

MEASUREMENT REPORT FCC Part 90

Applicant Name:

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

Date of Testing:

3/26 – 6/3/2021

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M2104020031-06.A3L

FCC ID:

A3LSMF926U

APPLICANT:

Samsung Electronics Co., Ltd.

Application Type:

Certification

Model:

SM-F926U

Additional Model(s):

SM-F926U1

EUT Type:

Portable Handset

FCC Classification:

PCS Licensed Transmitter Held to Ear (PCE)

FCC Rule Part:

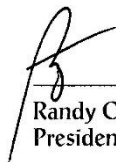
§2.1049, §22(H), §90(S), §90(R)

Test Procedure(s):

ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB
971168 D01 v03r01, KDB 648474 D03 v01r04

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

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



Randy Ortanez
President

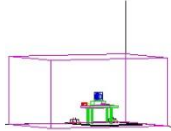


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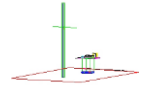
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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	Measurement	Max. Power [W]	Max. Power [dBm]	Emission Designator
LTE Band 14	10 MHz	QPSK	793.0	ERP	0.086	19.34	8M99G7D
		16QAM	793.0	ERP	0.070	18.45	8M99W7D
	5 MHz	QPSK	790.5 - 795.5	ERP	0.087	19.38	4M57G7D
		16QAM	790.5 - 795.5	ERP	0.072	18.57	4M52W7D
LTE Band 26	15 MHz	QPSK	821.5	ERP	0.076	18.83	13M5G7D
		16QAM	821.5	ERP	0.065	18.10	13M5W7D
	15 MHz	QPSK	821.5	Conducted	0.289	24.60	13M5G7D
		16QAM	821.5	Conducted	0.240	23.81	13M5W7D
	10 MHz	QPSK	819.0	Conducted	0.292	24.66	8M99G7D
		16QAM	819.0	Conducted	0.242	23.85	8M99W7D
	5 MHz	QPSK	816.5 - 821.5	Conducted	0.301	24.79	4M54G7D
		16QAM	816.5 - 821.5	Conducted	0.244	23.87	4M52W7D
	3 MHz	QPSK	815.5 - 822.5	Conducted	0.297	24.72	2M72G7D
		16QAM	815.5 - 822.5	Conducted	0.251	24.00	2M72W7D
	1.4 MHz	QPSK	814.7 - 823.3	Conducted	0.289	24.61	1M09G7D
		16QAM	814.7 - 823.3	Conducted	0.241	23.82	1M10W7D
CDMA BC10	N/A	CDMA	817.9 - 823.1	Conducted	0.272	24.35	1M28F9W

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 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: A3LSMF926U**. 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.

Test Device Serial No.: 0429M, 0405M, 0131M, 0209M

2.2 Device Capabilities

This device contains the following capabilities:

800/850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

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 two configurations: one is with screen open and one is with screen closed. Both configurations are tested, and the worst case radiated emissions data is shown in this report.

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

2.4 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

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

3.2 Radiated Power and Radiated Spurious Emissions

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

The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

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

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

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

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01.

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4.0 MEASUREMENT UNCERTAINTY

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

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

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5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	AP2	EMC Cable and Switch System	9/9/2020	Annual	9/9/2021	AP2
-	AP1	EMC Cable and Switch System	9/10/2020	Annual	9/10/2021	AP1
-	LTX4	Licensed Transmitter Cable Set	9/16/2020	Annual	9/16/2021	LTX4
-	LTX5	Licensed Transmitter Cable Set	9/16/2020	Annual	9/16/2021	LTX5
Keysight Technologies	N9020A	MXA Signal Analyzer	8/14/2020	Annual	8/14/2021	US46470561
Keysight Technologies	N9038A	MXE EMI Receiver	8/11/2020	Annual	8/11/2021	MY51210133
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	8/17/2020	Annual	8/17/2021	MY52350166
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
Espec	ESX-2CA	Environmental Chamber	8/27/2020	Annual	8/27/2022	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
Keysight Technologies	N9020A	MXA Signal Analyzer	9/22/2020	Annual	9/22/2021	MY54500644
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/17/2020	Annual	9/17/2021	MY57141001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
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	ESU40	EMI Test Receiver (40GHz)	9/9/2020	Annual	9/9/2021	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/10/2020	Annual	8/10/2021	103200
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/27/2019	Biennial	8/27/2021	A042511
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107

Table 5-1. Summary of Test Results

Notes:

- 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.
- Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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6.0 SAMPLE CALCULATIONS

Emission Designator

Emission Designator = 1M25F9W

CDMA BW = 1.25 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

Spurious Radiated Emission – BC10

Example: Channel 476 CDMA BC10 Mode 3rd Harmonic (2453.70MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 2453.70 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80) = 50.3 dBc.

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

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

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

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7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMF926U
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): CDMA/LTE
 Band: Band Class 10 / Band 26 / Band 14

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	N/A	PASS	Section 7.2
	Conducted Band Edge / Spurious Emissions (LTE Band 14)	2.1051, 90.691(a)	On all frequencies between 769-775 MHz and 799-805 MHz, attenuation by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations. On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, attenuation by at least $43 + 10 \log(P)$ dB	PASS	Sections 7.3, 7.4
	Conducted Band Edge / Spurious Emissions (LTE Band 26)	2.1051, 90.543(a)	> $43 + 10 \log_{10}(P[\text{Watts}])$ for all out-of-band emissions except > $50 + 10 \log_{10}(P[\text{Watts}])$ at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge	PASS	Sections 7.3, 7.4
	Conducted Band Edge / Spurious Emissions (CDMA BC10)			PASS	Sections 7.3, 7.4
	Frequency Stability	2.1055, 90.213	< 2.5 ppm	PASS	Section 7.8
	Conducted Power	2.1046, 90.635	< 100 Watts	PASS	Section 7.5
RADIATED	Effective Radiated Power (LTE Band 14)	90.542(a)(7)	< 3 Watts max. ERP	PASS	Section 7.6
	Effective Radiated Power (NR Band n14)			PASS	Section 7.6
	Effective Radiated Power (LTE Band 26)	22.913(a.2)	< 7 Watts max. ERP	PASS	Section 7.6
	Effective Radiated Power (CDMA BC10)			PASS	Section 7.6
	Radiated Spurious Emissions (LTE Band 14)	2.1053, 90.543(e)	> $43 + 10 \log_{10}(P[\text{Watts}])$ for all out-of-band emissions except emissions in the 1559 - 1610MHz band are subject to a limit of -40dBm/MHz for wideband signals	PASS	Section 7.7
	Radiated Spurious Emissions (NR Band n14)			PASS	Section 7.7
	Radiated Spurious Emissions (LTE Band 26)	2.1053, 90.543(e)	> $43 + 10 \log_{10}(P[\text{Watts}])$ for all out-of-band emissions except > $50 + 10 \log_{10}(P[\text{Watts}])$ at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge	PASS	Section 7.7
	Radiated Spurious Emissions (CDMA BC10)			PASS	Section 7.7

Table 7-1. Summary of Test Results

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Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST EMC Software Tool Beta 8.
- 5) For LTE B14 conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "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 $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

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

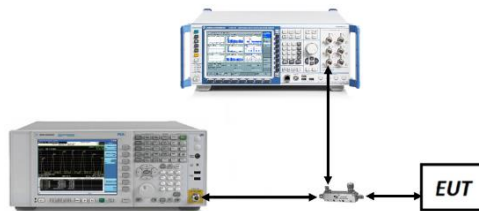


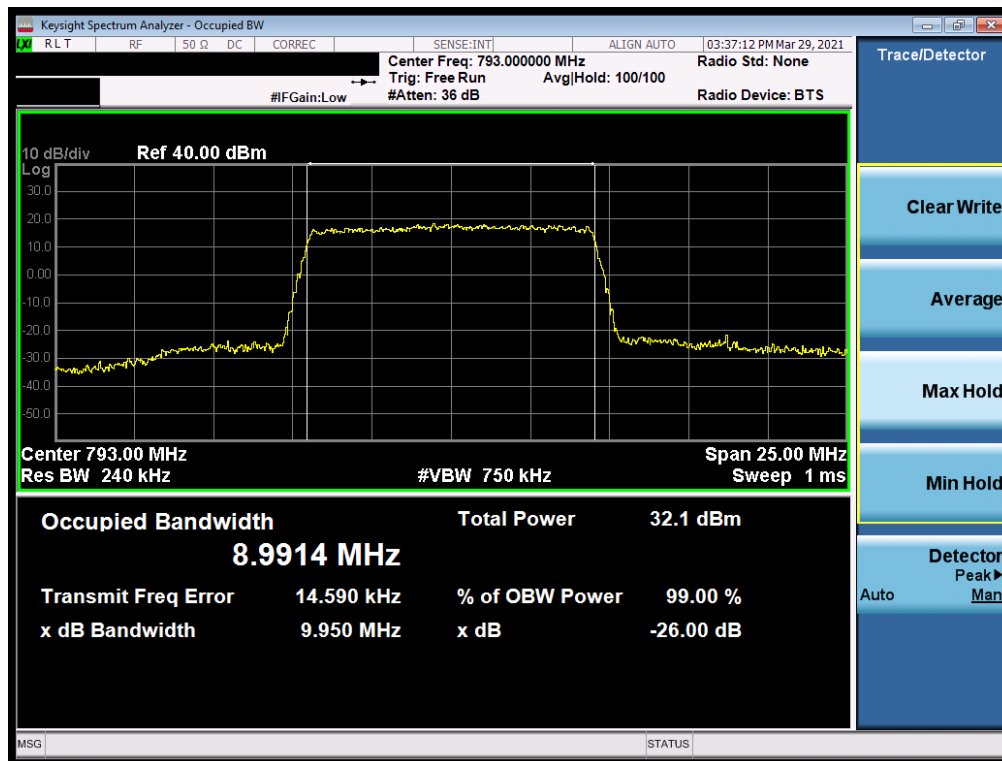
Figure 7-1. Test Instrument & Measurement Setup

Test Notes

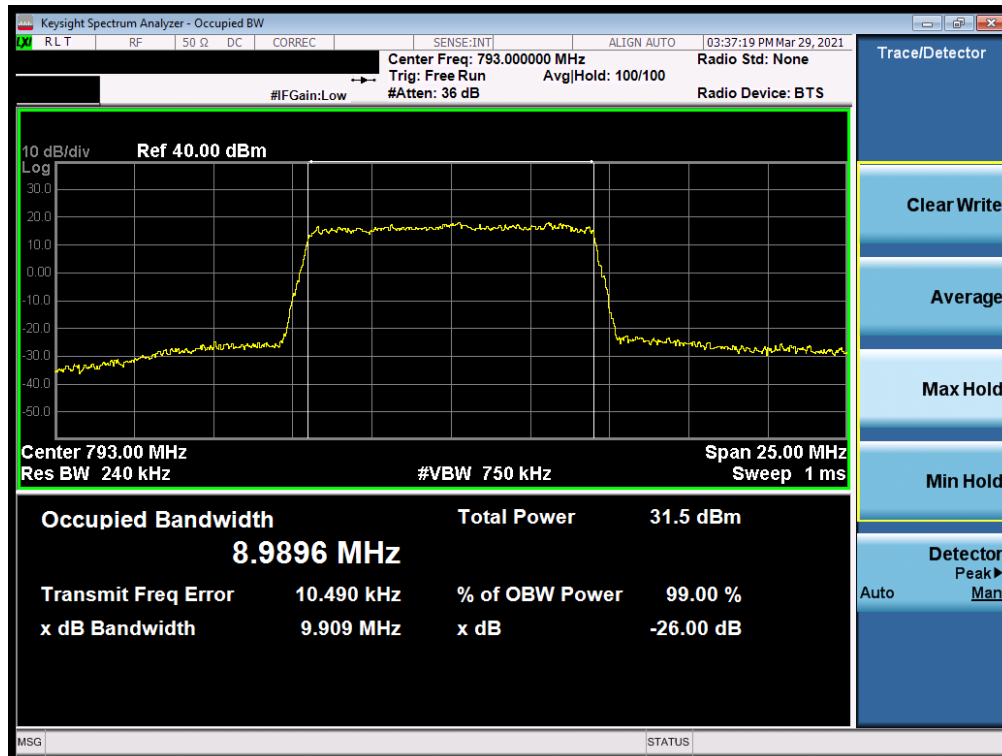
None.

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LTE Band 14



Plot 7-1. Occupied Bandwidth Plot (LTE Band 14 - 10MHz QPSK - Full RB)

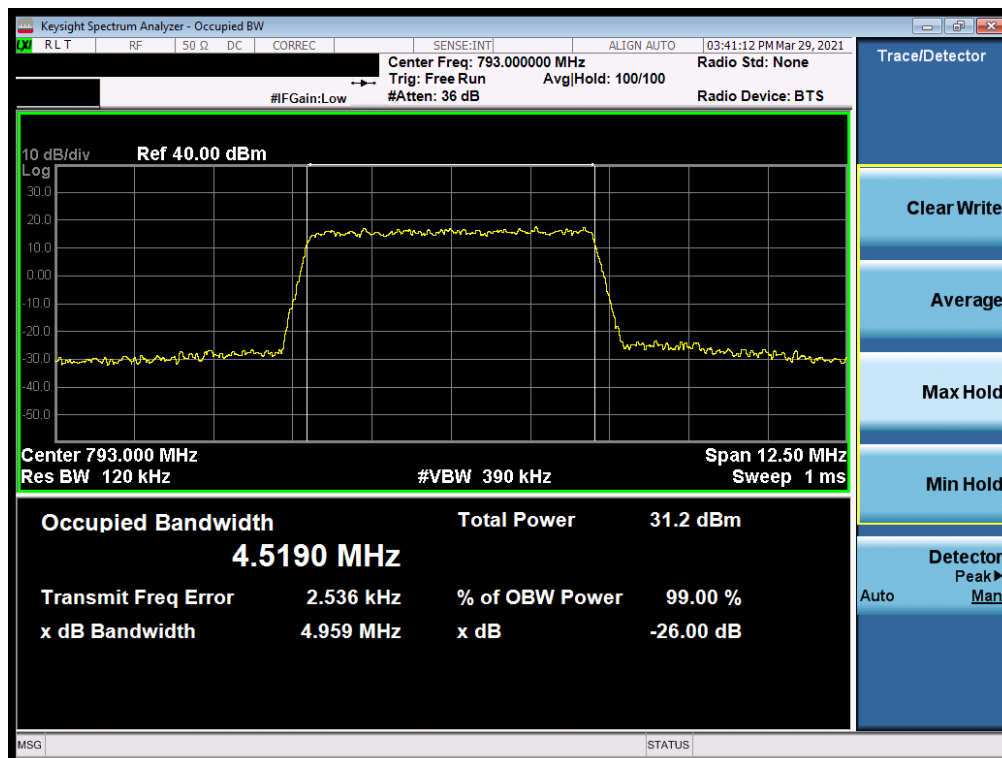


Plot 7-2. Occupied Bandwidth Plot (LTE Band 14 - 10MHz 16-QAM - Full RB)

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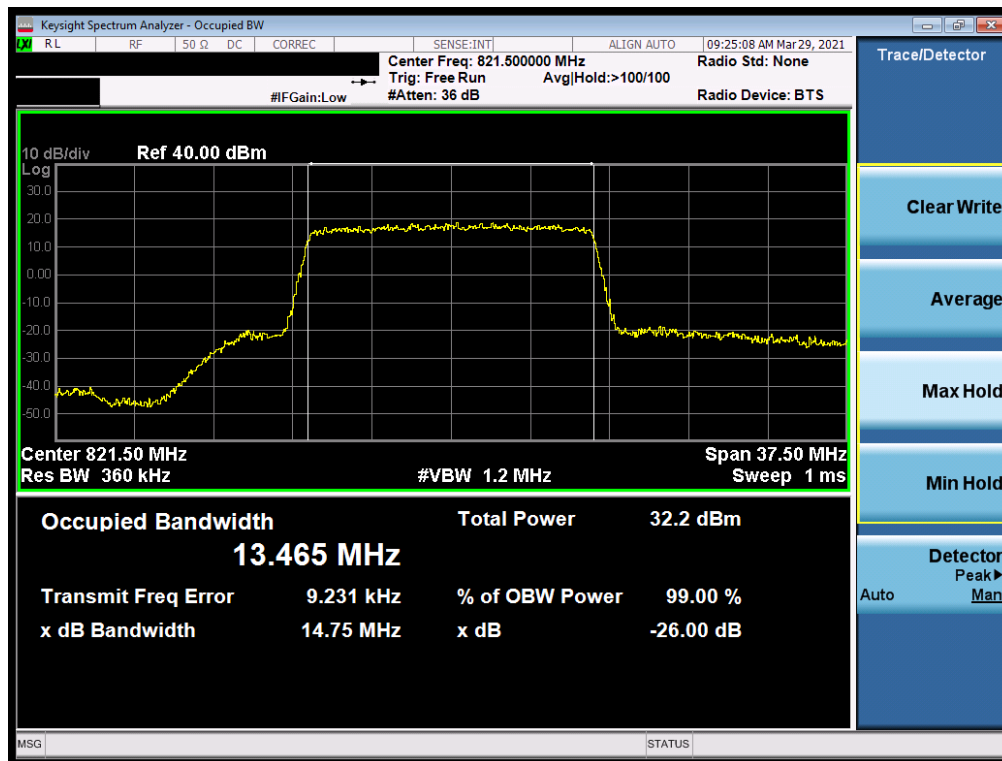
Plot 7-3. Occupied Bandwidth Plot (LTE Band 14 - 5MHz QPSK - Full RB)



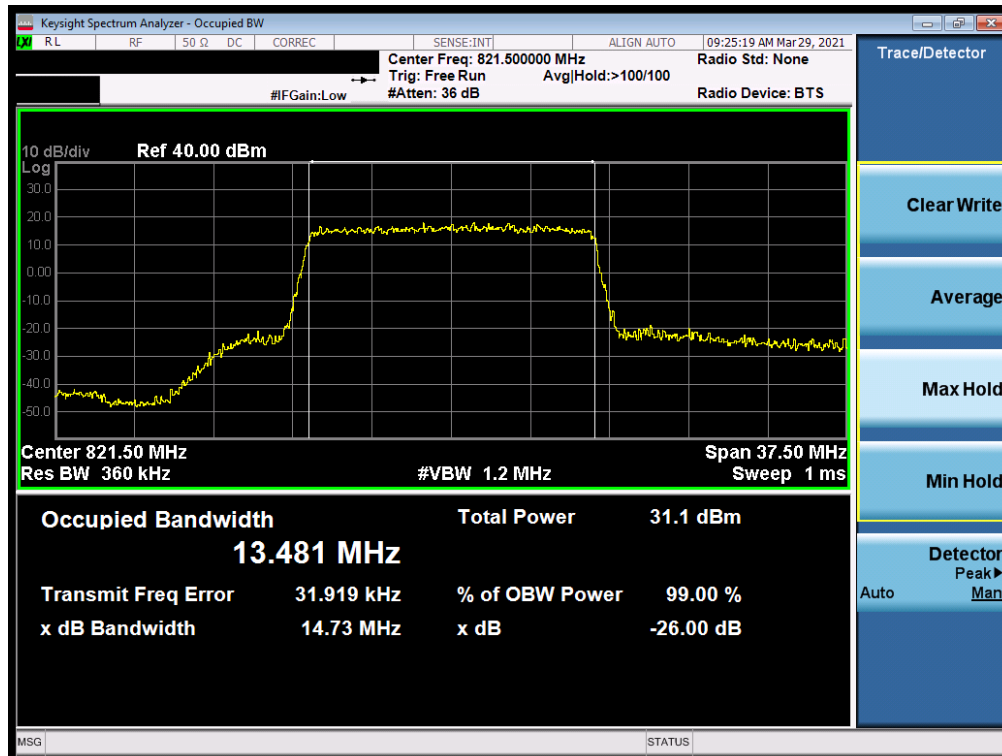
Plot 7-4. Occupied Bandwidth Plot (LTE Band 14 - 5MHz 16-QAM - Full RB)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 - 6/3/2021	EUT Type: Portable Handset		Page 14 of 56

LTE Band 26



Plot 7-5. Occupied Bandwidth Plot (LTE Band 26 - 15MHz QPSK - Full RB)

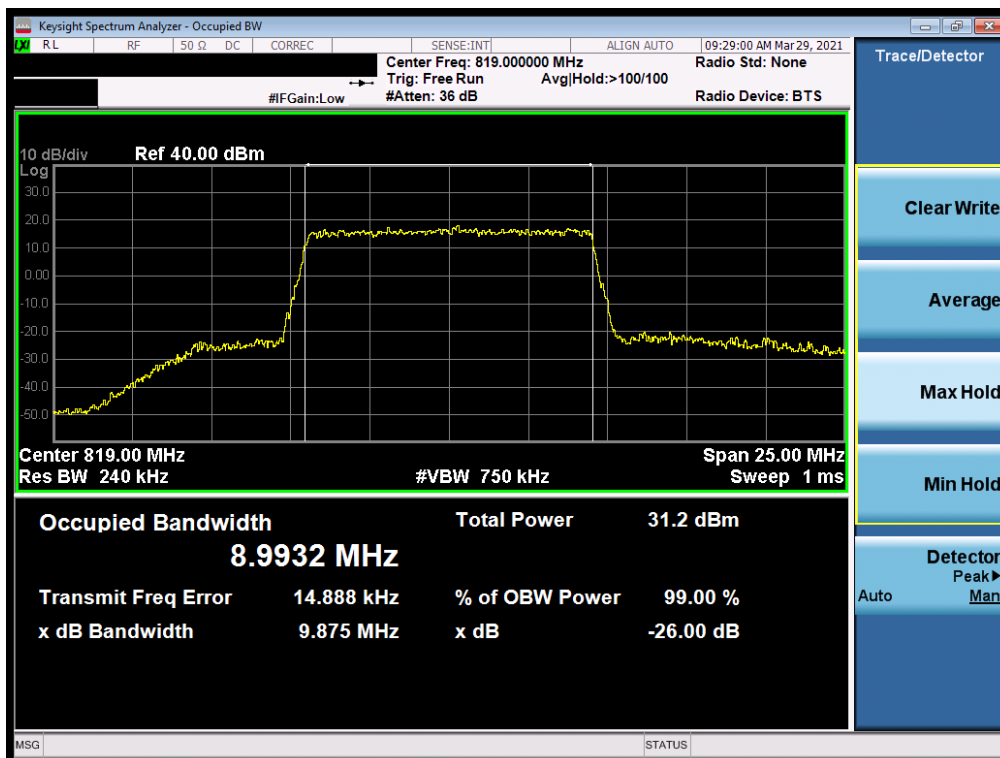


Plot 7-6. Occupied Bandwidth Plot (LTE Band 26 - 15MHz 16-QAM - Full RB)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 - 6/3/2021	EUT Type: Portable Handset		Page 15 of 56

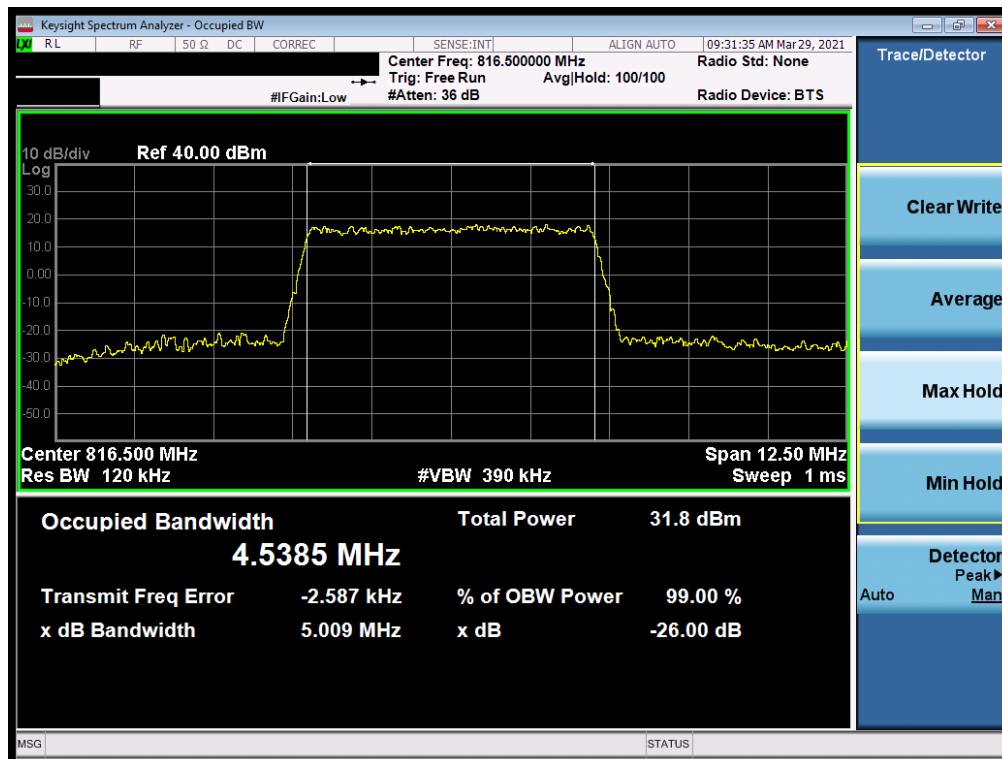


Plot 7-7. Occupied Bandwidth Plot (LTE Band 26 - 10MHz QPSK - Full RB)

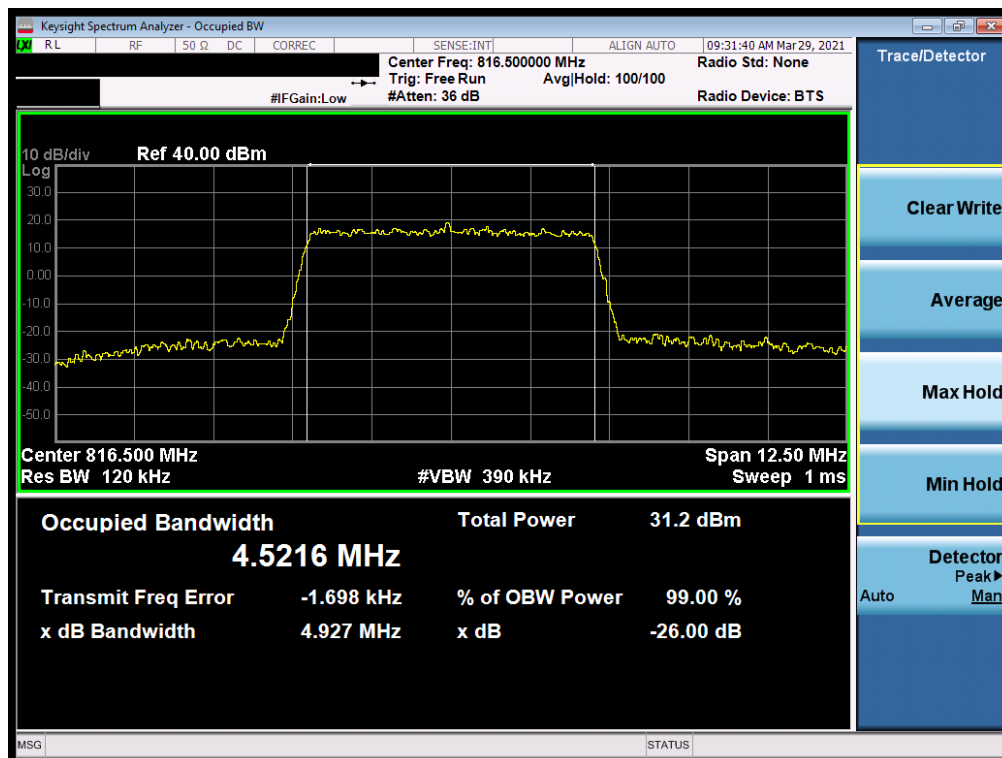


Plot 7-8. Occupied Bandwidth Plot (LTE Band 26 - 10MHz 16-QAM - Full RB)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 - 6/3/2021	EUT Type: Portable Handset		Page 16 of 56

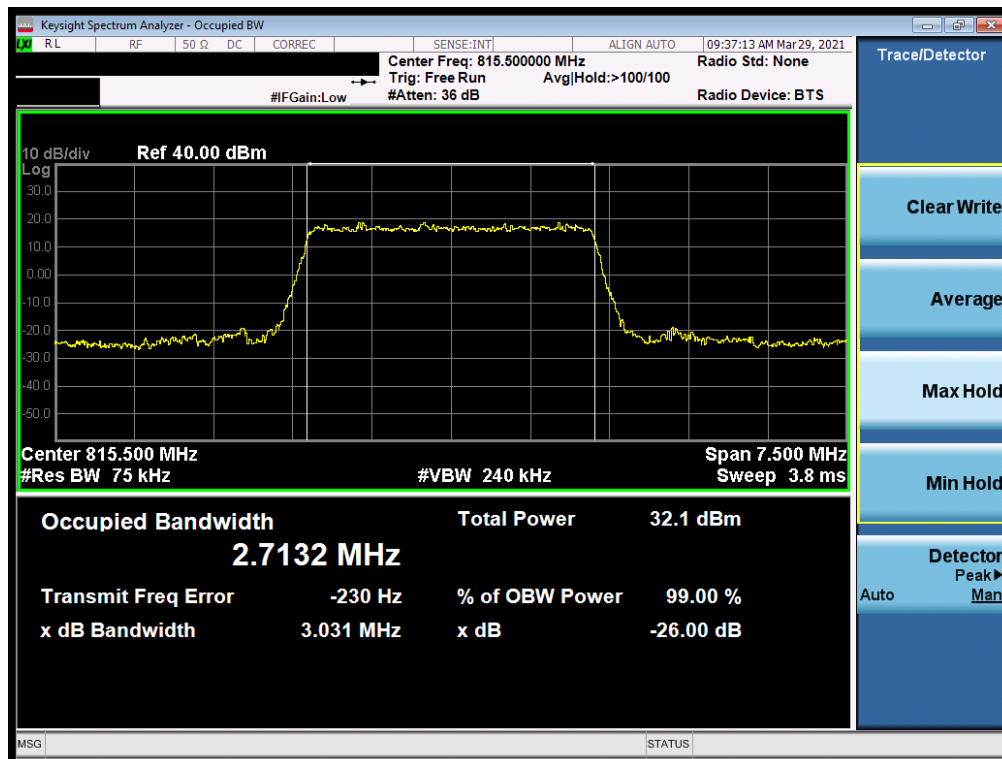


Plot 7-9. Occupied Bandwidth Plot (LTE Band 26 - 5MHz QPSK - Full RB)

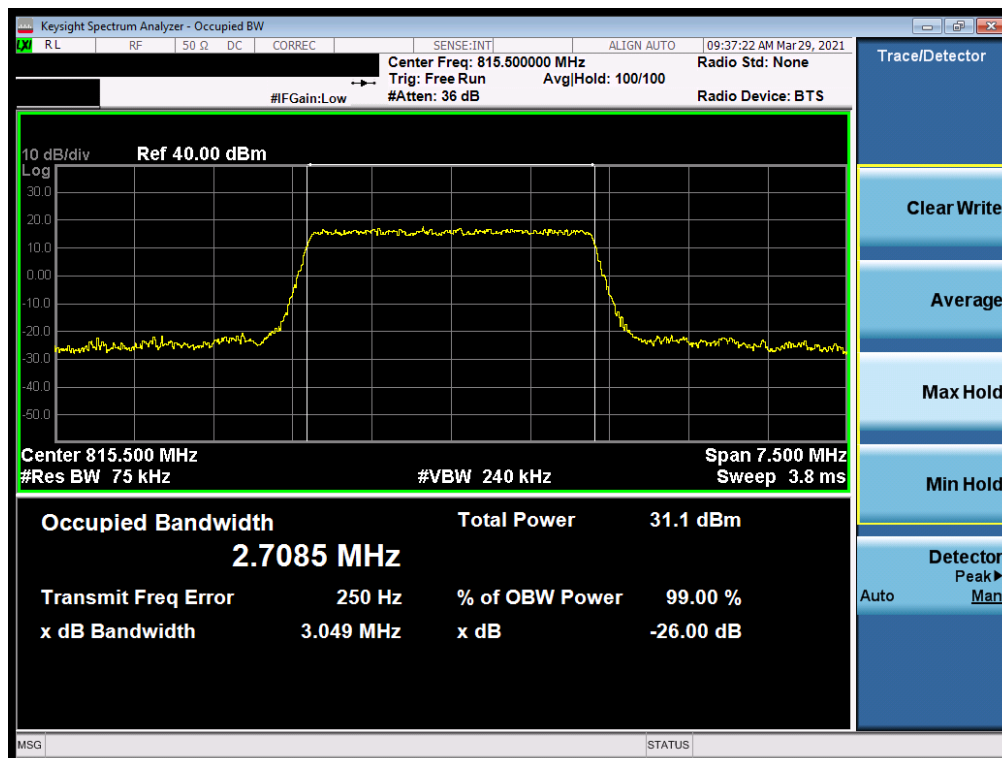


Plot 7-10. Occupied Bandwidth Plot (LTE Band 26 - 5MHz 16-QAM - Full RB)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 - 6/3/2021	EUT Type: Portable Handset		Page 17 of 56



Plot 7-11. Occupied Bandwidth Plot (LTE Band 26 - 3MHz QPSK - Full RB)



Plot 7-12. Occupied Bandwidth Plot (LTE Band 26 - 3MHz 16-QAM - Full RB)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 - 6/3/2021	EUT Type: Portable Handset		Page 18 of 56



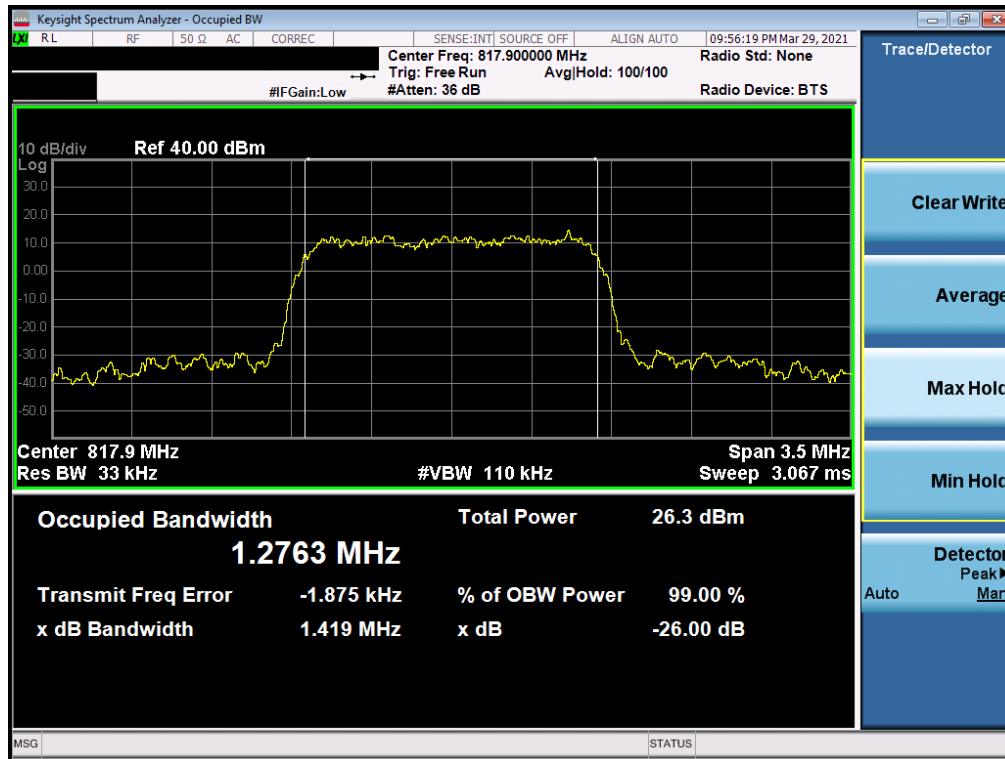
Plot 7-13. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz QPSK - Full RB)



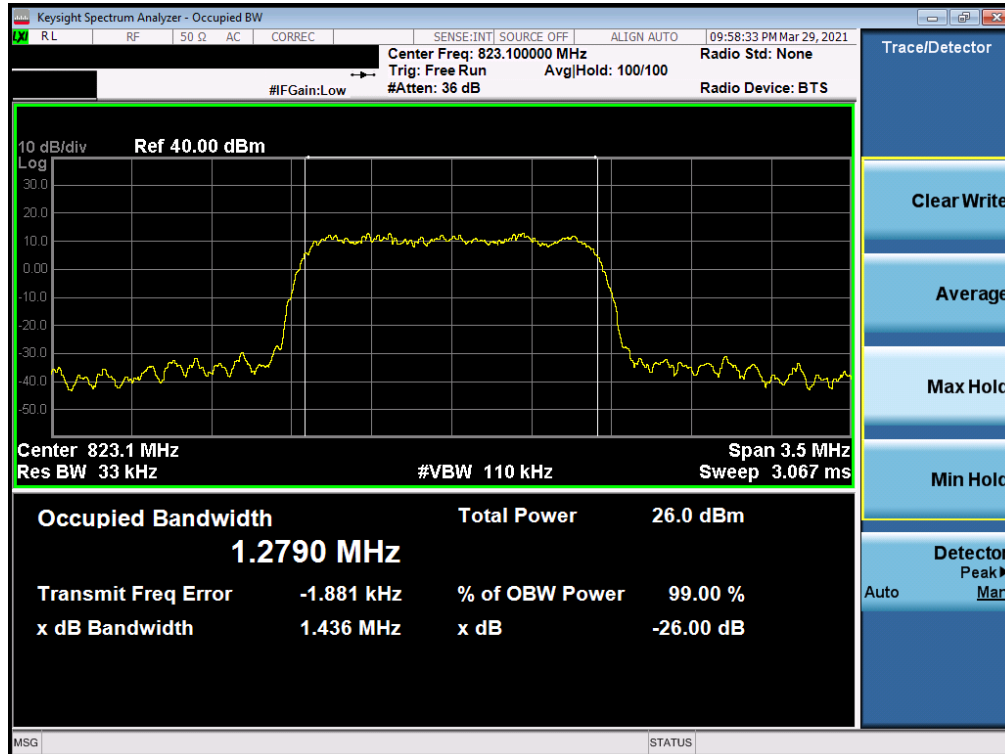
Plot 7-14. Occupied Bandwidth Plot (LTE Band 26 - 1.4MHz 16-QAM - Full RB)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 - 6/3/2021	EUT Type: Portable Handset		Page 19 of 56

CDMA BC10



Plot 7-15. Occupied Bandwidth Plot (CDMA, Ch. 476)



Plot 7-16. Occupied Bandwidth Plot (CDMA, Ch. 684)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 20 of 56

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 $43 + 10 \log_{10}(P_{\text{Watts}})$, 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. RBW $\geq$ 100kHz
3. VBW $\geq$ 3 x RBW
4. Detector = RMS
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

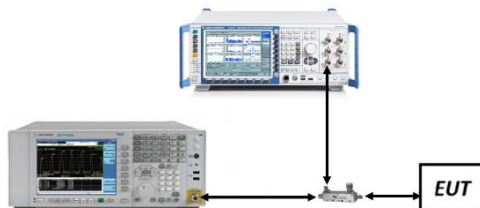


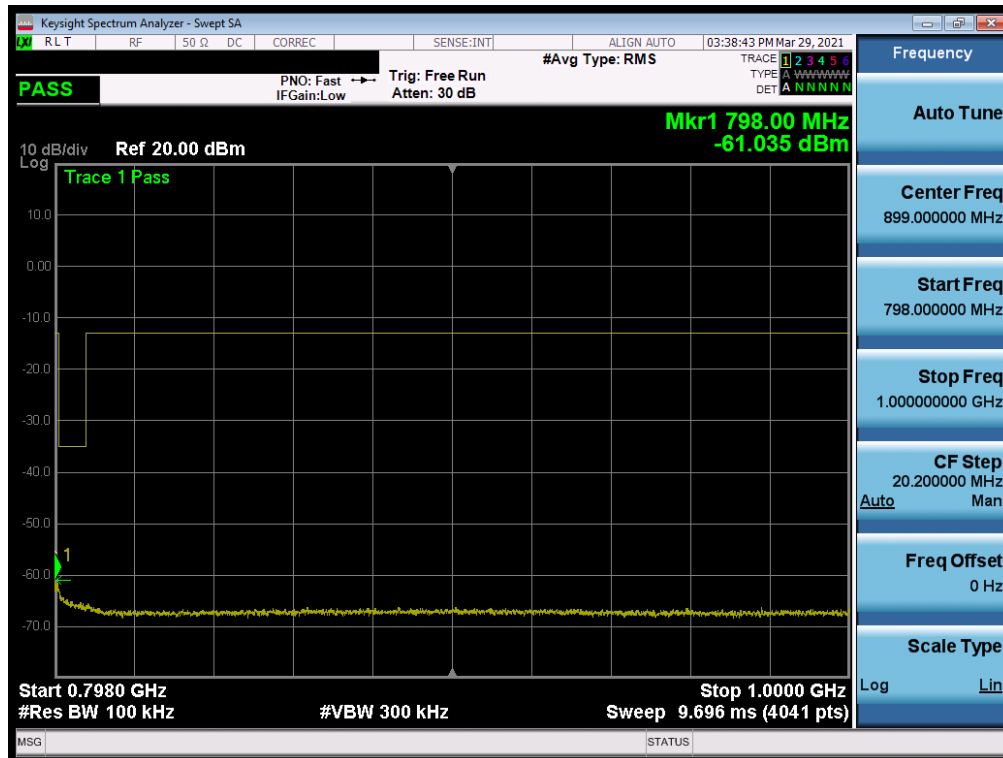
Figure 7-2. Test Instrument & Measurement Setup

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 21 of 56

LTE Band 14

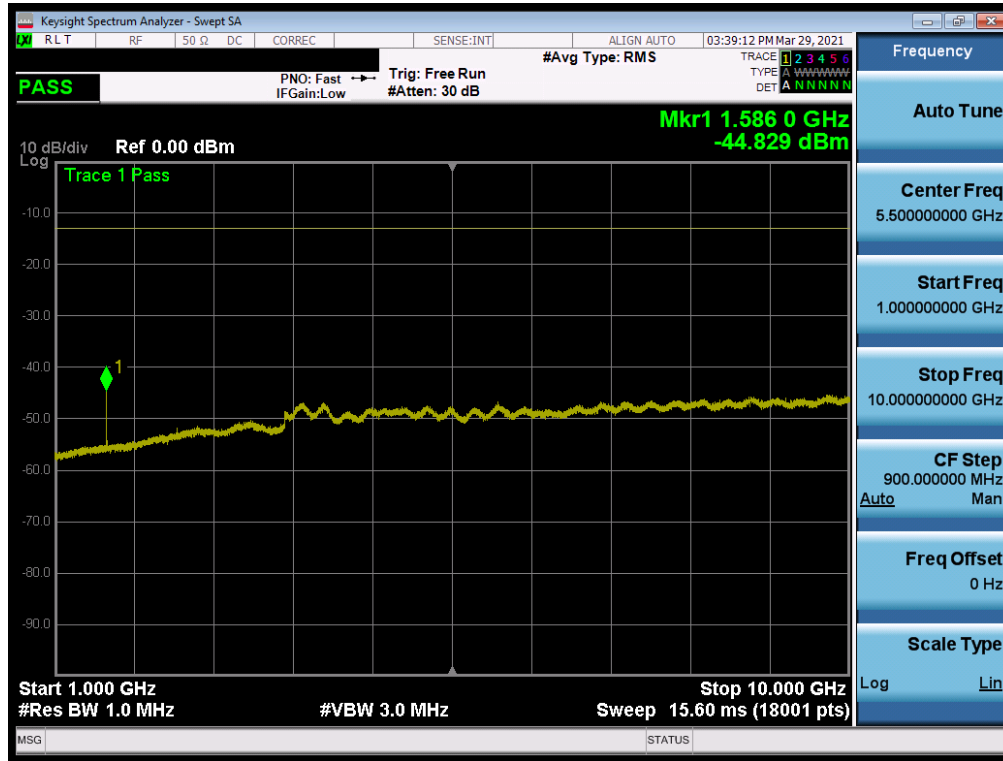


Plot 7-17. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-18. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)

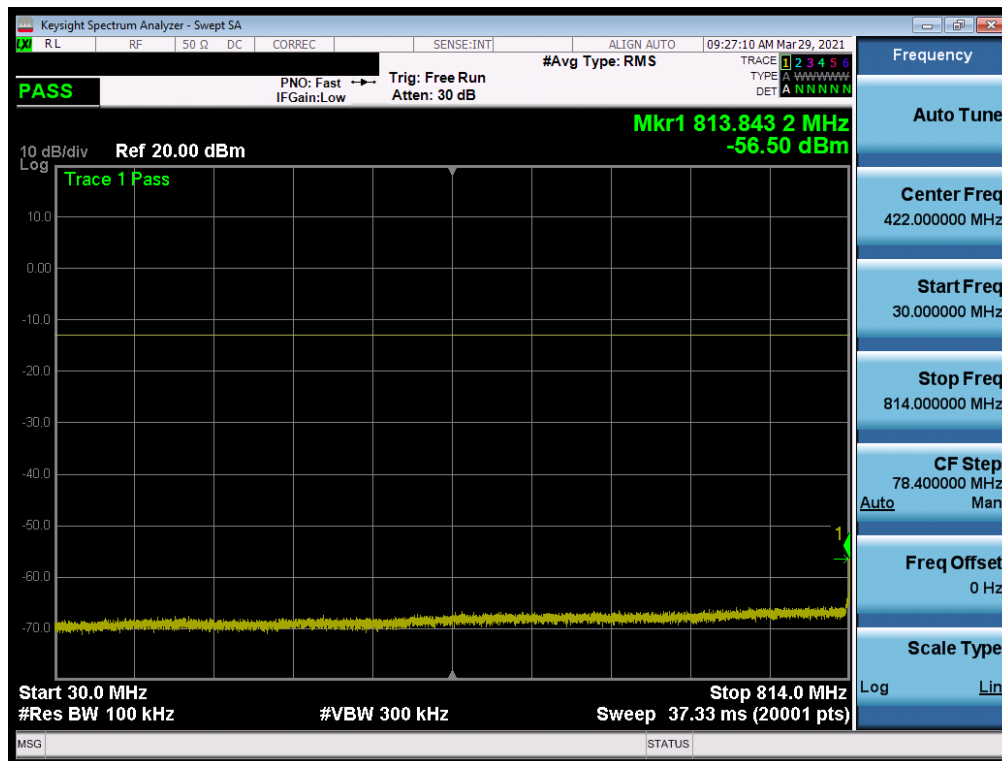
FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 22 of 56



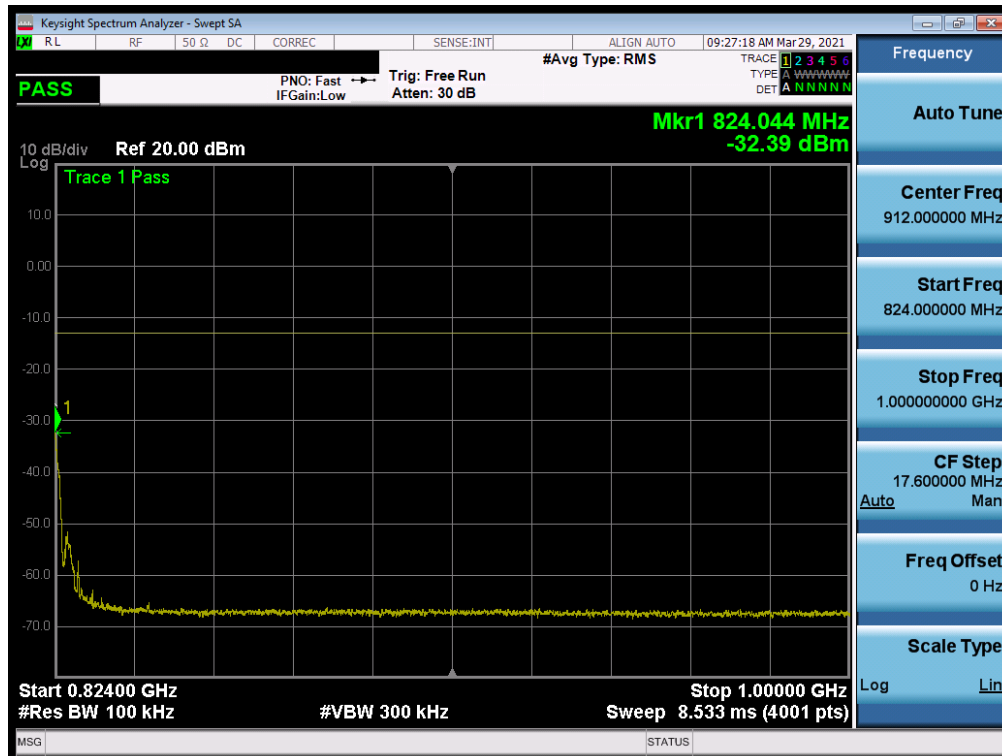
Plot 7-19. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 23 of 56

LTE Band 26

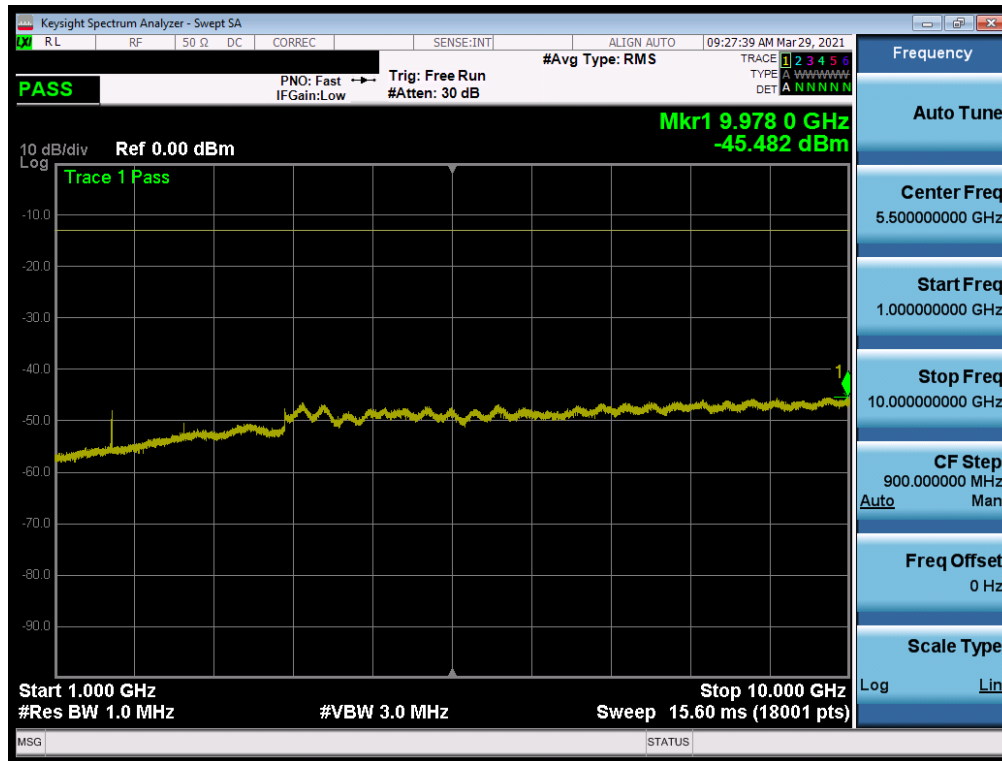


Plot 7-20. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-21. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)

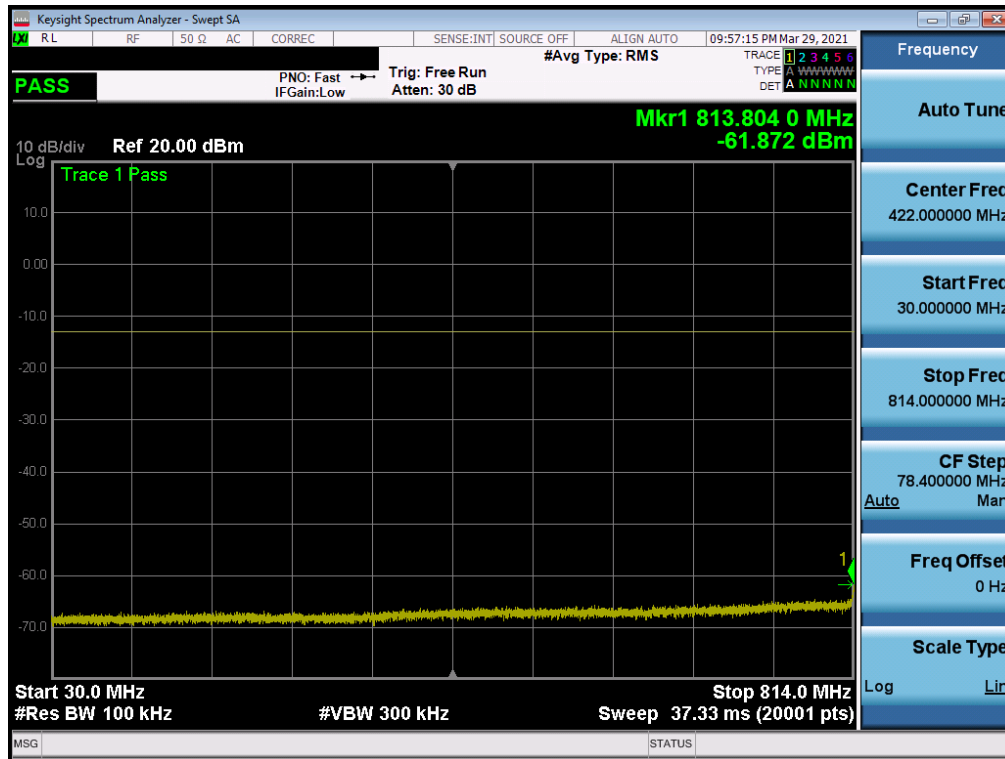
FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 - 6/3/2021	EUT Type: Portable Handset		Page 24 of 56



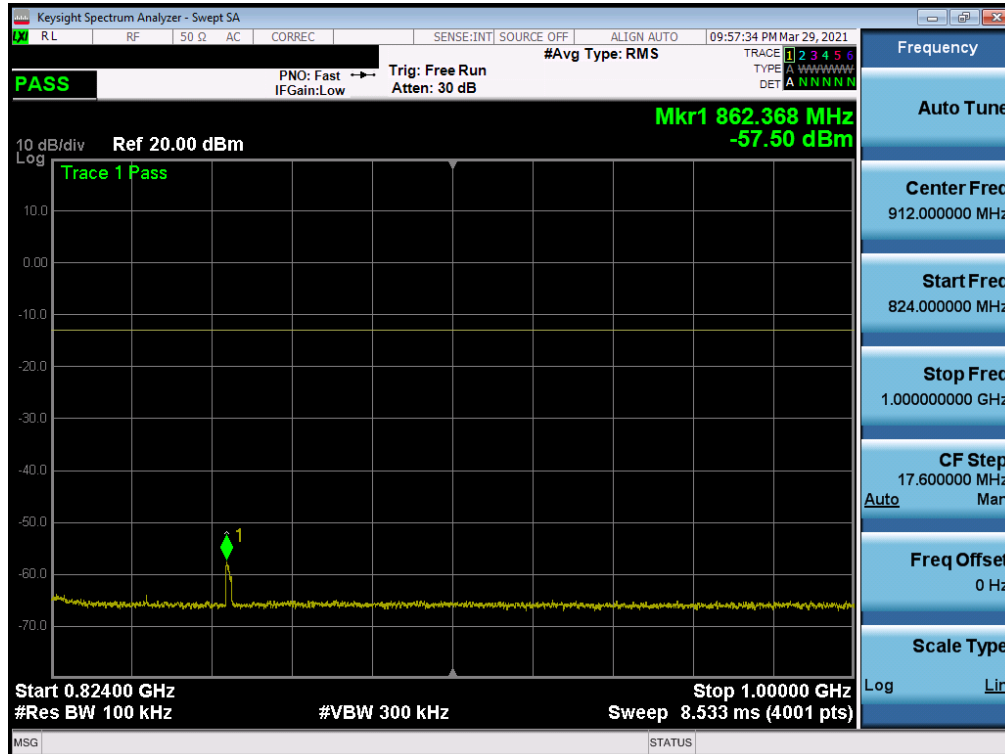
Plot 7-22. Conducted Spurious Plot (LTE Band 26 - 15MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 25 of 56

CDMA BC10

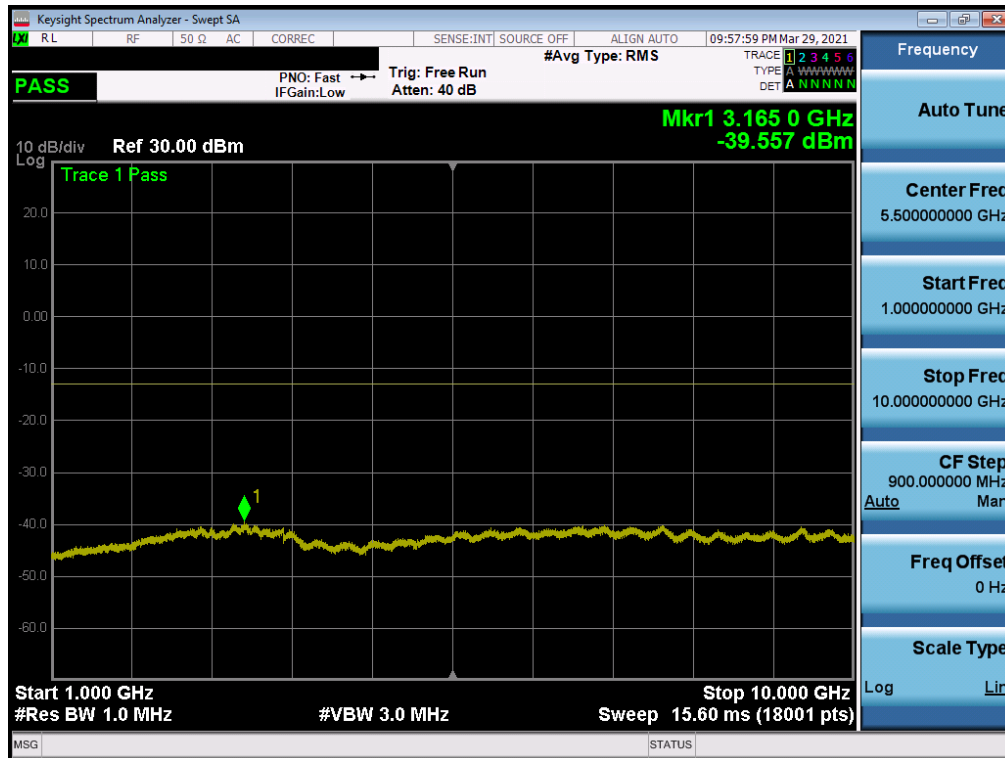


Plot 7-23. Conducted Spurious Plot (CDMA Ch. 476- Low Channel)

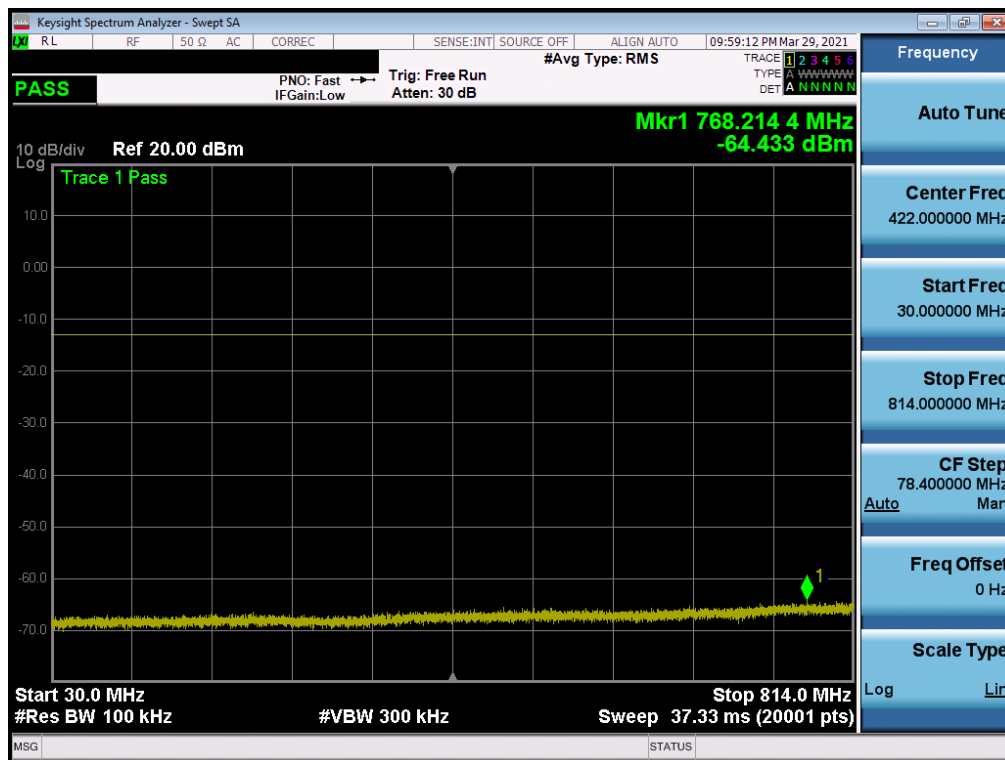


Plot 7-24. Conducted Spurious Plot (CDMA Ch. 476- Low Channel)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 26 of 56

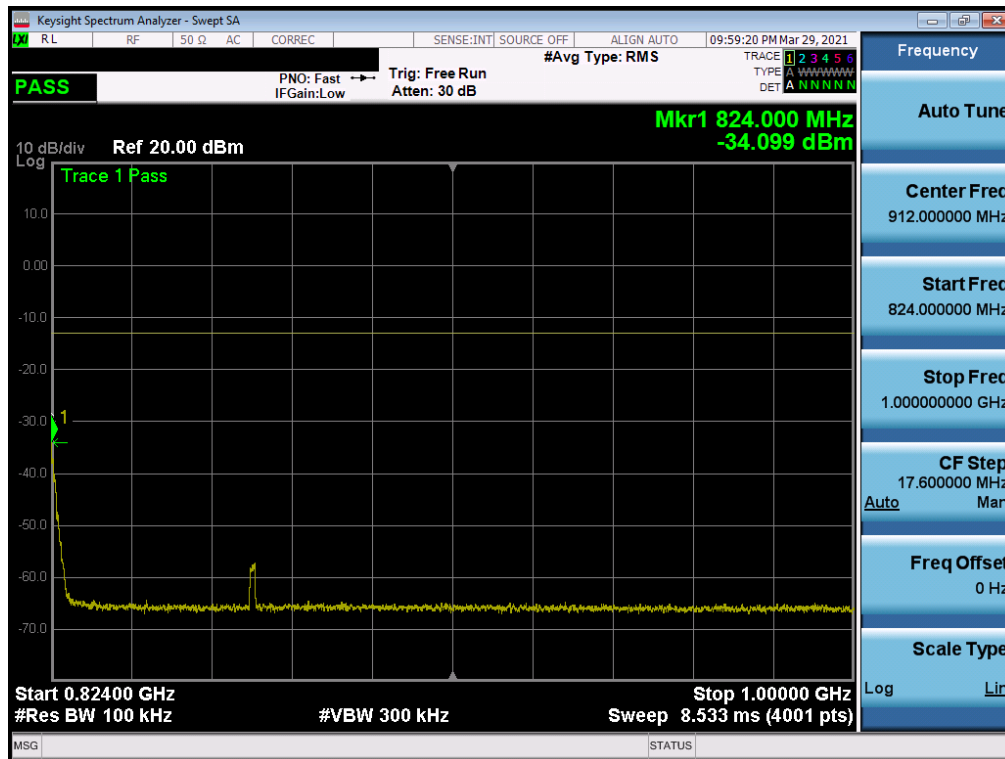


Plot 7-25. Conducted Spurious Plot (CDMA Ch. 476- Low Channel)

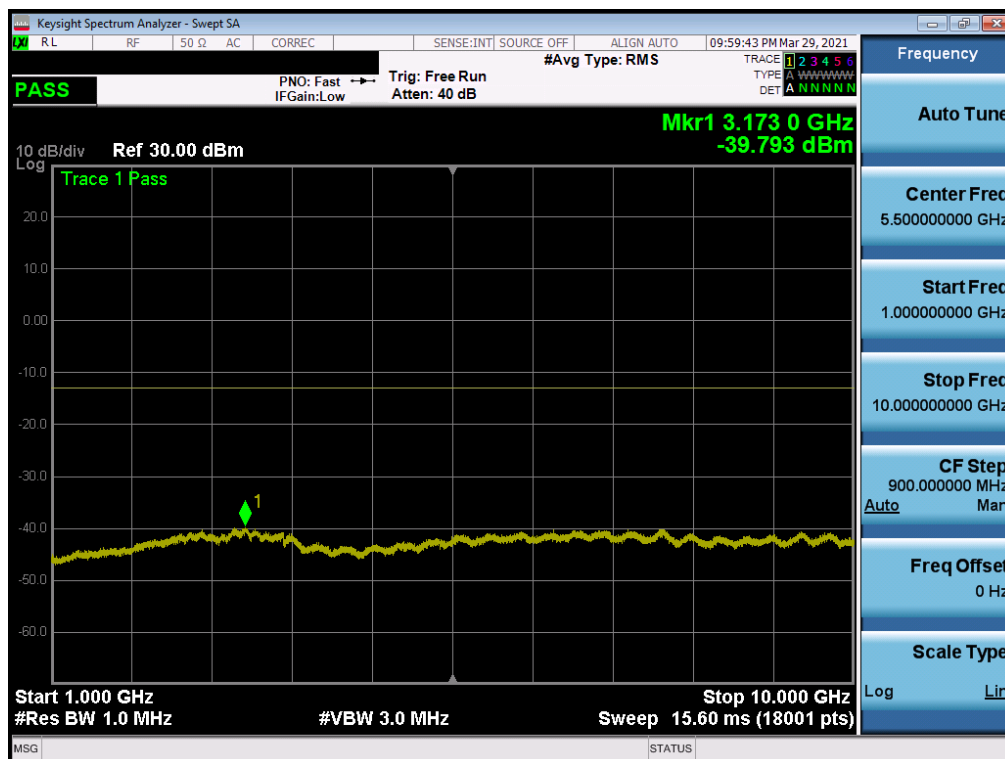


Plot 7-26. Conducted Spurious Plot (CDMA Ch. 684- High Channel)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 27 of 56



Plot 7-27. Conducted Spurious Plot (CDMA Ch. 684- High Channel)



Plot 7-28. Conducted Spurious Plot (CDMA Ch. 684- High Channel)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 28 of 56

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.

For LTE B26 operation under Part 90.691, the minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by greater than 37.5 kHz is $43 + 10\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts. The minimum permissible attenuation level of any spurious emission removed from the EA licensee's frequency block by up to and including 37.5 kHz is $50 + 10\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Span was set large enough so as to capture all out of band emissions near the band edge
2. RBW = 100 kHz
3. VBW = 300 kHz
4. Detector = RMS
5. Trace mode = trace average
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

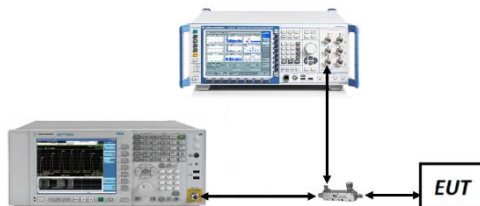


Figure 7-3. Test Instrument & Measurement Setup

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 29 of 56

Test Notes

For channel edge emission, the signal analyzer's "ACP" measurement capability is used.

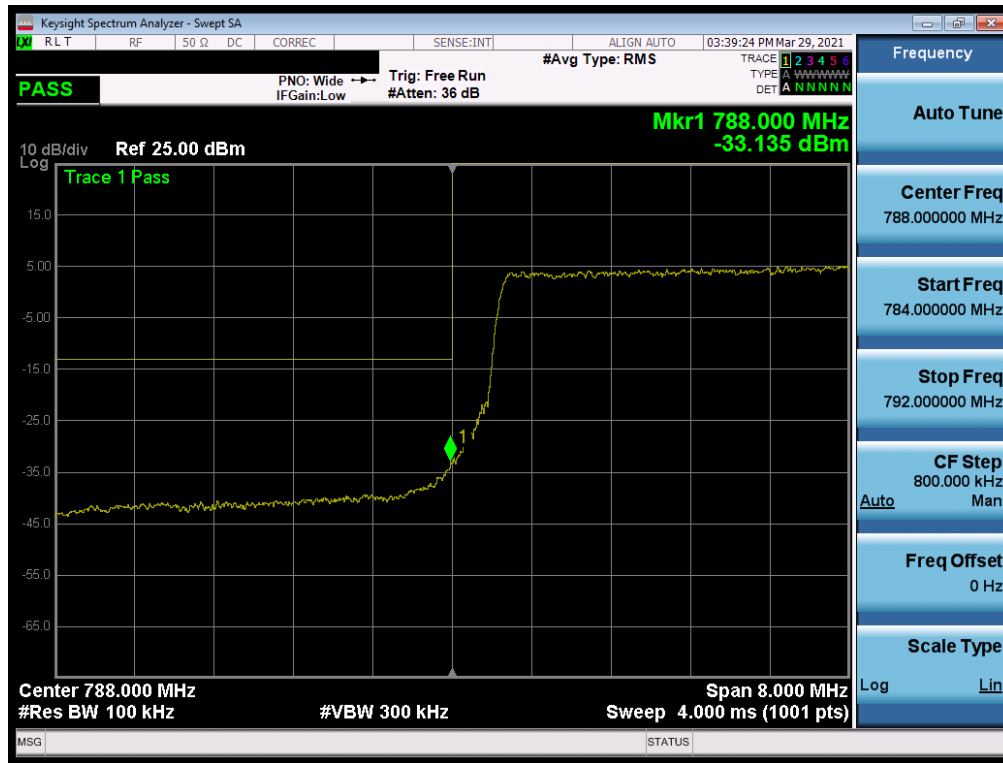
Per 22.917(b) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission 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 emission are attenuated at least 26 dB below the transmitter power.

For LTE Band 14 operation under Part 90.543, the power of any emission must be reduced below the mean output power (P) by at least $43 + 10\log(P)$ dB measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

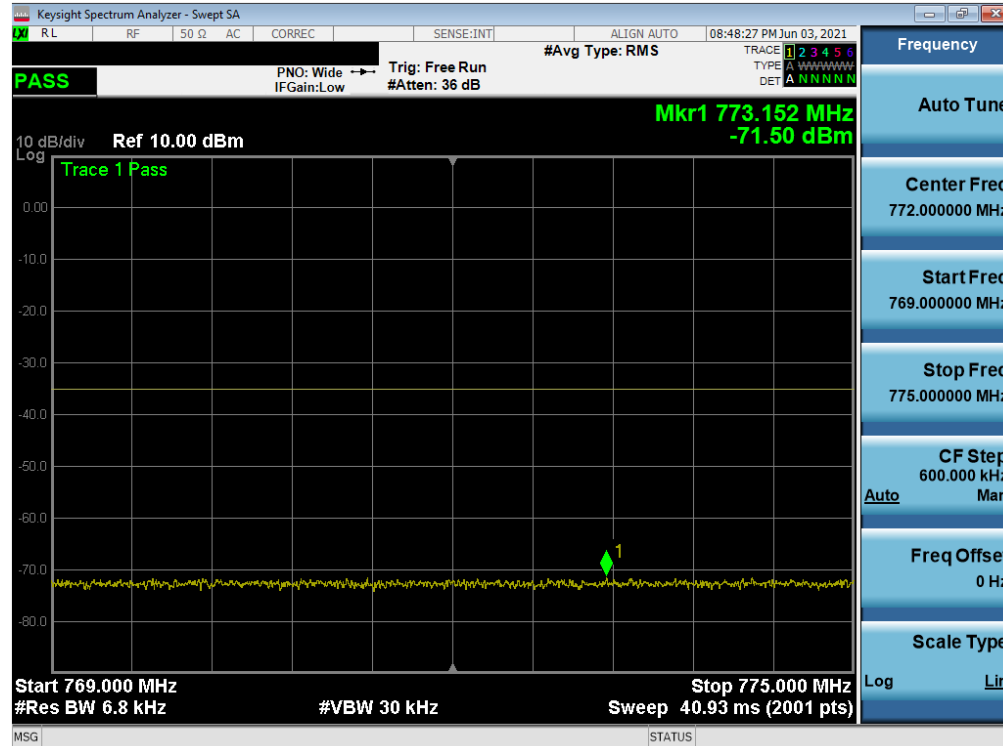
Additionally, for LTE Band 14 operation, on all frequencies between 769-775 MHz and 799-805 MHz, the power of any emission shall be attenuated by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.

FCC ID: A3LSMF926U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 30 of 56

LTE Band 14



Plot 7-29. Lower Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

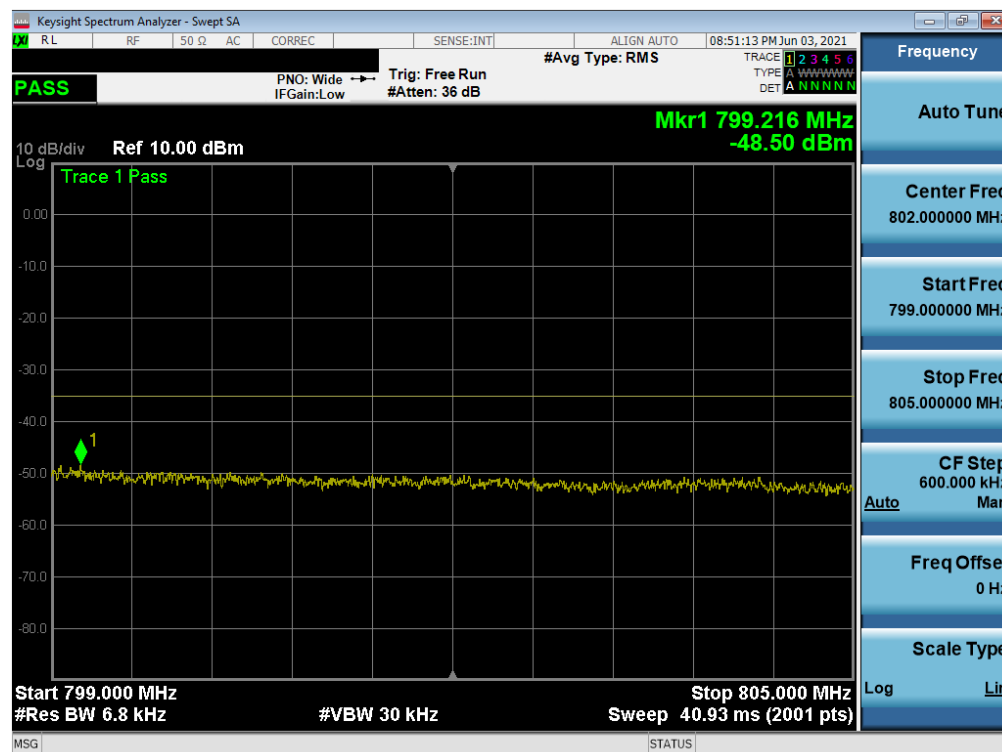


Plot 7-30. Lower Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 31 of 56

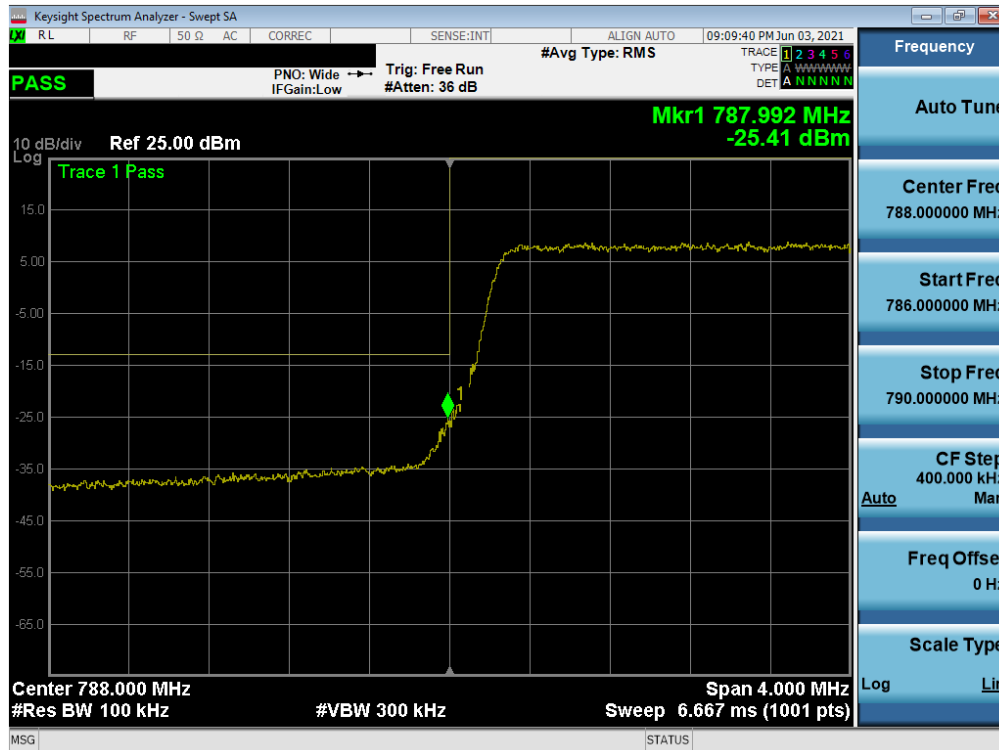


Plot 7-31. Upper Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

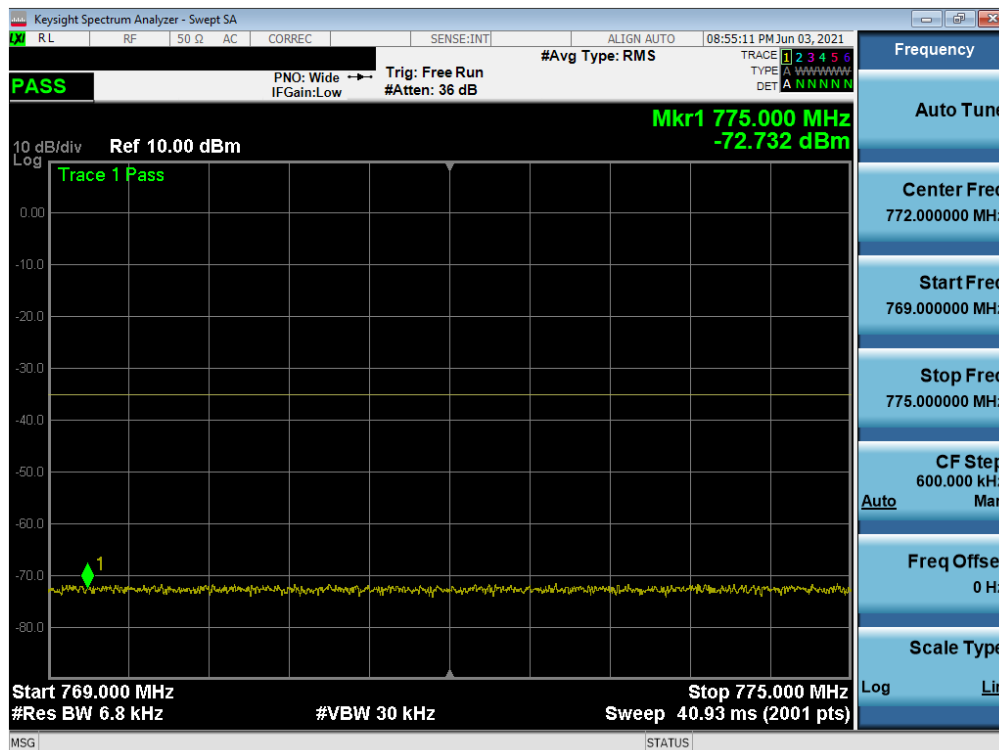


Plot 7-32. Upper Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 32 of 56

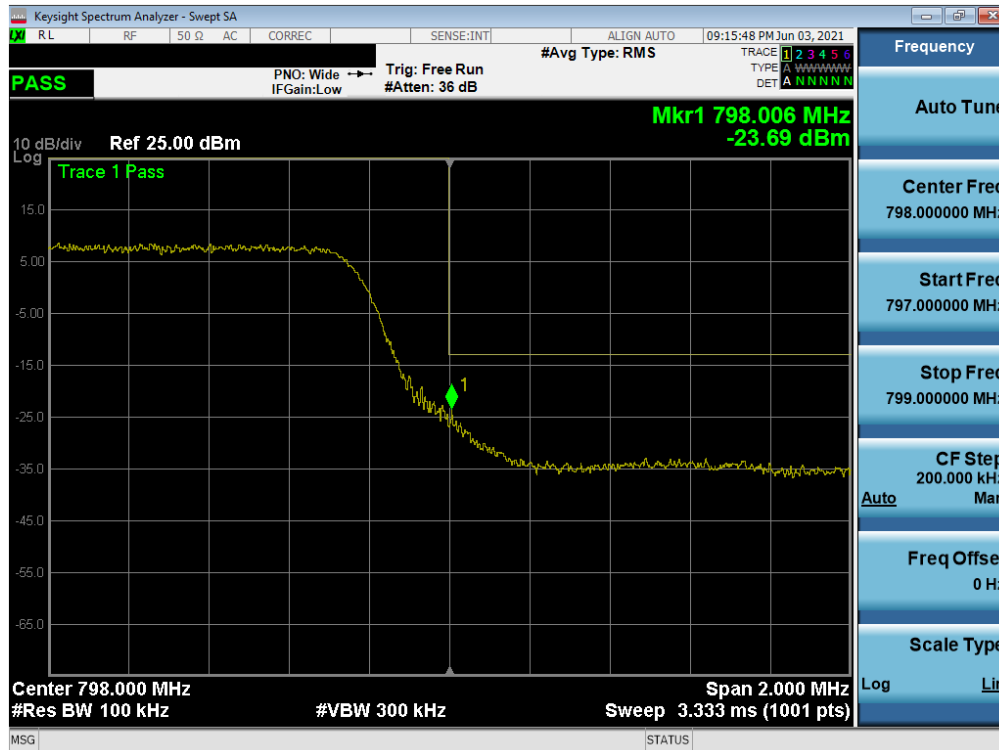


Plot 7-33. Lower Band Edge Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

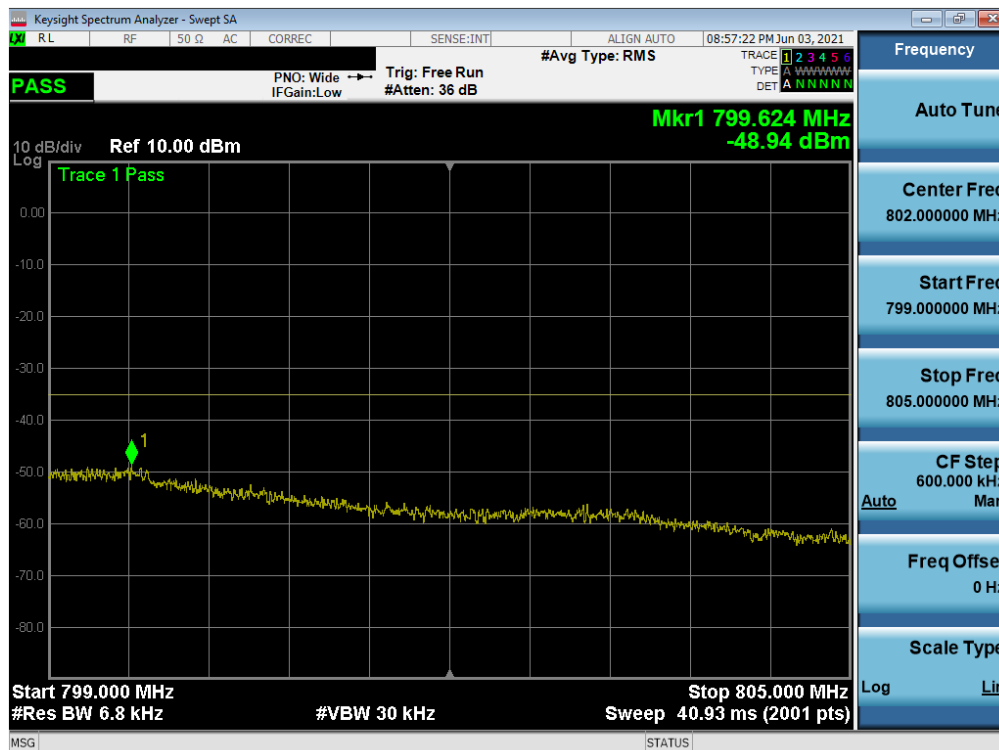


Plot 7-34. Lower Emission Mask Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 33 of 56



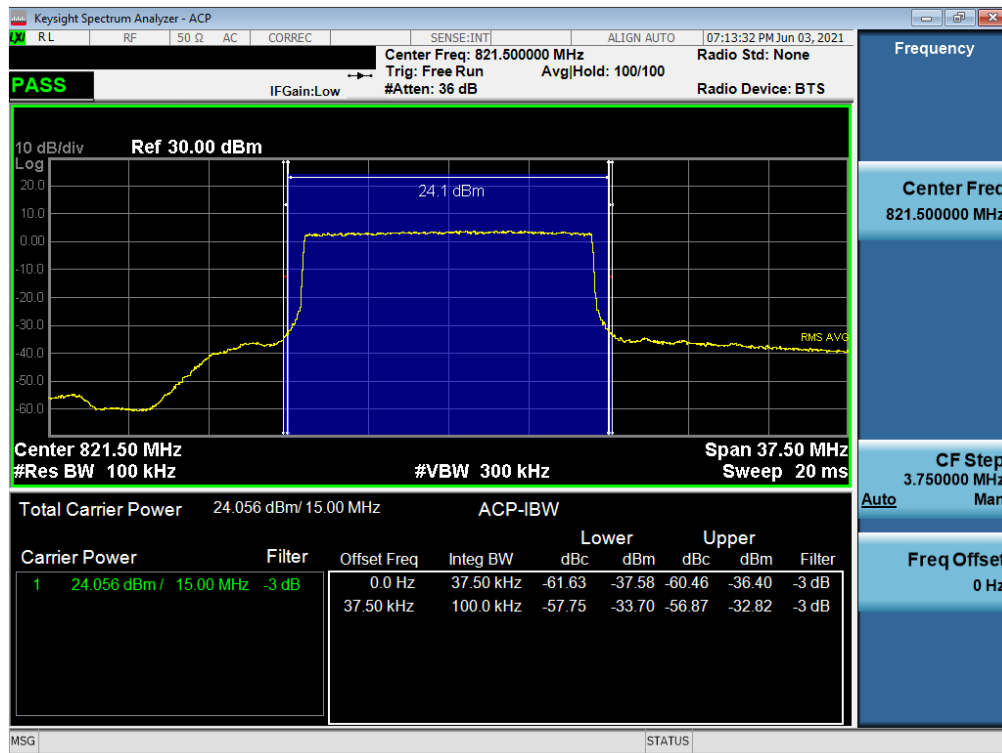
Plot 7-35. Upper Band Edge Plot (LTE Band 14, 5MHz QPSK - RB Size 25)



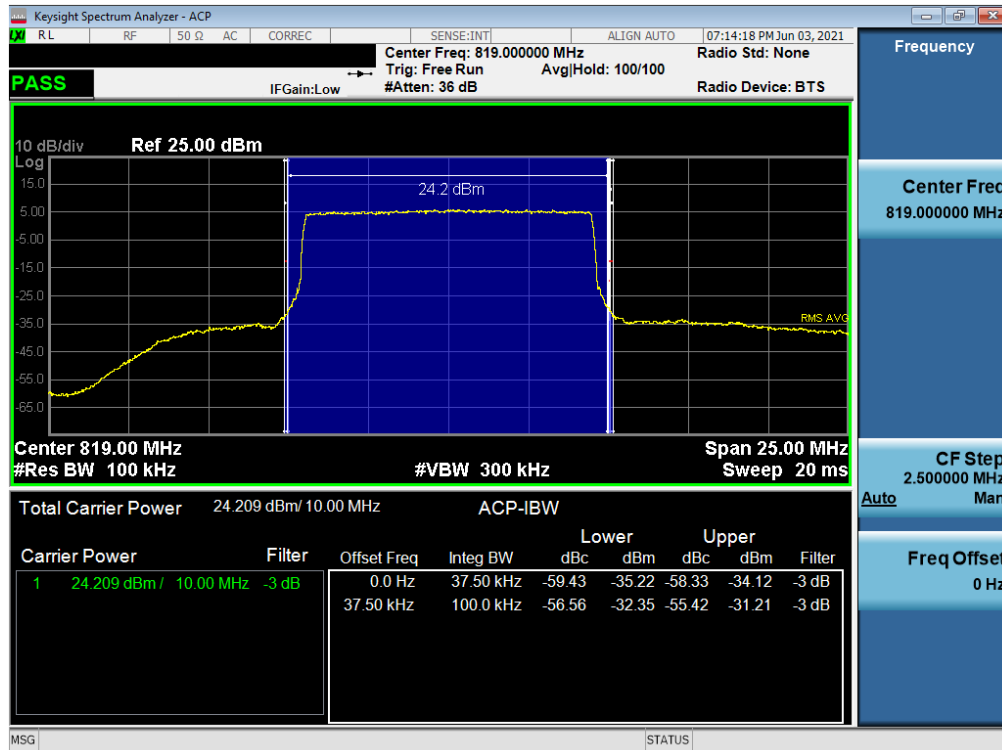
Plot 7-36. Upper Emission Mask Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 - 6/3/2021	EUT Type: Portable Handset		Page 34 of 56

LTE Band 26

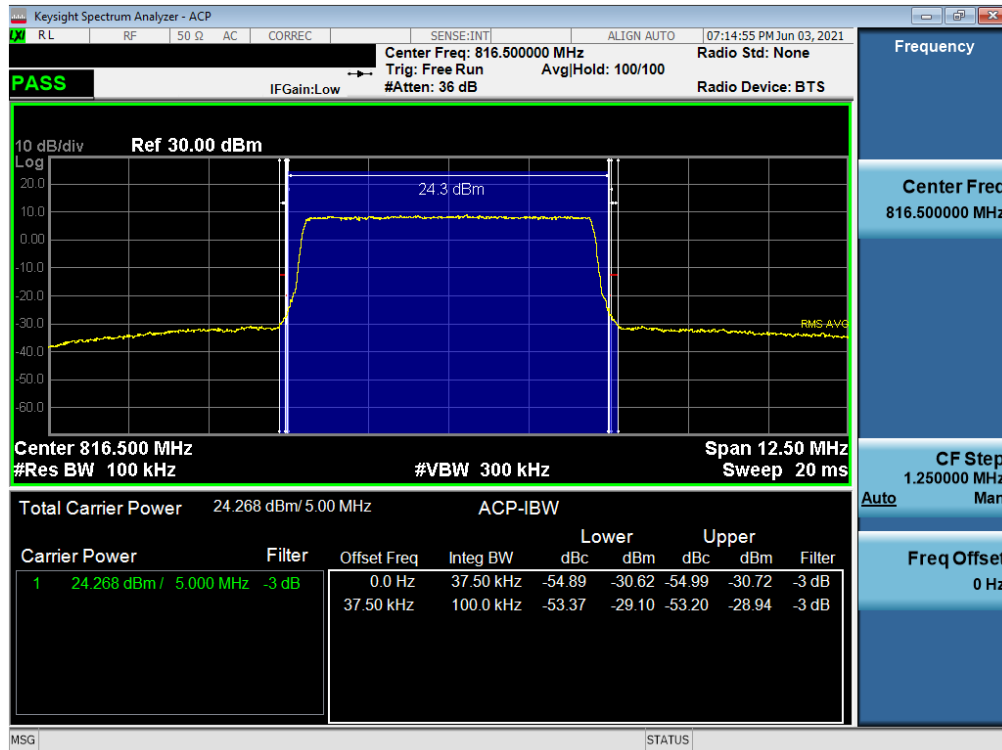


Plot 7-37. Channel Edge Plot (LTE Band 26 - 15MHz QPSK - Mid Channel)

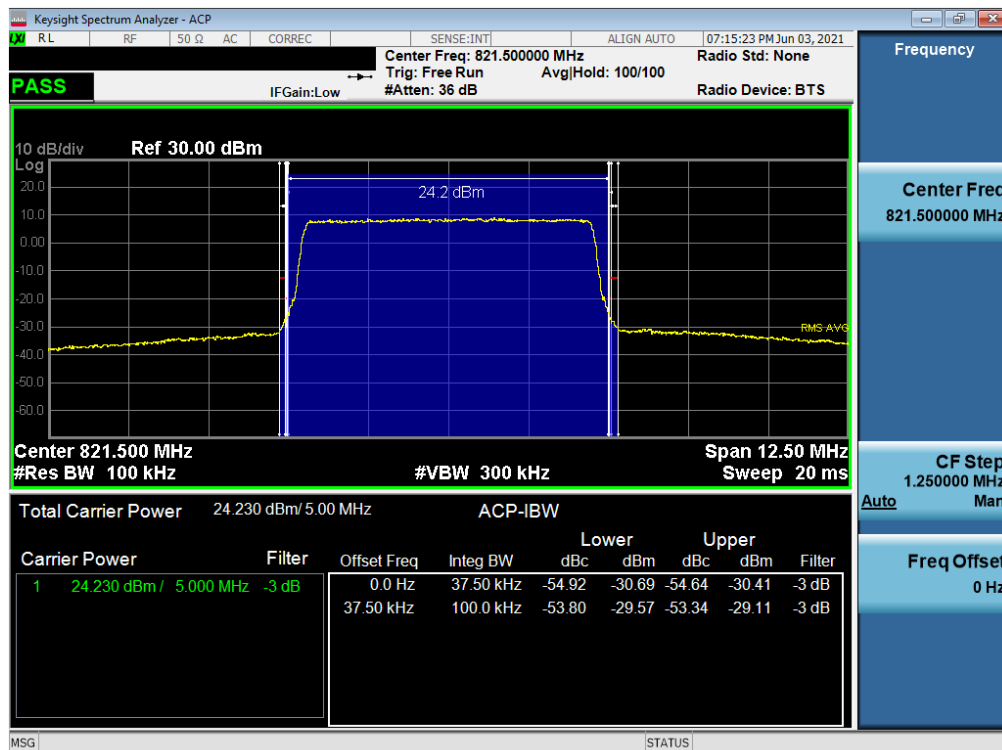


Plot 7-38. Channel Edge Plot (LTE Band 26 - 10MHz QPSK - Mid Channel)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 35 of 56

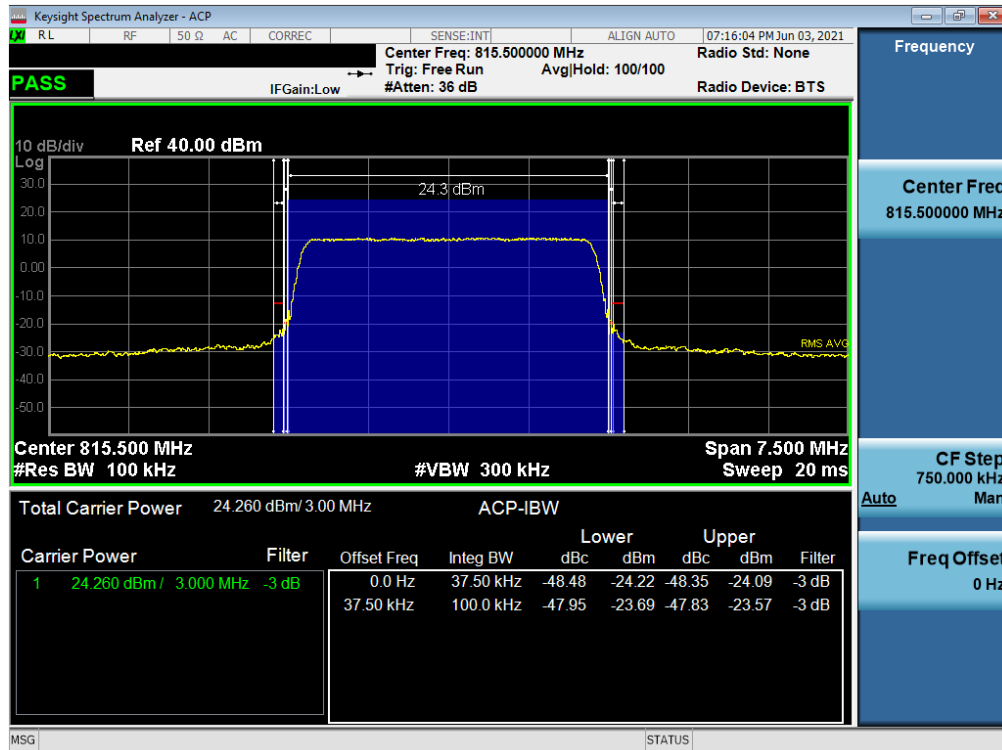


Plot 7-39. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - Low Channel)

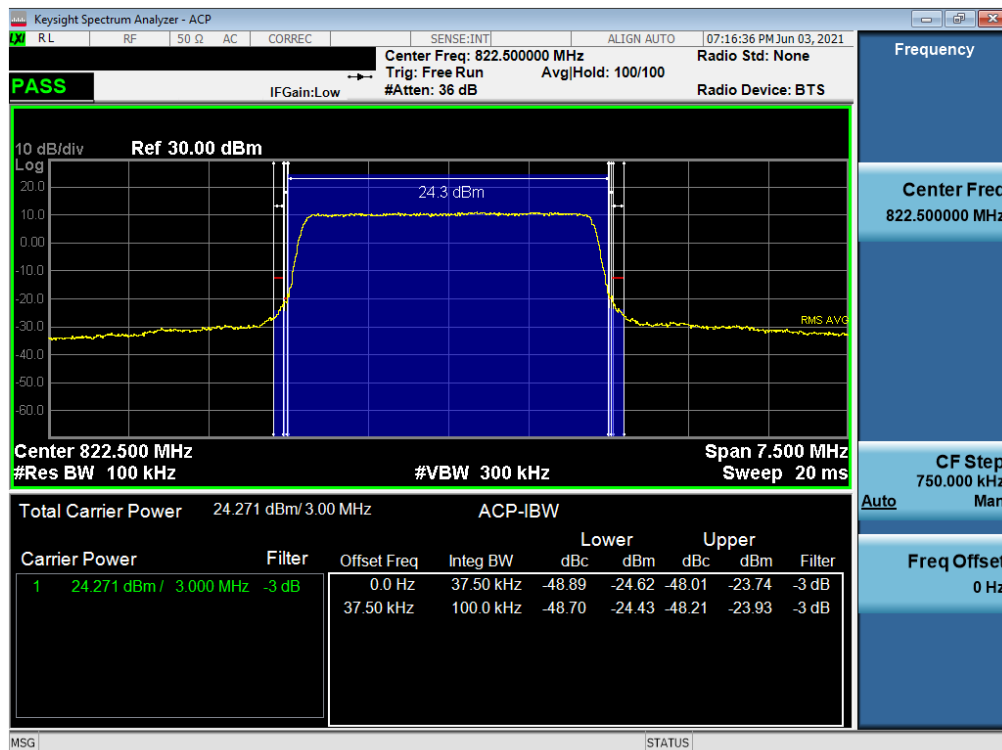


Plot 7-40. Channel Edge Plot (LTE Band 26 - 5MHz QPSK - High Channel)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 36 of 56

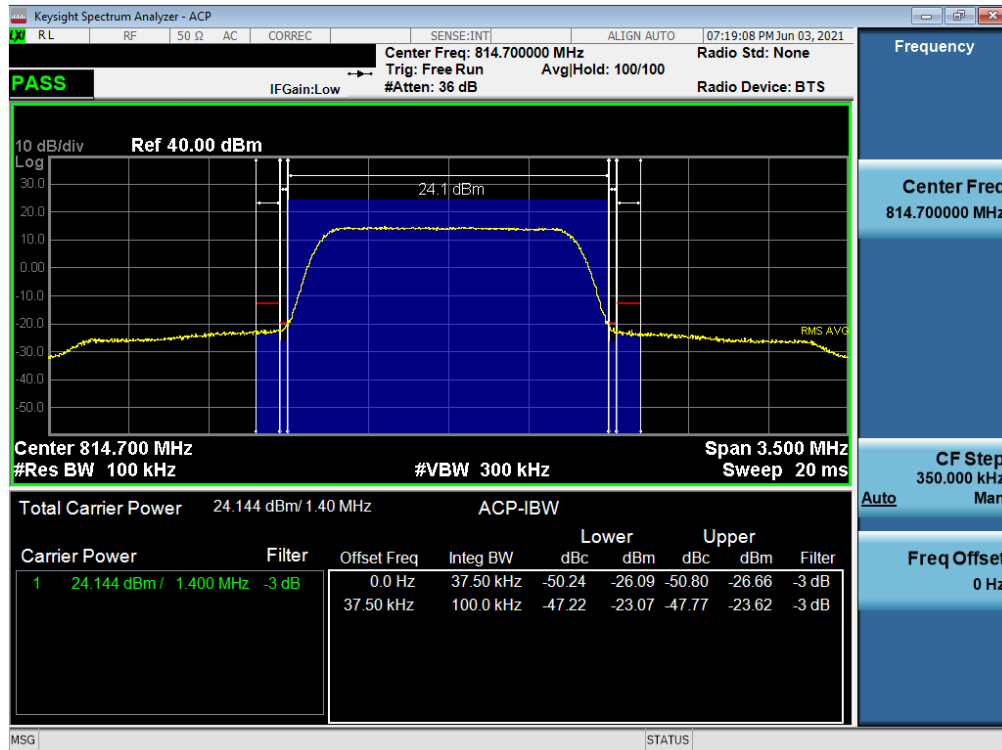


Plot 7-41. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - Low Channel)

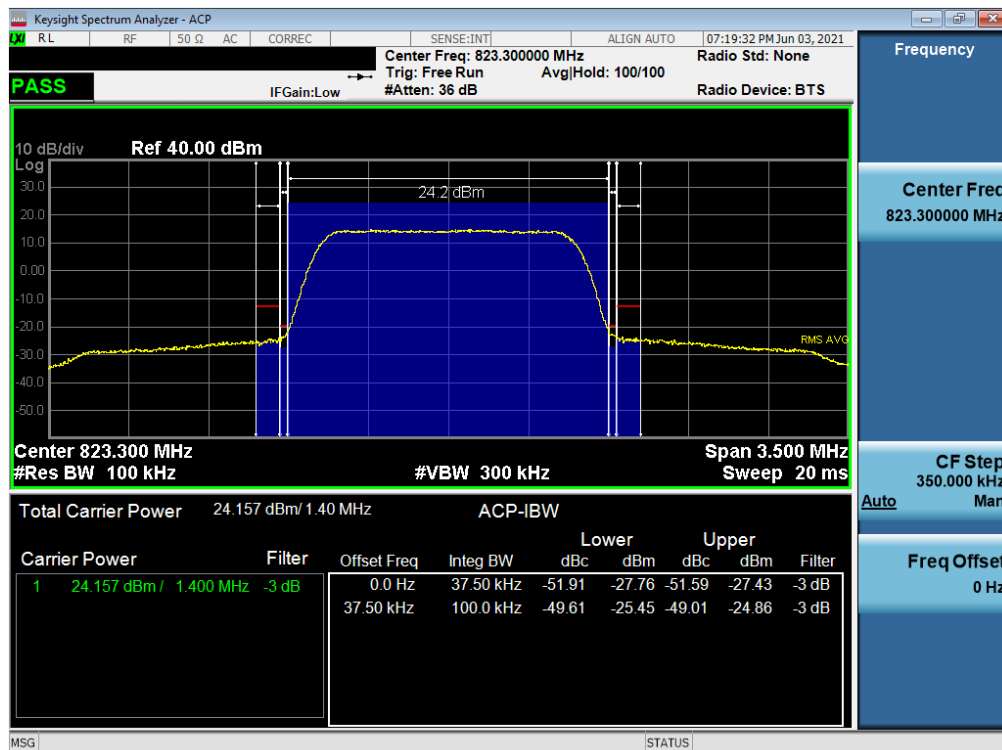


Plot 7-42. Channel Edge Plot (LTE Band 26 - 3MHz QPSK - High Channel)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 37 of 56



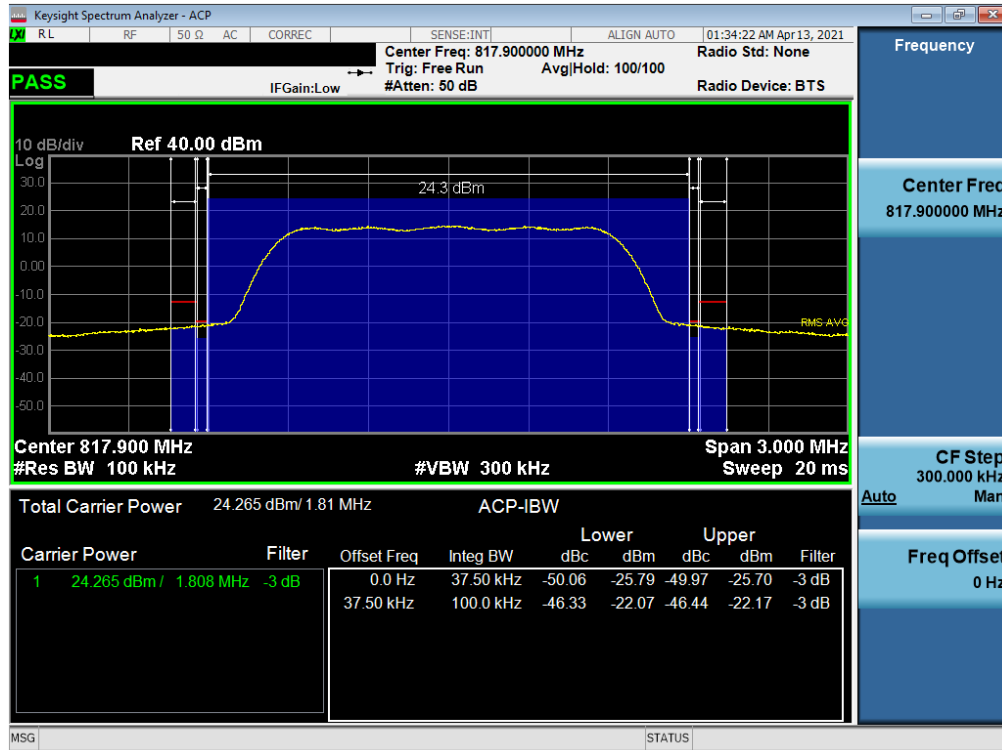
Plot 7-43. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - Low Channel)



Plot 7-44. Channel Edge Plot (LTE Band 26 - 1.4MHz QPSK - High Channel)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 - 6/3/2021	EUT Type: Portable Handset		Page 38 of 56

CDMA BC10



Plot 7-45. Channel Edge Plot (CDMA BC10 – Ch. 476)



Plot 7-46. Channel Edge Plot (CDMA BC10 – Ch. 684)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 39 of 56

7.5 Conducted Power Output Data

\$2.1046 \$2.1046 \$90.635

NOTES:

1. For CDMA mode, this device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
2. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
3. This unit was tested with its standard battery.

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin [dB]
15 MHz	QPSK	26765	821.5	1 / 36	24.60	0.289	50.00	-25.40
	16-QAM	26765	821.5	1 / 36	23.81	0.240	50.00	-26.19
	64-QAM	26765	821.5	1 / 36	22.88	0.194	50.00	-27.12
	256-QAM	26765	821.5	1 / 36	19.93	0.098	50.00	-30.07
10 MHz	QPSK	26740	819.0	1 / 25	24.66	0.292	50.00	-25.34
	16-QAM	26740	819.0	1 / 25	23.85	0.242	50.00	-26.15
	64-QAM	26740	819.0	1 / 25	22.69	0.186	50.00	-27.31
	256-QAM	26740	819.0	1 / 25	19.89	0.097	50.00	-30.11
5 MHz	QPSK	26715	816.5	1 / 24	24.79	0.301	50.00	-25.21
		26765	821.5	1 / 0	24.55	0.285	50.00	-25.45
	16-QAM	26715	816.5	1 / 24	23.87	0.244	50.00	-26.13
		26765	821.5	1 / 0	23.87	0.244	50.00	-26.13
	64-QAM	26715	816.5	1 / 24	22.87	0.194	50.00	-27.13
		26765	821.5	1 / 0	22.88	0.194	50.00	-27.12
	256-QAM	26715	816.5	1 / 24	19.65	0.092	50.00	-30.35
		26765	821.5	1 / 0	19.86	0.097	50.00	-30.14
3 MHz	QPSK	26705	815.5	1 / 14	24.71	0.296	50.00	-25.29
		26775	822.5	1 / 14	24.72	0.297	50.00	-25.28
	16-QAM	26705	815.5	1 / 14	23.94	0.248	50.00	-26.06
		26775	822.5	1 / 14	24.00	0.251	50.00	-26.00
	64-QAM	26705	815.5	1 / 14	22.80	0.190	50.00	-27.20
		26775	822.5	1 / 14	22.95	0.197	50.00	-27.05
	256-QAM	26705	815.5	1 / 14	19.97	0.099	50.00	-30.03
		26775	822.5	1 / 14	20.12	0.103	50.00	-29.88
1.4 MHz	QPSK	26697	814.7	1 / 5	24.61	0.289	50.00	-25.39
		26783	823.3	1 / 5	24.56	0.286	50.00	-25.44
	16-QAM	26697	814.7	1 / 5	23.82	0.241	50.00	-26.18
		26783	823.3	1 / 5	23.65	0.232	50.00	-26.35
	64-QAM	26697	814.7	1 / 5	22.84	0.192	50.00	-27.16
		26783	823.3	1 / 5	22.81	0.191	50.00	-27.19
	256-QAM	26697	814.7	1 / 5	19.71	0.093	50.00	-30.29
		26783	823.3	1 / 5	19.66	0.092	50.00	-30.34

Table 7-2. Conducted Power Output Data (LTE Band 26)

FCC ID: A3LSMF926U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 40 of 56

Frequency [MHz]	Channel	Battery Type	Conducted Power [dBm]	Conducted Power [Watts]	Conducted Power Limit [dBm]	Margin [dB]
817.90	476	Standard	24.35	0.272	50.00	-25.65
823.10	684	Standard	24.20	0.263	50.00	-25.80

Table 7-3. Conducted Power Output Data (CDMA BC10)

FCC ID: A3LSMF926U	 PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 41 of 56

7.6 Radiated Power (ERP)

Test Overview

Effective Radiated Power (ERP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, 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.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW $\geq 3 \times$ RBW
4. Span = 1.5 times the OBW
5. No. of sweep points $\geq 2 \times$ span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

FCC ID: A3LSMF926U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 42 of 56

Test Setup

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

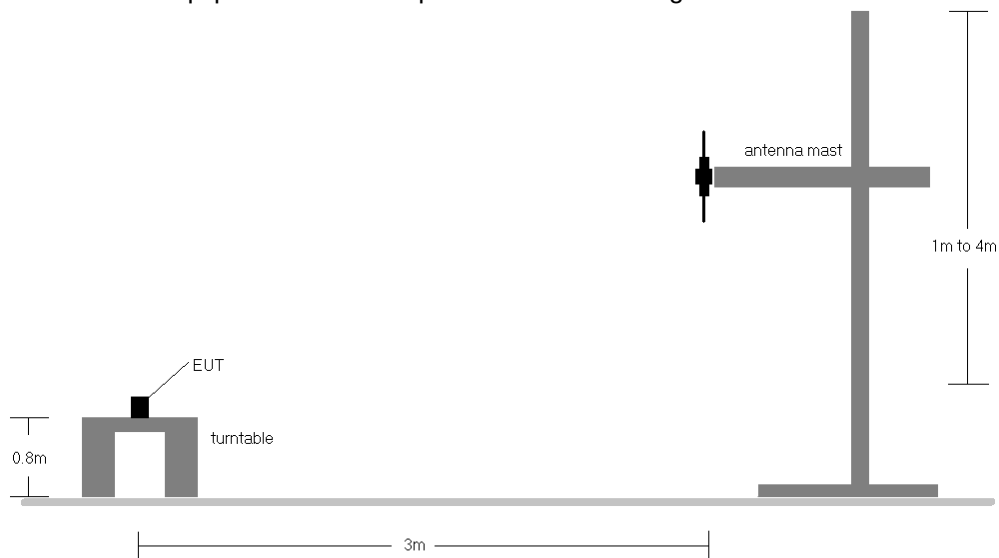


Figure 7-4. Radiated Test Setup <1GHz

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 43 of 56

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]
10 MHz	QPSK	793.0	H	226.0	333.0	6.11	1 / 0	15.38	19.34	0.086	34.77	-15.43
	16-QAM	793.0	H	226.0	333.0	6.11	1 / 0	14.49	18.45	0.070	34.77	-16.32
5 MHz	QPSK	790.5	H	226.0	333.0	6.09	1 / 24	15.33	19.26	0.084	34.77	-15.51
		793.0	H	226.0	333.0	6.11	1 / 24	15.31	19.27	0.085	34.77	-15.50
		795.5	H	226.0	333.0	6.24	1 / 12	15.29	19.38	0.087	34.77	-15.39
	16-QAM	793.0	H	226.0	333.0	6.11	1 / 24	14.60	18.57	0.072	34.77	-16.21
5 MHz	QPSK	795.5	V	161.00	139.00	6.11	1 / 0	13.02	16.98	0.050	34.77	-17.79
	QPSK (Closed)	790.5	H	224.00	312.00	6.11	1 / 0	12.35	16.31	0.043	34.77	-18.46
	QPSK (WCP)	790.5	H	209.00	123.00	6.11	1 / 0	12.92	16.88	0.049	34.77	-17.89

Table 7-4. ERP Data (LTE Band 14 – AntA + AntB)

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]
10 MHz	QPSK	793.0	V	147.0	226.0	6.11	1 / 25	11.08	15.04	0.032	34.77	-19.73
	16-QAM	793.0	V	147.0	226.0	6.11	1 / 25	10.12	14.08	0.026	34.77	-20.69
5 MHz	QPSK	790.5	V	147.0	226.0	6.09	1 / 24	11.03	14.96	0.031	34.77	-19.81
		793.0	V	147.0	226.0	6.11	1 / 12	11.01	14.97	0.031	34.77	-19.80
		795.5	V	147.0	226.0	6.24	1 / 12	10.99	15.08	0.032	34.77	-19.69
	16-QAM	795.5	V	147.0	226.0	6.24	1 / 12	10.08	14.17	0.026	34.77	-20.60
5 MHz	QPSK	795.5	H	243.00	286.00	6.11	1 / 25	10.35	14.31	0.027	34.77	-20.46
	QPSK (Closed)	795.5	H	208.00	172.00	6.11	1 / 25	9.04	13.00	0.020	34.77	-21.77
	QPSK (WCP)	790.5	H	208.00	172.00	6.11	1 / 25	9.40	13.36	0.022	34.77	-21.41

Table 7-5. ERP Data (LTE Band 14 – AntA)

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]
15 MHz	QPSK	821.5	V	174.0	73.0	6.32	1 / 74	14.66	18.83	0.076	38.45	-19.62
	16-QAM	821.5	V	174.0	73.0	6.32	1 / 74	13.93	18.10	0.065	38.45	-20.35
15 MHz	QPSK	821.5	H	204.0	100.0	6.72	1 / 74	13.04	17.61	0.058	38.45	-20.84
	QPSK (WCP)	821.5	H	101.0	111.0	6.72	1 / 74	13.45	18.02	0.063	38.45	-20.43

Table 7-6. ERP Data (LTE Band 26 – AntA + AntB)

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]
15 MHz	QPSK	821.5	H	135.0	199.0	6.32	1 / 37	9.97	14.14	0.026	38.45	-24.31
	16-QAM	821.5	H	135.0	199.0	6.32	1 / 37	8.87	13.04	0.020	38.45	-25.41
15 MHz	QPSK	821.5	V	100.0	232.0	6.32	1 / 37	8.51	12.68	0.019	38.45	-25.77
	QPSK (WCP)	821.5	H	100.0	217.0	6.32	1 / 37	7.97	12.14	0.016	38.45	-26.31

Table 7-7. ERP Data (LTE Band 26 – AntA)

FCC ID: A3LSMF926U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 44 of 56

7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as 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

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ 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: A3LSMF926U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 45 of 56

Test Setup

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

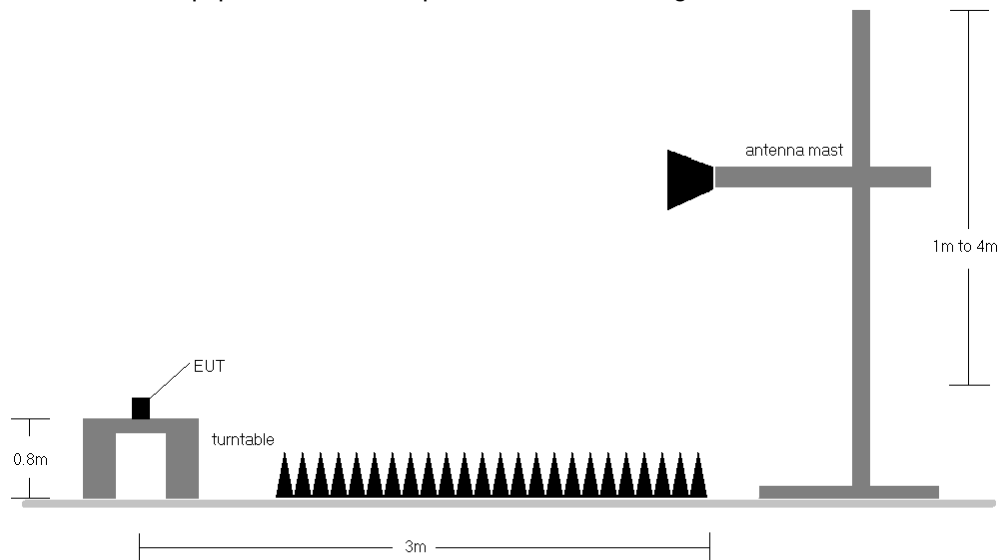


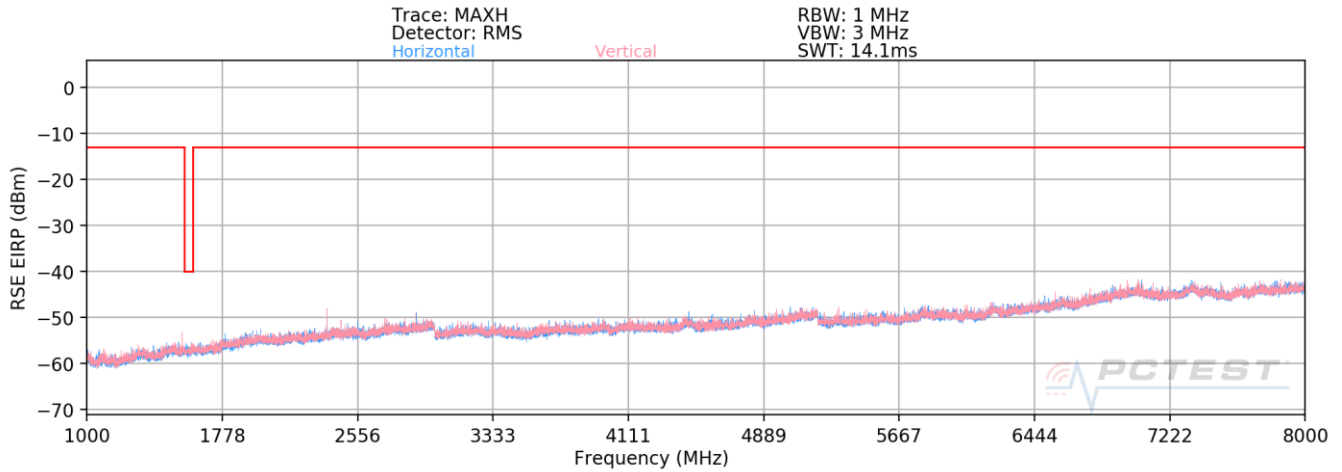
Figure 7-5. Test Instrument & Measurement Setup

Test Notes

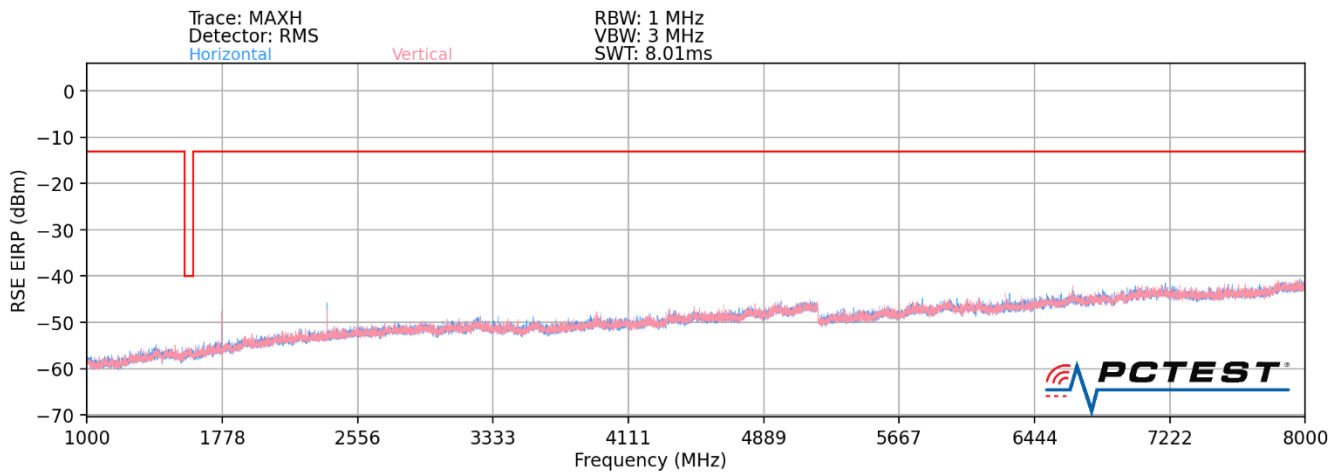
1. For CDMA mode, this device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
2. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
3. This unit was tested with its standard battery.
4. 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.
5. The "-" shown in the following RSE tables are used to denote a noise floor measurement.
6. Per 90(R)(f), emissions in the 1559 – 1610MHz band are subject to a limit of -40dBm/MHz for wideband signals. These emission measurements are shown in this section below.

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 46 of 56

LTE Band 14



Plot 7-47. Radiated Spurious Plot (LTE Band 14) – OPEN



Plot 7-48. Radiated Spurious Plot (LTE Band 14) - CLOSE

Bandwidth (MHz):	5
Frequency (MHz):	790.5
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1581.0	V	-	-	-78.58	-0.45	27.97	-67.29	-40.00	-27.29
2371.5	V	100	328	-64.29	2.96	45.67	-49.59	-13.00	-36.59
3162.0	V	-	-	-78.50	4.21	32.71	-62.55	-13.00	-49.55
3952.5	V	-	-	-77.96	5.49	34.53	-60.73	-13.00	-47.73
4743.0	V	-	-	-79.07	6.00	33.93	-61.33	-13.00	-48.33

Table 7-8. Radiated Spurious Data (LTE Band 14 – Low Channel)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 47 of 56

Bandwidth (MHz):	5
Frequency (MHz):	793.0
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1586.0	V	-	-	-77.19	-0.43	29.38	-65.88	-40.00	-25.88
2379.0	V	158	326	-63.08	3.05	46.97	-48.29	-13.00	-35.29
3172.0	V	-	-	-78.13	4.19	33.06	-62.20	-13.00	-49.20
3965.0	V	-	-	-78.96	5.59	33.63	-61.63	-13.00	-48.63
4758.0	V	-	-	-78.92	5.96	34.04	-61.22	-13.00	-48.22

Table 7-9. Radiated Spurious Data (LTE Band 14 – Mid Channel)

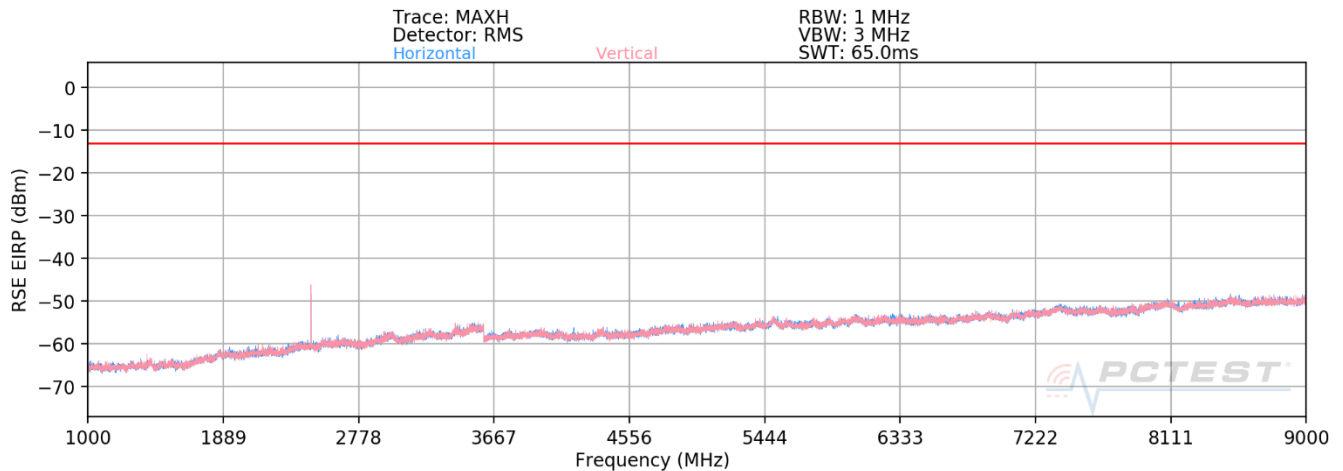
Bandwidth (MHz):	5
Frequency (MHz):	795.5
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1591.0	V	-	-	-78.02	-0.41	28.57	-66.68	-40.00	-26.68
2386.5	V	147	151	-68.13	3.15	42.02	-53.24	-13.00	-40.24
3182.0	V	-	-	-77.76	4.09	33.33	-61.93	-13.00	-48.93
3977.5	V	-	-	-78.98	5.27	33.29	-61.97	-13.00	-48.97
4773.0	V	-	-	-79.24	6.00	33.76	-61.50	-13.00	-48.50

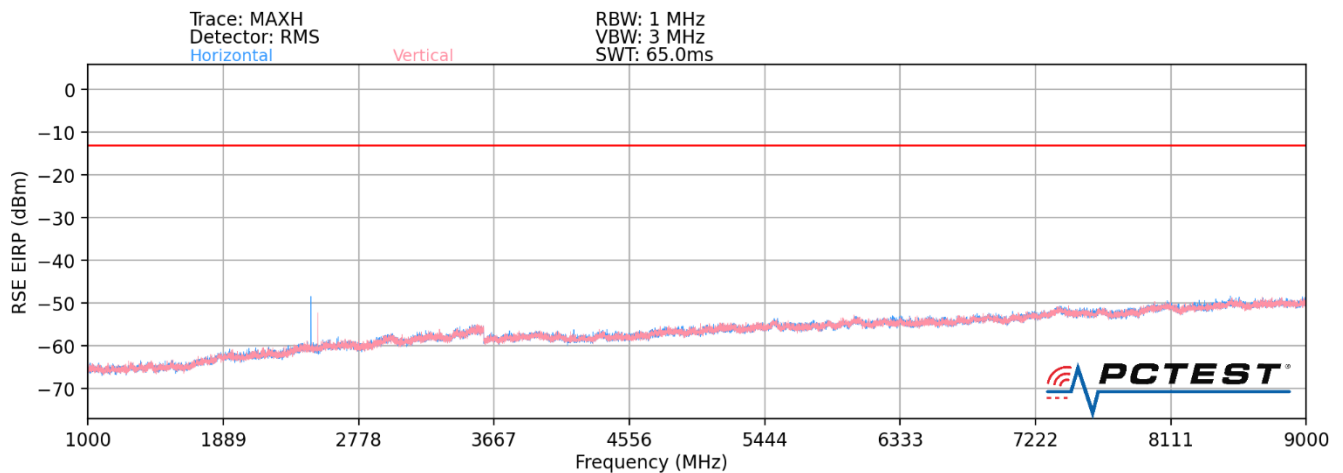
Table 7-10. Radiated Spurious Data (LTE Band 14 – High Channel)

FCC ID: A3LSMF926U	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset	Page 48 of 56

LTE Band 26 AntA + AntB



Plot 7-49. Radiated Spurious Plot (LTE Band 26 – AntA + AntB)- OPEN



Plot 7-50. Radiated Spurious Plot (LTE Band 26 – AntA + AntB)- CLOSE

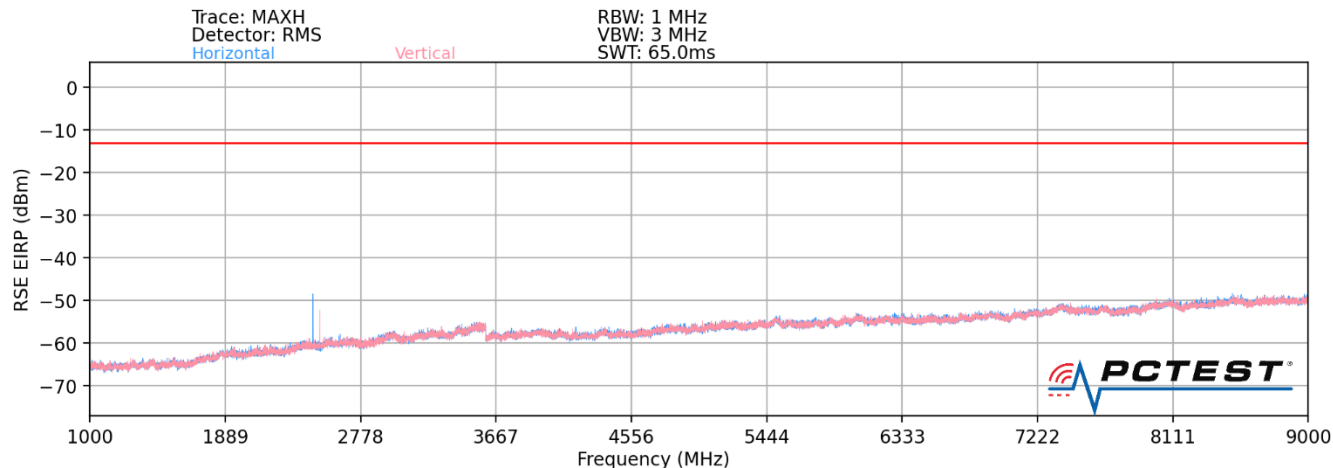
Bandwidth (MHz):	15
Frequency (MHz):	821.5
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 37

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]
1643.0	V	338	81	-72.64	-5.93	28.43	-66.83	-13.00	-53.83
2464.5	V	273	276	-55.36	-2.20	49.44	-45.81	-13.00	-32.81
3286.0	V	-	-	-78.03	0.71	29.68	-65.57	-13.00	-52.57
4107.5	V	-	-	-78.39	2.43	31.04	-64.22	-13.00	-51.22
4929.0	V	-	-	-79.61	3.58	30.97	-64.29	-13.00	-51.29

Table 7-11. Radiated Spurious Data (LTE Band 26 – AntA + AntB)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 49 of 56

LTE Band 26 AntA



Plot 7-51. Radiated Spurious Plot (LTE Band 26 – AntA)- CLOSE

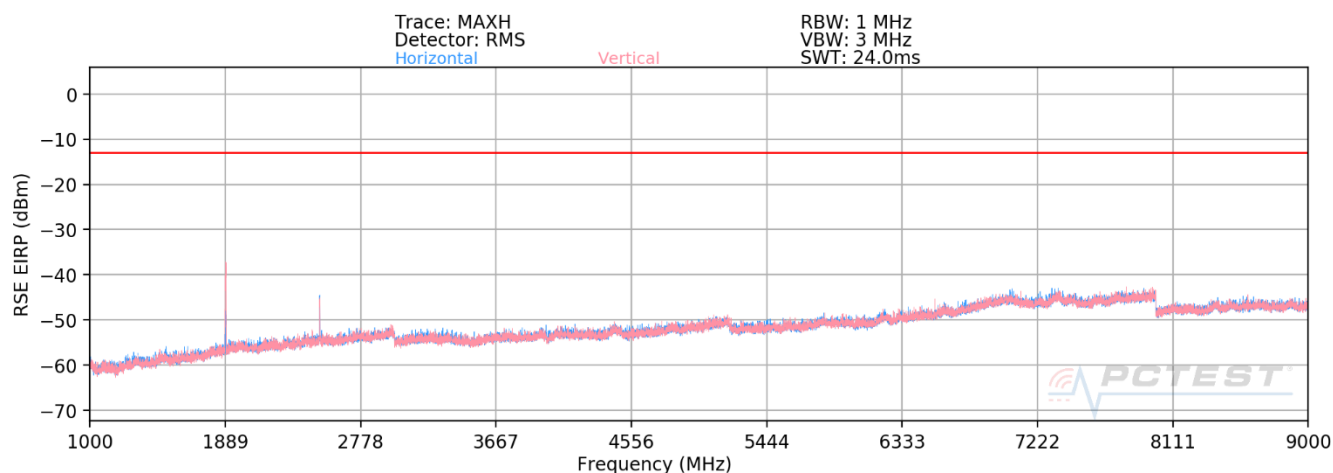
Bandwidth (MHz):	15
Frequency (MHz):	821.5
Modulation Signal:	QPSK
RB Config (Size / Offset):	1 / 37

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]
1643.0	H	-	-	-66.52	-5.93	34.55	-60.71	-13.00	-47.71
2464.5	H	-	-	-66.95	-2.20	37.85	-57.40	-13.00	-44.40
3286.0	H	-	-	-66.80	0.71	40.91	-54.34	-13.00	-41.34

Table 7-12. Radiated Spurious Data (LTE Band 26 – AntA)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 50 of 56

CDMA BC10



Plot 7-52. Radiated Spurious Plot (CDMA BC10)

Sample #:	1935S
Frequency (MHz):	817.9
Modulation:	CDMA BC10

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]
1635.8	H	-	-	-76.66	-5.99	24.35	-70.91	-13.00	-57.91
2453.7	H	136	132	-60.39	-2.20	44.41	-50.85	-13.00	-37.85
3271.6	H	-	-	-78.10	0.74	29.64	-65.61	-13.00	-52.61
4089.5	H	-	-	-78.84	2.49	30.65	-64.61	-13.00	-51.61

Table 7-13. Radiated Spurious Data (CDMA BC10 – Ch. 476)

Sample #:	1935S
Frequency (MHz):	823.1
Modulation:	CDMA BC10

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]
1646.2	H	-	-	-76.26	-5.70	25.04	-70.22	-13.00	-57.22
2469.3	H	181	138	-59.31	-2.29	45.40	-49.85	-13.00	-36.85
3292.4	H	-	-	-78.27	0.67	29.40	-65.86	-13.00	-52.86
4115.5	H	-	-	-78.46	2.13	30.67	-64.59	-13.00	-51.59

Table 7-14. Radiated Spurious Data (CDMA BC10 – Ch. 684)

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2104020031-06.A3L	Test Dates: 3/26 – 6/3/2021	EUT Type: Portable Handset		Page 51 of 56

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

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

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

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

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

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

Test Setup

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

Test Notes

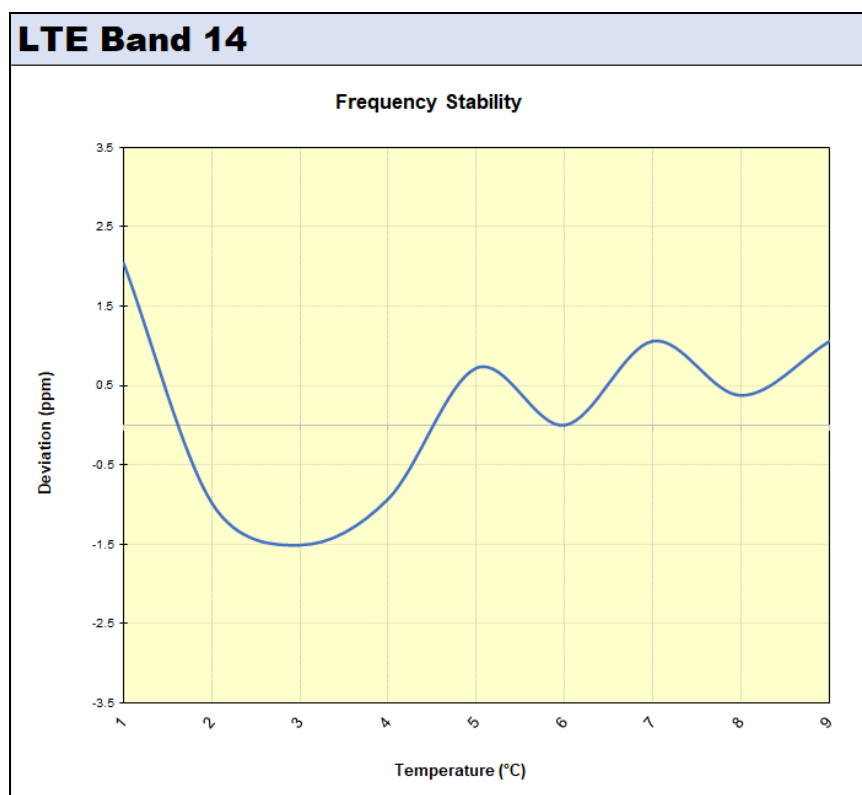
None

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Frequency Stability / Temperature Variation

LTE Band 14					
Operating Frequency (Hz):			793,000,000		
Ref. Voltage (VDC):			4.32		
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.32	- 30	793,003,141	1,621	0.0002044
		- 20	793,000,741	-779	-0.0000983
		- 10	793,000,319	-1,201	-0.0001514
		0	793,000,783	-737	-0.0000929
		+ 10	793,002,092	572	0.0000722
		+ 20 (Ref)	793,001,520	0	0.0000000
		+ 30	793,002,361	841	0.0001061
		+ 40	793,001,817	297	0.0000375
		+ 50	793,002,360	840	0.0001060
Battery Endpoint	2.47	+ 20	793,001,571	51	0.0000064

Table 7-15. LTE Band 14 Frequency Stability Data



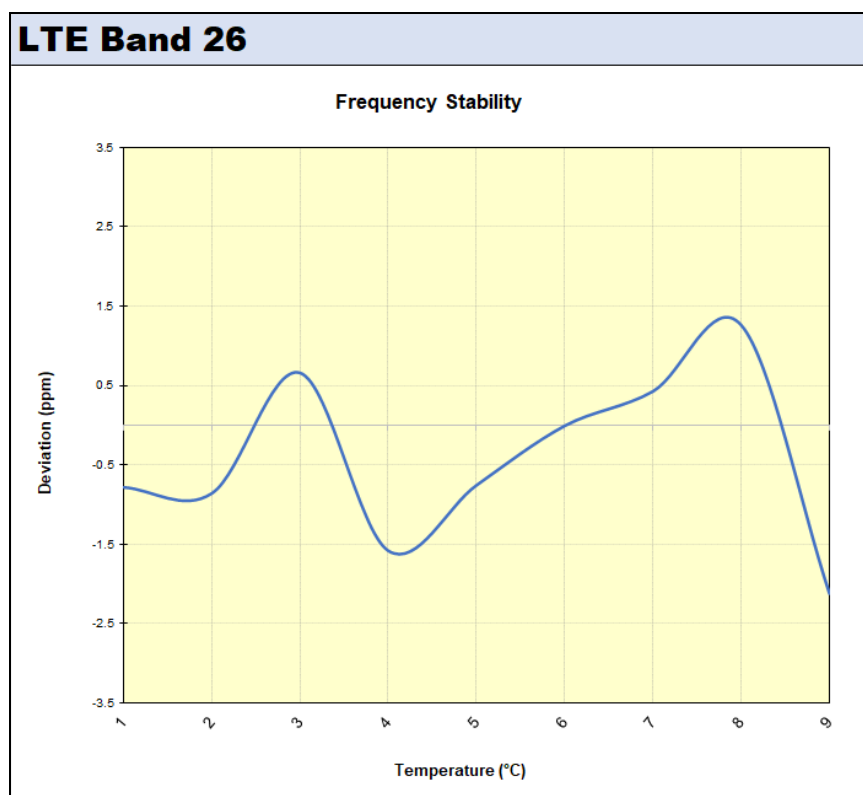
Plot 7-53. LTE Band 14 Frequency Stability Chart

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Frequency Stability / Temperature Variation

LTE Band 26					
Operating Frequency (Hz):		819,000,000			
Ref. Voltage (VDC):		4.32			
Deviation Limit:		± 0.00025% or 2.5 ppm			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.32	- 30	819,006,181	-634	-0.0000774
		- 20	819,006,119	-697	-0.0000851
		- 10	819,007,360	545	0.0000665
		0	819,005,527	-1,289	-0.0001573
		+ 10	819,006,202	-613	-0.0000748
		+ 20 (Ref)	819,006,815	0	0.0000000
		+ 30	819,007,171	355	0.0000434
		+ 40	819,007,852	1,037	0.0001266
		+ 50	819,005,084	-1,731	-0.0002113
Battery Endpoint	2.47	+ 20	819,006,479	-336	-0.0000411

Table 7-16. LTE Band 26 Frequency Stability Data



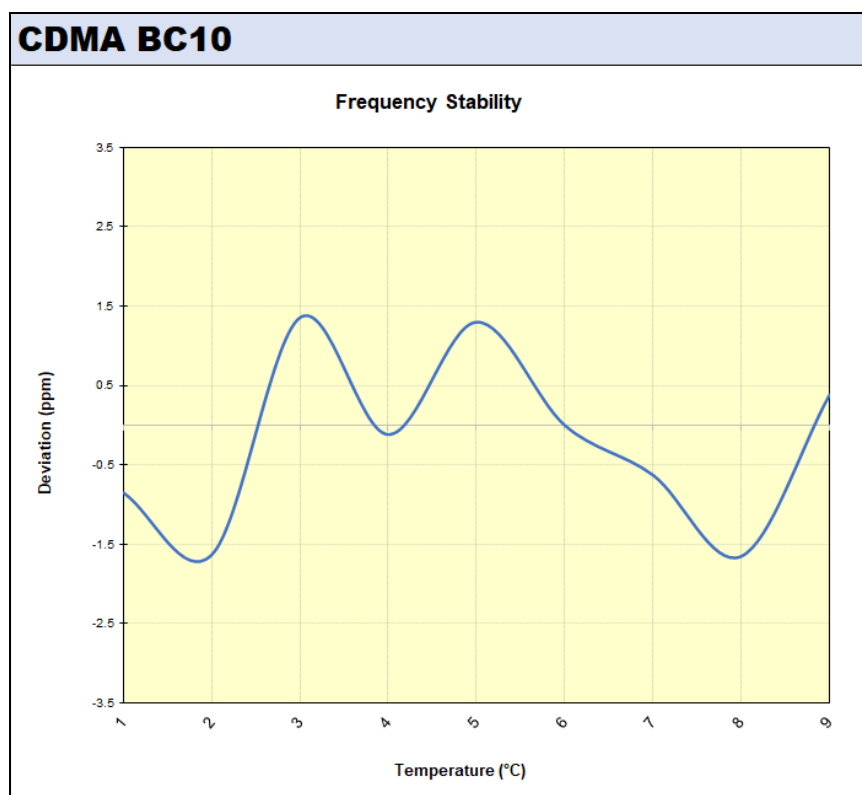
Plot 7-54. LTE Band 26 Frequency Stability Chart

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Frequency Stability / Temperature Variation

CDMA BC10					
Operating Frequency (Hz):		817,900,000			
Ref. Voltage (VDC):		4.32			
Deviation Limit:		± 0.00025% or 2.5 ppm			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.32	- 30	817,899,664	-694	-0.0000848
		- 20	817,899,029	-1,329	-0.0001625
		- 10	817,901,465	1,107	0.0001354
		0	817,900,264	-94	-0.0000115
		+ 10	817,901,419	1,060	0.0001297
		+ 20 (Ref)	817,900,358	0	0.0000000
		+ 30	817,899,847	-511	-0.0000625
		+ 40	817,899,012	-1,346	-0.0001646
		+ 50	817,900,671	313	0.0000383
Battery Endpoint	2.47	+ 20	817,900,192	-166	-0.0000203

Table 7-17. CDMA BC10 Frequency Stability Data



Plot 7-55. CDMA BC10 Frequency Stability Chart

FCC ID: A3LSMF926U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	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: A3LSMF926U** complies with all the requirements of Parts 22(H) and 90 of the FCC rules.

FCC ID: A3LSMF926U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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