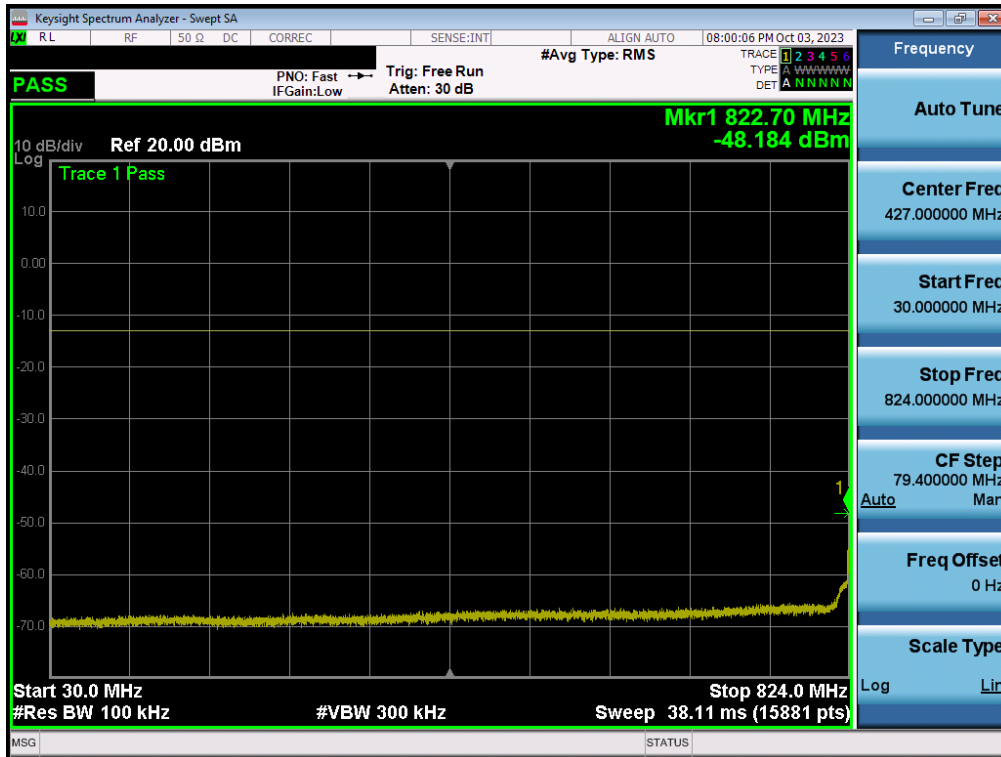
FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 29 of 65



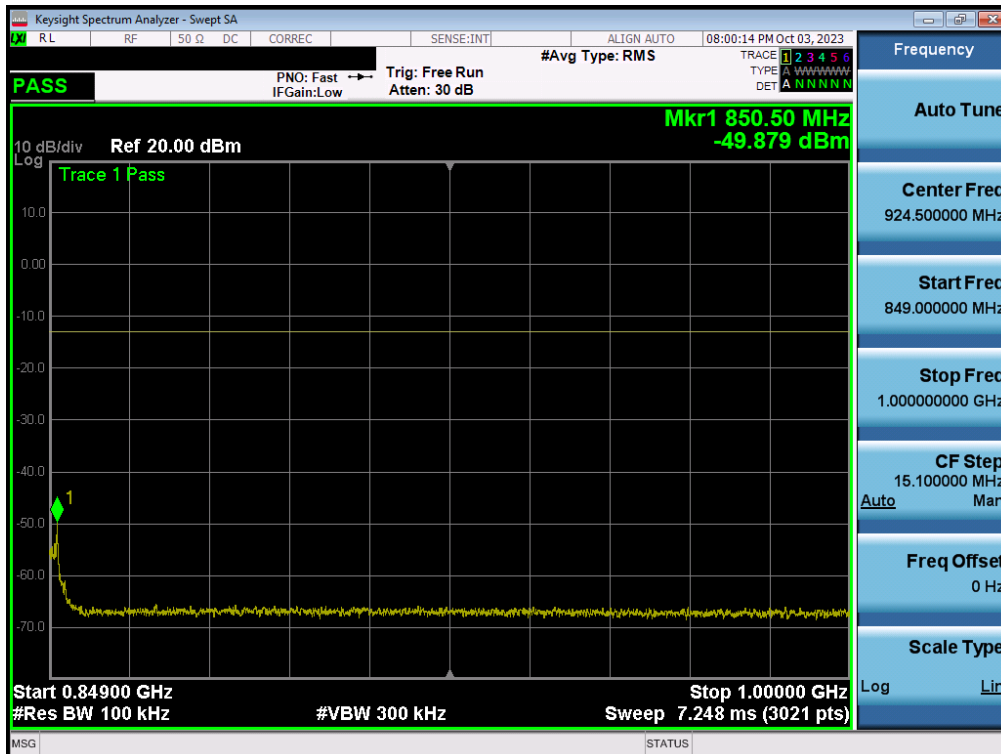
Plot 7-28. Conducted Spurious Plot (LTE Band 26/5 - 10MHz QPSK - 1 RB - Low Channel)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 30 of 65

NR Band n5

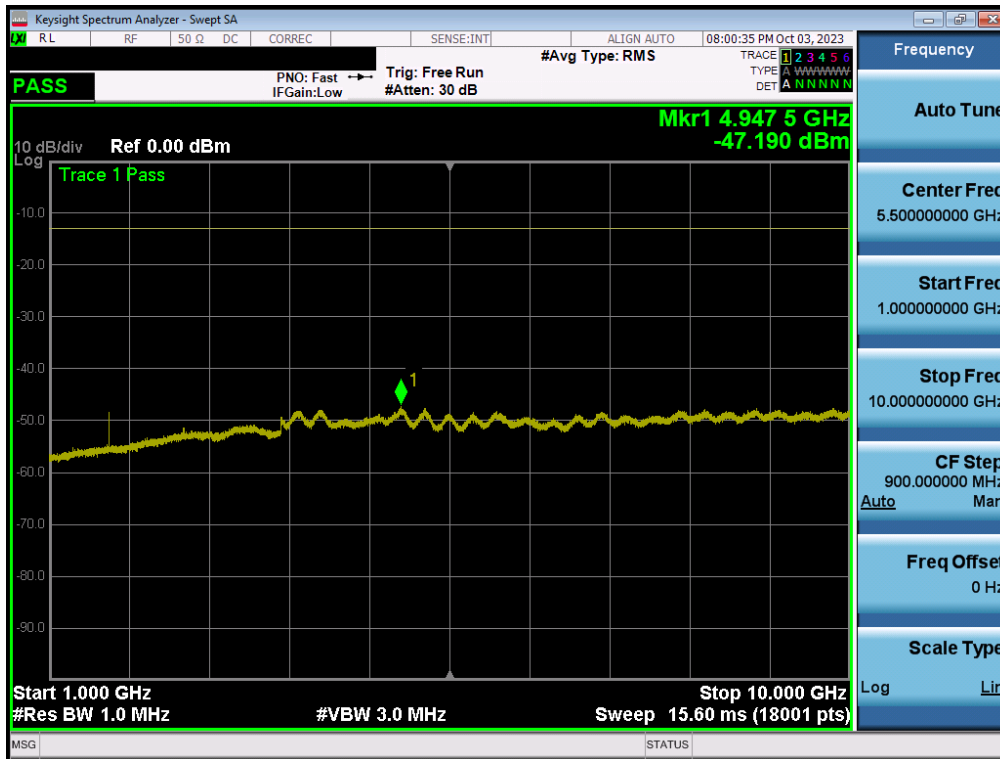


Plot 7-29. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)



Plot 7-30. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)

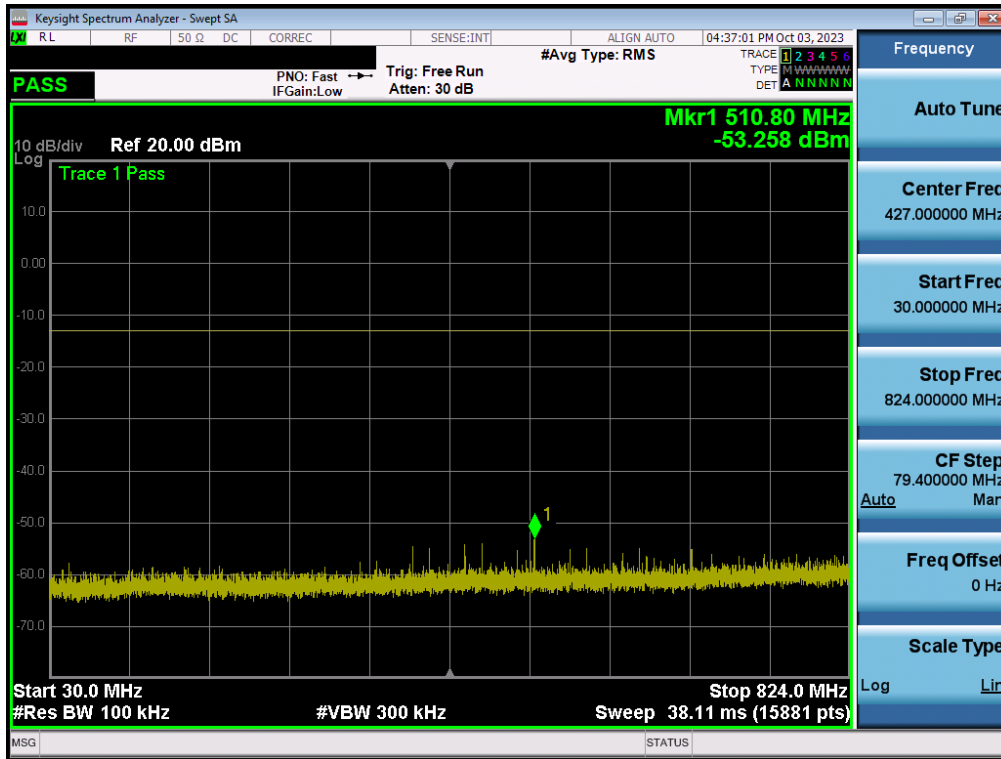
FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 31 of 65



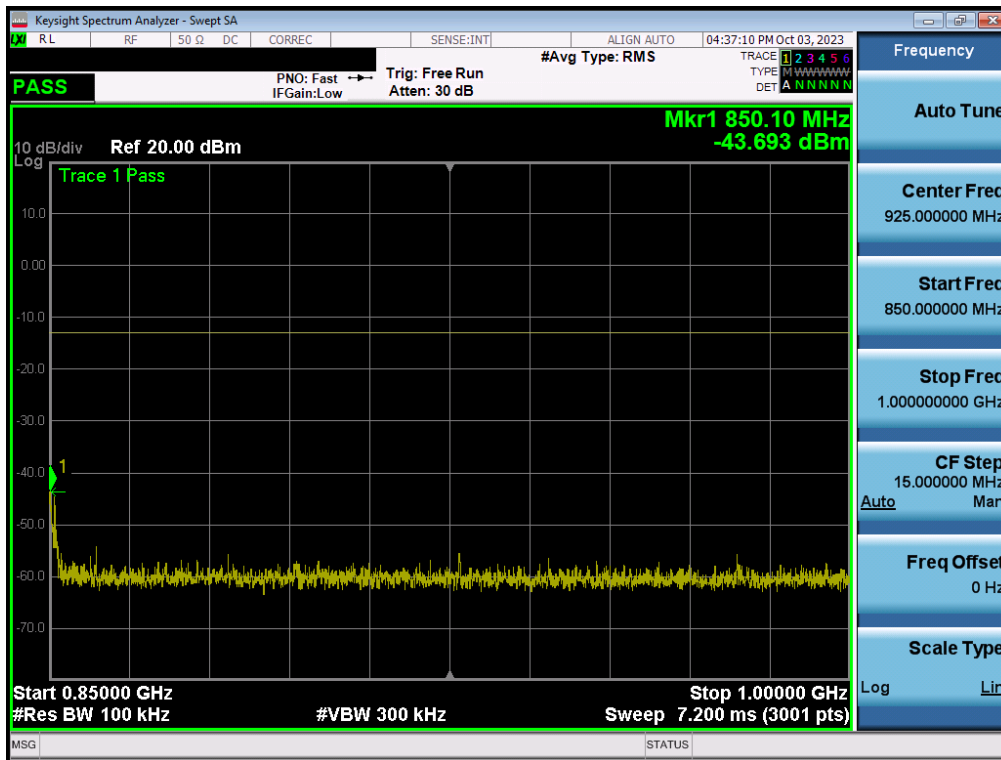
Plot 7-31. Conducted Spurious Plot (NR Band n5 - 20.0MHz - 1 RB - Mid Channel)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 32 of 65

GSM/GPRS Cell

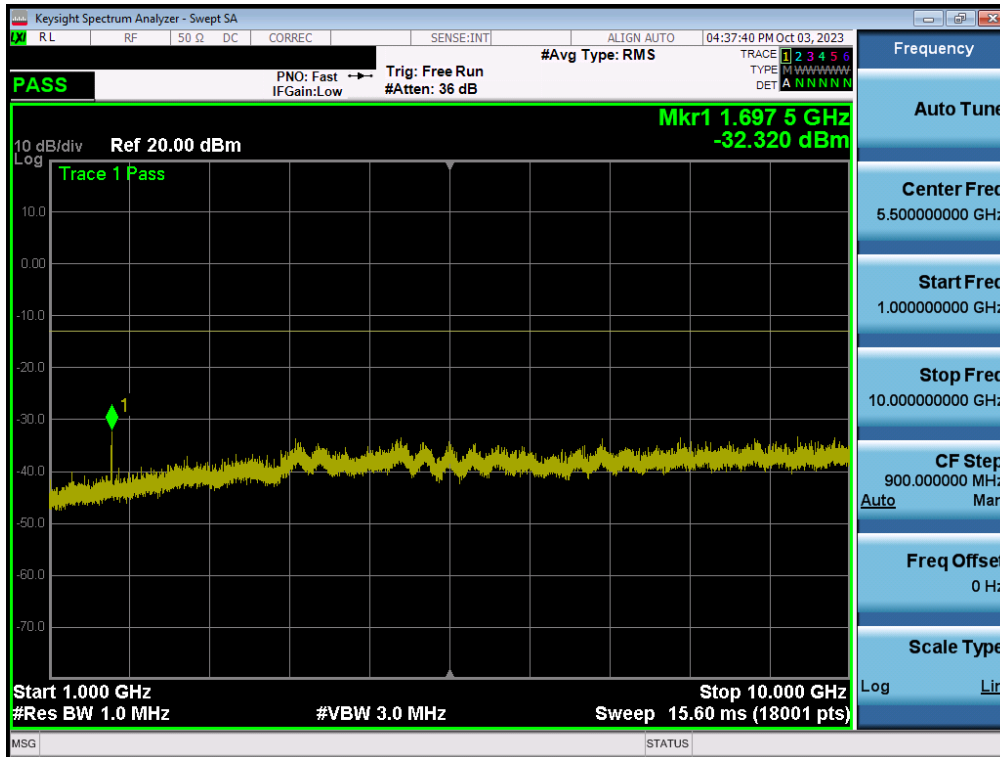


Plot 7-32. Conducted Spurious Plot (GPRS Ch. 251)



Plot 7-33. Conducted Spurious Plot (GPRS Ch. 251)

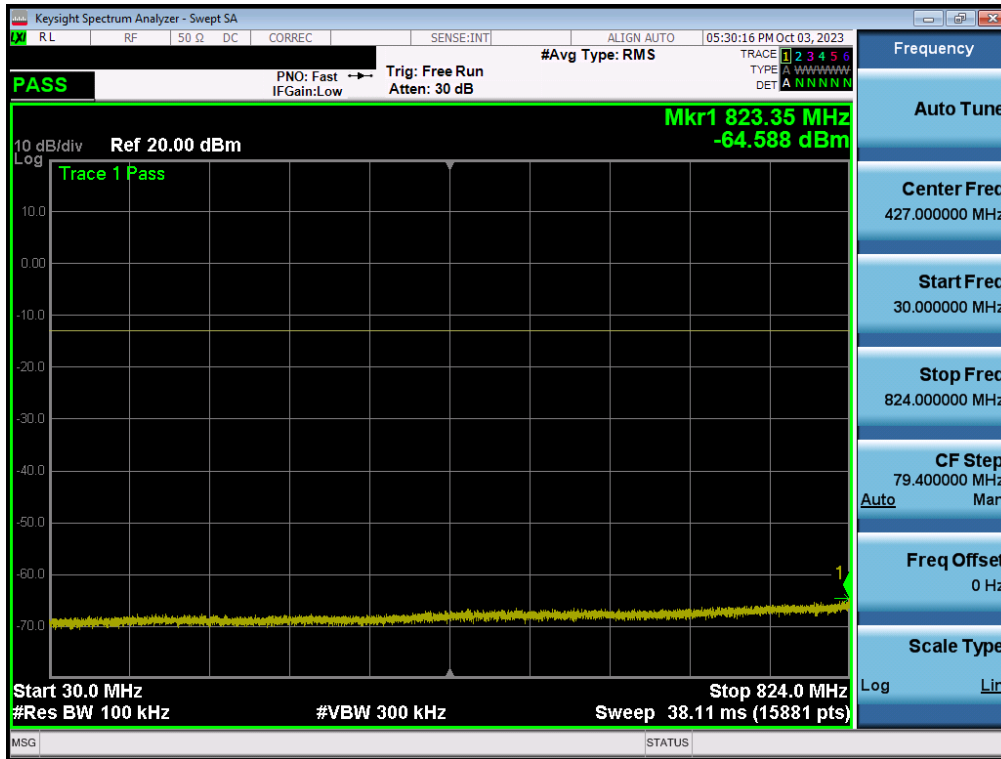
FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 33 of 65



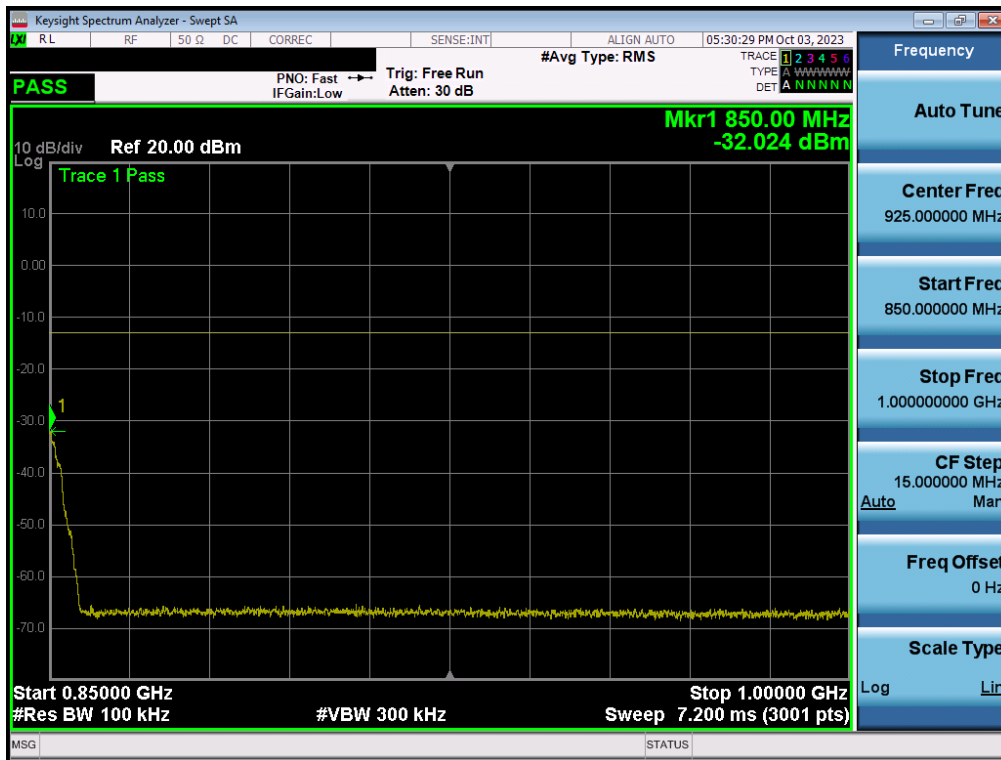
Plot 7-34. Conducted Spurious Plot (GPRS Ch. 251)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 34 of 65

WCDMA Cell

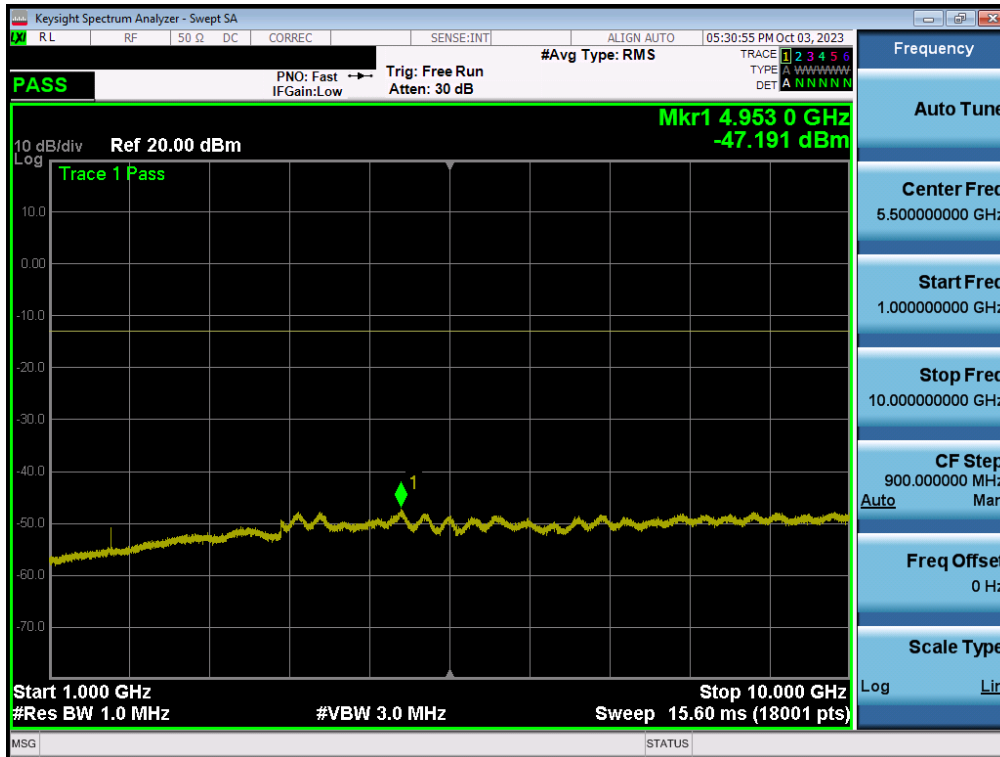


Plot 7-35. Conducted Spurious Plot (WCDMA Ch. 4233)



Plot 7-36. Conducted Spurious Plot (WCDMA Ch. 4233)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-37. Conducted Spurious Plot (WCDMA Ch. 4233)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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7.4 Band Edge Emissions at Antenna Terminal

Test Overview

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

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

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.3

Test Settings

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

Test Setup

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

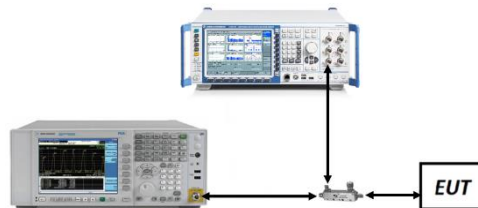


Figure 7-3. Test Instrument & Measurement Setup

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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Test Notes

1. Per 22.917(b), 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 emissions are attenuated at least 26 dB below the transmitter power.

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

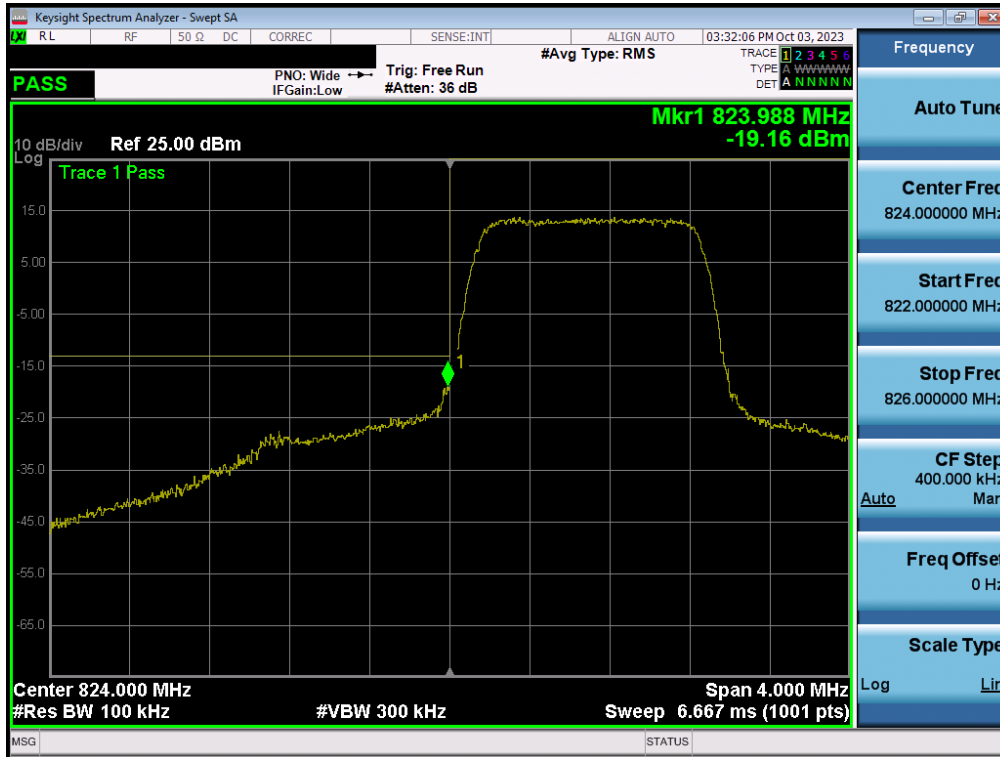
FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
GSM-Cell	250 kHz	Low	Band Edge	-14.36	-13.00	-1.36
		High		-14.28	-13.00	-1.28
WCDMA-Cell	5 MHz	Low		-22.91	-13.00	-9.91
		High		-23.43	-13.00	-10.43
LTE-B26-5	15 MHz (B26 Only)	Low		-32.27	-13.00	-19.27
		High		-32.61	-13.00	-19.61
	10 MHz	Low		-32.31	-13.00	-19.31
		High		-31.94	-13.00	-18.94
	5 MHz	Low		-24.85	-13.00	-11.85
		High		-26.77	-13.00	-13.77
	3 MHz	Low		-23.41	-13.00	-10.41
		High		-24.14	-13.00	-11.14
	1.4 MHz	Low		-19.16	-13.00	-6.16
		High		-18.40	-13.00	-5.40
NR-n5	20 MHz	Low	-30.67	-13.00	-17.67	
		High	-32.07	-13.00	-19.07	
	15 MHz	Low	-30.88	-13.00	-17.88	
		High	-31.94	-13.00	-18.94	
	10 MHz	Low	-32.02	-13.00	-19.02	
		High	-31.11	-13.00	-18.11	
	5 MHz	Low	-28.12	-13.00	-15.12	
		High	-27.02	-13.00	-14.02	

Table 7-4. Summary of Conducted Band Edge Test Results

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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LTE Band 26/5



Plot 7-38. Lower Band Edge Plot (LTE Band 26/5 – 1.4MHz QPSK – Full RB)



Plot 7-39. Upper Band Edge Plot (LTE Band 26/5 – 1.4MHz QPSK – Full RB)

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NR Band n5



Plot 7-40. Lower Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)



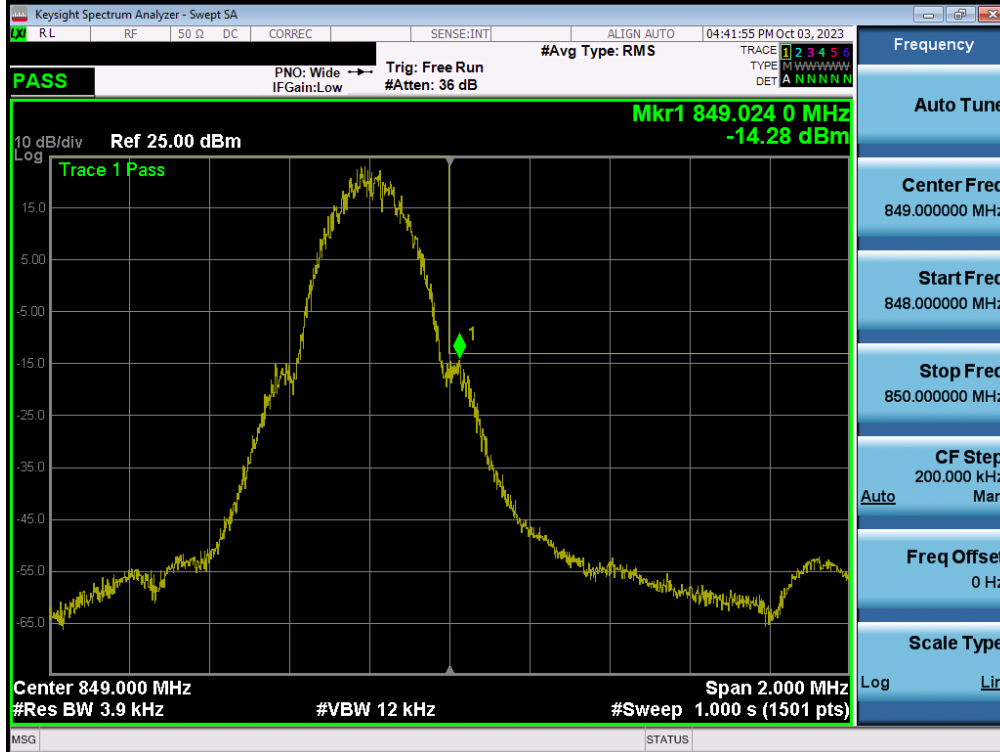
Plot 7-41. Upper Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)

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GSM/GPRS Cell



Plot 7-42. Lower Band Edge Plot (GPRS Cell – Ch. 128)



Plot 7-43. Upper Band Edge Plot (GPRS Cell – Ch. 251)

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WCDMA Cell



Plot 7-44. Lower Band Edge Plot (WCDMA Cell – Ch. 4132)



Plot 7-45. Upper Band Edge Plot (WCDMA Cell – Ch. 4233)

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7.5 Radiated Power (ERP)

Test Overview

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

Test Procedures Used

ANSI C63.26-2015 – Section 5.2.4.4

Test Settings

1. Radiated power measurements are performed using the signal analyzer’s “channel power” measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer’s “time domain power” measurement capability is used.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW \geq 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points \geq 2 x span / RBW
6. Detector = RMS
7. Trigger is set to “free run” for signals with continuous operation with the sweep times set to “auto”. Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration.
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the “gating” function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize.

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Test Setup

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

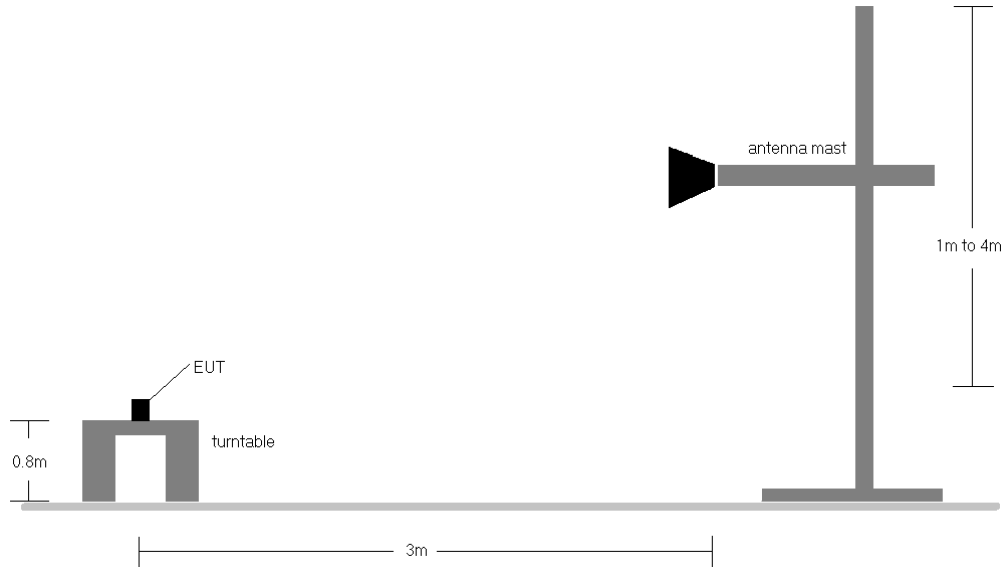


Figure 7-4. Radiated Test Setup < 1GHz

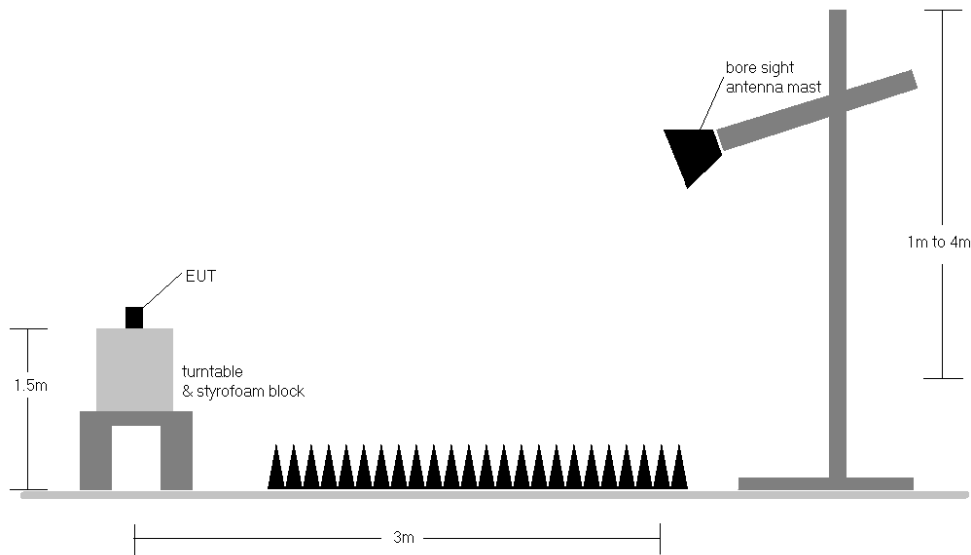


Figure 7-5. Radiated Test Setup > 1GHz

Test Notes

- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers are reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest powers are reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1".

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- 3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst-case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 4) This unit was tested with its standard battery.
- 5) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
15MHz (Band 26 only)	QPSK	831.50	H	222	297	1.46	1 / 0	20.02	19.33	0.086	38.45	-19.12
	QPSK	836.50	H	207	298	1.54	1 / 37	19.85	19.24	0.084	38.45	-19.21
	QPSK	841.50	H	195	299	1.62	1 / 74	19.69	19.16	0.082	38.45	-19.29
	16-QAM	831.50	H	222	297	1.46	1 / 0	19.48	18.79	0.076	38.45	-19.66
	16-QAM	836.50	H	207	298	1.54	1 / 37	19.33	18.72	0.075	38.45	-19.73
	16-QAM	841.50	H	195	299	1.62	1 / 74	19.11	18.58	0.072	38.45	-19.87
10 MHz	QPSK	829.00	H	222	297	1.42	1 / 25	20.11	19.38	0.087	38.45	-19.07
	QPSK	836.50	H	207	298	1.54	1 / 49	19.81	19.21	0.083	38.45	-19.25
	QPSK	844.00	H	195	299	1.66	1 / 25	19.66	19.17	0.083	38.45	-19.28
	16-QAM	829.00	H	222	297	1.42	1 / 0	19.48	18.75	0.075	38.45	-19.70
	16-QAM	836.50	H	207	298	1.54	1 / 0	19.39	18.79	0.076	38.45	-19.66
	16-QAM	844.00	H	195	299	1.66	1 / 25	18.92	18.43	0.070	38.45	-20.02
5 MHz	QPSK	826.50	H	222	297	1.38	1 / 0	20.10	19.33	0.086	38.45	-19.12
	QPSK	836.50	H	207	298	1.54	1 / 0	19.76	19.15	0.082	38.45	-19.30
	QPSK	846.50	H	195	299	1.70	1 / 12	19.56	19.11	0.081	38.45	-19.34
	16-QAM	826.50	H	222	297	1.38	1 / 0	19.66	18.89	0.077	38.45	-19.56
	16-QAM	836.50	H	207	298	1.54	1 / 24	19.52	18.91	0.078	38.45	-19.54
	16-QAM	846.50	H	195	299	1.70	1 / 0	18.93	18.49	0.071	38.45	-19.97
3 MHz	QPSK	825.50	H	222	297	1.36	1 / 14	19.87	19.09	0.081	38.45	-19.37
	QPSK	836.50	H	207	298	1.54	1 / 0	19.54	18.94	0.078	38.45	-19.51
	QPSK	847.50	H	195	299	1.72	1 / 0	19.54	19.11	0.081	38.45	-19.34
	16-QAM	825.50	H	222	297	1.36	1 / 7	19.58	18.80	0.076	38.45	-19.65
	16-QAM	836.50	H	207	298	1.54	1 / 0	19.34	18.73	0.075	38.45	-19.72
	16-QAM	847.50	H	195	299	1.72	1 / 14	18.80	18.37	0.069	38.45	-20.08
1.4 MHz	QPSK	824.70	H	222	297	1.35	1 / 3	20.02	19.22	0.084	38.45	-19.23
	QPSK	836.50	H	207	298	1.54	1 / 0	19.67	19.06	0.081	38.45	-19.39
	QPSK	848.30	H	195	299	1.73	1 / 5	19.59	19.17	0.083	38.45	-19.28
	16-QAM	824.70	H	222	297	1.35	1 / 5	19.45	18.65	0.073	38.45	-19.81
	16-QAM	836.50	H	207	298	1.54	1 / 0	19.17	18.56	0.072	38.45	-19.89
	16-QAM	848.30	H	195	299	1.73	1 / 0	18.74	18.32	0.068	38.45	-20.13

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

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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	834.00	H	213	303	1.50	1 / 1	19.65	19.00	0.079	38.45	-19.45
	π/2 BPSK	836.50	H	110	304	1.54	1 / 53	19.26	18.65	0.073	38.45	-19.80
	π/2 BPSK	839.00	H	206	302	1.58	1 / 1	19.86	19.29	0.085	38.45	-19.16
	QPSK	834.00	H	213	303	1.50	1 / 1	19.59	18.94	0.078	38.45	-19.51
	QPSK	836.50	H	110	304	1.54	1 / 53	19.06	18.45	0.070	38.45	-20.00
	QPSK	839.00	H	206	302	1.58	1 / 1	19.85	19.28	0.085	38.45	-19.17
	16-QAM	834.00	H	213	303	1.50	1 / 1	19.04	18.39	0.069	38.45	-20.06
	16-QAM	836.50	H	110	304	1.54	1 / 53	18.49	17.88	0.061	38.45	-20.57
16-QAM	839.00	H	206	302	1.58	1 / 1	19.21	18.64	0.073	38.45	-19.81	
15 MHz	π/2 BPSK	831.50	H	213	303	1.46	1 / 39	19.74	19.05	0.080	38.45	-19.40
	π/2 BPSK	836.50	H	110	304	1.54	1 / 77	19.33	18.73	0.075	38.45	-19.72
	π/2 BPSK	841.50	H	206	302	1.62	1 / 1	19.69	19.17	0.083	38.45	-19.28
	QPSK	831.50	H	213	303	1.46	1 / 39	19.79	19.10	0.081	38.45	-19.35
	QPSK	836.50	H	110	304	1.54	1 / 1	19.17	18.56	0.072	38.45	-19.89
	QPSK	841.50	H	206	302	1.62	1 / 77	19.83	19.31	0.085	38.45	-19.15
	16-QAM	831.50	H	213	303	1.46	1 / 39	19.12	18.44	0.070	38.45	-20.02
	16-QAM	836.50	H	110	304	1.54	1 / 39	18.64	18.04	0.064	38.45	-20.41
16-QAM	841.50	H	206	302	1.62	1 / 77	19.27	18.74	0.075	38.45	-19.71	
10 MHz	π/2 BPSK	829.00	H	213	303	1.42	1 / 50	19.67	18.94	0.078	38.45	-19.51
	π/2 BPSK	836.50	H	110	304	1.54	1 / 1	19.34	18.74	0.075	38.45	-19.71
	π/2 BPSK	844.00	H	206	302	1.66	1 / 26	19.65	19.16	0.082	38.45	-19.29
	QPSK	829.00	H	213	303	1.42	1 / 1	19.74	19.01	0.080	38.45	-19.44
	QPSK	836.50	H	110	304	1.54	1 / 50	19.14	18.53	0.071	38.45	-19.92
	QPSK	844.00	H	206	302	1.66	1 / 50	19.87	19.38	0.087	38.45	-19.07
	16-QAM	829.00	H	213	303	1.42	1 / 26	19.26	18.53	0.071	38.45	-19.92
	16-QAM	836.50	H	110	304	1.54	1 / 1	18.58	17.97	0.063	38.45	-20.48
16-QAM	844.00	H	206	302	1.66	1 / 50	19.34	18.86	0.077	38.45	-19.60	
5 MHz	π/2 BPSK	829.00	H	213	303	1.38	1 / 1	19.95	19.18	0.083	38.45	-19.27
	π/2 BPSK	836.50	H	110	304	1.54	1 / 12	19.28	18.67	0.074	38.45	-19.78
	π/2 BPSK	844.00	H	206	302	1.70	1 / 12	19.89	19.44	0.088	38.45	-19.01
	QPSK	829.00	H	213	303	1.38	1 / 12	19.85	19.08	0.081	38.45	-19.37
	QPSK	836.50	H	110	304	1.54	1 / 12	19.09	18.48	0.071	38.45	-19.97
	QPSK	844.00	H	206	302	1.70	1 / 12	19.81	19.36	0.086	38.45	-19.09
	16-QAM	829.00	H	213	303	1.38	1 / 12	18.91	18.14	0.065	38.45	-20.31
	16-QAM	836.50	H	110	304	1.54	1 / 23	18.56	17.96	0.062	38.45	-20.49
16-QAM	844.00	H	206	302	1.70	1 / 12	19.39	18.95	0.078	38.45	-19.50	
20 MHz	QPSK (CP-OFDM)	839.00	H	203	300	1.58	1 / 1	18.37	17.80	0.060	38.45	-20.65

Table 7-6. ERP Data (NR Band n5)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.20	GSM850	H	102	312	29.09	1.34	28.28	0.673	38.45	-10.17	30.43	1.104	40.61	-10.18
836.60	GSM850	H	204	301	28.65	1.54	28.04	0.637	38.45	-10.41	30.19	1.046	40.61	-10.41
848.80	GSM850	H	194	301	28.72	1.74	28.31	0.678	38.45	-10.14	30.46	1.112	40.61	-10.15
848.80	EDGE850	H	194	301	22.19	1.74	21.78	0.151	38.45	-16.67	23.93	0.247	40.61	-16.68

Table 7-7. ERP Data (GPRS Cell)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	H	223	302	20.28	1.38	19.51	0.089	38.45	-18.94	21.66	0.146	40.61	-18.95
836.60	WCDMA850	H	203	304	19.77	1.54	19.16	0.083	38.45	-19.29	21.31	0.135	40.61	-19.29
846.60	WCDMA850	H	202	311	19.12	1.71	18.68	0.074	38.45	-19.77	20.83	0.121	40.61	-19.78

Table 7-8. ERP Data (WCDMA Cell)

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7.6 Radiated Spurious Emissions Measurements

Test Overview

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

Test Procedures Used

ANSI C63.26-2015 – Section 5.5.4

Test Settings

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

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Test Setup

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

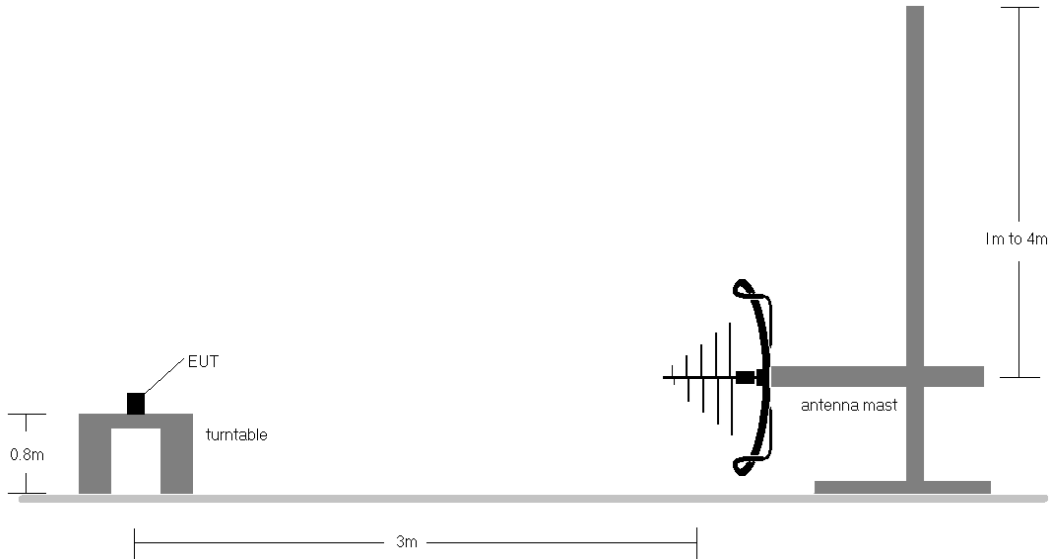


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

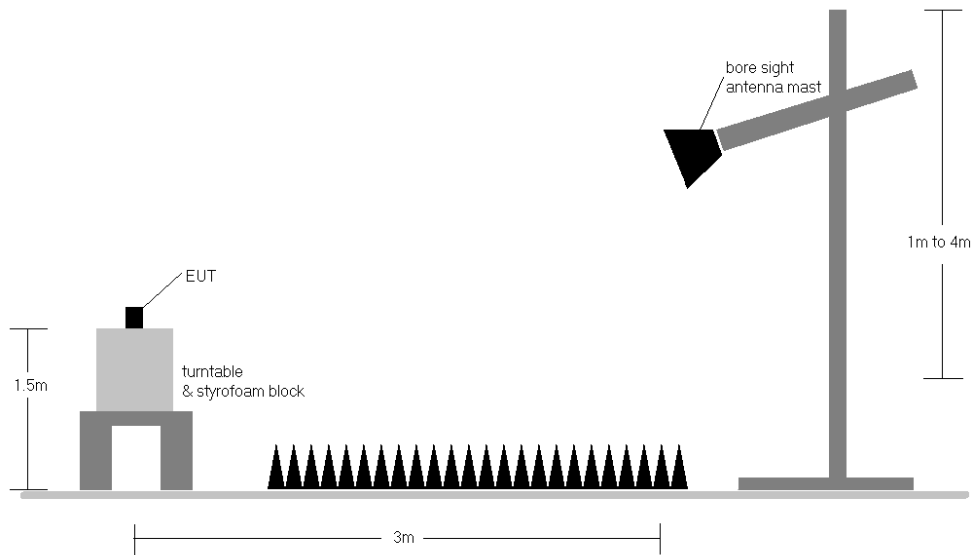


Figure 7-7. Test Instrument & Measurement Setup > 1GHz

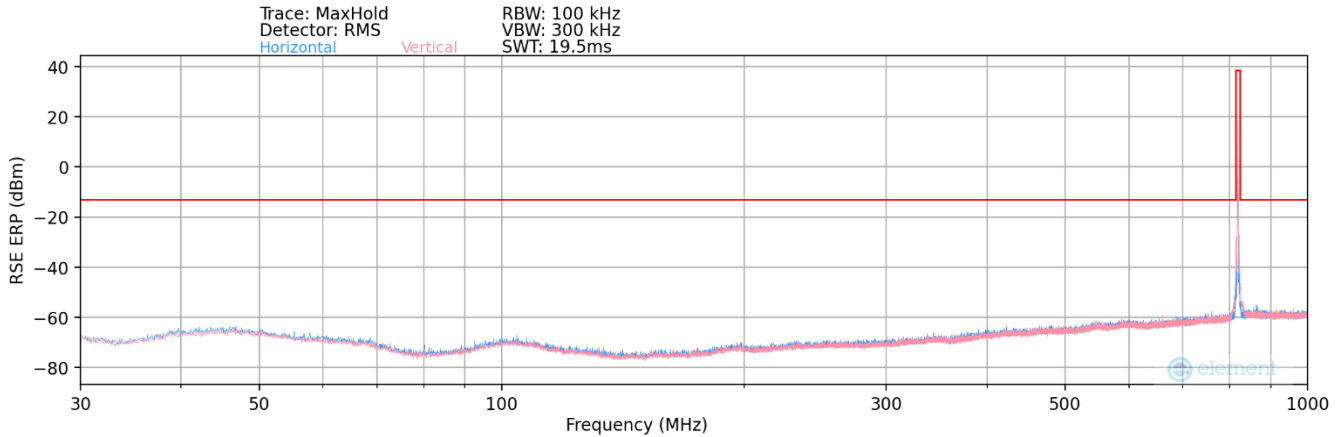
FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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Test Notes

- 1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
 - a) $E(\text{dB}\mu\text{V}/\text{m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$
 - b) $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V}/\text{m}) + 20\log D - 104.8$; where D is the measurement distance in meters.
- 2) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers are reported in GPRS mode while transmitting with one slot active.
- 3) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest powers are reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1".
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst-case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 5) This unit was tested with its standard battery.
- 6) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 7) Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1-meter test distance with the application of a distance correction factor.
- 8) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 9) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g., CP-OFDM and DFT-s-OFDM) were investigated to determine the worst-case configuration. All modes of operation were investigated, and the worst-case configuration results are reported in this section.
- 10) Spurious emission in EN-DC Operating mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor) has been checked and was found to not to be the worst case. Spurious emissions from the NR carrier device are subject to the rules under which the NR carrier operates. Spurious emissions caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

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LTE Band 26/5

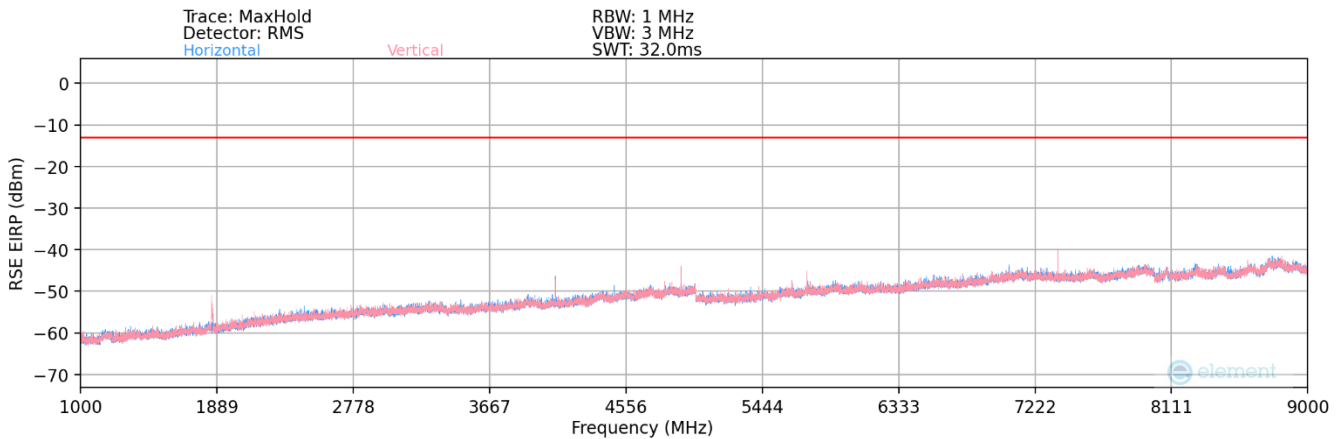


Plot 7-46. Radiated Spurious Plot Below 1GHz (LTE Band 26/5)

Bandwidth (MHz):	15
Frequency (MHz):	836.5
RB / Offset:	1 / 37

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
936.00	V	-	-	-79.23	2.06	29.83	-67.57	-13.00	-54.57

Table 7-9. Radiated Spurious Data Below 1GHz (LTE Band 26/5)



Plot 7-47. Radiated Spurious Plot Above 1GHz (LTE Band 26/5)

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Bandwidth (MHz):	10
Frequency (MHz):	829
RB / Offset:	1 / 37

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1658.00	V	-	-	-77.96	0.10	29.14	-66.11	-13.00	-53.11
2487.00	V	135	188	-77.52	4.09	33.57	-61.68	-13.00	-48.68
3316.00	V	151	359	-79.01	6.80	34.79	-60.47	-13.00	-47.47
4145.00	V	132	155	-73.36	8.03	41.67	-53.59	-13.00	-40.59
4974.00	V	199	320	-76.73	10.11	40.38	-54.88	-13.00	-41.88
5803.00	V	181	345	-80.13	11.67	38.54	-56.72	-13.00	-43.72
6632.00	V	131	355	-80.04	13.68	40.64	-54.62	-13.00	-41.62
7461.00	V	148	1	-79.75	15.74	42.99	-52.27	-13.00	-39.27

Table 7-10. Radiated Spurious Data Above 1GHz (LTE Band 26/5 – Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	836.5
RB / Offset:	1 / 37

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.00	V	-	-	-78.32	0.40	29.08	-66.18	-13.00	-53.18
2509.50	V	-	-	-79.05	4.08	32.03	-63.22	-13.00	-50.22
3346.00	V	128	3	-78.23	6.58	35.35	-59.91	-13.00	-46.91
4182.50	V	139	145	-74.23	8.03	40.80	-54.46	-13.00	-41.46
5019.00	V	160	44	-77.74	10.53	39.79	-55.47	-13.00	-42.47
5855.50	V	-	-	-81.24	11.64	37.40	-57.86	-13.00	-44.86
6692.00	V	102	336	-80.58	13.78	40.20	-55.05	-13.00	-42.05
7528.50	V	307	358	-79.86	15.64	42.78	-52.47	-13.00	-39.47

Table 7-11. Radiated Spurious Data Above 1GHz (LTE Band 26/5 – Mid Channel)

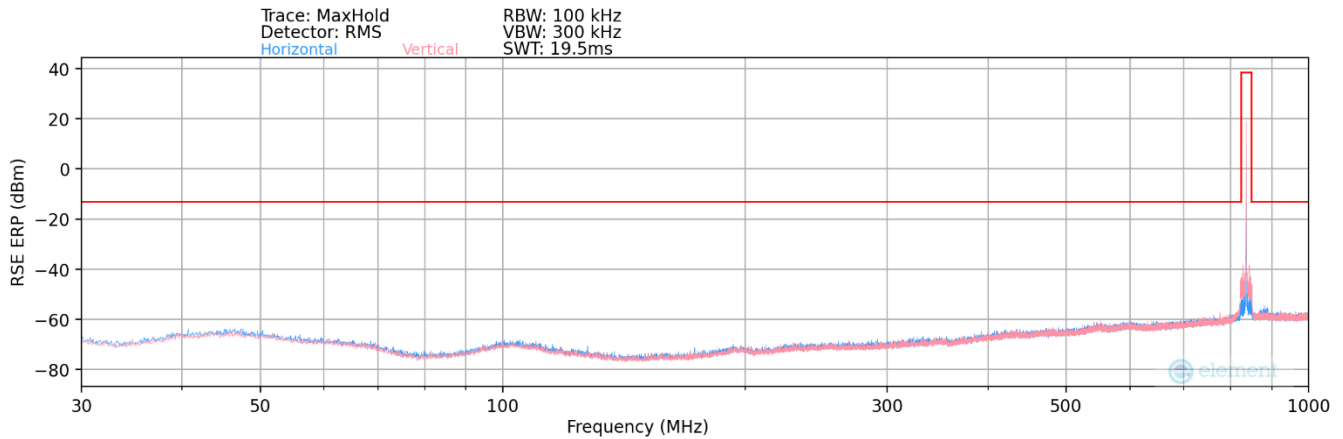
Bandwidth (MHz):	10
Frequency (MHz):	844
RB / Offset:	1 / 37

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1688.00	V	-	-	-78.26	0.49	29.23	-66.03	-13.00	-53.03
2532.00	V	-	-	-77.64	4.40	33.76	-61.50	-13.00	-48.50
3376.00	V	174	1	-77.73	6.39	35.66	-59.60	-13.00	-46.60
4220.00	V	143	145	-73.95	8.10	41.15	-54.11	-13.00	-41.11
5064.00	V	130	32	-75.45	10.67	42.22	-53.04	-13.00	-40.04
5908.00	V	149	334	-80.68	12.33	38.65	-56.61	-13.00	-43.61
6752.00	V	134	339	-79.55	13.64	41.09	-54.17	-13.00	-41.17
7596.00	V	150	359	-79.80	16.44	43.64	-51.61	-13.00	-38.61

Table 7-12. Radiated Spurious Data Above 1GHz (LTE Band 26/5 – High Channel)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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NR Band n5

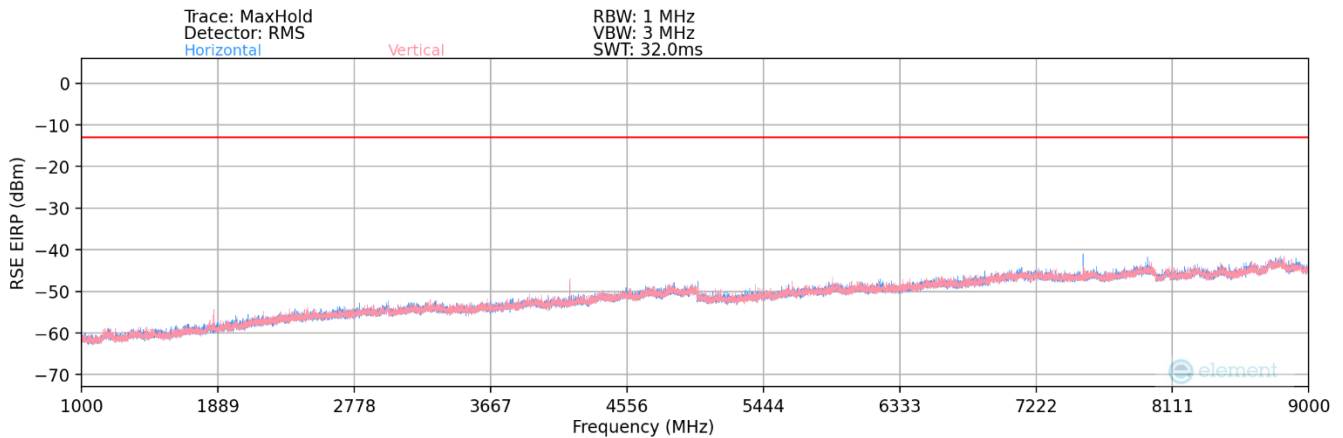


Plot 7-48. Radiated Spurious Plot Below 1GHz (NR Band n5)

Bandwidth (MHz):	20
Frequency (MHz):	836.5
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]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
892.00	V	-	-	-79.20	1.40	29.20	-68.20	-13.00	-55.20

Table 7-13. Radiated Spurious Data Below 1GHz (NR Band n5)



Plot 7-49. Radiated Spurious Plot Above 1GHz (NR Band n5)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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Bandwidth (MHz):	20
Frequency (MHz):	834
RB / Offset:	1 / 53

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1668.00	V	-	-	-78.31	0.35	29.04	-66.22	-13.00	-53.22
2502.00	V	-	-	-79.02	4.10	32.08	-63.18	-13.00	-50.18
3336.00	V	153	359	-78.63	6.71	35.08	-60.18	-13.00	-47.18
4170.00	V	159	146	-73.52	7.96	41.44	-53.82	-13.00	-40.82
5004.00	V	147	41	-77.08	10.41	40.33	-54.92	-13.00	-41.92
5838.00	V	166	347	-80.24	11.60	38.36	-56.90	-13.00	-43.90
6672.00	V	110	354	-79.87	13.77	40.90	-54.36	-13.00	-41.36
7506.00	V	294	4	-78.54	15.74	44.20	-51.06	-13.00	-38.06

Table 7-14. Radiated Spurious Data Above 1GHz (NR Band n5 – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.00	V	-	-	-78.19	0.40	29.21	-66.05	-13.00	-53.05
2509.50	V	-	-	-79.03	4.08	32.05	-63.20	-13.00	-50.20
3346.00	V	154	8	-78.47	6.58	35.11	-60.15	-13.00	-47.15
4182.50	V	153	150	-74.06	8.03	40.97	-54.29	-13.00	-41.29
5019.00	V	150	28	-76.78	10.53	40.75	-54.51	-13.00	-41.51
5855.50	V	156	343	-80.20	11.64	38.44	-56.82	-13.00	-43.82
6692.00	V	102	350	-79.71	13.78	41.07	-54.18	-13.00	-41.18
7528.50	V	311	4	-78.88	15.64	43.76	-51.49	-13.00	-38.49

Table 7-15. Radiated Spurious Data Above 1GHz (NR Band n5 – Mid Channel)

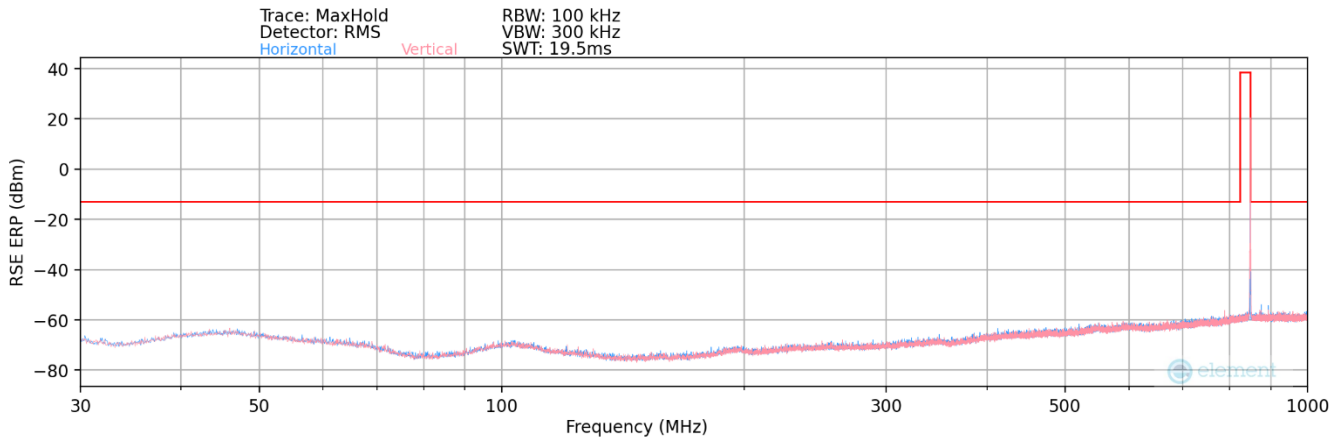
Bandwidth (MHz):	20
Frequency (MHz):	839
RB / Offset:	1 / 53

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1678.00	V	-	-	-78.34	0.44	29.10	-66.16	-13.00	-53.16
2517.00	V	-	-	-78.95	4.24	32.29	-62.97	-13.00	-49.97
3356.00	V	156	10	-78.36	6.47	35.11	-60.15	-13.00	-47.15
4195.00	V	151	149	-74.55	8.09	40.54	-54.72	-13.00	-41.72
5034.00	V	146	27	-77.22	10.63	40.41	-54.84	-13.00	-41.84
5873.00	V	135	336	-80.55	11.85	38.30	-56.96	-13.00	-43.96
6712.00	V	108	349	-79.68	13.59	40.91	-54.35	-13.00	-41.35
7551.00	V	299	3	-78.93	15.88	43.95	-51.30	-13.00	-38.30

Table 7-16. Radiated Spurious Data Above 1GHz (NR Band n5 – High Channel)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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GSM/GPRS Cell

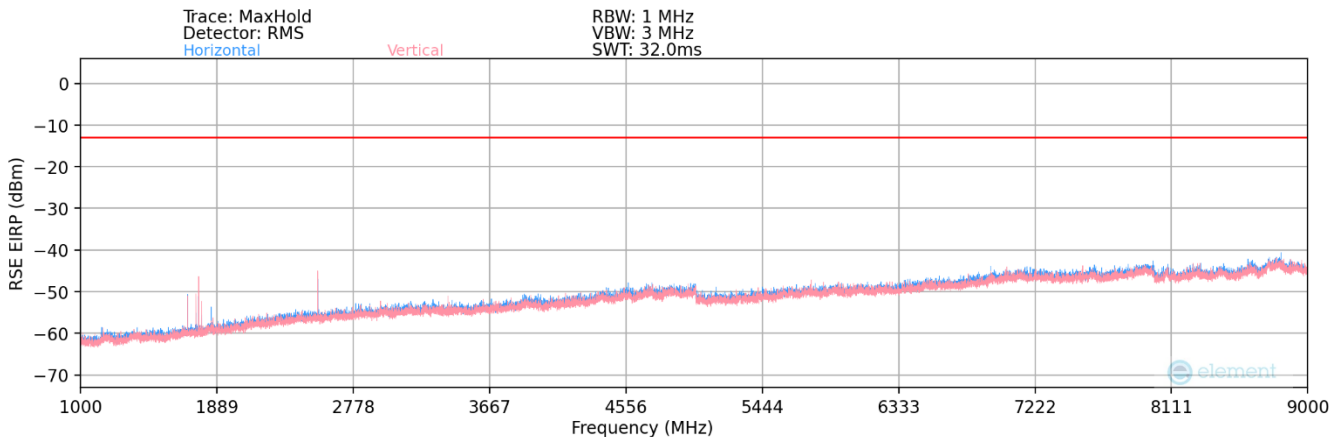


Plot 7-50. Radiated Spurious Plot Below 1GHz (GPRS Cell)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
435.00	V	-	-	-62.79	-0.42	43.79	-53.62	-13.00	-40.62

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



Plot 7-51. Radiated Spurious Plot Above 1GHz (GPRS Cell)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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Mode:	GPRS 1 Tx Slot
Channel:	128
Frequency (MHz):	824.2

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1648.40	V	214	180	-63.39	-0.19	43.42	-51.84	-13.00	-38.84
2472.60	V	143	210	-60.05	4.00	50.95	-44.31	-13.00	-31.31
3296.80	V	197	226	-67.46	6.50	46.04	-49.22	-13.00	-36.22
4121.00	V	-	-	-70.19	8.02	44.83	-50.42	-13.00	-37.42
4945.20	V	119	24	-70.56	9.53	45.97	-49.29	-13.00	-36.29
5769.40	V	-	-	-72.08	11.81	46.73	-48.53	-13.00	-35.53
6593.60	V	-	-	-72.37	13.59	48.22	-47.04	-13.00	-34.04

Table 7-18. Radiated Spurious Data Above 1GHz (GPRS Cell – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.20	V	357	330	-62.33	0.40	45.07	-50.19	-13.00	-37.19
2509.80	V	108	280	-62.22	4.08	48.86	-46.39	-13.00	-33.39
3346.40	V	119	325	-69.23	6.58	44.35	-50.91	-13.00	-37.91
4183.00	V	-	-	-70.27	8.03	44.76	-50.50	-13.00	-37.50
5019.60	V	116	288	-71.68	10.53	45.85	-49.41	-13.00	-36.41
5856.20	V	-	-	-72.29	11.65	46.36	-48.90	-13.00	-35.90
6692.80	V	-	-	-72.76	13.78	48.02	-47.24	-13.00	-34.24

Table 7-19. Radiated Spurious Data Above 1GHz (GPRS Cell – Mid Channel)

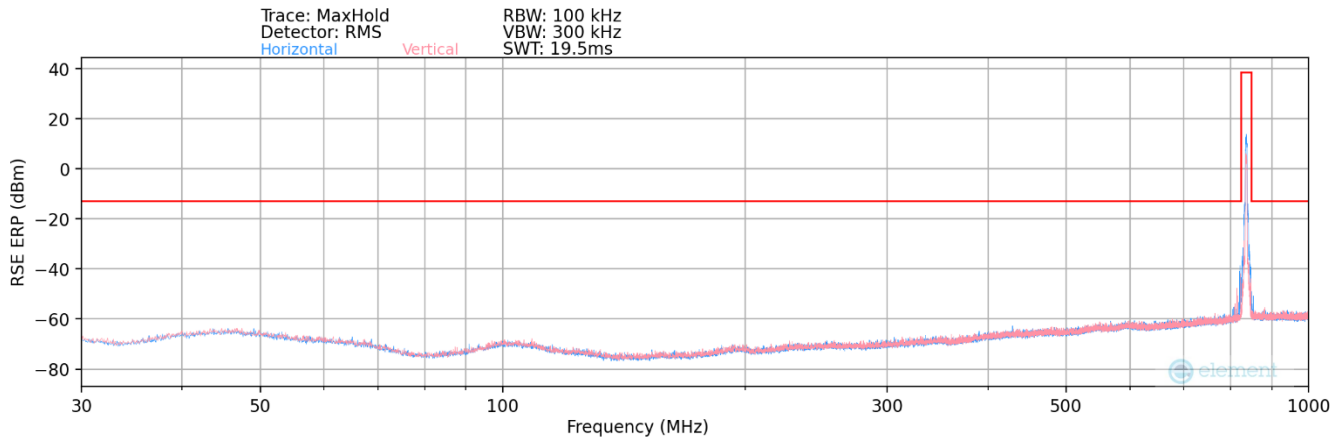
Mode:	GPRS 1 Tx Slot
Channel:	251
Frequency (MHz):	848.8

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1697.60	V	316	156	-59.90	0.64	47.74	-47.51	-13.00	-34.51
2546.40	V	203	301	-63.09	4.21	48.12	-47.14	-13.00	-34.14
3395.20	V	105	317	-66.78	6.24	46.46	-48.80	-13.00	-35.80
4244.00	V	-	-	-70.23	8.44	45.21	-50.04	-13.00	-37.04
5092.80	V	116	359	-71.19	10.11	45.92	-49.34	-13.00	-36.34
5941.60	V	-	-	-72.47	12.18	46.71	-48.55	-13.00	-35.55
6790.40	V	-	-	-72.36	14.39	49.03	-46.23	-13.00	-33.23

Table 7-20. Radiated Spurious Data Above 1GHz (GPRS Cell – High Channel)

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WCDMA Cell

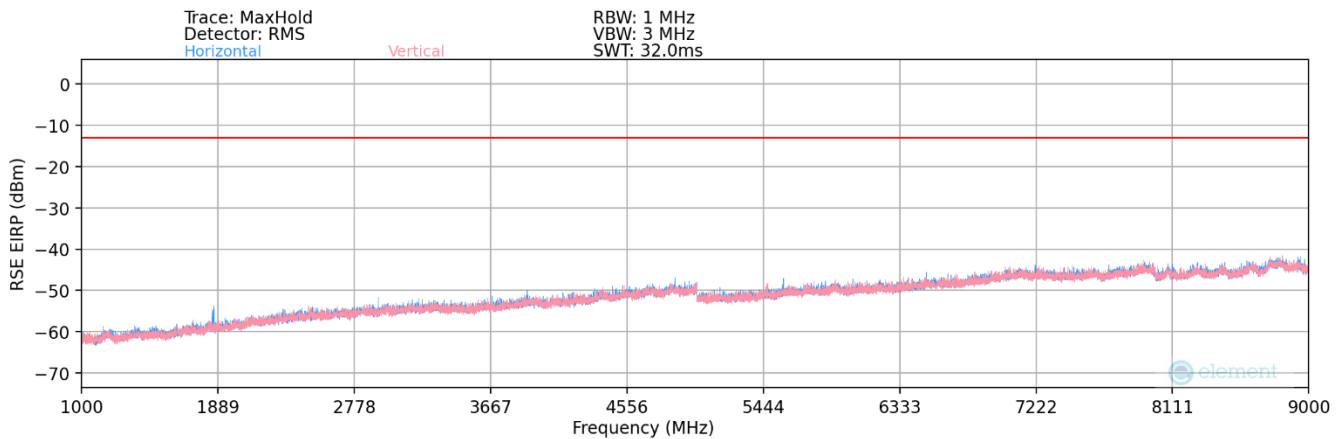


Plot 7-52. Radiated Spurious Plot Below 1GHz (WCDMA Cell)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
950.00	V	-	-	-69.26	2.58	40.32	-57.08	-13.00	-44.08

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



Plot 7-53. Radiated Spurious Plot Above 1GHz (WCDMA Cell)

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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Mode:	WCDMA RMC
Channel:	4132
Frequency (MHz):	826.4

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1652.80	V	-	-	-78.06	-0.06	28.88	-66.38	-13.00	-53.38
2479.20	V	-	-	-78.78	4.05	32.27	-62.98	-13.00	-49.98
3305.60	V	-	-	-79.47	6.67	34.20	-61.05	-13.00	-48.05
4132.00	V	102	136	-78.05	7.96	36.91	-58.35	-13.00	-45.35
4958.40	V	-	-	-80.21	9.66	36.45	-58.80	-13.00	-45.80

Table 7-22. Radiated Spurious Data Above 1GHz (WCDMA Cell – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.20	V	-	-	-78.14	0.40	29.26	-66.00	-13.00	-53.00
2509.80	V	-	-	-78.87	4.08	32.21	-63.04	-13.00	-50.04
3346.40	V	-	-	-79.60	6.58	33.98	-61.28	-13.00	-48.28
4183.00	V	104	138	-78.26	8.03	36.77	-58.49	-13.00	-45.49
5019.60	V	-	-	-80.45	10.53	37.08	-58.18	-13.00	-45.18

Table 7-23. Radiated Spurious Data Above 1GHz (WCDMA Cell – Mid Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1693.20	V	-	-	-78.32	0.59	29.27	-65.99	-13.00	-52.99
2539.80	V	-	-	-78.63	4.30	32.67	-62.59	-13.00	-49.59
3386.40	V	-	-	-79.58	6.23	33.65	-61.61	-13.00	-48.61
4233.00	V	103	138	-78.53	8.46	36.93	-58.33	-13.00	-45.33
5079.60	V	-	-	-80.52	9.90	36.38	-58.88	-13.00	-45.88

Table 7-24. Radiated Spurious Data Above 1GHz (WCDMA Cell – High Channel)

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7.7 Frequency Stability / Temperature Variation

Test Overview and Limit

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

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

Test Procedure Used

ANSI C63.26-2015 – Section 5.6

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

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

Test Notes

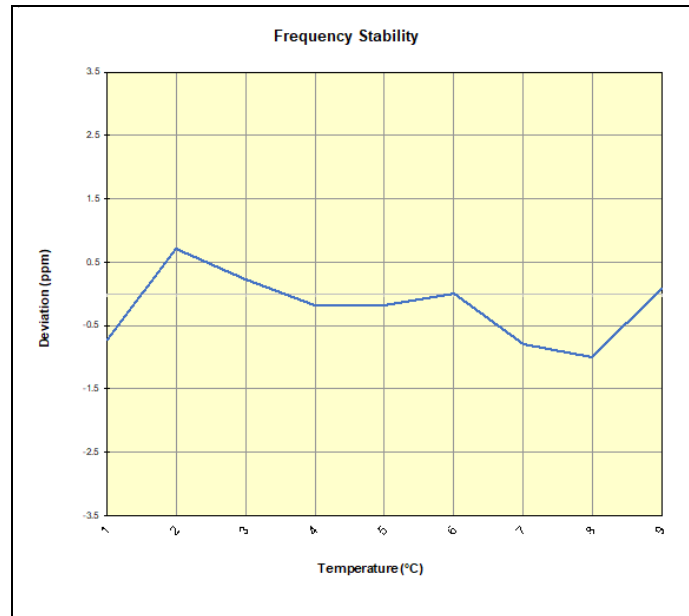
None.

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LTE Band 26/5

LTE Band 26/5					
		Operating Frequency (Hz):		836,500,000	
		Ref. Voltage (VDC):		4.331	
		Deviation Limit:		± 0.00025% or 2.5 ppm	
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.331	- 30	836,500,012	-611	-0.0000730
		- 20	836,501,218	595	0.0000712
		- 10	836,500,806	183	0.0000219
		0	836,500,477	-146	-0.0000175
		+ 10	836,500,468	-155	-0.0000185
		+ 20 (Ref)	836,500,623	0	0.0000000
		+ 30	836,499,964	-659	-0.0000788
		+ 40	836,499,792	-831	-0.0000993
Battery Endpoint	3.355	+ 20	836,500,422	-201	-0.0000240

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



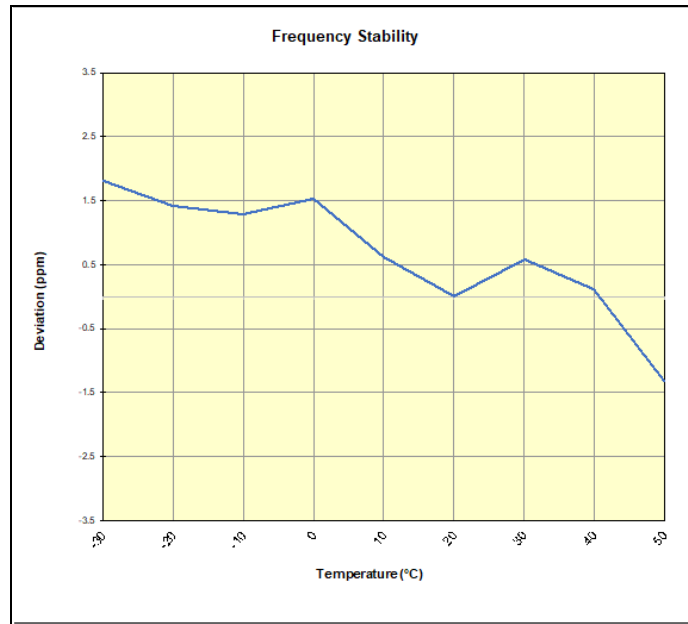
Plot 7-54. LTE Band 26/5 Frequency Stability Chart

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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NR Band n5

NR Band n5					
		Operating Frequency (Hz):		836,500,000	
		Ref. Voltage (VDC):		4.331	
		Deviation Limit:		± 0.00025% or 2.5 ppm	
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.331	- 30	836,495,960	1,512	0.0001808
		- 20	836,495,634	1,186	0.0001418
		- 10	836,495,532	1,084	0.0001296
		0	836,495,722	1,274	0.0001524
		+ 10	836,494,962	514	0.0000614
		+ 20 (Ref)	836,494,448	0	0.0000000
		+ 30	836,494,933	486	0.0000580
		+ 40	836,494,542	94	0.0000113
Battery Endpoint	3.355	+ 20	836,495,619	1,171	0.0001400

Table 7-26. NR Band n5 Frequency Stability Data



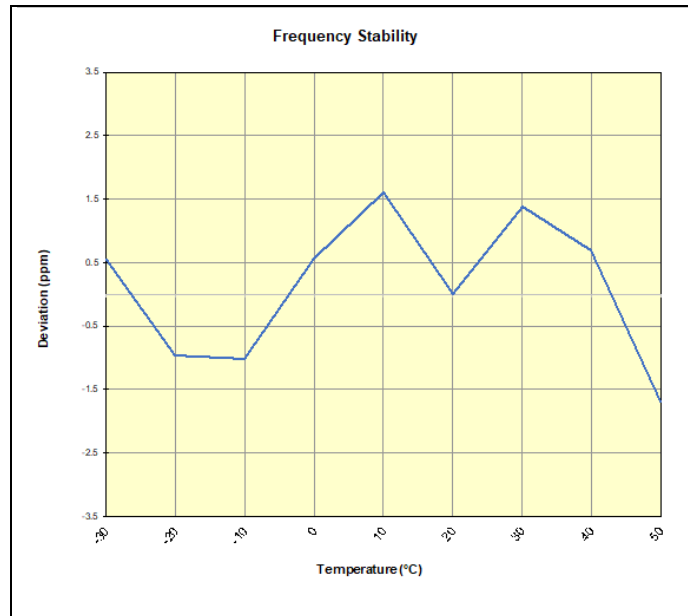
Plot 7-55. NR Band n5 Frequency Stability Chart

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GSM/GPRS Cell

GSM/GPRS Cellular					
		Operating Frequency (Hz):		836,600,000	
		Ref. Voltage (VDC):		4.331	
		Deviation Limit:		± 0.00025% or 2.5 ppm	
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.331	- 30	836,602,333	447	0.0000534
		- 20	836,601,081	-805	-0.0000962
		- 10	836,601,027	-859	-0.0001027
		0	836,602,360	474	0.0000567
		+ 10	836,603,224	1,339	0.0001600
		+ 20 (Ref)	836,601,886	0	0.0000000
		+ 30	836,603,040	1,154	0.0001380
		+ 40	836,602,469	583	0.0000697
Battery Endpoint	3.355	+ 20	836,601,639	-247	-0.0000295

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



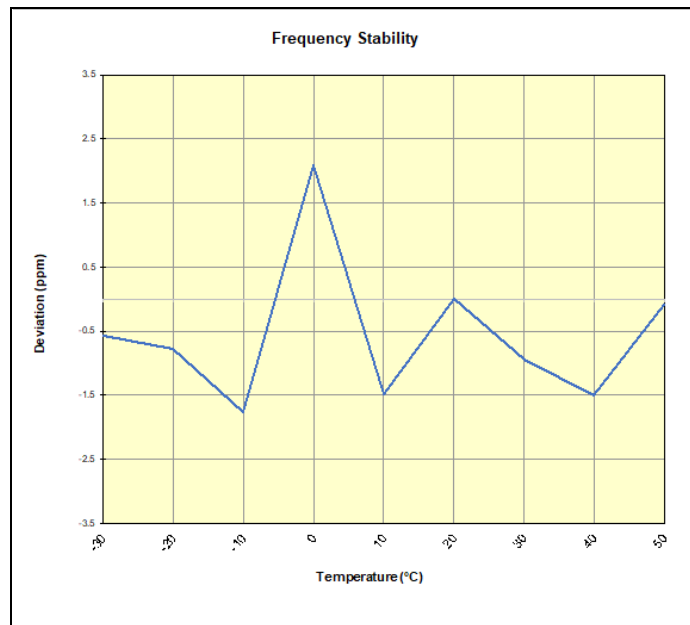
Plot 7-56. GSM/GPRS Cell Frequency Stability Chart

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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WCDMA Cell

WCDMA Cellular					
		Operating Frequency (Hz):		836,600,000	
		Ref. Voltage (VDC):		4.331	
		Deviation Limit:		± 0.00025% or 2.5 ppm	
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.331	- 30	836,597,361	-471	-0.0000564
		- 20	836,597,185	-647	-0.0000773
		- 10	836,596,351	-1,481	-0.0001771
		0	836,599,572	1,740	0.0002080
		+ 10	836,596,594	-1,238	-0.0001480
		+ 20 (Ref)	836,597,832	0	0.0000000
		+ 30	836,597,042	-790	-0.0000945
		+ 40	836,596,579	-1,253	-0.0001498
Battery Endpoint	3.355	+ 20	836,597,639	-194	-0.0000231

Table 7-28. WCDMA Cell Frequency Stability Data



Plot 7-57. WCDMA Cell Frequency Stability Chart

FCC ID: A3LSMA156M	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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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: A3LSMA156M** complies with all the requirements of Part 22 of the FCC rules.

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Test Report S/N: 1M2309070101-01.A3L	Test Dates: 09/08/2023 - 11/2/2023	EUT Type: Portable Handset	Page 65 of 65