FCC CFR47 PART 15 SUBPART C

Bluetooth Low Energy

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER : SM-A510F/DS, SM-A510F

FCC ID: A3LSMA510F

REPORT NUMBER: 15K22047-E2

ISSUE DATE: NOV 26, 2015

Prepared for

SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Prepared by

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ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/26/15	Initial issue	SungGil Park

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TABLE OF CONTENTS

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n, ANT+ and NFC
MODEL NUMBER:	SM-A510F/DS
SERIAL NUMBER:	R38FA0JNM9W/ 330091e6a336920d (RADIATED); 3300228292a67257 (CONDUCTED)
DATE TESTED:	OCT 19, 2015 - NOV 26, 2015

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

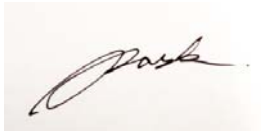
UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into 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:

CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

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

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at http://www.iasonline.org/PDF/TL/TL-637.pdf.

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

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 Phone + BT/BLE, DTS/UNII a/b/g/n, ANT+ and NFC.

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	8.52	7.11
		Average	8.29	6.75

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -1.19 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

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

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

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA20UWE	R37G9EN04S1DK3	N/A
Data Cable	SAMSUNG	ECB-DU4AWE	N/A	N/A
Earphone	SAMSUNG	GH59-11720H	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	Mini-USB	Shielded	0.8m	N/A
1	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

TEST SETUP

The EUT is a stand-alone unit during the tests. Test software exercised the radio card.

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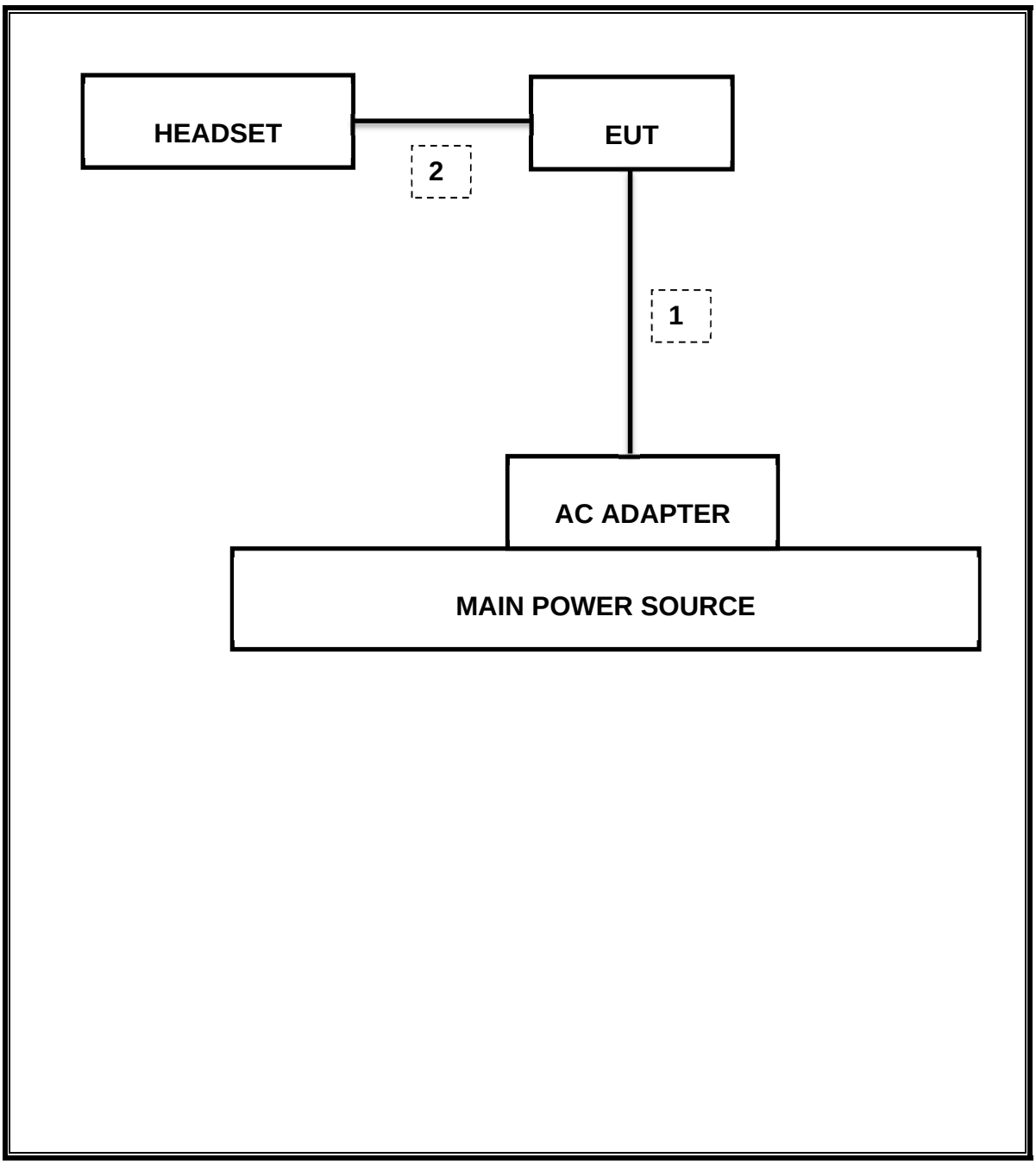
SETUP DIAGRAM FOR TESTS



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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	749	04-25-16
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-16
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-16
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-16
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-18-16
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-18-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-19-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-19-16
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-16
Average Power Sensor	R&S	NRZ-Z91	102681	08-18-16
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-18-16
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-19-16
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-19-16
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-19-16
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	009	08-18-16
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	015	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	009	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	010	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	016	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	015	08-18-16
LISN	R&S	ENV-216	101836	08-19-16
LISN	R&S	ENV-216	101837	08-19-16

7. MEASUREMENT METHODS

KDB 558074 D01 DTS Meas Guidance v03r03: Measurement Procedure §9.1.1 is used for peak power and §10.2 PKPSD is used for power spectral density.

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.

8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None: for reporting purposes only.

8.1. ON TIME AND DUTY CYCLE RESULTS

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	0.389	0.625	0.622	62.2%	2.06	2.570

9. 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	712.1 kHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-45.938 dBm
15.247	TX conducted output power	<30dBm		Pass	8.516 dBm (Peak)
15.247	PSD	<8dBm		Pass	-5.79 dBm (Peak)
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	42.2 dBuV (QP)
15.205, 15.209	Radiated Spurious Emission	< 40dBuV/m	Radiated	Pass	32.56 dBuV/m (QP)

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
Low	2402	712.1	500.0
Mid	2440	712.6	500.0
High	2480	714.1	500.0
Worst		712.1	500.0

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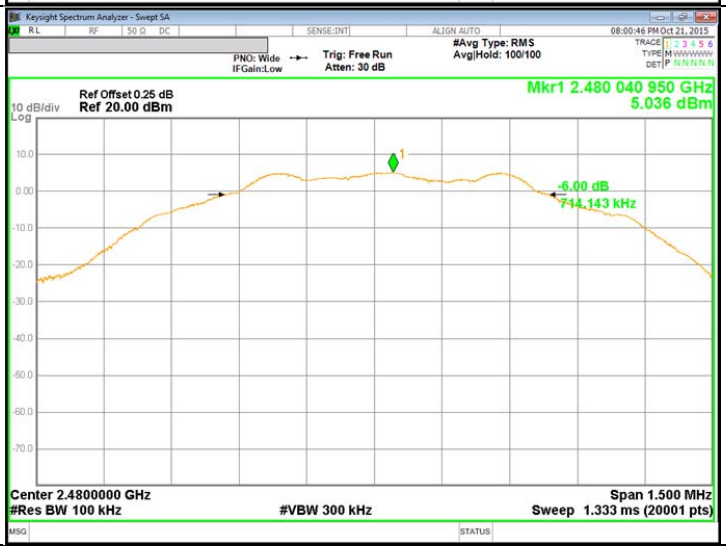
6 dB BANDWIDTH PLOTS

Low CH		
Middle CH		
High CH		

10.2. 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 sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2402	1.054
Mid	2440	1.072
High	2480	1.030
Worst		1.072

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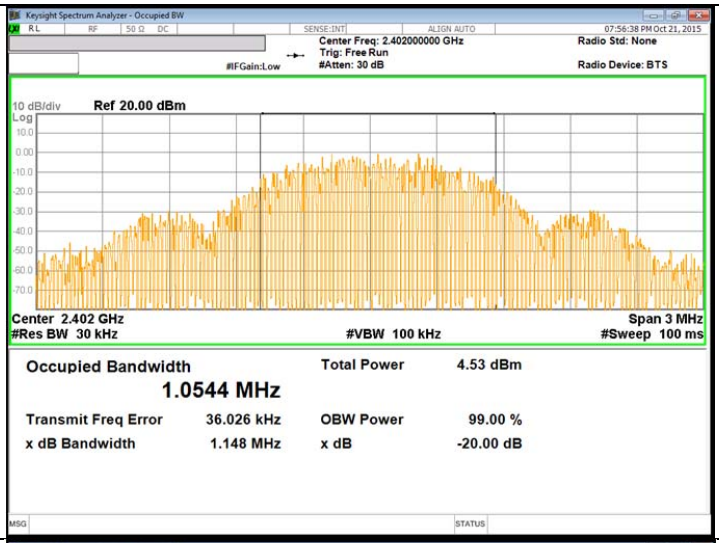
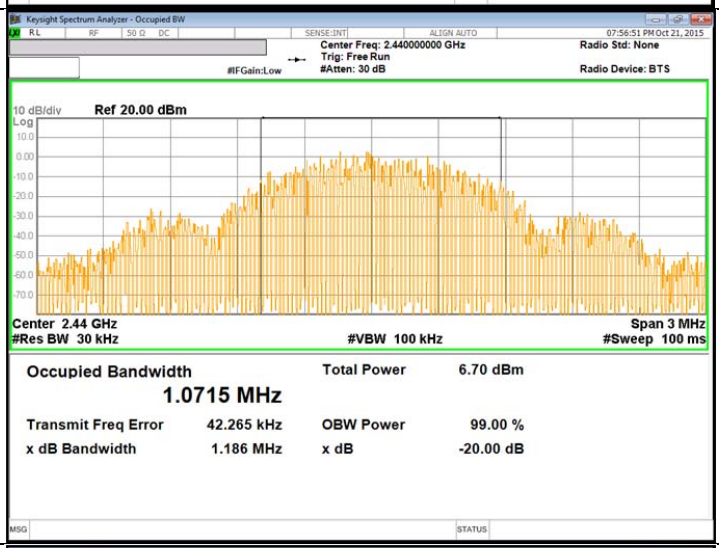
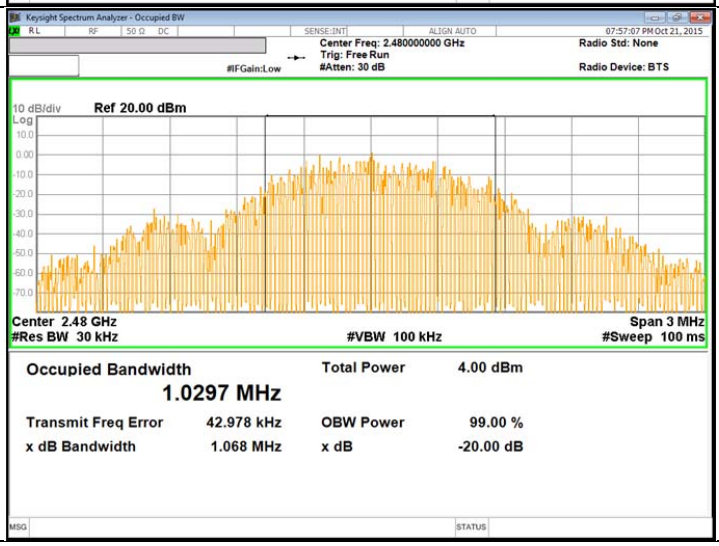
99% BANDWIDTH PLOTS

Low CH	
Middle CH	
High CH	

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10.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

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

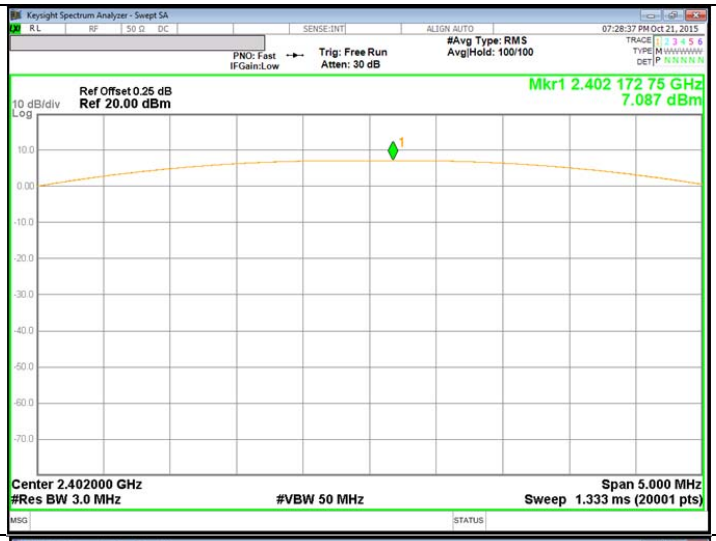
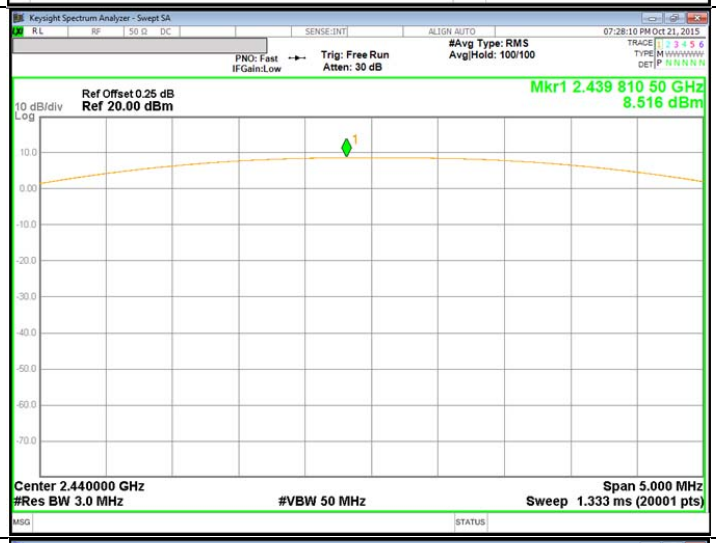
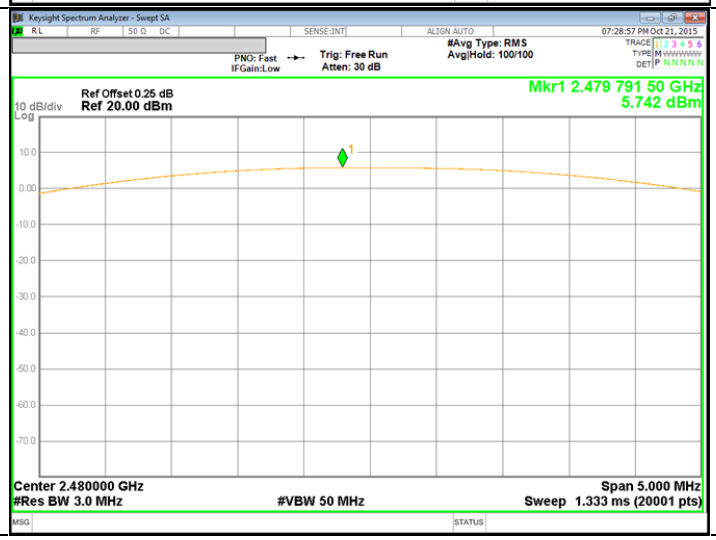
TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r03 under section 9.1.1 utilizing spectrum analyze.

RESULTS

Channel	Frequency [MHz]	Peak Power Reading [dBm]	Limit [dBm]	Margin [dB]
Low	2402	7.087	30.000	-22.913
Mid	2440	8.516	30.000	-21.484
High	2480	5.742	30.000	-24.258
Worst		8.516		-21.484

OUTPUT POWER PLOTS

Low CH		
Middle CH		
High CH		

10.4. 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 of 10.1 dB (including 10 dB pad and 0.1 dB cable) 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	6.90	4.89
Middle	2440	8.29	6.75
High	2480	5.48	3.53

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10.5. PSD

LIMITS

FCC §15.247

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 “Method PKPSD (Peak PSD)” under KDB558074 D01 DTS Meas Guidance v03r03

RESULTS

Channel	Frequency [MHz]	PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2402	-7.19	8.00	-15.19
Mid	2440	-5.79	8.00	-13.79
High	2480	-8.56	8.00	-16.56

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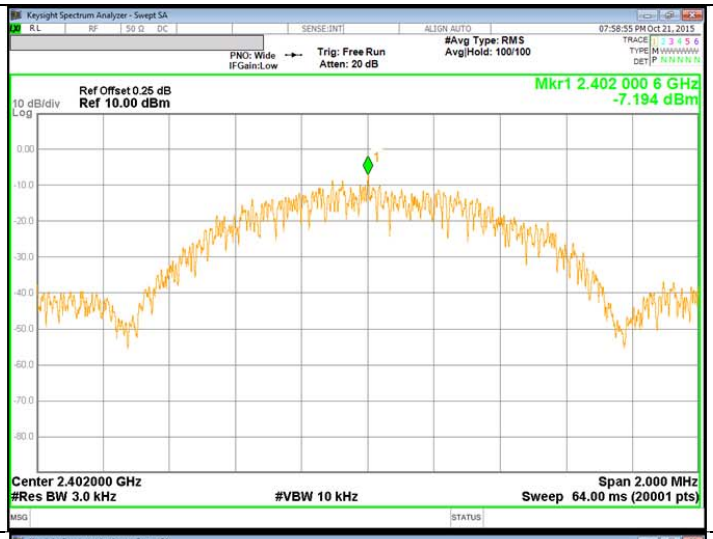
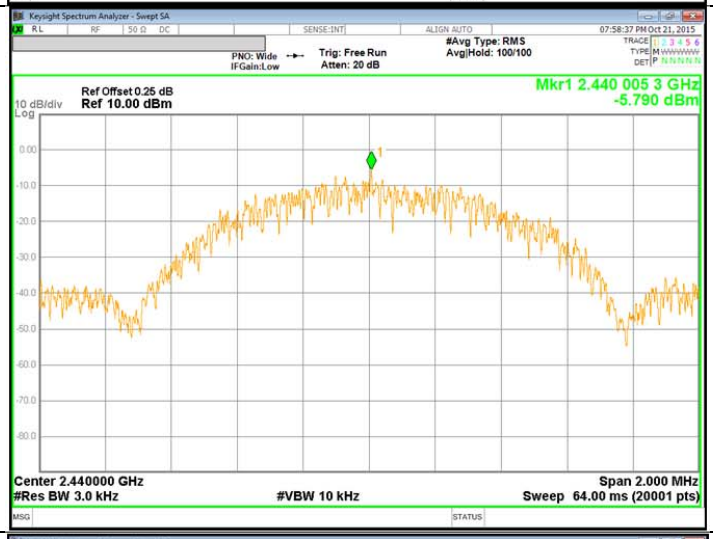
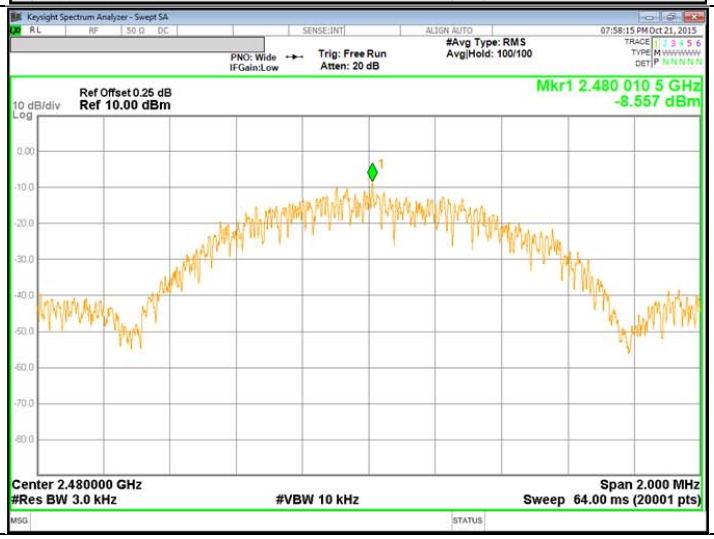
POWER SPECTRAL DENSITY PLOTS

Low CH		
Middle CH		
High CH		

10.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

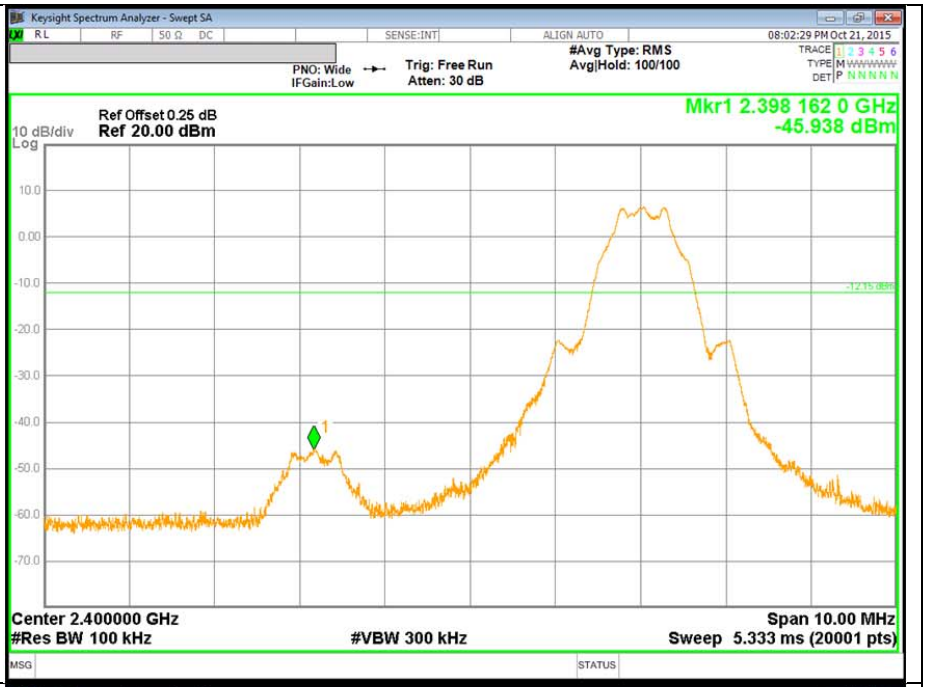
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

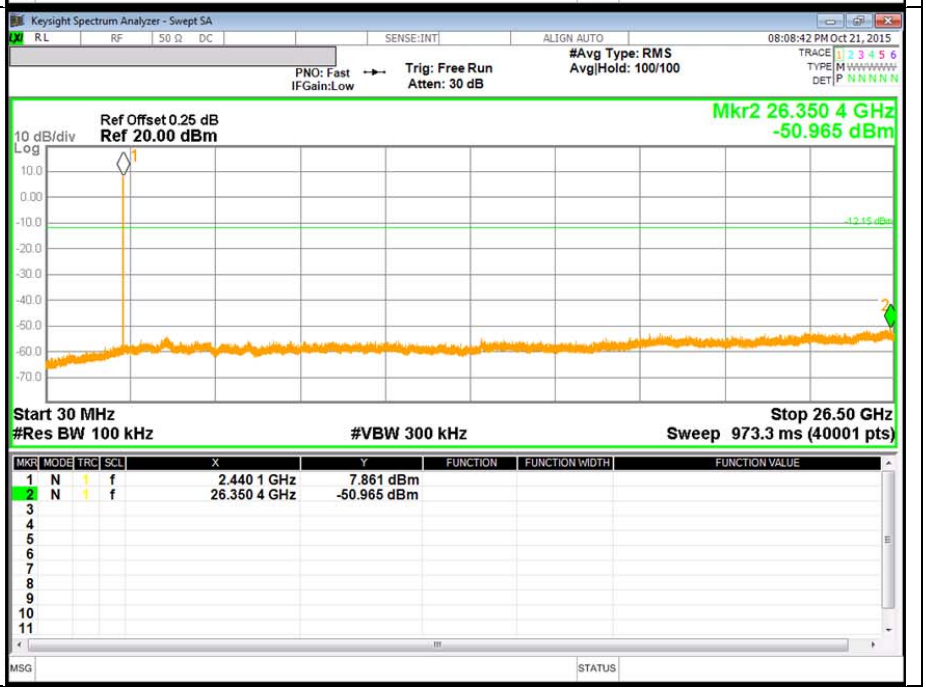
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

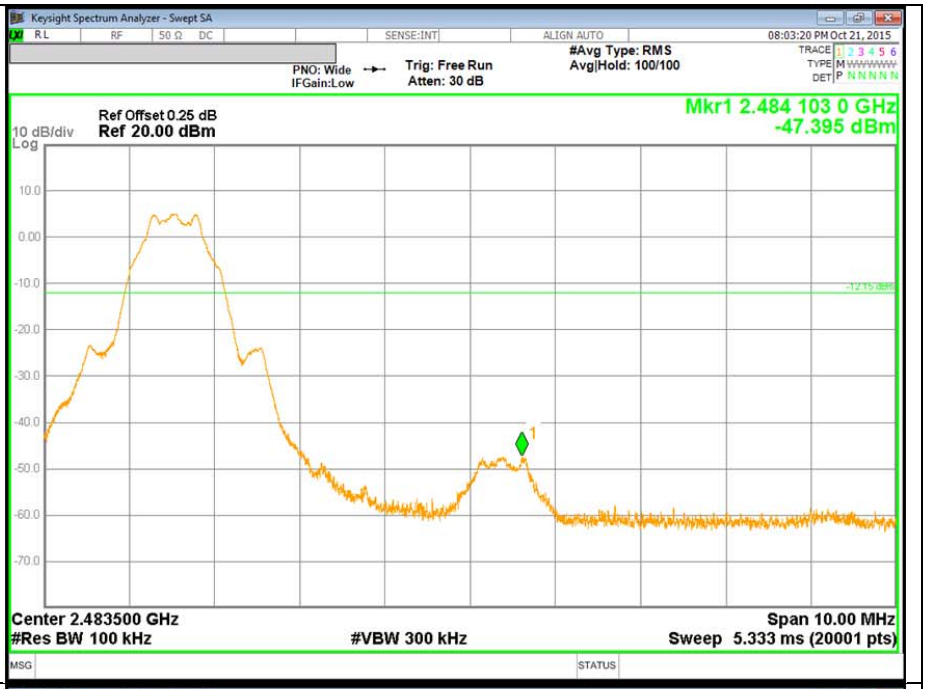
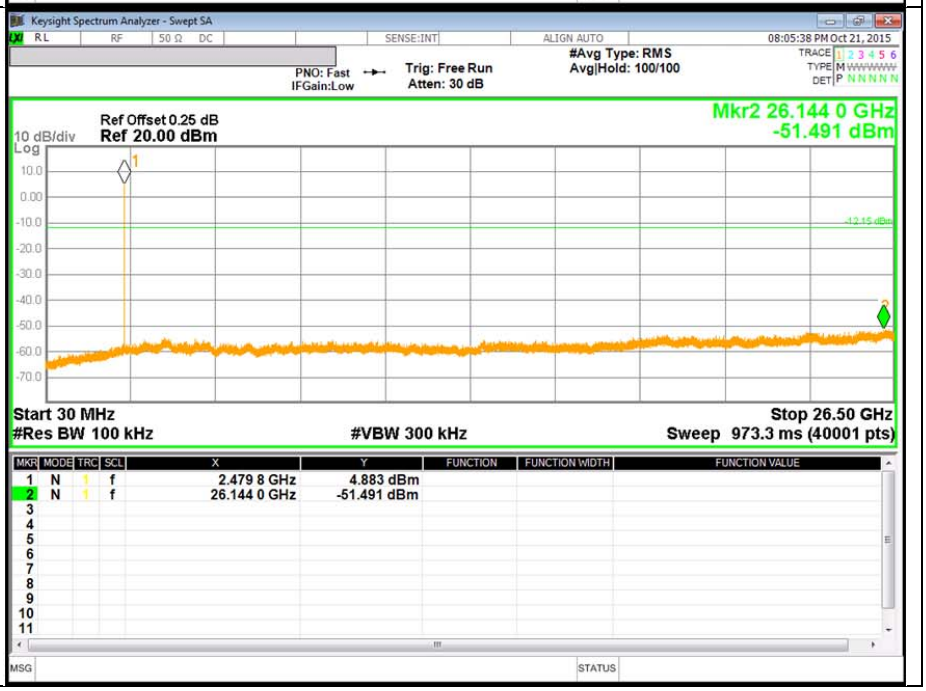
BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL

Low CH BandEdge	
Low CH Spurious	

SPURIOUS EMISSIONS, MID CHANNEL

Middle CH BandEdge	
Middle CH Spurious	

SPURIOUS EMISSIONS, HIGH CHANNEL

High CH BandEdge	
High CH Spurious	

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11. RADIATED TEST RESULTS

11.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10 - 2009. 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.

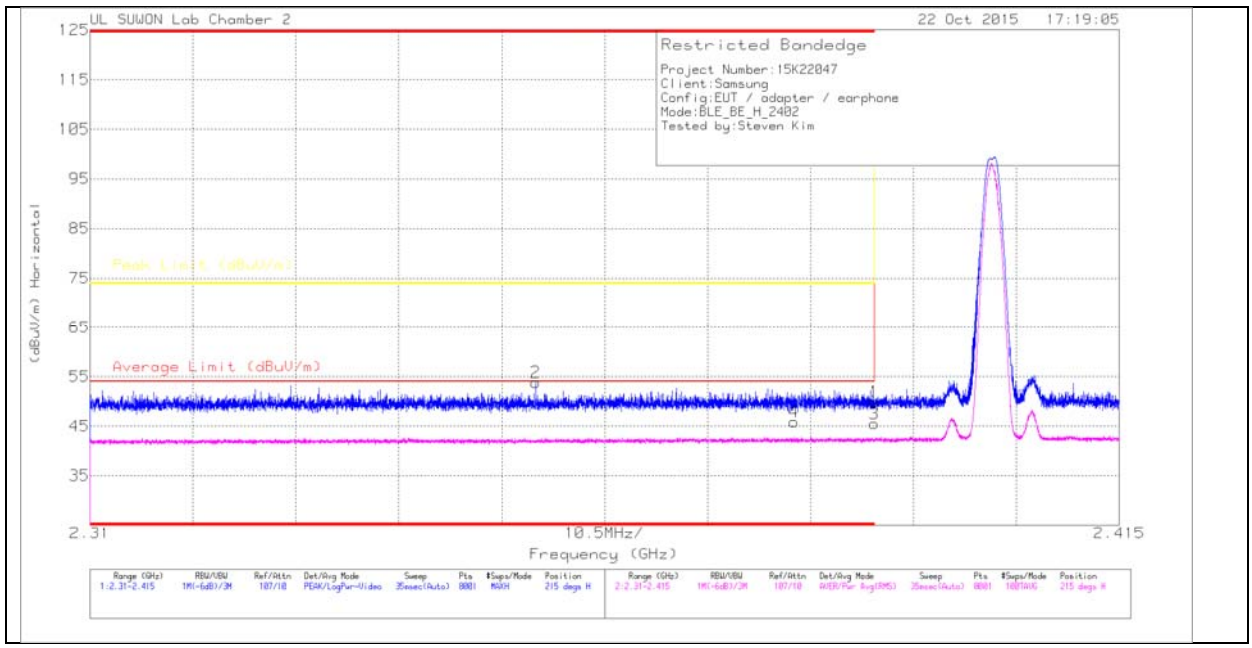
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor = 10 log (1/x). For this sample: DCF = 10log(1/0.622)=2.06dB (Spectrum Analyzer round it up to 2.06dB)

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

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

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

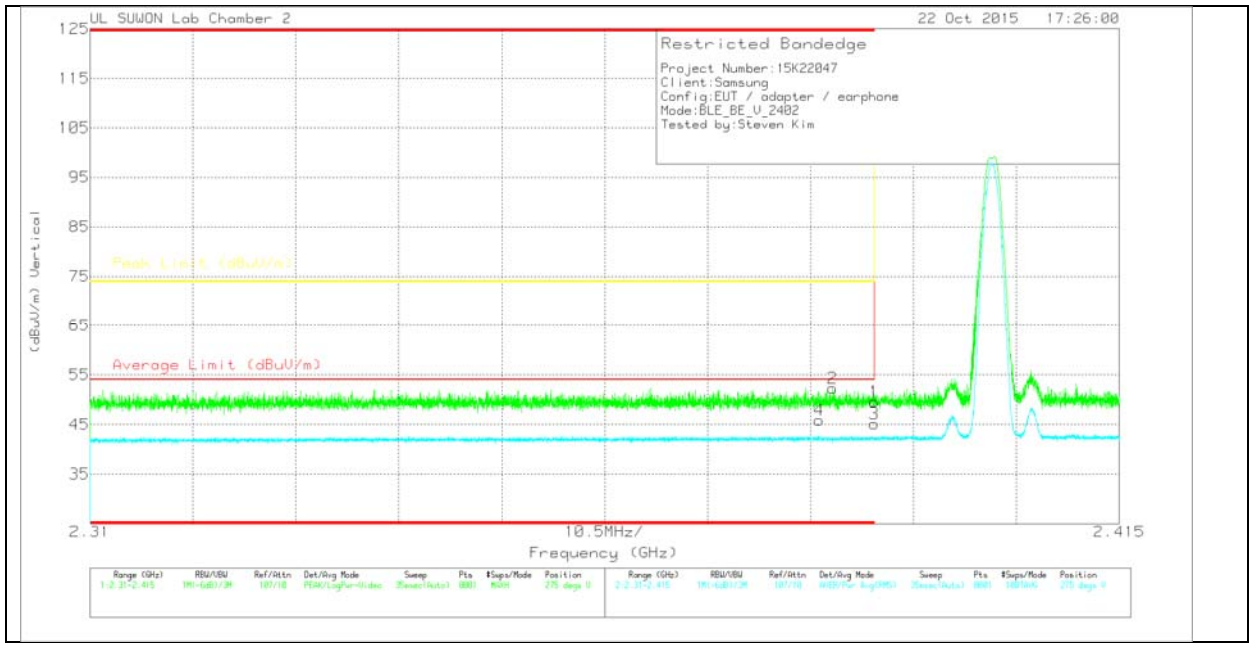
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.73	Pk	31.7	-19.5	0	49.93	-	-	74	-24.07	215	293	H
2	* 2.355	41.75	Pk	31.7	-19.6	0	53.85	-	-	74	-20.15	215	293	H
3	* 2.39	28.16	RMS	31.7	-19.5	2.06	42.42	54	-11.58	-	-	215	293	H
4	* 2.382	28.54	RMS	31.7	-19.5	2.06	42.8	54	-11.2	-	-	215	293	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_2_10dB	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	37.39	Pk	31.7	-19.5	0	49.59	-	-	74	-24.41	275	272	V
2	* 2.386	40.15	Pk	31.7	-19.5	0	52.35	-	-	74	-21.65	275	272	V
3	* 2.39	27.84	RMS	31.7	-19.5	2.06	42.1	54	-11.9	-	-	275	272	V
4	* 2.384	28.5	RMS	31.7	-19.5	2.06	42.76	54	-11.24	-	-	275	272	V

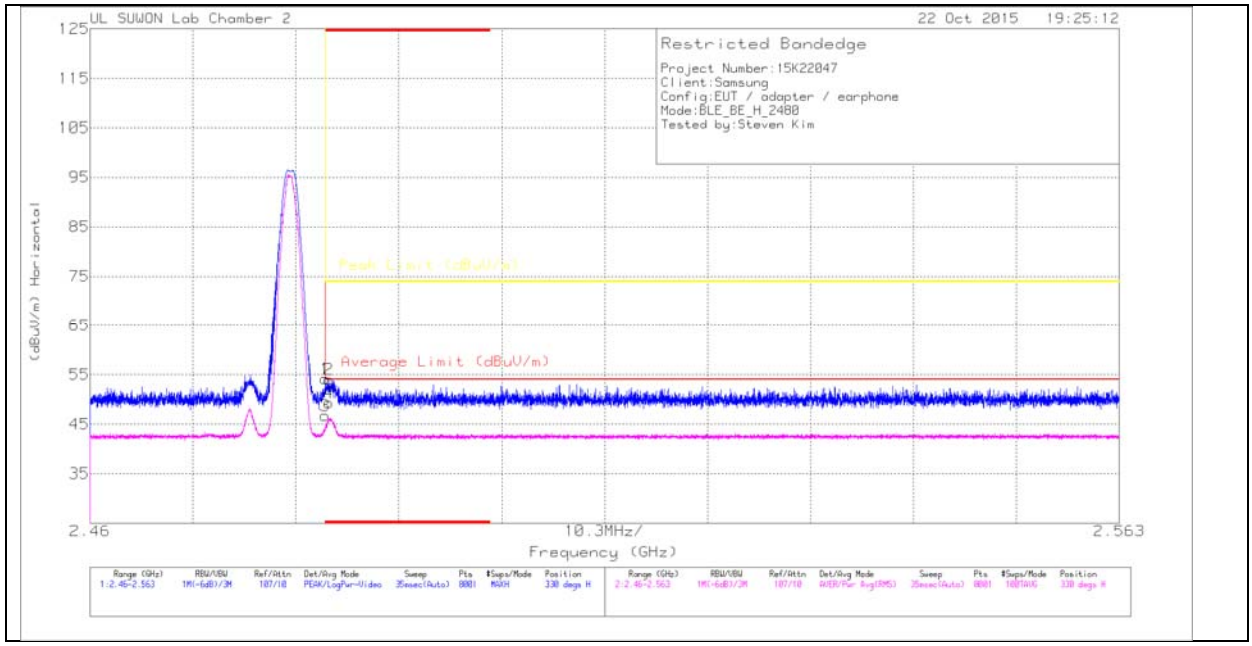
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

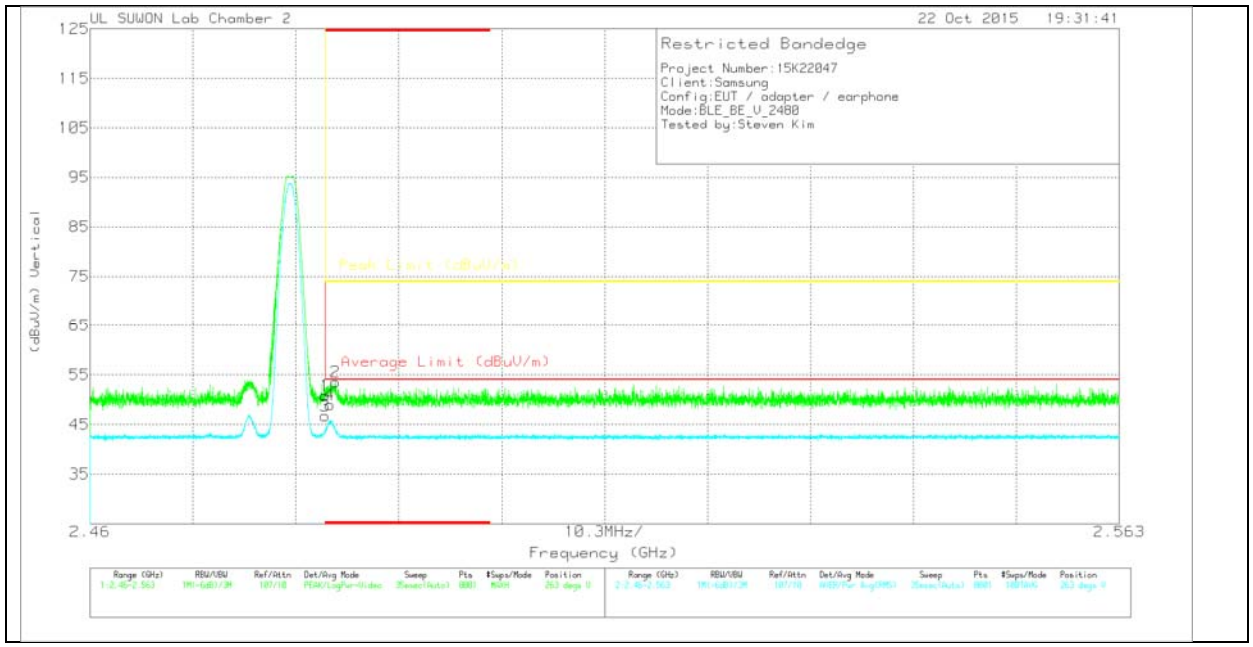
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.73	Pk	31.8	-19.4	0	54.13	-	-	74	-19.87	330	223	H
2	* 2.484	41.62	Pk	31.8	-19.4	0	54.02	-	-	74	-19.98	330	223	H
3	* 2.484	29.18	RMS	31.8	-19.4	2.06	43.64	54	-10.36	-	-	330	223	H
4	* 2.484	31.76	RMS	31.8	-19.4	2.06	46.22	54	-7.78	-	-	330	223	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_2_10dB	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	38.45	Pk	31.8	-19.4	0	50.85	-	-	74	-23.15	263	257	V
2	* 2.485	41.13	Pk	31.8	-19.4	0	53.53	-	-	74	-20.47	263	257	V
3	* 2.484	29.17	RMS	31.8	-19.4	2.06	43.63	54	-10.37	-	-	263	257	V
4	* 2.484	31.47	RMS	31.8	-19.4	2.06	45.93	54	-8.07	-	-	263	257	V

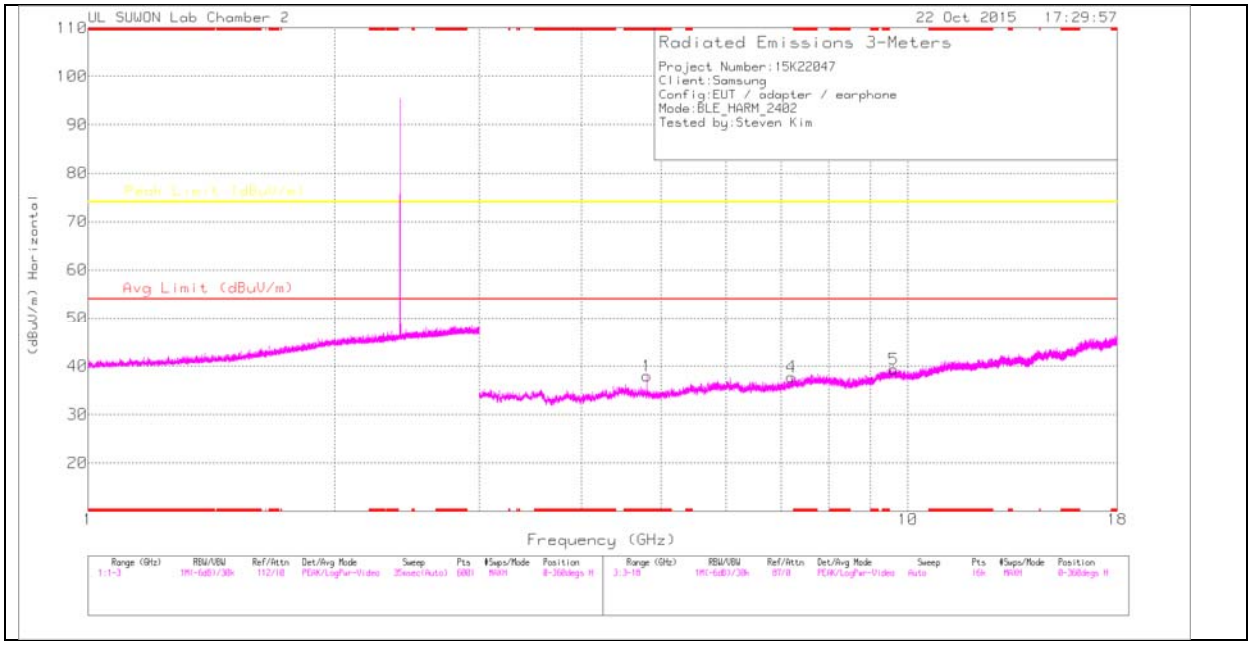
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

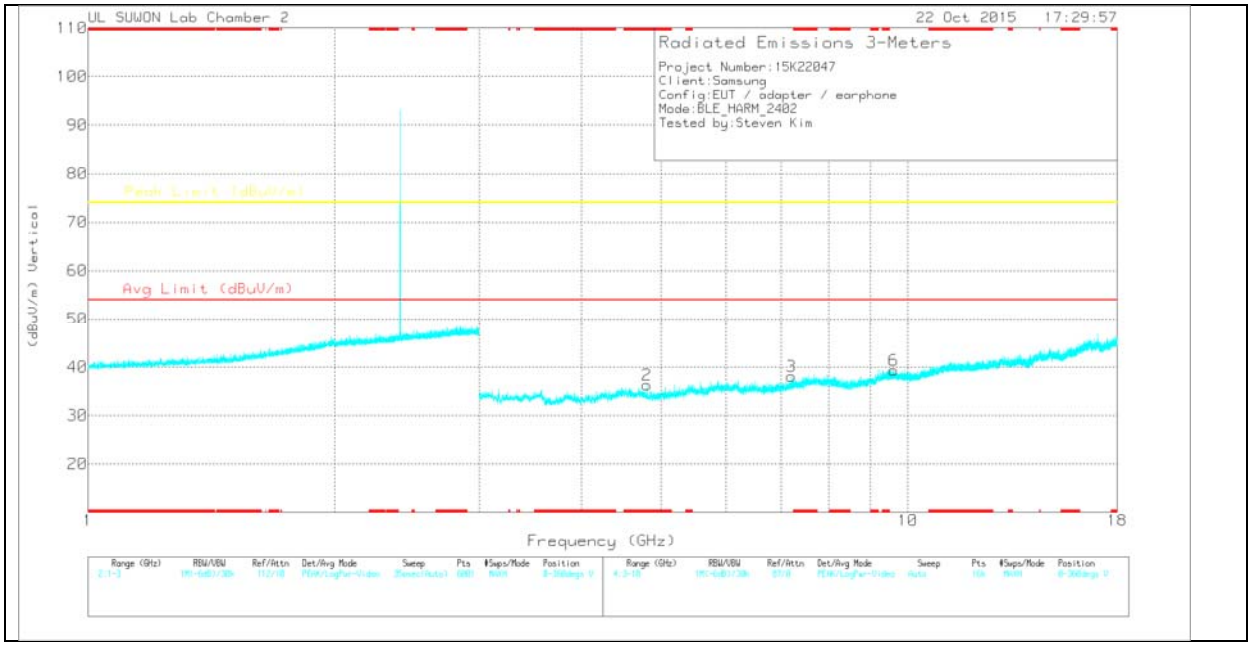
RMS - RMS detection

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	3117(00168717)_150619	Path_3_3GHP	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	* 4.804	29.35	PK	33.9	-25.3	0	37.95	-	-	74	-36.05	0-360	200	H
4	7.206	24.97	PK	35.8	-23	0	37.77	-	-	74	-36.23	0-360	200	H
5	9.607	21.59	PK	36.9	-19.1	0	39.39	-	-	74	-34.61	0-360	100	H
2	* 4.804	27.75	PK	33.9	-25.3	0	36.35	-	-	74	-37.65	0-360	200	V
3	7.206	25.24	PK	35.8	-23	0	38.04	-	-	74	-35.96	0-360	200	V
6	9.608	21.51	PK	36.9	-19.1	0	39.31	-	-	74	-34.69	0-360	100	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	39.18	PK2	33.9	-25.3	0	47.78	-	-	74	-26.22	312	207	H
* 4.804	27.65	MAv1	33.9	-25.3	2.06	38.31	54	-15.69	-	-	312	207	H
* 4.803	37.66	PK2	33.9	-25.3	0	46.26	-	-	74	-27.74	35	269	V
* 4.804	24.92	MAv1	33.9	-25.3	2.06	35.58	54	-18.42	-	-	35	269	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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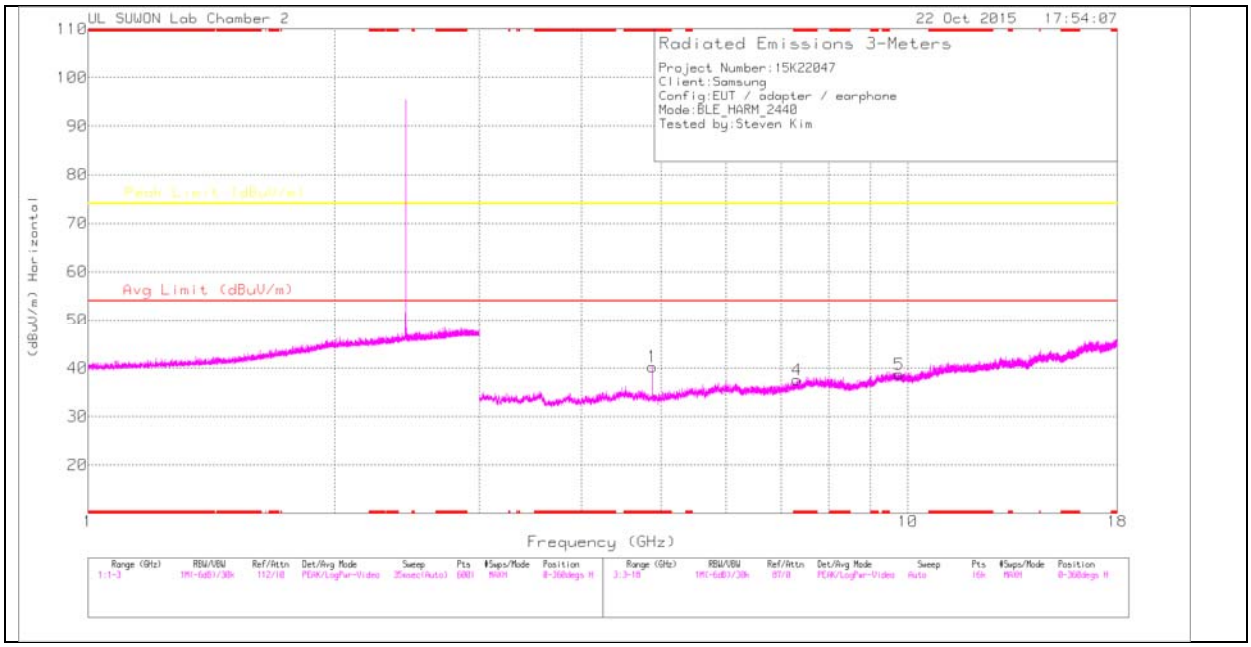
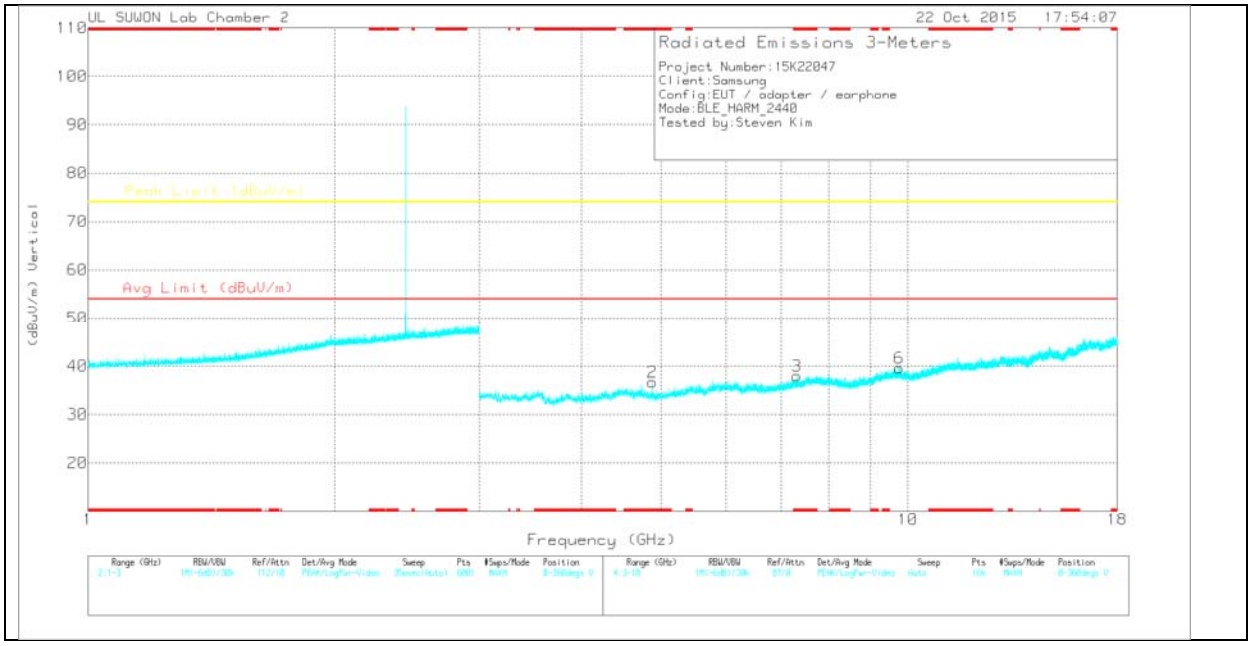
MID CHANNEL HORIZONTAL



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	3117(00168717)_150619	Path_3_3GHP	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	* 4.88	31.6	PK	33.9	-25.2	0	40.3	-	-	74	-33.7	0-360	200	H
4	* 7.32	24.21	PK	35.9	-22.5	0	37.61	-	-	74	-36.39	0-360	200	H
5	9.76	21.06	PK	37	-19.3	0	38.76	-	-	74	-35.24	0-360	200	H
2	* 4.881	28.01	PK	33.9	-25.2	0	36.71	-	-	74	-37.29	0-360	99	V
3	* 7.321	24.59	PK	35.9	-22.5	0	37.99	-	-	74	-36.01	0-360	200	V
6	9.759	21.85	PK	37	-19.3	0	39.55	-	-	74	-34.45	0-360	99	V

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

PK – Peak Detector

Radiated Emissions

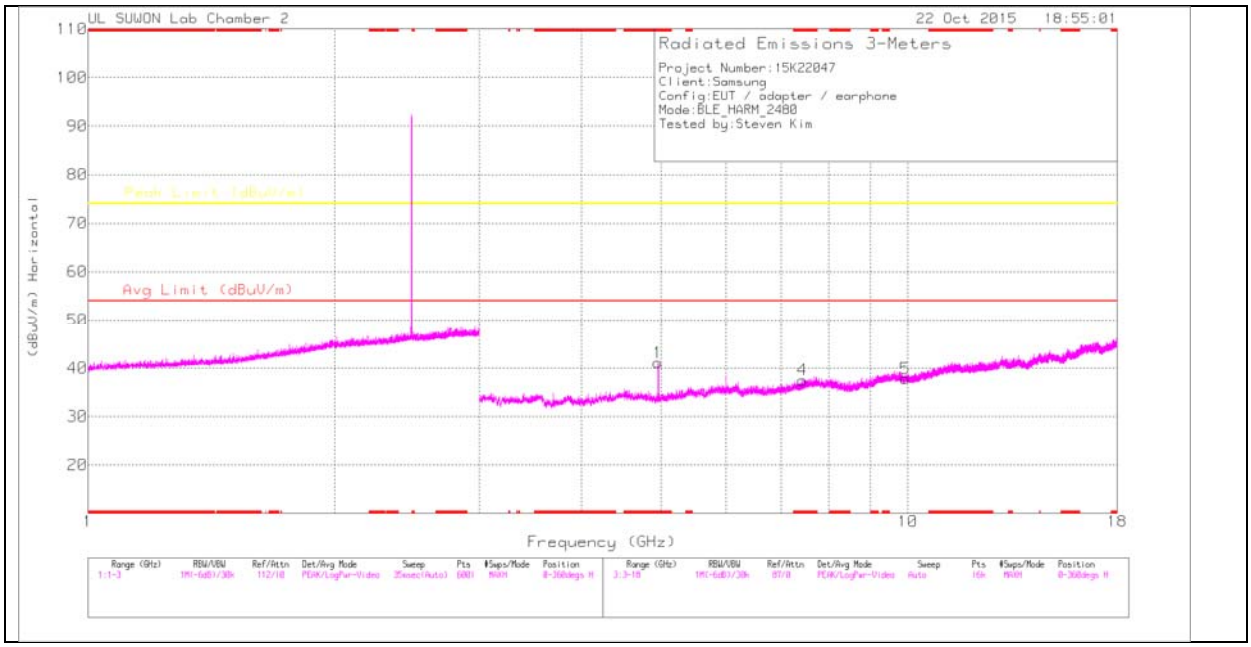
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_3_3GHP	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88	38.08	PK2	33.9	-25.2	0	46.78	-	-	74	-27.22	302	299	H
* 4.88	26.87	MAv1	33.9	-25.2	2.06	37.63	54	-16.37	-	-	302	299	H
* 4.881	37.18	PK2	33.9	-25.2	0	45.88	-	-	74	-28.12	42	213	V
* 4.88	26.06	MAv1	33.9	-25.2	2.06	36.82	54	-17.18	-	-	42	213	V

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

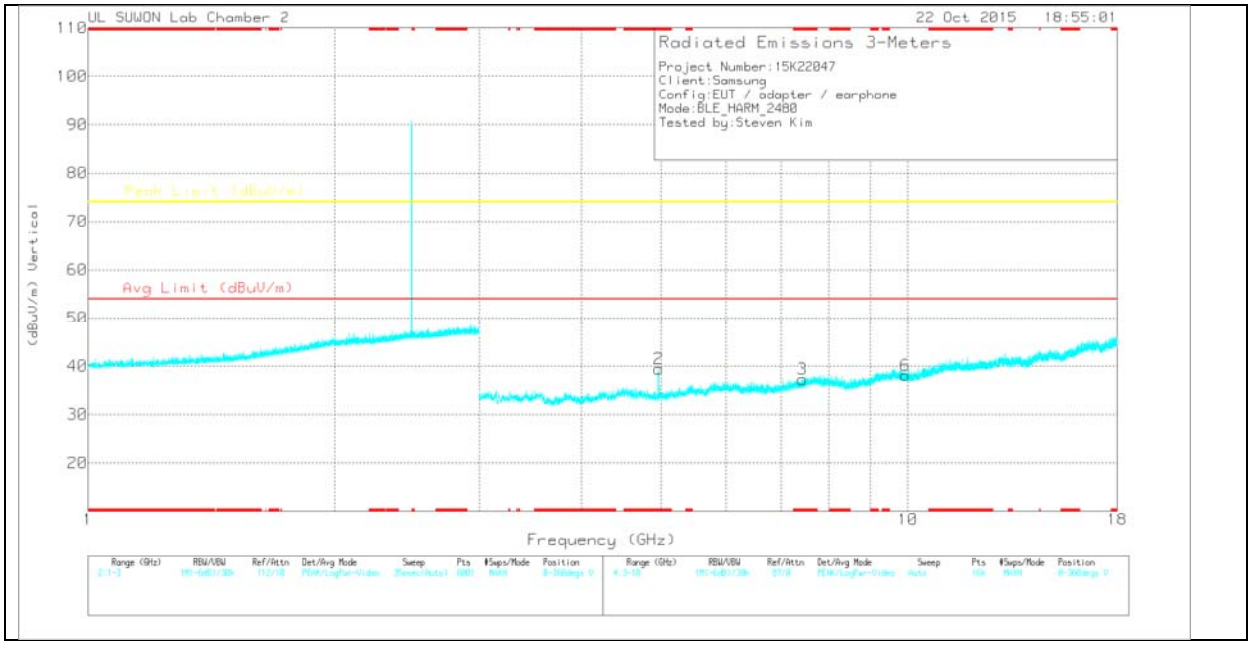
PK2 - Maximum Peak

MAv1 - Maximum RMS Average

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	3117(00168717)_150619	Path_3_3GHP	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	32.23	PK	33.9	-25	0	41.13	-	-	74	-32.87	0-360	200	H
4	* 7.441	23.62	PK	36	-22.1	0	37.52	-	-	74	-36.48	0-360	200	H
5	9.918	19.68	PK	37.1	-19	0	37.78	-	-	74	-36.22	0-360	100	H
2	* 4.96	30.52	PK	33.9	-25	0	39.42	-	-	74	-34.58	0-360	200	V
3	* 7.439	23.37	PK	36	-22.1	0	37.27	-	-	74	-36.73	0-360	200	V
6	9.928	19.91	PK	37.2	-19	0	38.11	-	-	74	-35.89	0-360	100	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_3_3GHP	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.961	39.38	PK2	33.9	-25	0	48.28	-	-	74	-25.72	307	323	H
* 4.96	29.49	MAv1	33.9	-25	2.06	40.45	54	-13.55	-	-	307	323	H
* 4.96	37.46	PK2	33.9	-25	0	46.36	-	-	74	-27.64	38	204	V
* 4.96	27.04	MAv1	33.9	-25	2.06	38	54	-16	-	-	38	204	V

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

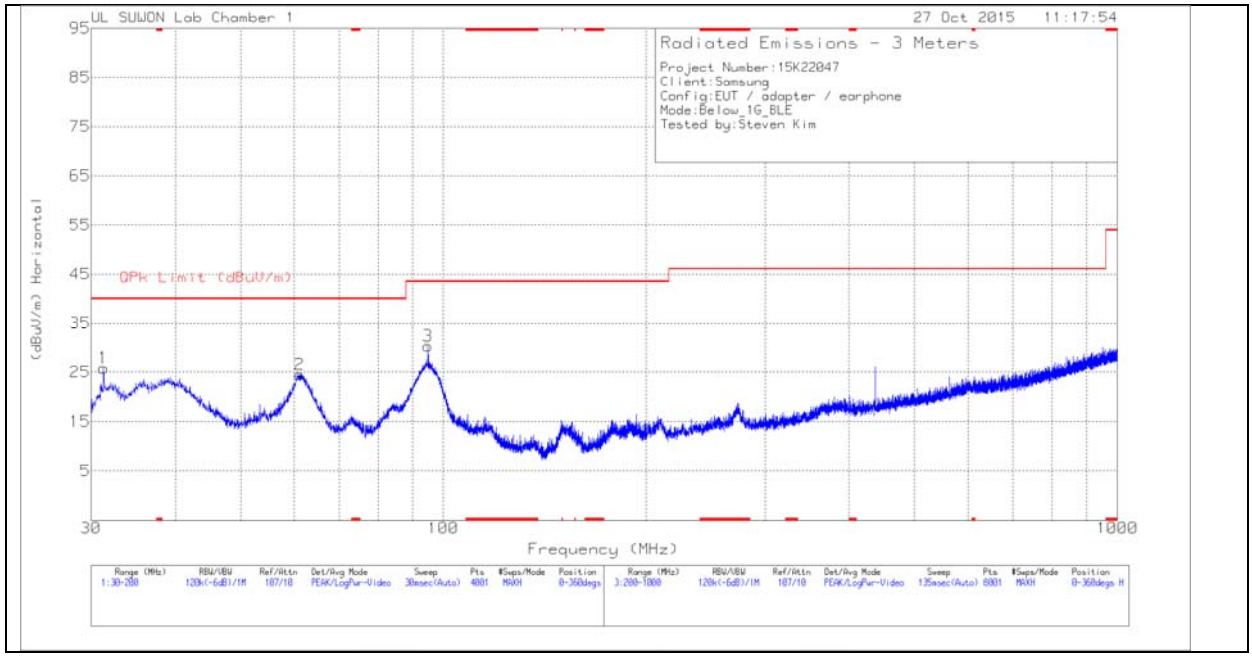
PK2 - Maximum Peak

MAv1 - Maximum RMS Average

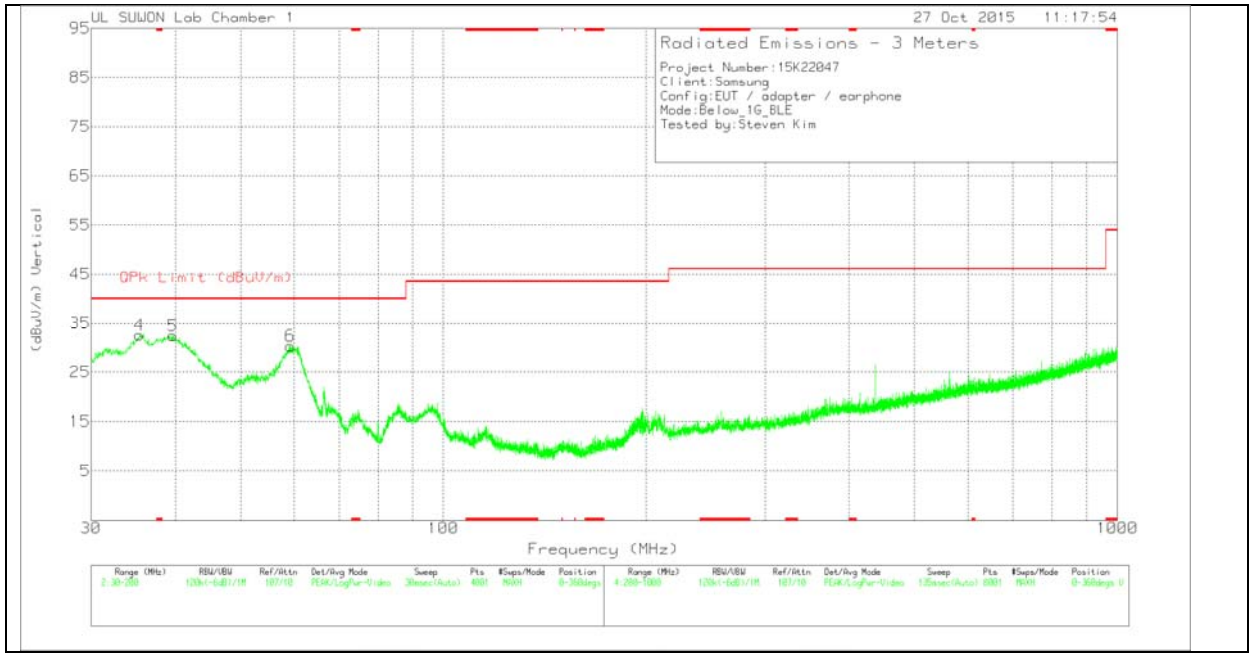
11.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-749	Below_1G	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.3175	46.02	Pk	10.3	-30.5	25.82	40	-14.18	0-360	300	H	1
2	61.1525	42.1	Pk	12.3	-29.9	24.5	40	-15.5	0-360	300	H	2
3	94.8975	49.09	Pk	10.5	-29.3	30.29	43.52	-13.23	0-360	201	H	3
4	35.3975	52.36	Pk	10.6	-30.4	32.56	40	-7.44	0-360	100	V	4
5	39.69	50.42	Pk	12.3	-30.3	32.42	40	-7.58	0-360	100	V	5
6	59.24	47.51	Pk	12.7	-29.9	30.31	40	-9.69	0-360	100	V	6

Pk - Peak detector

12. 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

ANSI C63.10 - 2009

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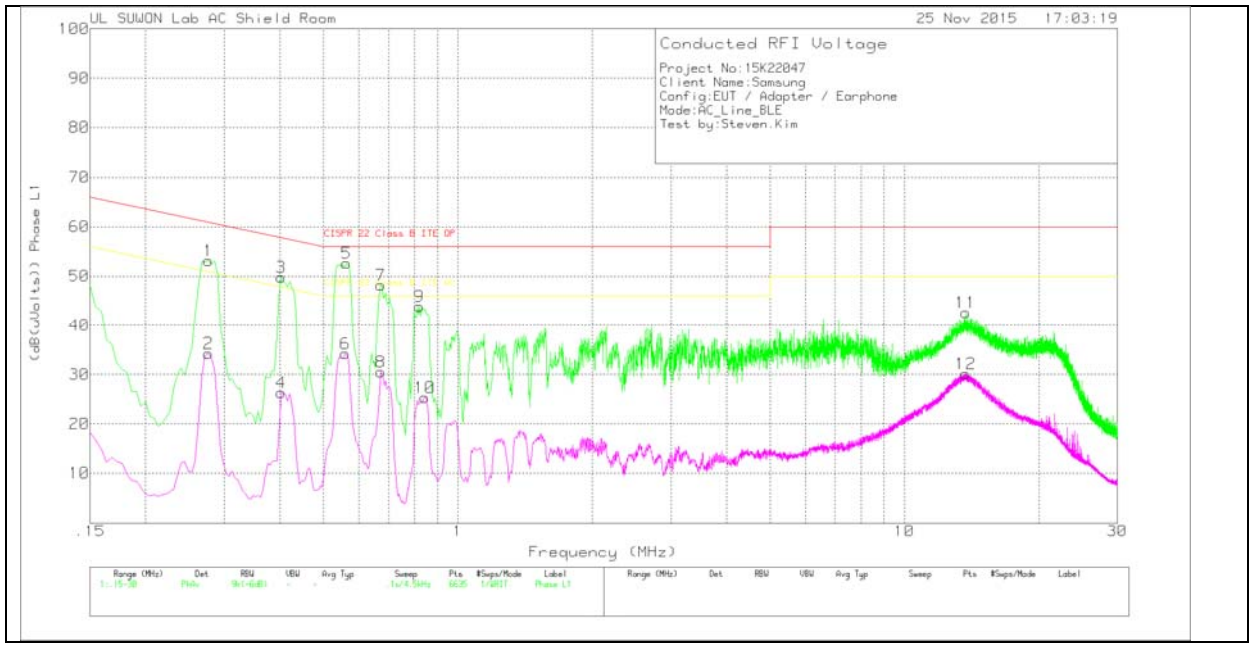
RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



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LINE 1 RESULTS

Trace Markers

Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.276	43.39	Pk	9.8	0	53.19	60.94	-7.75	-	-
2	.276	24.49	Av	9.8	0	34.29	-	-	50.94	-16.65
3	.402	39.72	Pk	10.1	0	49.82	57.81	-7.99	-	-
4	.402	16.27	Av	10.1	0	26.37	-	-	47.81	-21.44
5	.564	42.51	Pk	10.1	0	52.61	56	-3.39	-	-
6	.5595	24.12	Av	10.1	0	34.22	-	-	46	-11.78
7	.672	38.14	Pk	10.1	0	48.24	56	-7.76	-	-
8	.672	20.42	Av	10.1	0	30.52	-	-	46	-15.48
9	.8205	33.91	Pk	10	0	43.91	56	-12.09	-	-
10	.843	15.45	Av	9.9	0	25.35	-	-	46	-20.65
11	13.7175	32.35	Pk	10.1	.2	42.65	60	-17.35	-	-
12	13.704	19.9	Av	10.1	.2	30.2	-	-	50	-19.8

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.2769	34.52	Qp	9.8	0	44.32	60.91	-16.59	-	-
.4065	31.57	Qp	10.1	0	41.67	57.72	-16.05	-	-
.5667	32.1	Qp	10.1	0	42.2	56	-13.8	-	-
.6711	26.78	Qp	10.1	0	36.88	56	-19.12	-	-
.8169	17.24	Qp	10	0	27.24	56	-28.76	-	-
13.713	19.02	Qp	10.1	.2	29.32	60	-30.68	-	-

Qp - Quasi-Peak detector

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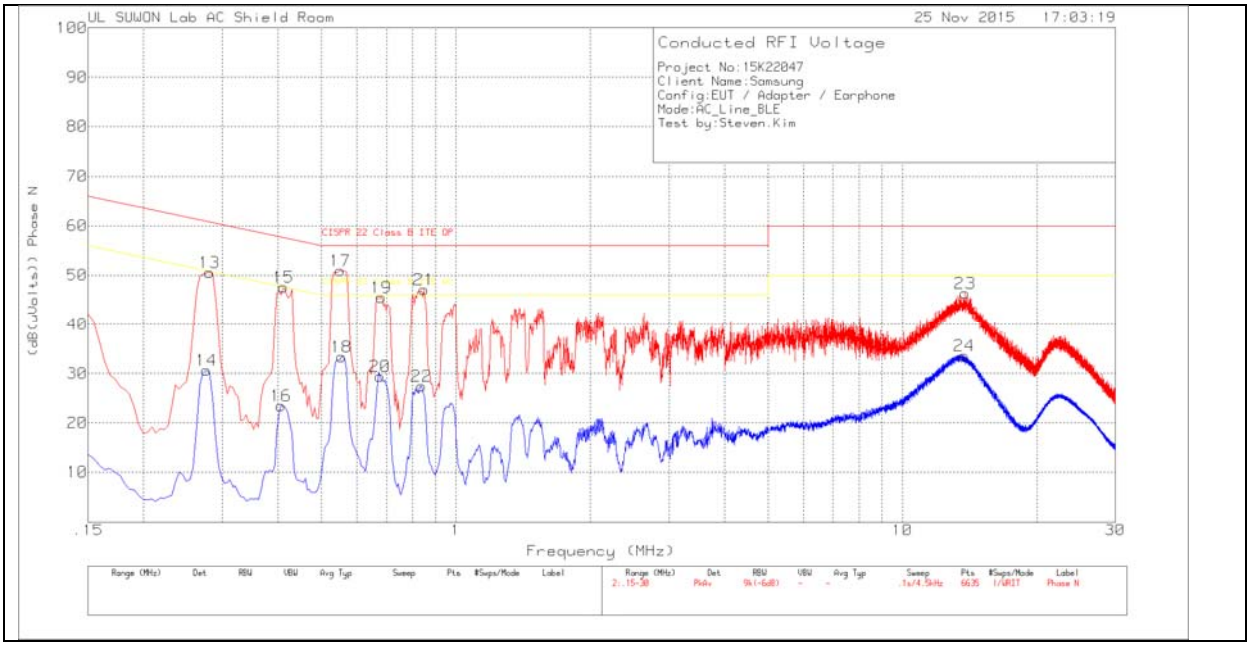
LINE 2 PLOT



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LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.2805	40.78	Pk	9.8	0	50.58	60.8	-10.22	-	-
14	.276	20.81	Av	9.8	0	30.61	-	-	50.94	-20.33
15	.411	37.53	Pk	10.1	0	47.63	57.63	-10	-	-
16	.4065	13.36	Av	10.1	0	23.46	-	-	47.72	-24.26
17	.5505	40.81	Pk	10.1	0	50.91	56	-5.09	-	-
18	.555	23.25	Av	10.1	0	33.35	-	-	46	-12.65
19	.681	35.54	Pk	10	0	45.54	56	-10.46	-	-
20	.6765	19.41	Av	10	0	29.41	-	-	46	-16.59
21	.8475	37.2	Pk	9.9	0	47.1	56	-8.9	-	-
22	.8385	17.5	Av	9.9	0	27.4	-	-	46	-18.6
23	13.83	35.9	Pk	10.2	.2	46.3	60	-13.7	-	-
24	13.758	23.16	Av	10.2	.2	33.56	-	-	50	-16.44

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.2832	34.36	Qp	9.8	0	44.16	60.72	-16.56	-	-
.4101	30.86	Qp	10.1	0	40.96	57.65	-16.69	-	-
.5496	30.11	Qp	10.1	0	40.21	56	-15.79	-	-
.6819	25.15	Qp	10	0	35.15	56	-20.85	-	-
.8466	18.95	Qp	9.9	0	28.85	56	-27.15	-	-
13.83	22.17	Qp	10.2	.2	32.57	60	-27.43	-	-

Qp - Quasi-Peak detector

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