

MEASUREMENT REPORT
LTE

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


Date of Testing:
 12/19-12/29/2017
Test Site/Location:
 PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
 1M1712210330-02.A3L

FCC ID:	A3LSMG965U
APPLICANT:	Samsung Electronics Co., Ltd.

Application Type: Class II Permissive Change
Model: SM-G965U
Additional Model(s): SM-G965U1, SM-G965W, SM-G965XU
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 v03, KDB 648474 D03 v01r04
Class II Permissive Change: Please see FCC change document
Original Grant Date: 1/11/2018

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

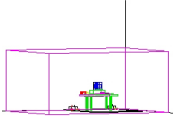


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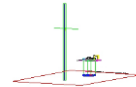
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FCC Part 27



Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	
LTE Band 7	27	2502.5 - 2567.5	0.159	22.02	QPSK
LTE Band 7	27	2502.5 - 2567.5	0.133	21.25	16QAM
LTE Band 7	27	2502.5 - 2567.5	0.111	20.47	64QAM
LTE Band 7	27	2505 - 2565	0.172	22.35	QPSK
LTE Band 7	27	2505 - 2565	0.149	21.72	16QAM
LTE Band 7	27	2505 - 2565	0.116	20.64	64QAM
LTE Band 7	27	2507.5 - 2562.5	0.173	22.39	QPSK
LTE Band 7	27	2507.5 - 2562.5	0.152	21.83	16QAM
LTE Band 7	27	2507.5 - 2562.5	0.114	20.58	64QAM
LTE Band 7	27	2510 - 2560	0.179	22.52	QPSK
LTE Band 7	27	2510 - 2560	0.138	21.39	16QAM
LTE Band 7	27	2510 - 2560	0.112	20.48	64QAM

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 17025-2005 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: A3LSMG965U**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 77859

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac 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.

This device also employs an antenna switching mechanism that allows for radiated transmission from one of two antennas at a time for LTE B30 and B7. LTE B30 and LTE B7 RF tests were performed with a manufacturer SW test code that simulated the two transmit conditions, and it was verified that the test results in this report reflect the actual transmit conditions. Both antennas cannot transmit simultaneously so dual transmission conditions were not investigated. The main transmit antenna data is labeled as "Antenna B" and the secondary transmit antenna data is labeled as "Antenna A" in the radiated section of this report.

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03. 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.

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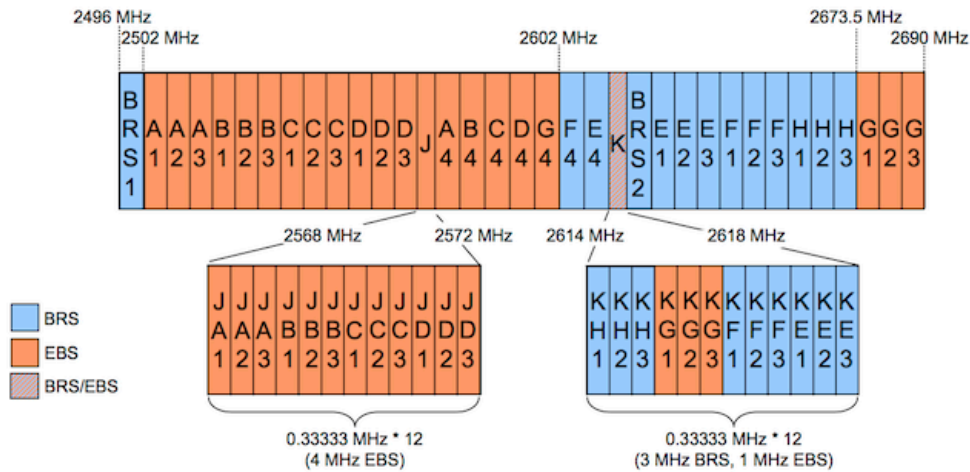
3.0 DESCRIPTION OF TESTS

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 v03) were used in the measurement of the EUT.

3.2 BRS/EBS Frequency Block

§27.5



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3.3 Radiated Power and Radiated Spurious Emissions §2.1053 §27.53(m)

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 v03.

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

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

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

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power} [Watts])$. For Band 7, the calculated P_d levels are compared to the absolute spurious emission limit of -25dBm which is equivalent to the required minimum attenuation of $55 + 10\log_{10}(\text{Power} [Watts])$.

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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	8/10/2017	Annual	8/10/2018	LTx2
Agilent	N9030A	PXA Signal Analyzer (44GHz)	3/27/2017	Annual	3/27/2018	MY52350166
COM-Power	AL-130R	Active Loop Antenna	6/5/2017	Annual	6/5/2018	121085
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/23/2016	Biennial	8/23/2018	135427
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	12/1/2016	Biennial	12/1/2018	125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	4/26/2016	Biennial	4/26/2018	128337
Huber+Suhner	Sucoflex 102A	40GHz Radiated Cable	5/19/2017	Annual	5/19/2018	251425001
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	3/24/2017	Annual	3/24/2018	11401010036
Mini Circuits	TVA-11-422	RF Power Amp	N/A		N/A	QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A		N/A	11208010032
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	4/19/2017	Annual	4/19/2018	100342
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/11/2017	Annual	8/11/2018	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102135
Anritsu	MT8820C	Radio Communication Analyzer	10/25/2017	Annual	10/25/2018	6201144419
Rohde & Schwarz	TC-TA18	Cross-Pol Antenna 400MHz-18GHz	10/30/2017	Annual	10/30/2018	101058
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	3/30/2016	Biennial	3/30/2018	9105-2404
Rohde & Schwarz	TS-PR8	Preamplifier-Antenna SYS; 30MHz-8GHz	10/19/2017	Annual	10/19/2018	102324
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107

Table 5-1. Test Equipment

Notes:

- 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

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: A3LSMG965U
 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
2.1051 27.53(m)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)	Conducted	PASS	Section 7.2
27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 7)	< 2 Watts max. EIRP	RADIATED	PASS	Section 7.3
2.1053 27.53(m)	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)		PASS	Section 7.4

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots (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 4.8.

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7.2 Band Edge Emissions at Antenna Terminal §2.1051 §27.53(m)

Test Overview

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

The minimum permissible attenuation level for Band 7 is as noted in the Test Notes on the following page.

Test Procedure Used

KDB 971168 D01 v03 – Section 6.0

Test Settings

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

Test Setup

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

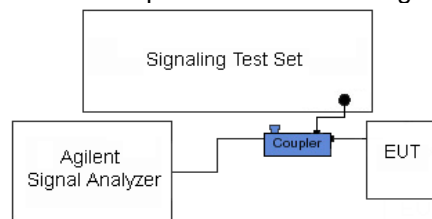


Figure 7-1. Test Instrument & Measurement Setup

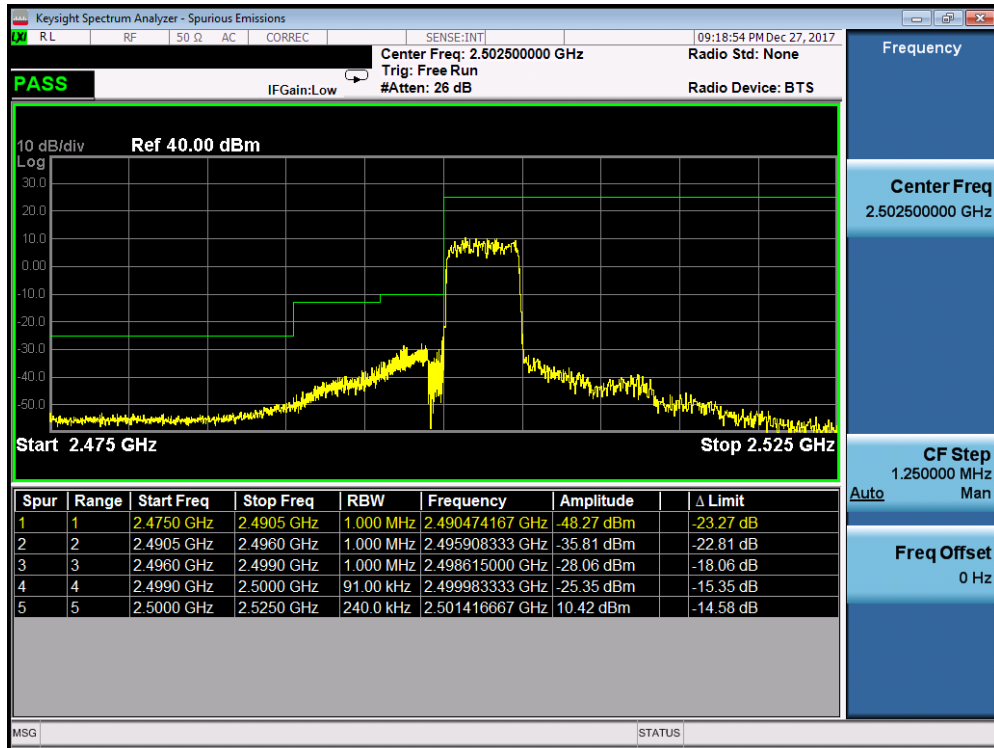
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Test Notes

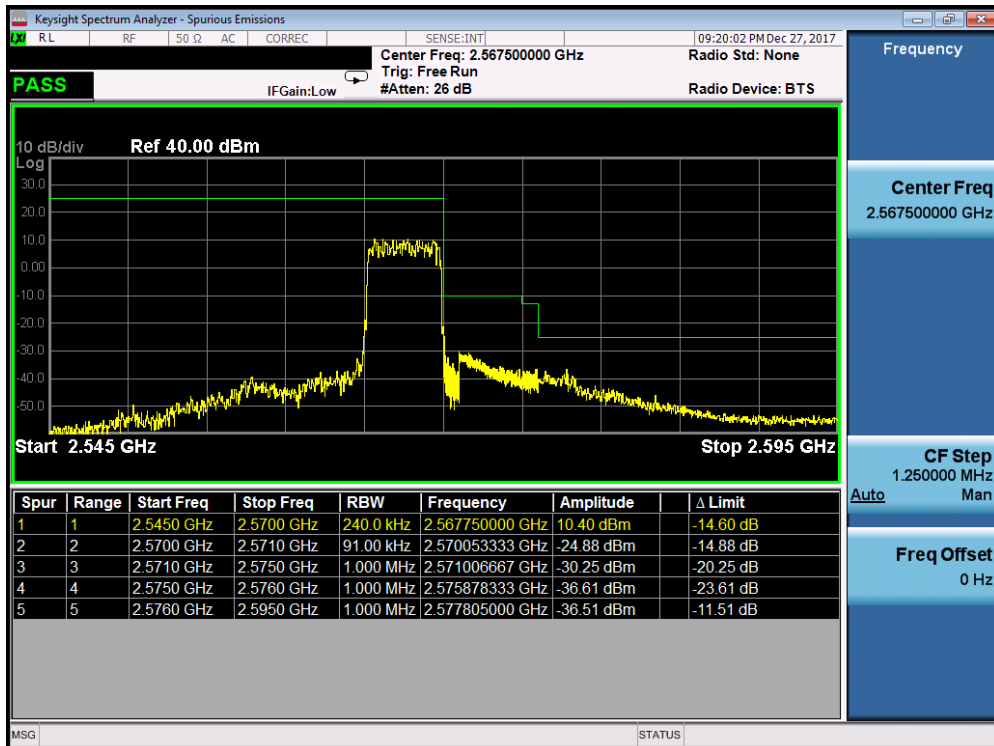
Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz.

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Band 7 – Antenna A

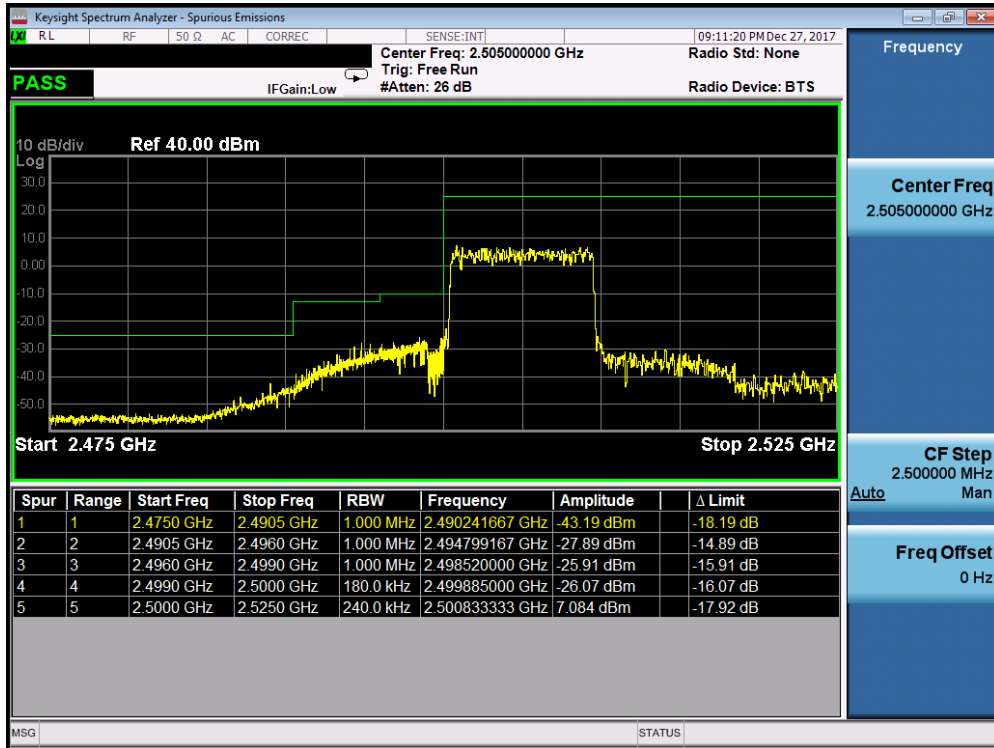


Plot 7-1. Lower ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25 – Antenna A)

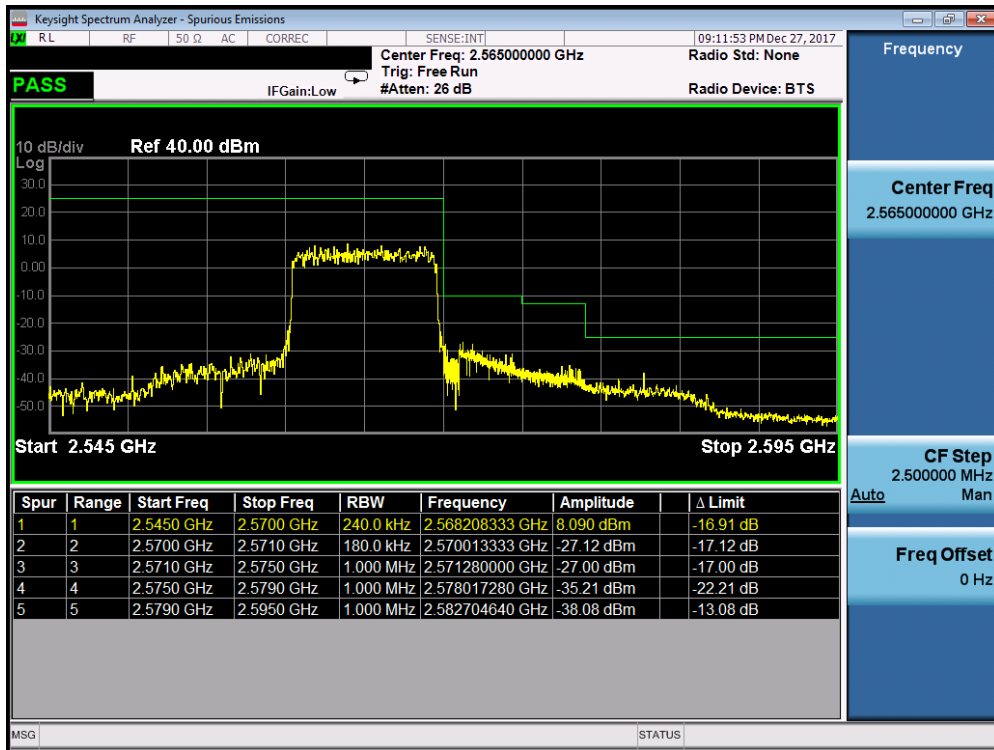


Plot 7-2. Upper ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25 – Antenna A)

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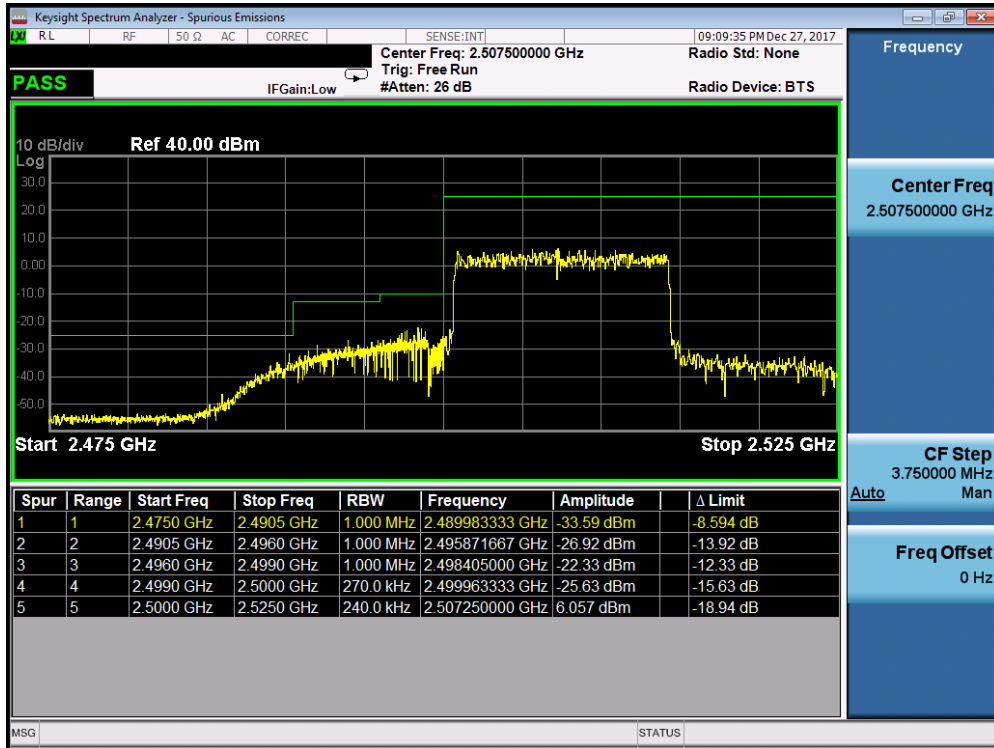


Plot 7-3. Lower ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50 – Antenna A)

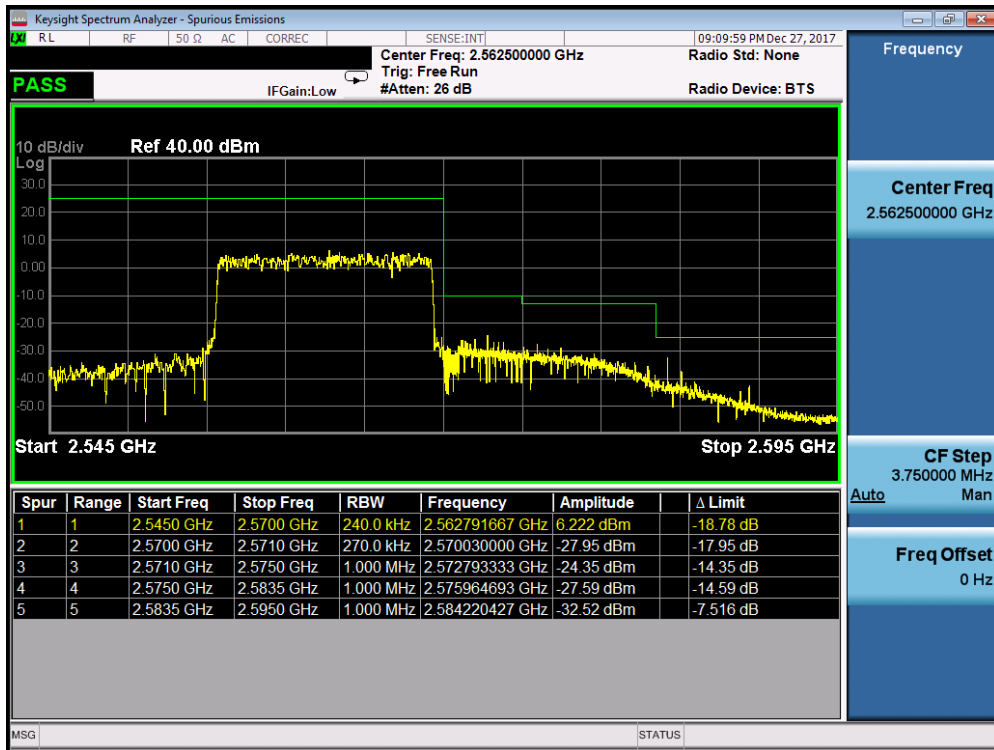


Plot 7-4. Upper ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50 – Antenna A)

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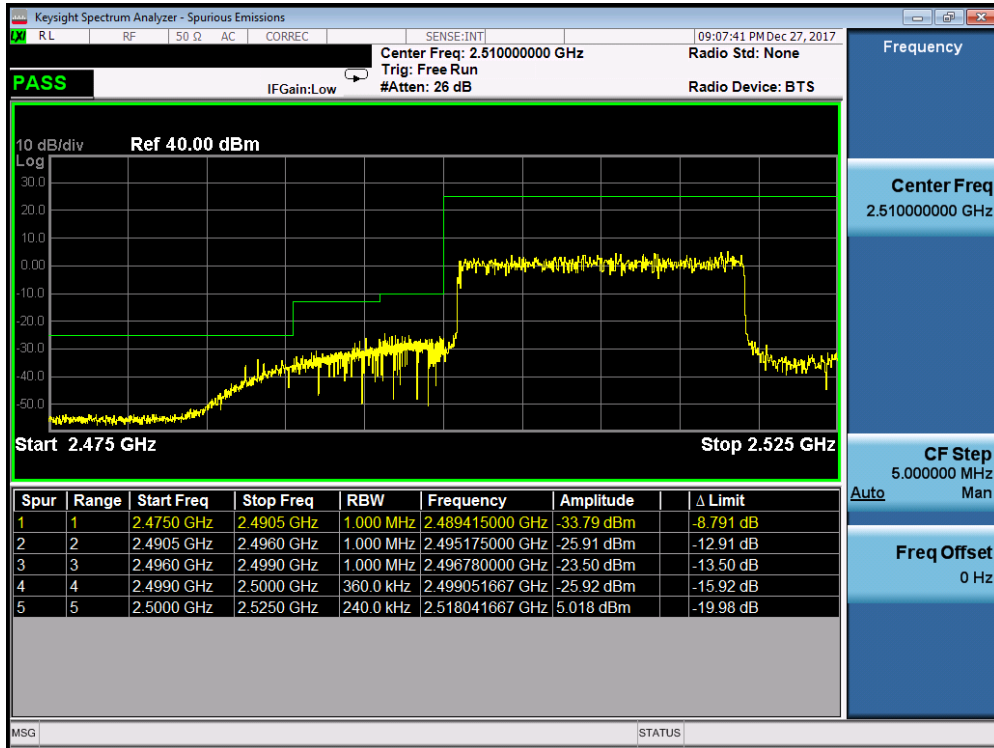


Plot 7-5. Lower ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75 – Antenna A)

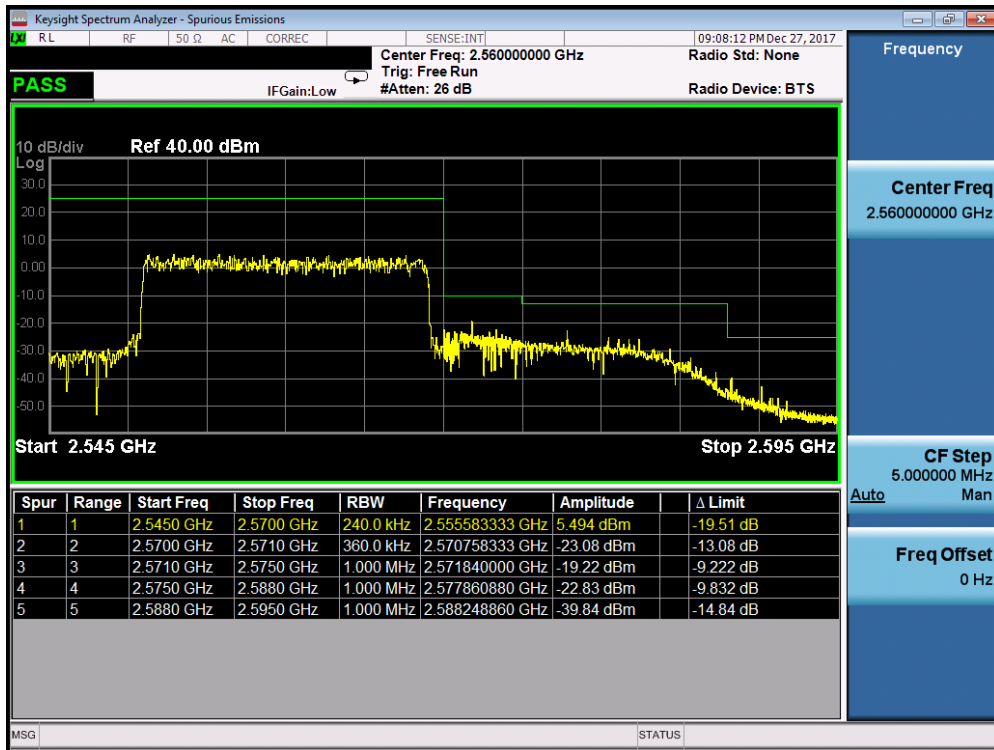


Plot 7-6. Upper ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75 – Antenna A)

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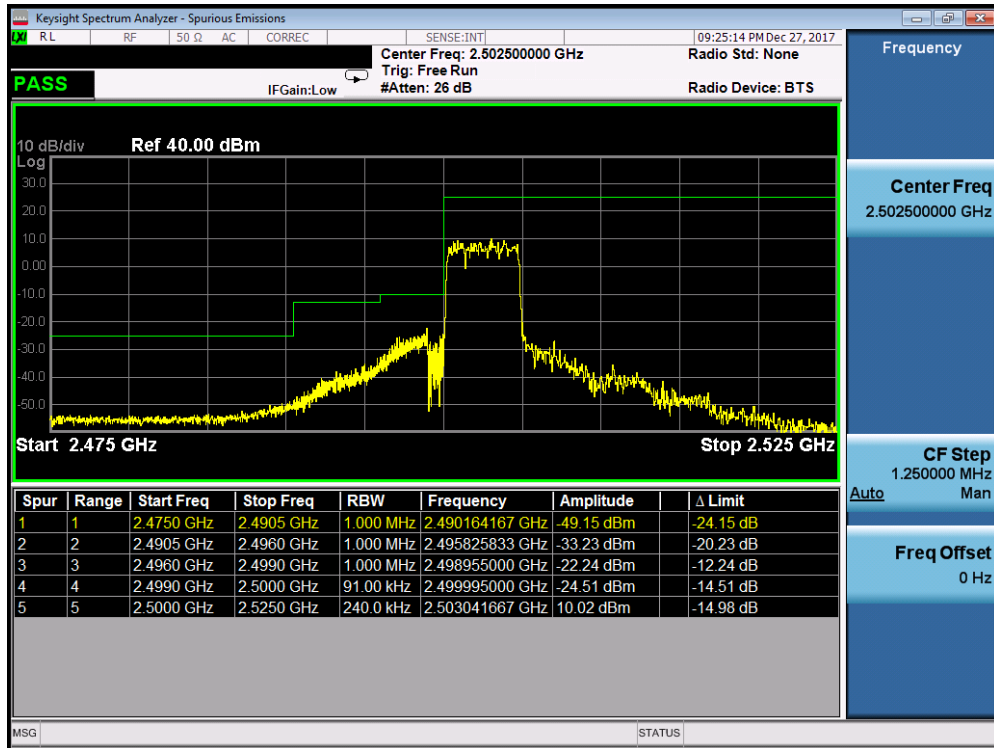
Plot 7-7. Lower ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100 – Antenna A)



Plot 7-8. Upper ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100 – Antenna A)

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Band 7 – Antenna B

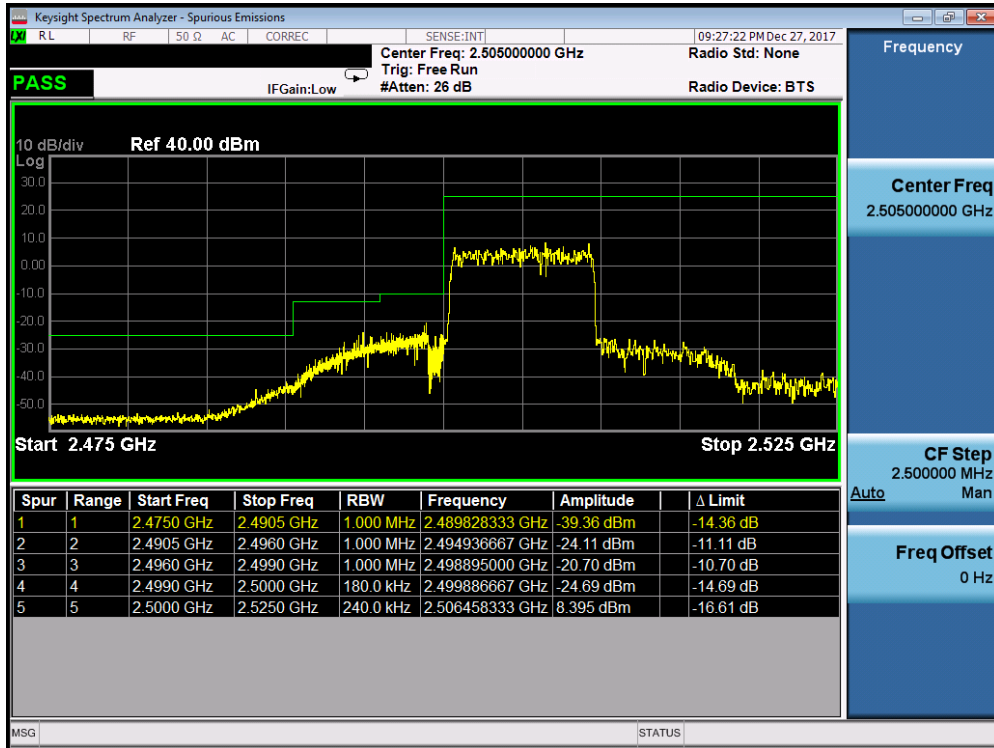


Plot 7-9. Lower ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25 – Antenna B)

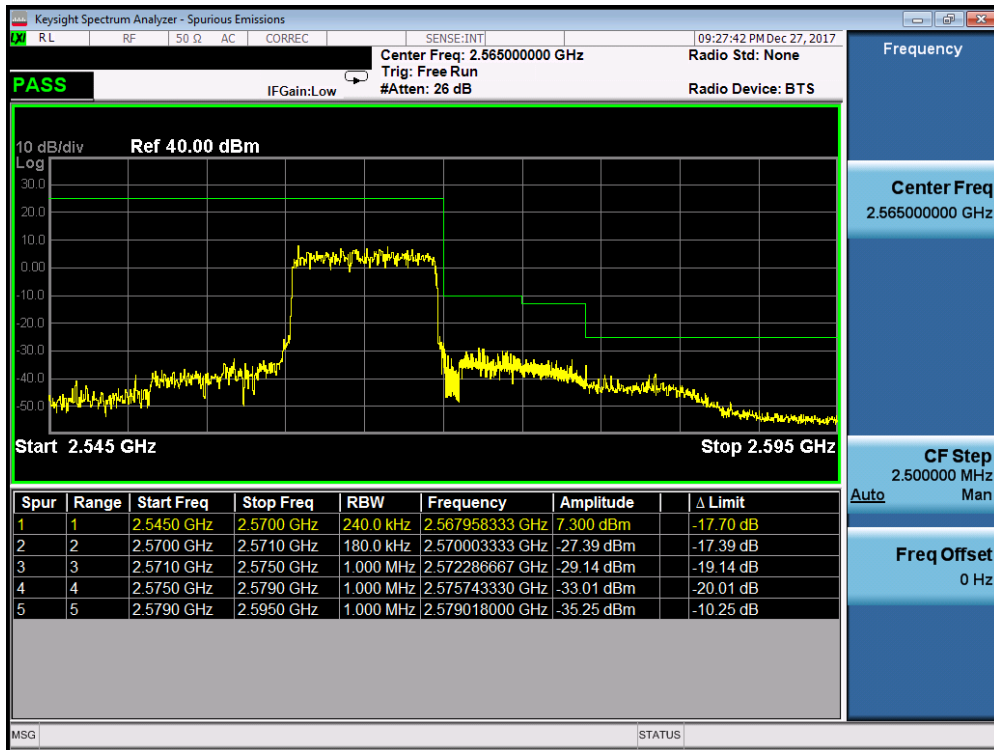


Plot 7-10. Upper ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25 – Antenna B)

FCC ID: A3LSMG965U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
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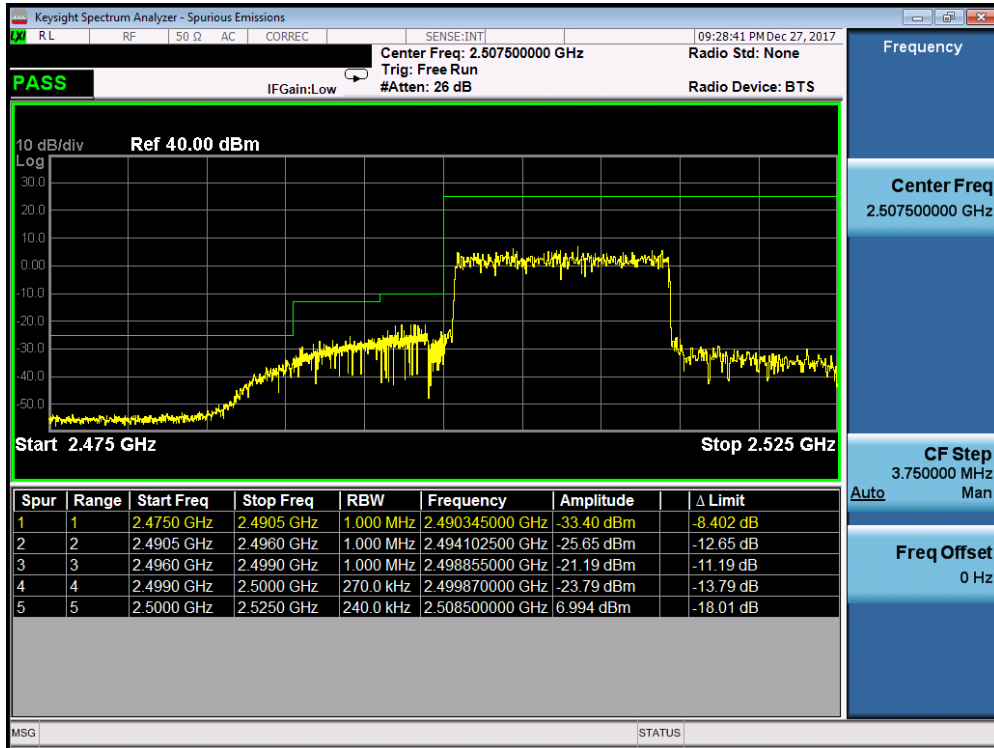


Plot 7-11. Lower ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50 – Antenna B)

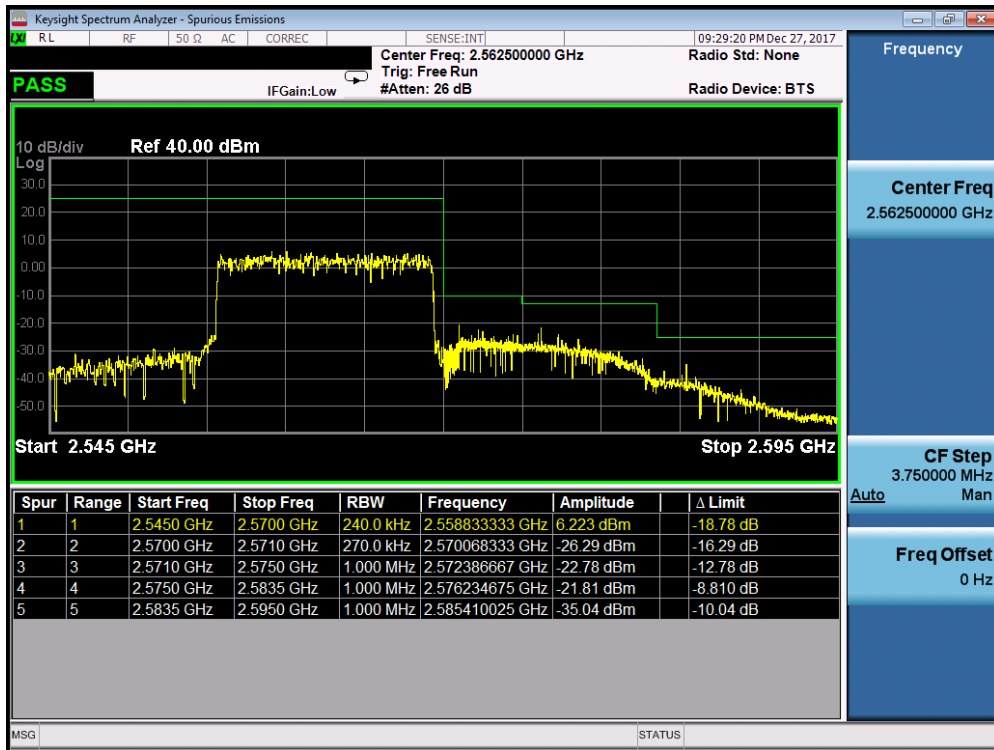


Plot 7-12. Upper ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50 – Antenna B)

FCC ID: A3LSMG965U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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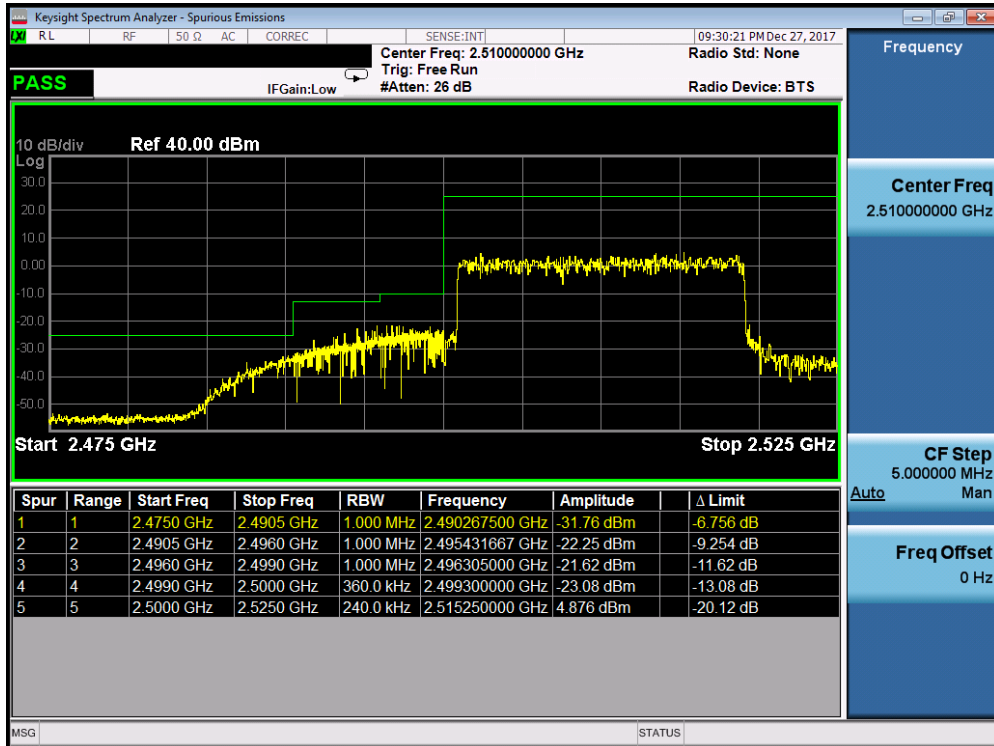


Plot 7-13. Lower ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75 – Antenna B)

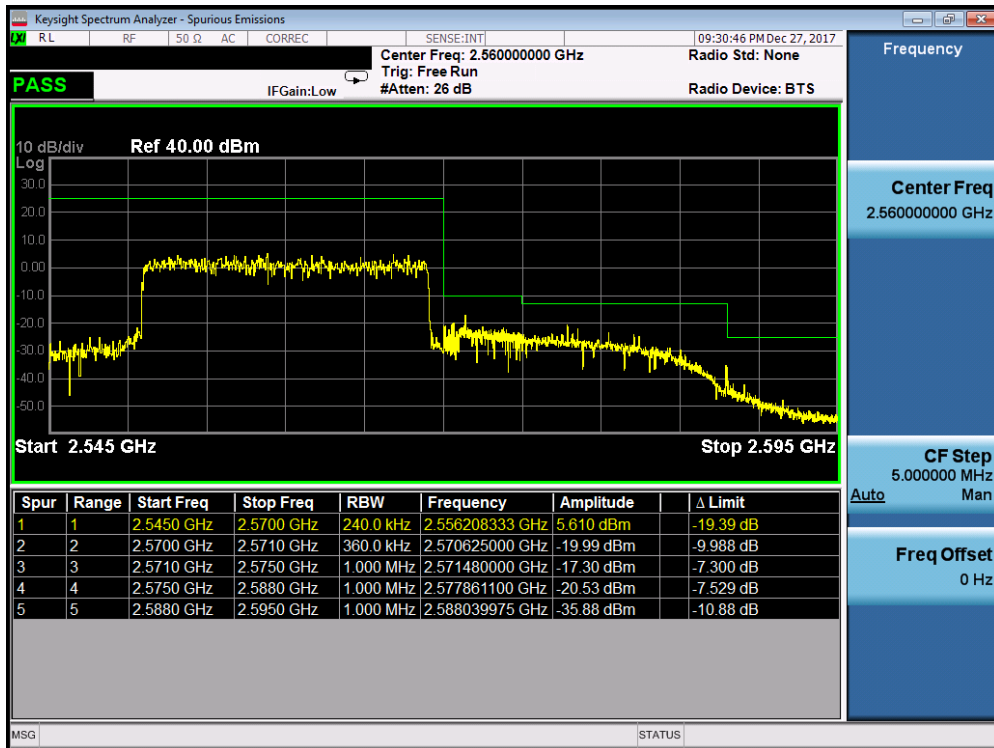


Plot 7-14. Upper ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75 – Antenna B)

FCC ID: A3LSMG965U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
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Plot 7-15. Lower ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100 – Antenna B)



Plot 7-16. Upper ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100 – Antenna B)

FCC ID: A3LSMG965U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M1712210330-02.A3L	Test Dates: 12/19-12/29/2017	EUT Type: Portable Handset		Page 21 of 32

7.3 Radiated Power (EIRP) §27.50(h)(2)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03 – 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 ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to “free run” for signals with continuous operation with the sweep times set to “auto”.
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: A3LSMG965U		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.

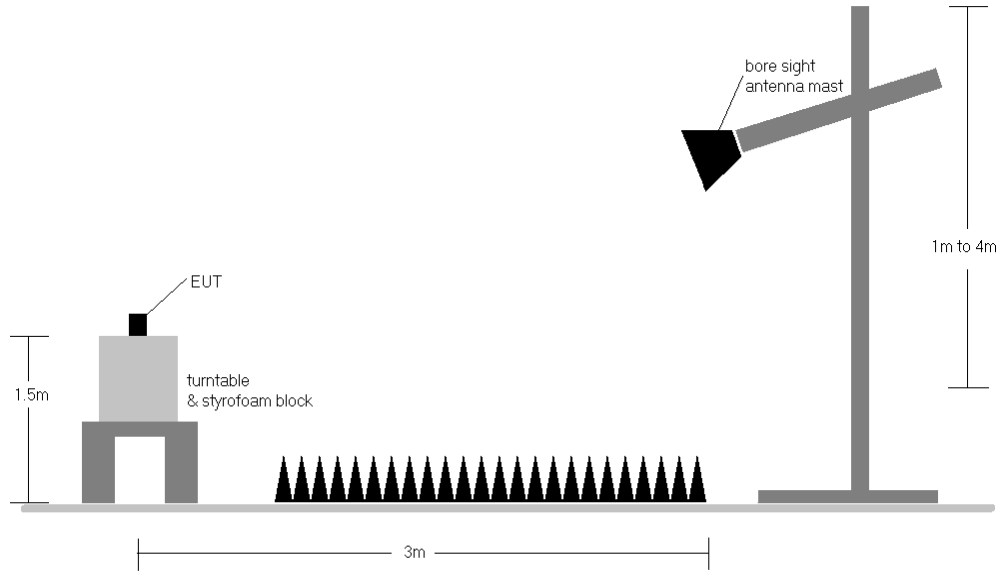


Figure 7-2. Radiated Test Setup >1GHz

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: A3LSMG965U	 PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712210330-02.A3L	Test Dates: 12/19-12/29/2017	EUT Type: Portable Handset	Page 23 of 32	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	H	150	315	1 / 0	15.98	5.74	21.72	0.149	33.01	-11.29
2535.00	5	QPSK	H	150	317	1 / 0	15.79	5.86	21.65	0.146	33.01	-11.36
2567.50	5	QPSK	H	150	316	1 / 24	16.04	5.98	22.02	0.159	33.01	-10.99
2567.50	5	16-QAM	H	150	316	1 / 24	15.27	5.98	21.25	0.133	33.01	-11.76
2567.50	5	64-QAM	H	150	316	1 / 24	14.49	5.98	20.47	0.111	33.01	-12.54
2505.00	10	QPSK	H	150	318	1 / 0	15.94	5.75	21.69	0.148	33.01	-11.32
2535.00	10	QPSK	H	150	316	1 / 0	16.49	5.86	22.35	0.172	33.01	-10.66
2565.00	10	QPSK	H	150	316	1 / 49	16.06	5.97	22.03	0.160	33.01	-10.98
2535.00	10	16-QAM	H	150	316	1 / 0	15.86	5.86	21.72	0.149	33.01	-11.29
2535.00	10	64-QAM	H	150	316	1 / 0	14.78	5.86	20.64	0.116	33.01	-12.37
2507.50	15	QPSK	H	150	316	1 / 0	16.12	5.76	21.88	0.154	33.01	-11.13
2535.00	15	QPSK	H	150	318	1 / 0	16.53	5.86	22.39	0.173	33.01	-10.62
2562.50	15	QPSK	H	150	318	1 / 74	15.86	5.96	21.82	0.152	33.01	-11.19
2535.00	15	16-QAM	H	150	318	1 / 0	15.97	5.86	21.83	0.152	33.01	-11.18
2535.00	15	64-QAM	H	150	318	1 / 0	14.72	5.86	20.58	0.114	33.01	-12.43
2510.00	20	QPSK	H	150	317	1 / 99	16.12	5.77	21.89	0.154	33.01	-11.12
2535.00	20	QPSK	H	150	311	1 / 0	16.56	5.86	22.42	0.175	33.01	-10.59
2560.00	20	QPSK	H	150	315	1 / 0	16.57	5.95	22.52	0.179	33.01	-10.49
2560.00	20	16-QAM	H	150	315	1 / 0	15.44	5.95	21.39	0.138	33.01	-11.62
2560.00	20	64-QAM	H	150	315	1 / 0	14.53	5.95	20.48	0.112	33.01	-12.53
2560.00	20	QPSK	V	150	276	1 / 0	15.53	5.85	21.38	0.137	33.01	-11.63
2560.00	20 (WCP)	QPSK	V	150	355	1 / 0	15.90	5.85	21.75	0.150	33.01	-11.26

Table 7-2. EIRP Data (Band 7 – Antenna A)

FCC ID: A3LSMG965U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712210330-02.A3L	Test Dates: 12/19-12/29/2017	EUT Type: Portable Handset		Page 24 of 32	

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	H	150	295	1 / 24	14.04	5.74	19.78	0.095	33.01	-13.23
2535.00	5	QPSK	H	150	297	1 / 24	15.31	5.86	21.17	0.131	33.01	-11.84
2567.50	5	QPSK	H	150	300	1 / 24	15.74	5.98	21.72	0.149	33.01	-11.29
2567.50	5	16-QAM	H	150	300	1 / 24	15.02	5.98	21.00	0.126	33.01	-12.01
2567.50	5	64-QAM	H	150	300	1 / 24	14.03	5.98	20.01	0.100	33.01	-13.00
2505.00	10	QPSK	H	150	294	1 / 0	14.27	5.75	20.02	0.100	33.01	-12.99
2535.00	10	QPSK	H	150	299	1 / 49	15.32	5.86	21.18	0.131	33.01	-11.83
2565.00	10	QPSK	H	150	301	1 / 49	15.83	5.97	21.80	0.151	33.01	-11.21
2565.00	10	16-QAM	H	150	301	1 / 49	15.02	5.97	20.99	0.126	33.01	-12.02
2565.00	10	64-QAM	H	150	301	1 / 49	13.94	5.97	19.91	0.098	33.01	-13.10
2507.50	15	QPSK	H	150	296	1 / 74	14.42	5.76	20.18	0.104	33.01	-12.83
2535.00	15	QPSK	H	150	298	1 / 74	15.59	5.86	21.45	0.140	33.01	-11.56
2562.50	15	QPSK	H	150	298	1 / 74	15.77	5.96	21.73	0.149	33.01	-11.28
2562.50	15	16-QAM	H	150	298	1 / 74	14.85	5.96	20.81	0.121	33.01	-12.20
2562.50	15	64-QAM	H	150	298	1 / 74	14.02	5.96	19.98	0.100	33.01	-13.03
2510.00	20	QPSK	H	150	298	1 / 99	14.35	5.77	20.12	0.103	33.01	-12.89
2535.00	20	QPSK	H	150	296	1 / 99	15.37	5.86	21.23	0.133	33.01	-11.78
2560.00	20	QPSK	H	150	300	1 / 99	15.76	5.95	21.71	0.148	33.01	-11.30
2560.00	20	16-QAM	H	150	300	1 / 99	14.83	5.95	20.78	0.120	33.01	-12.23
2560.00	20	64-QAM	H	150	300	1 / 99	14.03	5.95	19.98	0.100	33.01	-13.03
2565.00	10	QPSK	V	150	282	1 / 99	14.42	6.07	20.49	0.112	33.01	-12.52
2565.00	10 (WCP)	QPSK	V	150	252	1 / 99	12.37	6.07	18.44	0.070	33.01	-14.57

Table 7-3. EIRP Data (Band 7 – Antenna B)

FCC ID: A3LSMG965U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
Test Report S/N: 1M1712210330-02.A3L	Test Dates: 12/19-12/29/2017	EUT Type: Portable Handset			Page 25 of 32

7.4 Radiated Spurious Emissions Measurements

§2.1053 §27.53(m)

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.

Test Procedures Used

KDB 971168 D01 v03 – 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: A3LSMG965U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712210330-02.A3L	Test Dates: 12/19-12/29/2017	EUT Type: Portable Handset	Page 26 of 32	

Test Setup

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

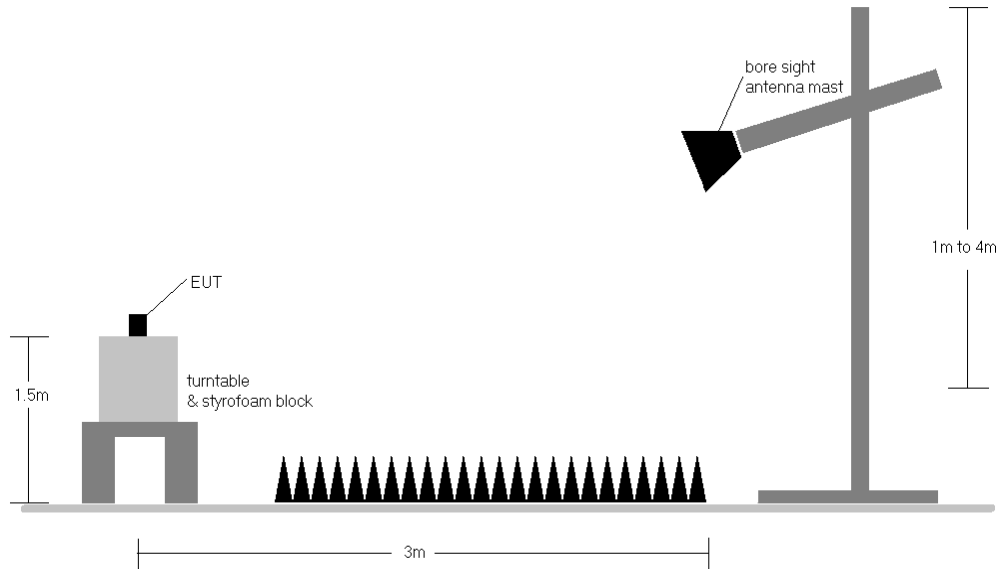


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

- 1) 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) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) 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.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC ID: A3LSMG965U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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Band 7 - Antenna A

OPERATING FREQUENCY: 2510.00 MHz
 CHANNEL: 20850
 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	H	150	87	-61.04	8.35	-52.69	-27.7
7525.00	H	-	-	-58.26	8.44	-49.82	-24.8

Table 7-4. Radiated Spurious Data (Band 7 – Low Channel)

OPERATING FREQUENCY: 2535.00 MHz
 CHANNEL: 21100
 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	H	150	98	-60.50	8.39	-52.11	-27.1
7605.00	H	-	-	-58.30	8.51	-49.79	-24.8

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

FCC ID: A3LSMG965U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
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OPERATING FREQUENCY: 2560.00 MHz
 CHANNEL: 21350
 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	H	150	87	-60.83	8.42	-52.41	-27.4
7685.00	H	-	-	-58.89	8.64	-50.25	-25.2

Table 7-6. Radiated Spurious Data (Band 7 – High Channel)

OPERATING FREQUENCY: 2535.00 MHz
 CHANNEL: 21100
 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	H	150	7	-61.73	8.39	-53.34	-28.3
7635.00	H	-	-	-58.86	8.56	-50.30	-25.3

Table 7-7. Radiated Spurious Data with WCP (Band 7 – Mid Channel)

FCC ID: A3LSMG965U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Approved by: Quality Manager
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Band 7 – Antenna B

OPERATING FREQUENCY: 2505.00 MHz
 CHANNEL: 20800
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 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]
5010.00	H	150	302	-55.77	8.34	-47.43	-22.4
7515.00	H	-	-	-58.42	8.44	-49.98	-25.0
10020.00	H	-	-	-57.99	9.87	-48.12	-23.1

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

OPERATING FREQUENCY: 2535.00 MHz
 CHANNEL: 21100
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 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	H	150	308	-54.14	8.39	-45.76	-20.8
7605.00	H	-	-	-58.30	8.51	-49.79	-24.8
10140.00	H	-	-	-57.32	9.70	-47.62	-22.6

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

FCC ID: A3LSMG965U		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712210330-02.A3L	Test Dates: 12/19-12/29/2017	EUT Type: Portable Handset	Page 30 of 32	

OPERATING FREQUENCY: 2565.00 MHz
 CHANNEL: 21400
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 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]
5130.00	H	150	306	-53.25	8.43	-44.82	-19.8
7695.00	H	-	-	-58.85	8.66	-50.19	-25.2
10260.00	H	-	-	-57.58	9.72	-47.86	-22.9

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

OPERATING FREQUENCY: 2565.00 MHz
 CHANNEL: 21400
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 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]
5130.00	H	150	178	-59.10	8.43	-50.68	-25.7
7695.00	H	-	-	-59.65	8.66	-50.99	-26.0
10260.00	H	-	-	-57.95	9.72	-48.24	-23.2

Table 7-11. Radiated Spurious Data with WCP (Band 7 – High Channel)

FCC ID: A3LSMG965U	 PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Approved by: Quality Manager
Test Report S/N: 1M1712210330-02.A3L	Test Dates: 12/19-12/29/2017	EUT Type: Portable Handset	Page 31 of 32	

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG965U** complies with all the requirements of Part 27 of the FCC Rules for LTE operation only.

FCC ID: A3LSMG965U	 MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		 Approved by: Quality Manager
Test Report S/N: 1M1712210330-02.A3L	Test Dates: 12/19-12/29/2017	EUT Type: Portable Handset	Page 32 of 32