PCTEST
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
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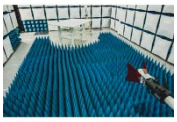


MEASUREMENT REPORT
LTE / 5GNR Sub6

Applicant Name:
LG Electronics USA, Inc.
111 Sylvan Avenue, North Building
Englewood Cliffs, NJ 07632
United States

Date of Testing:
07/25 - 09/14/2020
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2007230114-07.ZNF

FCC ID:	**ZNFF100VM**
APPLICANT:	**LG Electronics USA, Inc.**

Application Type:	Class II Permissive Change
Model:	LM-F100VM
Additional Model(s):	LMF100VM, F100VM
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	22, 24, & 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 change document

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.

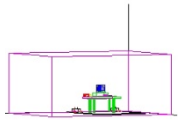
I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking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

Randy Ortanez
President

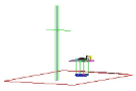
ACCREDITED
CERT #2041.01

TABLE OF CONTENTS

1.0 INTRODUCTION 5
1.1 Scope 5
1.2 PCTEST Test Location 5
1.3 Test Facility / Accreditations 5
2.0 PRODUCT INFORMATION 6
2.1 Equipment Description 6
2.2 Device Capabilities 6
2.3 Test Configuration 6
2.4 EMI Suppression Device(s)/Modifications 6
3.0 DESCRIPTION OF TESTS 7
3.1 Measurement Procedure 7
3.2 Radiated Power and Radiated Spurious Emissions 7
4.0 MEASUREMENT UNCERTAINTY 8
5.0 TEST EQUIPMENT CALIBRATION DATA 9
6.0 SAMPLE CALCULATIONS 10
7.0 TEST RESULTS 11
7.1 Summary 11
7.2 Radiated Power (ERP/EIRP) 12
7.3 Radiated Spurious Emissions Measurements 17
7.4 Uplink Carrier Aggregation Radiated Measurements 32
8.0 CONCLUSION 40



MEASUREMENT REPORT
FCC Part 22, 24, & 27



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	
LTE Band 12	27	704 - 711	0.058	17.66	0.096	19.81	QPSK
LTE Band 12	27	704 - 711	0.045	16.52	0.074	18.67	16QAM
LTE Band 12	27	704 - 711	0.043	16.29	0.070	18.44	64QAM
LTE Band 13	27	782	0.082	19.11	0.134	21.26	QPSK
LTE Band 13	27	782	0.049	16.92	0.081	19.07	16QAM
LTE Band 13	27	782	0.040	16.04	0.066	18.19	64QAM
LTE Band 5	22H	829 - 844	0.093	19.70	0.153	21.85	QPSK
LTE Band 5	22H	829 - 844	0.058	17.66	0.096	19.81	16QAM
LTE Band 5	22H	829 - 844	0.056	17.51	0.092	19.66	64QAM

EUT Overview (<1 GHz)

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP	
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]
NR Band n5	20 MHz	π/2 BPSK	834.0 - 839.0	0.043	16.32	0.070	18.47
		QPSK	834.0 - 839.0	0.040	16.04	0.066	18.19
		16QAM	834.0 - 839.0	0.031	14.96	0.051	17.11
		64QAM	834.0 - 839.0	0.021	13.26	0.035	15.41
		256QAM	834.0 - 839.0	0.012	10.96	0.020	13.11

EUT Overview (<1 GHz)

Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	
LTE Band 66	27	1720 - 1770	0.254	24.05	QPSK
LTE Band 66	27	1720 - 1770	0.209	23.20	16QAM
LTE Band 66	27	1720 - 1770	0.155	21.90	64QAM
LTE Band 2	24E	1860 - 1900	0.242	23.84	QPSK
LTE Band 2	24E	1860 - 1900	0.185	22.67	16QAM
LTE Band 2	24E	1860 - 1900	0.139	21.43	64QAM

EUT Overview (Mid Bands)

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP	
				Max. Power [W]	Max. Power [dBm]
NR Band n66	20 MHz	π/2 BPSK	834.0 - 839.0	0.195	22.90
		QPSK	834.0 - 839.0	0.197	22.94
		16QAM	834.0 - 839.0	0.146	21.64
		64QAM	834.0 - 839.0	0.105	20.22
		256QAM	834.0 - 839.0	0.069	18.36

EUT Overview (Mid Band)

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP	
				Max. Power [W]	Max. Power [dBm]
NR Band n2	20 MHz	π/2 BPSK	1860 - 1905	0.232	23.65
		QPSK	1860 - 1905	0.230	23.63
		16QAM	1860 - 1905	0.176	22.47
		64QAM	1860 - 1905	0.122	20.88
		256QAM	1860 - 1905	0.071	18.51

EUT Overview (Mid Band)

Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	
LTE Band 30	27	2310	0.114	20.57	QPSK
LTE Band 30	27	2310	0.088	19.47	16QAM
LTE Band 30	27	2310	0.068	18.32	64QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.185	22.68	QPSK
LTE Band 41 (PC3)	27	2506 - 2680	0.151	21.80	16QAM
LTE Band 41 (PC3)	27	2506 - 2680	0.119	20.75	64QAM

EUT Overview (High Bands)

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 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 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.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFF100VM**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 04254, 04270, 04296

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 WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC

LTE Band 66 (1710 - 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz). Therefore, test data provided in this report covers Band 4 as well as Band 66.

2.3 Test Configuration

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

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-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.

The EUT is capable of operating in screen closed and screen open configurations. The worst-case configuration for radiated emissions was determined from open and closed configurations in X, Y, and Z orientations for horizontal and vertical antenna polarizations. The worst case radiated emissions data is shown in this report. Additionally, the EUT is support a camera that mechanically pops up from the device. The worst case configuration was investigated with the camera down and popped up and worst case radiated data is reported herein.

2.4 EMI Suppression Device(s)/Modifications

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

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 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:

$$P_{d\ [dBm]} = P_{g\ [dBm]} - \text{cable loss}_{\ [dB]} + \text{antenna gain}_{\ [dBd/dBi]}$$

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 $P_{g\ [dBm]}$ – 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 $\log_{10}$(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.

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 (±dB)
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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	10/30/2019	Annual	10/30/2020	LTx2
-	LTx3	LIcensed Transmitter Cable Set	10/30/2019	Annual	10/30/2020	LTx3
Agilent	N9038A	MXE EMI Receiver	8/11/2020	Annual	8/11/2021	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	8/17/2020	Annual	8/17/2021	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Mini Circuits	PWR-4GHS	USB Power Sensor	6/18/2020	Annual	6/18/2021	12001070013
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11403100002
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			102060
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/23/2019	Annual	9/23/2020	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/21/2020	Annual	2/21/2021	102133
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol Science	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/27/2019	Biennial	8/27/2021	A042511

Table 5-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

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

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 analzyer. 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).

7.0 TEST RESULTS

7.1 Summary

Company Name: LG Electronics USA, Inc.

FCC ID: ZNFF100VM

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

Mode(s): LTE / 5GNR Sub6

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(5)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 5)	< 7 Watts max. ERP	RADIATED	PASS	Section 7.7
27.50(b)(10) 27.50(c)(10)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 12, 13)	< 3 Watts max. ERP			Section 7.7
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 2)	< 2 Watts max. EIRP			Section 7.7
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4/66)	< 1 Watts max. EIRP			Section 7.7
27.50(a)(3)	Equivalent Isotropic Radiated Power (Band 30)	< 0.25 Watts max. EIRP			Section 7.7
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Undesirable Emissions (Band 12, 13, 5, 66/4, 2)	> 43 + 10 $\log_{10}$ (P[Watts]) for all out-of-band emissions			Section 7.3
27.53(f)	Undesirable Emissions (Band 13)	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 – 1610 MHz			Section 7.3
27.53(a)	Undesirable Emissions (Band 30)	> 70 + 10 $\log_{10}$ (P[Watts])			Section 7.3
27.53(m)	Undesirable Emissions (Band 41)	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h) 27.53(m)	Uplink Carrier Aggregation	Undesirable emissions must meet the limits detailed in corresponding rule parts			Section 7.3

Table 7-1. Summary of Radiated Test Results

7.2 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and 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 below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at 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 ≥ 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

Test Setup

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

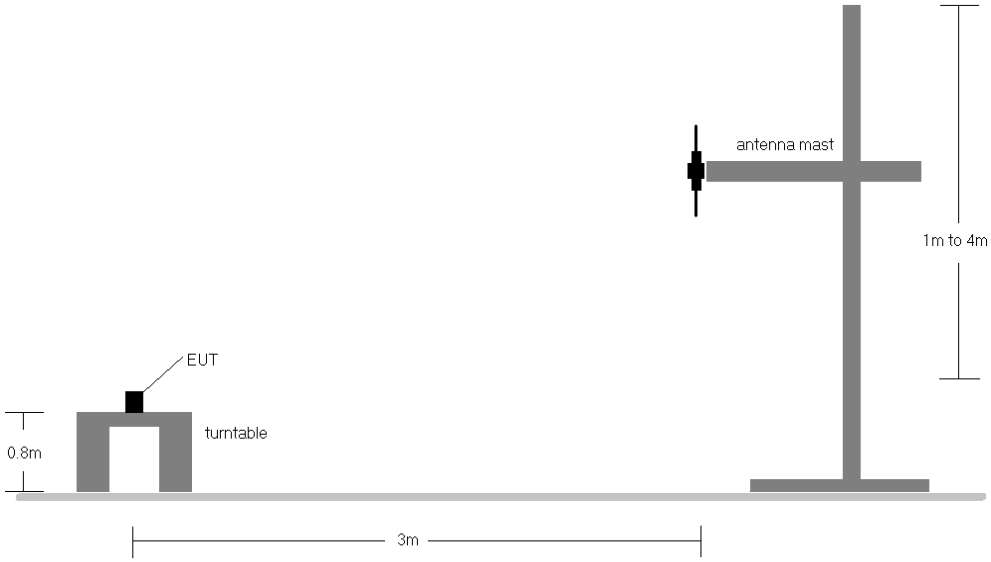


Figure 7-1. Radiated Test Setup <1GHz

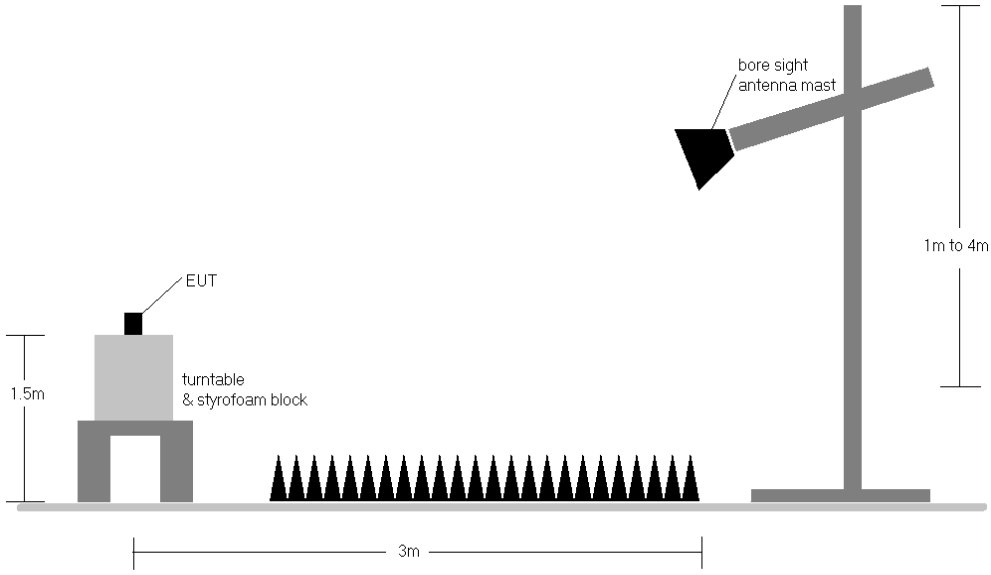


Figure 7-2. Radiated Test Setup >1GHz

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.

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]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
707.50	10	QPSK	V-Swivel	152	77	25 / 12	15.19	4.62	**17.66**	**0.058**	34.77	-17.11	**19.81**	**0.096**	36.99	-17.18
707.50	10	16-QAM	V-Swivel	152	77	25 / 12	14.05	4.62	**16.52**	0.045	34.77	-18.25	**18.67**	0.074	36.99	-18.32
707.50	10	64-QAM	V-Swivel	152	77	25 / 12	13.82	4.62	**16.29**	0.043	34.77	-18.48	**18.44**	0.070	36.99	-18.55
707.50	10	QPSK	H-Swivel	262	99	25 / 12	14.87	4.62	17.34	0.054	34.77	-17.43	19.49	0.089	36.99	-17.50
707.50	10 (WCP)	QPSK	V-Swivel	151	43	25 / 12	10.58	4.62	13.05	0.020	34.77	-21.72	15.20	0.033	36.99	-21.79

Table 7-2. ERP Data (Band 12)

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]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
782.00	10	QPSK	H-Swivel	223	91	1 / 49	15.37	5.89	**19.11**	**0.082**	34.77	-15.66	**21.26**	**0.134**	36.99	-15.73
782.00	10	16-QAM	H-Swivel	223	91	1 / 49	13.18	5.89	**16.92**	0.049	34.77	-17.85	**19.07**	0.081	36.99	-17.92
782.00	10	64-QAM	H-Swivel	223	91	1 / 49	12.30	5.89	**16.04**	0.040	34.77	-18.73	**18.19**	0.066	36.99	-18.80
782.00	10	QPSK	V-Swivel	148	77	1 / 49	15.04	5.89	18.78	0.076	34.77	-15.99	20.93	0.124	36.99	-16.06

Table 7-3. ERP Data (Band 13)

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]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
836.50	10	QPSK	V-Swivel	142	48	25 / 12	15.47	6.38	**19.70**	**0.093**	38.45	-18.75	**21.85**	**0.153**	40.61	-18.76
836.50	10	16-QAM	V-Swivel	142	48	25 / 12	13.43	6.38	**17.66**	0.058	38.45	-20.79	**19.81**	0.096	40.61	-20.80
836.50	10	64-QAM	V-Swivel	142	48	25 / 12	13.28	6.38	**17.51**	0.056	38.45	-20.94	**19.66**	0.092	40.61	-20.95
836.50	10	QPSK	H-Swivel	208	80	25 / 12	13.96	6.38	18.19	0.066	38.45	-20.26	20.34	0.108	40.61	-20.27

Table 7-4. ERP Data (Band 5)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	836.5	V-Swivel	139.0	104.0	6.38	1 / 50	12.09	**16.32**	0.043	38.45	-22.13	**18.47**	0.070	40.61	-22.14
	QPSK	836.5	V-Swivel	139.0	104.0	6.38	1 / 50	11.81	**16.04**	0.040	38.45	-22.41	**18.19**	0.066	40.61	-22.42
	16-QAM	836.5	V-Swivel	139.0	104.0	6.38	1 / 50	10.73	**14.96**	0.031	38.45	-23.49	**17.11**	0.051	40.61	-23.50
	64-QAM	836.5	V-Swivel	139.0	104.0	6.38	1 / 50	9.03	**13.26**	0.021	38.45	-25.19	**15.41**	0.035	40.61	-25.20
	256-QAM	836.5	V-Swivel	139.0	104.0	6.38	1 / 50	6.73	**10.96**	0.012	38.45	-27.49	**13.11**	0.020	40.61	-27.50
	QPSK (Opposite Pol.)	836.5	H-Swivel	191.0	88.0	6.38	1 / 50	7.72	14.10	0.026	38.45	-24.35	16.25	0.042	40.61	-24.36

Table 7-5. ERP Data (Band n5)

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]
1745.00	20	QPSK	H-Swivel	100	357	50 / 25	14.79	9.26	**24.05**	**0.254**	30.00	-5.95
1745.00	20	16-QAM	H-Swivel	100	357	50 / 25	13.94	9.26	**23.20**	0.209	30.00	-6.80
1745.00	20	64-QAM	H-Swivel	100	357	50 / 25	12.64	9.26	**21.90**	0.155	30.00	-8.10
1745.00	20	QPSK	V-Swivel	177	332	50 / 25	14.47	9.26	23.73	0.236	30.00	-6.27
1745.00	20 (WCP)	QPSK	H-Swivel	331	197	50 / 25	14.09	9.26	23.35	0.216	30.00	-6.65

Table 7-6. EIRP Data (Band 66/4)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	1745.0	H-Swivel	194.0	298.0	9.26	1 / 50	13.64	**22.90**	0.195	30.00	-7.10
	QPSK	1745.0	H-Swivel	194.0	298.0	9.26	1 / 50	13.68	**22.94**	0.197	30.00	-7.06
	16-QAM	1745.0	H-Swivel	194.0	298.0	9.26	1 / 50	12.38	**21.64**	0.146	30.00	-8.36
	64-QAM	1745.0	H-Swivel	194.0	298.0	9.26	1 / 50	10.96	**20.22**	0.105	30.00	-9.78
	256-QAM	1745.0	H-Swivel	194.0	298.0	9.26	1 / 50	9.10	**18.36**	0.069	30.00	-11.64
	QPSK (Opposite Pol.)	1745.0	V-Swivel	251.0	188.0	9.26	1 / 50	12.95	22.21	0.166	30.00	-7.79

Table 7-7. EIRP Data (Band n66)

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]
1880.00	20	QPSK	H-Swivel	104	359	50 / 25	13.91	9.93	**23.84**	**0.242**	33.01	-9.17
1880.00	20	16-QAM	H-Swivel	104	359	1 / 0	12.74	9.93	**22.67**	0.185	33.01	-10.34
1880.00	20	64-QAM	H-Swivel	104	359	1 / 0	11.50	9.93	**21.43**	0.139	33.01	-11.58
1880.00	20	QPSK	V-Swivel	147	340	50 / 25	13.80	9.93	23.73	0.236	33.01	-9.28
1880.00	20 (WCP)	QPSK	H-Swivel	399	183	50 / 25	12.83	9.93	22.76	0.189	33.01	-10.25

Table 7-8. EIRP Data (Band 2)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	1880.0	H-Swivel	164.0	297.0	9.93	1 / 50	13.72	**23.65**	0.232	33.01	-9.36
	QPSK	1880.0	H-Swivel	164.0	297.0	9.93	1 / 50	13.70	**23.63**	0.230	33.01	-9.38
	16-QAM	1880.0	H-Swivel	164.0	297.0	9.93	1 / 50	12.54	**22.47**	0.176	33.01	-10.54
	64-QAM	1880.0	H-Swivel	164.0	297.0	9.93	1 / 50	10.95	**20.88**	0.122	33.01	-12.13
	256-QAM	1880.0	H-Swivel	164.0	297.0	9.93	1 / 50	8.58	**18.51**	0.071	33.01	-14.50
	QPSK (Opposite Pol.)	1880.0	V-Swivel	271.0	80.0	9.93	1 / 50	12.12	22.05	0.160	33.01	-10.96

Table 7-9. EIRP Data (Band n2)

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]
2310.00	10	QPSK	H-Swivel	107	231	25 / 12	10.23	10.34	**20.57**	**0.114**	23.98	-3.41
2310.00	10	16-QAM	H-Swivel	107	231	25 / 12	9.13	10.34	19.47	0.088	23.98	-4.51
2310.00	10	64-QAM	H-Swivel	107	231	25 / 12	7.98	10.34	18.32	0.068	23.98	-5.66
2310.00	10	QPSK	V-Swivel	150	3	25 / 12	9.34	10.34	19.68	0.093	23.98	-4.30
2310.00	10 (WCP)	QPSK	H-Swivel	150	208	25 / 12	7.35	10.34	17.69	0.059	23.98	-6.29

Table 7-10. EIRP Data (Band 30)

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]
2593.00	20	QPSK	V	289	327	50 / 25	13.09	9.59	**22.68**	**0.185**	33.01	-10.33
2593.00	20	16-QAM	V	289	327	50 / 25	12.21	9.59	**21.80**	0.151	33.01	-11.21
2593.00	20	64-QAM	V	289	327	50 / 25	11.16	9.59	**20.75**	0.119	33.01	-12.26
2593.00	20	QPSK	H	109	351	50 / 25	12.96	9.59	22.55	0.180	33.01	-10.46
2593.00	20	QPSK (WCP)	V	118	338	50 / 25	12.79	9.59	22.38	0.173	33.01	-10.63

Table 7-11. EIRP Data (Band 41 PC3)

7.3 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 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 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 ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

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

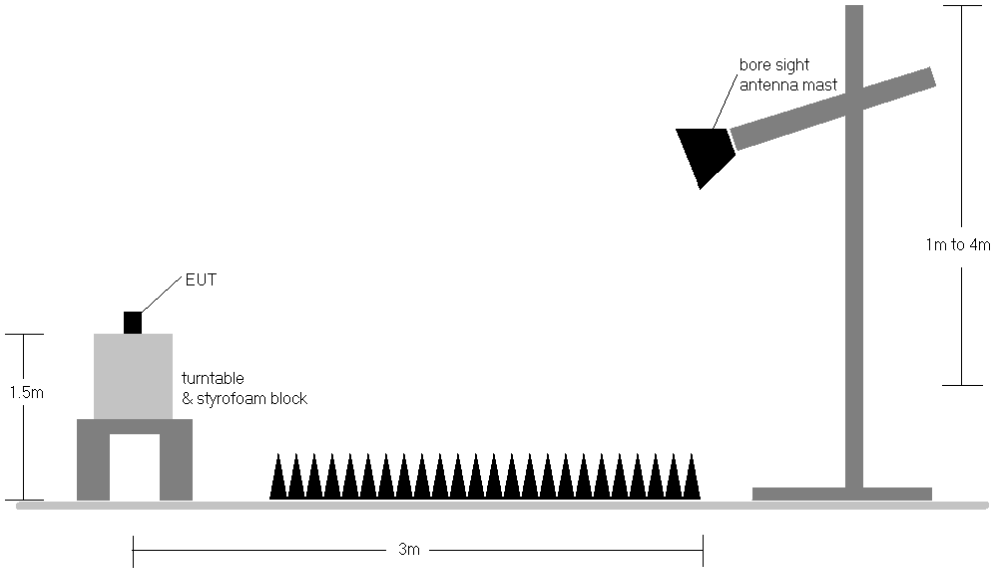


Figure 7-3. Test Instrument & Measurement Setup

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.

Band 12

OPERATING FREQUENCY:	707.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
1415.00	H	150	161	-77.29	7.66	-69.62	-56.6
2122.50	H	161	167	-71.18	8.89	-62.29	-49.3
2830.00	H	-	-	-78.21	10.12	-68.08	-55.1
3537.50	H	-	-	-74.85	9.93	-64.93	-51.9

Table 7-12. Radiated Spurious Data (Band 12 – Mid Channel)

Band 13

OPERATING FREQUENCY:	782.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
2346.00	H	247	179	-66.53	9.46	-57.06	-44.1
3128.00	H	-	-	-75.66	9.37	-66.29	-53.3
3910.00	H	-	-	-73.82	9.40	-64.42	-51.4

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

MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.00	MHz
DISTANCE:	3	meters
NARROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

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]
1564.00	H	213	352	-79.73	8.56	-71.17	-31.2

Table 7-14. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

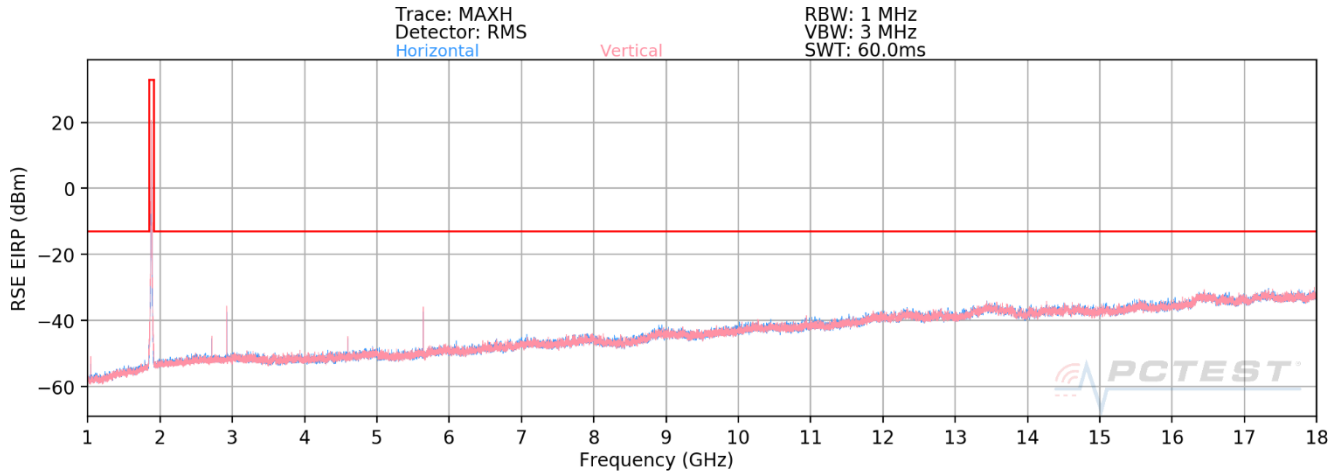
Band 5

OPERATING FREQUENCY:	836.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
1673.00	H	344	320	-80.64	8.98	-71.66	-58.7
2509.50	H	130	10	-69.30	9.78	-59.51	-46.5
3346.00	H	-	-	-75.92	9.63	-66.29	-53.3
4182.50	H	-	-	-74.81	10.37	-64.43	-51.4

Table 7-15. Radiated Spurious Data (Band 5 – Mid Channel)

EN-DC Band n5 + B2



Plot 7-1. Radiated Spurious Plot above 1GHz (EN-DC Band n5 + B2)

Bandwidth (MHz):	20
Frequency (MHz):	836.5
RB / Offset:	1/53
Mode:	EN-DC
Anchor Band:	B2

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]
1250.5	V	-	-	-77.56	-1.05	28.39	-66.87	-13.00	-53.87
2509.5	V	143	154	-77.67	5.01	34.34	-60.92	-13.00	-47.92
2923.5	V	161	293	-60.76	6.28	52.52	-42.74	-13.00	-29.74
4596.5	V	110	179	-74.67	8.90	41.23	-54.03	-13.00	-41.03
5640.0	V	103	172	-67.99	10.76	49.77	-45.49	-13.00	-32.49
7520.0	V	-	-	-82.42	15.34	39.92	-55.34	-13.00	-42.34

Table 7-16. Radiated Spurious Data (EN-DC Band n5 + B2 – Mid Channel)

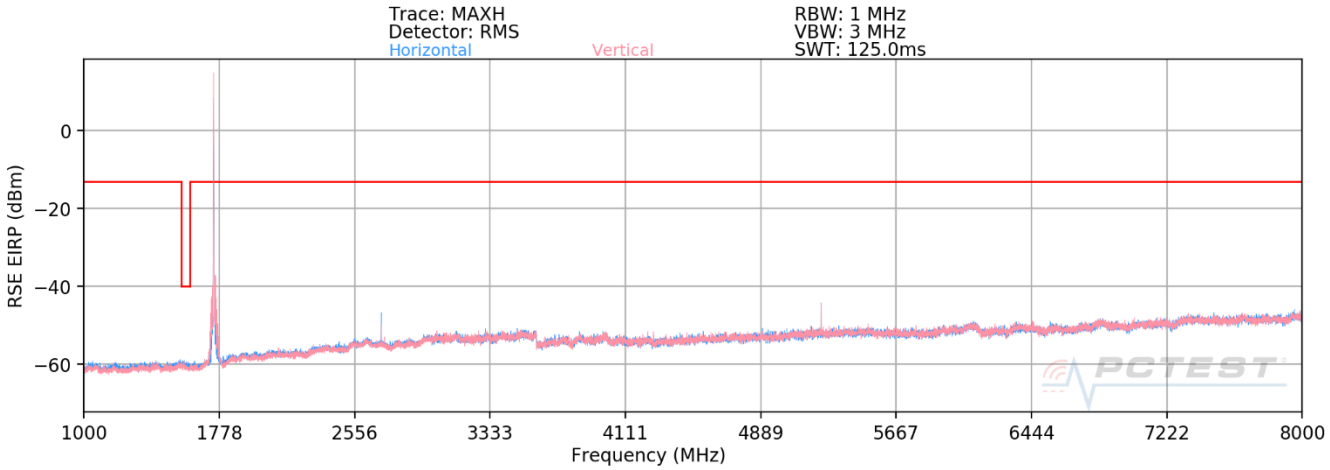
Band 66/4

OPERATING FREQUENCY:	1745.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
3490.00	H	247	3	-68.35	9.94	-58.41	-45.4
5235.00	H	164	344	-71.05	10.76	-60.29	-47.3
6980.00	H	188	328	-70.02	11.85	-58.17	-45.2
8725.00	H	-	-	-69.24	11.03	-58.22	-45.2
10470.00	H	-	-	-70.70	12.64	-58.06	-45.1

Table 7-17. Radiated Spurious Data (Band 66/4 – Mid Channel)

EN-DC Band n66 + B13



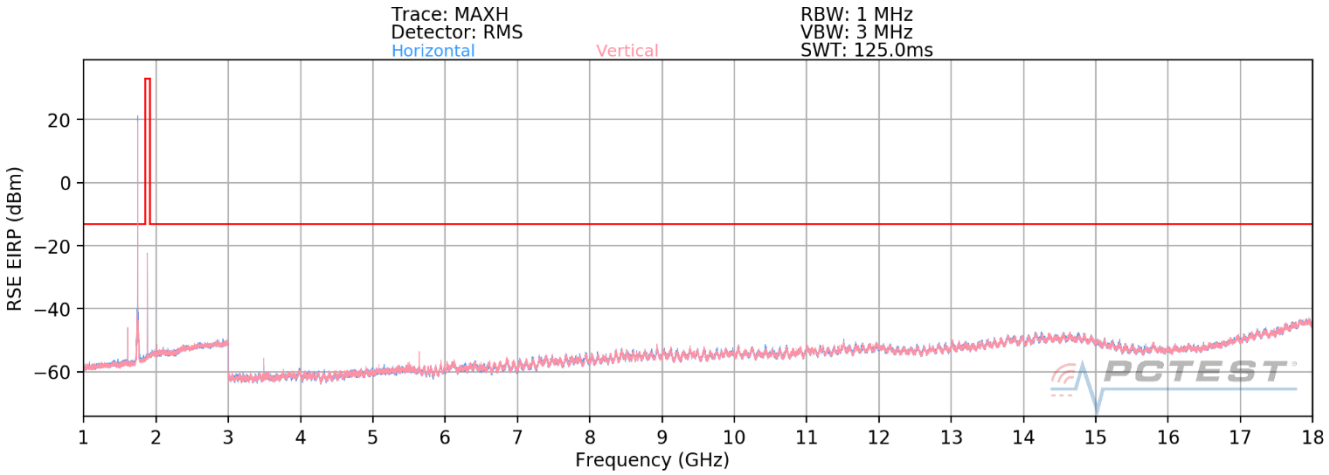
Plot 7-2. Radiated Spurious Plot above 1GHz (EN-DC Band n66 + B13)

Bandwidth (MHz):	20
Frequency (MHz):	1745.0
RB / Offset:	1/53
Mode:	EN-DC
Anchor Band:	B13

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]
2708.0	H	292	138	-68.65	-2.38	35.97	-59.29	-13.00	-46.29
3490.0	H	195	352	-72.07	1.00	35.93	-59.33	-13.00	-46.33
5235.0	H	350	154	-72.60	4.42	38.82	-56.44	-13.00	-43.44
6980.0	H	311	349	-77.20	6.53	36.33	-58.93	-13.00	-45.93
8725.0	H	-	-	-80.47	10.53	37.06	-58.20	-13.00	-45.20

Table 7-18. Radiated Spurious Data (EN-DC Band n66 + B13 – Mid Channel)

EN-DC Band n66 + B2



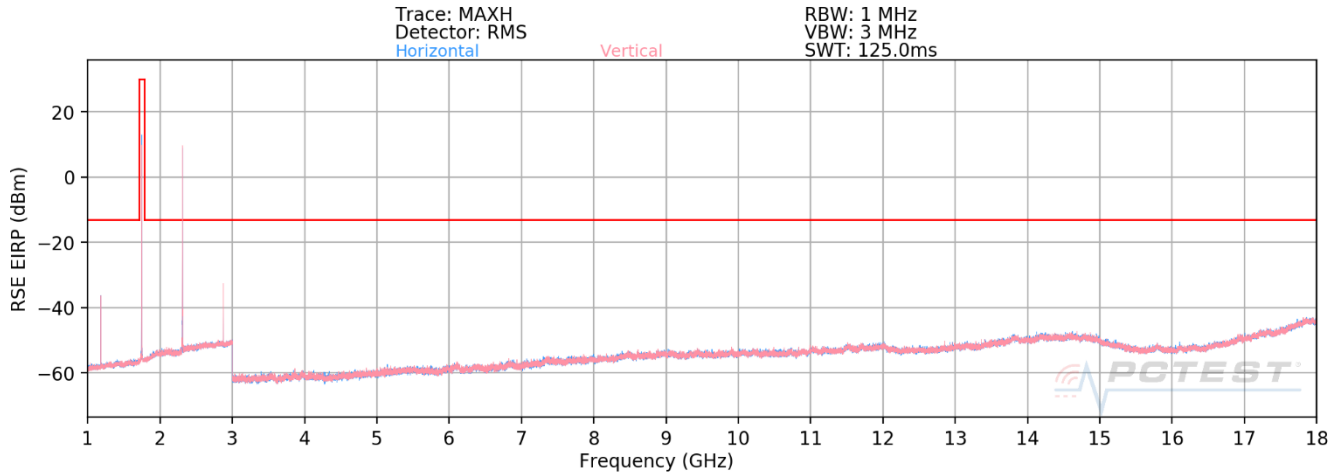
Plot 7-3. Radiated Spurious Plot above 1GHz (EN-DC Band n66 + B2)

Bandwidth (MHz):	20
Frequency (MHz):	1745.0
RB / Offset:	1 /53
Mode:	EN-DC
Anchor Band:	B2

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]
1610.0	H-Swivel	145	313	-59.79	3.40	50.61	-44.65	-13.00	-31.65
2015.0	H-Swivel	164	231	-77.26	6.24	35.98	-59.28	-13.00	-46.28
2285.0	H-Swivel	-	-	-77.41	5.48	35.07	-60.19	-13.00	-47.19
3490.0	H-Swivel	132	19	-72.12	1.00	35.88	-59.38	-13.00	-46.38
5235.0	H-Swivel	-	-	-78.78	4.42	32.64	-62.62	-13.00	-49.62

Table 7-19. Radiated Spurious Data (EN-DC Band n66 + B2 – Mid Channel)

EN-DC Band n66 + B30



Plot 7-4. Radiated Spurious Plot above 1GHz (EN-DC Band n66 + B30)

Bandwidth (MHz):	20
Frequency (MHz):	1745.0
RB / Offset:	1 / 53
Mode:	EN-DC
Anchor Band:	LTE Band 30

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]
3490.0	H	117	359	-66.04	1.30	42.26	-53.00	-13.00	-40.00
5235.0	H	-	-	-76.81	4.65	34.84	-60.42	-13.00	-47.42
6980.0	H	-	-	-77.98	7.11	36.13	-59.13	-13.00	-46.13
8725.0	H	-	-	-78.38	10.88	39.50	-55.75	-13.00	-42.75

Table 7-20. Radiated Spurious Data (EN-DC Band n66 + B30 – Mid Channel)

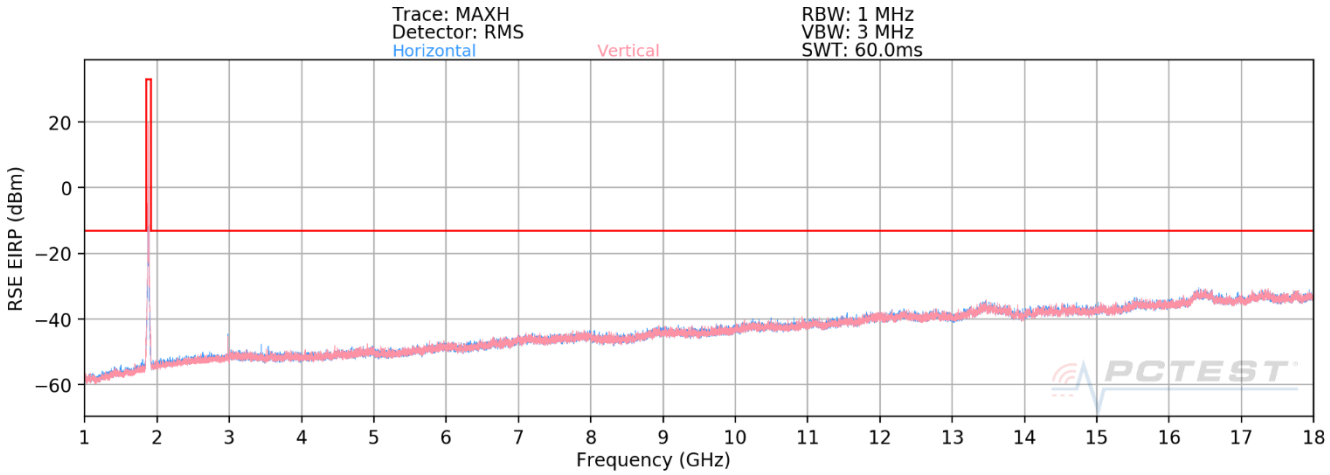
Band 2

OPERATING FREQUENCY:	1880.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
3760.00	H	334	300	-71.98	9.40	-62.58	-49.6
5640.00	H	251	6	-69.48	11.20	-58.28	-45.3
7520.00	H	256	35	-61.37	11.14	-50.24	-37.2
9400.00	H	-	-	-69.79	11.60	-58.19	-45.2
11280.00	H	-	-	-69.95	12.78	-57.17	-44.2

Table 7-21. Radiated Spurious Data (Band 2 – Mid Channel)

EN-DC Band n2 + B13



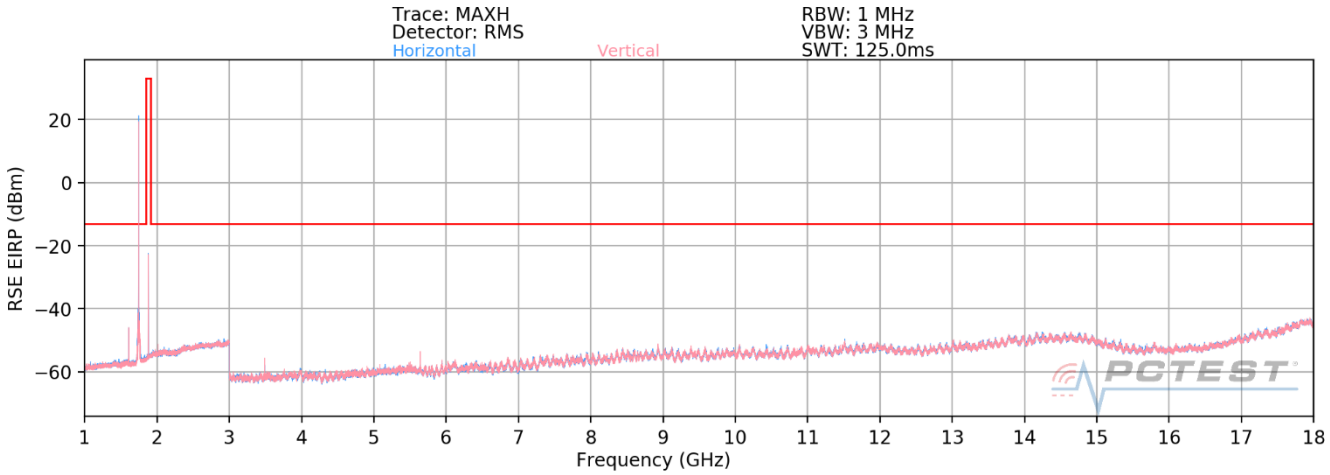
Plot 7-5. Radiated Spurious Plot above 1GHz (EN-DC Band n2 + B13)

Bandwidth (MHz):	20
Frequency (MHz):	1880.0
RB / Offset:	1/53
Mode:	EN-DC
Anchor Band:	B13

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]
2978.0	V	120	348	-70.38	6.02	42.64	-52.62	-13.00	-39.62
3760.0	V	-	-	-79.97	7.91	34.94	-60.32	-13.00	-47.32
5640.0	V	-	-	-81.48	10.76	36.28	-58.98	-13.00	-45.98

Table 7-22. Radiated Spurious Data (EN-DC Band n2 + B13– Mid Channel)

EN-DC Band n2 + B66



Plot 7-6. Radiated Spurious Plot above 1GHz (EN-DC Band n2 + B66)

Bandwidth (MHz):	20
Frequency (MHz):	1880.0
RB / Offset:	1/53
Mode:	EN-DC
Anchor Band:	B66

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]
1610.0	H-Swivel	124	194	-63.40	19.47	63.07	-32.19	-13.00	-19.19
2015.0	H-Swivel	186	292	-66.50	22.47	62.97	-32.29	-13.00	-19.29
3760.0	H-Swivel	-	-	-80.13	7.91	34.78	-60.48	-13.00	-47.48

Table 7-23. Radiated Spurious Data (EN-DC Band n2 + B66– Mid Channel)

Band 30

OPERATING FREQUENCY:	2310.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-40	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]
4620.00	H	221	346	-64.70	10.95	-53.76	-13.8
6930.00	H	353	307	-72.39	11.77	-60.62	-20.6
9240.00	H	156	26	-68.82	11.65	-57.17	-17.2
11550.00	H	-	-	-69.17	12.76	-56.40	-16.4
13860.00	H	-	-	-65.56	12.04	-53.51	-13.5

Table 7-24. Radiated Spurious Data (Band 30 – Mid Channel)

OPERATING FREQUENCY:	2310.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-40	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]
4620.00	H	220	52	-68.15	10.95	-57.21	-17.2
6930.00	H	159	359	-72.21	11.77	-60.44	-20.4
9240.00	H	135	346	-68.93	11.65	-57.28	-17.3
11550.00	H	-	-	-69.15	12.76	-56.38	-16.4
13860.00	H	-	-	-65.63	12.04	-53.58	-13.6

Table 7-25. Radiated Spurious Data with WCP (Band 30 – Mid Channel)

Band 41 (PC3)

OPERATING FREQUENCY:	2593.00	MHz
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]
5186.00	H	115	310	-52.27	10.77	-41.50	-16.5
7779.00	H	385	37	-60.76	11.47	-49.29	-24.3
10372.00	H	291	54	-65.17	12.48	-52.69	-27.7
12965.00	H	-	-	-66.91	13.34	-53.57	-28.6
15558.00	H	124	336	-68.53	16.37	-52.16	-27.2

Table 7-26. Radiated Spurious Data (Band 41 – Mid Channel)

7.4 Uplink Carrier Aggregation Radiated Measurements

§2.1053,

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 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-D-2010 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. No. of sweep points ≥ 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

Test Setup

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

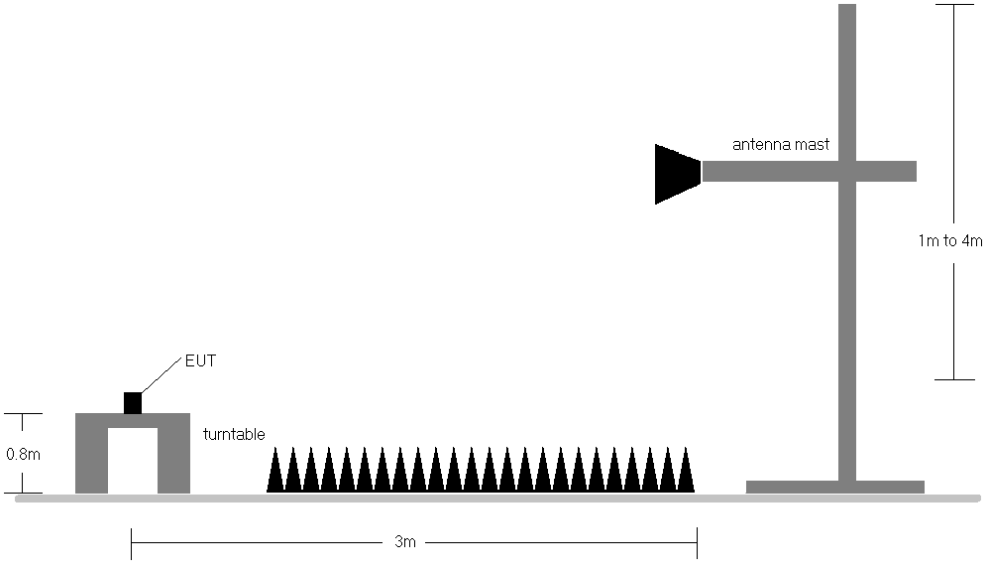


Figure 7-4. Test Instrument & Measurement Setup

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.

ULCA Band 5

OPERATING FREQUENCY (PCC):	829.00	MHz
OPERATING FREQUENCY (SCC):	838.90	MHz
CHANNEL (PCC):	20450	
CHANNEL (SCC):	20549	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
1658.00	H	-	-	-81.21	8.98	-72.23	-59.2
2487.00	H	159	358	-72.10	9.73	-62.37	-49.4
3316.00	H	-	-	-75.58	9.62	-65.96	-53.0
4145.00	H	-	-	-75.12	10.24	-64.87	-51.9

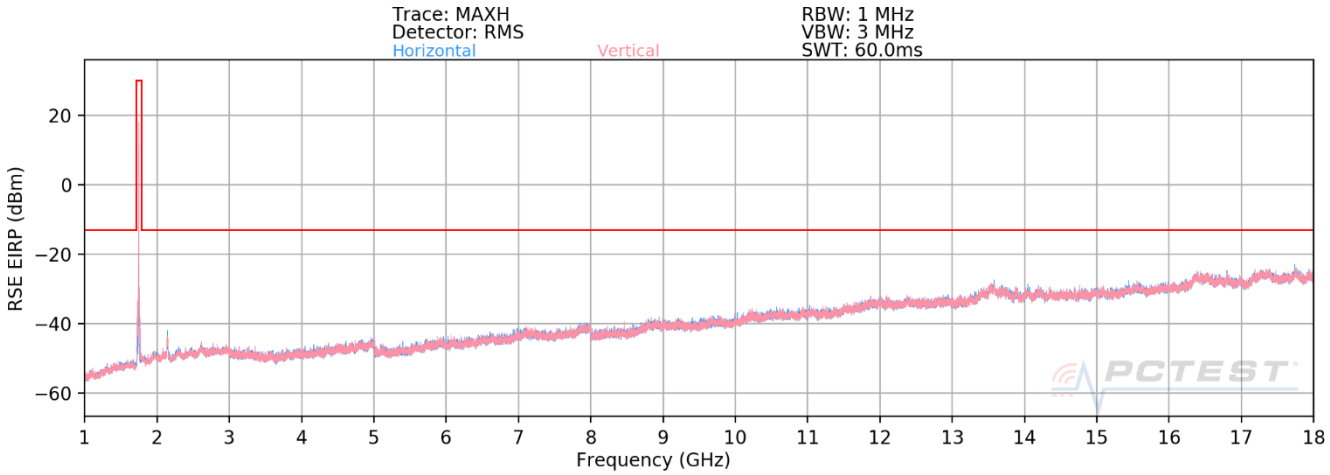
Table 7-27. Radiated Spurious Data (ULCA B5 PCC: RB 1 Offset 49, SCC: RB 1 Offset 0 – Low Channel)

OPERATING FREQUENCY (PCC):	844.00	MHz
OPERATING FREQUENCY (SCC):	834.10	MHz
CHANNEL (PCC):	20600	
CHANNEL (SCC):	20501	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
1688.00	H	-	-	-80.51	8.98	-71.53	-58.5
2532.00	H	162	39	-72.98	9.78	-63.20	-50.2
3376.00	H	-	-	-75.86	9.74	-66.13	-53.1
4220.00	H	-	-	-75.22	10.51	-64.70	-51.7

Table 7-28. Radiated Spurious Data (ULCA B5 PCC: RB 1 Offset 0, SCC: RB 1 Offset 49 – High Channel)

Inter-band Uplink CA Radiated Spurious Data 12A-66A



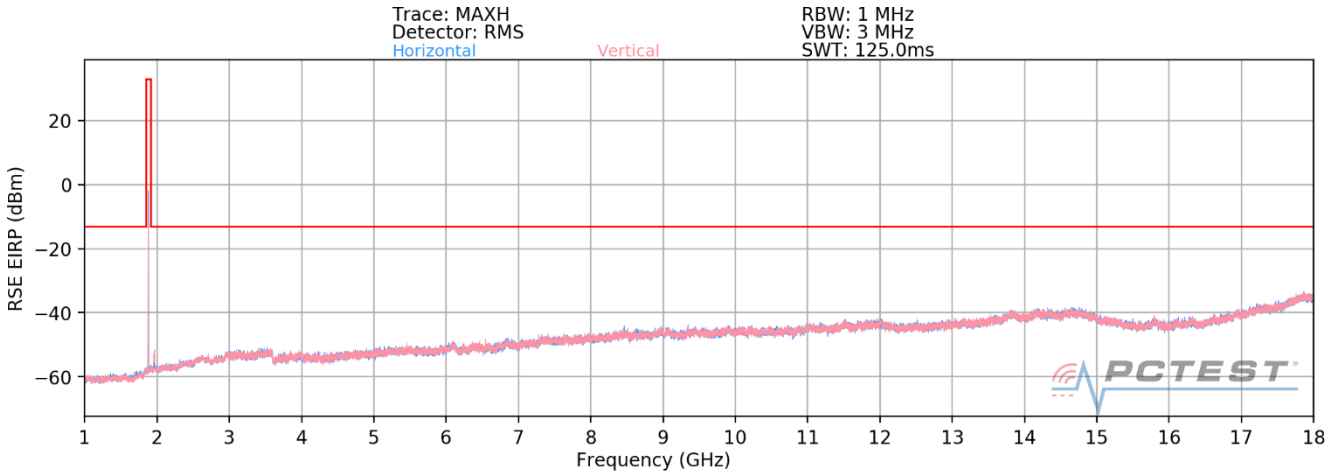
Plot 7-7. Radiated Spurious Plot 1GHz - 18GHz (ULCA 12A-66A)

OPERATING FREQUENCY (PCC):	707.50	MHz
OPERATING FREQUENCY (SCC):	1745.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10+20	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
1415.00	V	-	-	-66.21	2.39	-63.82	-50.8
2122.50	V	-	-	-64.20	3.14	-61.06	-48.1
3490.00	V	-	-	-67.60	6.47	-61.13	-48.1

Table 7-29. Radiated Spurious Data (ULCA 12A-66A – Mid Channel)

Inter-band Uplink CA Radiated Spurious Data 2A-12A



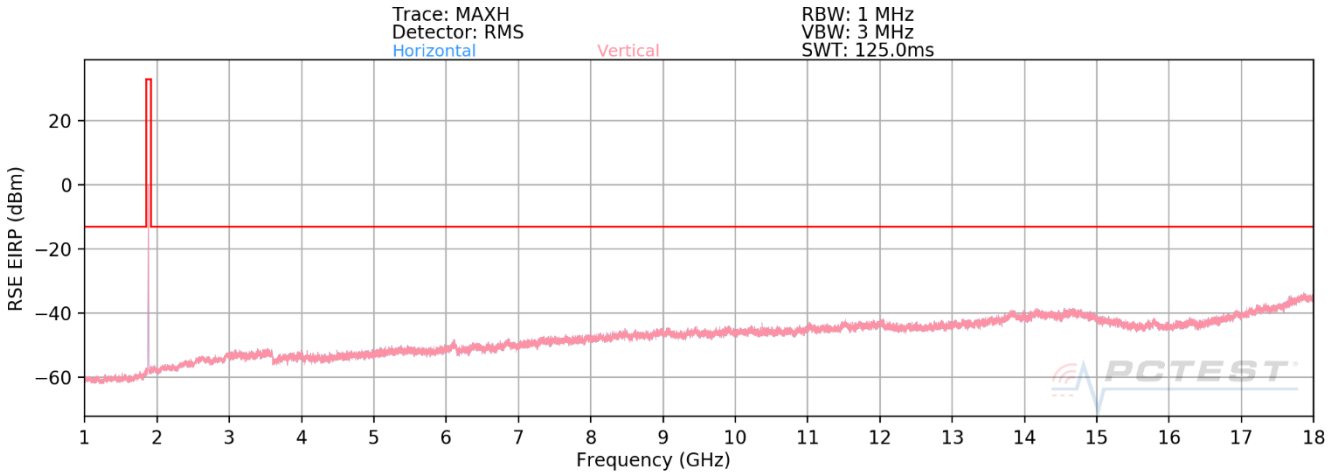
Plot 7-8. Radiated Spurious Plot 1GHz - 18GHz (ULCA 2A-12A)

OPERATING FREQUENCY (PCC):	1880.00	MHz
OPERATING FREQUENCY (SCC):	707.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20+10	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
1415.00	H	-	-	-79.34	7.66	-71.67	-58.7
2122.50	H	-	-	-78.46	8.89	-69.57	-56.6
3760.00	H	-	-	-73.51	9.40	-64.11	-51.1
5640.00	H	-	-	-74.20	11.20	-63.00	-50.0

Table 7-30. Radiated Spurious Data (ULCA 2A-12A – Mid Channel)

Inter-band Uplink CA Radiated Spurious Data 2A-5A



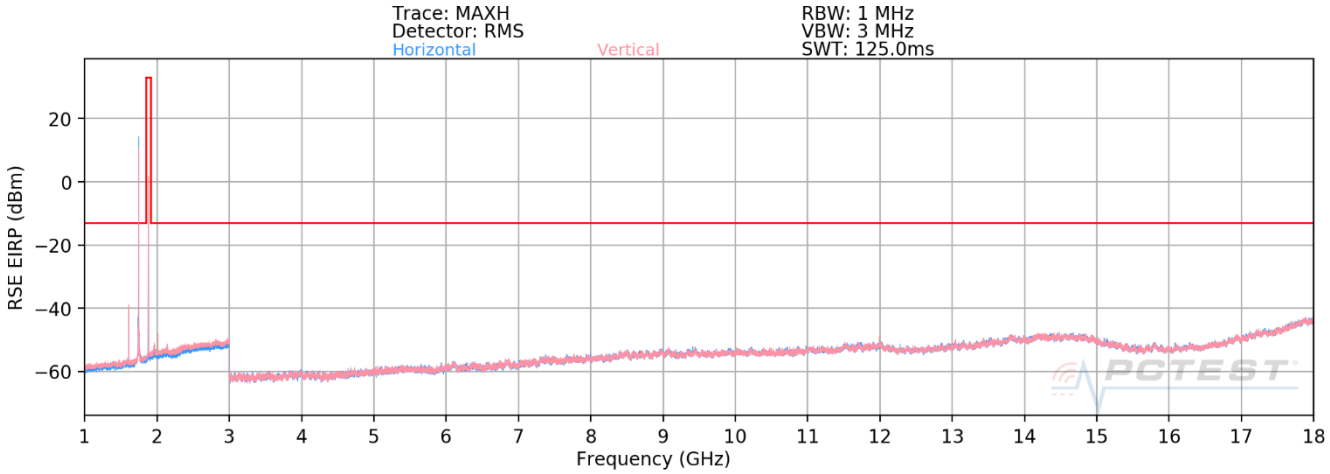
Plot 7-9. Radiated Spurious Plot 1GHz - 18GHz (ULCA 2A-5A)

OPERATING FREQUENCY (PCC):	1880.00	MHz
OPERATING FREQUENCY (SCC):	836.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20+10	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
1673.00	H	-	-	-80.53	8.98	-71.55	-58.6
2509.50	H	-	-	-78.45	9.78	-68.66	-55.7
3760.00	H	-	-	-75.19	9.40	-65.79	-52.8
5640.00	H	-	-	-74.19	11.20	-62.99	-50.0

Table 7-31. Radiated Spurious Data (ULCA 2A-5A – Mid Channel)

Inter-band Uplink CA Radiated Spurious Data 2A-66A



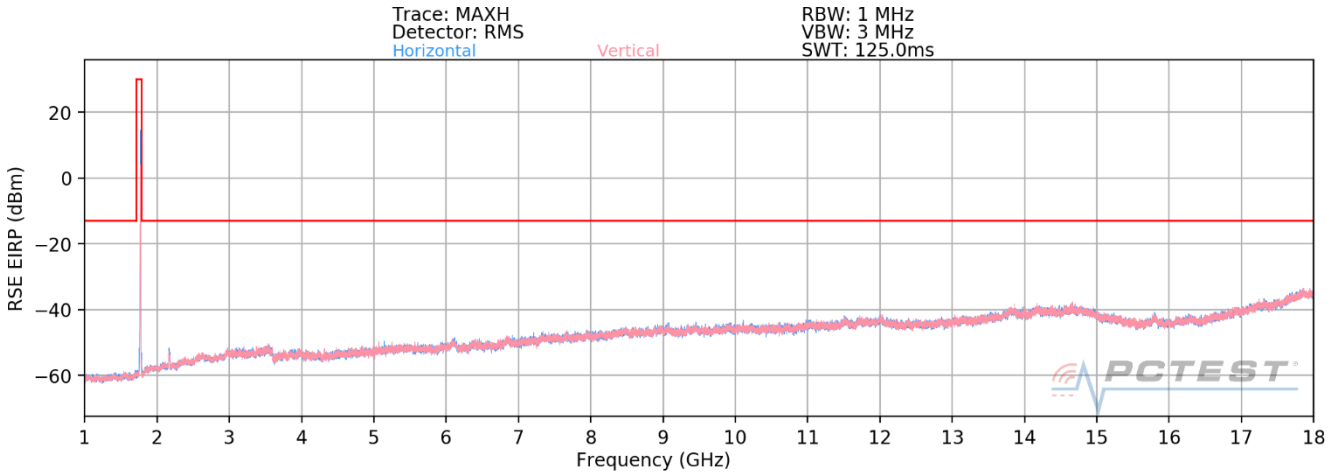
Plot 7-10. Radiated Spurious Plot 1GHz - 18GHz (ULCA 2A-66A)

OPERATING FREQUENCY (PCC):	1745.00	MHz
OPERATING FREQUENCY (SCC):	1880.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
1610.00	V	248	321	-55.80	8.75	-47.05	-34.0
3490.00	V	312	365	-72.11	9.94	-62.17	-49.2
5235.00	V	-	-	-73.70	10.76	-62.94	-49.9
3760.00	V	-	-	-73.66	9.40	-64.26	-51.3
5640.00	V	-	-	-74.00	11.20	-62.80	-49.8

Table 7-32. Radiated Spurious Data (ULCA 2A-66A – Mid Channel)

Inter-band Uplink CA Radiated Spurious Data 5A-66A



Plot 7-11. Radiated Spurious Plot 1GHz - 18GHz (ULCA 5A-66A)

OPERATING FREQUENCY (PCC):	836.50	MHz
OPERATING FREQUENCY (SCC):	1745.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	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]
1673.00	H	-	-	-81.96	8.98	-72.98	-60.0
2509.50	H	-	-	-79.00	9.78	-69.21	-56.2
3490.00	H	299	12	-62.57	6.47	-56.10	-43.1
5235.00	H	-	-	-66.58	8.97	-57.62	-44.6

Table 7-33. Radiated Spurious Da ta (ULCA 5A-66A – Mid Channel)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFF100VM** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.