FCC CFR47 PART 15 SUBPART C

Bluetooth Low Energy

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Tablet + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC

MODEL NUMBER : SM-T395C

FCC ID: A3LSMT395C

REPORT NUMBER: 4788148881-E2V1

ISSUE DATE: OCT 13, 2017

Prepared for
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129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
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ACCREDITED
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Revision History

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V1	10/13/17	Initial issue	Junwhan Lee

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 5
1.1. INTRODUCTION OF TEST DATA REUSE 6
1.2. DIFFERENCE 6
1.3. SPOT CHECK VERIFICATION DATA 6
1.4. REFERENCE DETAIL 7
2. TEST METHODOLOGY 8
3. FACILITIES AND ACCREDITATION 8
4. CALIBRATION AND UNCERTAINTY 8
4.1. MEASURING INSTRUMENT CALIBRATION 8
4.2. SAMPLE CALCULATION 8
4.3. MEASUREMENT UNCERTAINTY 9
5. EQUIPMENT UNDER TEST 10
5.1. DESCRIPTION OF EUT 10
5.2. MAXIMUM OUTPUT POWER 10
5.3. DESCRIPTION OF AVAILABLE ANTENNAS 10
5.4. WORST-CASE CONFIGURATION AND MODE 10
5.5. DESCRIPTION OF TEST SETUP 11
6. TEST AND MEASUREMENT EQUIPMENT 13
7. REFERENCE MEASUREMENT RESULTS 14
7.1. ON TIME AND DUTY CYCLE RESULTS 14
7.2. 99% BANDWIDTH 15
8. SUMMARY TABLE 17
9. ANTENNA PORT TEST RESULTS 18
9.1. 6 dB BANDWIDTH 18
9.2. OUTPUT POWER 20
9.3. AVERAGE POWER 22
9.4. PSD 23
9.5. OUT-OF-BAND EMISSIONS 25
10. RADIATED TEST RESULTS 29
10.1. LIMITS AND PROCEDURE 29

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10.2. TRANSMITTER ABOVE 1 GHz.....31

10.3. BANDEDGE (on Worst case) equipped with protective case.....41

10.4. HARMONICS AND SPURIOUS EMISSIONS (on Worst case) equipped with protective case 42

10.5. WORST-CASE BELOW 1 GHz 44

11. AC POWER LINE CONDUCTED EMISSIONS 46

12. SETUP PHOTOS 51

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Tablet + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC
MODEL NUMBER:	SM-T395C
SERIAL NUMBER:	R32J500ANHD, R32J500B9LL (RADIATED, Original model); R32J500B6RB (CONDUCTED, Original model) R22J9005ZNF, R22J9008P2V (RADIATED, Spot check model);
DATE TESTED:	AUG 02, 2017 - AUG 25, 2017 (Original Test) OCT 10 – OCT 12, 2017 (Spot check and Additional Test)

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

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1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMT395, DTS BLE(FCC CFR 47 Part 15C).
And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.2. DIFFERENCE

The FCC ID: A3LSMT395C shares the same enclosure and circuit board as FCC ID: A3LSMT395. The BLE circuitry and layout are identical between these two units.
The BLE antennas and surrounding circuitry are the same between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMT395 remains representative of FCC ID: A3LSMT395C. The test data of FCC ID: A3LSMT395 being submitted for this application to cover BLE features.

Due to difference of charger, radiated emission under 1GHz and AC line conducted test were performed newly.

1.3. SPOT CHECK VERIFICATION DATA

Band	Test Item	Frequency	Test Limit	Original model SM-T395 Results FCC ID : A3LSMT395	Spot check model SM-T395C Results FCC ID : A3LSMT395C	Deviation	Remark
DTS BLE (2.4GHz)	Band Edge	2480 MHz	54 dBuV/m	41.82 dBuV/m	41.74 dBuV/m	-0.08 dB	
	RSE	2440 MHz	74 dBuV/m	38.96 dBuV/m	39.06 dBuV/m	0.1 dB	Noise floor level (Both data)

Comparison of two models, deviation is within 3dB range and test results are under FCC Technical Limits.

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1.4. REFERENCE DETAIL

Reference application that contains the reused reference data.

Equipment Class	Reference FCC ID	Type Grant/Permissive Change	Reference Application	Folder Test/RF Exposure	Report Tittle / Section
DTS	A3LSMT395	Grant	4788060215-E2V2	Test	FCC Report BLE / All sections (Except Section 10.5, 11)
			4788060215-E1V2	Test	FCC Report DTS / All sections (Except Section 10.5, 11)
DSS	A3LSMT395	Grant	4788060215-E3V2	Test	FCC Report BT / All sections (Except Section 10.5, 11)
DXX	A3LSMT395	Grant	4788060215-E5V1	Test	FCC Report ANT+ / All sections (Except Section 7.2.4, 8)
			4788060215-E6V2	Test	FCC Report NFC / All sections (Except Section 8.1.2, 9)
NII	A3LSMT395	Grant	4788060215-E4V3	Test	FCC Report UNII / All sections (Except Section 11, 12)

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2
2. FCC CFR 47 Part 15
3. KDB 558074 D01 DTS Meas Guidance v04.
4. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Chamber 1
☐ Chamber 2

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4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Tablet + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC Tablet. This test report addresses the DTS (BLE) operational mode.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted output power as follows:

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2402 - 2480	BLE	Peak	0.873	1.22
		Average	0.630	1.16

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of -1.3 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA12CBC	DK2J606HS/B- E	N/A
Data Cable	SAMSUNG	EP-DN930CWE	N/A	N/A
Earphone	SAMSUNG	EO-EG920BW	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	C-type	Shielded	1.2m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.2m	N/A

NOTE : Protective cover (with S-pen) is in-box item. So additional radiated spurious emission measurements were performed on worst case equipped with protective case.

TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software in hidden menu exercised the EUT to enable BLE mode.

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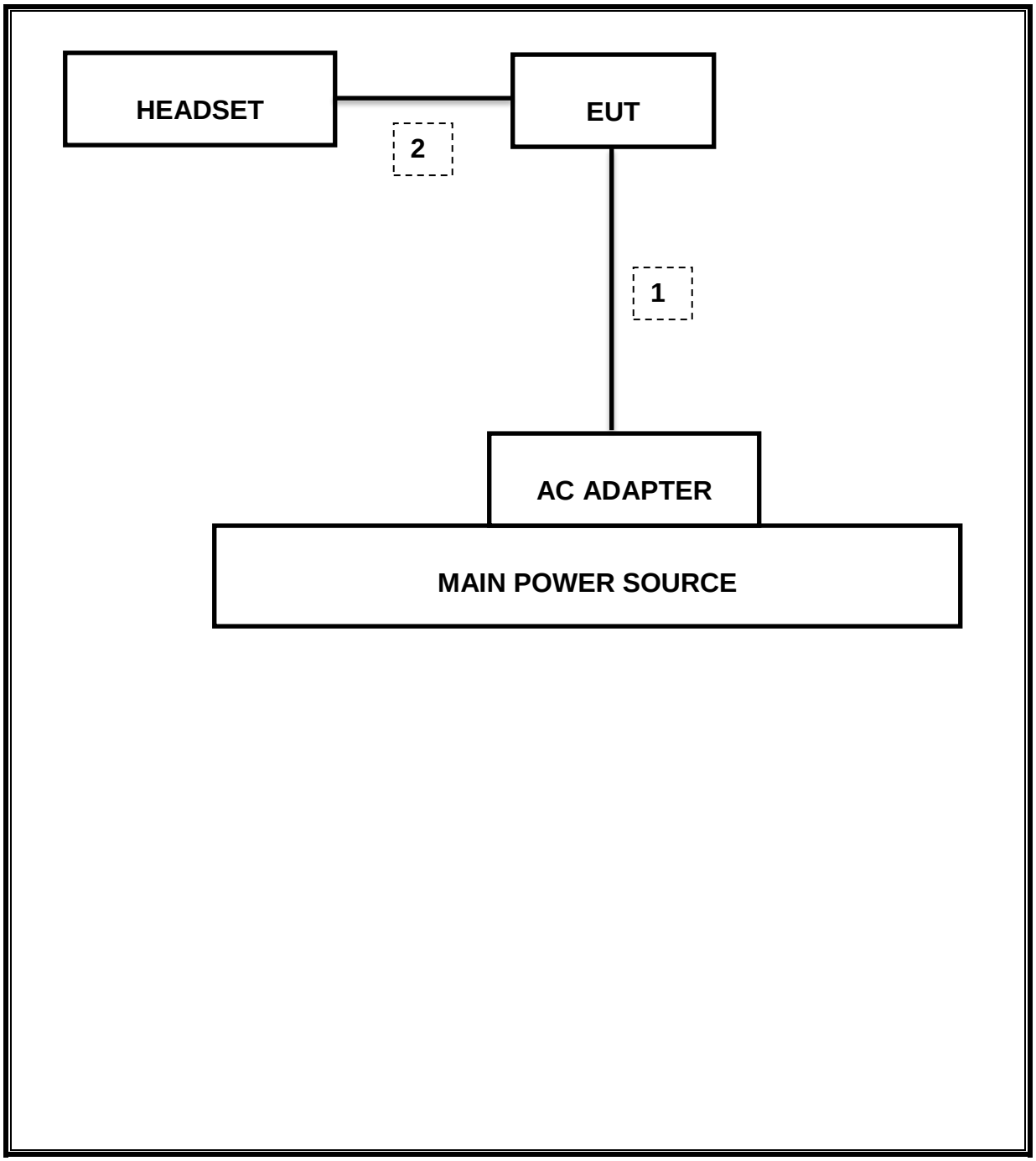
SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N**	**Cal Due**
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-31-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-14-19
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
Antenna, Horn, 18 GHz	ETS	3115	00161451	03-10-19
Antenna, Horn, 18 GHz	ETS	3117	00168724	05-31-19
Antenna, Horn, 18 GHz	ETS	3117	00168717	05-31-19
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-09-18
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-18
Preamplifier	ETS	3115-PA	00167475	08-09-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-08-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-08-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-08-18
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-08-18
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-07-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-08-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-08-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-08-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-08-18
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-08-18
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	08-08-18
LISN	R&S	ENV-216	101837	08-09-18
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

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7. REFERENCE MEASUREMENT RESULTS

7.1. ON TIME AND DUTY CYCLE RESULTS

LIMITS

None: for reporting purposes only.

Mode	ON Time B [msec]	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
2400MHz Bands						
BLE	0.404	0.626	0.645	64.5%	1.90	2.475

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7.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to >= 3 times the RBW.
The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2402	1.069
Mid	2440	1.069
High	2480	1.069
Worst		1.069

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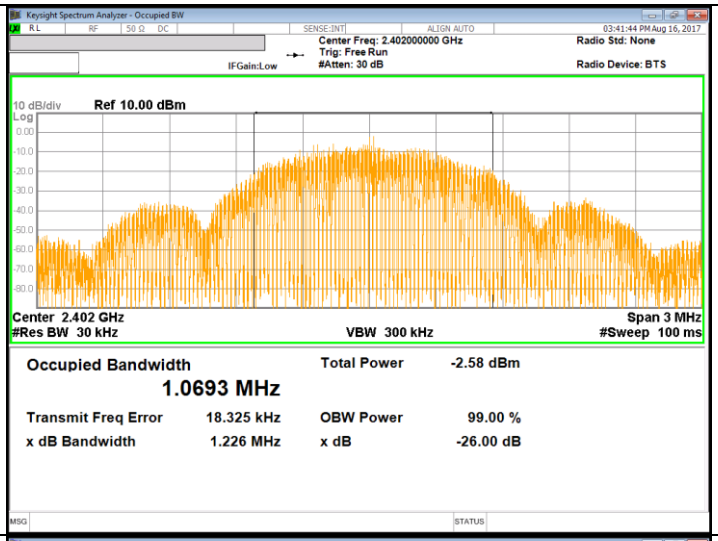
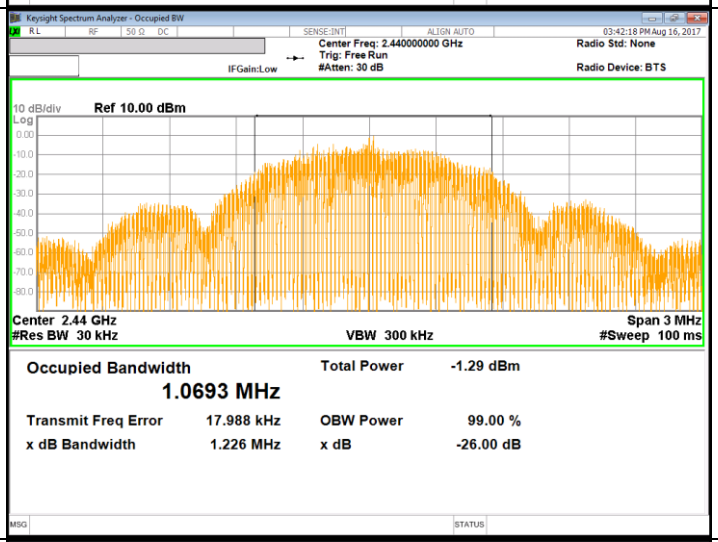
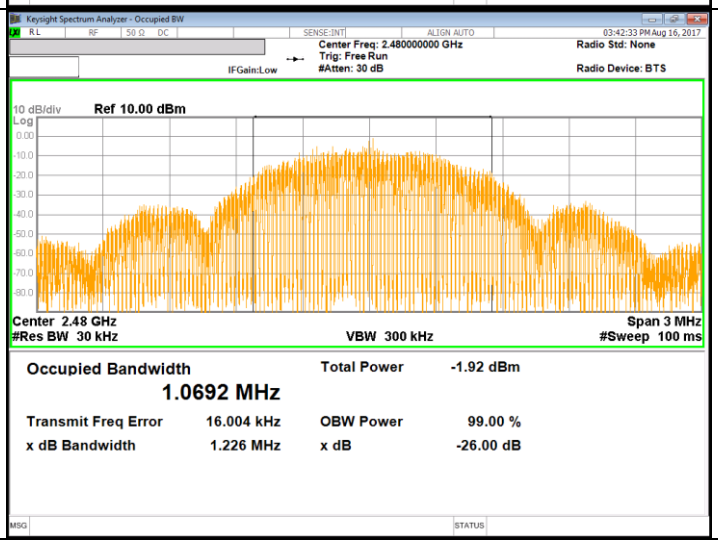
99% BANDWIDTH PLOTS

Low CH			
Middle CH			
High CH			

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8. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	659.8 kHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-57.406 dBm
15.247 (b)(3)	TX conducted output power	<30dBm		Pass	0.873 dBm (Peak)
15.247 (e)	PSD	<8dBm		Pass	-14.31 dBm (Peak)
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	42.46 dBuV (Pk)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	41.82 dBuV/m (Av)

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9. ANTENNA PORT TEST RESULTS

9.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)
IC RSS-247 §5.2 (1)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

Reference to KDB 558074 D01 DTS Meas Guidance v04: The transmitter output is connected to a spectrum analyzer with the RBW set to100KHz, the VBW >= 3 x RBW, peak detector and max hold.

RESULTS

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
Low	2402	659.8	500.0
Mid	2440	666.8	500.0
High	2480	666.6	500.0
Worst		659.8	500.0

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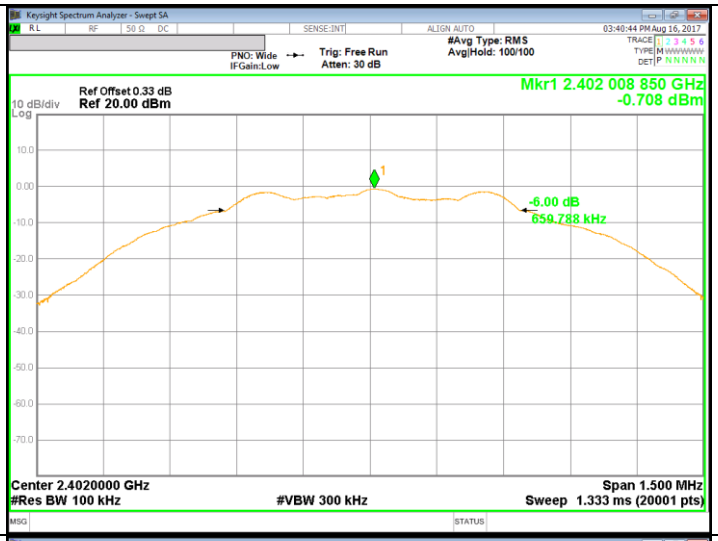
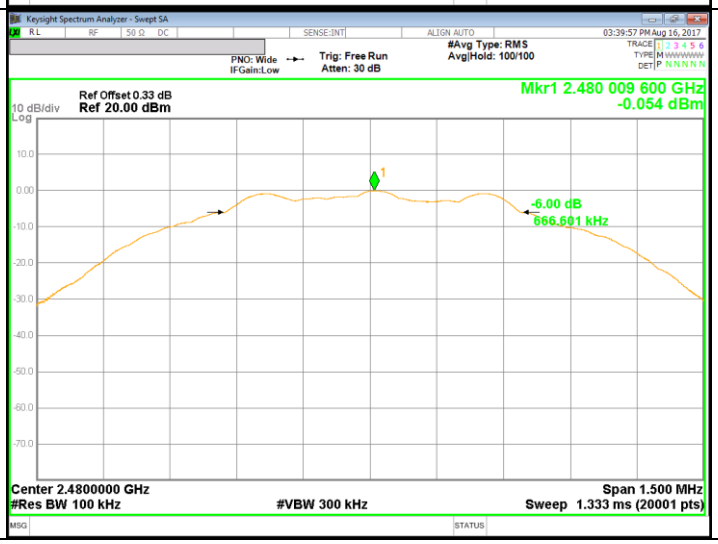
6 dB BANDWIDTH PLOTS

Low CH			
Middle CH			
High CH			

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9.2. OUTPUT POWER

LIMITS

FCC §15.247 (b)
IC RSS-247 §5.4 (4)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v04 under section 9.1.1 utilizing spectrum analyzer.

RESULTS

Channel	Frequency [MHz]	Peak Power Reading [dBm]	Limit [dBm]	Margin [dB]
Low	2402	-0.339	30.000	-30.339
Mid	2440	0.873	30.000	-29.127
High	2480	0.363	30.000	-29.637
Worst		0.873		-29.127

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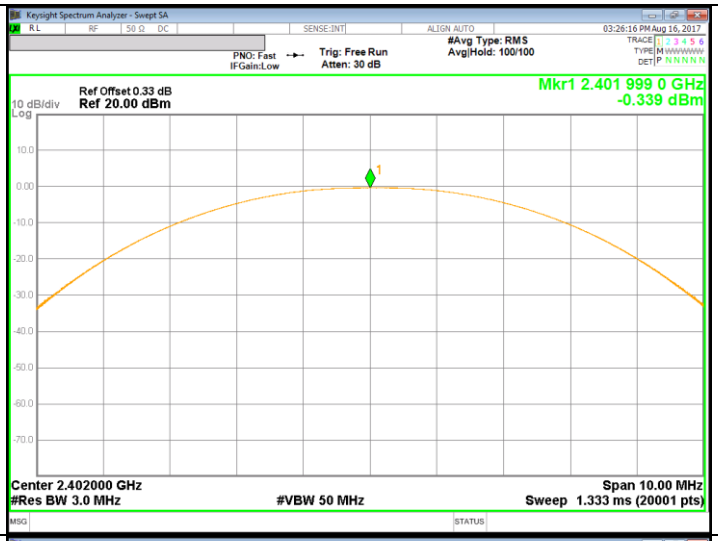
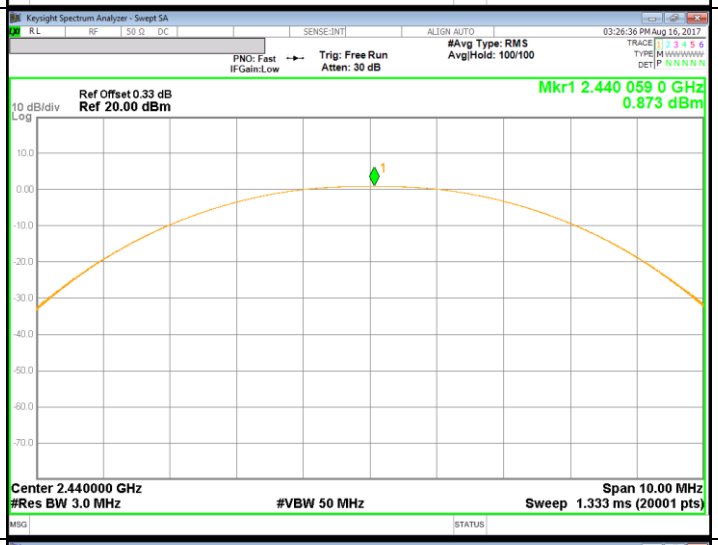
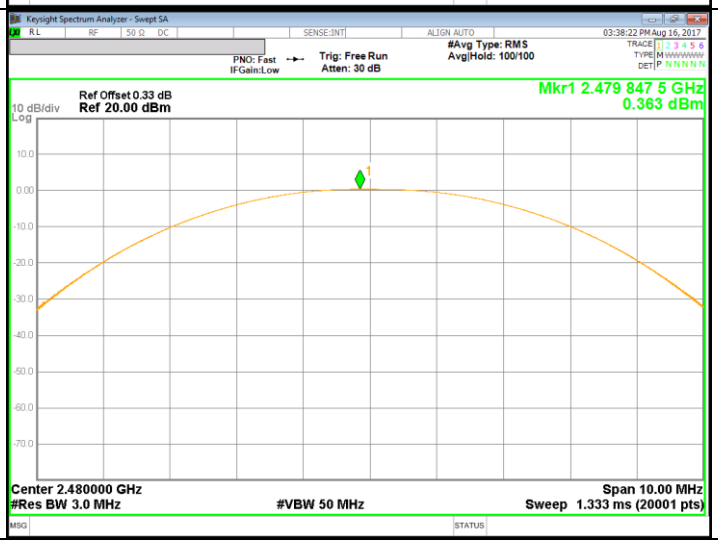
OUTPUT POWER PLOTS

Low CH			
Middle CH			
High CH			

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9.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	-0.616	0.868
Middle	2440	0.630	1.156
High	2480	0.319	1.076

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9.4. PSD

LIMITS

FCC §15.247
IC RSS-247 §5.2 (2)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Power Spectral Density was performed utilizing the "§10.2 Method PKPSD (Peak PSD)" under KDB558074 D01 DTS Meas Guidance v04

RESULTS

Channel	Frequency [MHz]	PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2402	-15.58	8.00	-23.58
Mid	2440	-14.31	8.00	-22.31
High	2480	-14.87	8.00	-22.87

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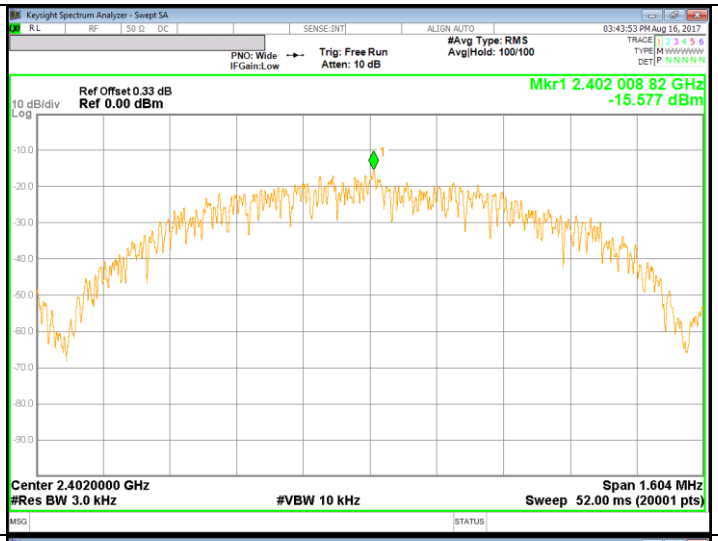
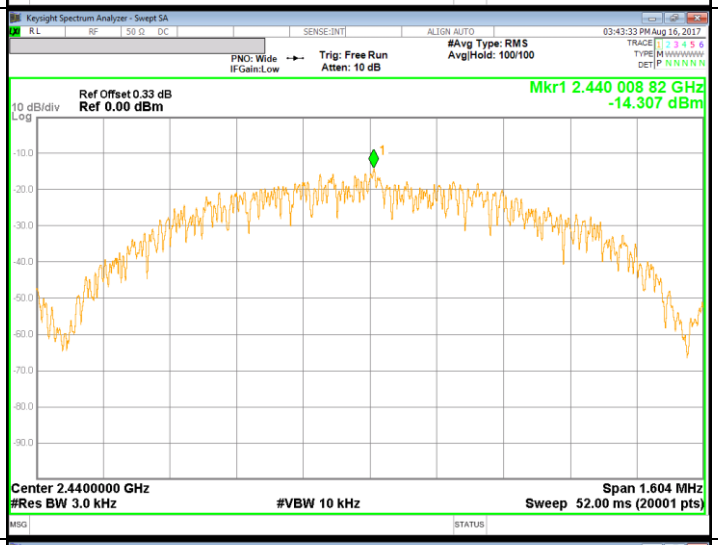
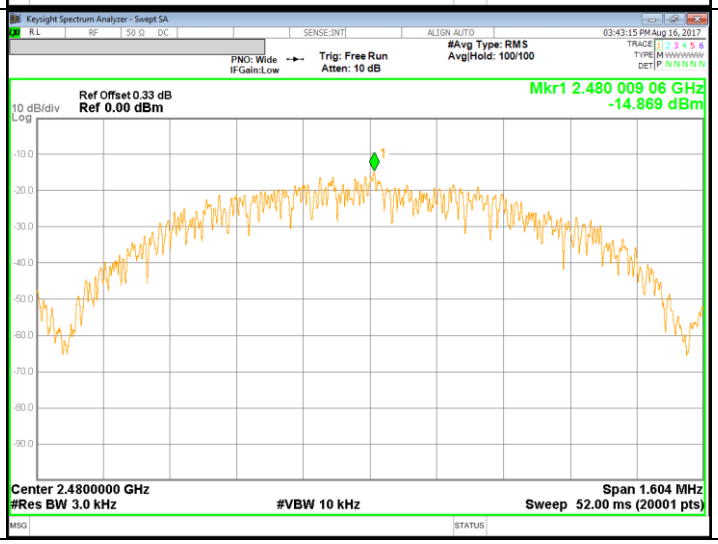
POWER SPECTRAL DENSITY PLOTS

Low CH			
Middle CH			
High CH			

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9.5. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)
IC RSS-247 §5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

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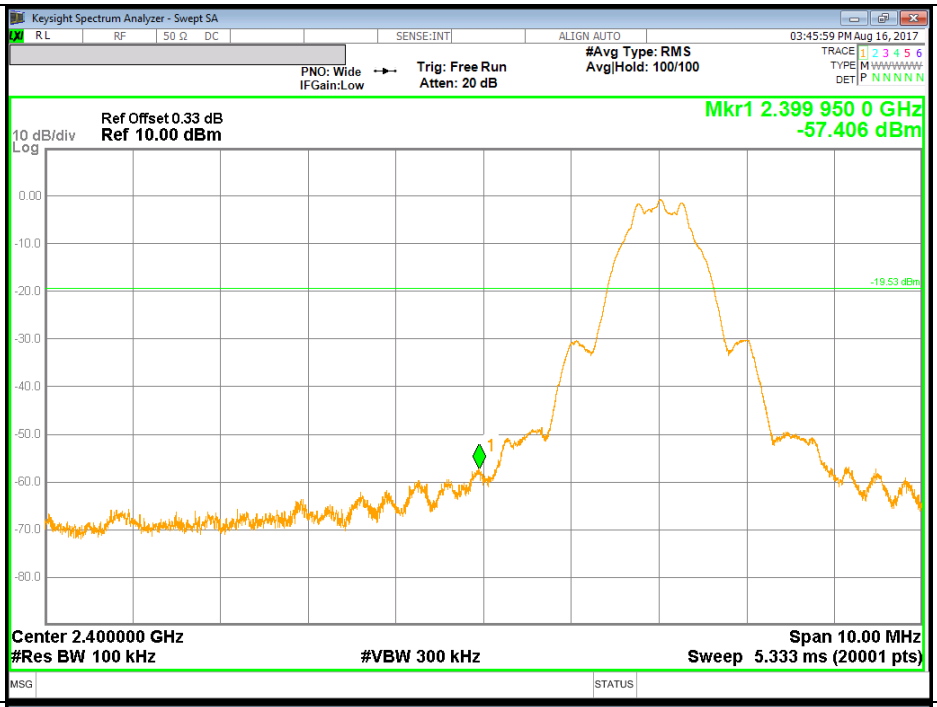
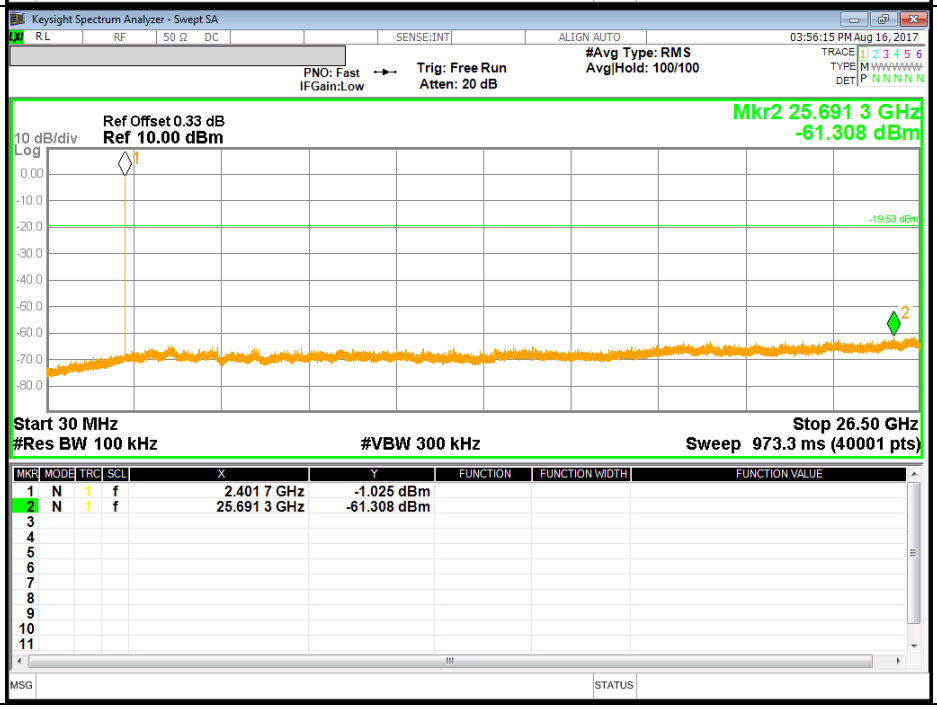
RESULTS

BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL

Low CH BandEdge	
Low CH Spurious	

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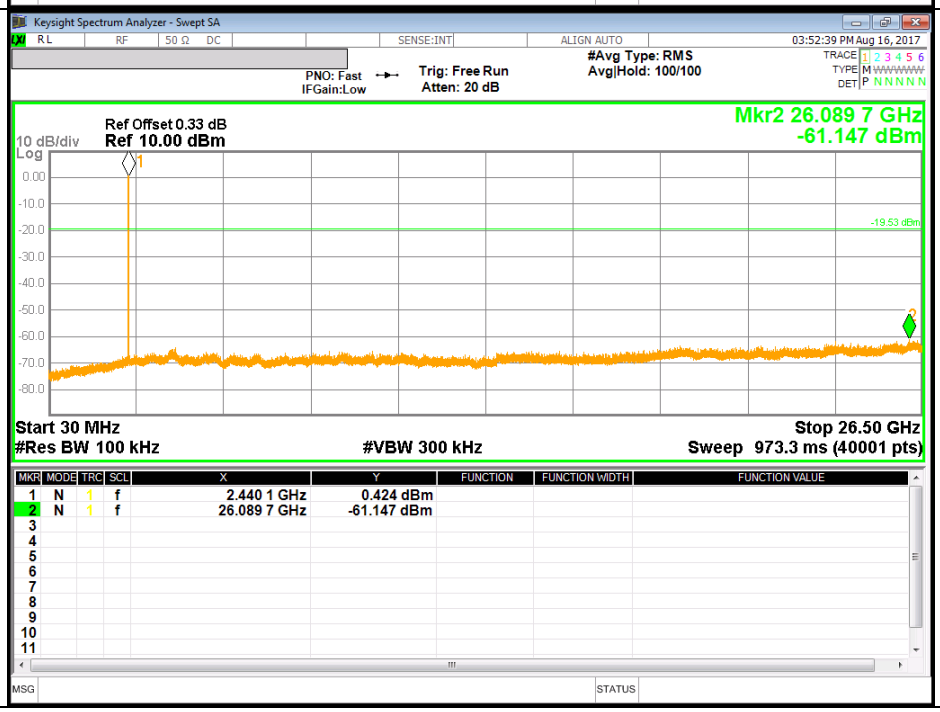
SPURIOUS EMISSIONS, MID CHANNEL

Middle CH BandEdge	
Middle CH Spurious	

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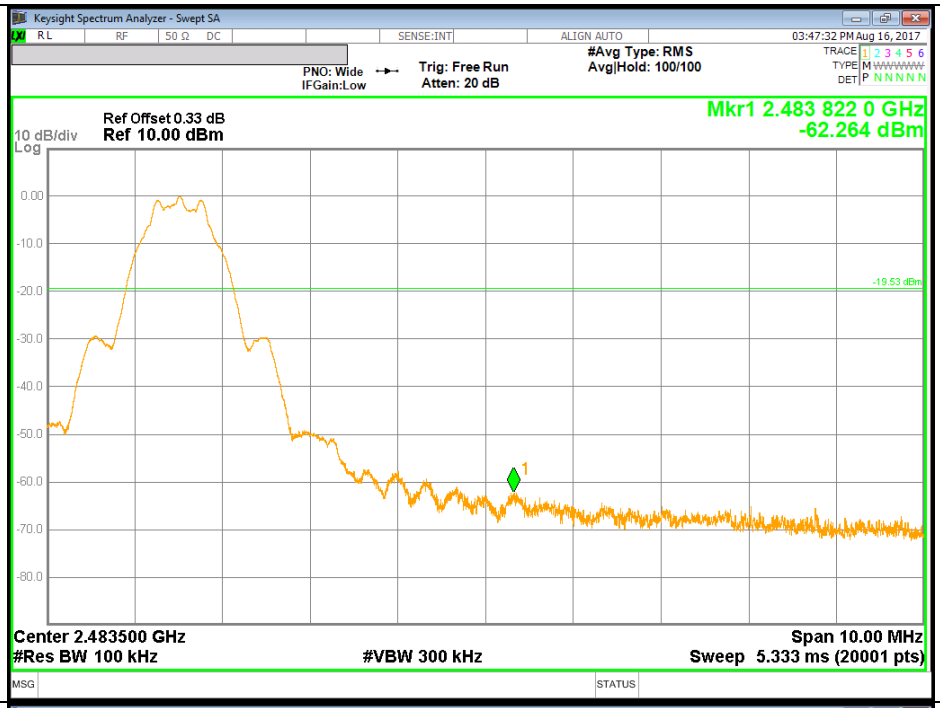
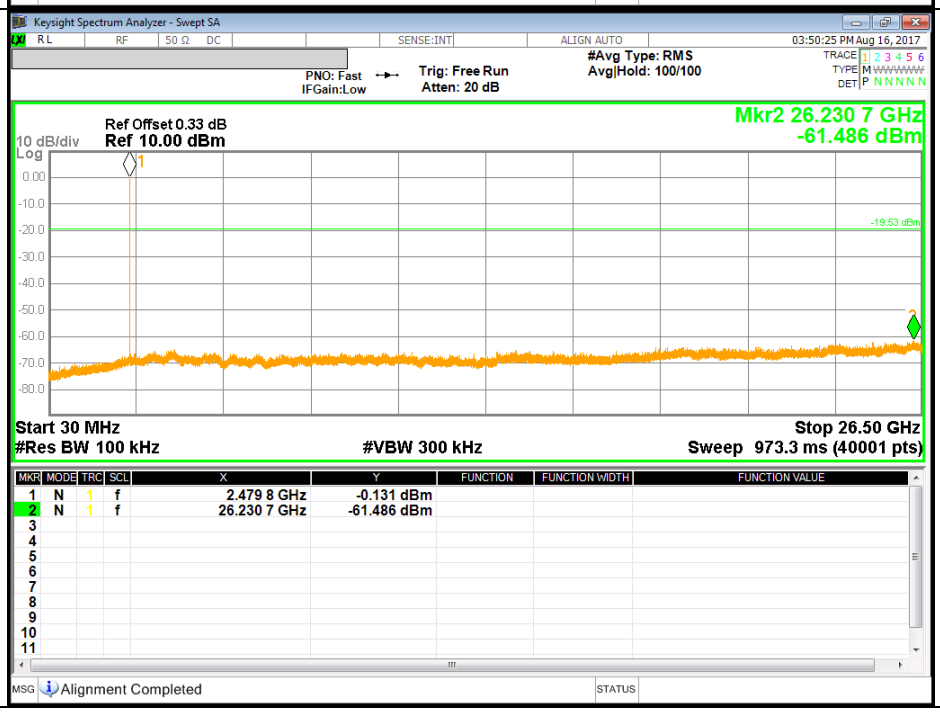
SPURIOUS EMISSIONS, HIGH CHANNEL

High CH BandEdge	
High CH Spurious	

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10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

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TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. (Restriced bandedge, Final detection of spurious harmonic emissions)Duty cycle factor = 10 log (1/x). For this sample: DCF = 10log(1/0.645)=1.9dB
(Spectrum Analyzer round it up to 1.9dB)

Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

The spectrum from 1 GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Unwanted emissions within Restricted Bands are measured using traditional radiated procedures.

Band edge emissions within Restricted Bands are measured using RMS with duty cycle factor offset method.

Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

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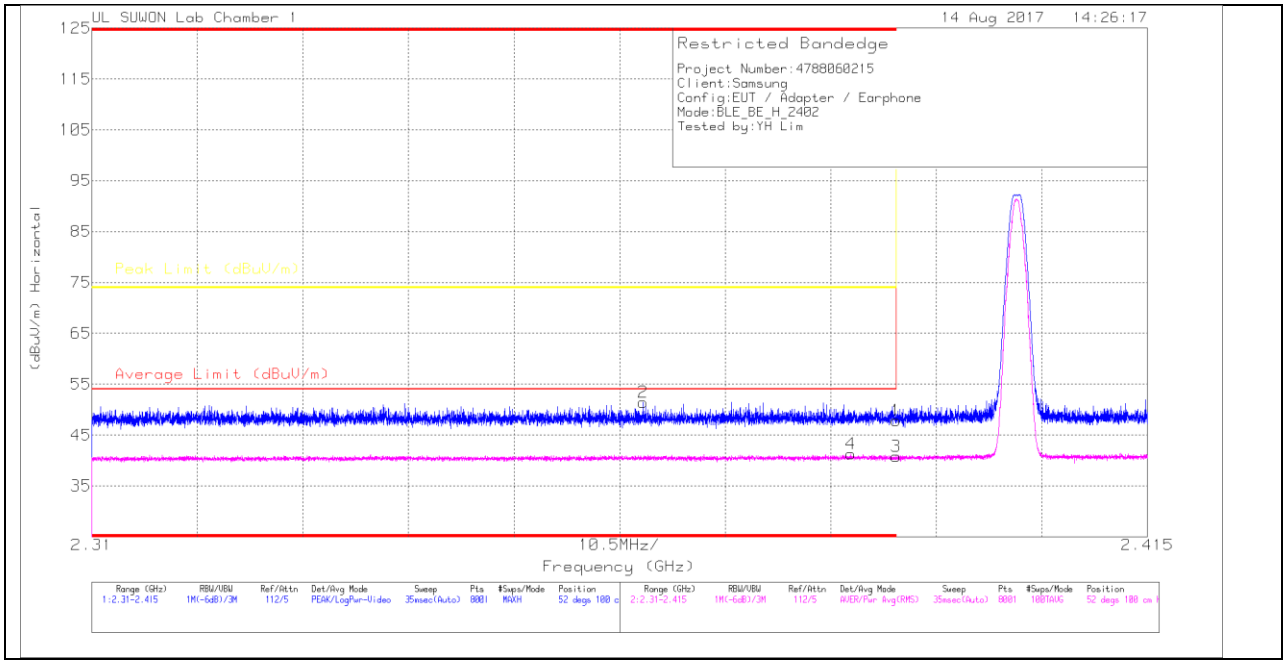
10.2. TRANSMITTER ABOVE 1 GHz
RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	10dB_ATT(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.22	Pk	31.3	-25.7	0	47.82	-	-	74	-26.18	52	100	H
2	* 2.365	46.07	Pk	31.2	-25.8	0	51.47	-	-	74	-22.53	52	100	H
3	* 2.39	33.34	RMS	31.3	-25.7	1.9	40.84	54	-13.16	-	-	52	100	H
4	* 2.385	33.81	RMS	31.3	-25.7	1.9	41.31	54	-12.69	-	-	52	100	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

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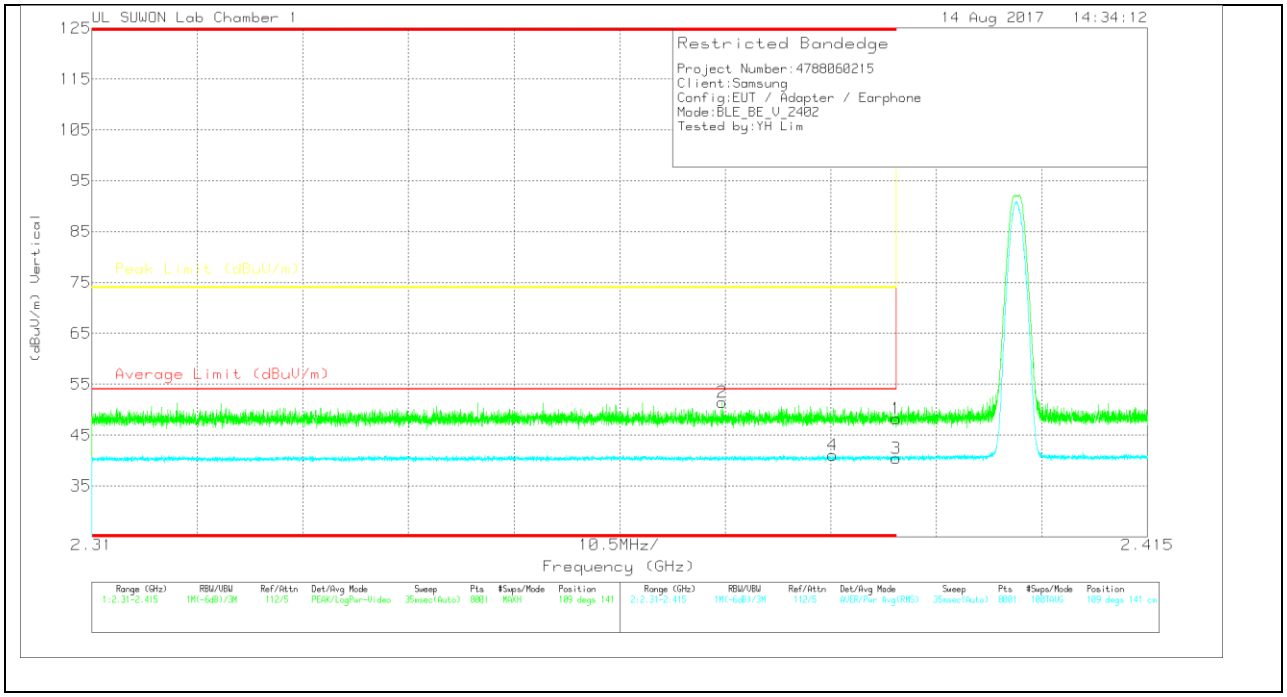
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	10dB_ATT(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.66	Pk	31.3	-25.7	0	48.26	-	-	74	-25.74	109	141	V
2	* 2.373	46.03	Pk	31.2	-25.8	0	51.43	-	-	74	-22.57	109	141	V
3	* 2.39	32.91	RMS	31.3	-25.7	1.9	40.41	54	-13.59	-	-	109	141	V
4	* 2.384	33.6	RMS	31.3	-25.7	1.9	41.1	54	-12.9	-	-	109	141	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

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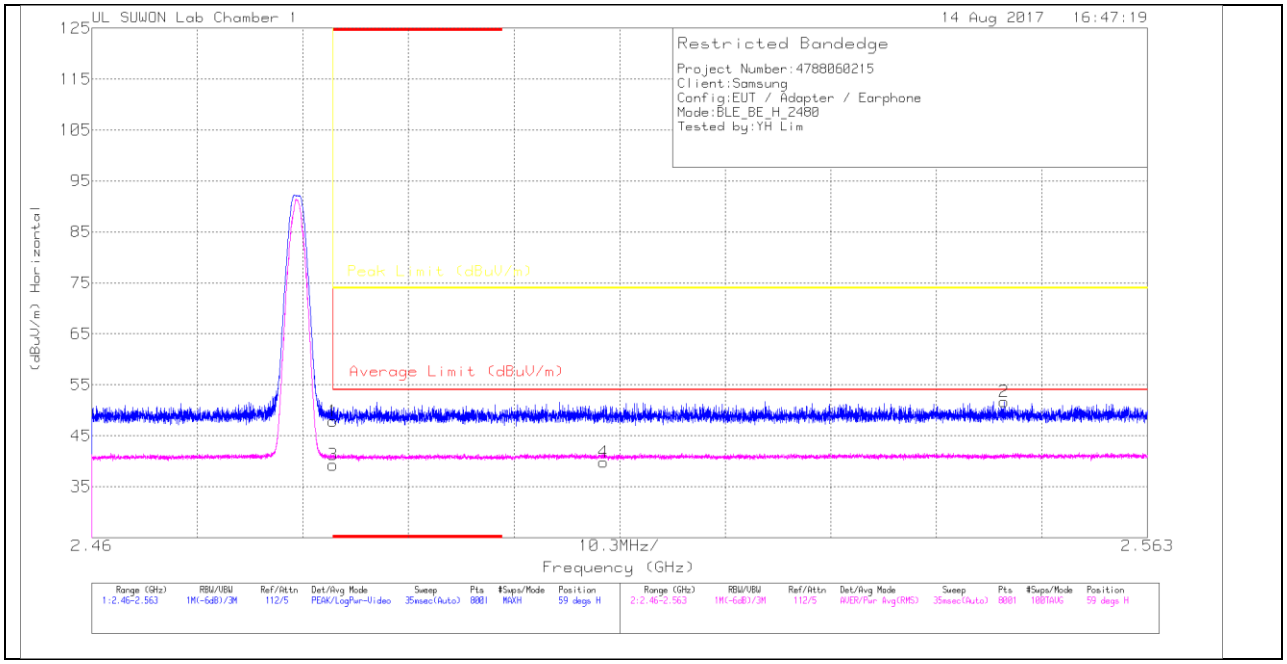
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	10dB_ATT(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.75	Pk	31.6	-25.5	0	47.85	-	-	74	-26.15	59	101	H
2	2.549	45.32	Pk	31.7	-25.3	0	51.72	-	-	74	-22.28	59	101	H
3	* 2.484	33.16	RMS	31.6	-25.5	1.9	41.16	54	-12.84	-	-	59	101	H
4	2.51	33.63	RMS	31.6	-25.4	1.9	41.73	54	-12.27	-	-	59	101	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

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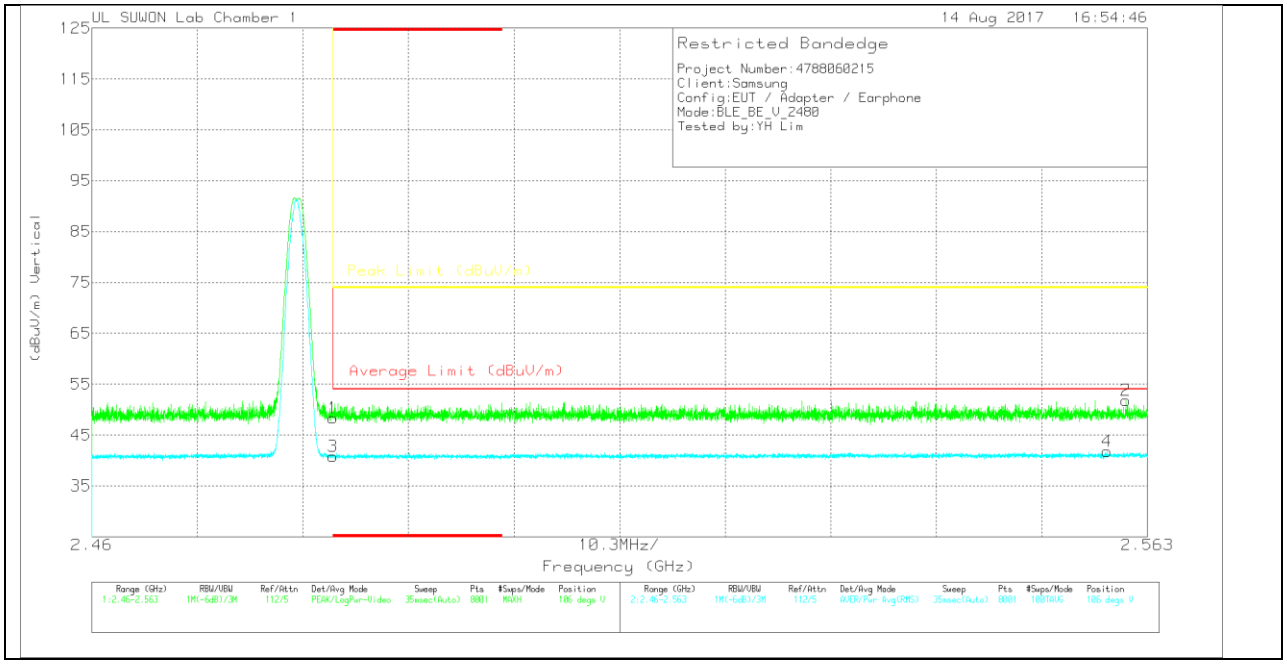
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	10dB_ATT(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	42.23	Pk	31.6	-25.5	0	48.33	-	-	74	-25.67	106	113	V
2	2.561	45.39	Pk	31.7	-25.3	0	51.79	-	-	74	-22.21	106	113	V
3	* 2.484	32.78	RMS	31.6	-25.5	1.9	40.78	54	-13.22	-	-	106	113	V
4	2.559	33.52	RMS	31.7	-25.3	1.9	41.82	54	-12.18	-	-	106	113	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

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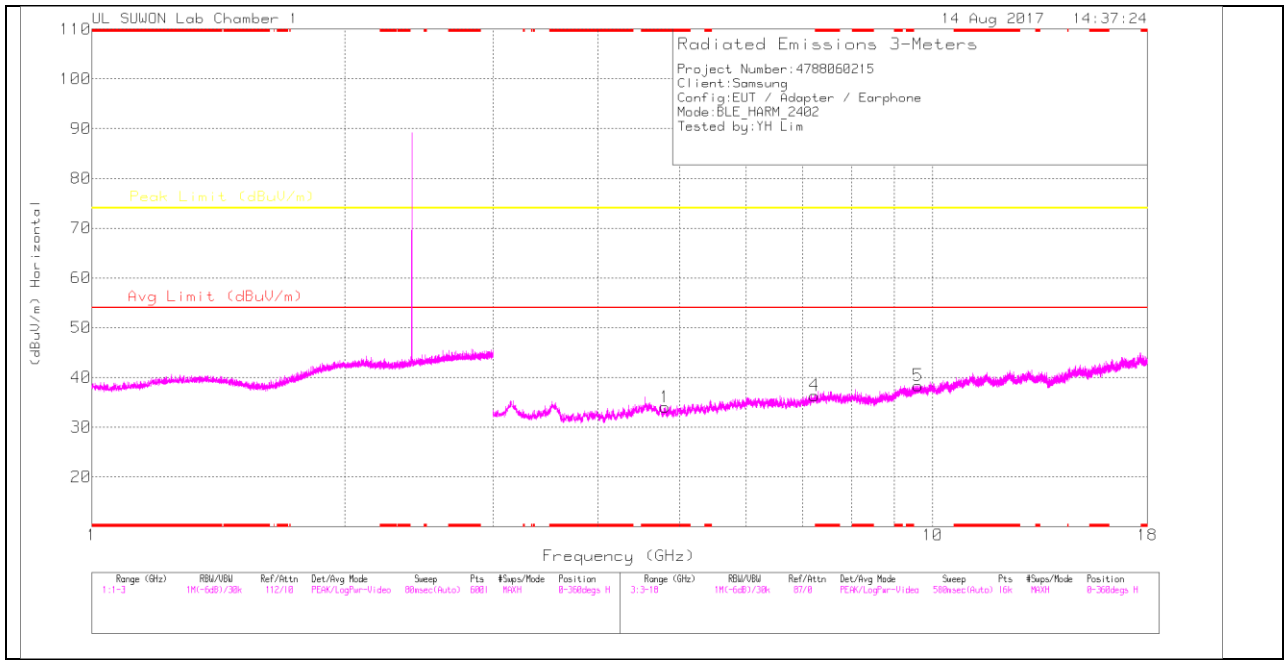
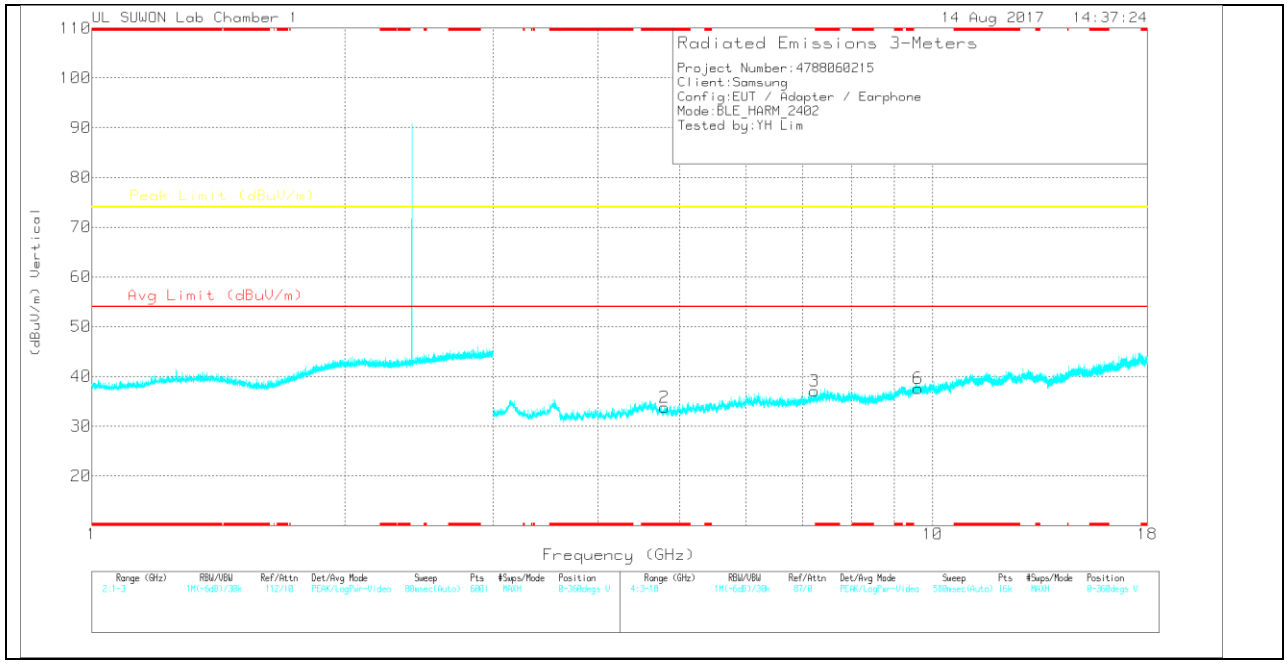
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	3GHz_HP(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.806	31.79	PK	33.8	-31.6	0	33.99	-	-	74	-40.01	0-360	150	H
4	7.233	28.48	PK	35.9	-28	0	36.38	-	-	74	-37.62	0-360	150	H
5	9.601	25.2	PK	36.7	-23.5	0	38.4	-	-	74	-35.6	0-360	150	H
2	* 4.8	31.54	PK	33.8	-31.6	0	33.74	-	-	74	-40.26	0-360	250	V
3	7.237	29.2	PK	35.9	-28	0	37.1	-	-	74	-36.9	0-360	150	V
6	9.601	24.39	PK	36.7	-23.5	0	37.59	-	-	74	-36.41	0-360	250	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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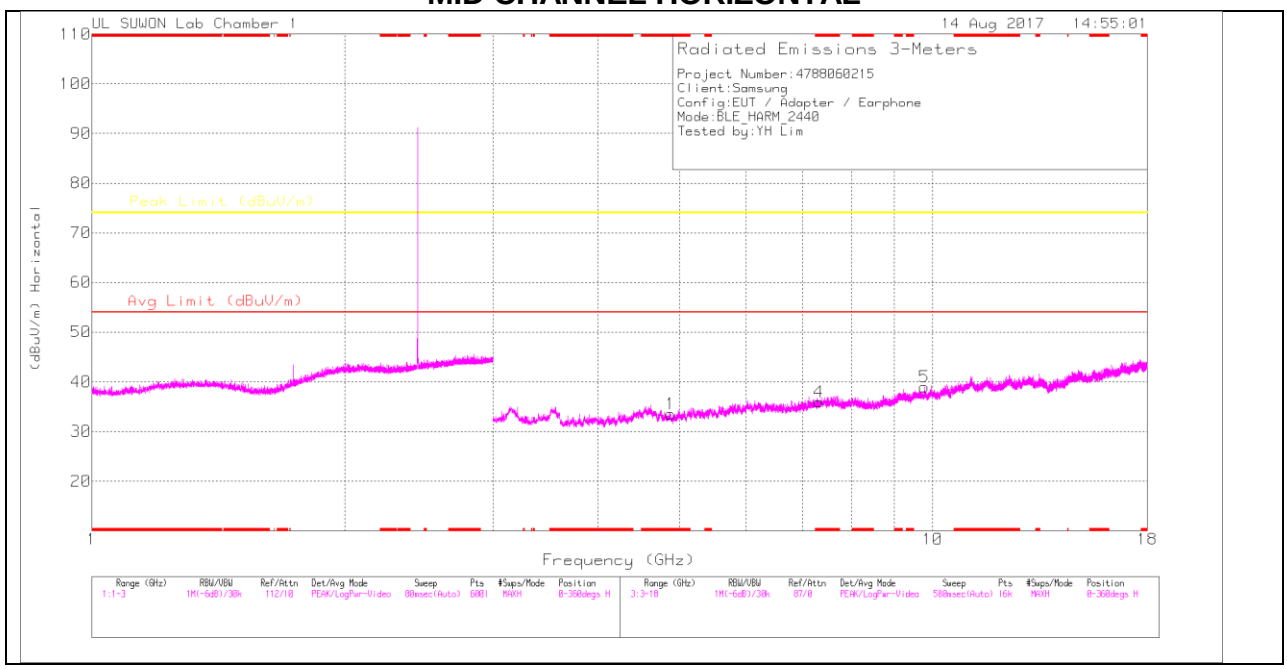
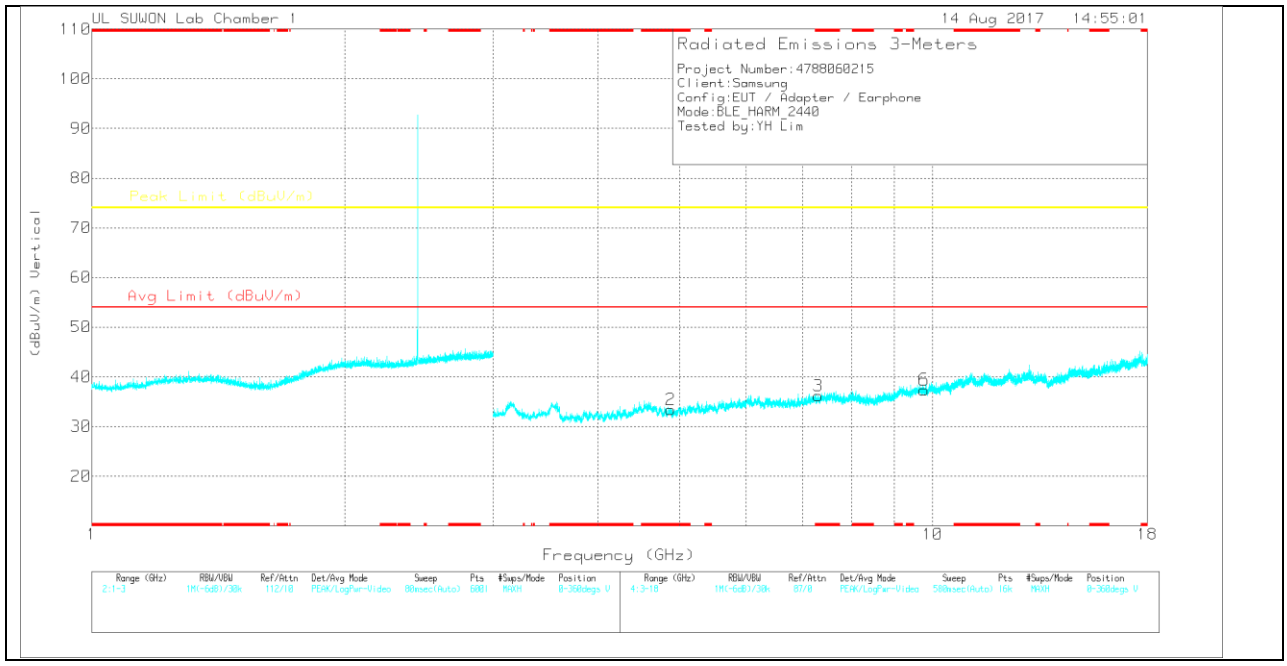
MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	3GHz_HP(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.877	31.46	PK	33.8	-31.7	0	33.56	-	-	74	-40.44	0-360	250	H
4	* 7.318	27.65	PK	35.9	-27.6	0	35.95	-	-	74	-38.05	0-360	250	H
5	9.769	26.26	PK	36.9	-24.2	0	38.96	-	-	74	-35.04	0-360	250	H
2	* 4.879	31.31	PK	33.8	-31.7	0	33.41	-	-	74	-40.59	0-360	150	V
3	* 7.308	27.97	PK	35.9	-27.7	0	36.17	-	-	74	-37.83	0-360	150	V
6	9.766	24.69	PK	36.9	-24.2	0	37.39	-	-	74	-36.61	0-360	150	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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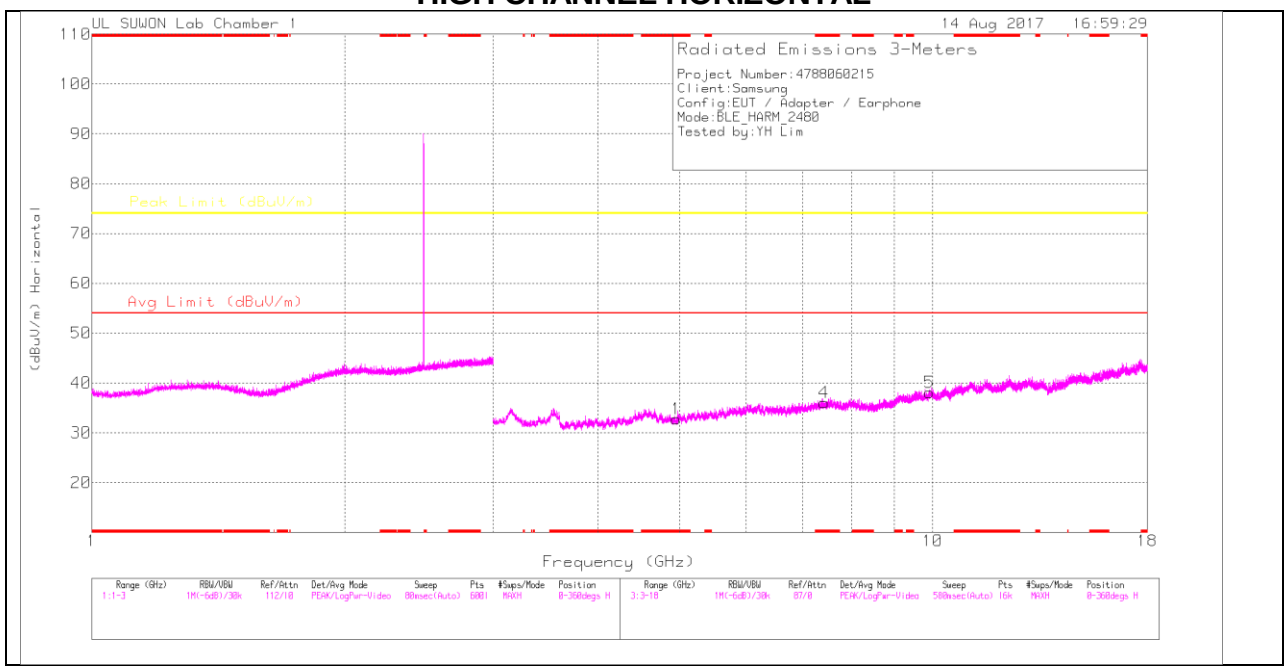
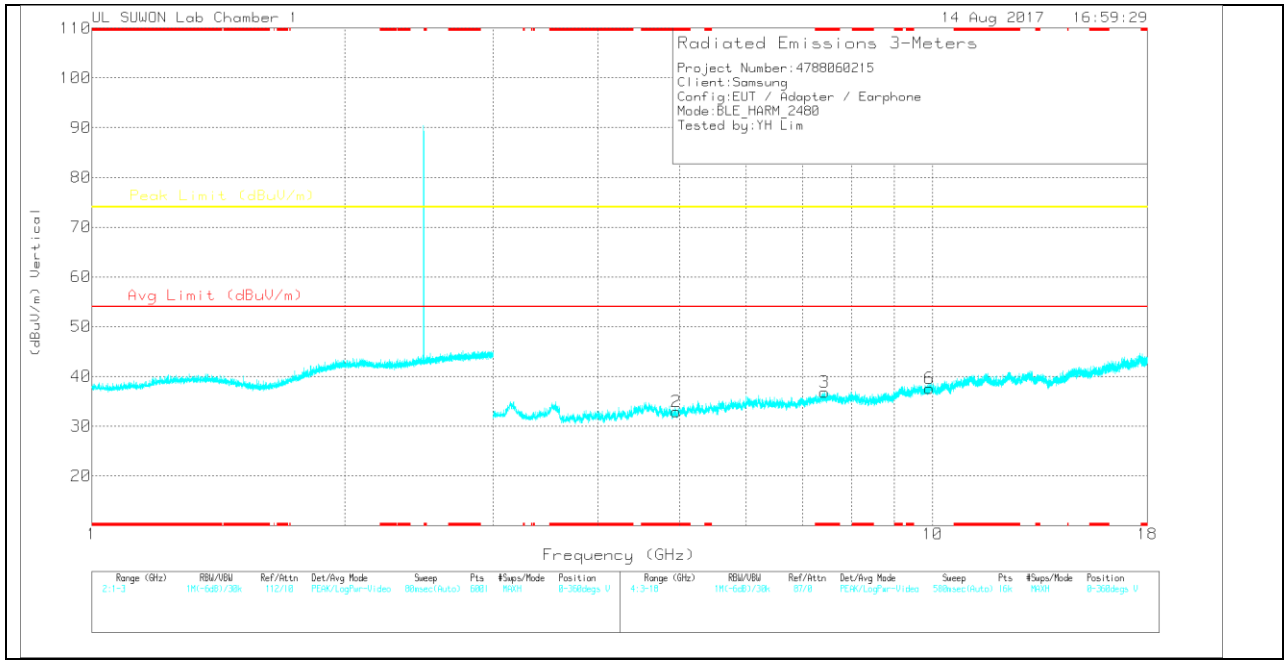
HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	3GHz_HP(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.959	30.71	PK	33.8	-31.7	0	32.81	-	-	74	-41.19	0-360	250	H
4	* 7.429	27.21	PK	35.9	-27.1	0	36.01	-	-	74	-37.99	0-360	150	H
5	9.905	23.48	PK	37.1	-22.5	0	38.08	-	-	74	-35.92	0-360	250	H
2	* 4.956	30.76	PK	33.8	-31.7	0	32.86	-	-	74	-41.14	0-360	150	V
3	* 7.438	28.08	PK	35.9	-27.2	0	36.78	-	-	74	-37.22	0-360	250	V
6	9.91	22.89	PK	37.1	-22.4	0	37.59	-	-	74	-36.41	0-360	250	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

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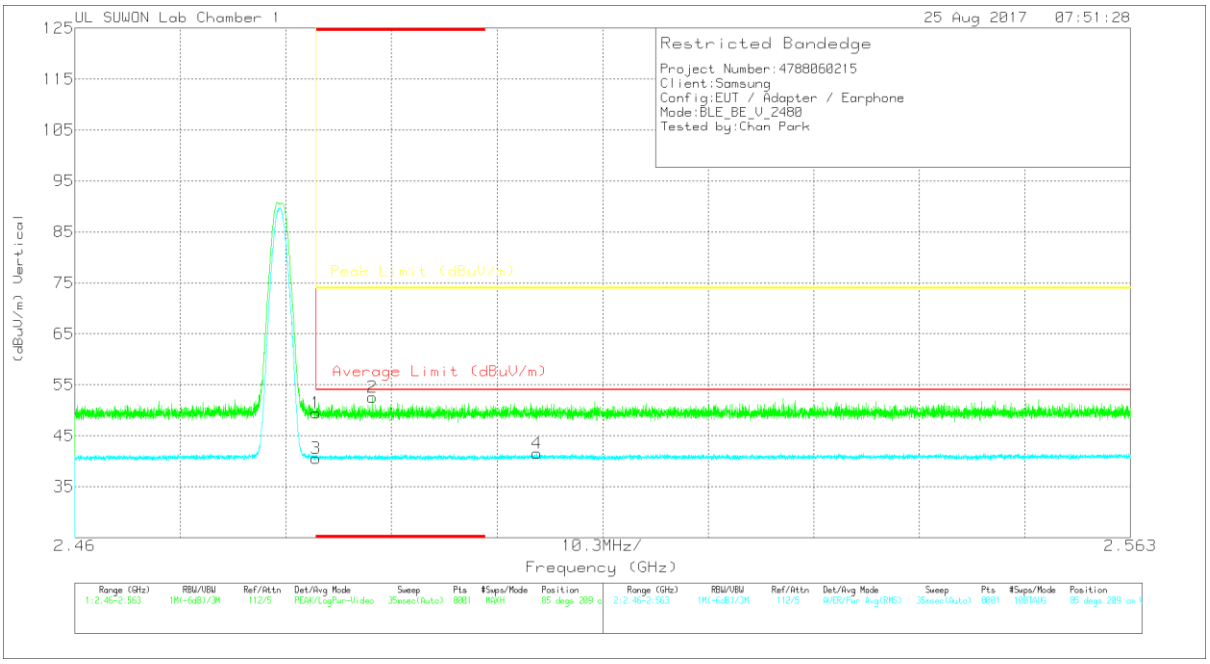
10.3. BANDEDGE (on Worst case) equipped with protective case



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	10dB_ATT(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.41	Pk	31.6	-25.5	0	49.51	-	-	74	-24.49	85	209	V
2	* 2.489	46.37	Pk	31.6	-25.4	0	52.57	-	-	74	-21.43	85	209	V
3	* 2.484	32.59	RMS	31.6	-25.5	1.9	40.59	54	-13.41	-	-	85	209	V
4	2.505	33.44	RMS	31.6	-25.4	1.9	41.54	54	-12.46	-	-	85	209	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

Note : Noise floor level.(Both stand alone and euipped with protective case condition)

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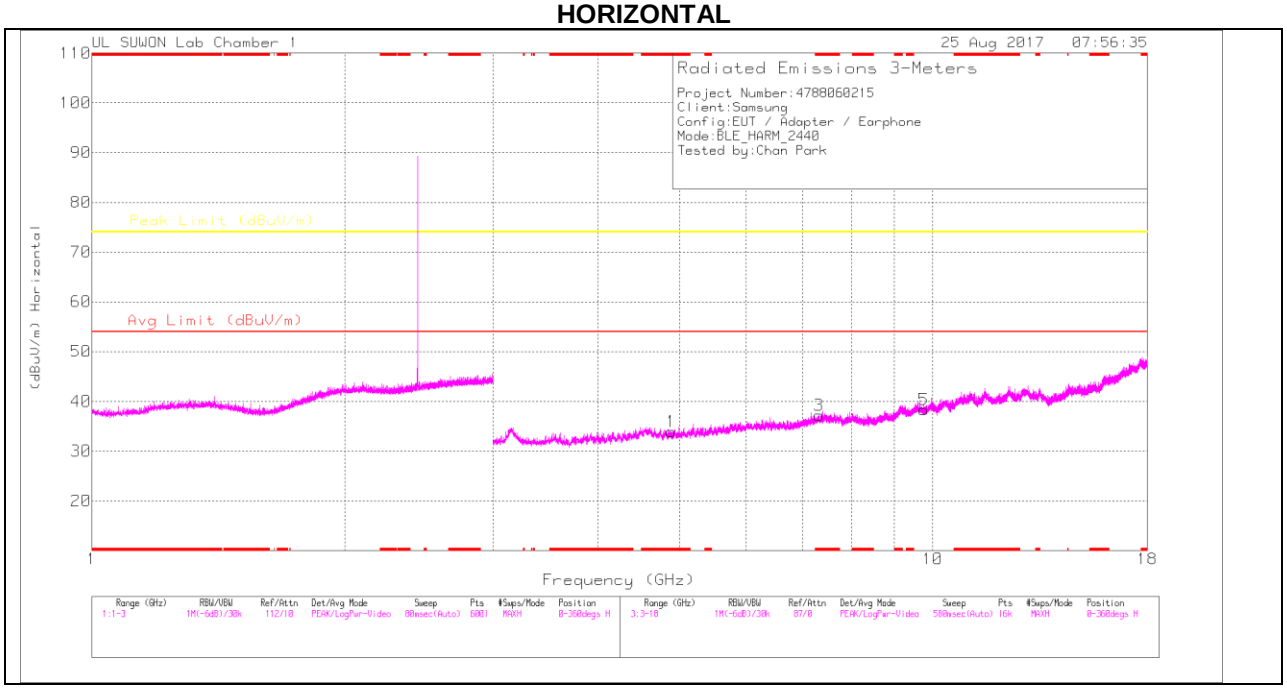
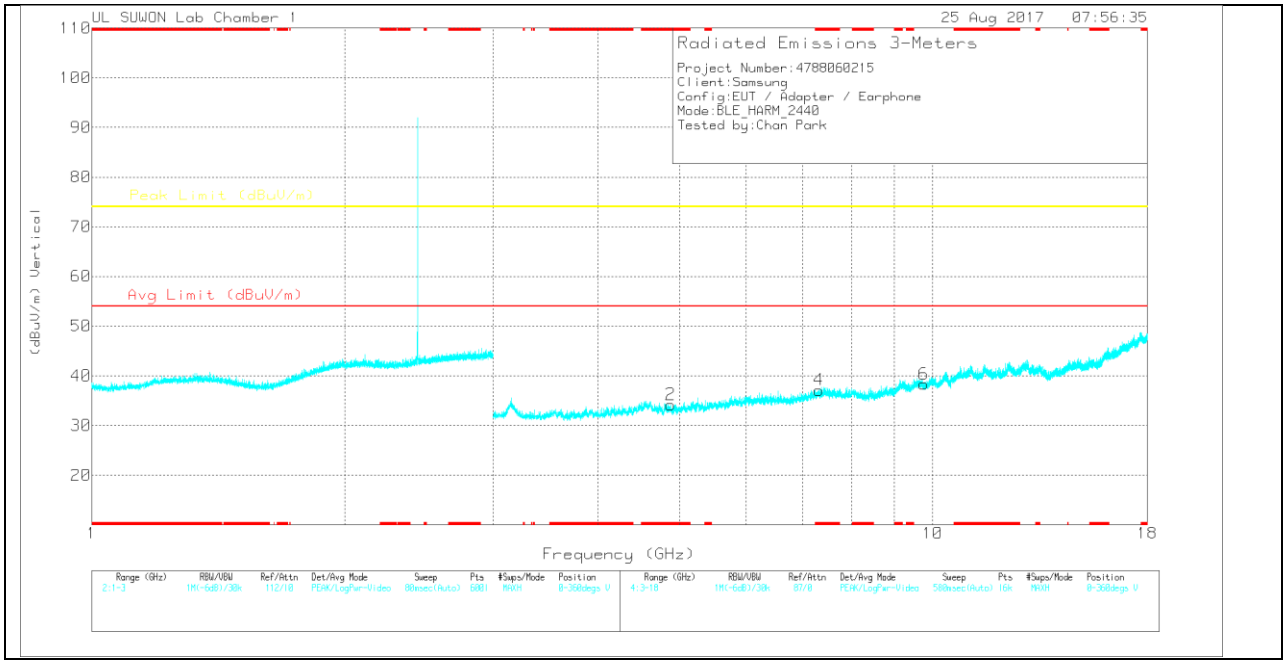
10.4. HARMONICS AND SPURIOUS EMISSIONS (on Worst case) equipped with protective case

HORIZONTAL



VERTICAL



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Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168717	3GHz_HP(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.884	31.8	PK	33.8	-31.7	0	33.9	-	-	74	-40.1	0-360	250	H
3	* 7.323	28.92	PK	35.9	-27.6	0	37.22	-	-	74	-36.78	0-360	150	H
5	9.759	25.69	PK	36.9	-24.2	0	38.39	-	-	74	-35.61	0-360	150	H
2	* 4.881	32.13	PK	33.8	-31.7	0	34.23	-	-	74	-39.77	0-360	150	V
4	* 7.323	28.84	PK	35.9	-27.6	0	37.14	-	-	74	-36.86	0-360	250	V
6	9.758	25.76	PK	36.9	-24.3	0	38.36	-	-	74	-35.64	0-360	150	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

Note : Noise floor level.(Both stand-alone and euipped with protective case condition)

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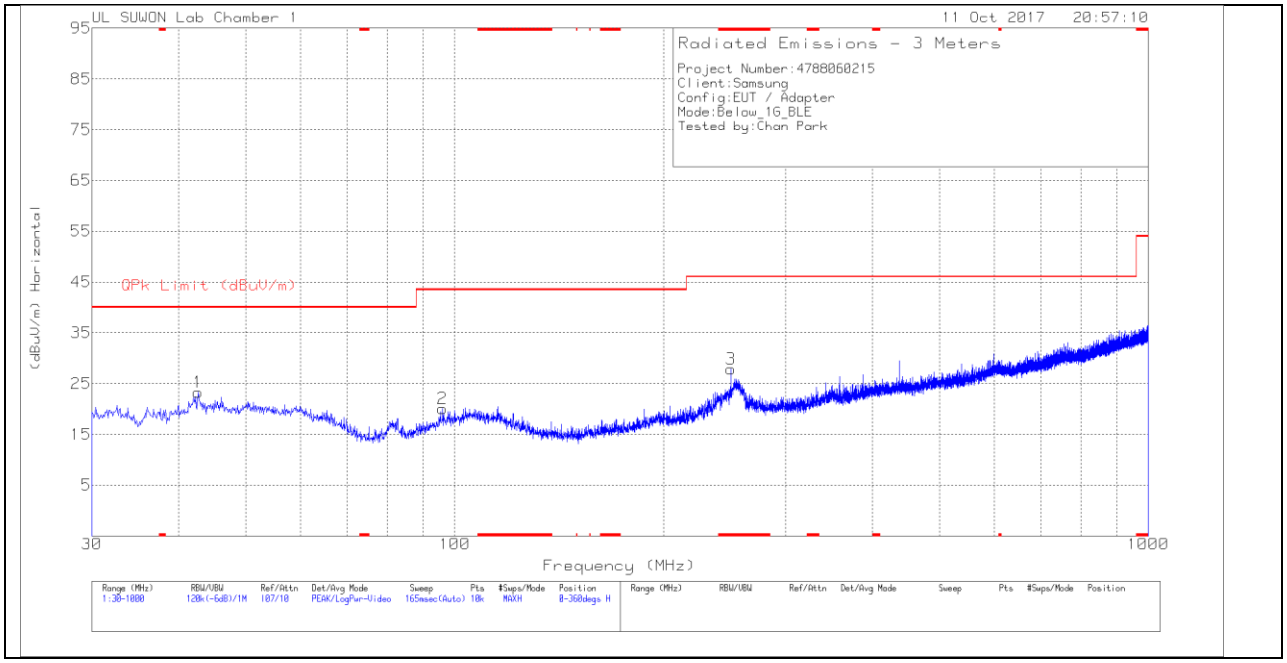
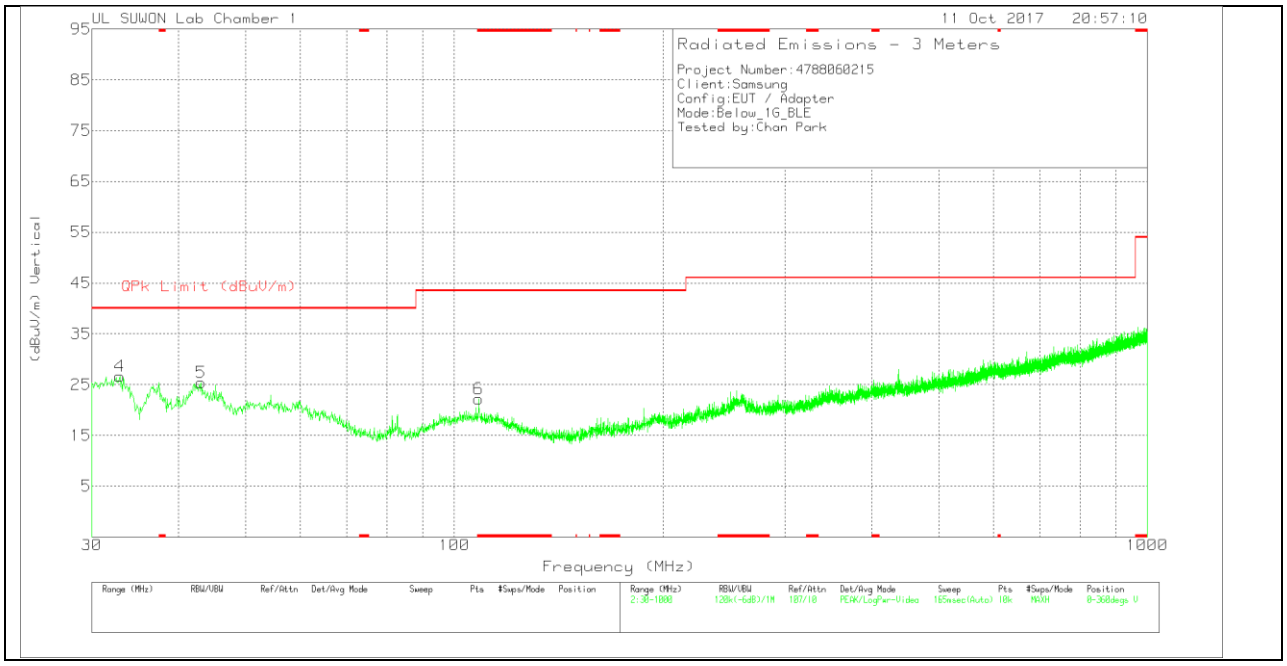
10.5. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



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BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	750_20170831	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	42.707	33.44	Pk	19.2	-29.4	23.24	40	-16.76	0-360	200	H
2	96.057	31.65	Pk	16.9	-28.5	20.05	43.52	-23.47	0-360	300	H
3	* 250.19	36.9	Pk	18.4	-27.4	27.9	46.02	-18.12	0-360	100	H
4	32.91	39.88	Pk	16.3	-29.6	26.58	40	-13.42	0-360	100	V
5	43.095	35.38	Pk	19.3	-29.3	25.38	40	-14.62	0-360	100	V
6	* 108.473	33.3	Pk	17.3	-28.4	22.2	43.52	-21.32	0-360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

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11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

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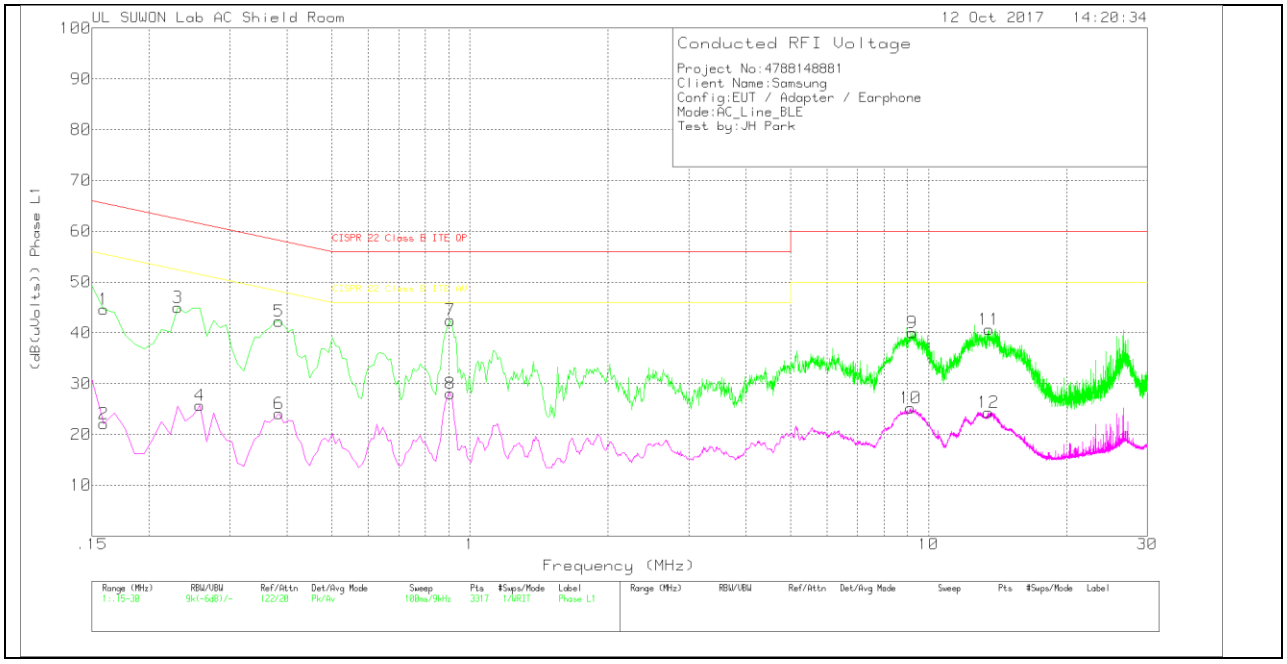
RESULTS

WORST EMISSIONS

LINE 1 PLOT



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LINE 1 RESULTS

Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_L1_with extension	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.159	34.5	Pk	10	.1	44.6	65.52	-20.92	-	-
2	.159	12.03	Av	10	.1	22.13	-	-	55.52	-33.39
3	.231	35.22	Pk	9.6	.2	45.02	62.41	-17.39	-	-
4	.258	16.02	Av	9.5	.2	25.72	-	-	51.5	-25.78
5	.384	32.41	Pk	9.7	.2	42.31	58.19	-15.88	-	-
6	.384	14.21	Av	9.7	.2	24.11	-	-	48.19	-24.08
7	.906	32.46	Pk	9.7	.3	42.46	56	-13.54	-	-
8	.906	18.1	Av	9.7	.3	28.1	-	-	46	-17.9
9	9.231	29.95	Pk	9.7	.4	40.05	60	-19.95	-	-
10	9.141	15.12	Av	9.7	.4	25.22	-	-	50	-24.78
11	13.542	30.43	Pk	9.8	.4	40.63	60	-19.37	-	-
12	13.506	14.09	Av	9.8	.4	24.29	-	-	50	-25.71

Pk - Peak detector
Av - Average detection

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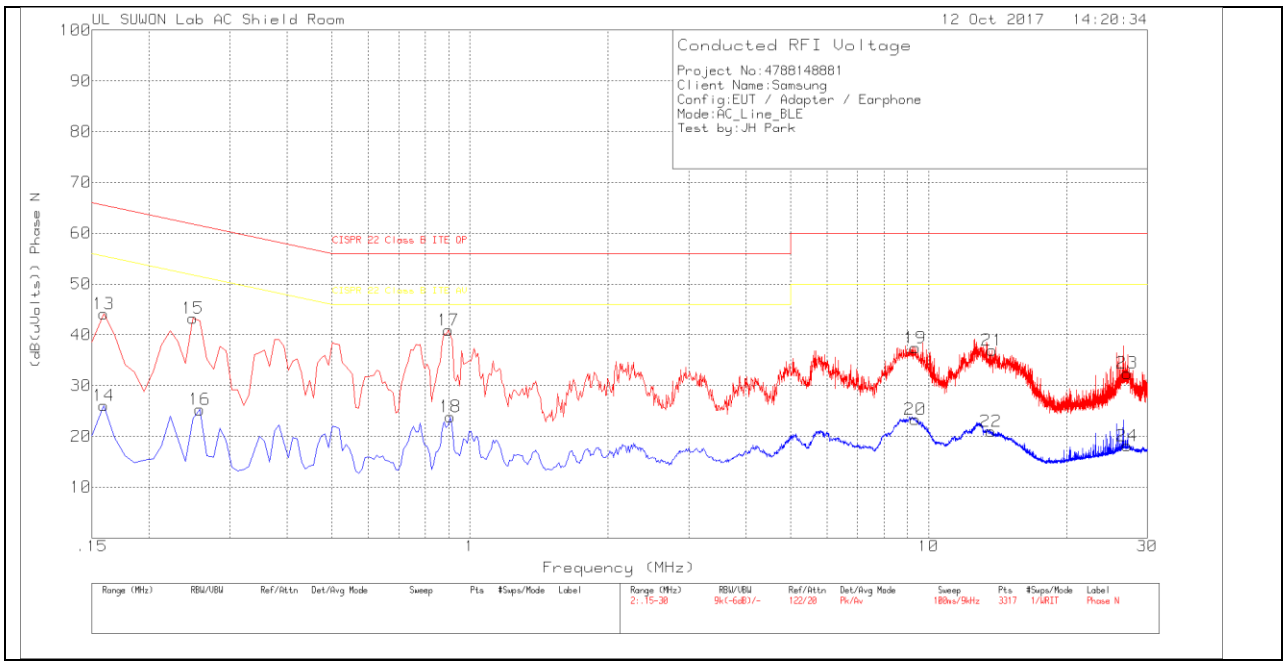
LINE 2 PLOT



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LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_N_with extension	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.159	34.04	Pk	10	.1	44.14	65.52	-21.38	-	-
14	.159	15.96	Av	10	.1	26.06	-	-	55.52	-29.46
15	.249	33.43	Pk	9.6	.2	43.23	61.79	-18.56	-	-
16	.258	15.47	Av	9.6	.2	25.27	-	-	51.5	-26.23
17	.897	30.92	Pk	9.7	.3	40.92	56	-15.08	-	-
18	.906	13.8	Av	9.8	.3	23.9	-	-	46	-22.1
19	9.357	27.25	Pk	9.8	.4	37.45	60	-22.55	-	-
20	9.357	13.16	Av	9.8	.4	23.36	-	-	50	-26.64
21	13.767	26.81	Pk	9.8	.4	37.01	60	-22.99	-	-
22	13.686	10.77	Av	9.8	.4	20.97	-	-	50	-29.03
23	27.096	21.94	Pk	10.2	.3	32.44	60	-27.56	-	-
24	27.132	7.62	Av	10.2	.3	18.12	-	-	50	-31.88

Pk - Peak detector
Av - Average detection

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