

PART 22 MEASUREMENT REPORT

Applicant Name:
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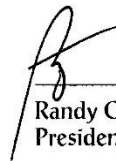
Date of Testing:
 1/16/2021 - 1/26/2021
Test Site/Location:
 PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
 1M2101110003-02.A3L

FCC ID:	A3LSMG998JPN
Applicant Name:	Samsung Electronics Co., Ltd.

Application Type: Certification
Model: SC-52B
EUT Type: Portable Handset
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part: 22
Test Procedure(s): ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01, KDB 648474 D03 v01r04

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

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


 Randy Ortanez
 President







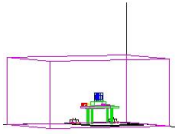
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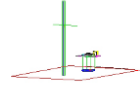
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Overview Table (Front Page Table)

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	-	GMSK	824.2 - 848.8	0.365	25.62	0.598	27.77	243KGXW
EDGE	-	8-PSK	824.2 - 848.8	0.085	19.27	0.139	21.42	237KG7W
WCDMA	-	Spread Spectrum	826.4 - 846.6	0.069	18.36	0.112	20.51	4M16F9W
LTE Band 5	10 MHz	QPSK	829.0 - 844.0	0.067	18.26	0.110	20.41	9M02G7D
		16QAM	829.0 - 844.0	0.058	17.64	0.095	19.79	8M97W7D
		64QAM	829.0 - 844.0	0.047	16.71	0.077	18.86	9M00W7D
	5 MHz	QPSK	826.5 - 846.5	0.064	18.04	0.104	20.19	4M51G7D
		16QAM	826.5 - 846.5	0.057	17.57	0.094	19.72	4M51W7D
		64QAM	826.5 - 846.5	0.046	16.67	0.076	18.82	4M52W7D
	3 MHz	QPSK	825.5 - 847.5	0.063	18.02	0.104	20.17	2M70G7D
		16QAM	825.5 - 847.5	0.057	17.57	0.094	19.72	2M70W7D
		64QAM	825.5 - 847.5	0.046	16.59	0.075	18.74	2M70W7D
	1.4 MHz	QPSK	824.7 - 848.3	0.063	17.97	0.103	20.12	1M09G7D
16QAM		824.7 - 848.3	0.057	17.58	0.094	19.73	1M10W7D	
64QAM		824.7 - 848.3	0.046	16.60	0.000	18.75	1M09W7D	

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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:A3LSMG998JPN**. 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.: 0466M, 70564H, 70681H, 0482M

2.2 Device Capabilities

This device contains the following capabilities:

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



2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 EMI Suppression Device(s)/Modifications

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

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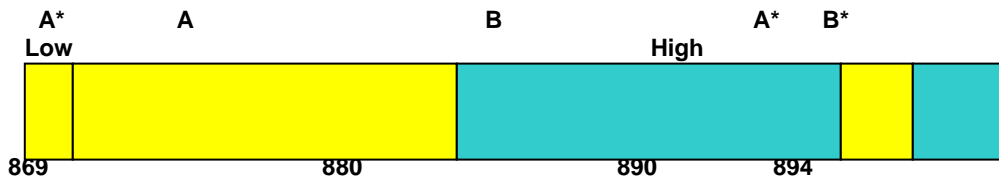
3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-E-2016) and “Measurement Guidance for Certification of Licensed Digital Transmitters” (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure.....None

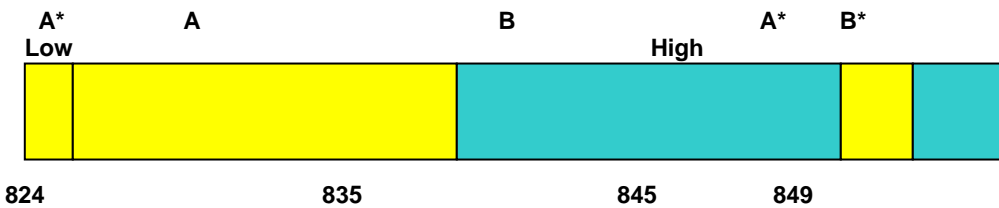
3.2 Cellular - Base Frequency Blocks



BLOCK 1: 869 – 880 MHz (A* Low + A)
BLOCK 2: 880 – 890 MHz (B)



BLOCK 3: 890 – 891.5 MHz (A* High)
BLOCK 4: 891.5 – 894 MHz (B*)

3.3 Cellular - Mobile Frequency Blocks



BLOCK 1: 824 – 835 MHz (A* Low + A)
BLOCK 2: 835 – 845 MHz (B)

BLOCK 3: 845 – 846.5 MHz (A* High)
BLOCK 4: 846.5 – 849 MHz (B*)

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3.4 Radiated Power and Radiated Spurious Emissions

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

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

For radiated power measurements, substitution method is used per the guidance of ANSI/TIA-603-E-2016. A half-wave dipole is substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

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

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 $P_g \text{ [dBm]} - \text{cable loss [dB]}$.

For radiated spurious emissions measurements and calculations, conversion method is used per the formulas in KDB 971168 Section 5.8.4. Field Strength (EIRP) is calculated using the following formulas:



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

And

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

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 474788 D01.



Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-E-2016.

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4.0 MEASUREMENT UNCERTAINTY

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

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

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5.0 TEST EQUIPMENT CALIBRATION DATA



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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx2	Licensed Transmitter Cable Set	4/9/2020	Annual	4/9/2021	LTx2
-	LTx4	Licensed Transmitter Cable Set	7/9/2020	Annual	7/9/2021	LTx4
-	LTx5	Licensed Transmitter Cable Set	4/9/2020	Annual	4/6/2021	LTx5
Agilent	N9020A	MXA Signal Analyzer	8/4/2020	Annual	8/4/2021	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	7/17/2020	Annual	7/17/2021	MY52350166
Agilent	E5515C	Wireless Communications Test Set	N/A			GB45360985
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6200901190
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11403100002
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			100976
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/21/2020	Annual	2/21/2021	102133
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/27/2019	Biennial	8/27/2021	A042511

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: A3LSMG998JPN
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): GSM/GPRS/WCDMA

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	RSS-Gen(6.7)	N/A	PASS	Section 7.2
	Conducted Band Edge / Spurious Emissions	2.1051, 22.917(a)	RSS-132(5.5)	> 43 + 10log10(P[Watts]) at Band Edge and for all out-of-band emissions	PASS	Sections 7.3, 7.4
	Transmitter Conducted Output Power	2.1046	RSS-132(5.4)	N/A	PASS	See RF Exposure Report
	Frequency Stability	2.1055, 22.355	RSS-132(5.3)	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power	22.913(a)(5)	RSS-132(5.4)	< 7 Watts max. ERP	PASS	Section 7.6
	Radiated Spurious Emissions	2.1053, 22.917(a)	RSS-132(5.5)	> 43 + 10 log10 (P[Watts]) for all out-of-band emissions	PASS	Section 7.7

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST 2G/3G Automation Version 4.5, LTE Automation Version 5.3.

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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

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.

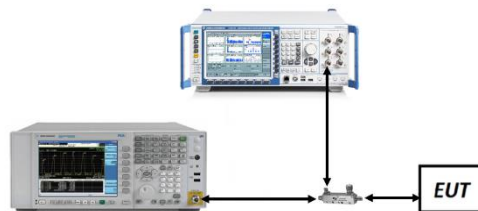





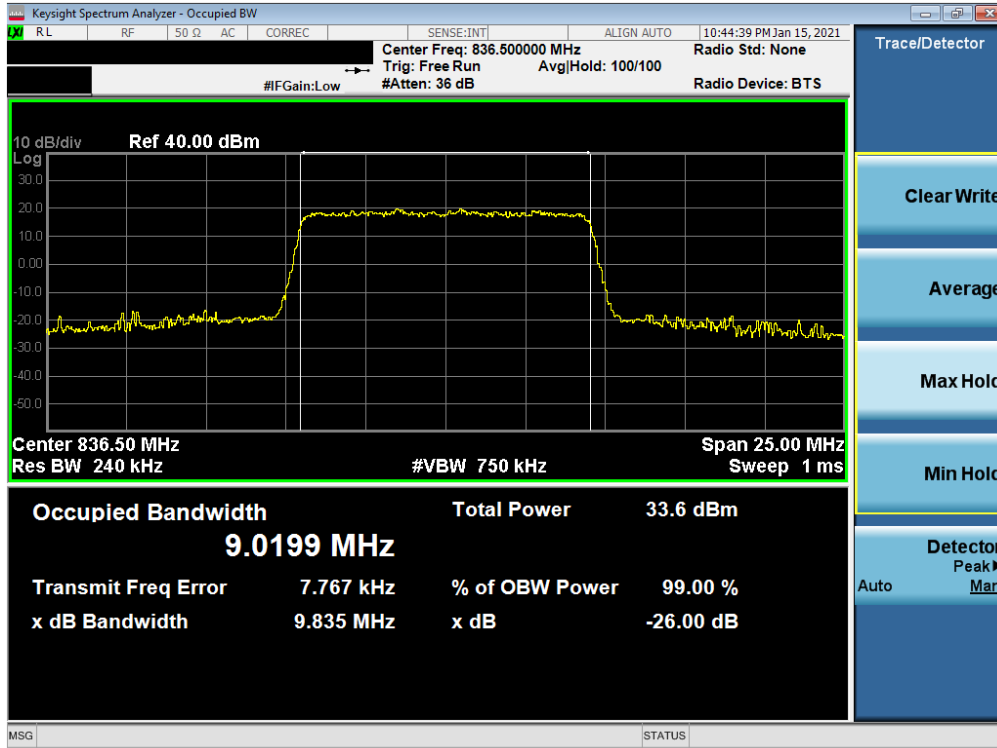
Figure 7-1. Test Instrument & Measurement Setup

Test Notes

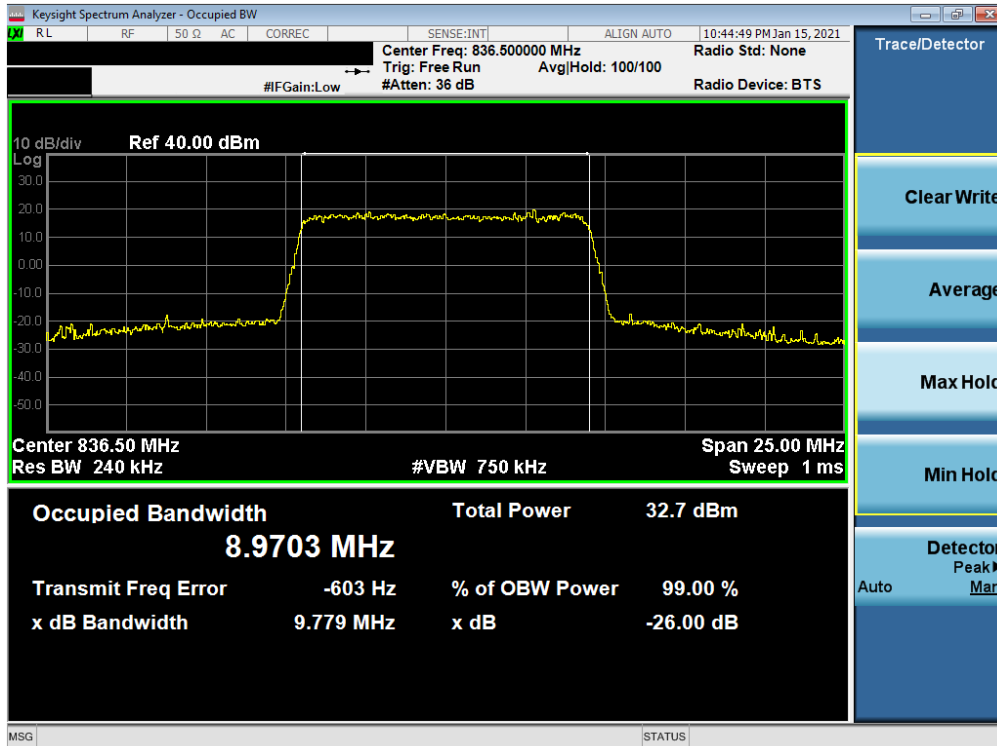
None.

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LTE Band 5

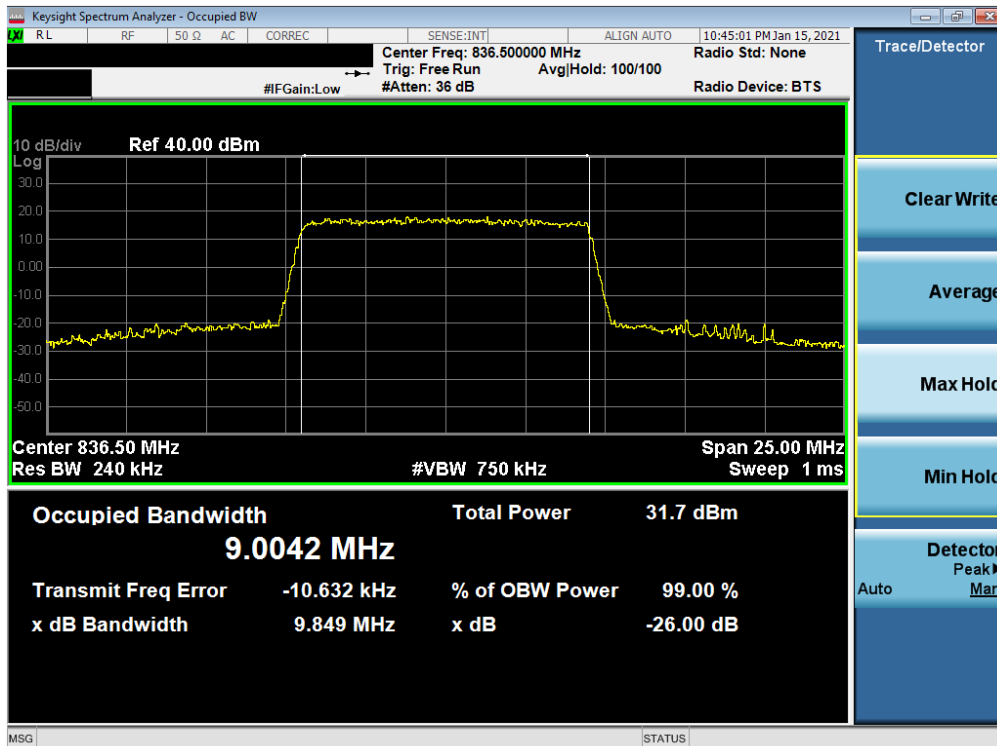


Plot 7-1. Occupied Bandwidth Plot (LTE Band 5 - 10MHz QPSK - Full RB Configuration)

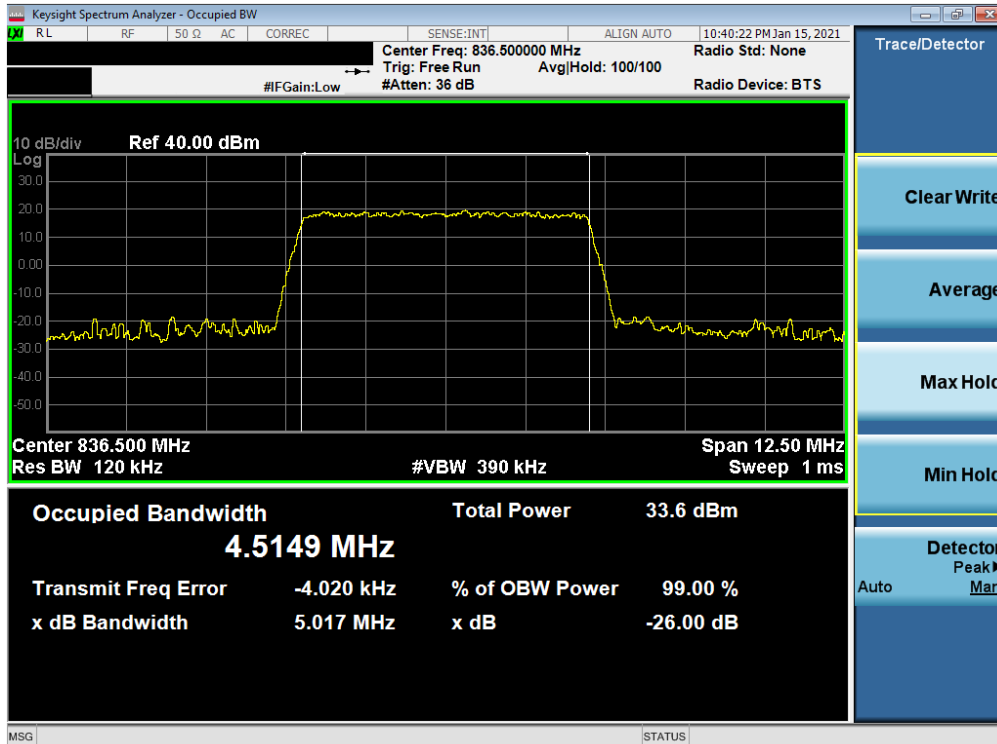


Plot 7-2. Occupied Bandwidth Plot (LTE Band 5 - 10MHz 16-QAM - Full RB Configuration)

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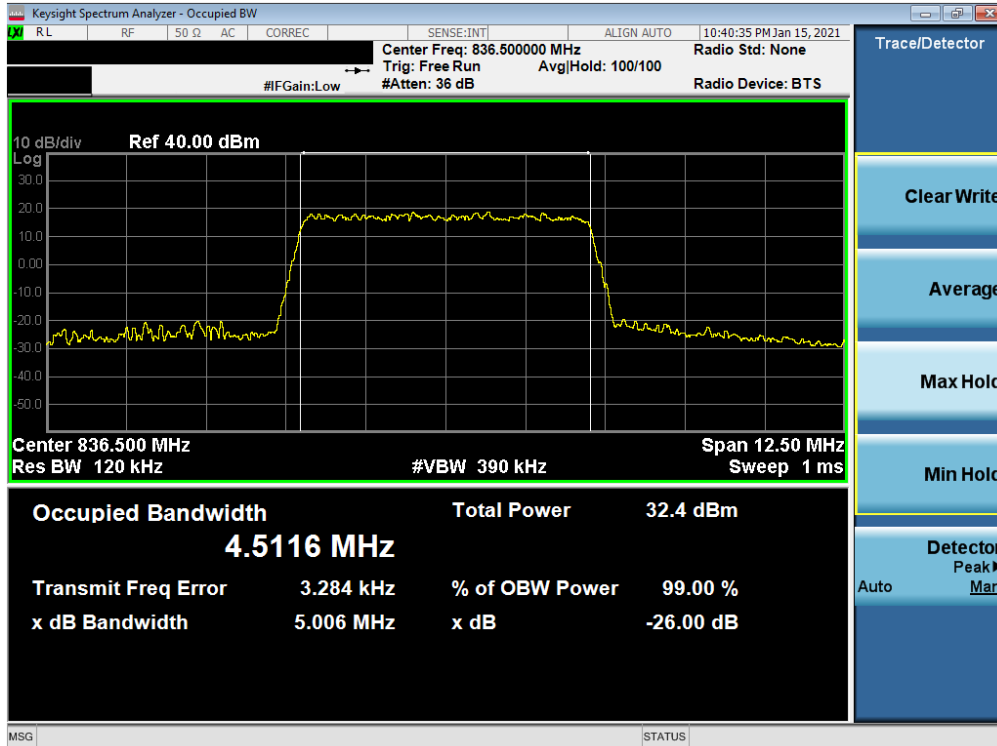


Plot 7-3. Occupied Bandwidth Plot (LTE Band 5 - 10MHz 64-QAM - Full RB Configuration)

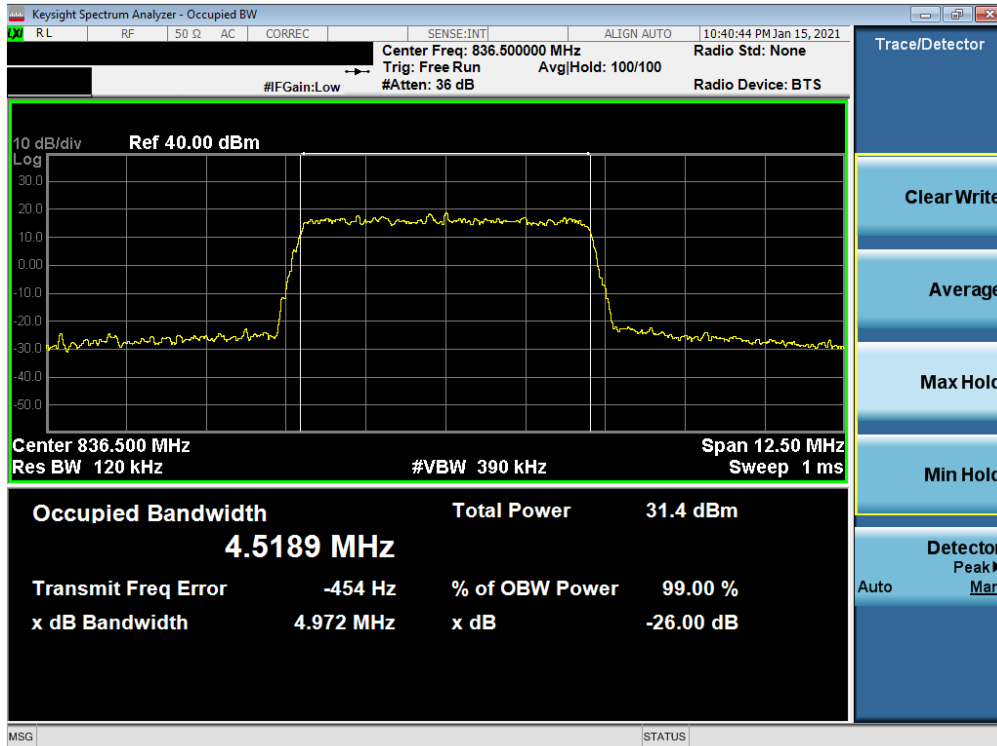


Plot 7-4. Occupied Bandwidth Plot (LTE Band 5 - 5MHz QPSK - Full RB Configuration)

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

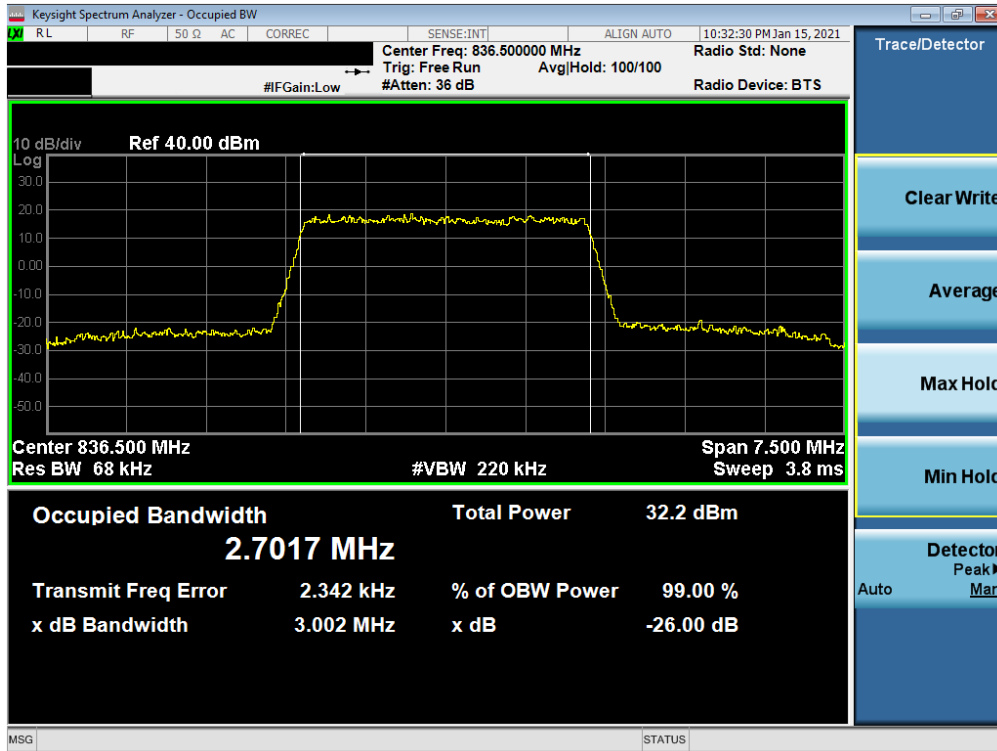


Plot 7-6. Occupied Bandwidth Plot (LTE Band 5 - 5MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 16 of 65

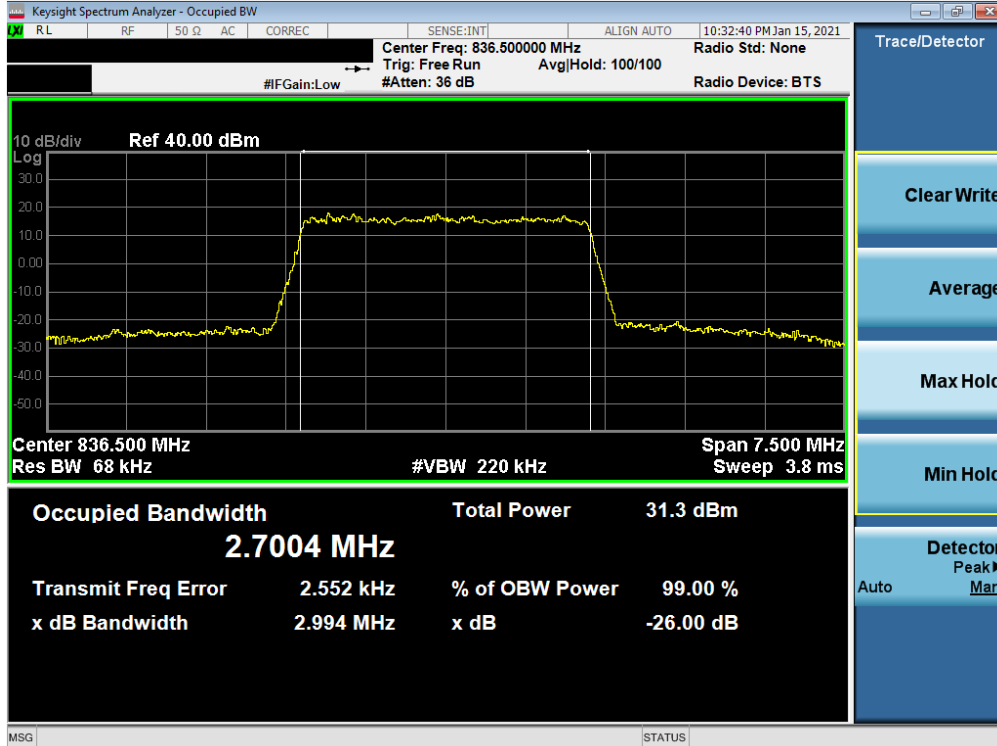


Plot 7-7. Occupied Bandwidth Plot (LTE Band 5 - 3MHz QPSK - Full RB Configuration)

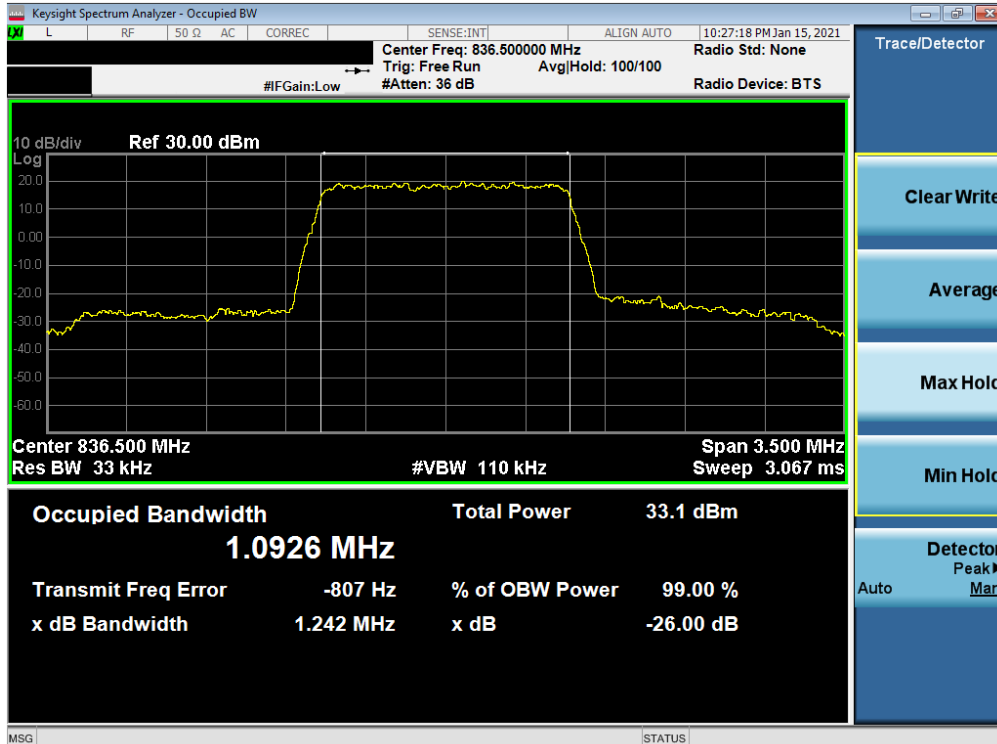


Plot 7-8. Occupied Bandwidth Plot (LTE Band 5 - 3MHz 16-QAM - Full RB Configuration)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 17 of 65

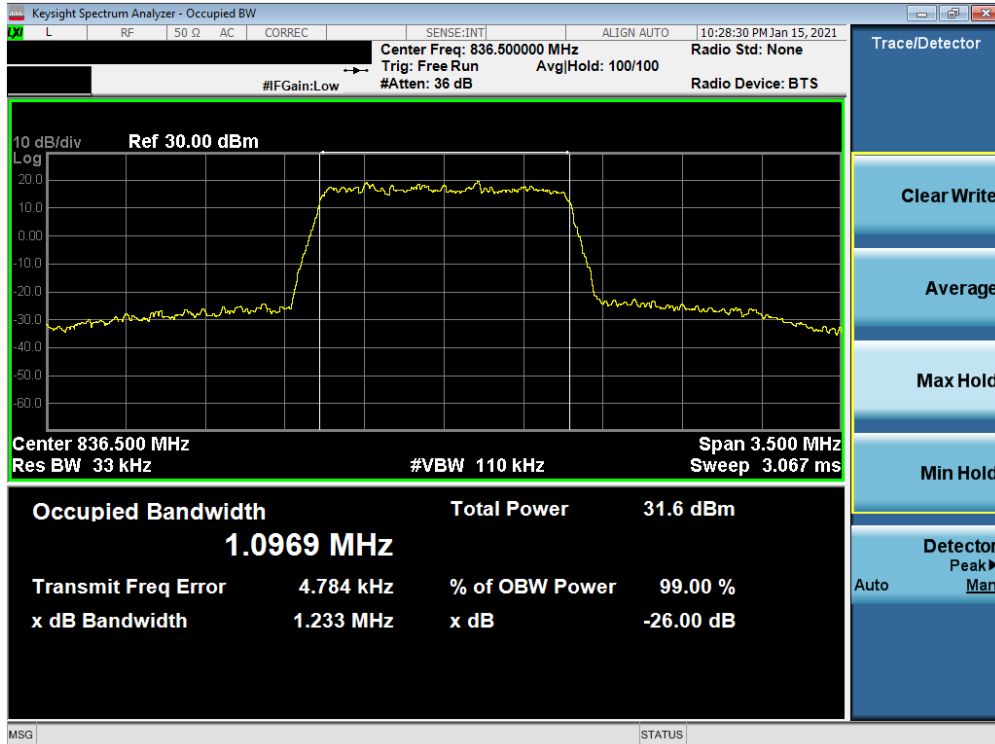


Plot 7-9. Occupied Bandwidth Plot (LTE Band 5 - 3MHz 64-QAM - Full RB Configuration)

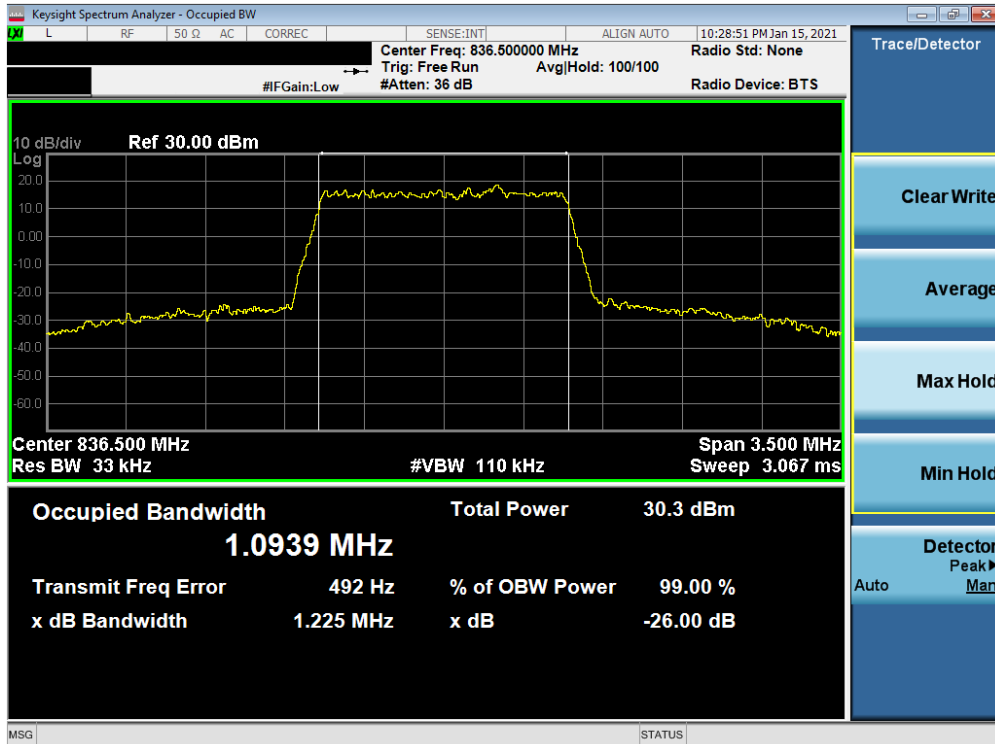


Plot 7-10. Occupied Bandwidth Plot (LTE Band 5 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 18 of 65



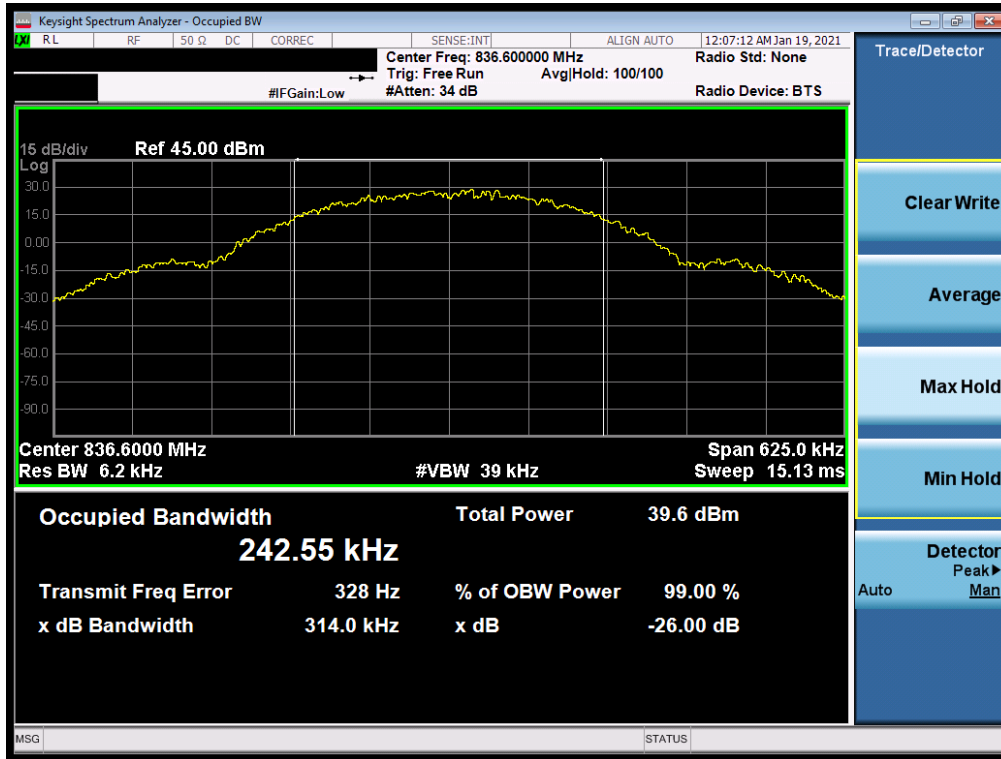
Plot 7-11. Occupied Bandwidth Plot (LTE Band 5 - 1.4MHz 16-QAM - Full RB Configuration)



Plot 7-12. Occupied Bandwidth Plot (LTE Band 5 - 1.4MHz 64-QAM - Full RB Configuration)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset	Page 19 of 65

GPRS Cell



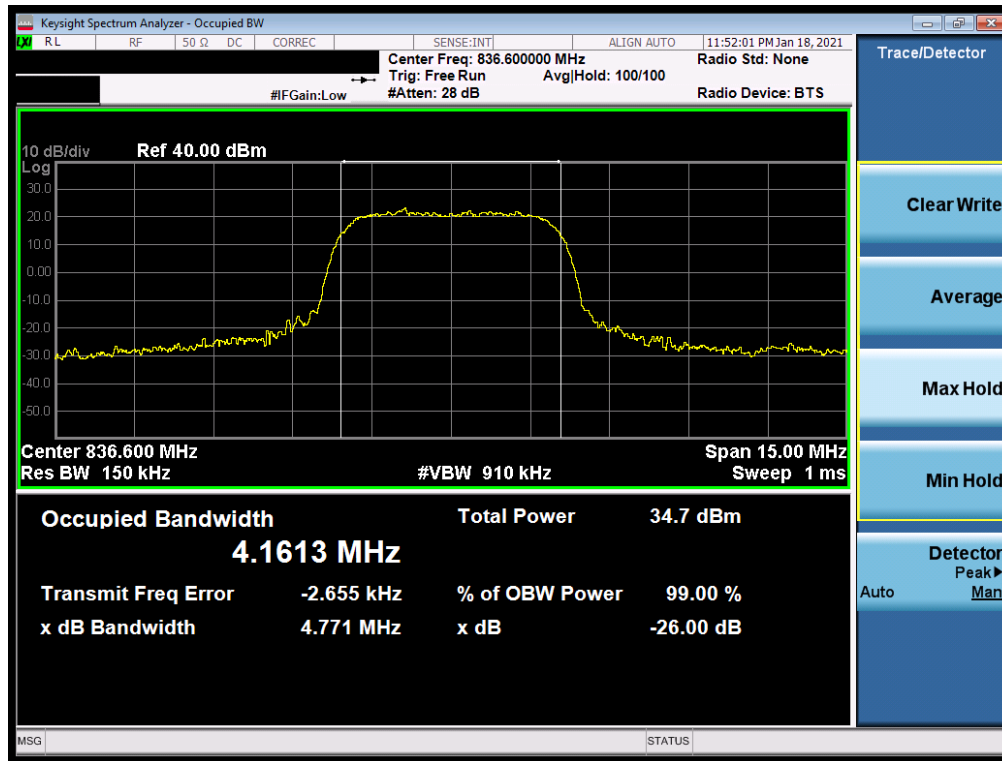
Plot 7-13. Occupied Bandwidth Plot (GPRS, Ch. 190)



Plot 7-14. Occupied Bandwidth Plot (EDGE, Ch. 190)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 20 of 65

WCDMA Cell



Plot 7-15. Occupied Bandwidth Plot (WCDMA, Ch. 4183)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 21 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

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

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

Test Setup

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

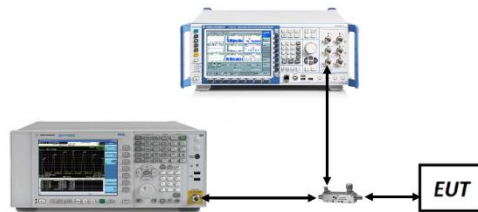


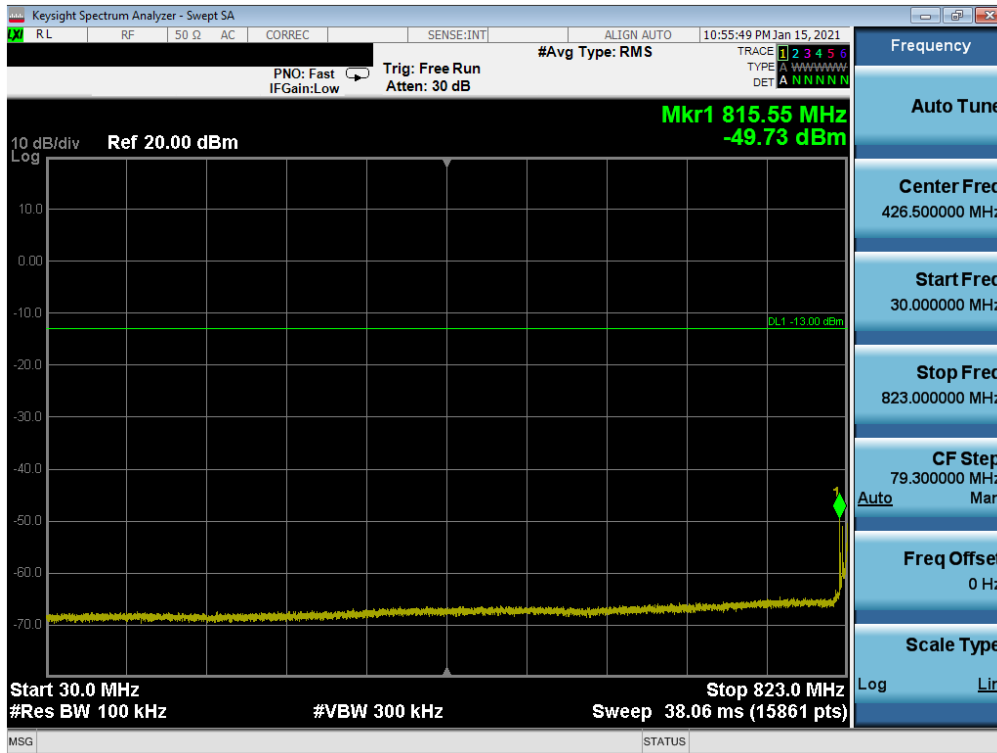
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

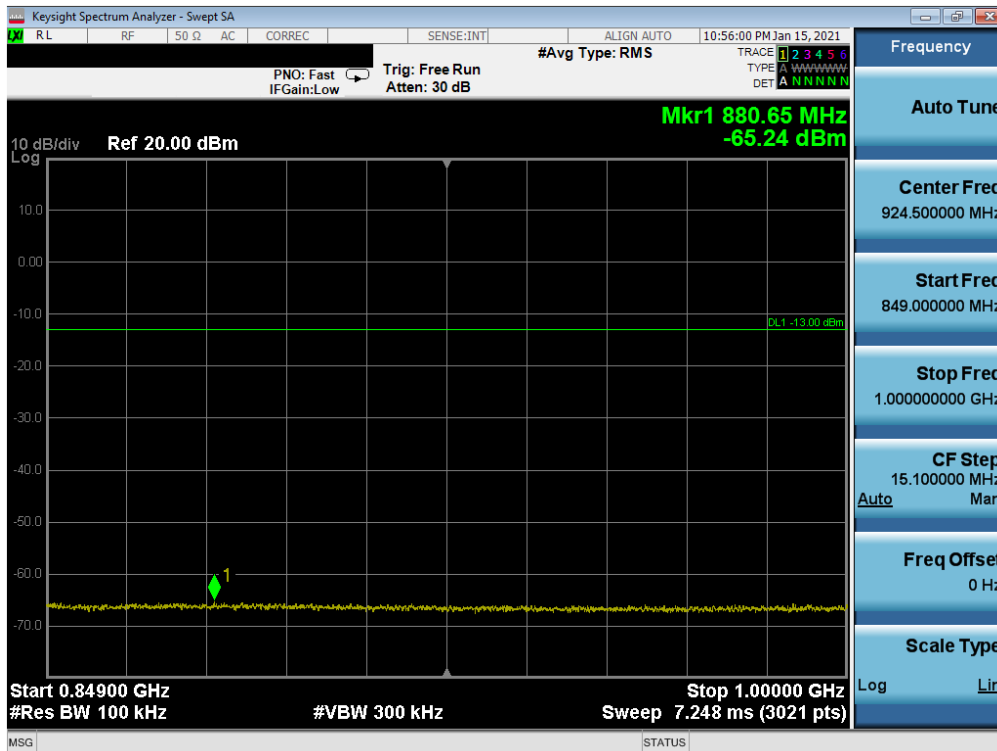
Per Part 22 and RSS-132, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 22 of 65

LTE Band 5

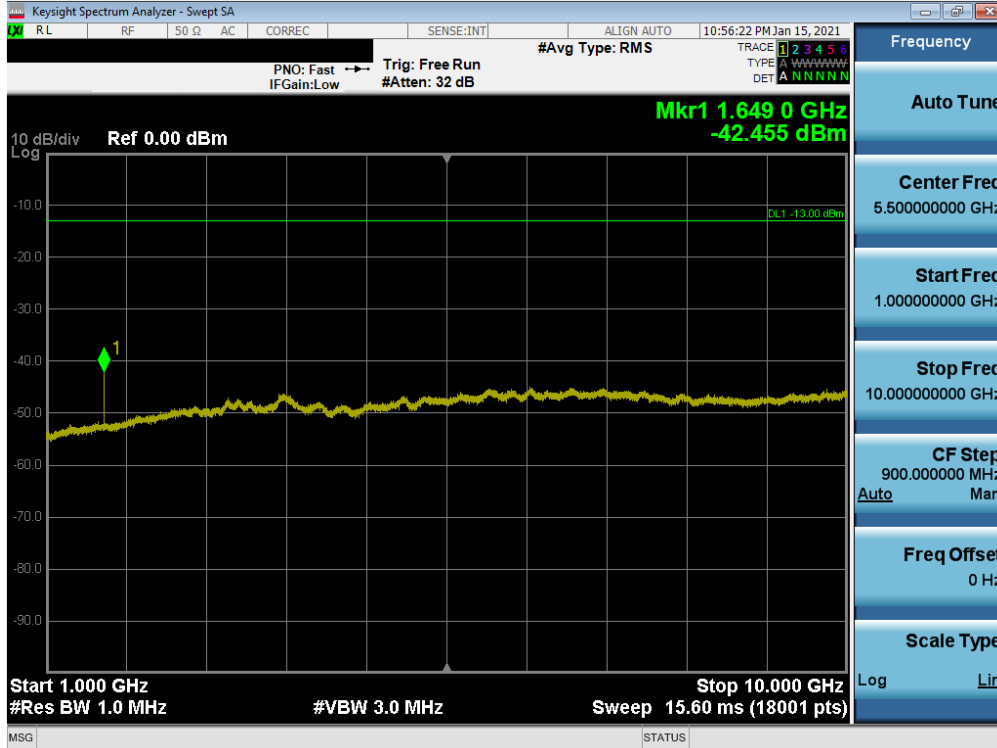


Plot 7-16. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

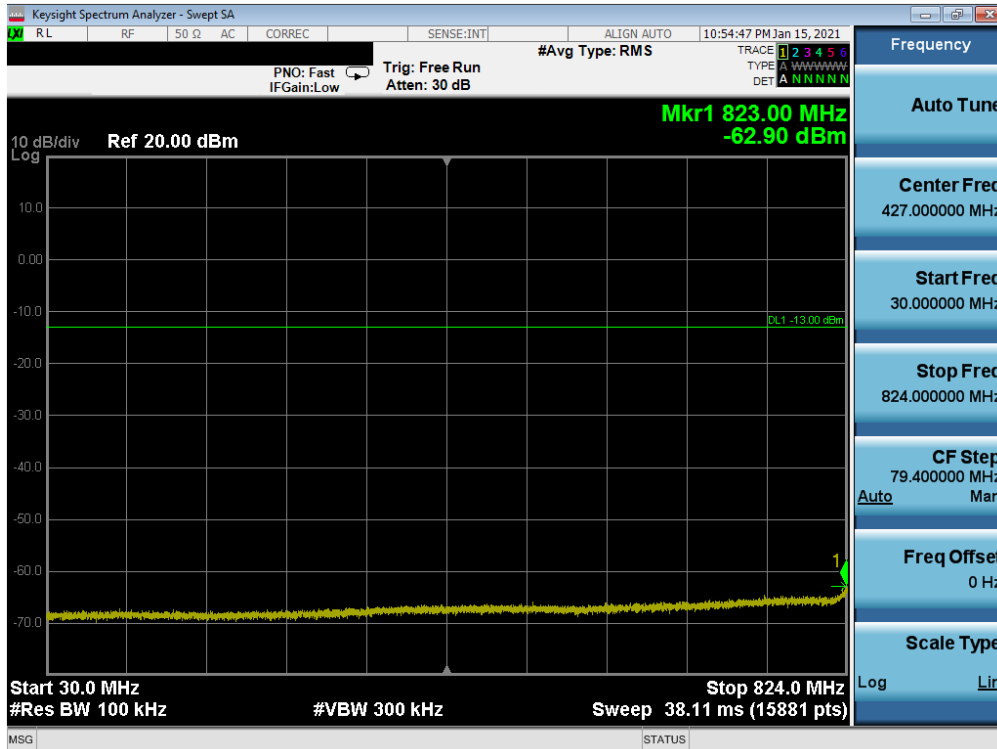


Plot 7-17. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 23 of 65

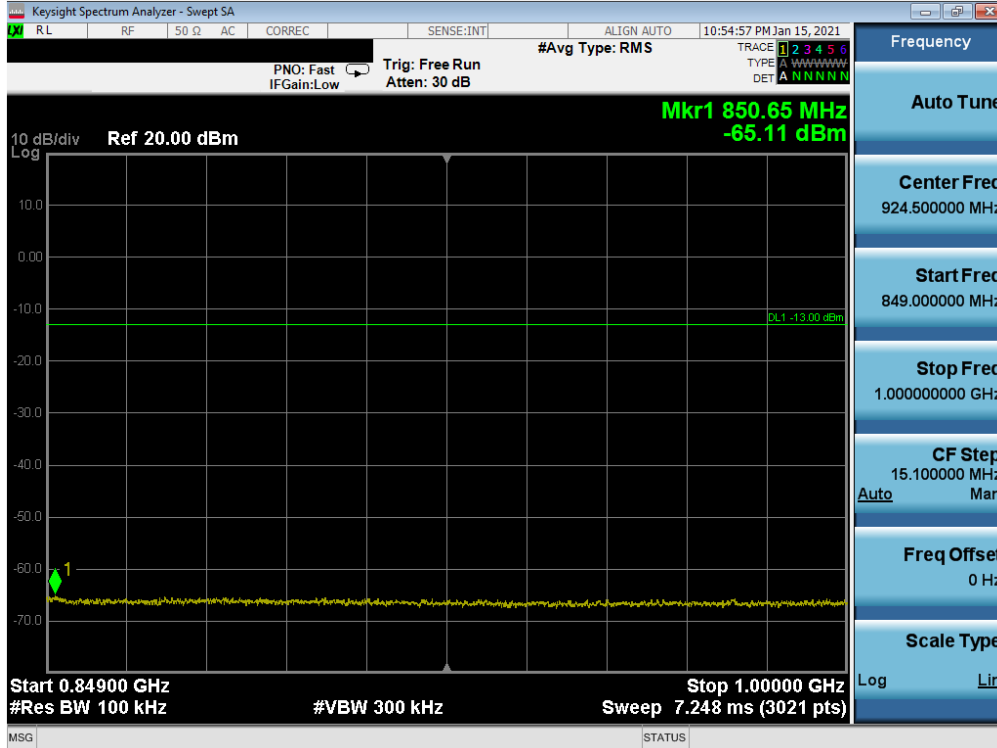


Plot 7-18. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

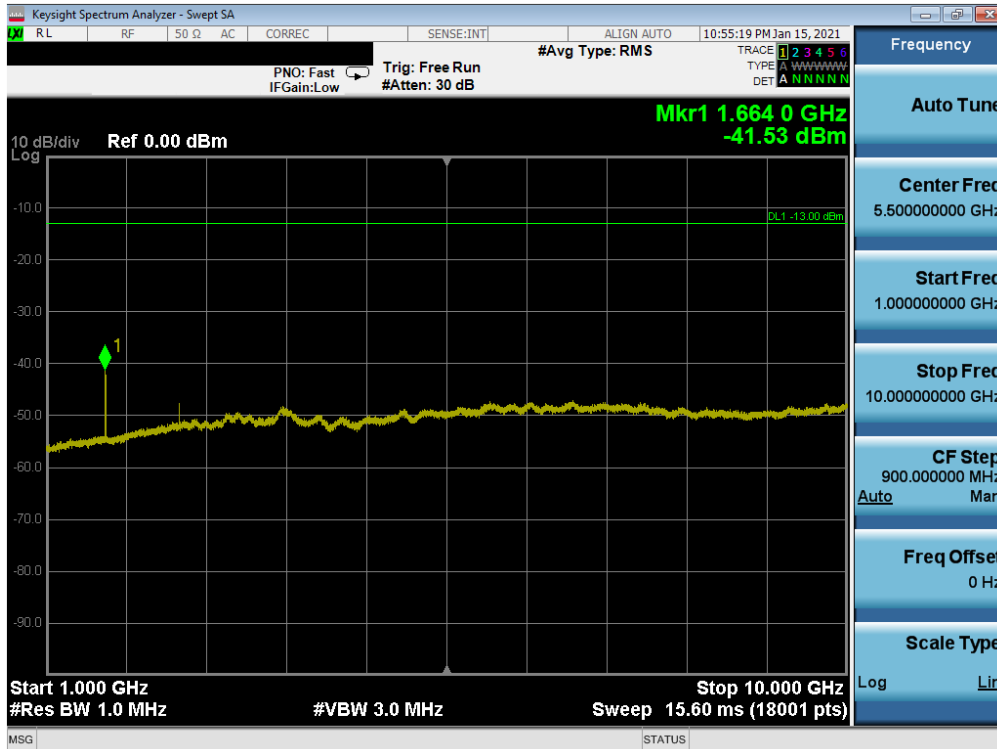


Plot 7-19. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 24 of 65



Plot 7-20. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

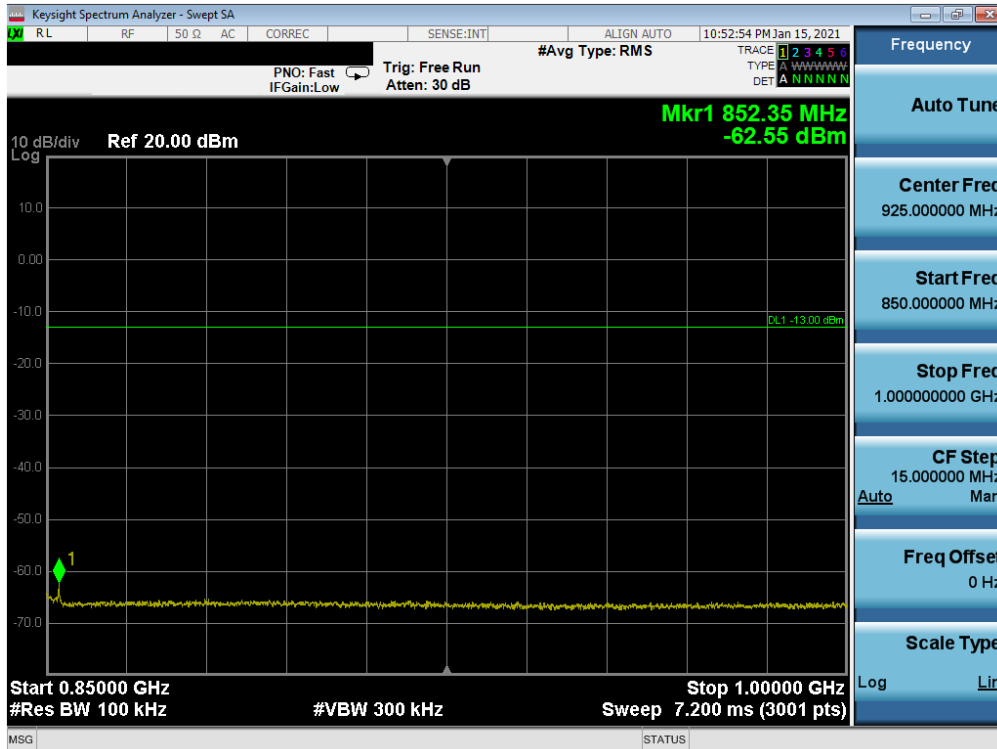


Plot 7-21. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 25 of 65

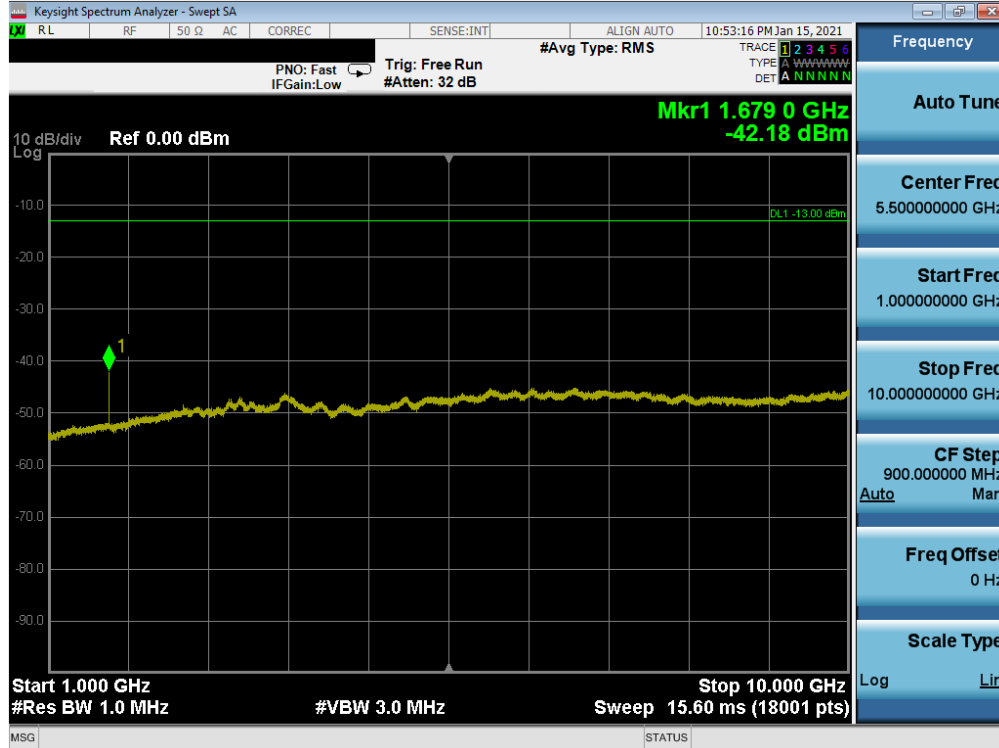


Plot 7-22. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-23. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

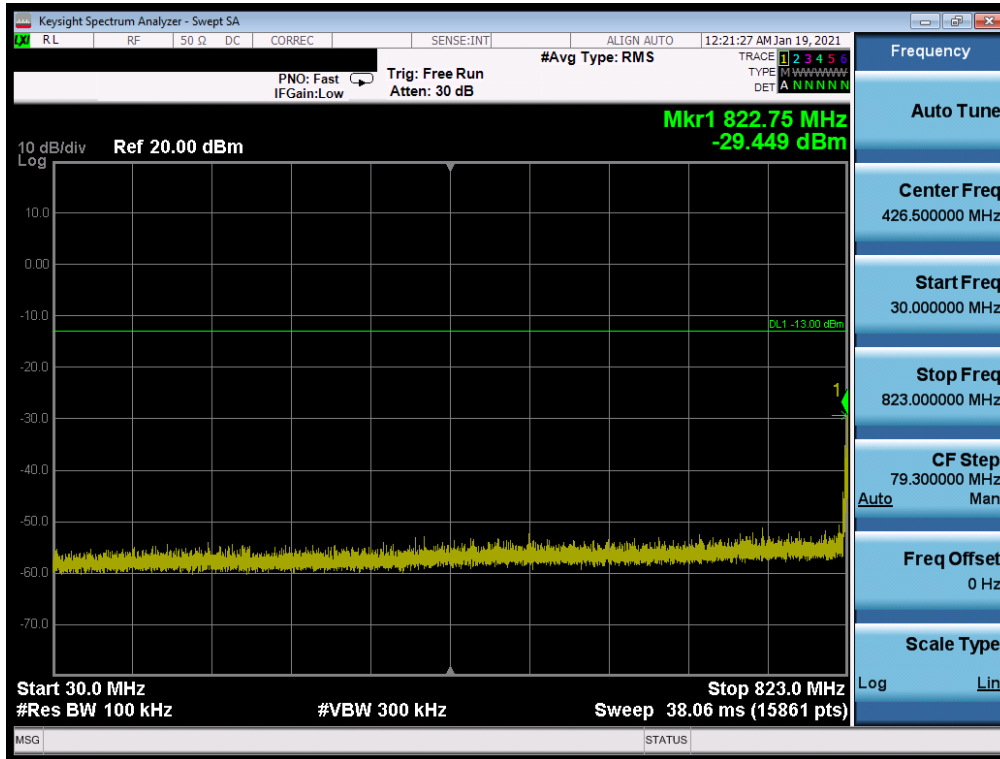
FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 26 of 65



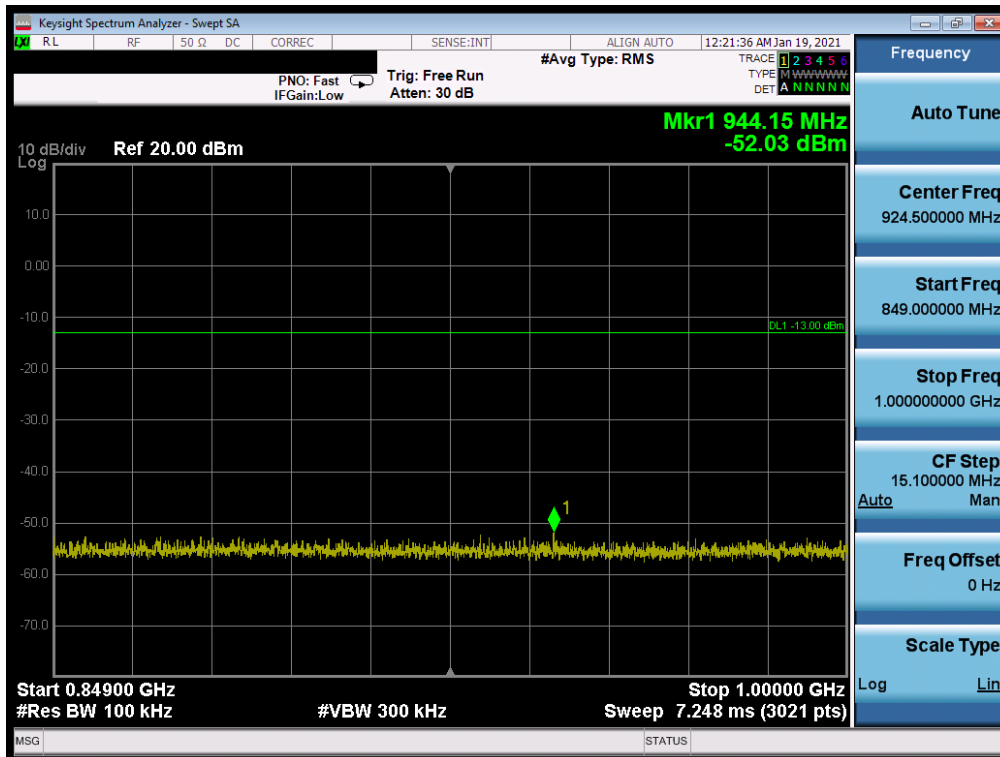
Plot 7-24. Conducted Spurious Plot (LTE Band 5 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 27 of 65

GSM/GPRS Cell

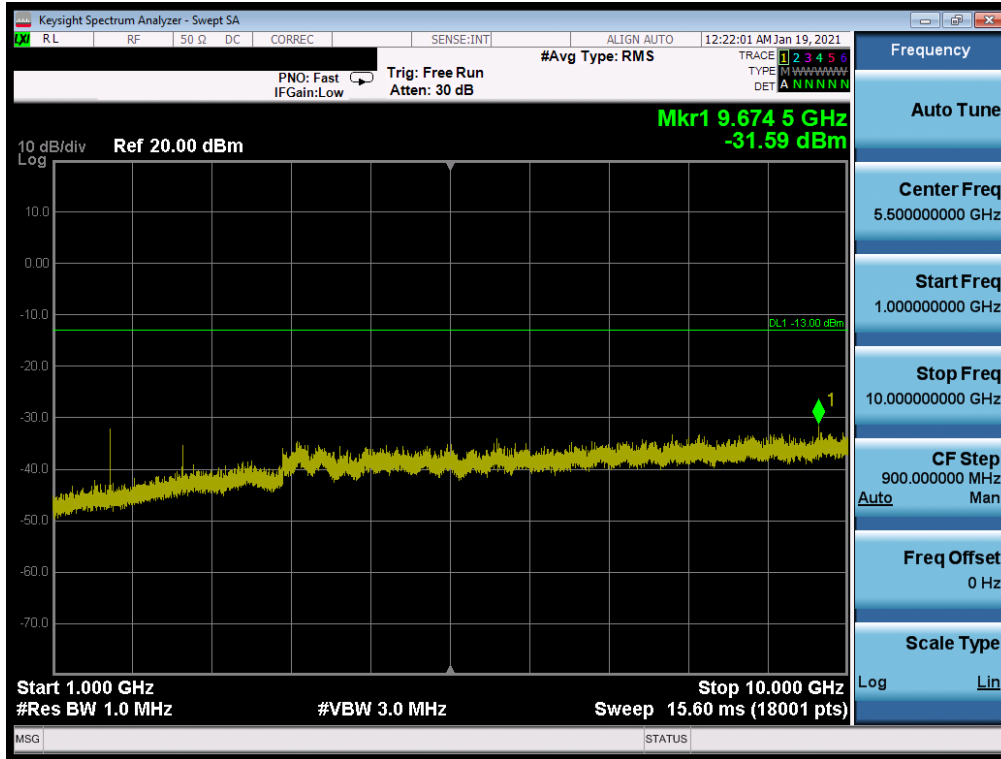


Plot 7-25. Conducted Spurious Plot (GPRS Ch. 128)

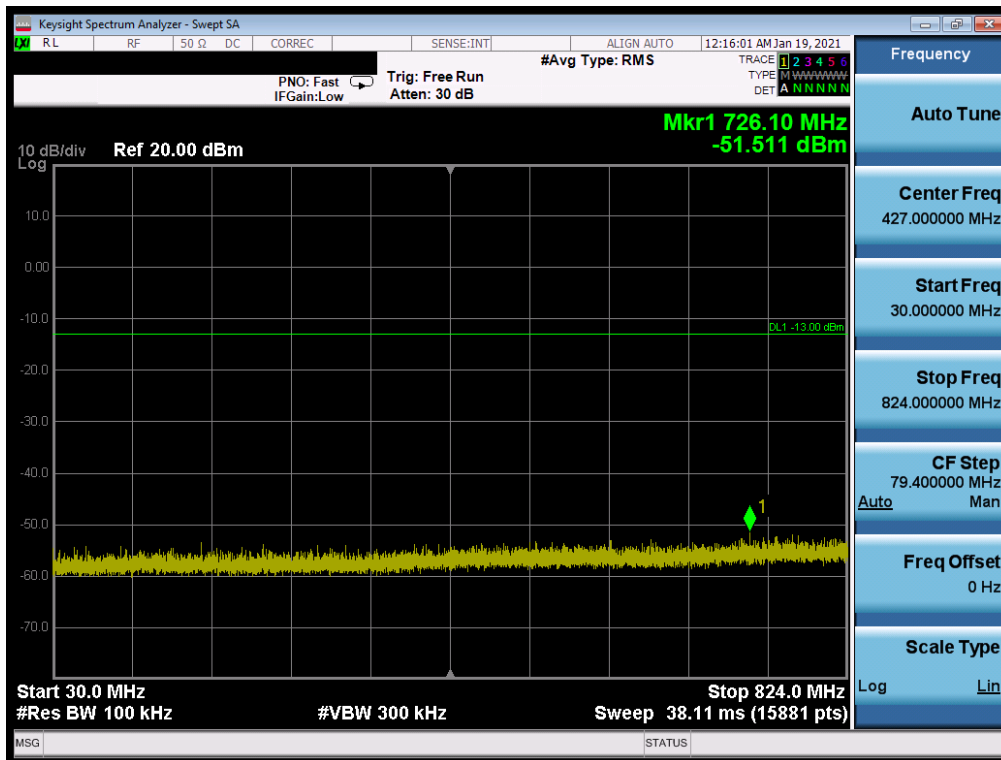


Plot 7-26. Conducted Spurious Plot (GPRS Ch. 128)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 28 of 65

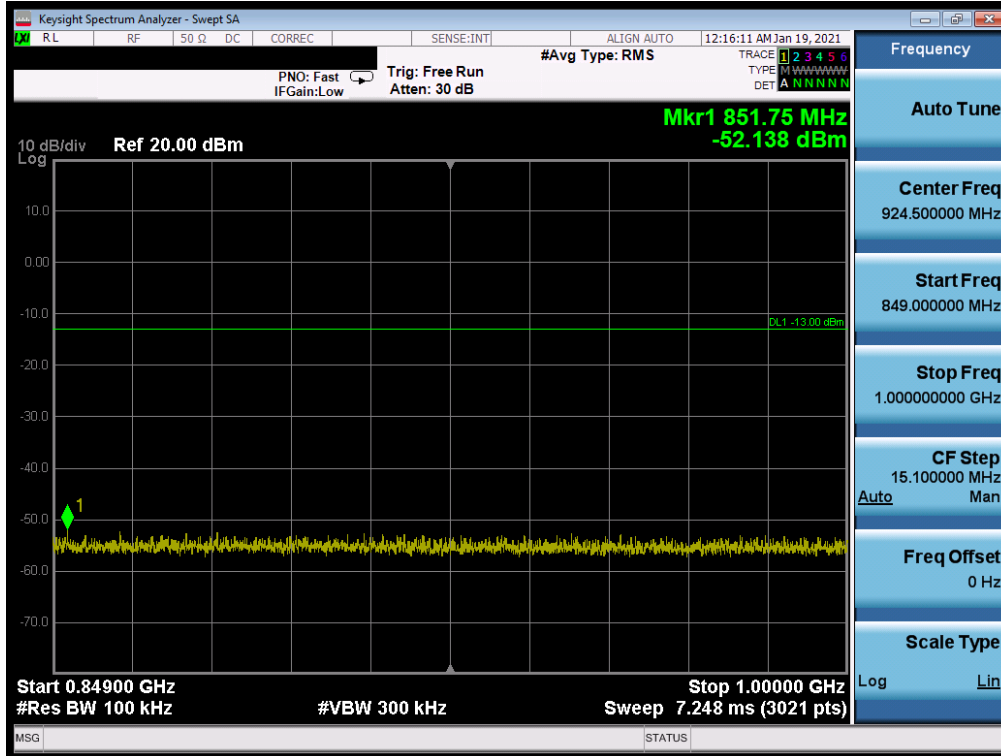


Plot 7-27. Conducted Spurious Plot (GPRS Ch. 128)

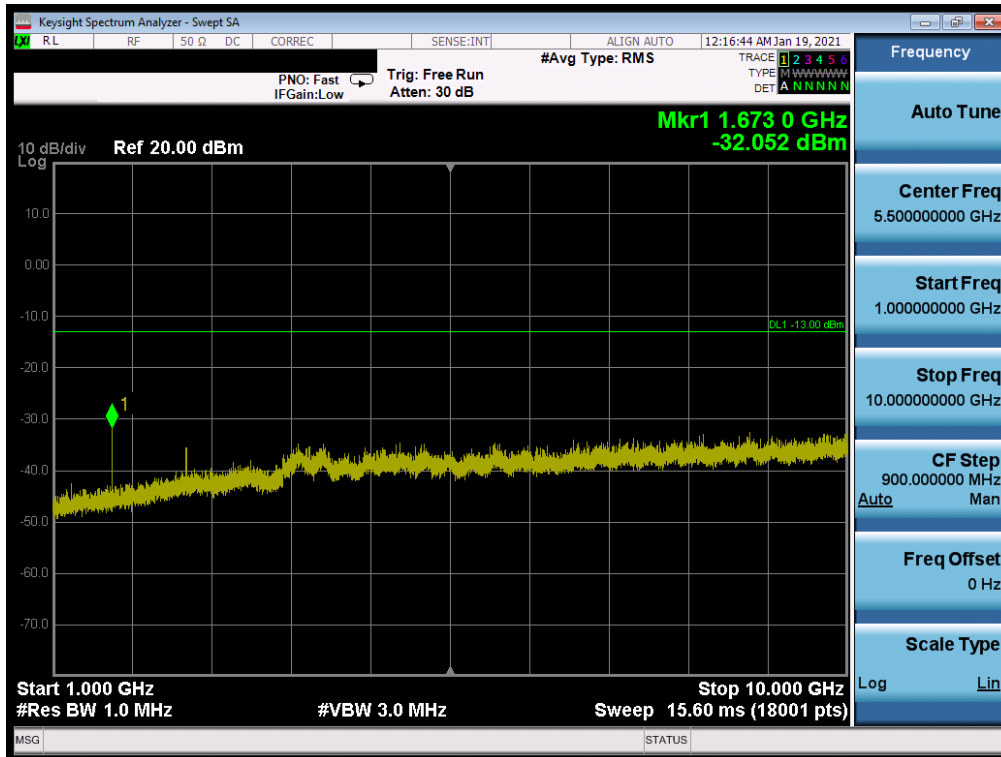


Plot 7-28. Conducted Spurious Plot (GPRS Ch. 190)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 29 of 65

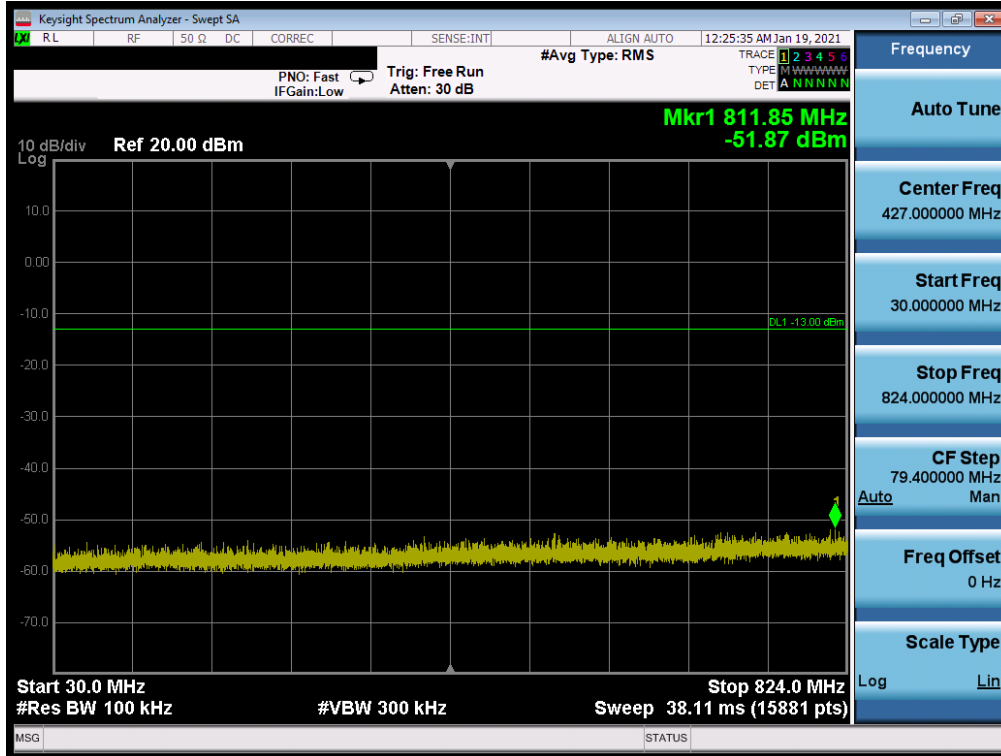


Plot 7-29. Conducted Spurious Plot (GPRS Ch. 190)

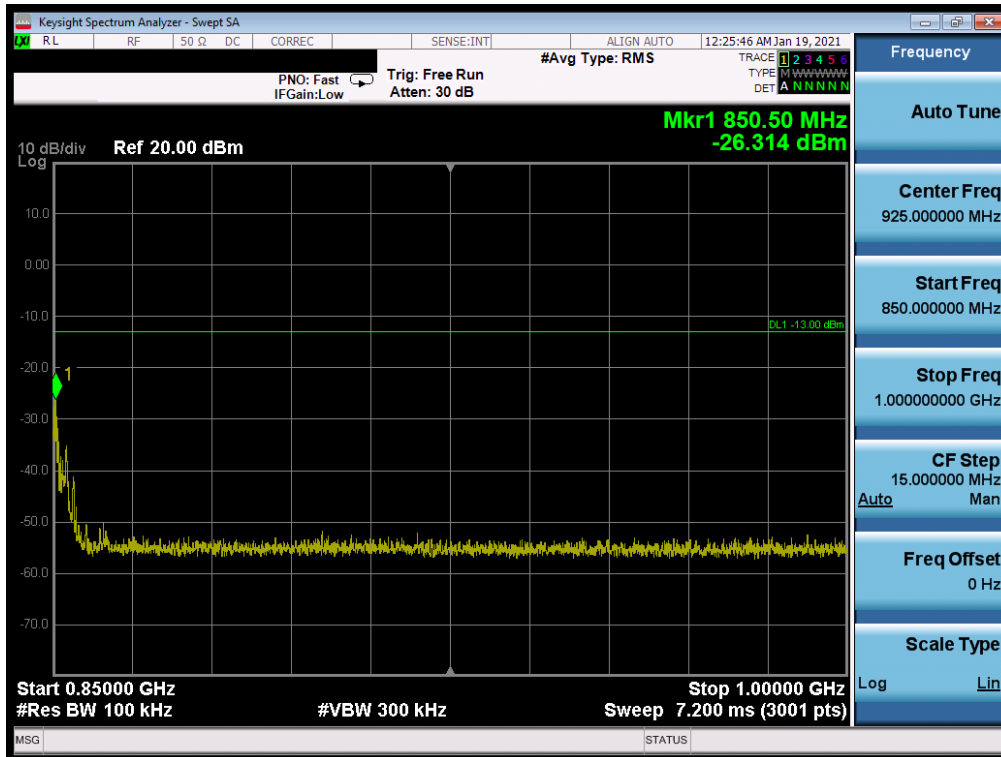


Plot 7-30. Conducted Spurious Plot (GPRS Ch. 190)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 30 of 65

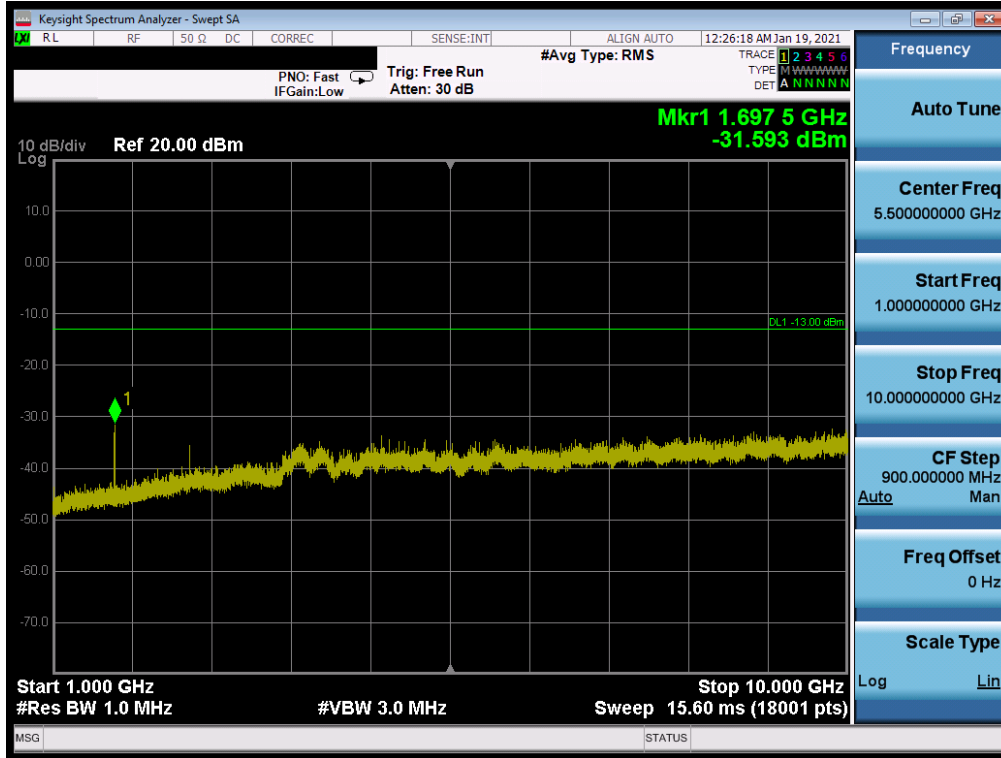


Plot 7-31. Conducted Spurious Plot (GPRS Ch. 251)



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

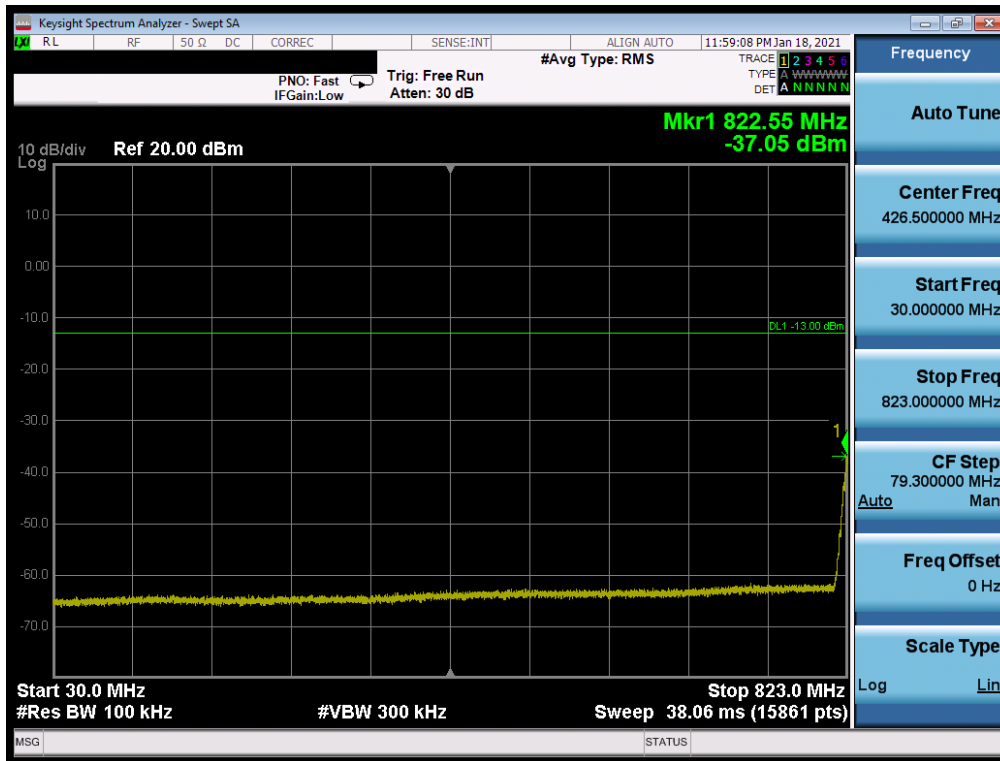
FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 31 of 65



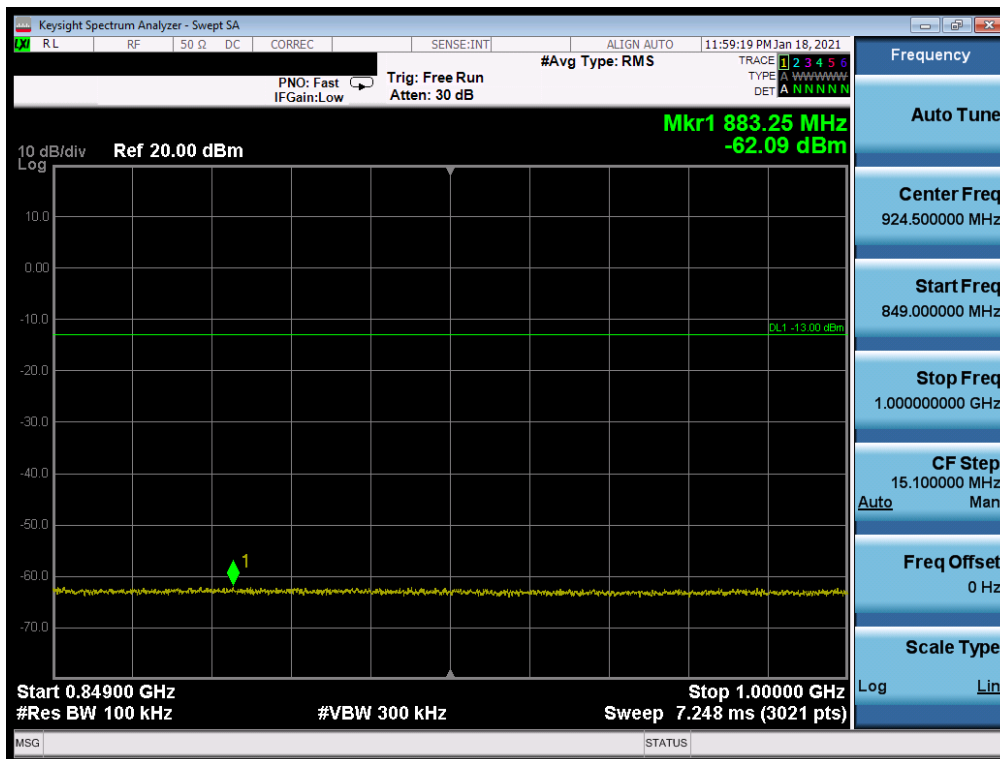
Plot 7-33. Conducted Spurious Plot (GPRS Ch. 251)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 32 of 65

WCDMA Cell

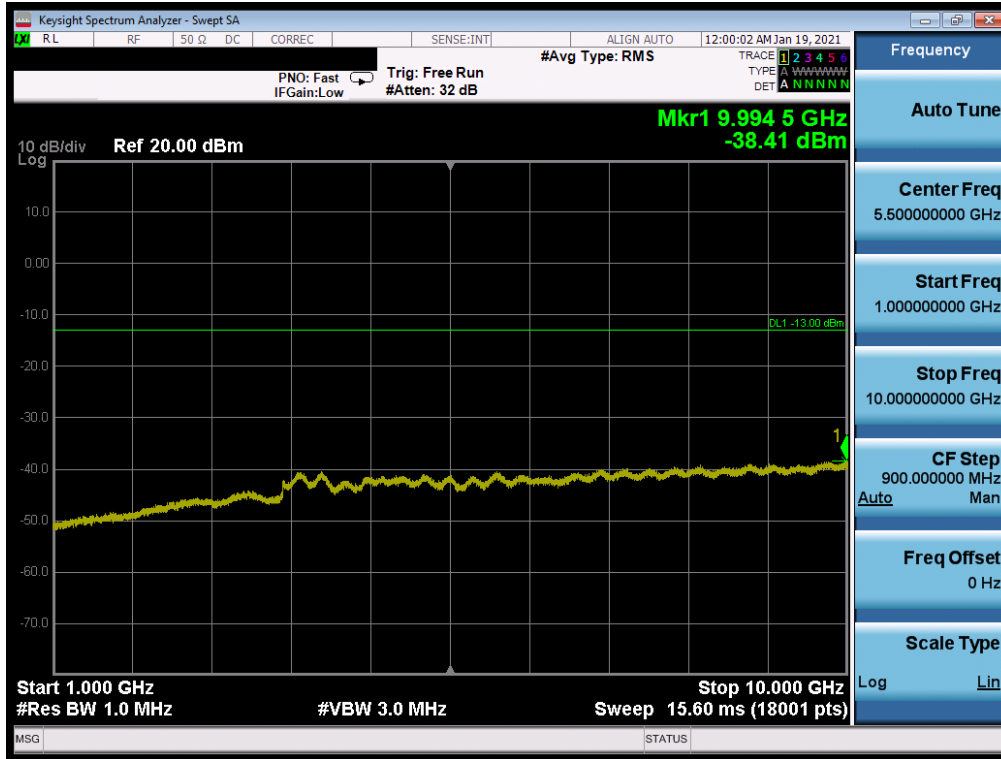


Plot 7-34. Conducted Spurious Plot (WCDMA Ch. 4132)

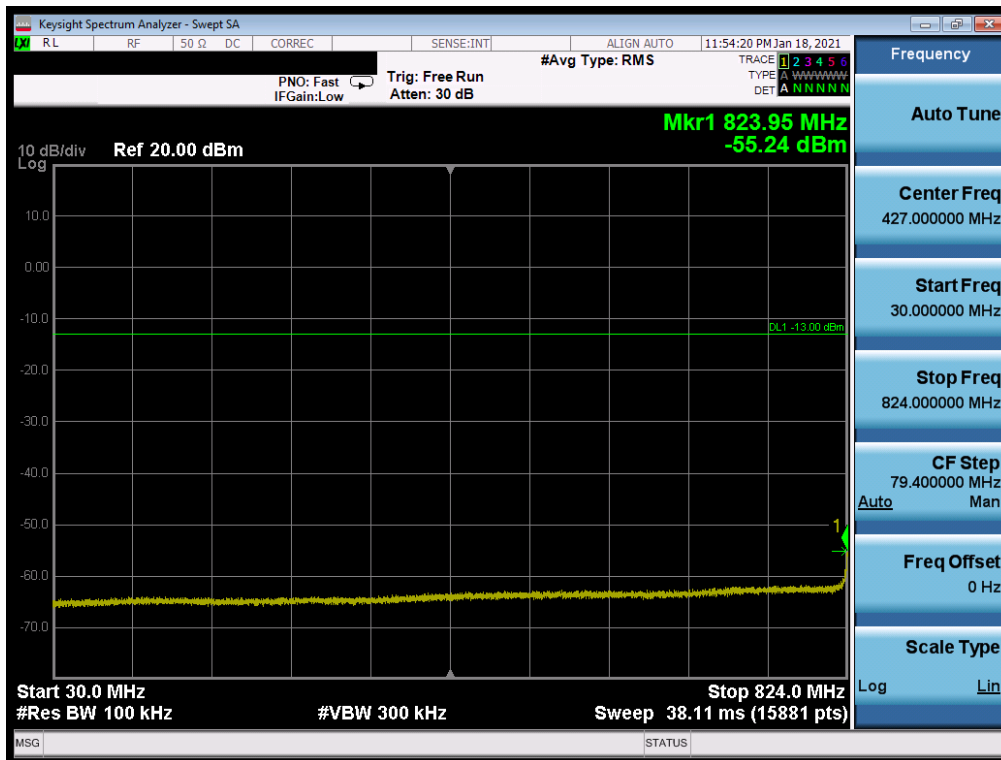


Plot 7-35. Conducted Spurious Plot (WCDMA Ch. 4132)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 33 of 65

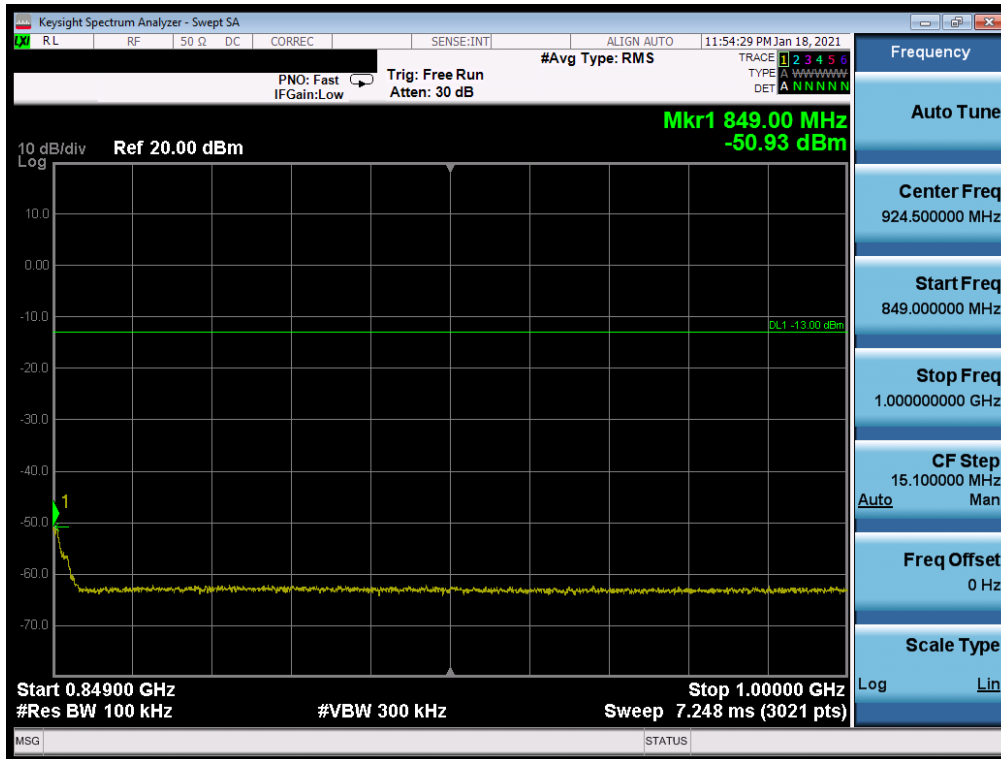


Plot 7-36. Conducted Spurious Plot (WCDMA Ch. 4132)



Plot 7-37. Conducted Spurious Plot (WCDMA Ch. 4183)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 34 of 65

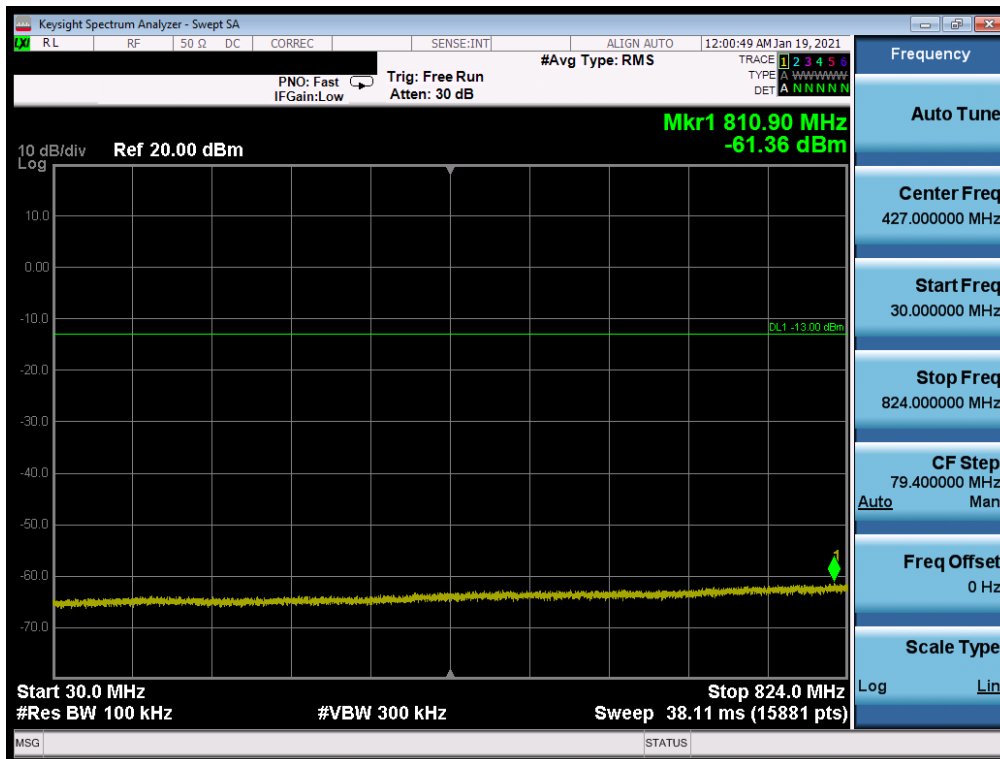


Plot 7-38. Conducted Spurious Plot (WCDMA Ch. 4183)

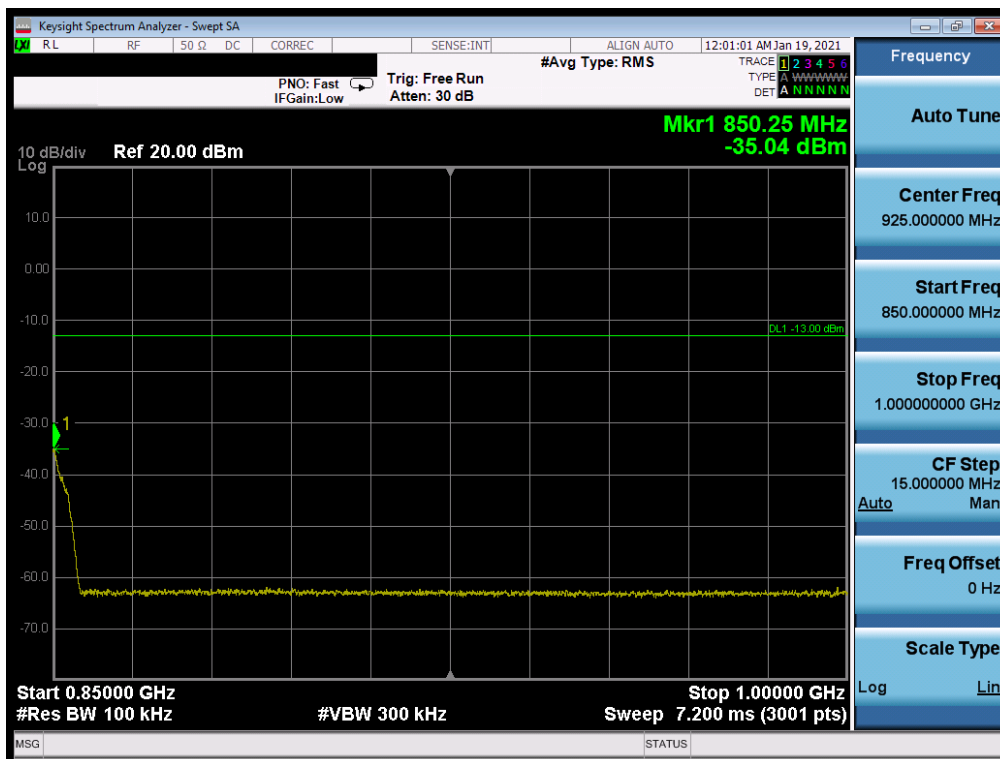


Plot 7-39. Conducted Spurious Plot (WCDMA Ch. 4183)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 35 of 65



Plot 7-40. Conducted Spurious Plot (WCDMA Ch. 4233)



Plot 7-41. Conducted Spurious Plot (WCDMA Ch. 4233)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 36 of 65



Plot 7-42. Conducted Spurious Plot (WCDMA Ch. 4233)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 37 of 65

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

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

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

Test Setup

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

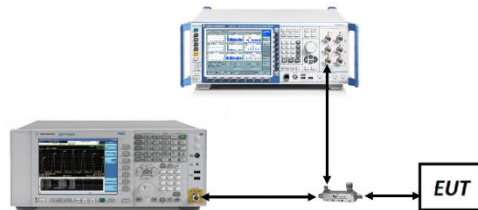




Figure 7-3. Test Instrument & Measurement Setup

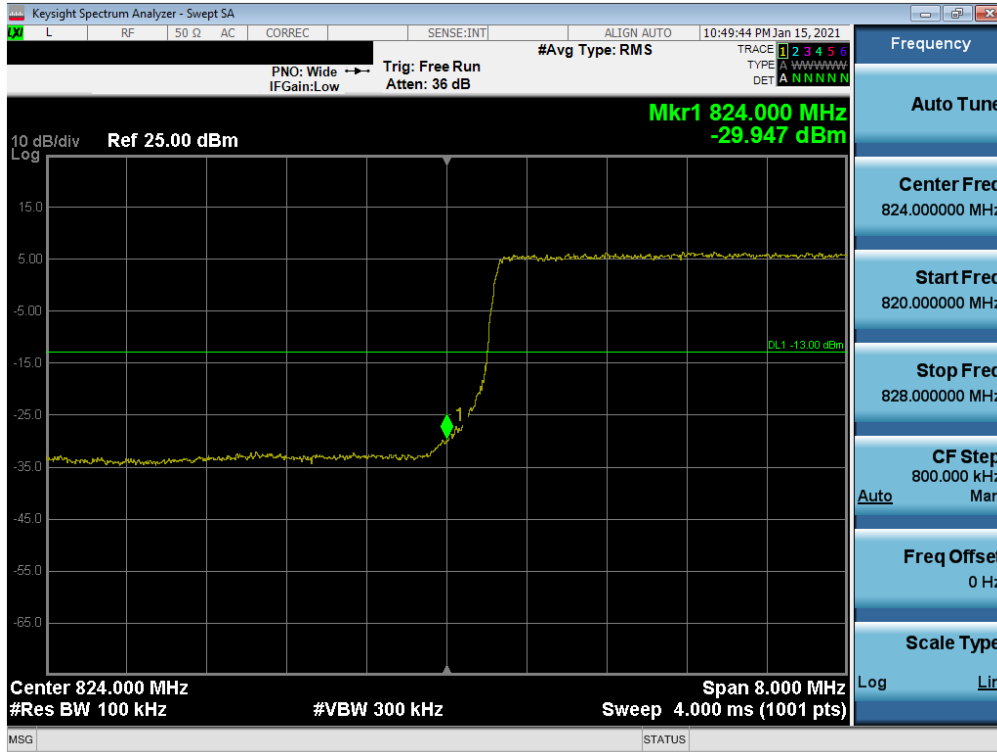
FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 38 of 65

Test Notes

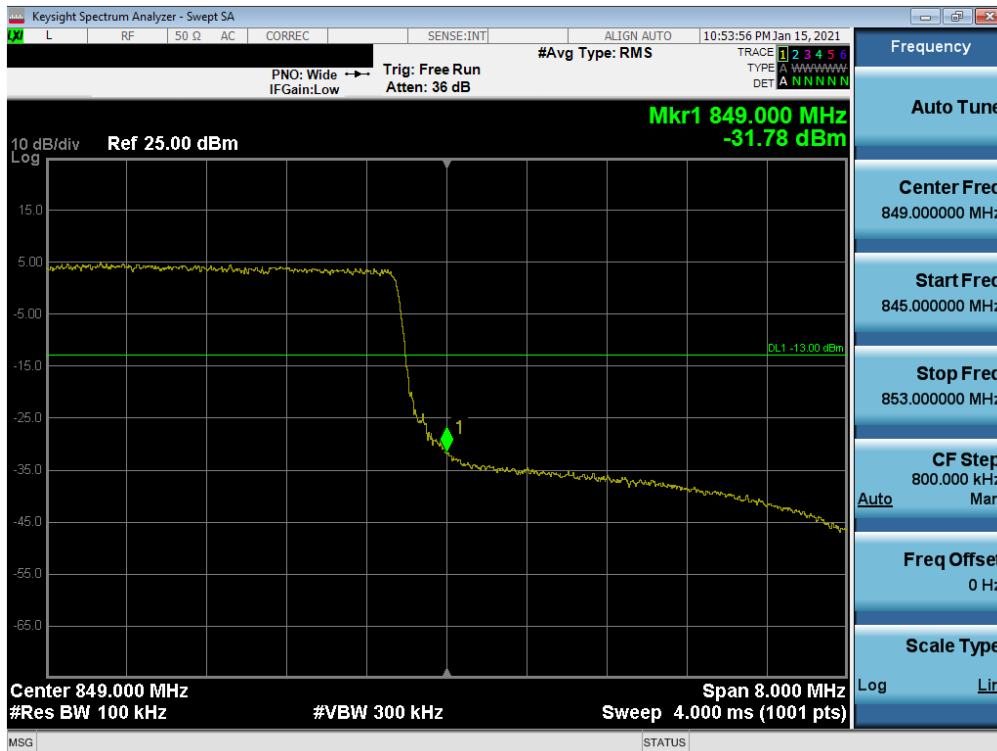
Per 22.917(b) and RSS-132(5.5), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

FCC ID: A3LSMG998JPN	 PART 22 MEASUREMENT REPORT 		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset	Page 39 of 65

LTE Band 5

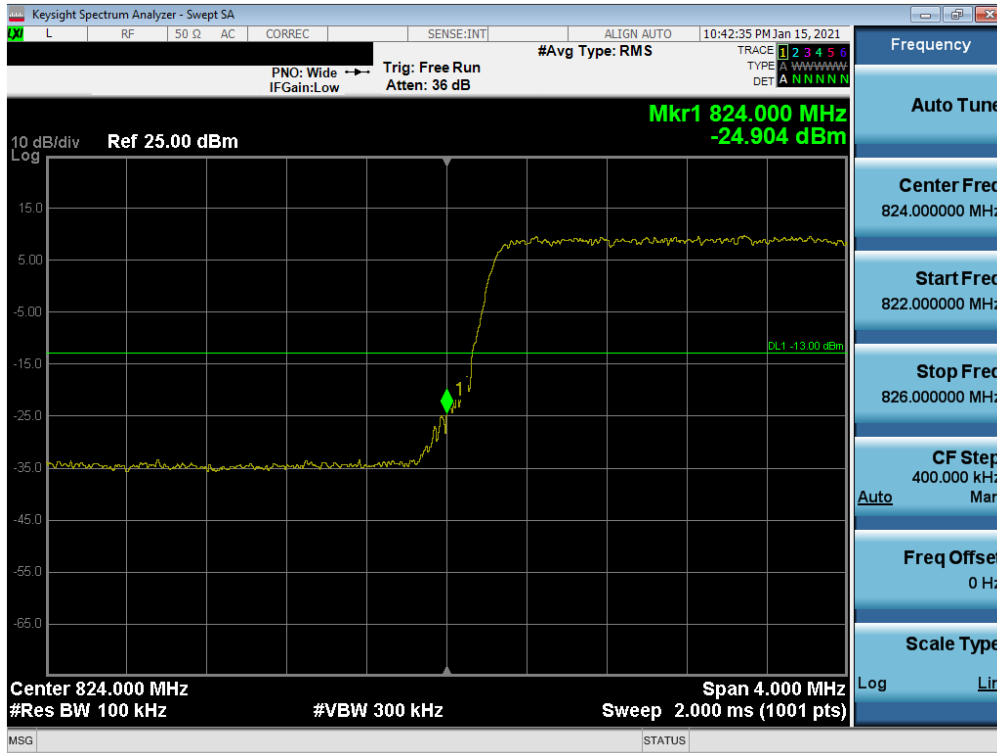


Plot 7-43. Lower Band Edge Plot (LTE Band 5 - 10MHz QPSK – Full RB Configuration)



Plot 7-44. Upper Band Edge Plot (LTE Band 5 - 10MHz QPSK – Full RB Configuration)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 40 of 65

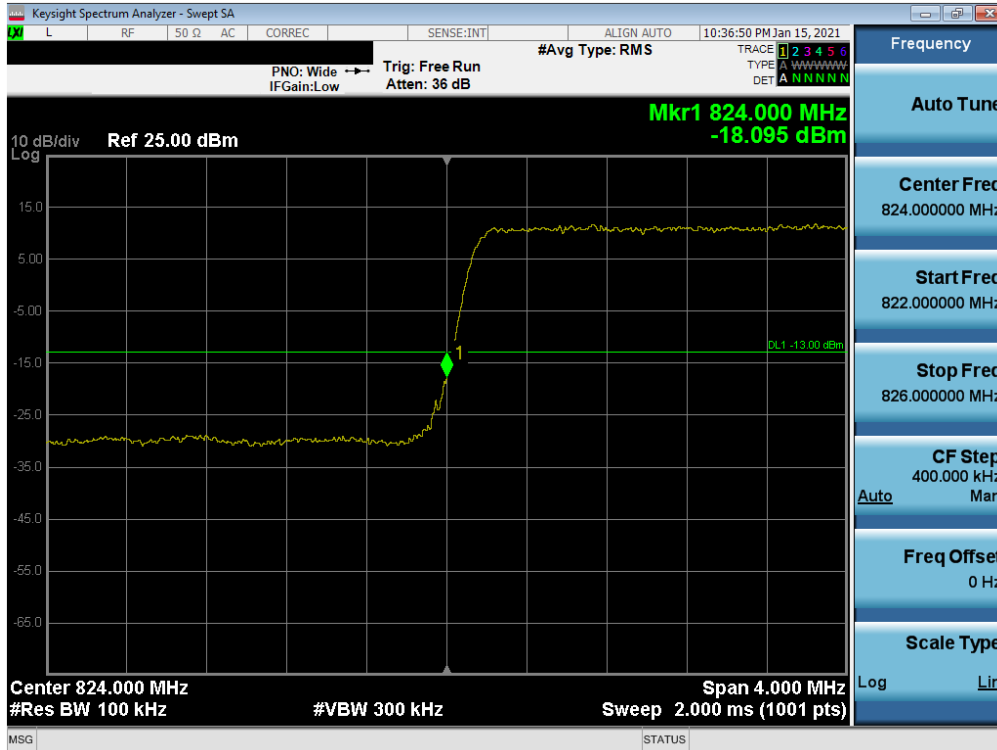


Plot 7-45. Lower Band Edge Plot (LTE Band 5 - 5MHz QPSK – Full RB Configuration)

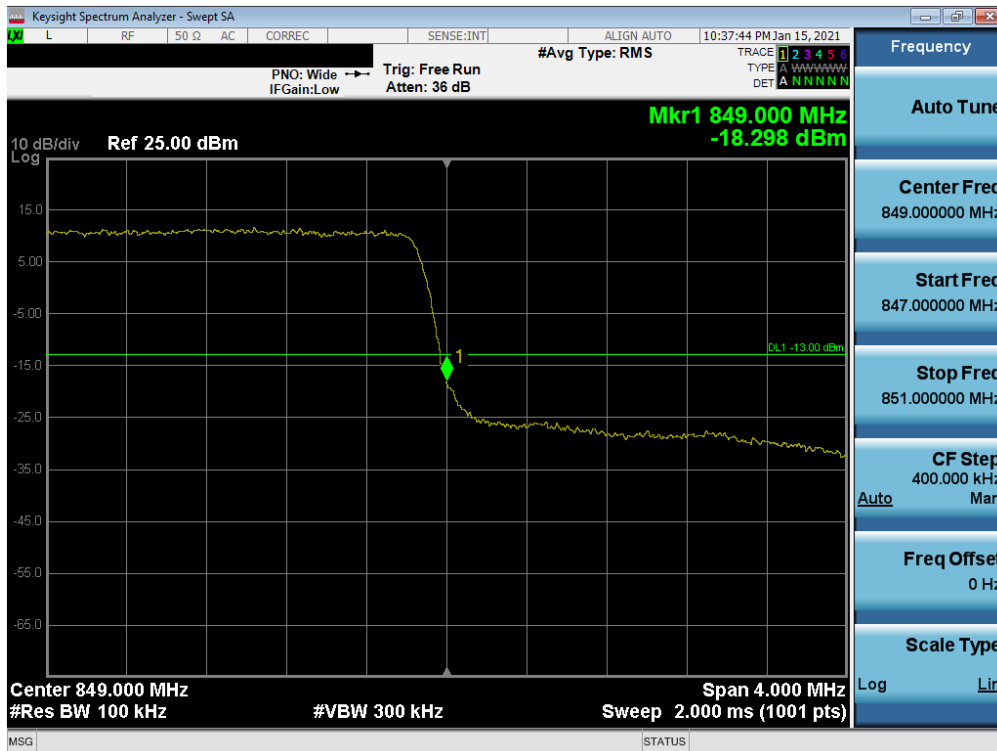


Plot 7-46. Upper Band Edge Plot (LTE Band 5 - 5MHz QPSK – Full RB Configuration)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 41 of 65

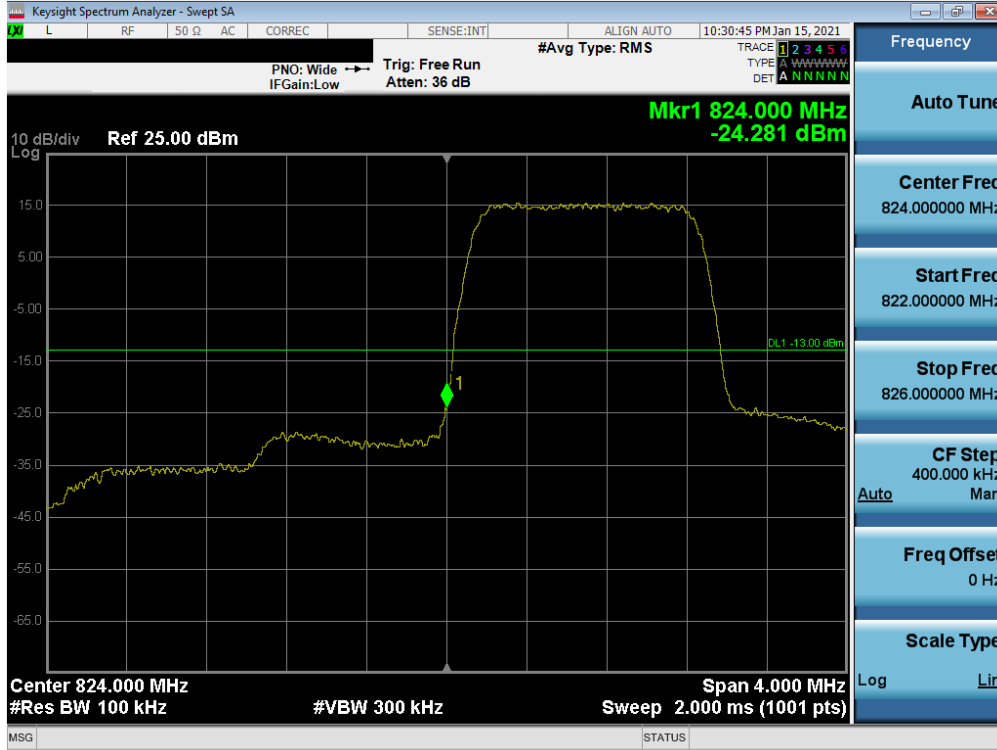


Plot 7-47. Lower Band Edge Plot (LTE Band 5 - 3MHz QPSK – Full RB Configuration)

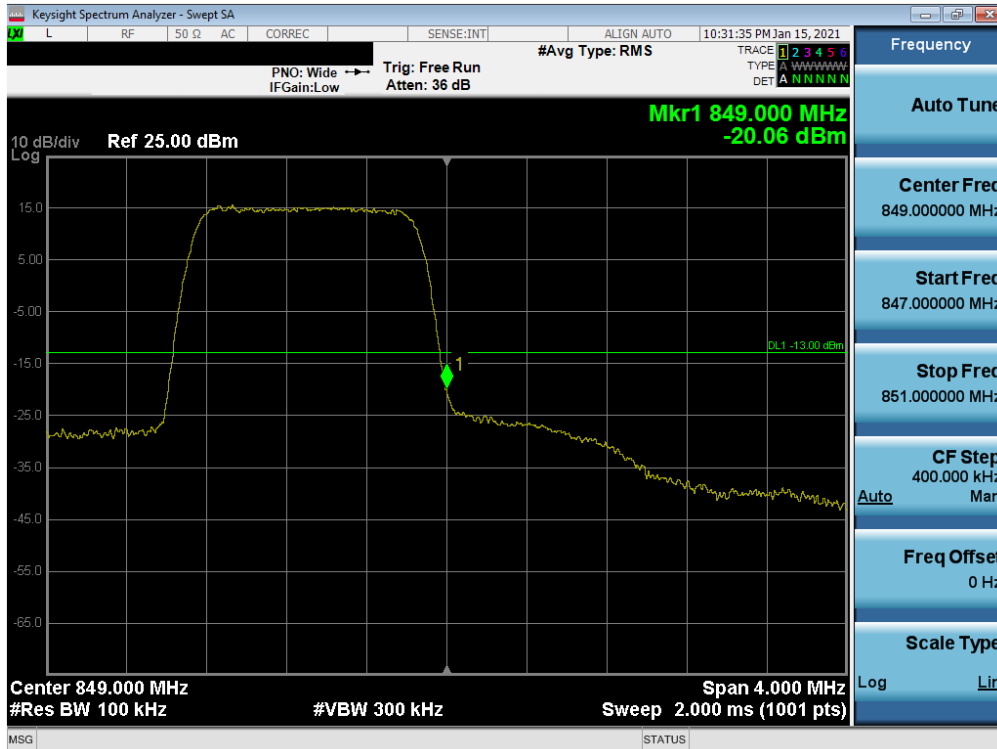


Plot 7-48. Upper Band Edge Plot (LTE Band 5 - 3MHz QPSK – Full RB Configuration)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 42 of 65



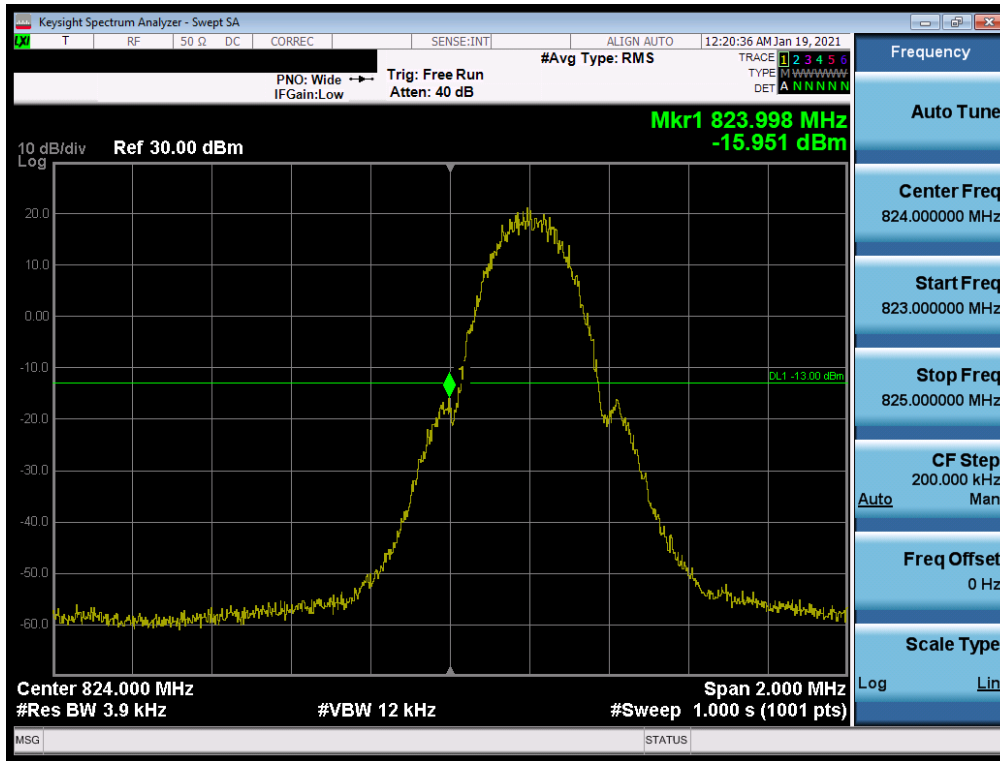
Plot 7-49. Lower Band Edge Plot (LTE Band 5 – 1.4MHz QPSK – Full RB Configuration)



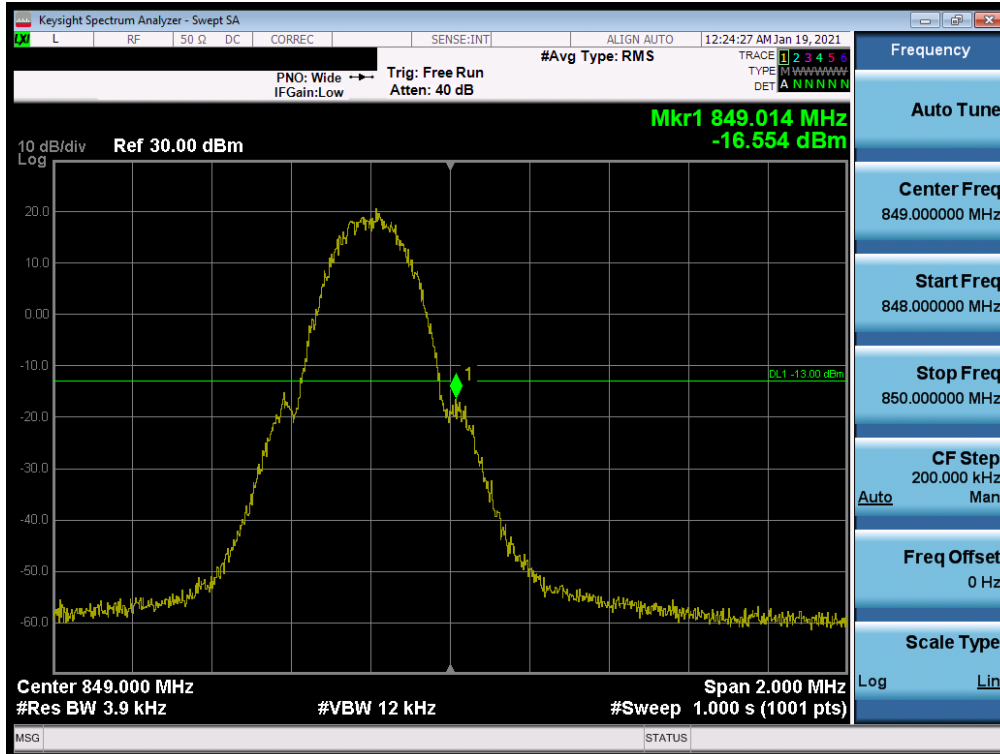
Plot 7-50. Upper Band Edge Plot (LTE Band 5 – 1.4MHz QPSK – Full RB Configuration)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 43 of 65

GSM/GPRS Cell



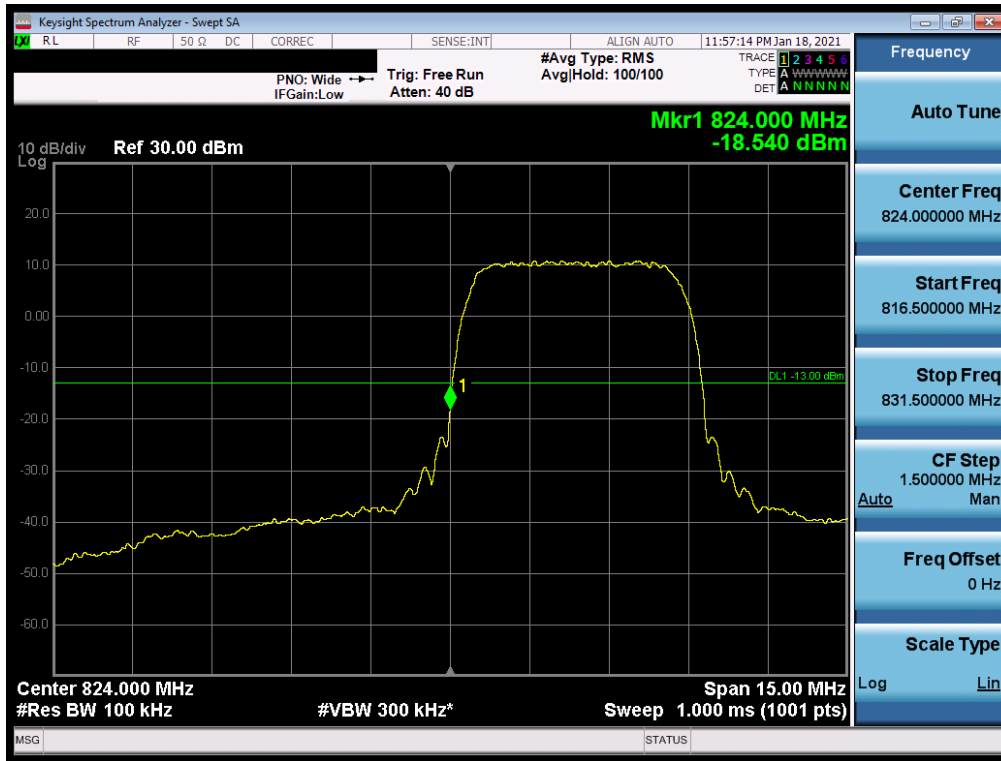
Plot 7-51. Lower Band Edge Plot (GPRS Cell – Ch. 128)



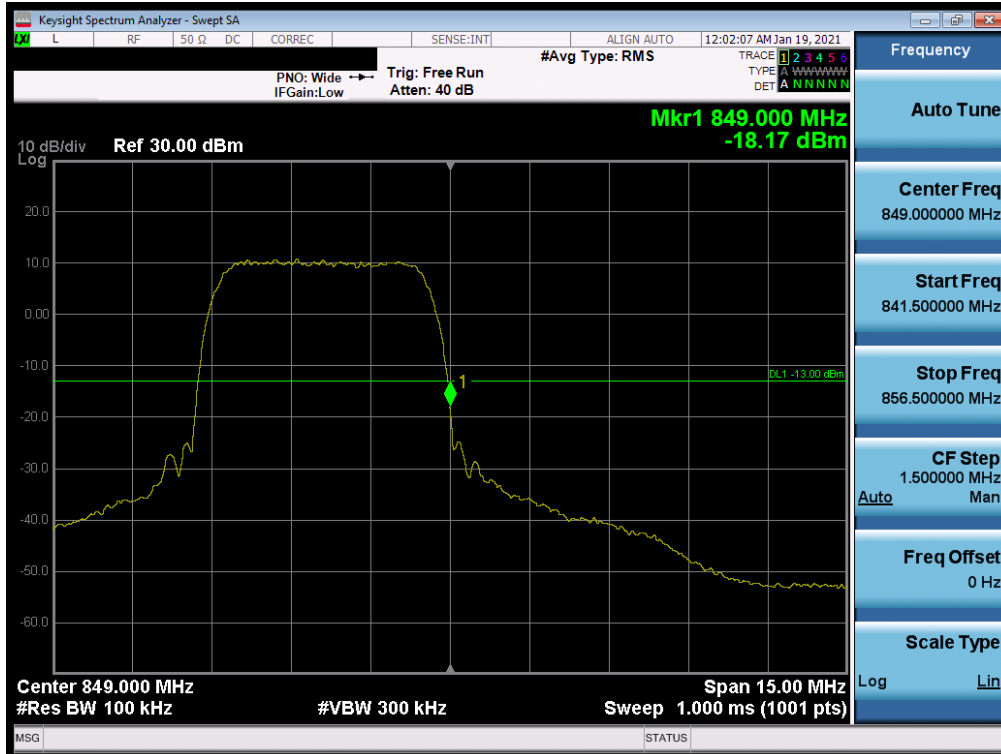
Plot 7-52. Upper Band Edge Plot (GPRS Cell – Ch. 251)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 44 of 65

WCDMA Cell



Plot 7-53. Lower Band Edge Plot (WCDMA Cell – Ch. 4132)



Plot 7-54. 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/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.



Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

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

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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Test Setup

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

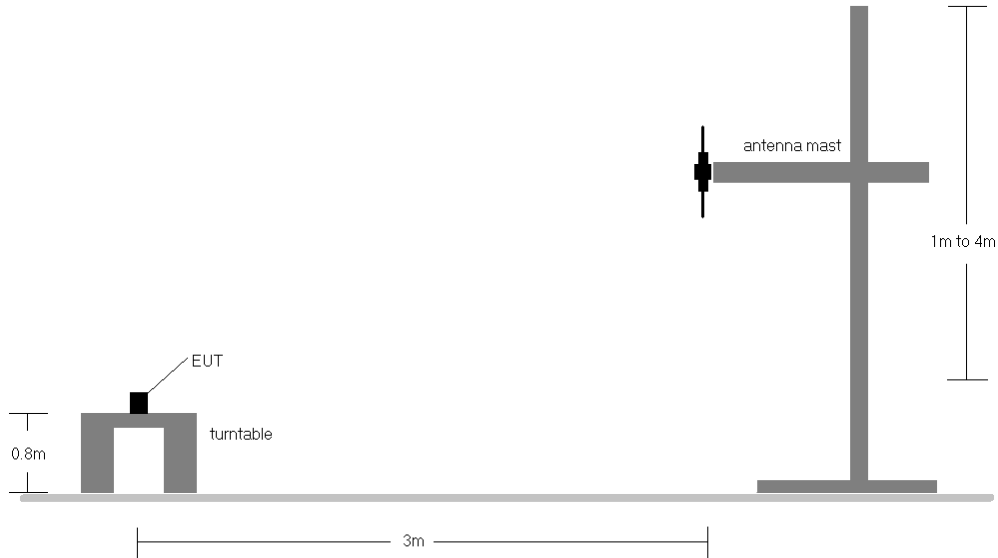


Figure 7-4. Radiated Test Setup <1GHz

Test Notes

- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers is 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 power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1".
- 3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 4) This unit was tested with its standard battery.
- 5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset	Page 47 of 65	

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
10 MHz	QPSK	829.0	H	226	287	6.80	1 / 25	13.09	17.74	0.059	38.45	-20.71	19.89	0.098	40.61	-20.72
		836.5	H	114	283	6.68	1 / 49	13.70	18.23	0.067	38.45	-20.22	20.38	0.109	40.61	-20.23
		844.0	H	115	287	6.66	1 / 0	13.75	18.26	0.067	38.45	-20.19	20.41	0.110	40.61	-20.20
	16-QAM	844.0	H	115	287	6.66	1 / 25	13.13	17.64	0.058	38.45	-20.81	19.79	0.095	40.61	-20.82
64-QAM	844.0	H	115	287	6.66	1 / 25	12.20	16.71	0.047	38.45	-21.74	18.86	0.077	40.61	-21.75	
5 MHz	QPSK	826.5	H	226	287	6.80	1 / 12	12.98	17.63	0.058	38.45	-20.82	19.78	0.095	40.61	-20.83
		836.5	H	114	283	6.68	1 / 12	13.51	18.04	0.064	38.45	-20.41	20.19	0.104	40.61	-20.42
		846.5	H	115	287	6.66	1 / 12	13.48	17.99	0.063	38.45	-20.46	20.14	0.103	40.61	-20.47
	16-QAM	836.5	H	114	283	6.68	1 / 12	13.04	17.57	0.057	38.45	-20.88	19.72	0.094	40.61	-20.89
64-QAM	846.5	H	115	287	6.66	1 / 12	12.16	16.67	0.046	38.45	-21.78	18.82	0.076	40.61	-21.79	
3 MHz	QPSK	825.5	H	226	287	6.80	1 / 0	12.99	17.64	0.058	38.45	-20.81	19.79	0.095	40.61	-20.82
		836.5	H	114	283	6.68	1 / 0	13.49	18.02	0.063	38.45	-20.43	20.17	0.104	40.61	-20.44
		847.5	H	115	287	6.66	1 / 0	13.38	17.89	0.061	38.45	-20.56	20.04	0.101	40.61	-20.57
	16-QAM	836.5	H	114	283	6.68	1 / 0	13.04	17.57	0.057	38.45	-20.88	19.72	0.094	40.61	-20.89
64-QAM	847.5	H	115	287	6.66	1 / 0	12.08	16.59	0.046	38.45	-21.78	18.74	0.075	40.61	-21.79	
1.4 MHz	QPSK	824.7	H	226	287	6.80	1 / 2	13.00	17.65	0.058	38.45	-20.80	19.80	0.096	40.61	-20.81
		836.5	H	114	283	6.68	1 / 2	13.44	17.97	0.063	38.45	-20.48	20.12	0.103	40.61	-20.49
		848.3	H	115	287	6.66	1 / 2	13.40	17.91	0.062	38.45	-20.54	20.06	0.101	40.61	-20.55
	16-QAM	836.5	H	114	283	6.68	1 / 2	13.05	17.58	0.057	38.45	-20.87	19.73	0.094	40.61	-20.88
64-QAM	848.3	H	115	287	6.66	1 / 2	12.09	16.60	0.046	38.45	-21.85	18.75	0.075	40.61	-21.86	
10 MHz	Opposite Pol.	844.0	V	135	269	6.46	1 / 0	11.69	18.15	0.065	38.45	-20.30	20.30	0.107	40.61	-20.31
	WCP	844.0	H	178	258	6.66	1 / 0	5.95	12.61	0.018	38.45	-25.84	14.76	0.030	40.61	-25.85



Table 7-2. ERP Data (LTE Band 5)

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]
824.20	GSM850	H	196	276	20.83	6.75	25.43	0.349	38.45	-13.02
836.60	GSM850	H	100	287	21.09	6.68	25.62	0.365	38.45	-12.83
848.80	GSM850	H	389	293	20.27	6.71	24.83	0.304	38.45	-13.63
836.60	GSM850	V	169	258	19.50	6.38	23.73	0.236	38.45	-14.72
836.60	EDGE850	H	100	287	14.74	6.68	19.27	0.085	38.45	-19.18
836.60	GSM850 (WCP)	H	311	259	16.93	6.68	21.46	0.140	38.45	-16.99

Table 7-3. 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]
826.40	WCDMA850	H	221	295	13.16	6.77	17.78	0.060	38.45	-20.67
836.60	WCDMA850	H	199	295	13.83	6.68	18.36	0.069	38.45	-20.09
846.60	WCDMA850	H	210	290	13.71	6.68	18.24	0.067	38.45	-20.21
836.60	WCDMA850	V	150	251	12.54	6.38	16.77	0.048	38.45	-21.68
836.60	WCDMA850 (WCP)	H	183	300	10.13	6.68	14.66	0.029	38.45	-23.79

Table 7-4. ERP Data (WCDMA Cell)

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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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 KDB 971168 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

Test Settings

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

FCC ID: A3LSMG998JPN	 PCTEST® Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 49 of 65

Test Setup

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

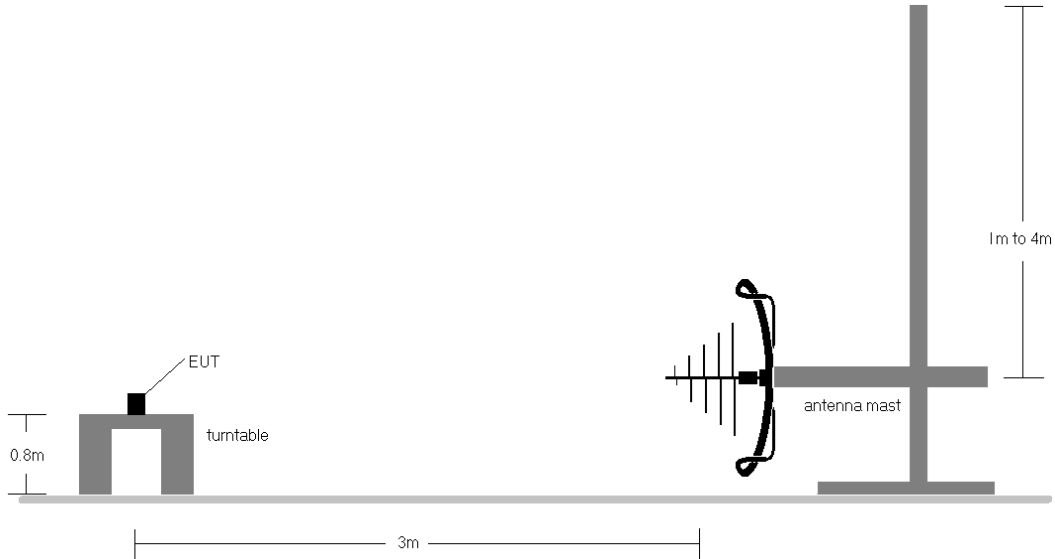


Figure 7-5. Test Instrument & Measurement Setup < 1GHz

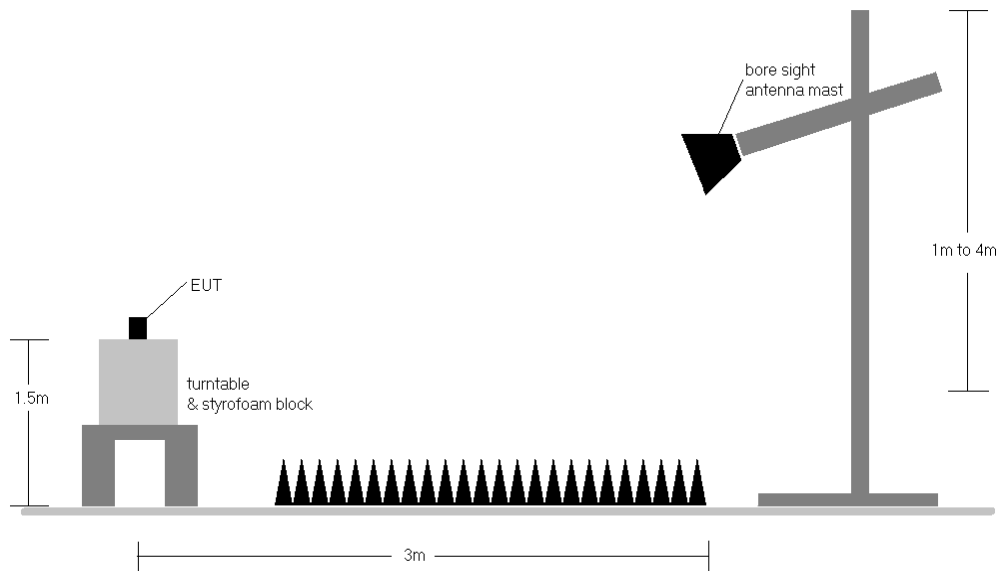




Figure 7-6. Test Instrument & Measurement Setup >1 GHz

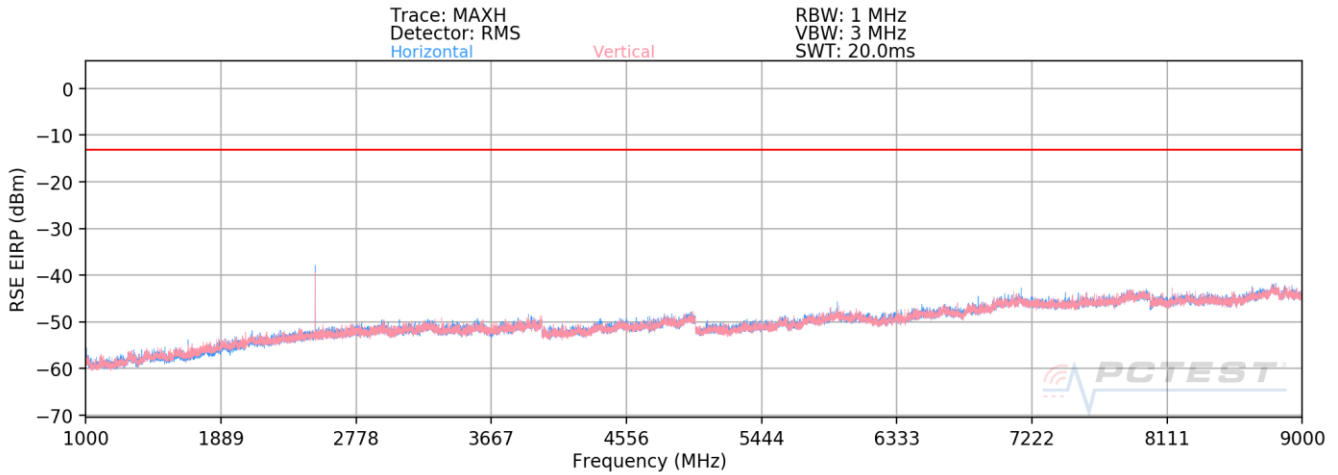
<p>FCC ID: A3LSMG998JPN</p>		<p>PART 22 MEASUREMENT REPORT</p>	<p>Approved by: Technical Manager</p>
<p>Test Report S/N: 1M2101110003-02.A3L</p>	<p>Test Dates: 1/16/2021 - 1/26/2021</p>	<p>EUT Type: Portable Handset</p>	<p>Page 50 of 65</p>

Test Notes

- 1) Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
 - b) $E(\text{dB}\mu\text{V}/\text{m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$
 - d) $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V}/\text{m}) + 20\log D - 104.8$; 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 is 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 power is 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 EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 7) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 8) 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.
- 9) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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LTE Band 5



Plot 7-55. Radiated Spurious Plot (LTE Band 5)

Bandwidth (MHz):	10
Frequency (MHz):	829.0
RB / Offset:	1 / 25



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1658.0	H	151	196	-72.80	0.77	34.97	-60.29	-13.00	-47.29
2487.0	H	101	254	-60.71	5.14	51.43	-43.83	-13.00	-30.83
3316.0	H	-	-	-80.18	6.76	33.58	-61.68	-13.00	-48.68
4145.0	H	-	-	-80.94	8.53	34.59	-60.66	-13.00	-47.66
4974.0	H	-	-	-81.44	10.56	36.12	-59.14	-13.00	-46.14

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.0	H	144	174	-75.40	1.02	32.62	-62.64	-13.00	-49.64
2509.5	H	117	254	-64.59	5.17	47.58	-47.67	-13.00	-34.67
3346.0	H	-	-	-81.22	6.75	32.53	-62.73	-13.00	-49.73
4182.5	H	-	-	-82.19	8.62	33.43	-61.83	-13.00	-48.83
5019.0	H	-	-	-83.19	10.78	34.59	-60.67	-13.00	-47.67



Table 7-6. Radiated Spurious Data (LTE Band 5 – Mid Channel)

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 52 of 65

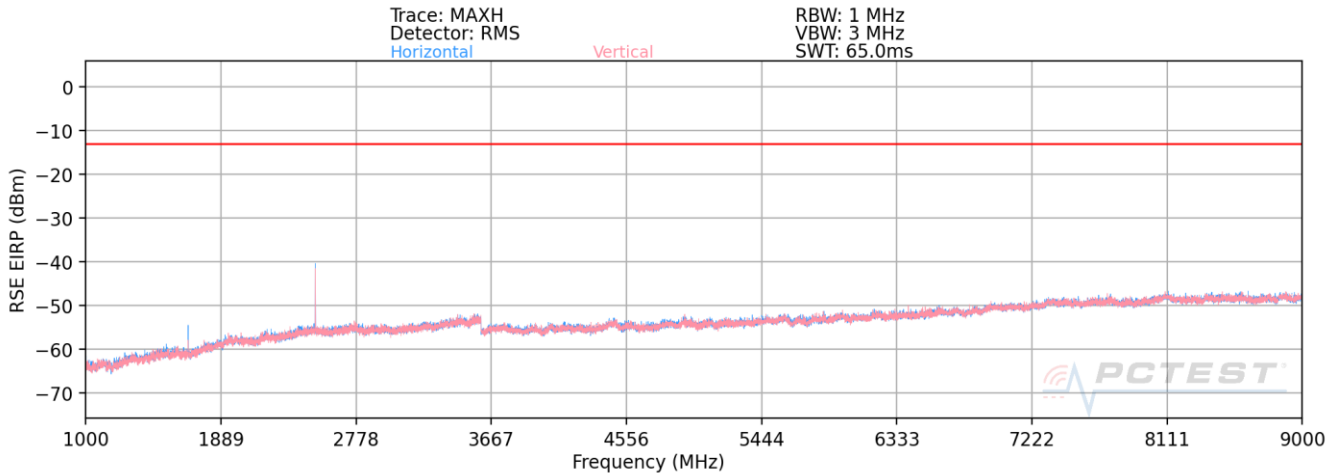
Bandwidth (MHz):	10
Frequency (MHz):	844.0
RB / Offset:	1 / 25

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	H	139	177	-72.55	1.24	35.69	-59.56	-13.00	-46.56
2532.00	H	121	262	-59.11	5.61	53.50	-41.76	-13.00	-28.76
3376.00	H	-	-	-80.53	7.09	33.56	-61.70	-13.00	-48.70
4220.00	H	-	-	-81.07	8.36	34.29	-60.96	-13.00	-47.96
5064.00	H	-	-	-81.41	9.77	35.36	-59.90	-13.00	-46.90

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

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 53 of 65

GSM/GPRS Cell



Plot 7-56. Radiated Spurious Plot (GPRS Cell)

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]
1648.4	H	213	2	-60.93	-5.62	40.45	-54.81	-13.00	-41.81
2472.6	H	124	216	-43.40	-2.33	61.27	-33.98	-13.00	-20.98
3296.8	H	-	-	-71.86	0.72	35.86	-59.40	-13.00	-46.40
4121.0	H	-	-	-76.41	2.17	32.76	-62.50	-13.00	-49.50
4945.2	H	-	-	-77.16	3.41	33.25	-62.01	-13.00	-49.01

Table 7-8. Radiated Spurious Data (GPRS Cell – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.2	H	138	356	-60.42	-5.27	41.31	-53.95	-13.00	-40.95
2509.8	H	127	209	-47.21	-2.26	57.53	-37.73	-13.00	-24.73
3346.4	H	-	-	-71.66	0.40	35.74	-59.51	-13.00	-46.51
4183.0	H	-	-	-76.81	2.10	32.29	-62.97	-13.00	-49.97
5019.6	H	-	-	-76.93	4.01	34.08	-61.17	-13.00	-48.17

Table 7-9. Radiated Spurious Data (GPRS Cell – Mid Channel)

FCC ID: A3LSMG998JPN	PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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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 [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1697.6	H	157	350	-61.68	-4.61	40.71	-54.55	-13.00	-41.55
2546.4	H	155	304	-38.86	-1.77	66.37	-28.88	-13.00	-15.88
3395.2	H	-	-	-71.21	0.51	36.30	-58.95	-13.00	-45.95
4244.0	H	-	-	-78.38	1.95	30.57	-64.68	-13.00	-51.68
5092.8	H	-	-	-79.16	4.42	32.26	-62.99	-13.00	-49.99

Table 7-10. Radiated Spurious Data (GPRS Cell – High Channel)

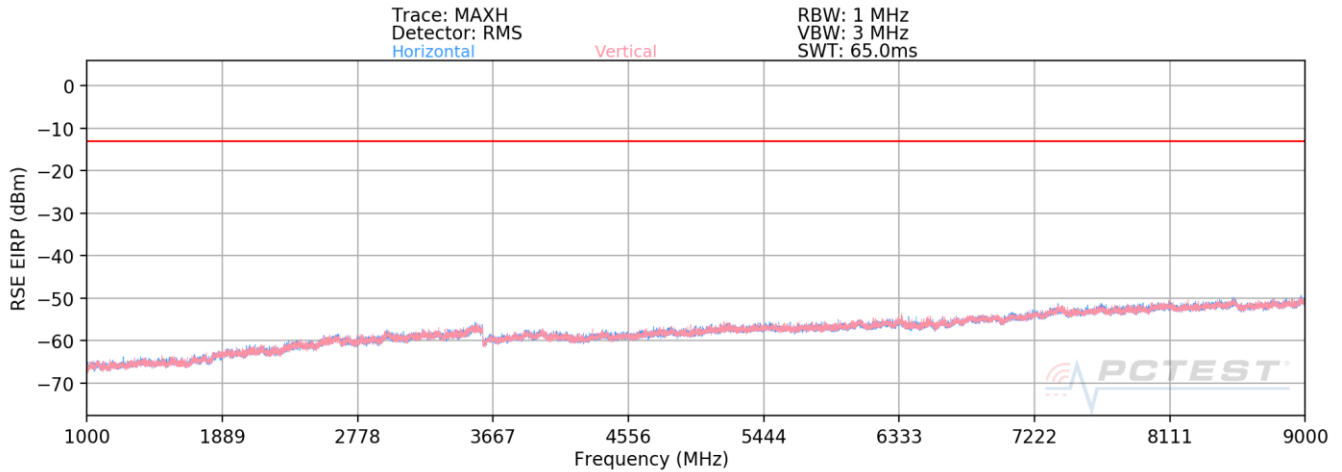
Sample #:	0466M
Mode:	GPRS 1 Tx Slot
Channel:	251
Frequency (MHz):	848.8

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1697.6	H	-	-	-70.56	-4.61	31.83	-63.43	-13.00	-50.43
2546.4	H	-	-	-71.13	-1.77	34.10	-61.15	-13.00	-48.15
3395.2	H	-	-	-71.87	0.51	35.64	-59.61	-13.00	-46.61

Table 7-11. Radiated Spurious Data with WCP (GPRS Cell)

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 55 of 65

WCDMA Cell



Plot 7-57. Radiated Spurious Plot (WCDMA Cell)

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]
1652.8	V	199	85	-71.12	-5.60	30.28	-64.98	-13.00	-51.98
2479.2	V	-	-	-73.73	-2.39	30.88	-64.38	-13.00	-51.38
3305.6	V	-	-	-74.08	0.70	33.62	-61.64	-13.00	-48.64
4132.0	V	-	-	-76.84	2.03	32.19	-63.07	-13.00	-50.07

Table 7-12. Radiated Spurious Data (WCDMA Cell – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.2	V	218	54	-72.64	-5.27	29.09	-66.17	-13.00	-53.17
2509.8	V	-	-	-74.46	-2.26	30.28	-64.98	-13.00	-51.98
3346.4	V	-	-	-74.32	0.40	33.08	-62.17	-13.00	-49.17
4183.0	V	-	-	-77.37	2.10	31.73	-63.53	-13.00	-50.53



Table 7-13. Radiated Spurious Data (WCDMA Cell – Mid Channel)

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
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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 [dB μ V/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1693.2	V	228	117	-73.42	-4.72	28.86	-66.40	-13.00	-53.40
2539.8	V	-	-	-74.11	-1.84	31.05	-64.21	-13.00	-51.21
3386.4	V	-	-	-73.36	0.38	34.02	-61.24	-13.00	-48.24
4233.0	V	-	-	-77.23	1.83	31.60	-63.66	-13.00	-50.66

Table 7-14. Radiated Spurious Data (WCDMA Cell – High Channel)

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 57 of 65

7.7 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

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

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

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings



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

Test Setup

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

Test Notes



None

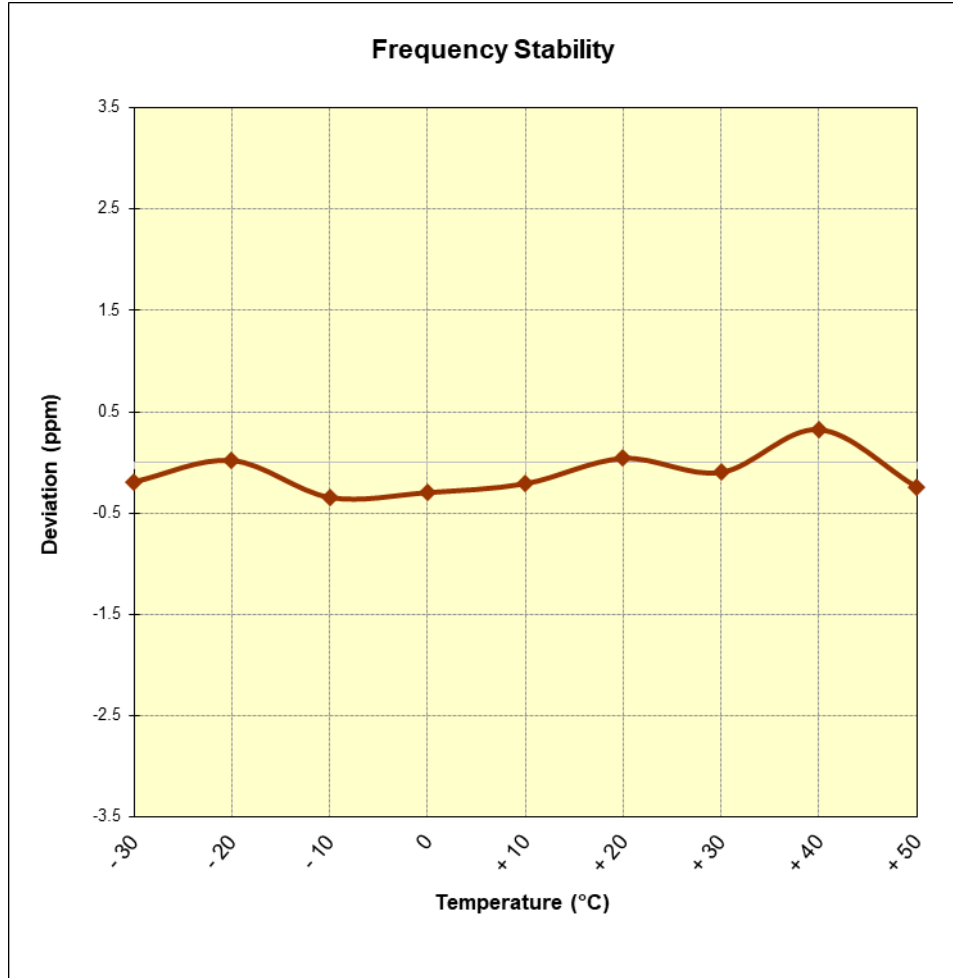
FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset	Page 58 of 65	

LTE Band 5



OPERATING FREQUENCY: <u>836,500,000</u> Hz					
CHANNEL: <u>20525</u>					
REFERENCE VOLTAGE: <u>4.18</u> VDC					
DEVIATION LIMIT: <u>± 0.00025 % or 2.5 ppm</u>					
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.18	+ 20 (Ref)	836,500,006	6	0.0000000
100 %		- 30	836,499,848	-158	-0.0000189
100 %		- 20	836,500,024	18	0.0000022
100 %		- 10	836,499,720	-286	-0.0000342
100 %		0	836,499,759	-247	-0.0000295
100 %		+ 10	836,499,832	-174	-0.0000208
100 %		+ 20	836,500,041	35	0.0000042
100 %		+ 30	836,499,926	-80	-0.0000096
100 %		+ 40	836,500,279	273	0.0000326
100 %		+ 50	836,499,805	-201	-0.0000240
85 %		+ 20	836,499,931	-75	-0.0000090
BATT. ENDPOINT		2.98	+ 20	836,499,981	-25

Table 7-15. LTE Band 5 Frequency Stability Data

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 59 of 65



Plot 7-58. LTE Band 5 Frequency Stability Chart



FCC ID: A3LSMG998JPN		PART 22 MEASUREMENT REPORT	 Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset	Page 60 of 65

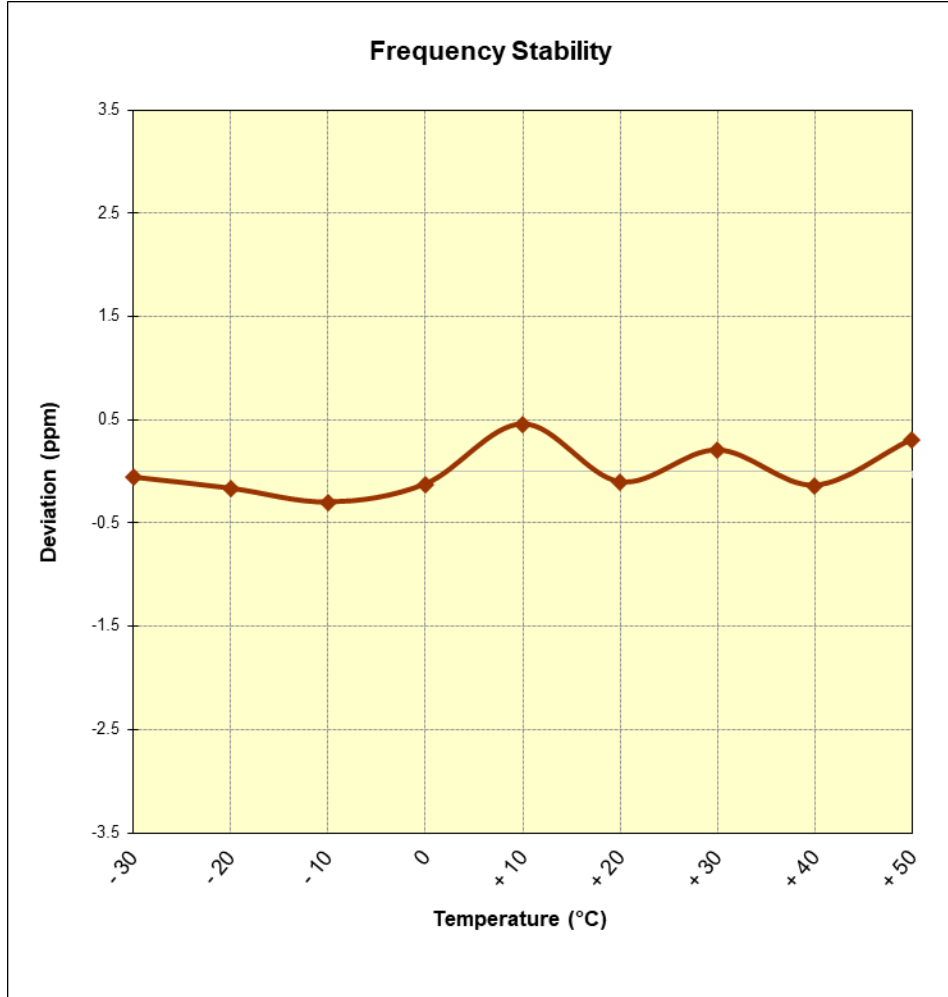
GSM/GPRS Cell

OPERATING FREQUENCY:		836,600,000	Hz
CHANNEL:		190	
REFERENCE VOLTAGE:		4.18	VDC
DEVIATION LIMIT:		± 0.00025 % or 2.5 ppm	



VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %		+ 20 (Ref)	836,599,990	-10	0.0000000
100 %	4.18	- 30	836,599,940	-50	-0.0000060
100 %		- 20	836,599,850	-140	-0.0000167
100 %		- 10	836,599,738	-252	-0.0000301
100 %		0	836,599,886	-104	-0.0000124
100 %		+ 10	836,600,373	383	0.0000458
100 %		+ 20	836,599,903	-87	-0.0000104
100 %		+ 30	836,600,161	171	0.0000204
100 %		+ 40	836,599,876	-114	-0.0000136
100 %		+ 50	836,600,248	258	0.0000308
85 %			+ 20	836,600,175	185
BATT. ENDPOINT	2.98	+ 20	836,600,074	84	0.0000100

Table 7-16. GSM/GPRS Cell Frequency Stability Data

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 61 of 65





Plot 7-59. GSM/GPRS Cell Frequency Stability Chart

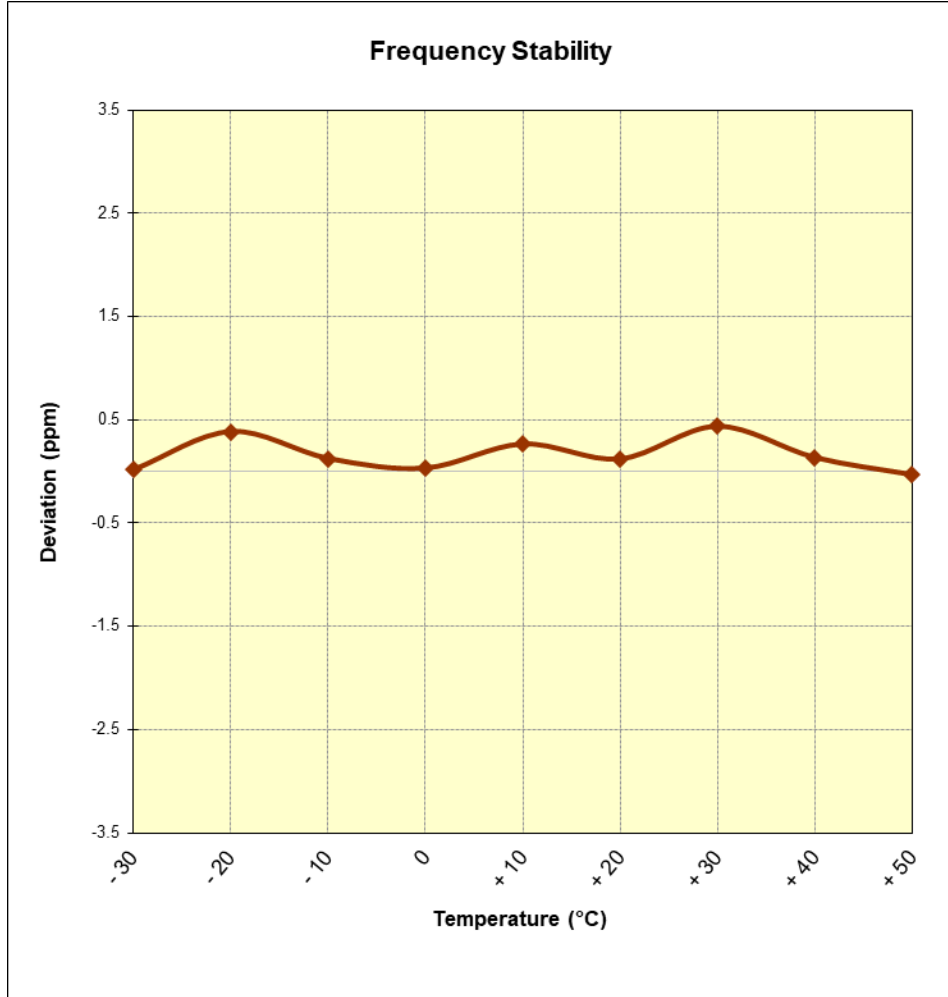
FCC ID: A3LSMG998JPN		PART 22 MEASUREMENT REPORT	 Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset	Page 62 of 65

WCDMA Cell



OPERATING FREQUENCY: <u>836,600,000</u> Hz					
CHANNEL: <u>4183</u>					
REFERENCE VOLTAGE: <u>4.18</u> VDC					
DEVIATION LIMIT: <u>± 0.00025 % or 2.5 ppm</u>					
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.18	+ 20 (Ref)	836,600,215	215	0.0000000
100 %		- 30	836,600,229	14	0.0000017
100 %		- 20	836,600,537	322	0.0000385
100 %		- 10	836,600,319	104	0.0000124
100 %		0	836,600,241	26	0.0000031
100 %		+ 10	836,600,436	221	0.0000264
100 %		+ 20	836,600,315	100	0.0000120
100 %		+ 30	836,600,579	364	0.0000435
100 %		+ 40	836,600,327	112	0.0000134
100 %		+ 50	836,600,188	-27	-0.0000032
85 %		+ 20	836,600,200	-15	-0.0000018
BATT. ENDPOINT		2.98	+ 20	836,600,301	86

Table 7-17. WCDMA Cell Frequency Stability Data

FCC ID: A3LSMG998JPN	 PCTEST Proud to be part of element	PART 22 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset		Page 63 of 65





Plot 7-60. WCDMA Cell Frequency Stability Chart

FCC ID: A3LSMG998JPN		PART 22 MEASUREMENT REPORT	 Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset	Page 64 of 65

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the Samsung **Portable Handset** **FCC ID: A3LSMG998JPN** complies with all the requirements of Part 22 of the FCC rules.

FCC ID: A3LSMG998JPN	 PART 22 MEASUREMENT REPORT 		Approved by: Technical Manager
Test Report S/N: 1M2101110003-02.A3L	Test Dates: 1/16/2021 - 1/26/2021	EUT Type: Portable Handset	Page 65 of 65