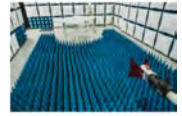




PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
<http://www.pctest.com>



MEASUREMENT REPORT LTE

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


Date of Testing:
4/10-5/24/2019
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M1905200081-02.A3L

FCC ID:	A3LSMG977KOR
APPLICANT:	Samsung Electronics Co., Ltd.



Application Type: Class II Permissive Change
Model: SM-G977B
EUT Type: Portable Handset
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s): 27
Test Procedure(s): ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01, KDB 648474 D03 v01r04
Class II Permissive Change: Please see FCC document
Original Grant Date: 03/14/2019

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



FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset	Page 1 of 34	



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V 9.0 02/01/2019

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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 17025-2005 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: A3LSMG977KOR**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 20784, 21162, 0788J, 0785W

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, ANT+

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 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 placed 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.

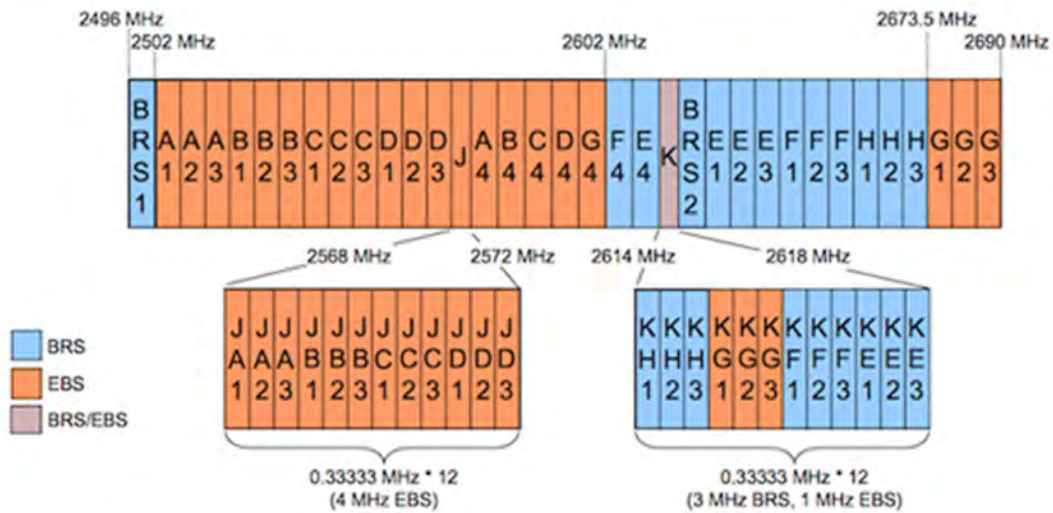
FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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3.0 DESCRIPTION OF TESTS

3.1 Measurement 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 BRS/EBS Frequency Block



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3.3 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. 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 Band 7 and 38, the calculated P_d levels are compared to the absolute spurious emission limit of -25dBm which is equivalent to the required minimum attenuation of $55 + 10 \log_{10}(\text{Power [Watts]})$.



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
-	LTx2	Licensed Transmitter Cable Set	8/23/2018	Annual	8/23/2019	LTx2
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Anritsu	MT8821C	Radio Communication Analyzer	7/24/2018	Annual	7/24/2019	6201664756
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	9/17/2018	Annual	9/17/2019	441119
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	6/7/2018	Triennial	6/7/2021	9203-2178
Espec	ESX-2CA	Environmental Chamber	3/28/2018	Annual	4/28/2019	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/28/2018	Biennial	3/28/2020	128337
Huber + Suhner	Sucoflex 102A	40GHz Radiated Cable Set	8/23/2018	Annual	8/23/2019	251425001
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	4/19/2019	Annual	4/19/2020	11401010036
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	CMW500	Radio Communication Tester	9/25/2018	Annual	9/25/2019	102060
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/25/2018	Annual	6/25/2019	102133
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	7/16/2018	Biennial	7/16/2020	101073
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	9/19/2018	Annual	9/19/2019	100040
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 5-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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6.0 SAMPLE CALCULATIONS

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: A3LSMG977KOR
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
27.53(m)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)	CONDUCTED	PASS	Section 7.2
2.1046	Transmitter Conducted Output Power	N/A			See RF Exposure Report

Table 7-1. Summary of Conducted Test Results



FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
27.53(m)	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)	RADIATED	PASS	Section 7.3

Table 7-2. Summary of Radiated 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 (Sections 7.2) 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) 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 "LTE Automation," Version 5.0.
- 5) For operation <1GHz, the EIRP limits in the table above are referenced to the specifications written in the relevant Radio Standards Specifications for Innovation, Science, and Economic Development Canada.

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7.2 Uplink Carrier Aggregation

§22.917(a) §27.53(h)

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers 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 its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

For Band 7 and 38, the minimum permissible attenuation level of any spurious emission is $55 + 10\log_{10}(P_{[Watts]})$.

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 at least 10 * the fundamental frequency (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 7-1. Test Instrument & Measurement Setup

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Test Notes

1. Uplink carrier aggregation is only supported in this EUT for LTE Band 7 and Band 38.
2. Conducted power and spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device. The worst case (highest) powers were found while operating with QPSK modulation, as shown in Table 7-3, 7-4, 7-5 and 7-6 below, with both carriers set to transmit using 1RB.
3. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. 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.

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Uplink CA Configuration 7

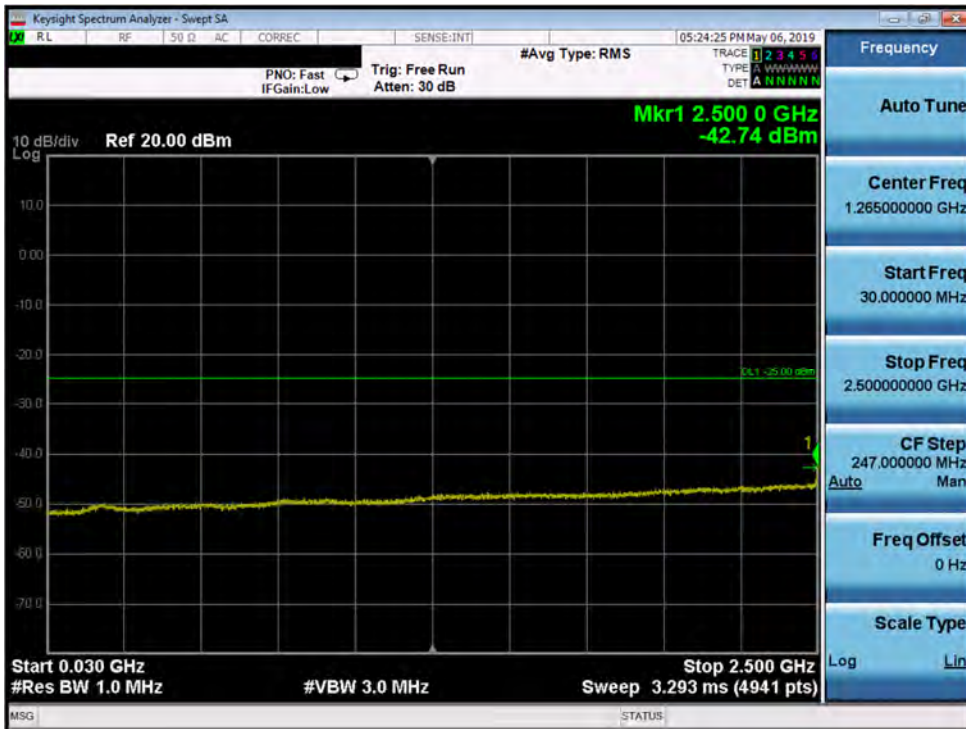
Power State	PCC							SCC							Power ULCA Tx.Power (dBm)
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	
Max	LTE B7	20	20850	2510	QPSK	1	99	LTE B7	20	21048	2529.8	QPSK	1	0	24.16
Max	LTE B7	20	21100	2535	QPSK	1	99	LTE B7	20	21298	2554.8	QPSK	1	0	24.45
Max	LTE B7	20	21350	2560	QPSK	1	0	LTE B7	20	21152	2540.2	QPSK	1	99	23.82

Table 7-3. Conducted Powers (B7 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

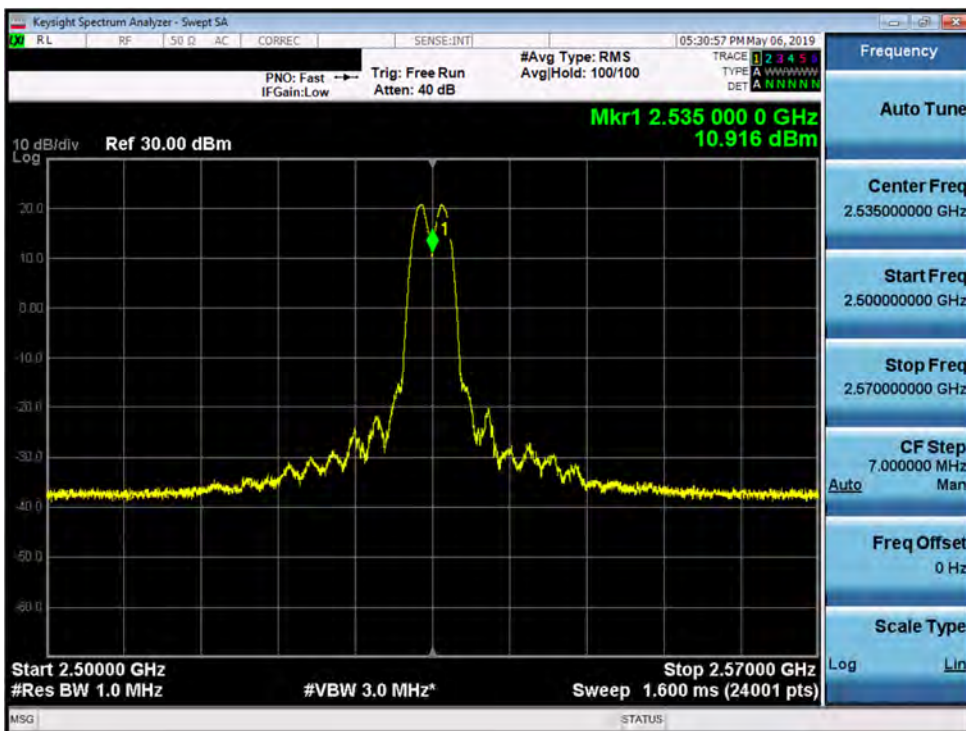
Power State	PCC							SCC							Power ULCA Tx.Power (dBm)
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	
Max	LTE B7	20	21100	2535	QPSK	1	0	LTE B7	20	21298	2544.8	QPSK	1	0	24.49
Max	LTE B7	20	21100	2535	QPSK	1	99	LTE B7	20	21298	2544.8	QPSK	1	99	24.21
Max	LTE B7	20	21100	2535	QPSK	1	0	LTE B7	20	21298	2544.8	QPSK	1	99	24.42
Max	LTE B7	20	21100	2535	QPSK	1	50	LTE B7	20	21298	2544.8	QPSK	1	50	24.52
Max	LTE B7	20	21100	2535	QPSK	1	99	LTE B7	20	21298	2544.8	QPSK	1	0	24.41
Max	LTE B7	20	21100	2535	QPSK	100	0	LTE B7	20	21298	2544.8	QPSK	100	0	24.48
Max	LTE B7	20	21100	2535	16-QAM	100	0	LTE B7	20	21298	2544.8	16-QAM	100	0	24.45
Max	LTE B7	20	21100	2535	64-QAM	100	0	LTE B7	20	21298	2544.8	64-QAM	100	0	24.41

Table 7-4. Conducted Powers (B7 with Various Combinations for 10MHz Channel Bandwidth)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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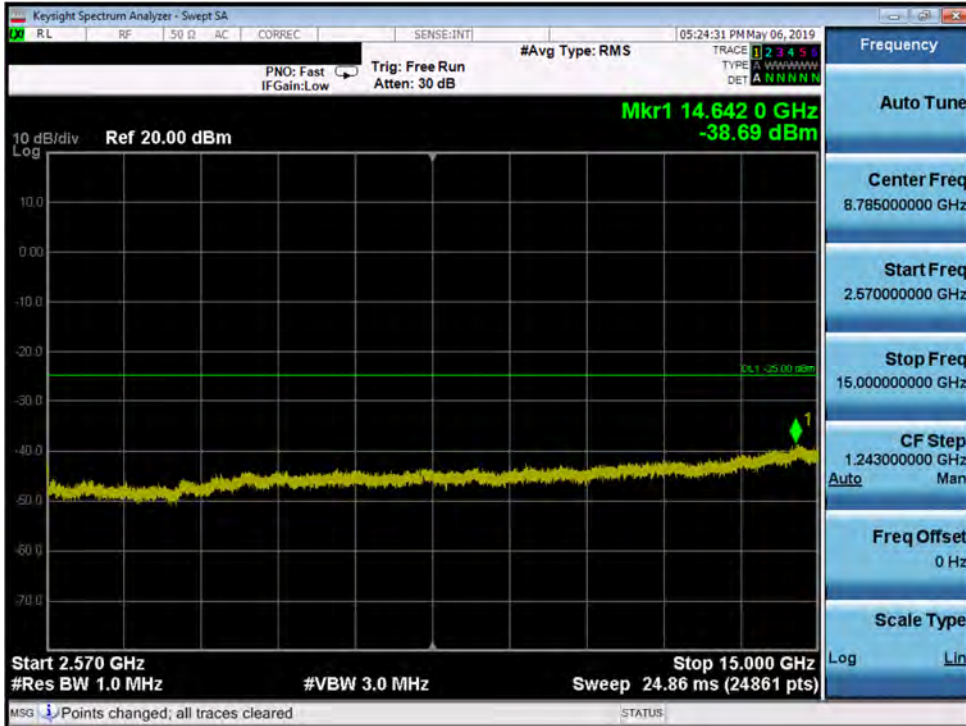


Plot 7-1. Conducted Spurious Plot (Band 7 – PCC:20 MHz SCC:20 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

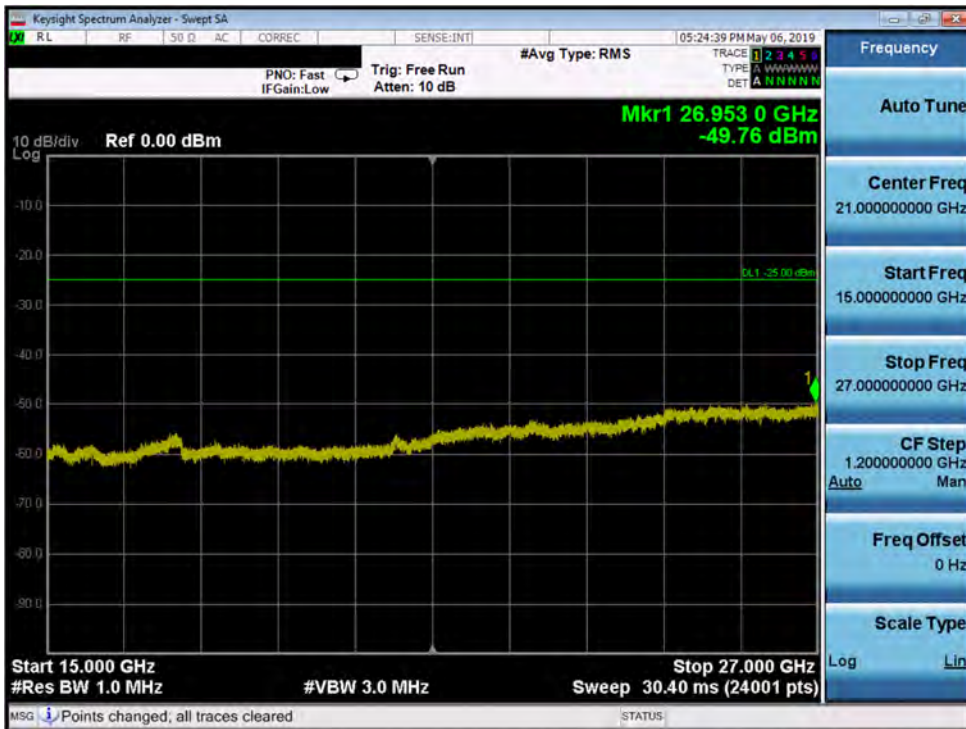


Plot 7-2. Conducted Spurious Plot (Band 7 – PCC:20 MHz SCC:20 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

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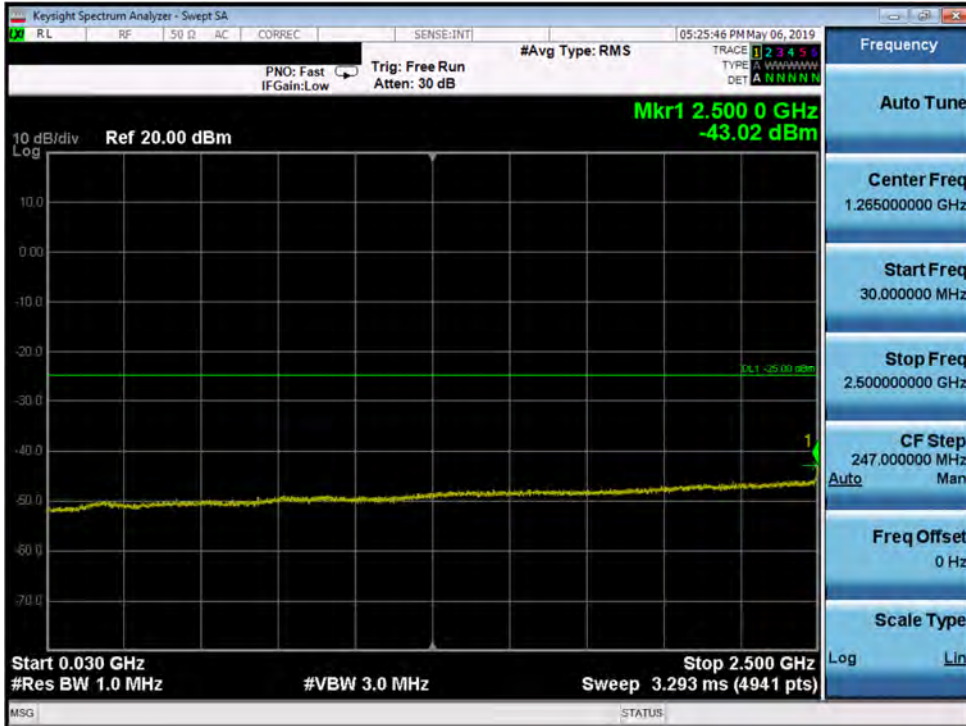


Plot 7-3. Conducted Spurious Plot (Band 7 – PCC:20 MHz SCC:20 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-4. Conducted Spurious Plot (Band 7 – PCC:20 MHz SCC:20 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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Plot 7-5. Conducted Spurious Plot (Band 7 – 20 MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)

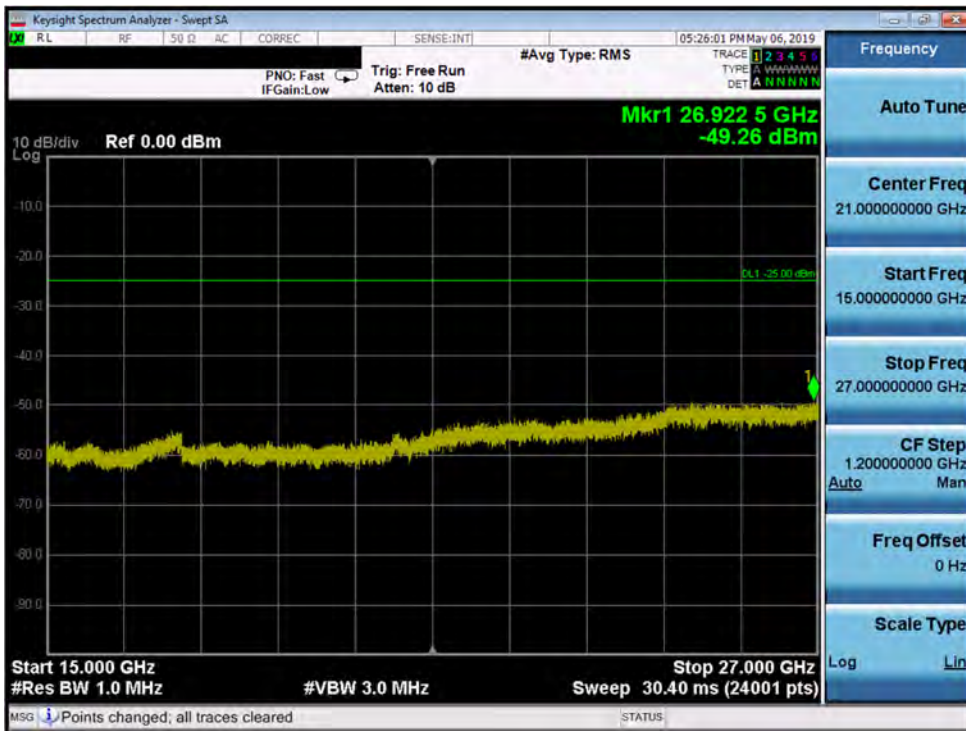


Plot 7-6. Conducted Spurious Plot (Band 7 – 20 MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset		Page 17 of 34

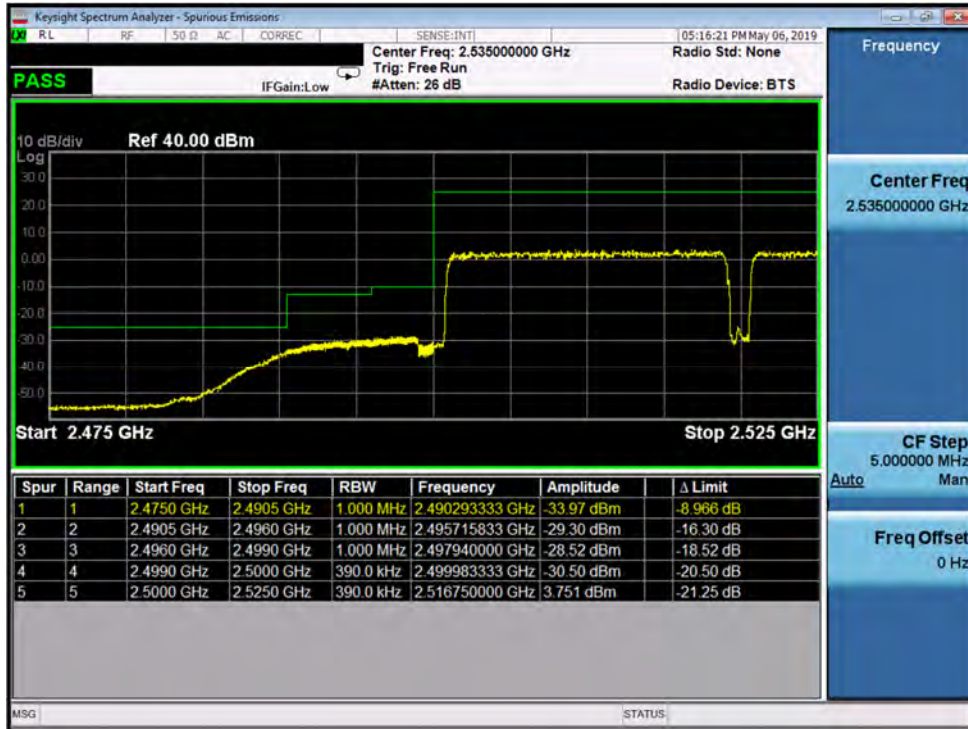


Plot 7-7. Conducted Spurious Plot (Band 7 – 20 MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)



Plot 7-8. Conducted Spurious Plot (Band 7 – 20 MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset		Page 18 of 34



Plot 7-9. Lower Band Edge Plot (Band 20 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)



Plot 7-10. Upper Band Edge Plot (Band 20 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset		Page 19 of 34

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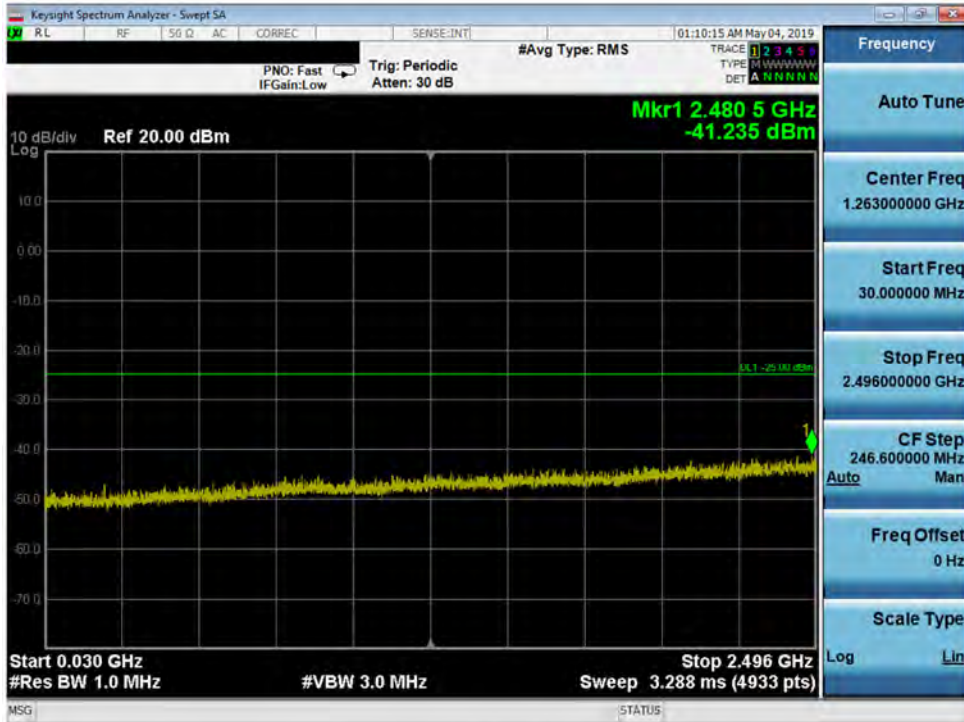
Power State	PCC							SCC							Power ULCA Tx.Power (dBm)
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	
Max	LTE B38	15	37825	2577.5	QPSK	1	74	LTE B38	15	37975	2592.5	QPSK	1	0	22.43
Max	LTE B38	20	37850	2580	QPSK	1	99	LTE B38	20	38048	2599.8	QPSK	1	0	22.66
Max	LTE B38	15	37925	2587.5	QPSK	1	74	LTE B38	15	38075	2602.5	QPSK	1	0	22.44
Max	LTE B38	20	37901	2585.1	QPSK	1	99	LTE B38	20	38099	2604.9	QPSK	1	0	22.39
Max	LTE B38	15	38025	2597.5	QPSK	1	74	LTE B38	15	38175	2612.5	QPSK	1	0	22.62
Max	LTE B38	20	37952	2590.2	QPSK	1	99	LTE B38	20	38150	2610	QPSK	1	0	22.40

Table 7-5. Conducted Powers (B38 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

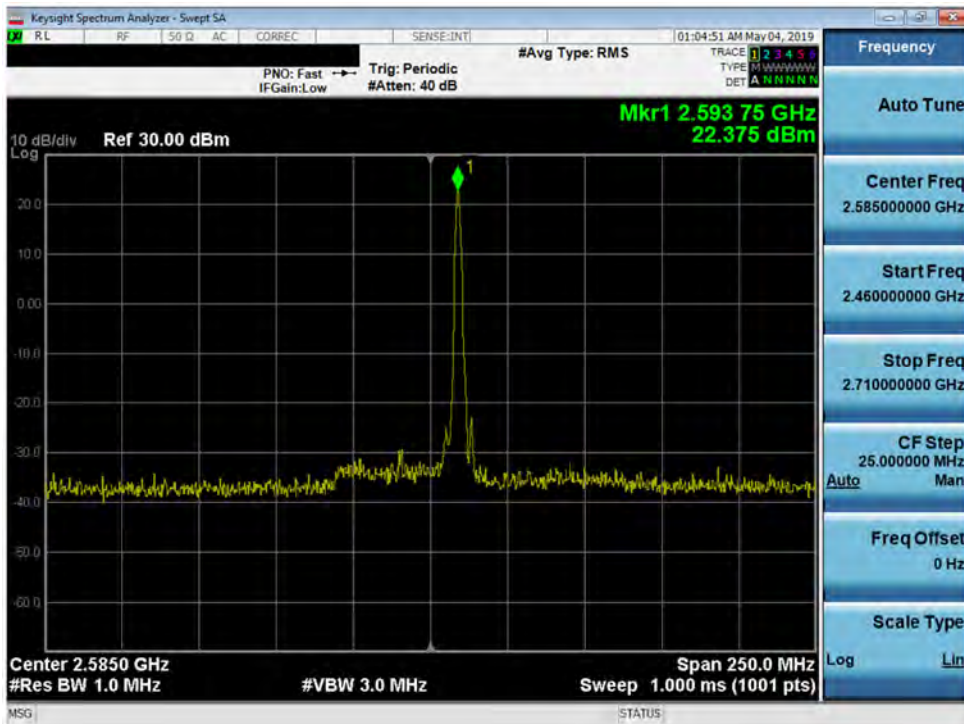
Power State	PCC							SCC							Power ULCA Tx.Power (dBm)
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	
Max	LTE B38	20	37850	2580	QPSK	1	0	LTE B38	15	38021	2597.1	QPSK	1	0	22.44
Max	LTE B38	20	37850	2580	QPSK	1	99	LTE B38	15	38021	2597.1	QPSK	1	99	22.41
Max	LTE B38	20	37850	2580	QPSK	1	0	LTE B38	15	38021	2597.1	QPSK	1	99	22.50
Max	LTE B38	20	37850	2580	QPSK	1	50	LTE B38	15	38021	2597.1	QPSK	1	50	22.55
Max	LTE B38	20	37850	2580	QPSK	1	99	LTE B38	15	38021	2597.1	QPSK	1	0	22.66
Max	LTE B38	20	37850	2580	QPSK	100	0	LTE B38	15	38021	2597.1	QPSK	100	0	22.56
Max	LTE B38	20	37850	2580	16-QAM	100	0	LTE B38	15	38021	2597.1	16-QAM	100	0	22.51
Max	LTE B38	20	37850	2580	64-QAM	100	0	LTE B38	15	38021	2597.1	64-QAM	100	0	22.23

Table 7-6. Conducted Powers (B38 with Various Combinations for 20MHz + 15MHz Channel Bandwidth)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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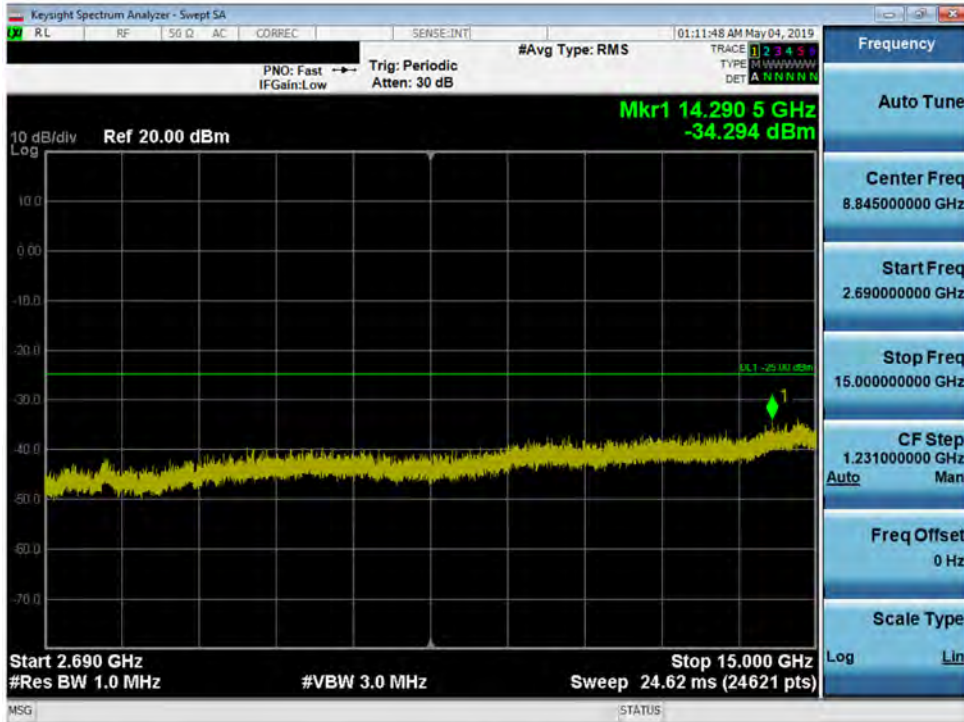


Plot 7-11. Conducted Spurious Plot (Band 38 – PCC:20 MHz SCC:15 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

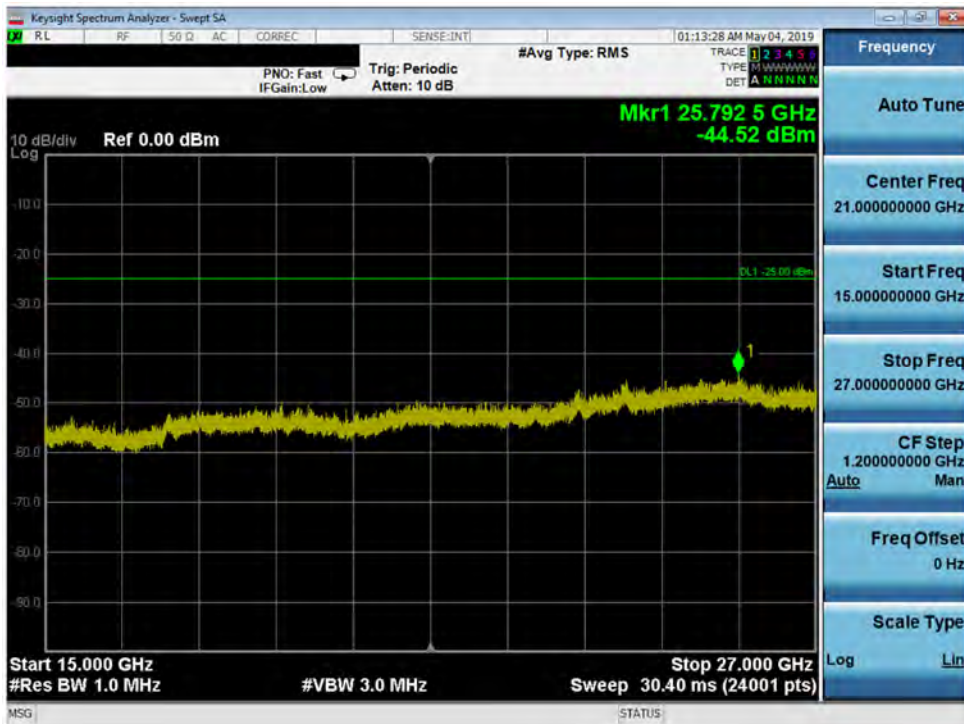


Plot 7-12. Conducted Spurious Plot (Band 38 – PCC:20 MHz SCC:15 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02-A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset		Page 21 of 34

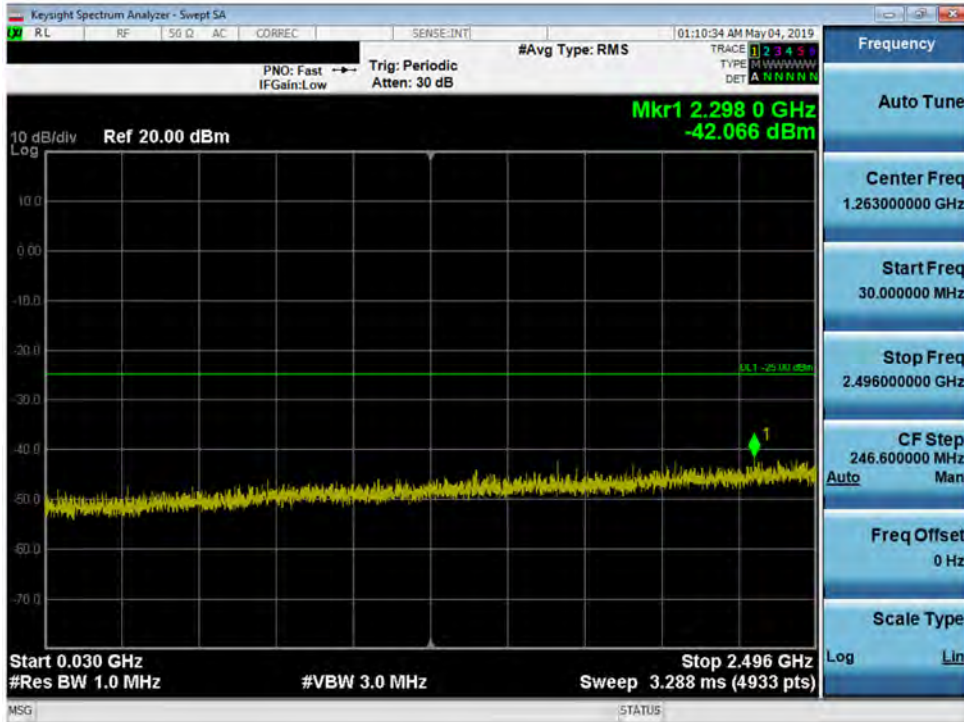


Plot 7-13. Conducted Spurious Plot (Band 38 – PCC:20 MHz SCC:15 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

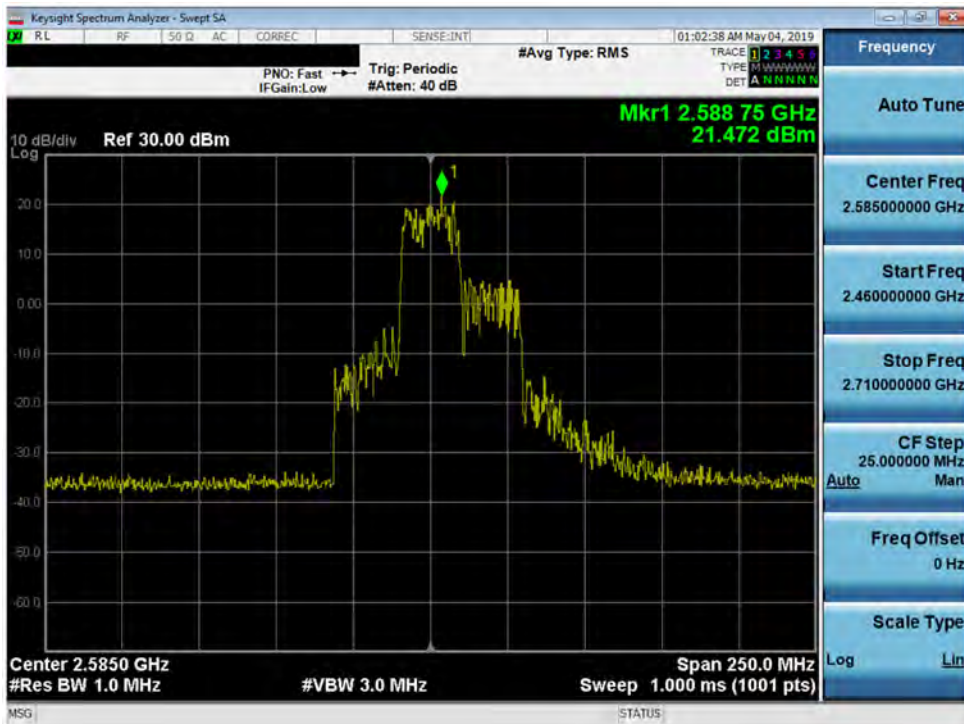


Plot 7-14. Conducted Spurious Plot (Band 38 – PCC:20 MHz SCC:15 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02-A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset		Page 22 of 34

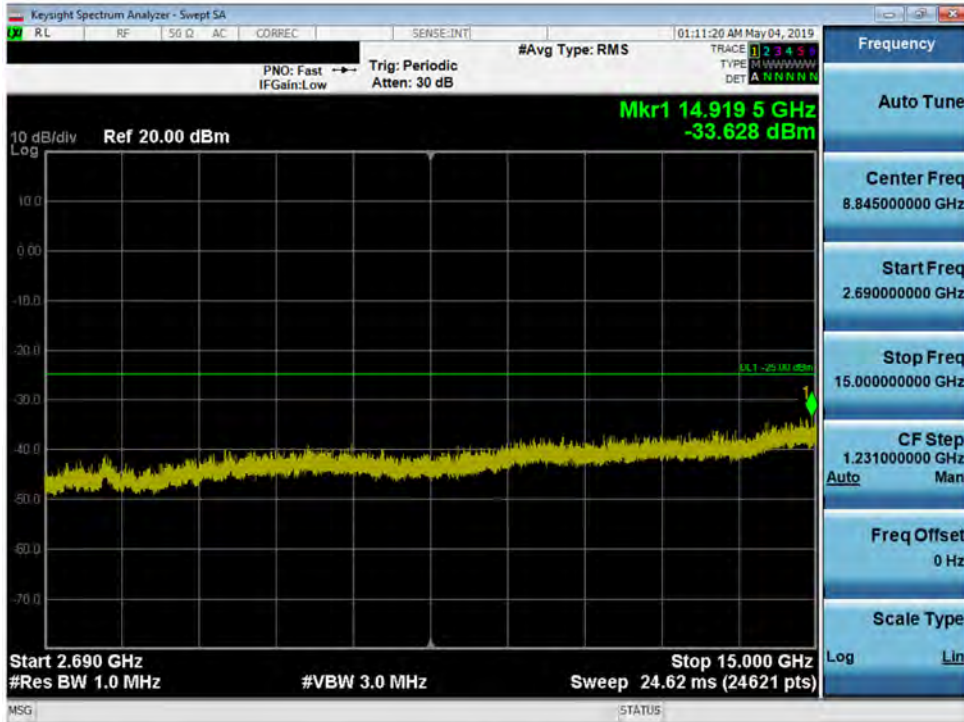


Plot 7-15. Conducted Spurious Plot (Band 38 – PCC:20 MHz SCC:15 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

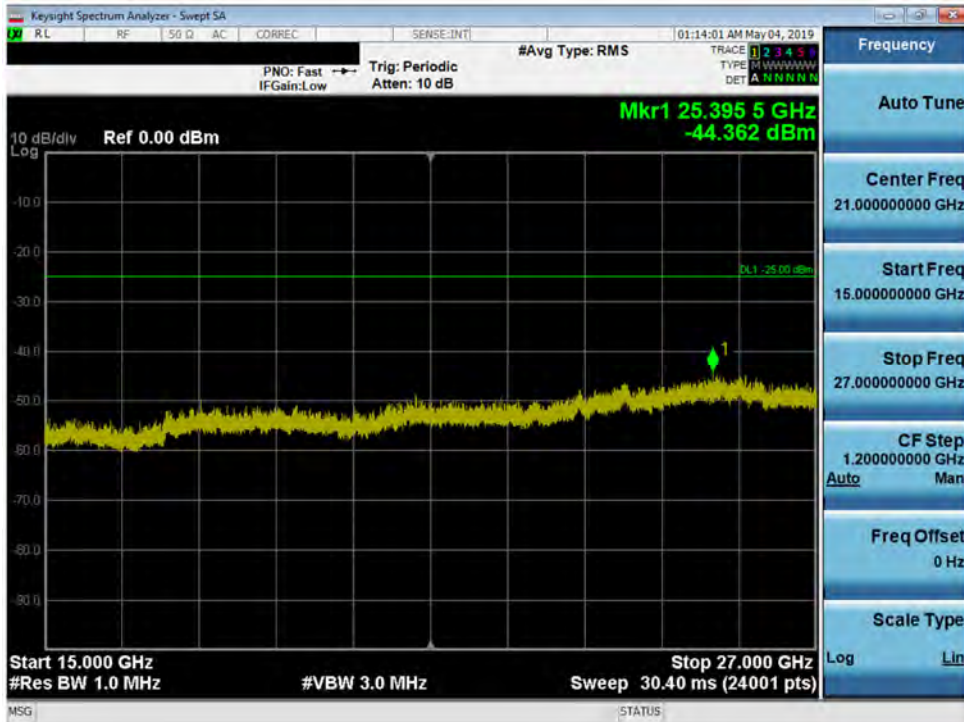


Plot 7-16. Conducted Spurious Plot (Band 38 – PCC:20 MHz SCC:15 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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Plot 7-17. Conducted Spurious Plot (Band 38 – PCC:20 MHz SCC:15 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

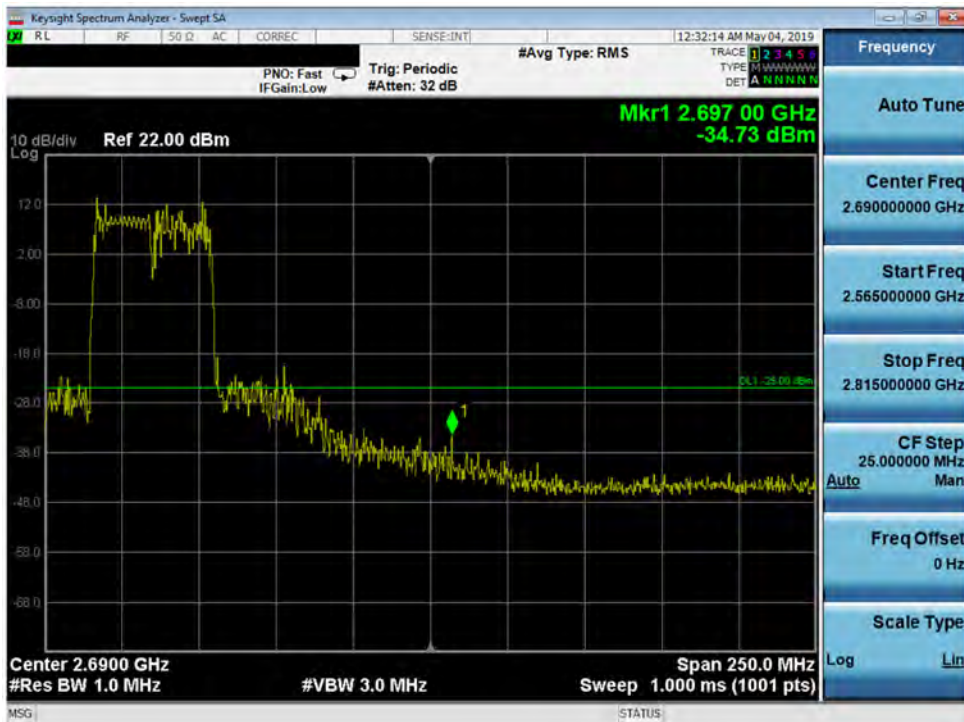


Plot 7-18. Conducted Spurious Plot (Band 38 – PCC:20 MHz SCC:15 MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset		Page 24 of 34



Plot 7-19. Lower Band Edge Plot (Band 38 QPSK – PCC:20 MHz SCC:15 MHz – Full RB)



Plot 7-20. Upper Band Edge Plot (Band 38 QPSK – PCC:20 MHz SCC:15 MHz – Full RB)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset		Page 25 of 34



7.3 Uplink Carrier Aggregation Radiated Measurements §22.917(a) §27.53(h)

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 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 peak 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 v02r02 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW \geq 3 x RBW
3. No. of sweep points \geq 2 x span / RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. The trace was allowed to stabilize

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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Test Setup

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

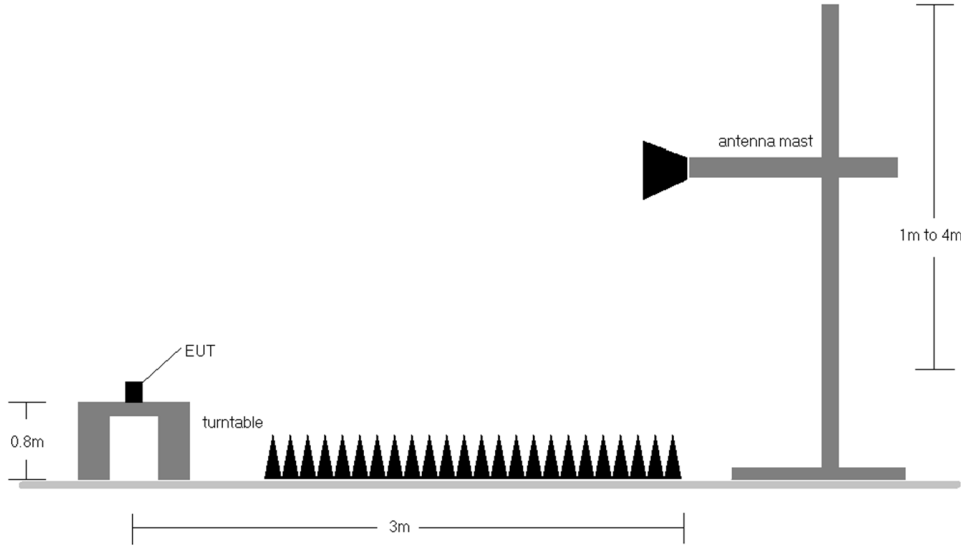




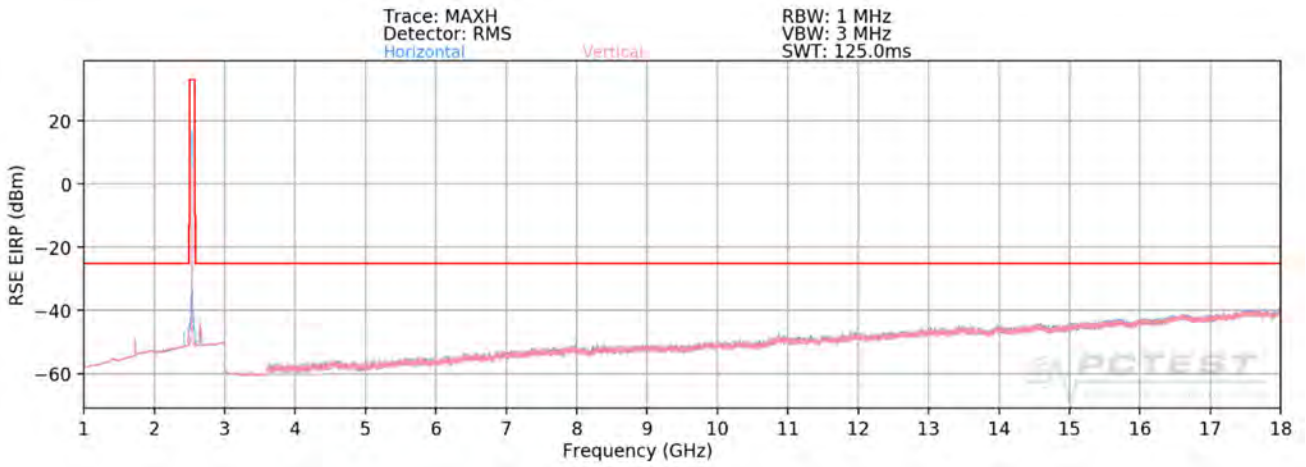
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

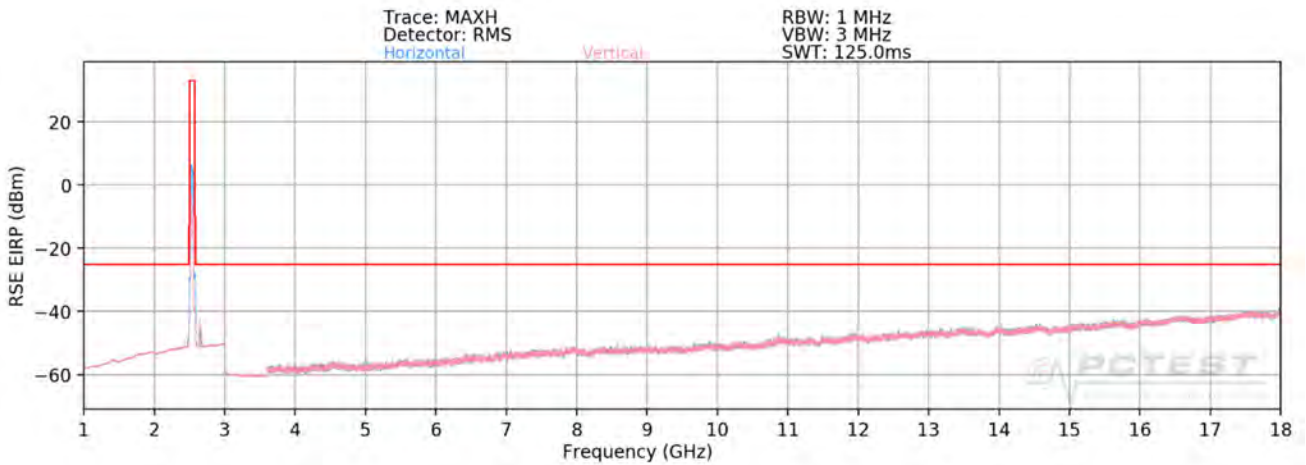
- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) Radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.
- 4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 6) No significant emissions were found as a result of two uplink carriers operating contiguously.

FCC ID: A3LSMG977KOR		<p align="center">MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</p>	 <p>Approved by: Quality Manager</p>
<p>Test Report S/N: 1M1905200081-02.A3L</p>	<p>Test Dates: 4/10-5/24/2019</p>	<p>EUT Type: Portable Handset</p>	<p>Page 27 of 34</p>

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Plot 7-21. Radiated Spurious Plot (ULCA B7 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)



Plot 7-22. Radiated Spurious Plot (ULCA B7 PCC: RB 100 Offset 0, SCC: RB 100 Offset 0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset		Page 28 of 34

OPERATING FREQUENCY (PCC): 2510.00 MHz
 OPERATING FREQUENCY (SCC): 2529.80 MHz
 CHANNEL (PCC): 20850
 CHANNEL (SCC): 21048
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5020.00	V	-	-	-67.97	8.78	-59.19	-34.2
7530.00	V	-	-	-64.71	9.31	-55.40	-30.4

Table 7-7. Radiated Spurious Data (ULCA B7 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Low Channel)

OPERATING FREQUENCY (PCC): 2535.00 MHz
 OPERATING FREQUENCY (SCC): 2554.80 MHz
 CHANNEL (PCC): 21100
 CHANNEL (SCC): 21298
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5070.00	V	-	-	-68.36	8.89	-59.47	-34.5
7605.00	V	-	-	-64.82	9.25	-55.57	-30.6

Table 7-8. Radiated Spurious Data (ULCA B7 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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OPERATING FREQUENCY (PCC): 2560.00 MHz
 OPERATING FREQUENCY (SCC): 2540.20 MHz
 CHANNEL (PCC): 21350
 CHANNEL (SCC): 21152
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5120.00	V	-	-	-68.34	8.91	-59.42	-34.4
7680.00	V	-	-	-64.68	9.28	-55.41	-30.4

Table 7-9. Radiated Spurious Data (ULCA B7 PCC: RB 1 Offset 0, SCC: RB 1 Offset 99 – High Channel)

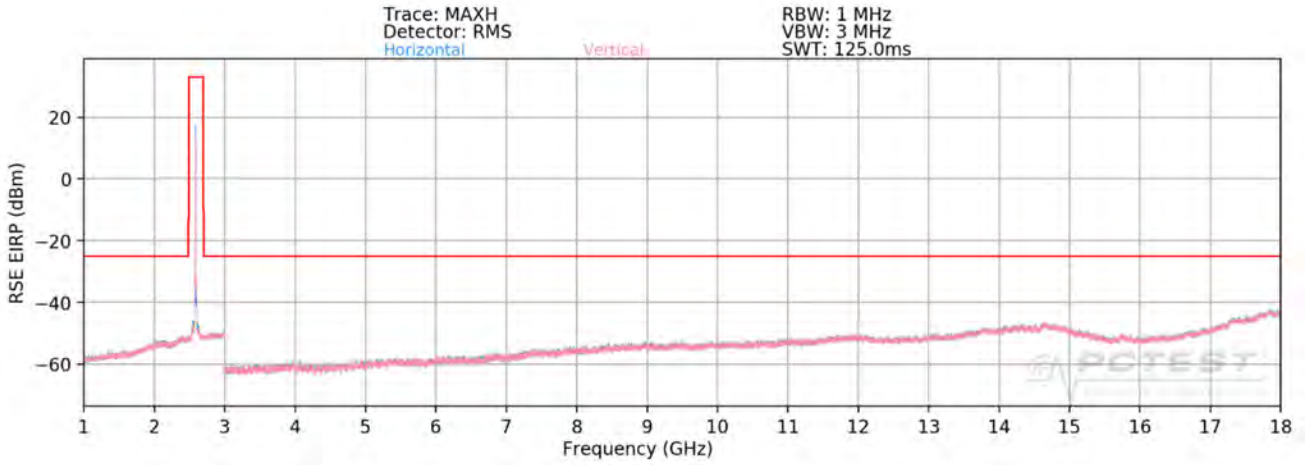
OPERATING FREQUENCY (PCC): 2560.00 MHz
 OPERATING FREQUENCY (SCC): 2540.20 MHz
 CHANNEL (PCC): 21350
 CHANNEL (SCC): 21152
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5120.00	V	-	-	-67.96	8.91	-59.04	-34.0
7680.00	V	-	-	-65.14	9.28	-55.87	-30.9

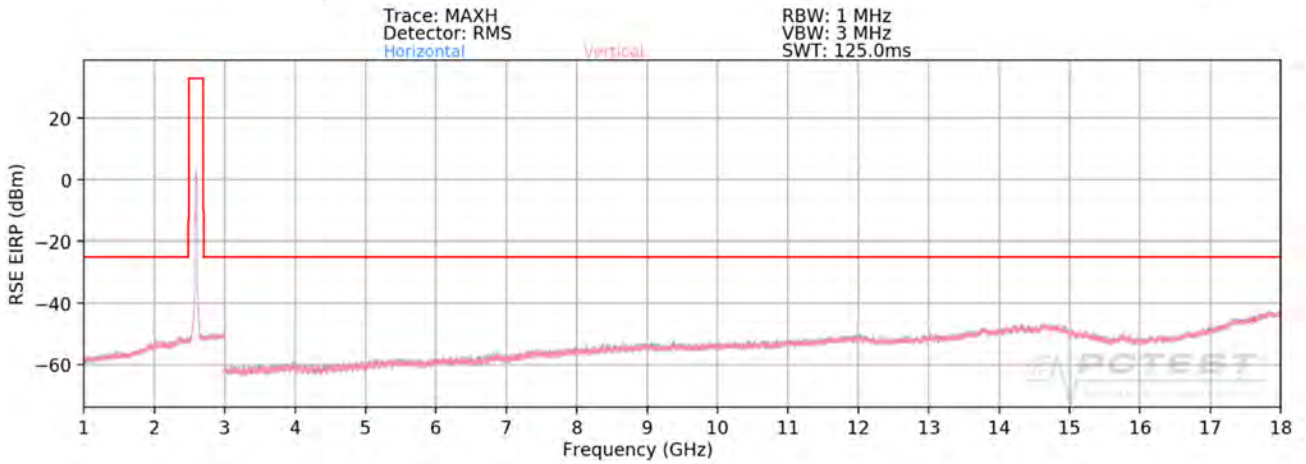
Table 7-10. Radiated Spurious Data with WCP (ULCA B7 PCC: RB 1 Offset 0, SCC: RB 1 Offset 99 – High Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset			Page 30 of 34

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Plot 7-23. Radiated Spurious Plot (ULCA B38 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)



Plot 7-24. Radiated Spurious Plot (ULCA B38 PCC: RB 100 Offset 0, SCC: RB 75 Offset 0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset		Page 31 of 34

OPERATING FREQUENCY (PCC): 2580.00 MHz
 OPERATING FREQUENCY (SCC): 2599.80 MHz
 CHANNEL (PCC): 37850
 CHANNEL (SCC): 38048
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5160.00	H	353	343	-63.33	10.71	-52.62	-27.6
7740.00	H	309	348	-60.43	11.43	-49.00	-24.0
10320.00	H	253	2	-61.02	12.38	-48.64	-23.6
12900.00	H	-	-	-67.74	13.32	-54.41	-29.4
15480.00	H	345	19	-70.05	15.88	-54.17	-29.2

Table 7-11. Radiated Spurious Data (ULCA B38 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Low Channel)

OPERATING FREQUENCY (PCC): 2585.10 MHz
 OPERATING FREQUENCY (SCC): 2604.90 MHz
 CHANNEL (PCC): 37901
 CHANNEL (SCC): 38099
 DISTANCE: 3 meters
 LIMIT: -25 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5170.20	H	349	354	-65.41	10.72	-54.69	-29.7
7755.30	H	322	351	-63.69	11.44	-52.25	-27.2
10340.40	H	400	57	-68.21	12.40	-55.81	-30.8
12925.50	H	-	-	-67.29	13.31	-53.98	-29.0
15510.60	H	-	-	-71.08	16.20	-54.88	-29.9

Table 7-12. Radiated Spurious Data (ULCA B38 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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OPERATING FREQUENCY (PCC): 2610.00 MHz
 OPERATING FREQUENCY (SCC): 2590.20 MHz
 CHANNEL (PCC): 28150
 CHANNEL (SCC): 37952
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5220.00	H	350	21	-58.45	10.74	-47.71	-22.7
7830.00	H	319	346	-62.86	11.38	-51.48	-26.5
10440.00	H	235	359	-61.79	12.55	-49.24	-24.2
13050.00	H	400	356	-66.87	13.21	-53.66	-28.7
15660.00	H	-	-	-71.89	16.52	-55.36	-30.4

Table 7-13. Radiated Spurious Data (ULCA B38 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – High Channel)

OPERATING FREQUENCY (PCC): 2610.00 MHz
 OPERATING FREQUENCY (SCC): 2590.20 MHz
 CHANNEL (PCC): 28150
 CHANNEL (SCC): 37952
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -25 dBm



Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5220.00	H	114	18	-66.89	10.74	-56.15	-31.1
7830.00	H	338	359	-65.24	11.38	-53.86	-28.9
10440.00	H	-	-	-67.91	12.55	-55.36	-30.4
13050.00	H	-	-	-67.06	13.21	-53.85	-28.9
15660.00	H	-	-	-71.62	16.52	-55.09	-30.1

Table 7-14. Radiated Spurious Data with WCP (ULCA B38 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Low Channel)

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality 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: A3LSMG977KOR** complies with all the requirements of Part 27 of the FCC Rules for LTE operation only.

FCC ID: A3LSMG977KOR		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1905200081-02.A3L	Test Dates: 4/10-5/24/2019	EUT Type: Portable Handset	Page 34 of 34	