



FCC CFR47 PART 15 SUBPART C

Bluetooth Low Energy

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER : SM-T818A

FCC ID: A3LSMT818A

REPORT NUMBER: 16K23785-E2V1

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

Prepared by
UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433



Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: WCDMA/LTE Tablet + Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+

MODEL NUMBER: SM-T818A

SERIAL NUMBER: R32H5003EKB, E0E42AED (RADIATED);
R32H5003EJN (CONDUCTED)

DATE TESTED: JUL 11, 2016 - AUG 15, 2016

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.

1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMT818T, 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: A3LSMT818A shares the same enclosure and circuit board as FCC ID: A3LSMT818T. 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: A3LSMT818T remains representative of FCC ID: A3LSMT818A. The test data of FCC ID: A3LSMT818T being submitted for this application to cover BLE features.

1.3. SPOT CHECK VERIFICATION DATA

Band		Test Item	Worst Freq. (MHz)	Test Limit (dBμV/m)	Original Model SM-T818T (FCC ID : A3LSMT818T)	Spot Check Model SM-T818A (FCC ID : A3LSMT818A)	Deviation
					Measured Data(dBμV/m)	Measured Power (dBμV/m)	
BLE	2.4GHz	Band Edge	2480.0	54(avg)	45.85	45.82	-0.03
		RSE	2402.0	54(avg)	39.07	38.75	-0.32

Comparison of two models, Deviation is within The EMC Lab Measurement Uncertainty range and all test results are under FCC Technical Limits.

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 Title / Section
DTS	A3LSMT818T	Grant	16K23624-E1V1	Test	FCC Report DTS WLAN / All sections
			16K23624-S1V3	RF Exposure	FCC Report SAR / Section 9.3, 10.8
DSS	A3LSMT818T	Grant	16K23624-E3V1	Test	FCC Report BT / All sections
			16K23624-S1V3	RF Exposure	FCC Report SAR / Section 9.5, 10.10
NII	A3LSMT818T	Grant	16K23624-E4V1	Test	FCC Report UNII DFS WLAN / All sections (Except DFS)
			16K23624-S1V3	RF Exposure	FCC Report SAR / Section 9.4, 10.9
DXX	A3LSMT818T	Grant	16K23624-E5V1	Test	FCC Report ANT+ / All sections
PCB	A3LSMT818T	Grant	16K23624-E6V1	Test	FCC Report WWAN / All sections for WCDMA B2/B5, LTE B2/B4/B5/B12
			16K23624-S1V3	RF Exposure	FCC Report SAR / Section for WCDMA B2 (9.1, 10.1), WCDMA B5 (9.1, 10.3), LTE B2 (9.2, 10.4), LTE B4 (9.2, 10.5), LTE B5 (9.2, 10.6), LTE B17 (9.2, 10.7)

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a WCDMA/LTE Tablet + Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+. 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	2.17	1.65
		Average	1.91	1.55

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of 0.61 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 X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA12JWE	DK3H518VS/B- E	N/A
Data Cable	SAMSUNG	DG925UWE	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	N/A	N/A

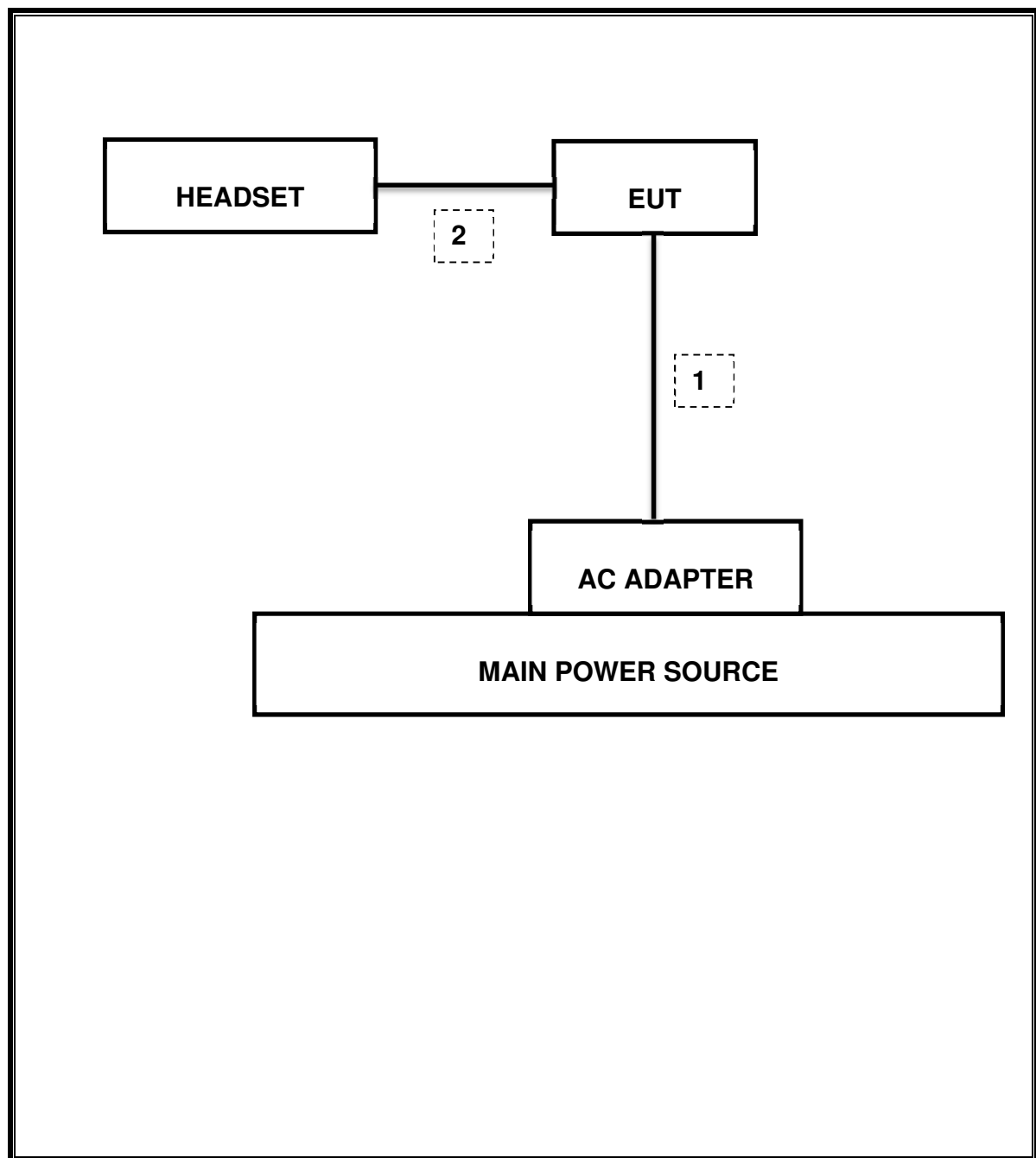
I/O CABLES

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
2	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



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	11-17-16
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00167211	09-20-16
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
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 5GHz	Micro-Tronics	LPS17541	009	08-18-16
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-18-16
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-18-16
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	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 v03r05: 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	0.405	0.626	0.647	64.7%	1.89	2.470



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	662.1 kHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-55.038 dBm
15.247	TX conducted output power	<30dBm		Pass	2.167 dBm (Peak)
15.247	PSD	<8dBm		Pass	-12.54 dBm (Peak)
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	42.52 dBuV (PK)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	45.92 dBuV/m (AV)

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.

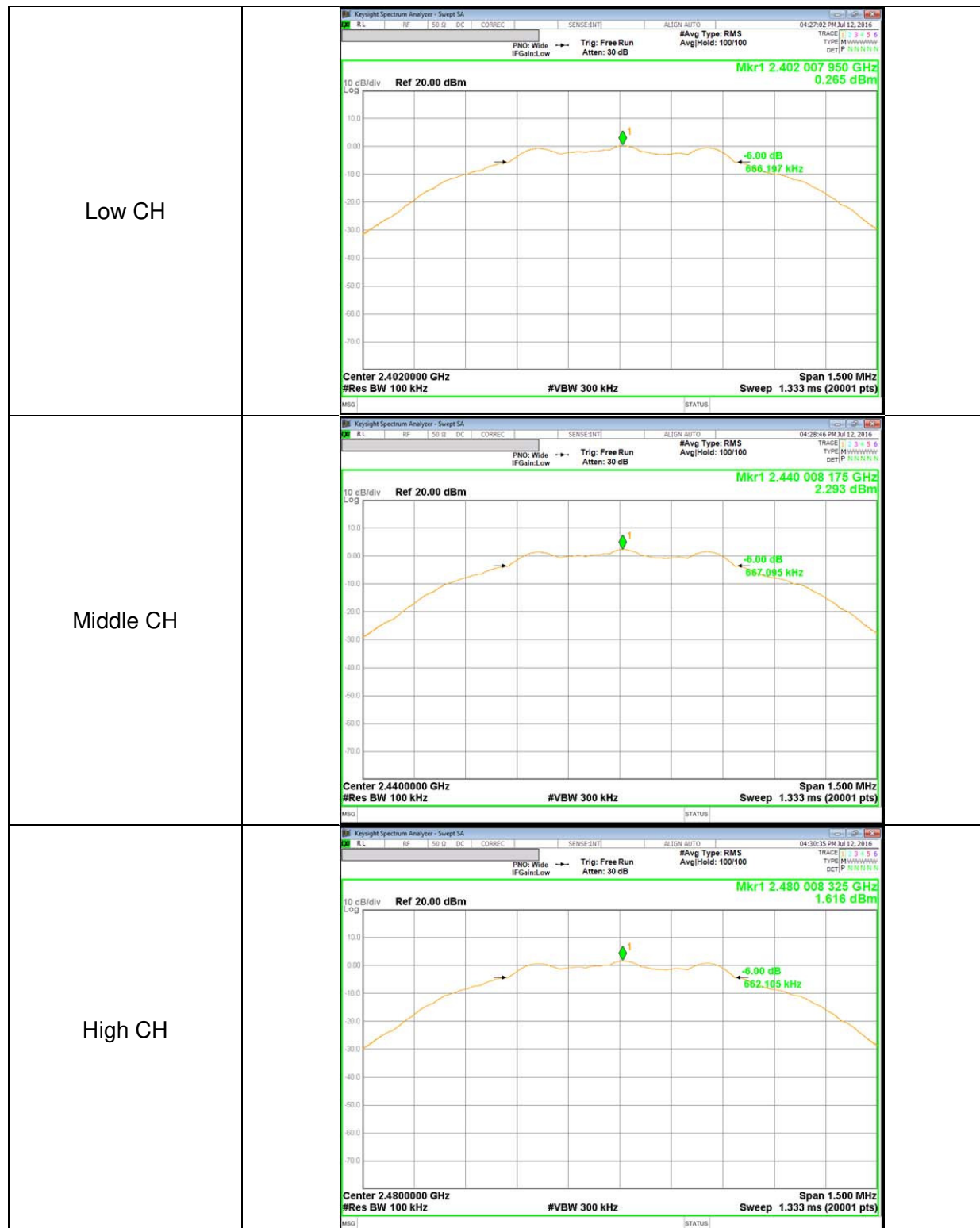
TEST PROCEDURE

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	666.2	500.0
Mid	2440	667.1	500.0
High	2480	662.1	500.0
Worst		662.1	500.0

6 dB BANDWIDTH PLOTS



10.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

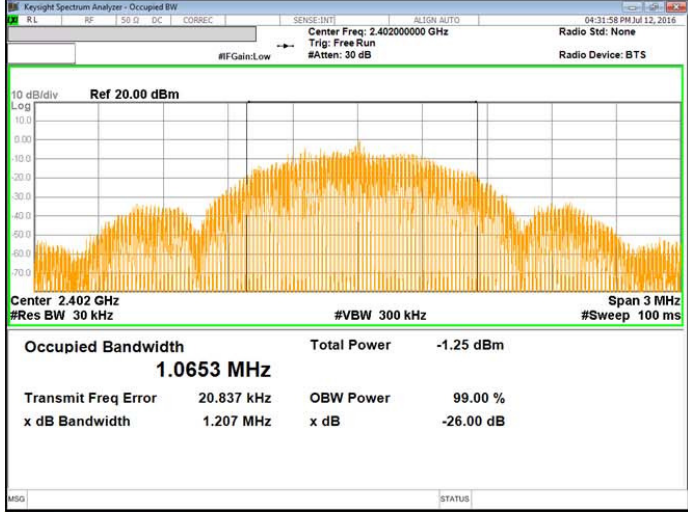
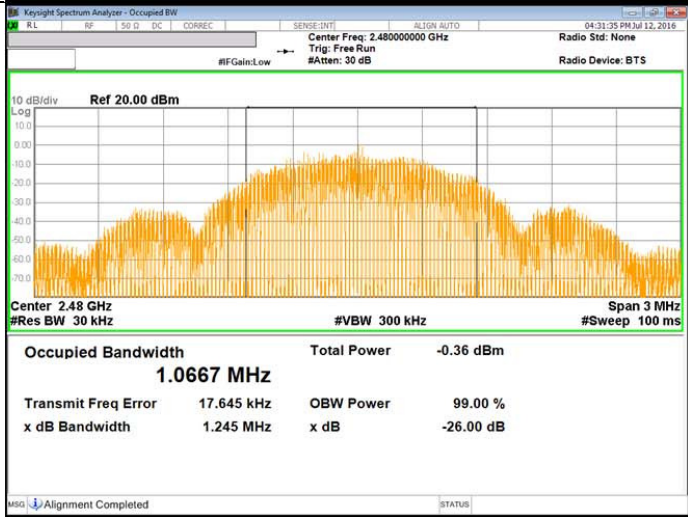
TEST PROCEDURE

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	1.065
Mid	2440	1.070
High	2480	1.067
Worst		1.070

99% BANDWIDTH PLOTS

<p>Low CH</p>	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.402000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS</p> <p>Ref 20.00 dBm</p> <p>Center 2.402 GHz #Res BW 30 kHz #VBW 300 kHz Span 3 MHz #Sweep 100 ms</p> <p>Occupied Bandwidth 1.0653 MHz</p> <p>Total Power -1.25 dBm</p> <p>Transmit Freq Error 20.837 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 1.207 MHz x dB -26.00 dB</p>
<p>Middle CH</p>	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.440000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS</p> <p>Ref 20.00 dBm</p> <p>Center 2.44 GHz #Res BW 30 kHz #VBW 300 kHz Span 3 MHz #Sweep 100 ms</p> <p>Occupied Bandwidth 1.0703 MHz</p> <p>Total Power 0.36 dBm</p> <p>Transmit Freq Error 16.382 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 1.226 MHz x dB -26.00 dB</p>
<p>High CH</p>	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.480000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS</p> <p>Ref 20.00 dBm</p> <p>Center 2.48 GHz #Res BW 30 kHz #VBW 300 kHz Span 3 MHz #Sweep 100 ms</p> <p>Occupied Bandwidth 1.0667 MHz</p> <p>Total Power -0.36 dBm</p> <p>Transmit Freq Error 17.645 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 1.245 MHz x dB -26.00 dB</p>

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.

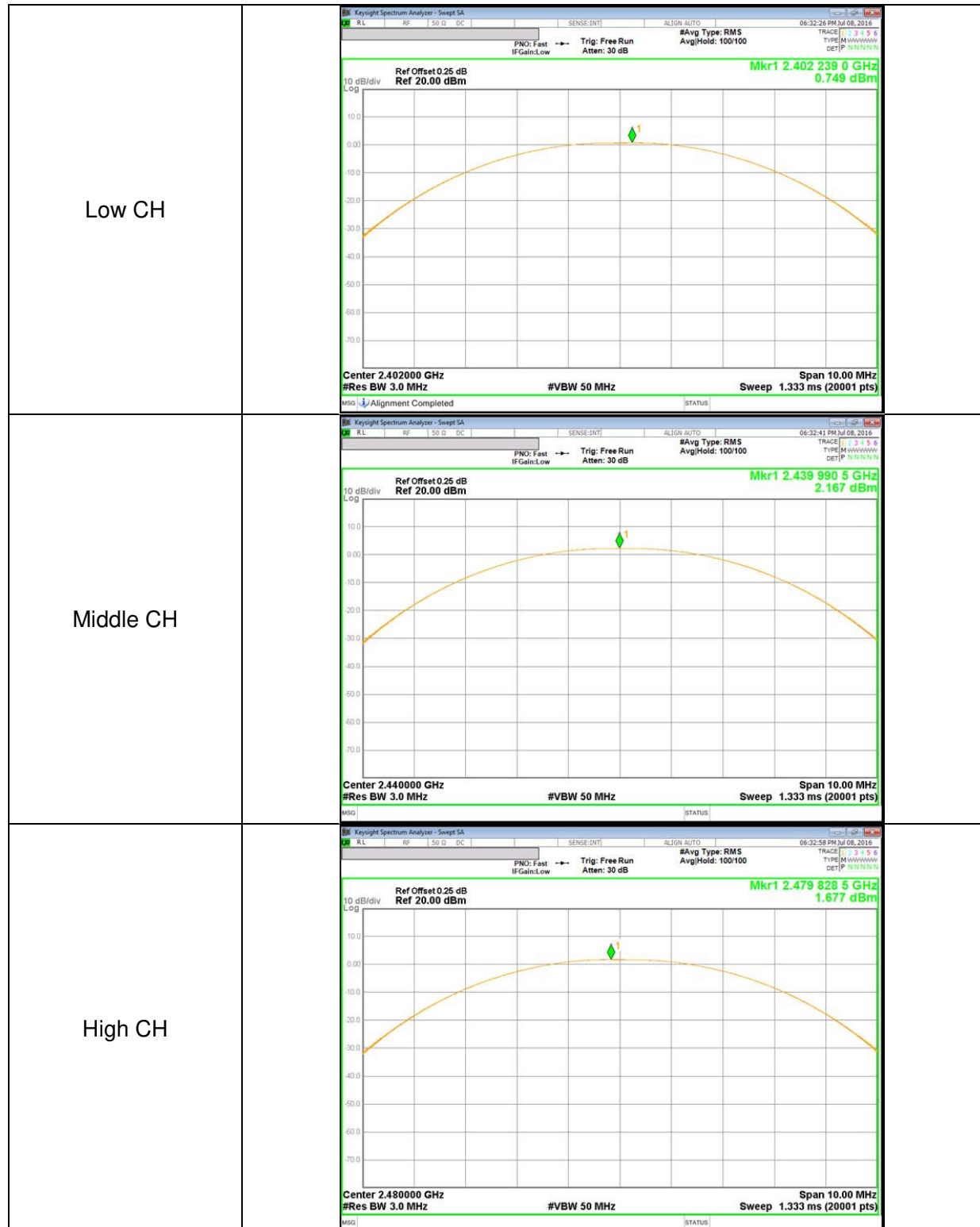
TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r05 under section 9.1.1 utilizing spectrum analyzer.

RESULTS

Channel	Frequency [MHz]	Peak Power Reading [dBm]	Limit [dBm]	Margin [dB]
Low	2402	0.749	30.000	-29.251
Mid	2440	2.167	30.000	-27.833
High	2480	1.677	30.000	-28.323
Worst		2.167		-27.833

OUTPUT POWER PLOTS



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	0.49	1.12
Middle	2440	1.91	1.55
High	2480	1.38	1.38

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.

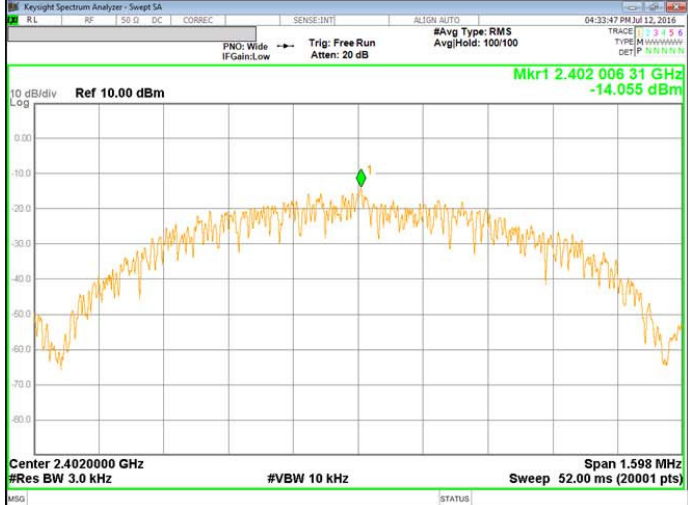
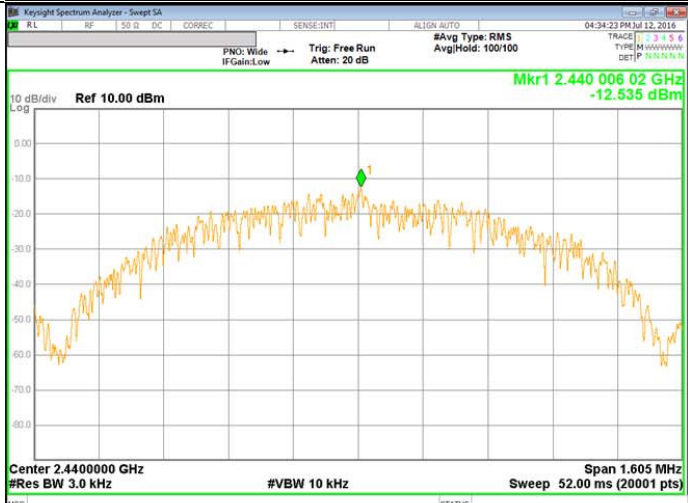
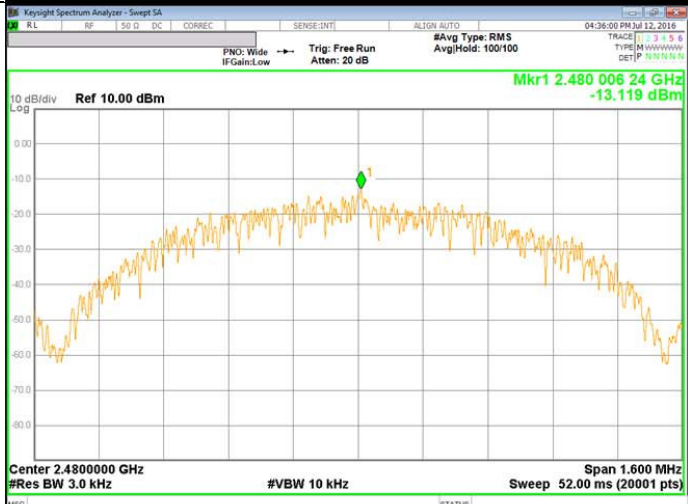
TEST PROCEDURE

Power Spectral Density was performed utilizing the "Method PKPSD (Peak PSD)" under KDB558074 D01 DTS Meas Guidance v03r05

RESULTS

Channel	Frequency [MHz]	PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2402	-14.06	8.00	-22.06
Mid	2440	-12.54	8.00	-20.54
High	2480	-13.12	8.00	-21.12

POWER SPECTRAL DENSITY PLOTS

Low CH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>RL RF 50 D DC CORREC SENSE:INT1 ALIGN: AUTO 04:33:47 PM Jul 12, 2016</p> <p>PNO: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS AvgHold: 100/100</p> <p>10 dB/div Log Ref 10.00 dBm Mkr1 2.402 006 31 GHz -14.055 dBm</p> <p>Center 2.4020000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 1.598 MHz Sweep 52.00 ms (20001 pts)</p>
Middle CH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>RL RF 50 D DC CORREC SENSE:INT1 ALIGN: AUTO 04:34:23 PM Jul 12, 2016</p> <p>PNO: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS AvgHold: 100/100</p> <p>10 dB/div Log Ref 10.00 dBm Mkr1 2.440 006 02 GHz -12.535 dBm</p> <p>Center 2.4400000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 1.605 MHz Sweep 52.00 ms (20001 pts)</p>
High CH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>RL RF 50 D DC CORREC SENSE:INT1 ALIGN: AUTO 04:36:00 PM Jul 12, 2016</p> <p>PNO: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS AvgHold: 100/100</p> <p>10 dB/div Log Ref 10.00 dBm Mkr1 2.480 006 24 GHz -13.119 dBm</p> <p>Center 2.4800000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 1.600 MHz Sweep 52.00 ms (20001 pts)</p>

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.

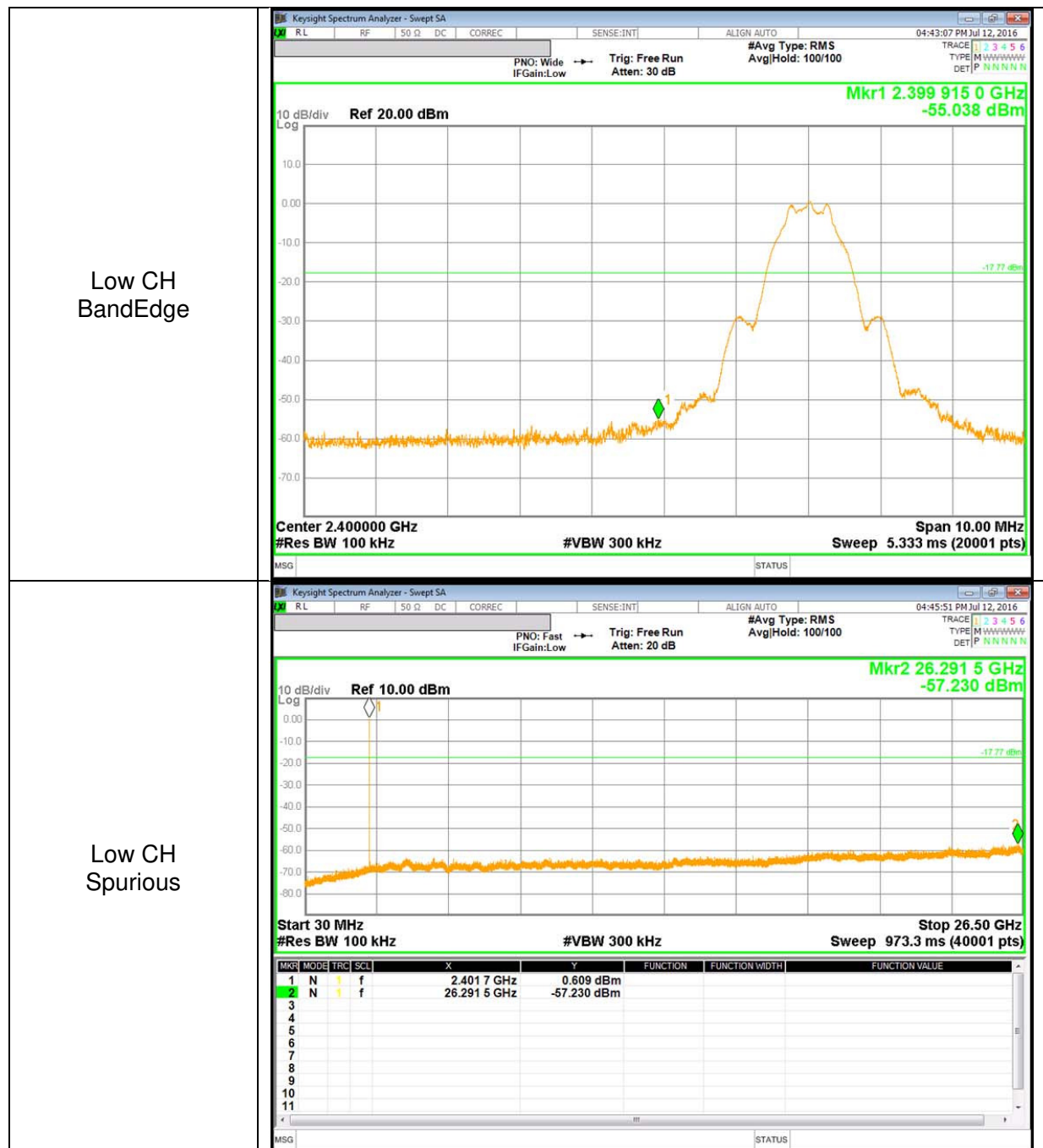
TEST PROCEDURE

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.

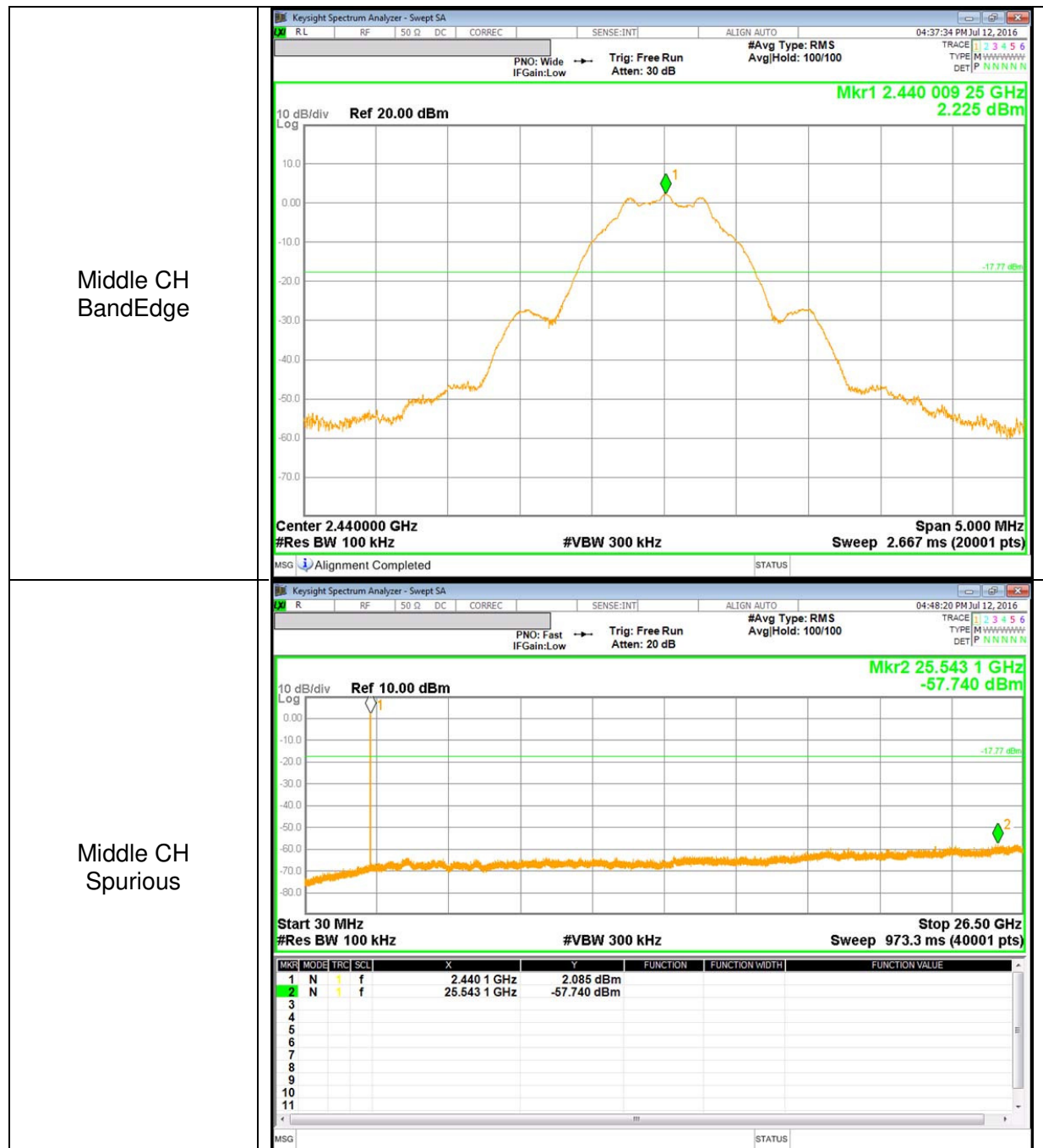
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

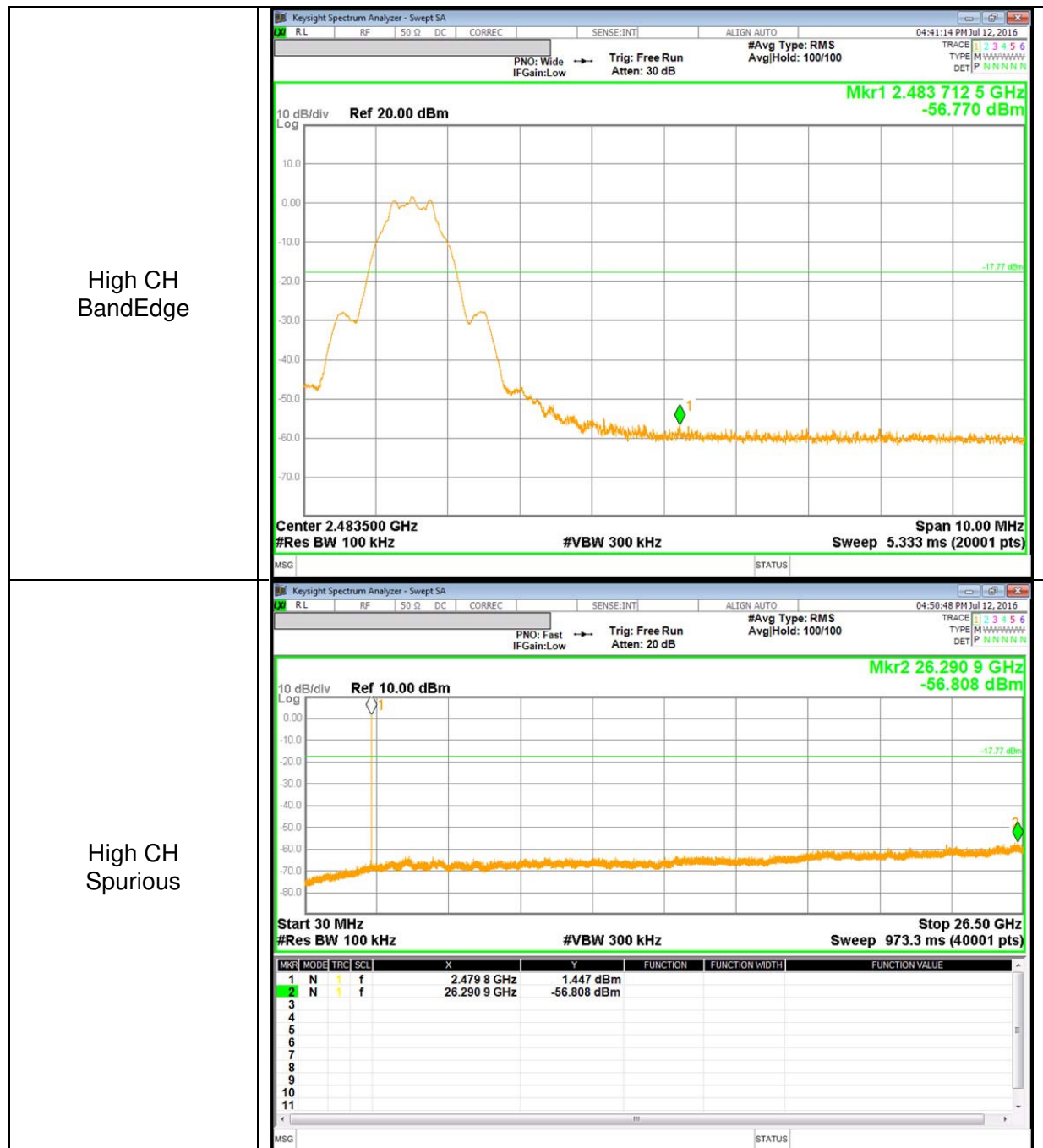
BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



11. RADIATED TEST RESULTS

11.1. 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.

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. Duty cycle factor = $10 \log (1/x)$. For this sample: DCF = $10\log(1/0.647)=1.89\text{dB}$ (Spectrum Analyzer round it up to 1.89dB)

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.

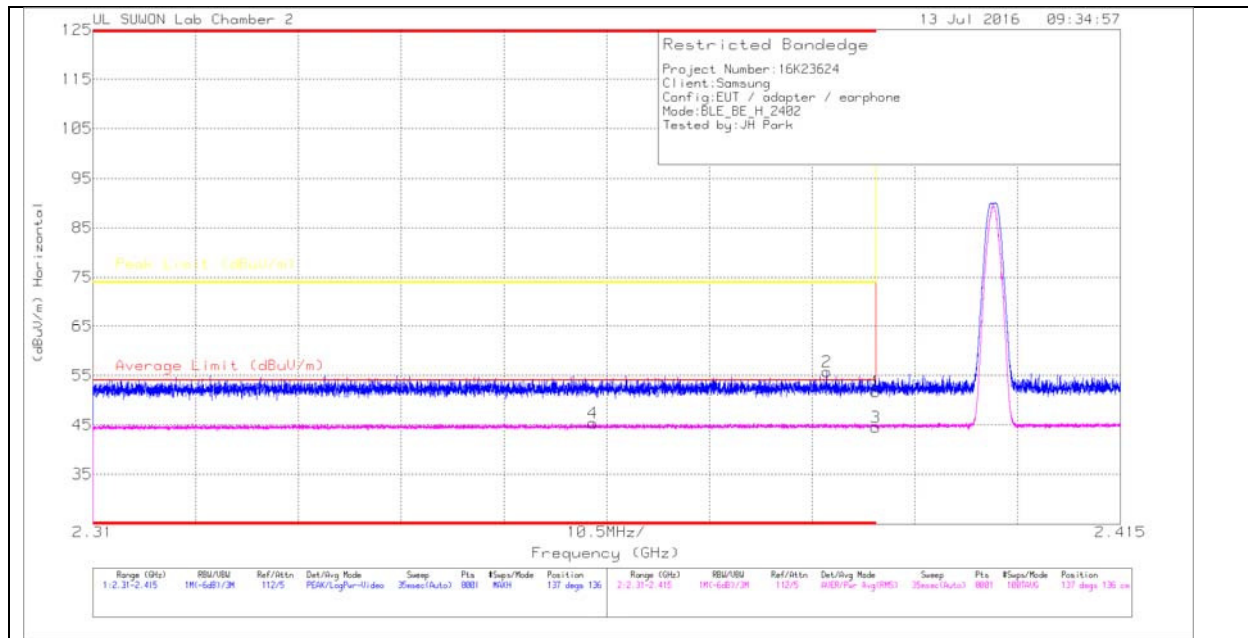
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

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.

Formula for converting the filed strength from uV/m to dBuV/m is:
 $\text{Limit (dBuV/m)} = 20 \log \text{limit (uV/m)}$

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

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

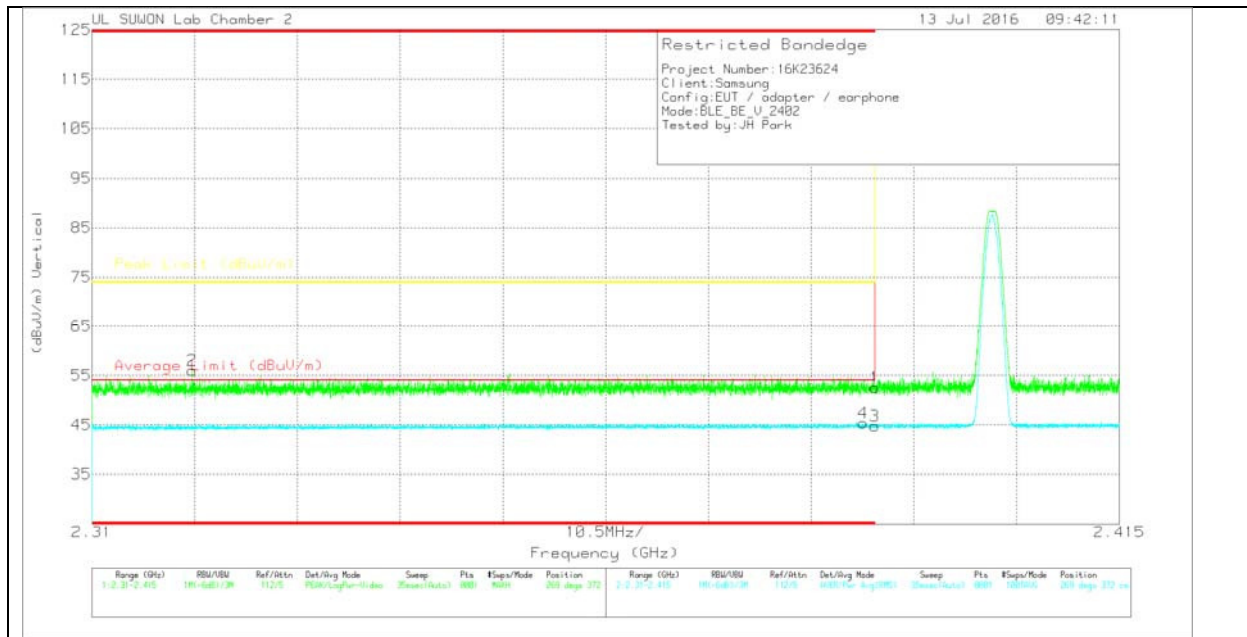
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117/001687 24/150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.46	Pk	31.7	-19.5	0	51.66	-	-	74	-22.34	137	136	H
2	* 2.385	43.62	Pk	31.7	-19.5	0	55.82	-	-	74	-18.18	137	136	H
3	* 2.39	30.39	RMS	31.7	-19.5	1.89	44.48	54	-9.52	-	-	137	136	H
4	* 2.361	31.4	RMS	31.7	-19.6	1.89	45.39	54	-8.61	-	-	137	136	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(001687 24)_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	40.35	Pk	31.7	-19.5	0	52.55	-	-	74	-21.45	269	372	V
2	* 2.32	44.12	Pk	31.6	-19.7	0	56.02	-	-	74	-17.98	269	372	V
3	* 2.39	30.64	RMS	31.7	-19.5	1.89	44.73	54	-9.27	-	-	269	372	V
4	* 2.389	31.3	RMS	31.7	-19.5	1.89	45.39	54	-8.61	-	-	269	372	V

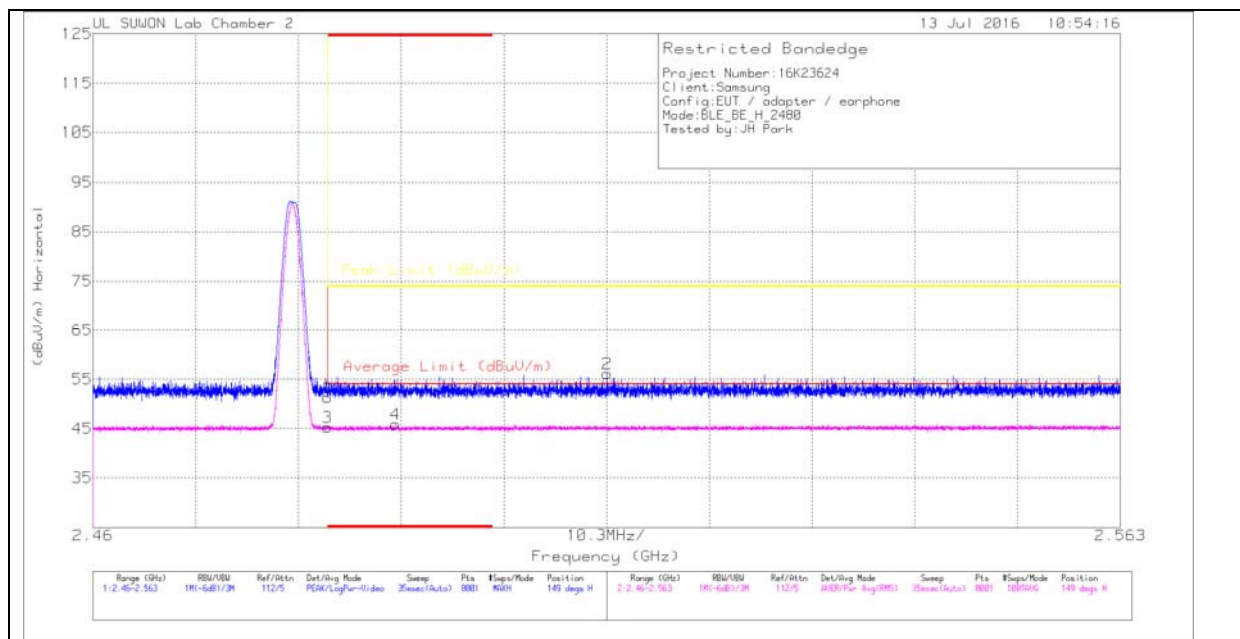
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

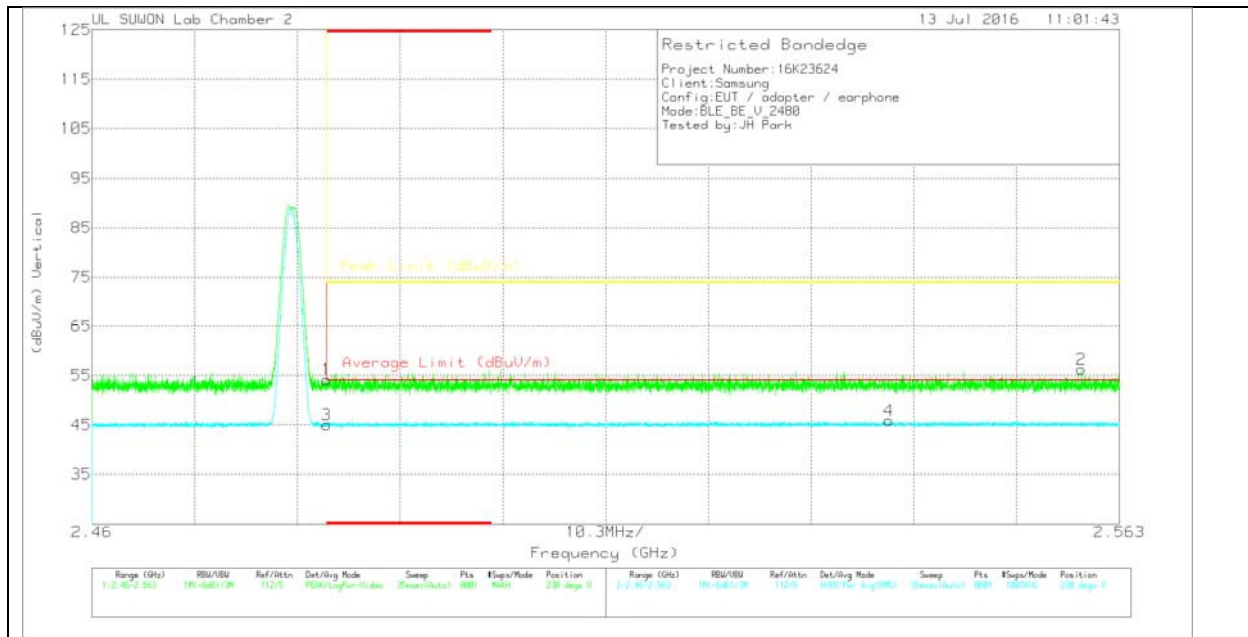
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.97	Pk	31.8	-19.4	0	51.37	-	-	74	-22.63	149	100	H
2	2.512	43.57	Pk	31.9	-19.3	0	56.17	-	-	74	-17.83	149	100	H
3	* 2.484	31.02	RMS	31.8	-19.4	1.89	45.31	54	-8.69	-	-	149	100	H
4	* 2.49	31.63	RMS	31.8	-19.4	1.89	45.92	54	-8.08	-	-	149	100	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(001687 24)_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	41.82	Pk	31.8	-19.4	0	54.22	-	-	74	-19.78	230	289	V
2	2.559	43.68	Pk	31.9	-19.3	0	56.28	-	-	74	-17.72	230	289	V
3	* 2.484	30.74	RMS	31.8	-19.4	1.89	45.03	54	-8.97	-	-	230	289	V
4	2.54	31.36	RMS	31.9	-19.3	1.89	45.85	54	-8.15	-	-	230	289	V

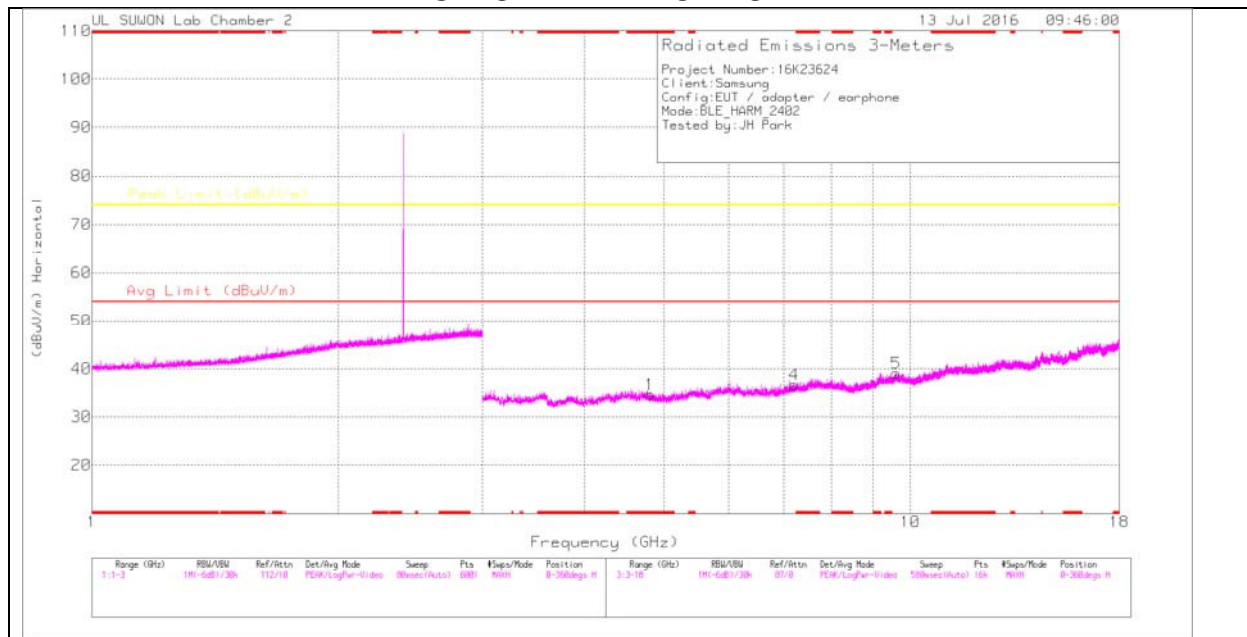
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

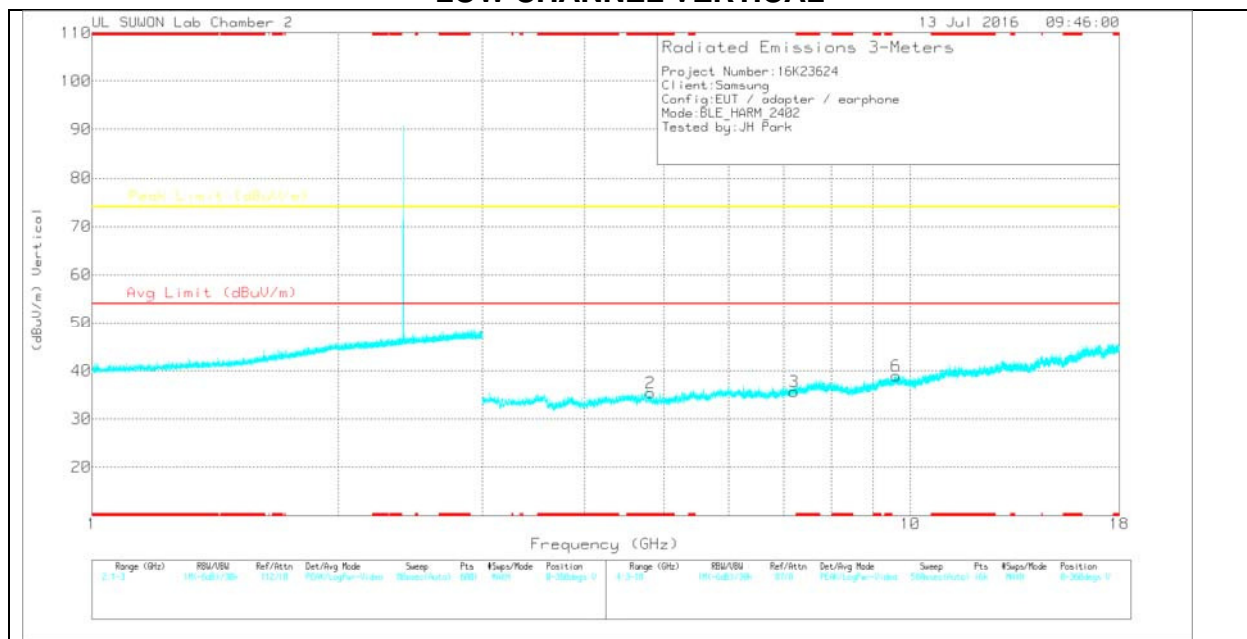
RMS - RMS detection

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.

LOW CHANNEL DATA

Trace Markers

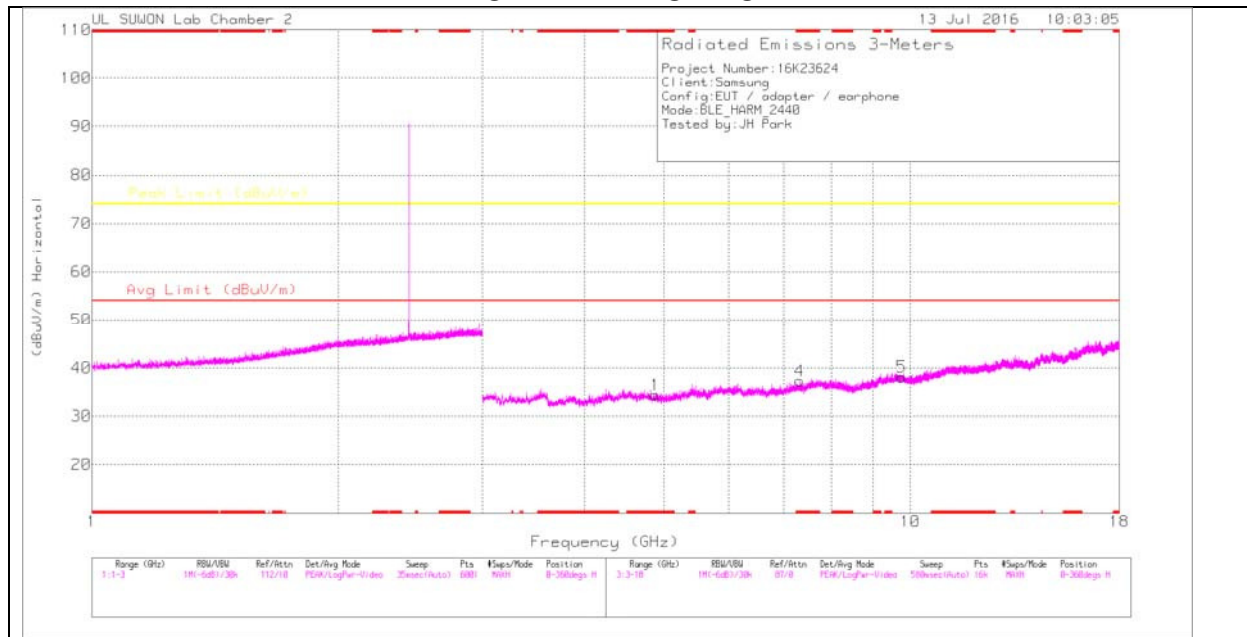
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016872 4)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.807	26.03	PK	33.9	-25.3	0	34.63	-	-	74	-39.37	0-360	100	H
4	7.207	23.84	PK	35.8	-23	0	36.64	-	-	74	-37.36	0-360	100	H
5	9.61	21.27	PK	36.9	-19.1	0	39.07	-	-	74	-34.93	0-360	100	H
2	* 4.81	26.84	PK	33.9	-25.3	0	35.44	-	-	74	-38.56	0-360	200	V
3	7.207	22.93	PK	35.8	-23	0	35.73	-	-	74	-38.27	0-360	200	V
6	9.607	21.15	PK	36.9	-19.1	0	38.95	-	-	74	-35.05	0-360	200	V

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

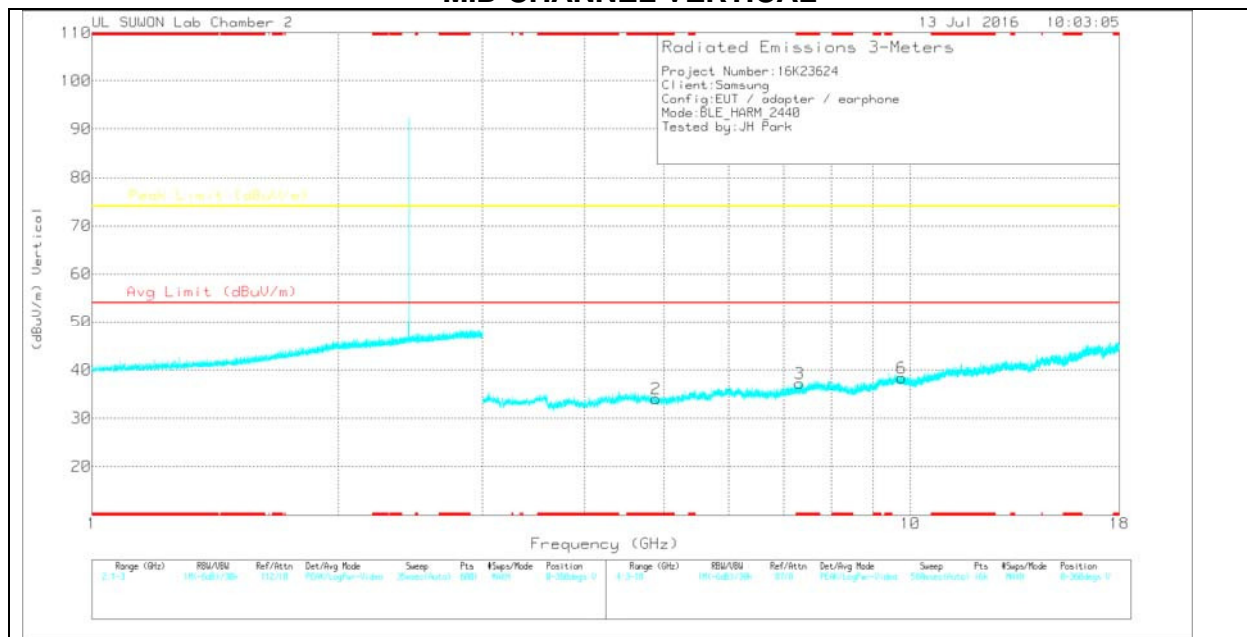
PK – Peak Detector

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

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.

MID CHANNEL DATA

Trace Markers

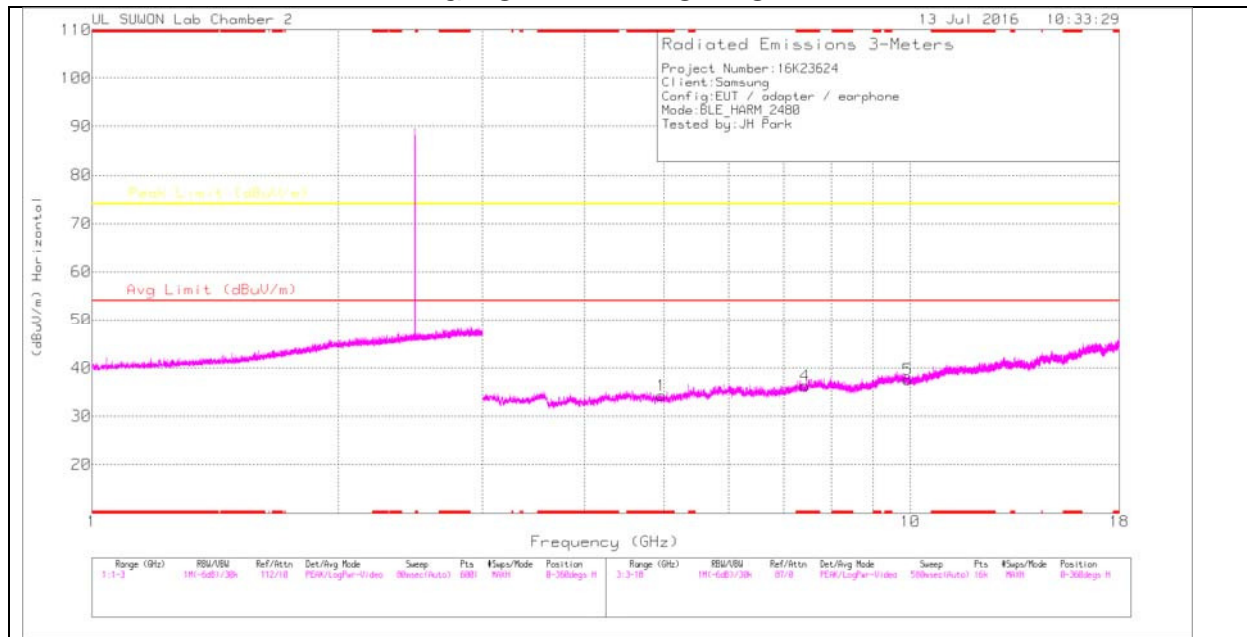
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016872 4)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.882	25.72	PK	33.9	-25.2	0	34.42	-	-	74	-39.58	0-360	200	H
4	* 7.323	23.9	PK	35.9	-22.5	0	37.3	-	-	74	-36.7	0-360	200	H
5	9.759	20.45	PK	37	-19.3	0	38.15	-	-	74	-35.85	0-360	100	H
2	* 4.886	25.38	PK	33.9	-25.2	0	34.08	-	-	74	-39.92	0-360	200	V
3	* 7.317	23.9	PK	35.9	-22.6	0	37.2	-	-	74	-36.8	0-360	100	V
6	9.76	20.62	PK	37	-19.3	0	38.32	-	-	74	-35.68	0-360	100	V

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

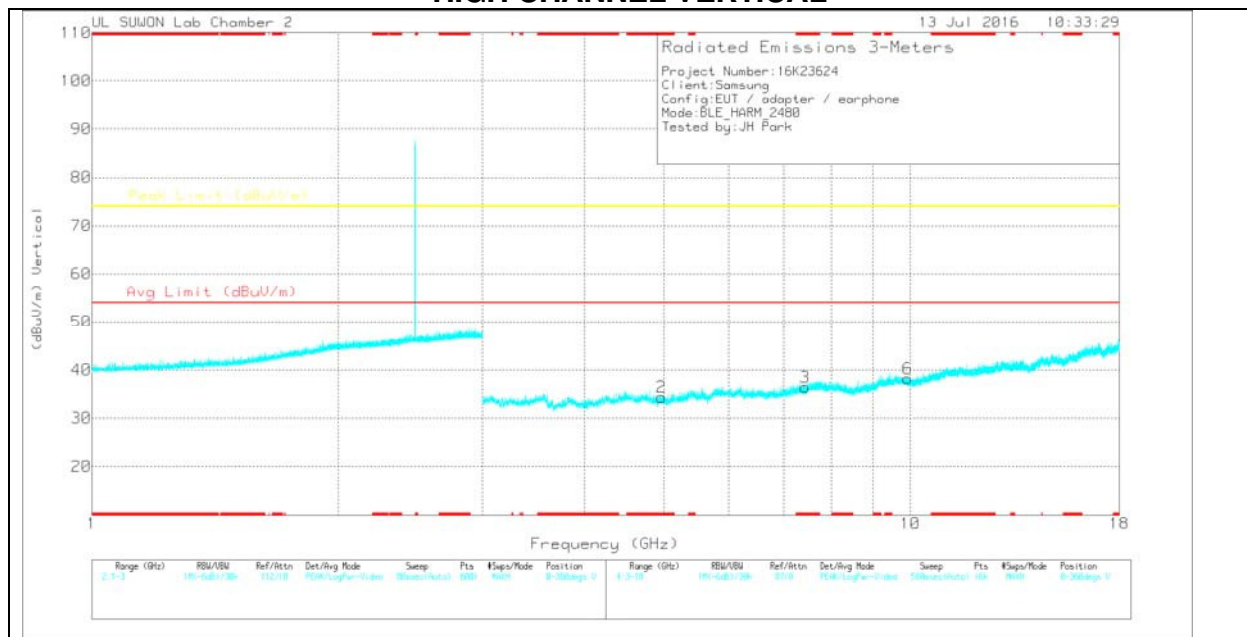
PK – Peak Detector

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

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.

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016872 4)_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
1	* 4.961	25.44	PK	33.9	-25	0	34.34	-	-	74	-39.66	0-360	200	H
4	* 7.438	22.4	PK	36	-22.1	0	36.3	-	-	74	-37.7	0-360	100	H
5	9.922	19.36	PK	37.2	-19	0	37.56	-	-	74	-36.44	0-360	100	H
2	* 4.96	25.46	PK	33.9	-25	0	34.36	-	-	74	-39.64	0-360	100	V
3	* 7.439	22.5	PK	36	-22.1	0	36.4	-	-	74	-37.6	0-360	100	V
6	9.926	20.03	PK	37.2	-19	0	38.23	-	-	74	-35.77	0-360	100	V

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

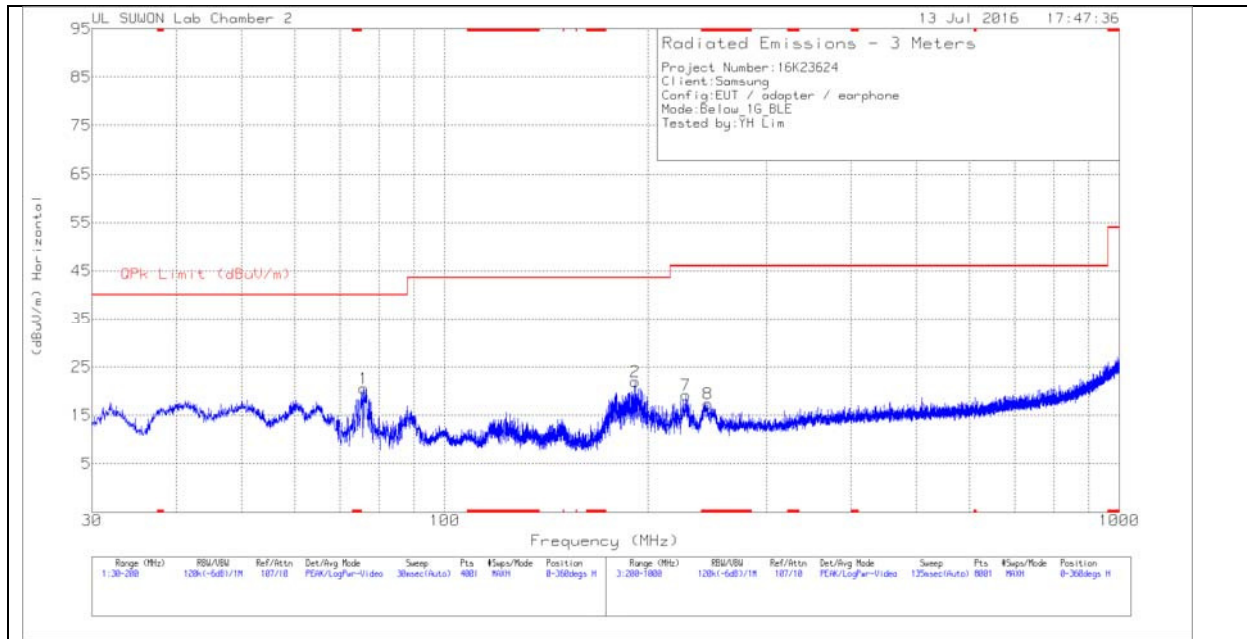
PK – Peak Detector

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

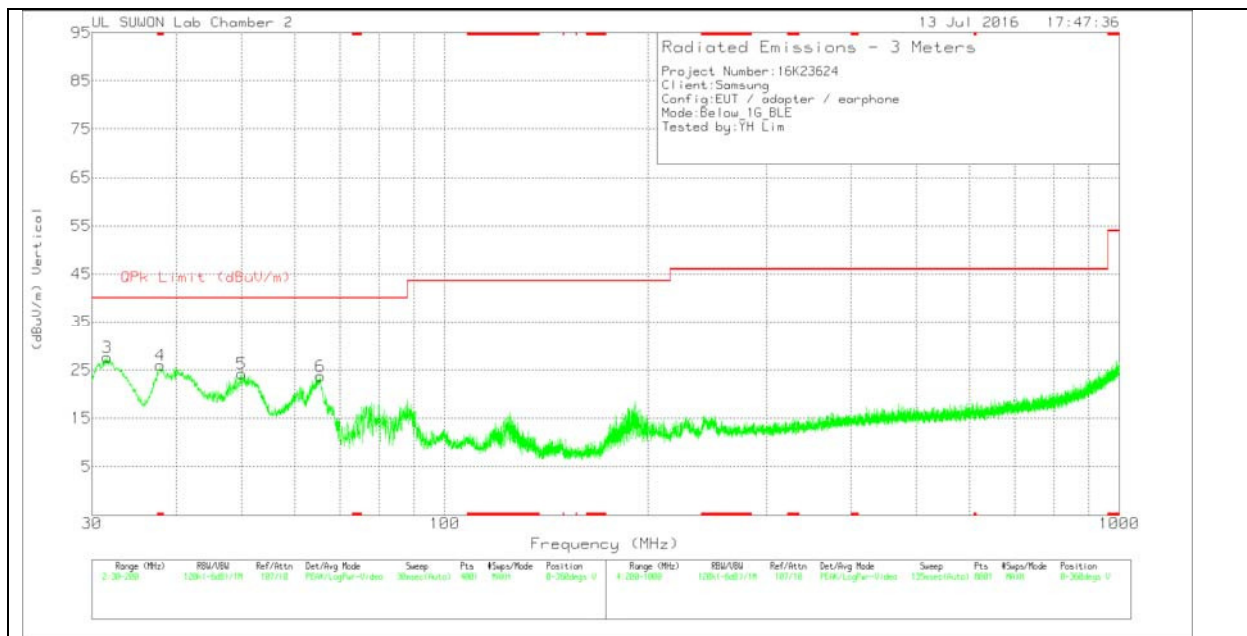
11.3. WORST-CASE BELOW 1 GHz

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	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	75.815	43.08	Pk	8.1	-30.6	20.58	40	-19.42	0-360	300	H
2	191.415	41.6	Pk	10.6	-30.3	21.9	43.52	-21.62	0-360	100	H
3	31.615	48.01	Pk	10.4	-30.8	27.61	40	-12.39	0-360	100	V
4	* 37.905	44.92	Pk	11.9	-30.8	26.02	40	-13.98	0-360	100	V
5	49.975	40.85	Pk	14.1	-30.7	24.25	40	-15.75	0-360	100	V
6	65.4025	43.34	Pk	11.1	-30.7	23.74	40	-16.26	0-360	100	V
7	227.6	37.4	Pk	12	-30.2	19.2	46.02	-26.82	0-360	101	H
8	* 245.5	35.17	Pk	12.3	-30.1	17.37	46.02	-28.65	0-360	101	H

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

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

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.

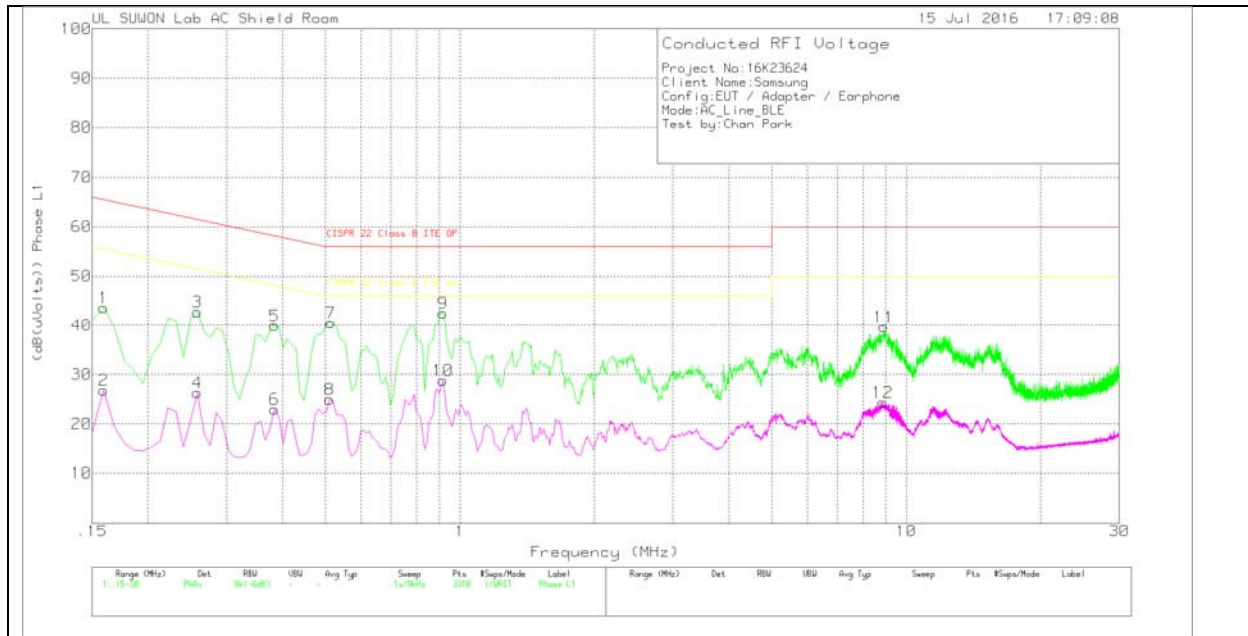
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

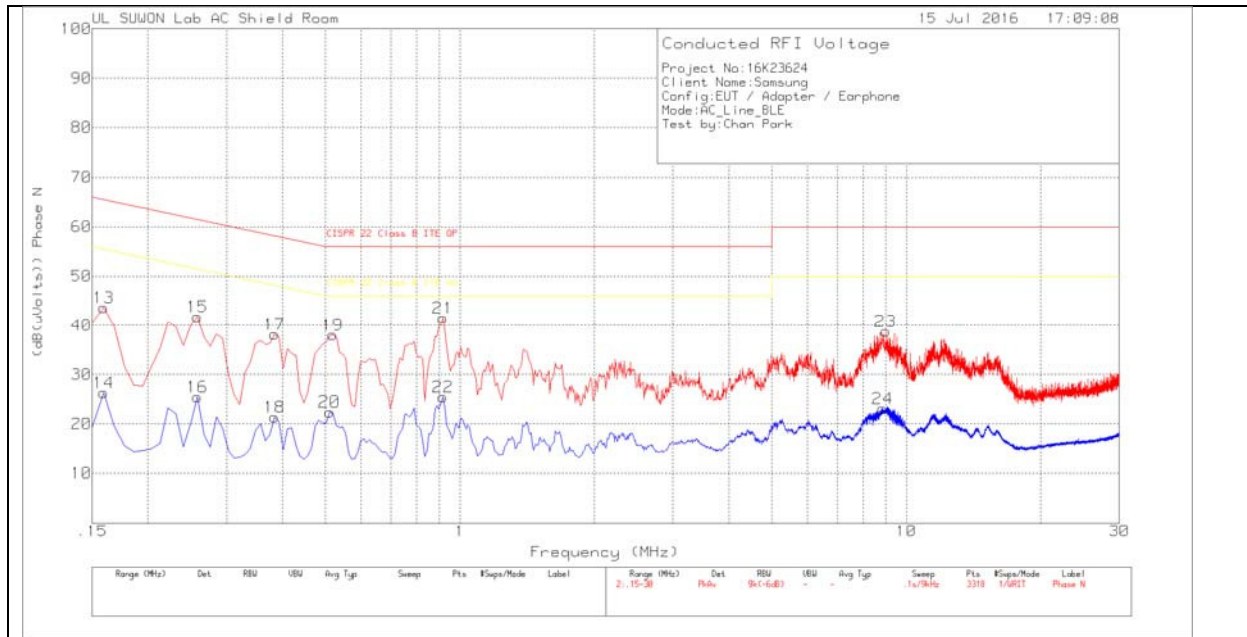
Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith 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	.159	33.61	Pk	10	0	43.61	65.52	-21.91	-	-
2	.159	16.79	Av	10	0	26.79	-	-	55.52	-28.73
3	.258	32.93	Pk	9.8	0	42.73	61.5	-18.77	-	-
4	.258	16.54	Av	9.8	0	26.34	-	-	51.5	-25.16
5	.384	29.81	Pk	10.1	0	39.91	58.19	-18.28	-	-
6	.384	12.88	Av	10.1	0	22.98	-	-	48.19	-25.21
7	.5145	30.36	Pk	10.2	0	40.56	56	-15.44	-	-
8	.51	14.7	Av	10.2	0	24.9	-	-	46	-21.1
9	.915	32.62	Pk	9.9	0	42.52	56	-13.48	-	-
10	.915	18.92	Av	9.9	0	28.82	-	-	46	-17.18
11	8.907	29.56	Pk	10	.1	39.66	60	-20.34	-	-
12	8.862	14.27	Av	10	.1	24.37	-	-	50	-25.63

Pk - Peak detector

Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith 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	.159	33.6	Pk	10	0	43.6	65.52	-21.92	-	-
14	.159	16.37	Av	10	0	26.37	-	-	55.52	-29.15
15	.258	32.07	Pk	9.7	0	41.77	61.5	-19.73	-	-
16	.258	15.77	Av	9.7	0	25.47	-	-	51.5	-26.03
17	.384	28.1	Pk	10.1	0	38.2	58.19	-19.99	-	-
18	.384	11.32	Av	10.1	0	21.42	-	-	48.19	-26.77
19	.519	27.93	Pk	10.1	0	38.03	56	-17.97	-	-
20	.51	12.32	Av	10.1	0	22.42	-	-	46	-23.58
21	.915	31.67	Pk	9.9	0	41.57	56	-14.43	-	-
22	.915	15.54	Av	9.9	0	25.44	-	-	46	-20.56
23	8.979	28.66	Pk	10	.1	38.76	60	-21.24	-	-
24	8.862	13.03	Av	10	.1	23.13	-	-	50	-26.87

Pk - Peak detector

Av - Average detection