



**FCC CFR47 PART 15 SUBPART C**

**Bluetooth Low Energy**

**CERTIFICATION TEST REPORT**

**FOR**

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

**MODEL NUMBER : SM-T819Y**

**FCC ID: A3LSMT819Y**

**REPORT NUMBER: 16K23303-E2V1**

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	05/10/16	Initial issue	SungGil Park

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** GSM/WCDMA/LTE Tablet + BT/BLE and DTS/UNII a/b/g/n/ac and ANT+  
**MODEL NUMBER:** SM-T819Y  
**SERIAL NUMBER:** R32H3009MNP (RADIATED);  
R32H20027PL (CONDUCTED)  
**DATE TESTED:** APR 15, 2016 - MAY 05, 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.

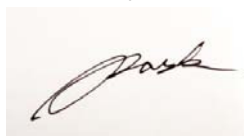
**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration 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.

## 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
<input checked="" type="checkbox"/> Chamber 1
<input checked="" type="checkbox"/> 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 GSM/WCDMA/LTE Tablet + BT/BLE and 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	4.18	2.62
		Average	3.93	2.47

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -3.35dBi.

### 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-TA20EWE	R37GBTP1HN3DK3	N/A
Data Cable	SAMSUNG	EP-DG925UWE	N/A	N/A
Earphone	SAMSUNG	E0-EG900BW	N/A	N/A

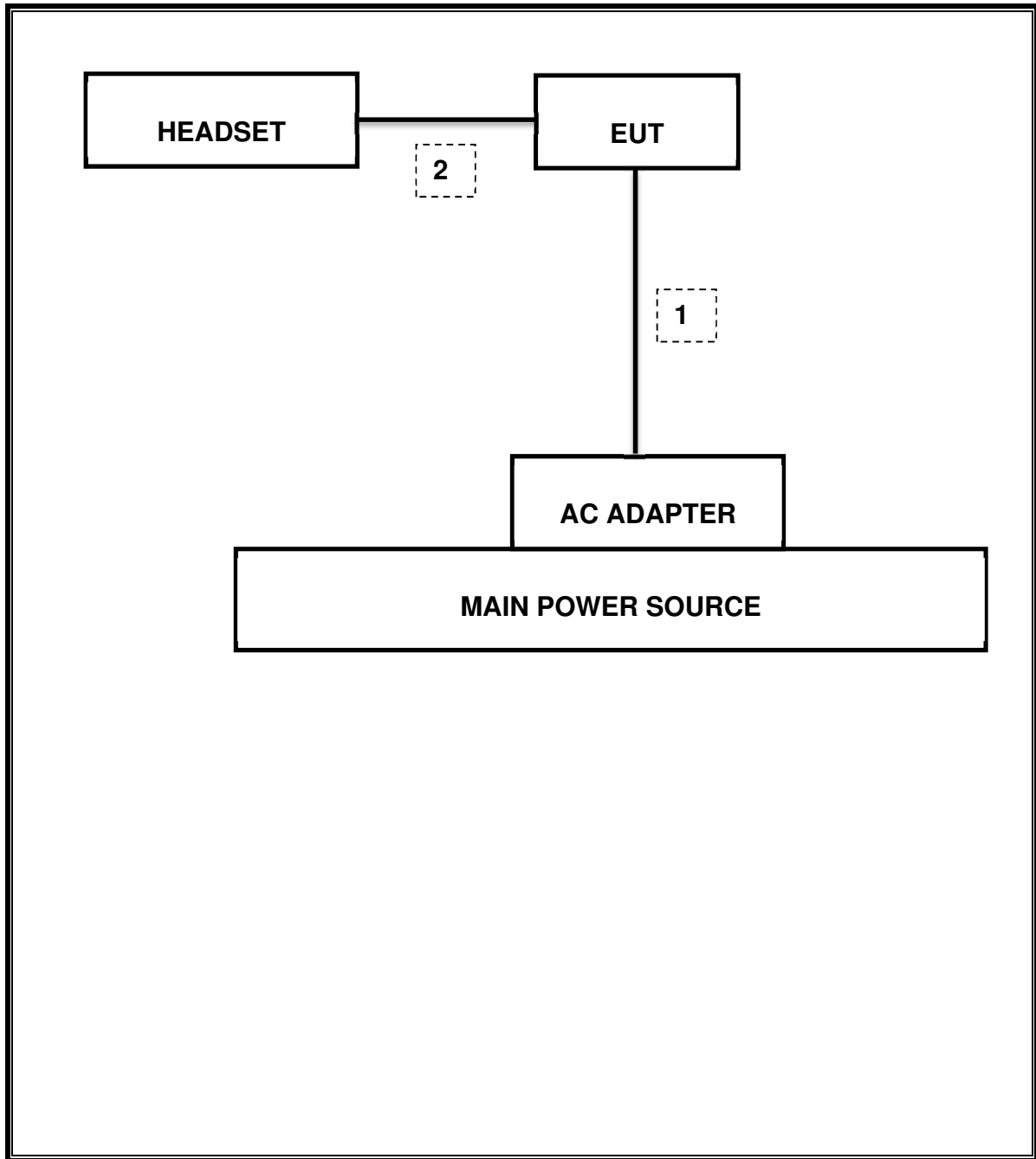
### I/O CABLES

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 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	09-26-16
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	09-23-16
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-24-17
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 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 v03r04: 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]
<b>2400MHz Bands</b>						
BLE	0.4058	0.6253	0.649	64.9%	1.88	2.464



## 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	660.6 kHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-55.310 dBm
15.247	TX conducted output power	<30dBm		Pass	4.176 dBm (Peak)
15.247	PSD	<8dBm		Pass	-11.13 dBm (Peak)
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	42.13 dBuV (QP)
15.205, 15.209	Radiated Spurious Emission	< 40dBuV/m	Radiated	Pass	35.11 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	663.5	500.0
Mid	2440	665.8	500.0
High	2480	660.6	500.0
Worst		660.6	500.0

**6 dB BANDWIDTH PLOTS**

<p>Low CH</p>	
<p>Middle CH</p>	
<p>High CH</p>	

## 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	1.077
Mid	2440	1.068
High	2480	1.069

**99% BANDWIDTH PLOTS**

<p>Low CH</p>	<p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.40200000 GHz        Trig: Free Run        #Atten: 30 dB        Radio Std: None        Radio Device: BTS</p> <p>10 dB/div Ref 20.00 dBm</p> <p>Center 2.402 GHz Span 3 MHz        #Res BW 30 kHz VBW 300 kHz #Sweep 100 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>0.15 dBm</td> </tr> <tr> <td><b>1.0765 MHz</b></td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>25.503 kHz</td> <td>OBW Power</td> </tr> <tr> <td>x dB Bandwidth</td> <td>1.080 MHz</td> <td>x dB</td> </tr> <tr> <td></td> <td></td> <td>99.00 %</td> </tr> <tr> <td></td> <td></td> <td>-20.00 dB</td> </tr> </table>	Occupied Bandwidth	Total Power	0.15 dBm	<b>1.0765 MHz</b>			Transmit Freq Error	25.503 kHz	OBW Power	x dB Bandwidth	1.080 MHz	x dB			99.00 %			-20.00 dB
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<b>1.0765 MHz</b>																			
Transmit Freq Error	25.503 kHz	OBW Power																	
x dB Bandwidth	1.080 MHz	x dB																	
		99.00 %																	
		-20.00 dB																	
<p>Middle CH</p>	<p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.44000000 GHz        Trig: Free Run        #Atten: 30 dB        Radio Std: None        Radio Device: BTS</p> <p>10 dB/div Ref 20.00 dBm</p> <p>Center 2.44 GHz Span 3 MHz        #Res BW 30 kHz VBW 300 kHz #Sweep 100 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>1.67 dBm</td> </tr> <tr> <td><b>1.0683 MHz</b></td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>26.889 kHz</td> <td>OBW Power</td> </tr> <tr> <td>x dB Bandwidth</td> <td>1.080 MHz</td> <td>x dB</td> </tr> <tr> <td></td> <td></td> <td>99.00 %</td> </tr> <tr> <td></td> <td></td> <td>-20.00 dB</td> </tr> </table>	Occupied Bandwidth	Total Power	1.67 dBm	<b>1.0683 MHz</b>			Transmit Freq Error	26.889 kHz	OBW Power	x dB Bandwidth	1.080 MHz	x dB			99.00 %			-20.00 dB
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Transmit Freq Error	26.889 kHz	OBW Power																	
x dB Bandwidth	1.080 MHz	x dB																	
		99.00 %																	
		-20.00 dB																	
<p>High CH</p>	<p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.48000000 GHz        Trig: Free Run        #Atten: 30 dB        Radio Std: None        Radio Device: BTS</p> <p>10 dB/div Ref 20.00 dBm</p> <p>Center 2.48 GHz Span 3 MHz        #Res BW 30 kHz VBW 300 kHz #Sweep 100 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>0.94 dBm</td> </tr> <tr> <td><b>1.0691 MHz</b></td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>27.328 kHz</td> <td>OBW Power</td> </tr> <tr> <td>x dB Bandwidth</td> <td>1.080 MHz</td> <td>x dB</td> </tr> <tr> <td></td> <td></td> <td>99.00 %</td> </tr> <tr> <td></td> <td></td> <td>-20.00 dB</td> </tr> </table>	Occupied Bandwidth	Total Power	0.94 dBm	<b>1.0691 MHz</b>			Transmit Freq Error	27.328 kHz	OBW Power	x dB Bandwidth	1.080 MHz	x dB			99.00 %			-20.00 dB
Occupied Bandwidth	Total Power	0.94 dBm																	
<b>1.0691 MHz</b>																			
Transmit Freq Error	27.328 kHz	OBW Power																	
x dB Bandwidth	1.080 MHz	x dB																	
		99.00 %																	
		-20.00 dB																	

### 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 v03r04 under section 9.1.1 utilizing spectrum analyzer.

#### RESULTS

Channel	Frequency [MHz]	Peak Power Reading [dBm]	Limit [dBm]	Margin [dB]
Low	2402	2.763	30.000	-27.237
Mid	2440	4.176	30.000	-25.824
High	2480	3.389	30.000	-26.611
Worst		4.176		-25.824

**OUTPUT POWER PLOTS**

<p>Low CH</p>	<p>KeySight Spectrum Analyzer - Swept SA      03:15:57 PM Apr 21, 2016      #Avg Type: RMS      Avg/Hold: 100/100      Mkr1 2.402 310 00 GHz      2.763 dBm      Ref Offset 0.26 dB      Ref 20.00 dBm      Center 2.402000 GHz      #Res BW 3.0 MHz #VBW 50 MHz Span 5.000 MHz      Sweep 1.333 ms (20001 pts)</p>
<p>Middle CH</p>	<p>KeySight Spectrum Analyzer - Swept SA      03:15:41 PM Apr 21, 2016      #Avg Type: RMS      Avg/Hold: 100/100      Mkr1 2.439 903 25 GHz      4.176 dBm      Ref Offset 0.26 dB      Ref 20.00 dBm      Center 2.440000 GHz      #Res BW 3.0 MHz #VBW 50 MHz Span 5.000 MHz      Sweep 1.333 ms (20001 pts)</p>
<p>High CH</p>	<p>KeySight Spectrum Analyzer - Swept SA      03:15:27 PM Apr 21, 2016      #Avg Type: RMS      Avg/Hold: 100/100      Mkr1 2.479 983 50 GHz      3.389 dBm      Ref Offset 0.26 dB      Ref 20.00 dBm      Center 2.480000 GHz      #Res BW 3.0 MHz #VBW 50 MHz Span 5.000 MHz      Sweep 1.333 ms (20001 pts)</p>

## 10.4. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

### RESULTS

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	2.48	1.77
Middle	2440	3.93	2.47
High	2480	3.14	2.06

## 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.

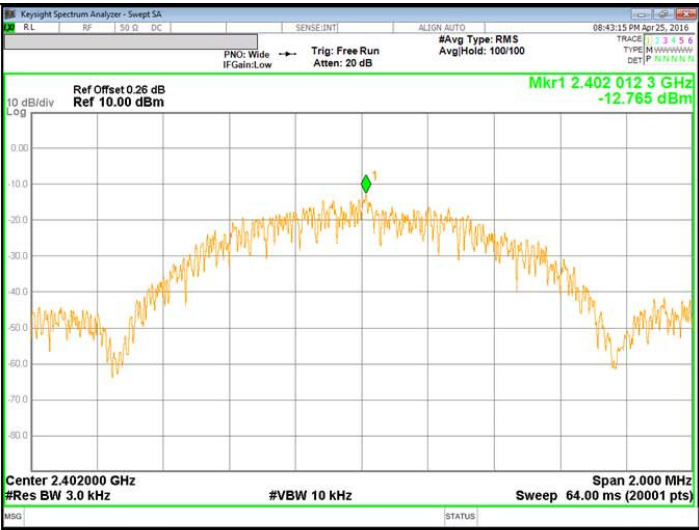
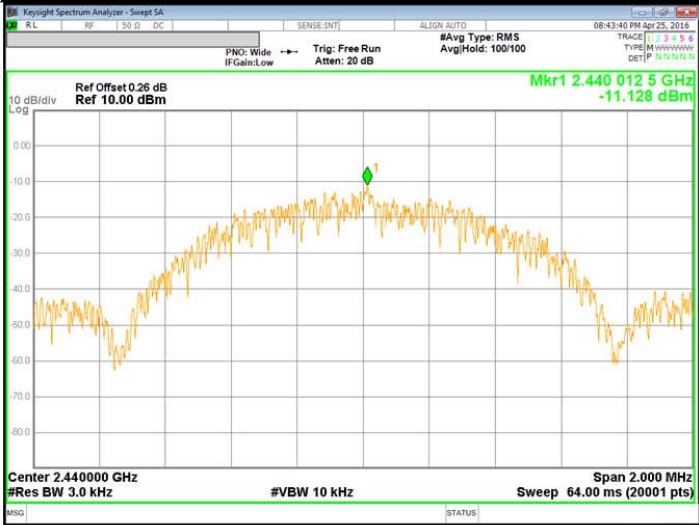
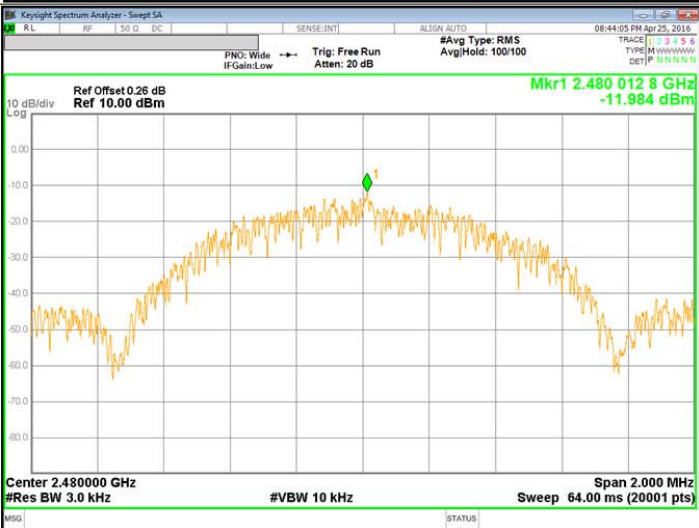
### TEST PROCEDURE

Power Spectral Density was performed utilizing the "Method PKPSD (Peak PSD)" under KDB558074 D01 DTS Meas Guidance v03r04

### RESULTS

Channel	Frequency [MHz]	PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2402	-12.77	8.00	-20.77
Mid	2440	-11.13	8.00	-19.13
High	2480	-11.98	8.00	-19.98

**POWER SPECTRAL DENSITY PLOTS**

<p>Low CH</p>	 <p>KeySight Spectrum Analyzer - Swept SA        R.L. RF 50 Ω DC SENSE:INTI ALIGN: AUTO 08:43:15 PM Apr 25, 2016        PNO: Wide IF Gain: Low Trig: Free Run #Avg Type: RMS Avg/Hold: 100/100        Ref Offset 0.26 dB Ref 10.00 dBm Mkr1 2.402 012 3 GHz -12.765 dBm        10 dB/div Log        Center 2.402000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 2.000 MHz Sweep 64.00 ms (20001 pts)</p>
<p>Middle CH</p>	 <p>KeySight Spectrum Analyzer - Swept SA        R.L. RF 50 Ω DC SENSE:INTI ALIGN: AUTO 08:43:40 PM Apr 25, 2016        PNO: Wide IF Gain: Low Trig: Free Run #Avg Type: RMS Avg/Hold: 100/100        Ref Offset 0.26 dB Ref 10.00 dBm Mkr1 2.440 012 5 GHz -11.128 dBm        10 dB/div Log        Center 2.440000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 2.000 MHz Sweep 64.00 ms (20001 pts)</p>
<p>High CH</p>	 <p>KeySight Spectrum Analyzer - Swept SA        R.L. RF 50 Ω DC SENSE:INTI ALIGN: AUTO 08:44:05 PM Apr 25, 2016        PNO: Wide IF Gain: Low Trig: Free Run #Avg Type: RMS Avg/Hold: 100/100        Ref Offset 0.26 dB Ref 10.00 dBm Mkr1 2.480 012 8 GHz -11.984 dBm        10 dB/div Log        Center 2.480000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 2.000 MHz Sweep 64.00 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.

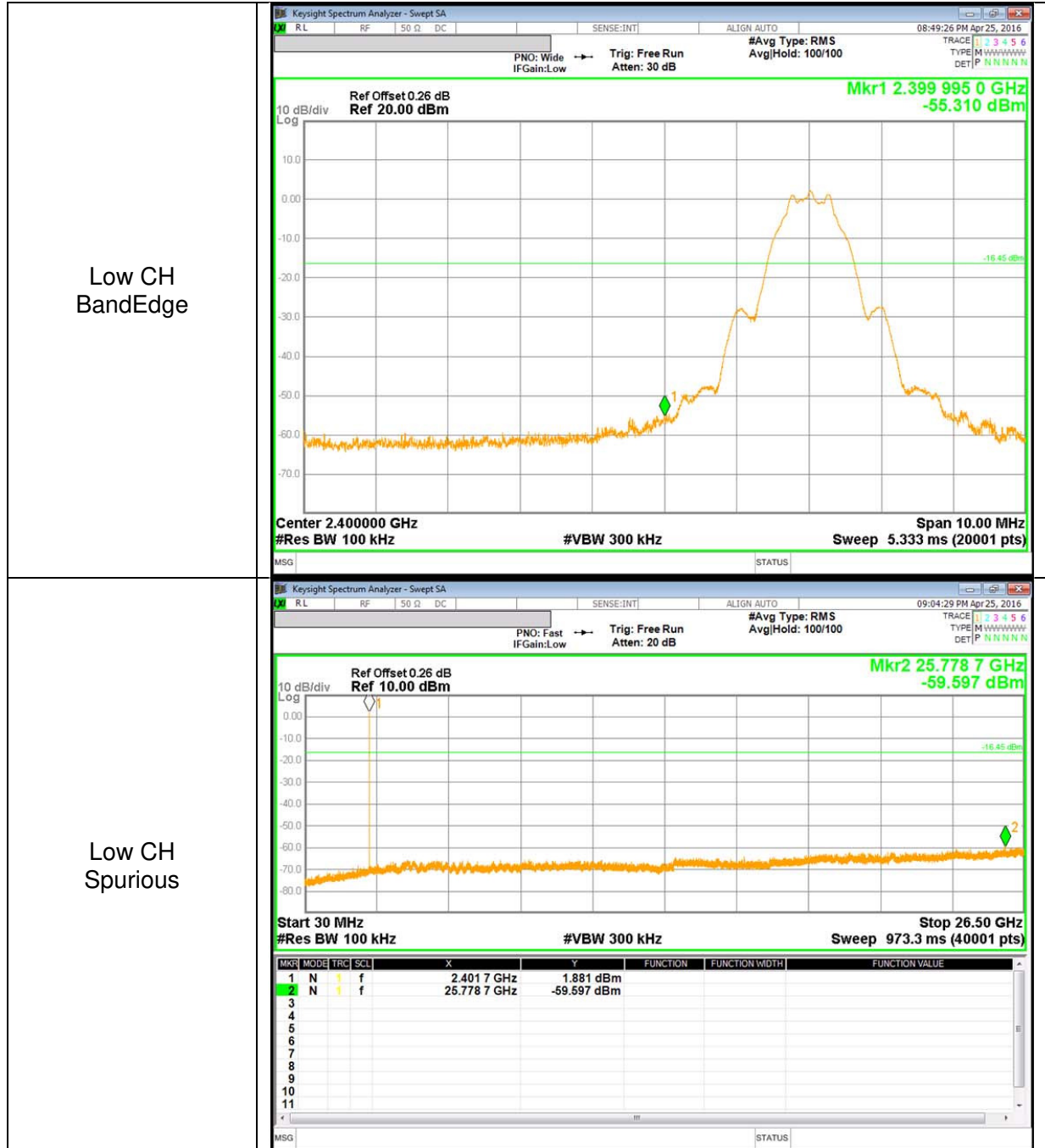
### **TEST PROCEDURE**

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.

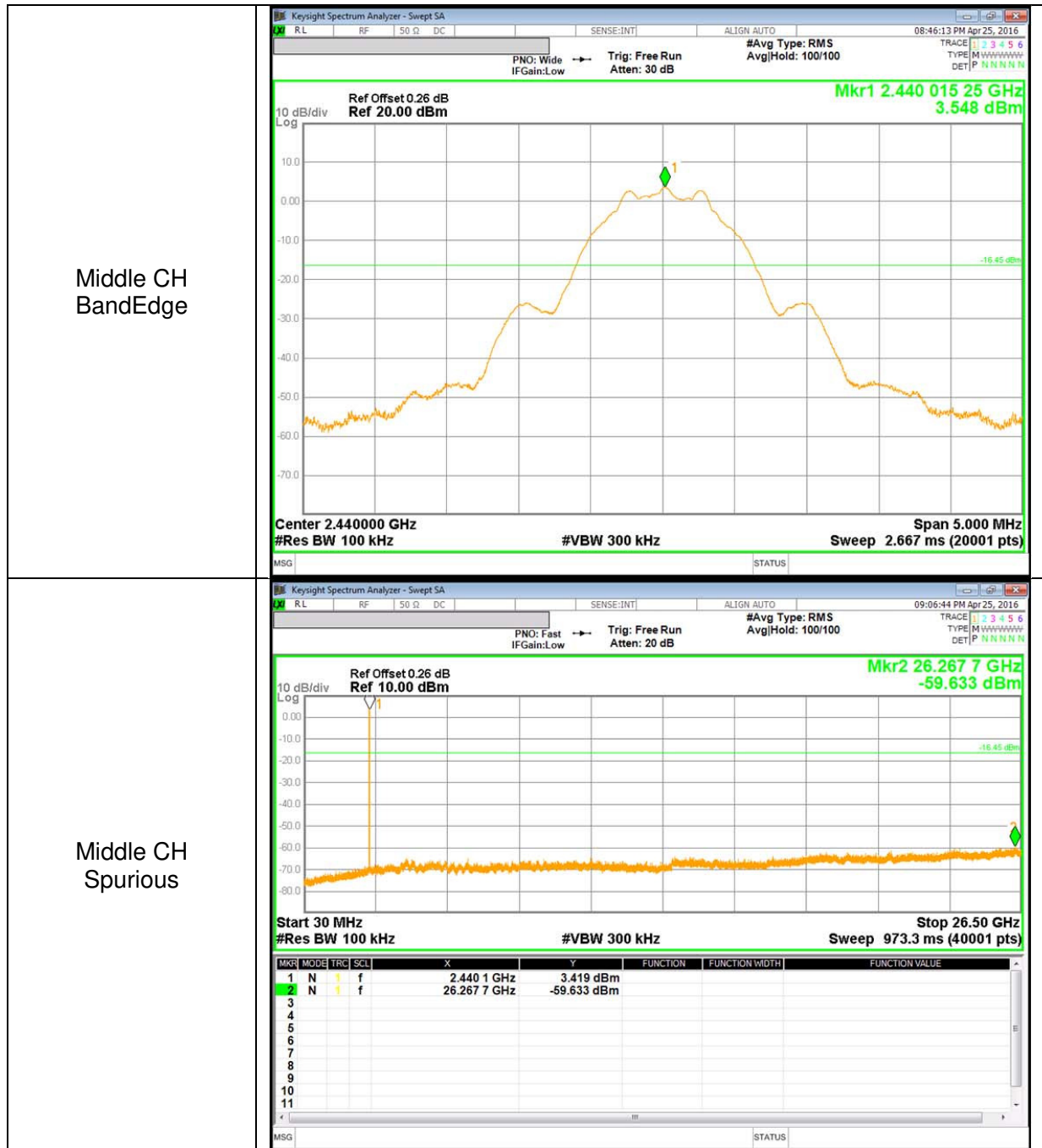
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

**RESULTS**

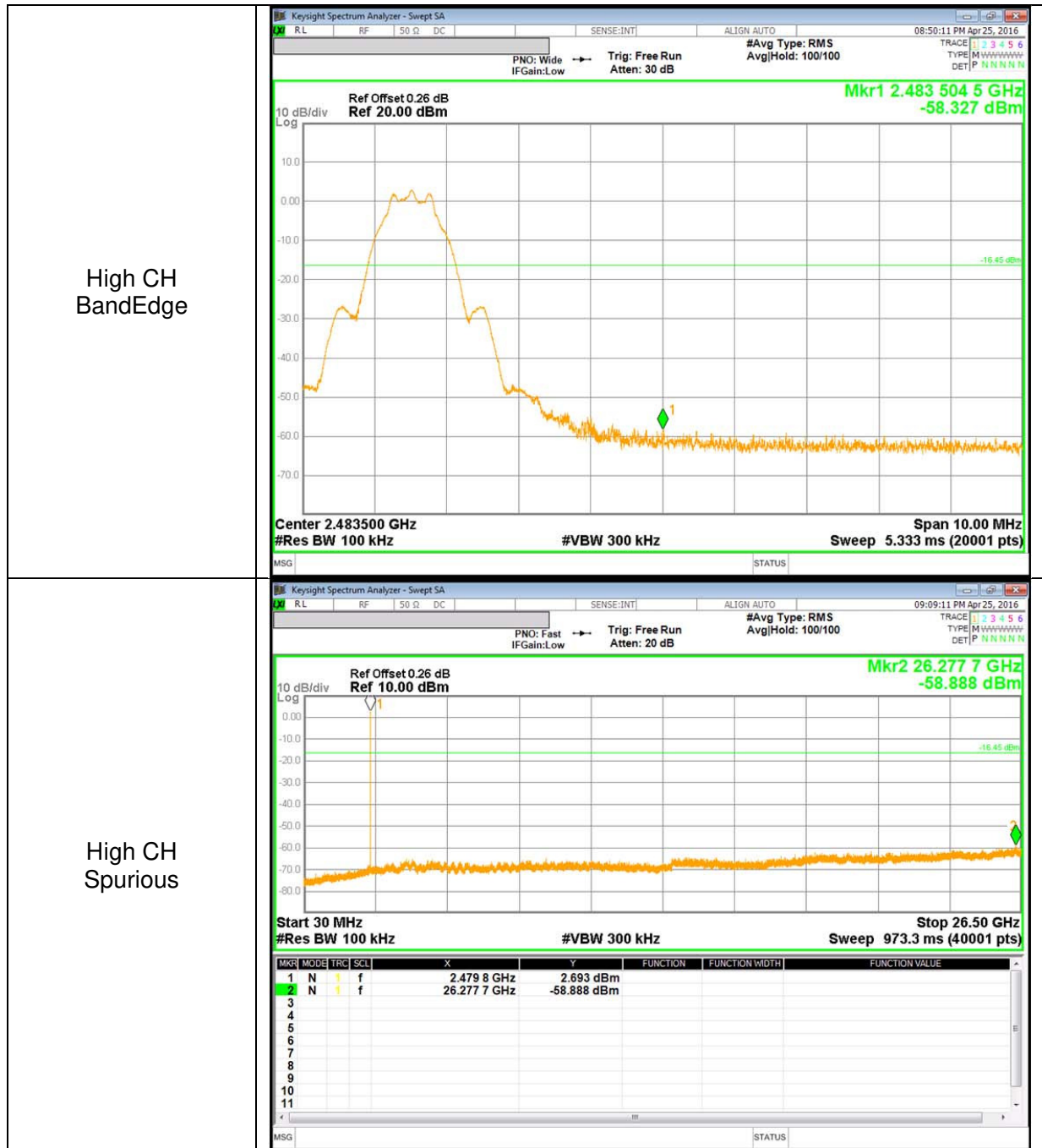
**BANDEDGE & SPURIOUS EMISSIONS, LOW CHANNEL**



**SPURIOUS EMISSIONS, MID CHANNEL**



**SPURIOUS EMISSIONS, HIGH CHANNEL**



## 11. RADIATED TEST RESULTS

### 11.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

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.

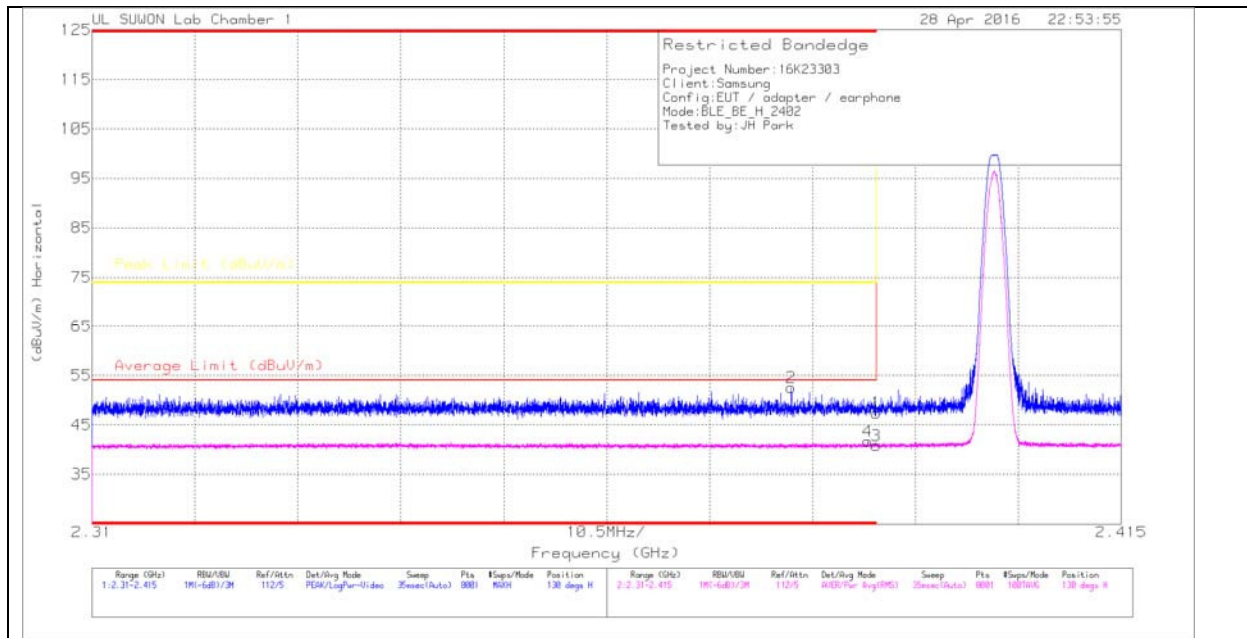
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor =  $10 \log(1/x)$ . For this sample: DCF =  $10 \log(1/0.648) = 1.88 \text{ dB}$  (Spectrum Analyzer round it up to 1.88dB)

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.

### 11.1. TRANSMITTER ABOVE 1 GHz RESTRICTED BANDEDGE (LOW CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### Trace Markers

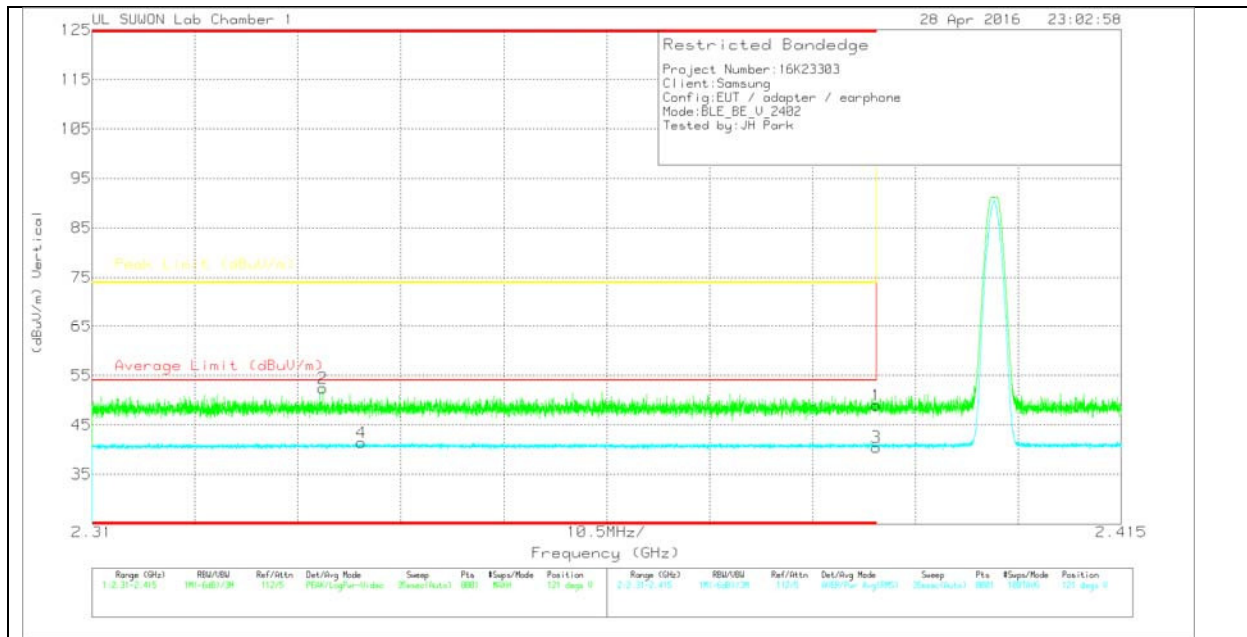
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	44.62	Pk	31.8	-29	0	47.42	-	-	74	-26.58	130	144	H
2	* 2.381	49.75	Pk	31.8	-29	0	52.55	-	-	74	-21.45	130	144	H
3	* 2.39	36.15	RMS	31.8	-29	1.88	40.83	54	-13.17	-	-	130	144	H
4	* 2.389	36.94	RMS	31.8	-29	1.88	41.62	54	-12.38	-	-	130	144	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 17)_150619	Path_2	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	46.12	Pk			0	48.92	-	-	74	-25.08	121	311	V
2	* 2.334	49.69	Pk			0	52.39	-	-	74	-21.61	121	311	V
3	* 2.39	35.81	RMS			1.88	40.49	54	-13.51	-	-	121	311	V
4	* 2.337	36.89	RMS			1.88	41.47	54	-12.53	-	-	121	311	V

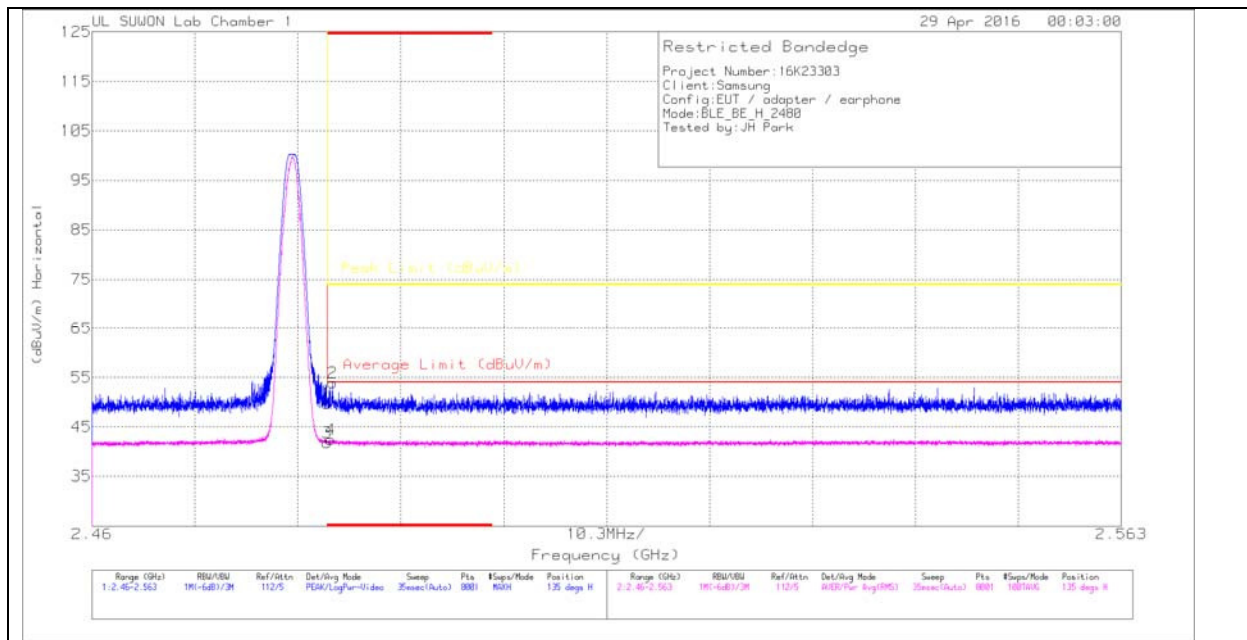
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

Trace Markers

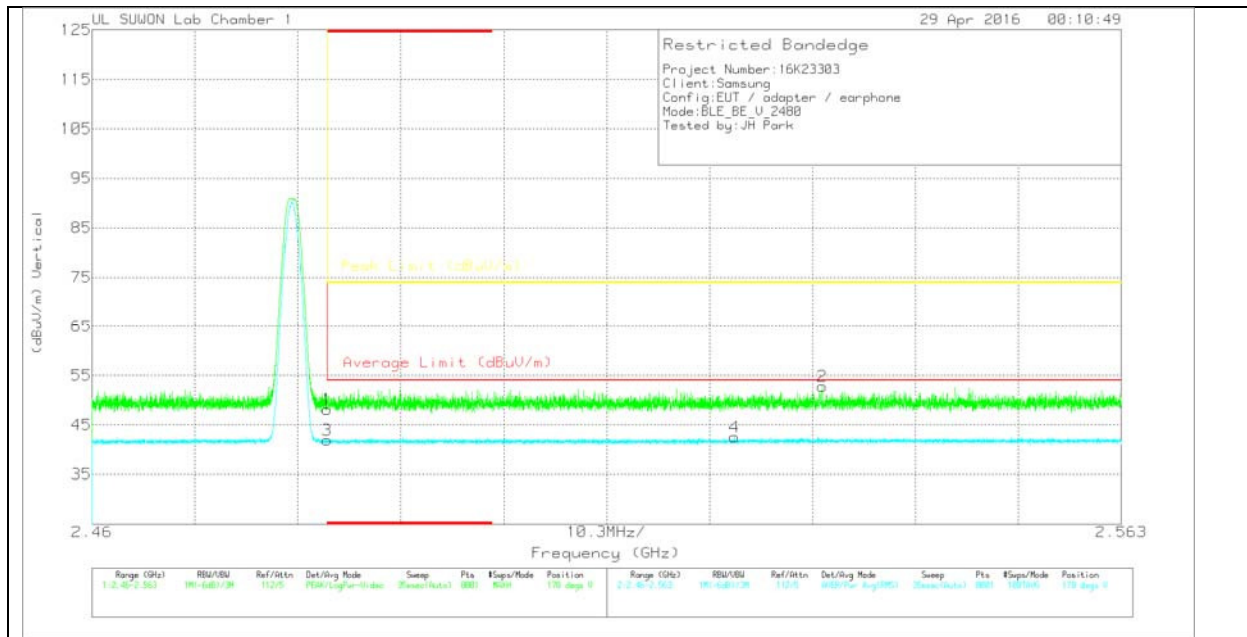
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.97	Pk	32	-28.3	0	49.67	-	-	74	-24.33	135	134	H
2	* 2.484	50.19	Pk	32	-28.3	0	53.89	-	-	74	-20.11	135	134	H
3	* 2.484	36.23	RMS	32	-28.3	1.88	41.81	54	-12.19	-	-	135	134	H
4	* 2.484	36.87	RMS	32	-28.3	1.88	42.45	54	-11.55	-	-	135	134	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 17)_150619	Path_2	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	44.46	Pk	32	-28.3	0	48.16	-	-	74	-25.84	178	131	V
2	2.533	49.09	Pk	32	-28.3	0	52.79	-	-	74	-21.21	178	131	V
3	* 2.484	36.34	RMS	32	-28.3	1.88	41.92	54	-12.08	-	-	178	131	V
4	2.524	36.94	RMS	32	-28.3	1.88	42.52	54	-11.48	-	-	178	131	V

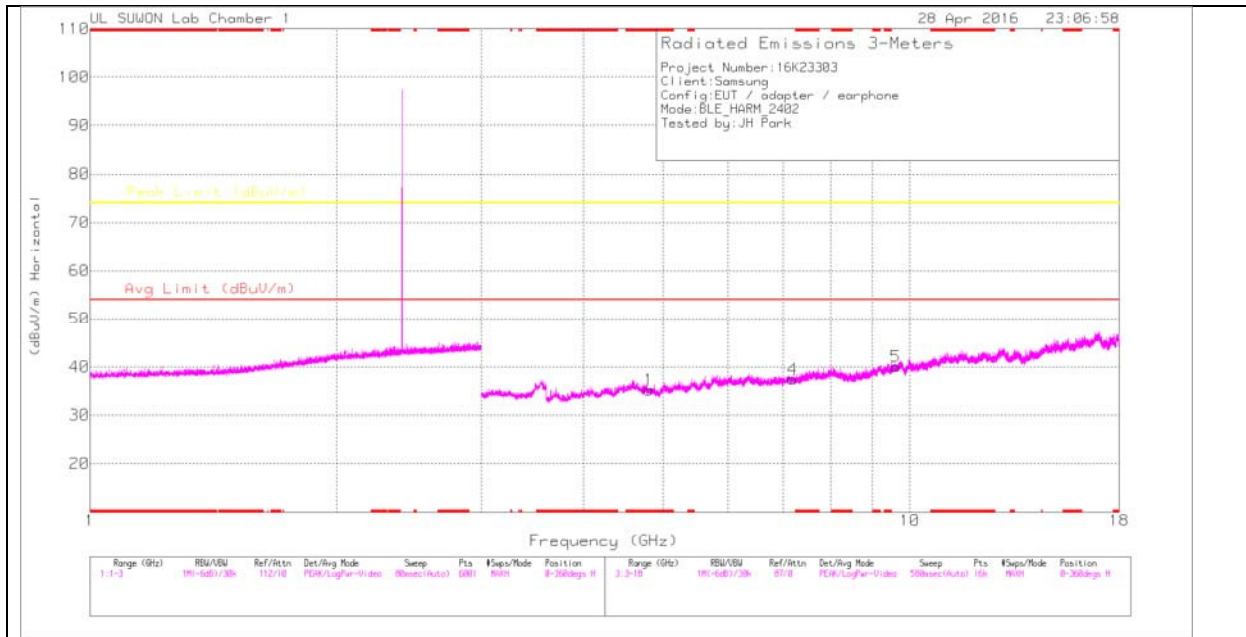
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

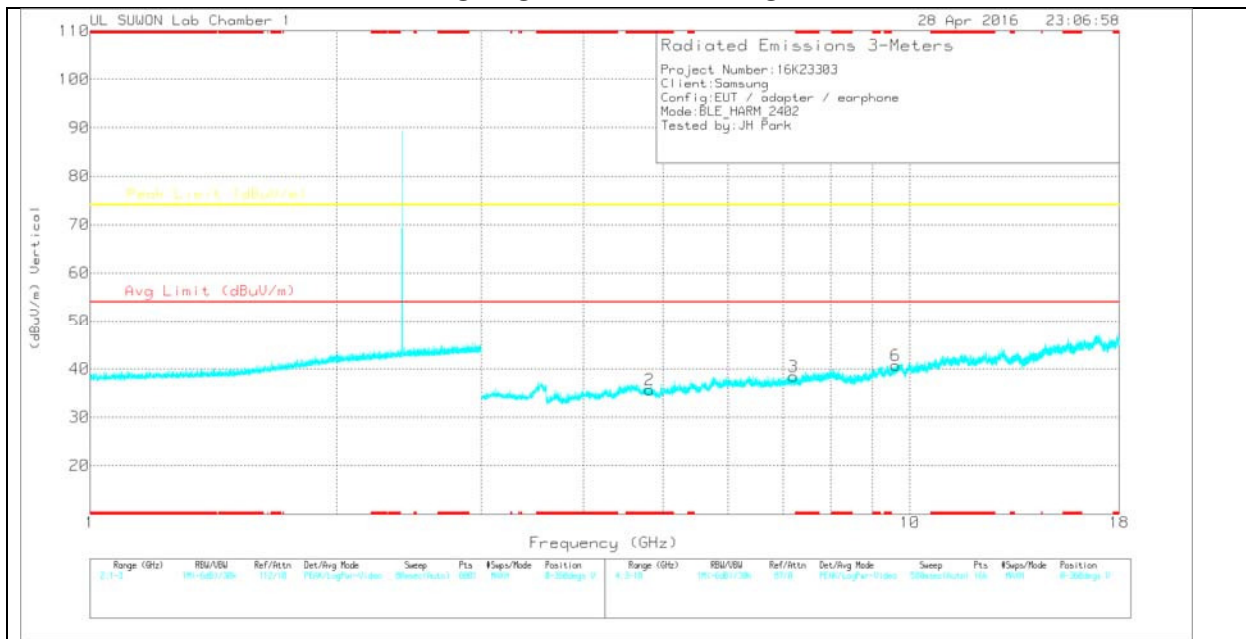
RMS - RMS detection

**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

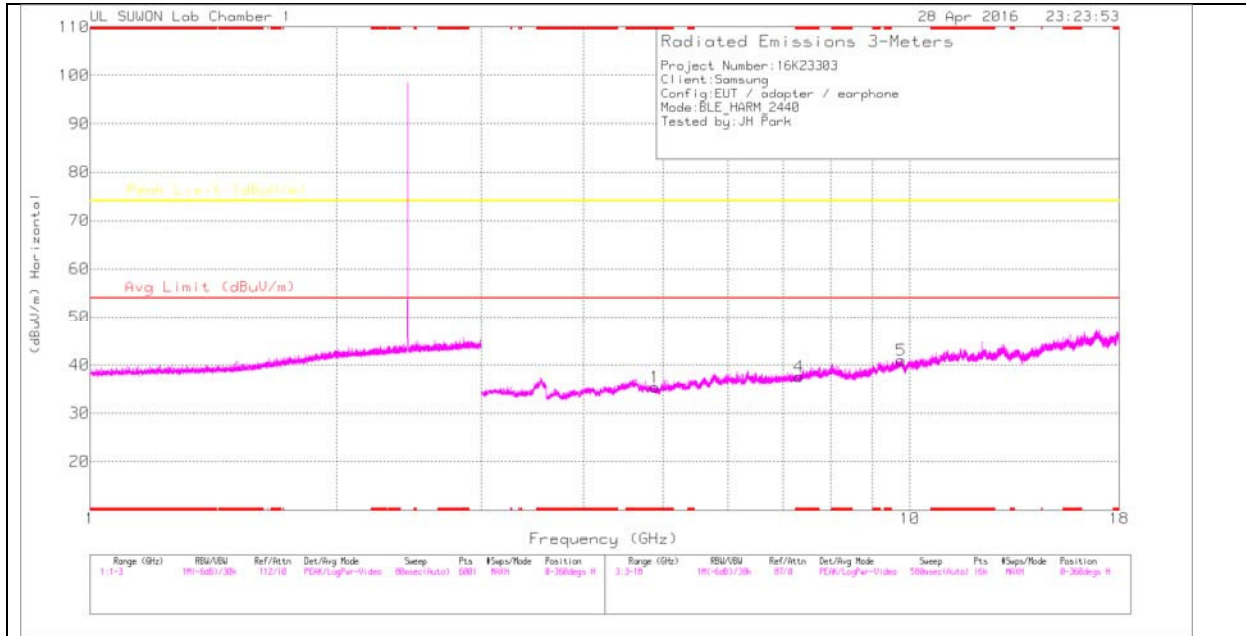
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.806	35.04	PK	34	-33.8	0	35.24	-	-	74	-38.76	0-360	200	H
4	7.201	32.51	PK	35.7	-30.7	0	37.51	-	-	74	-36.49	0-360	200	H
5	9.607	30.45	PK	37	-27.3	0	40.15	-	-	74	-33.85	0-360	100	H
2	* 4.81	35.46	PK	34	-33.8	0	35.66	-	-	74	-38.34	0-360	200	V
3	7.207	33.54	PK	35.7	-30.8	0	38.44	-	-	74	-35.56	0-360	100	V
6	9.602	31.09	PK	37	-27.3	0	40.79	-	-	74	-33.21	0-360	100	V

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

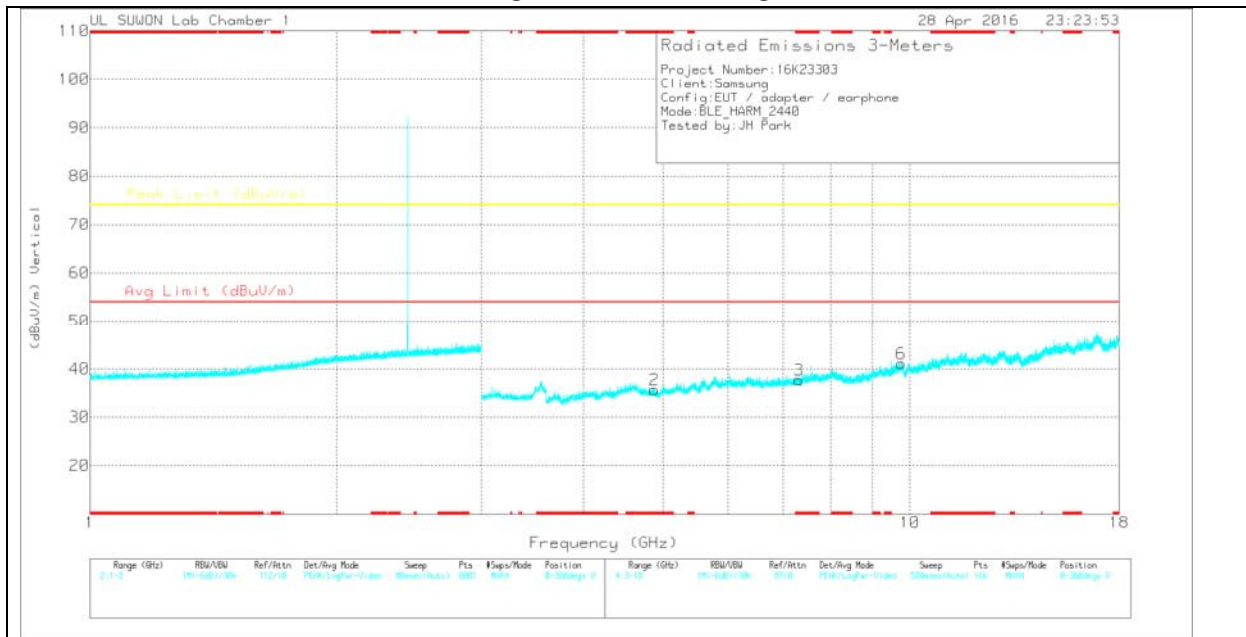
PK – Peak Detector

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

### 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

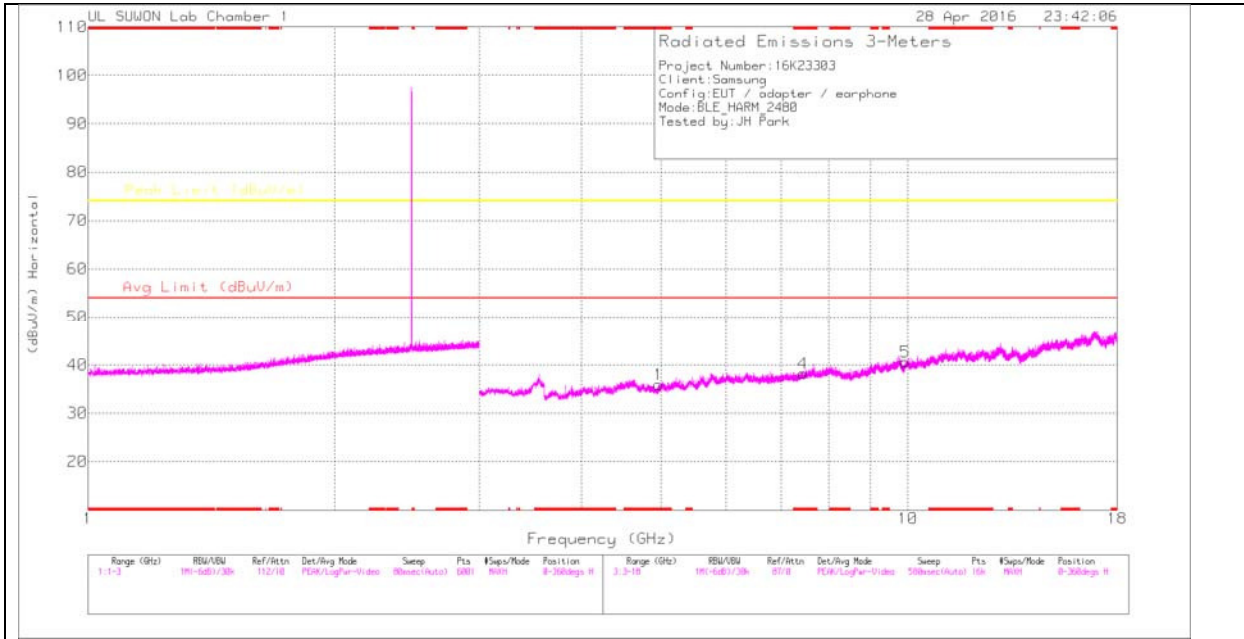
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.884	35.41	PK	34	-34	0	35.41	-	-	74	-38.59	0-360	200	H
4	* 7.322	32.68	PK	35.8	-30.9	0	37.58	-	-	74	-36.42	0-360	100	H
5	9.758	30.46	PK	37.2	-26.7	0	40.96	-	-	74	-33.04	0-360	100	H
2	* 4.883	35.73	PK	34	-34	0	35.73	-	-	74	-38.27	0-360	100	V
3	* 7.32	32.83	PK	35.8	-30.9	0	37.73	-	-	74	-36.27	0-360	200	V
6	9.763	30.52	PK	37.2	-26.6	0	41.12	-	-	74	-32.88	0-360	200	V

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

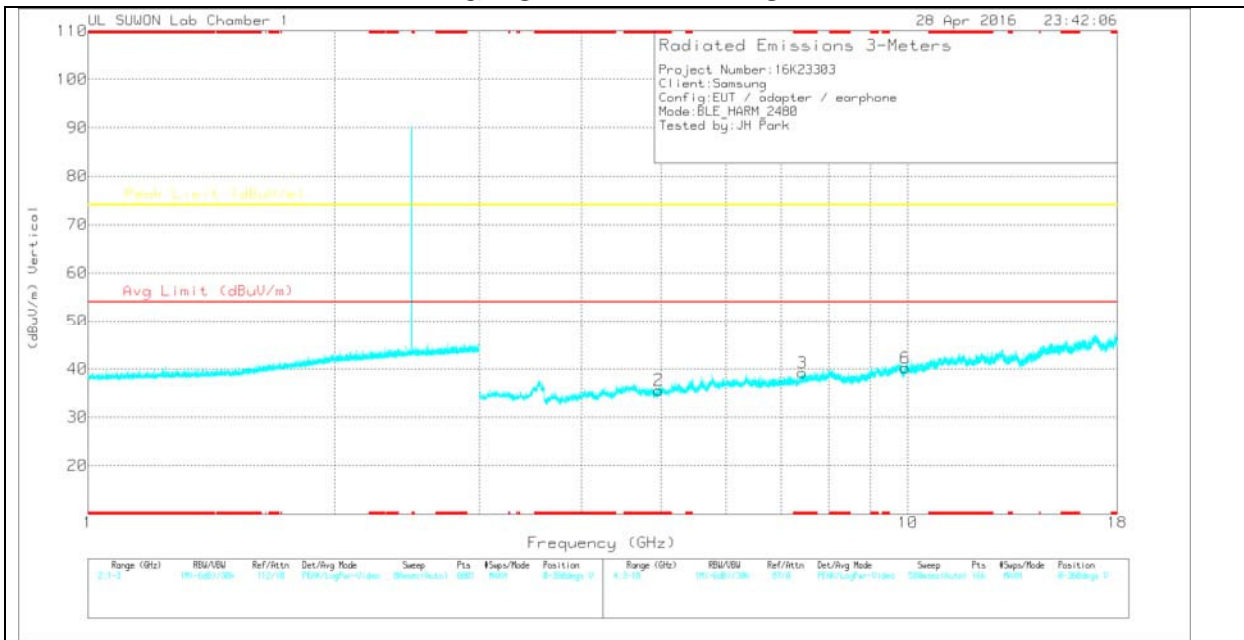
PK – Peak Detector

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

### 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(001687 17)_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	* 4.963	35.98	PK	34	-34	0	35.98	-	-	74	-38.02	0-360	200	H
4	* 7.448	33.07	PK	35.8	-30.6	0	38.27	-	-	74	-35.73	0-360	100	H
5	9.923	30.28	PK	37.4	-27.1	0	40.58	-	-	74	-33.42	0-360	200	H
2	* 4.967	35.52	PK	34.1	-34	0	35.62	-	-	74	-38.38	0-360	100	V
3	* 7.442	34.11	PK	35.8	-30.7	0	39.21	-	-	74	-34.79	0-360	200	V
6	9.92	30.04	PK	37.4	-27.2	0	40.24	-	-	74	-33.76	0-360	200	V

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

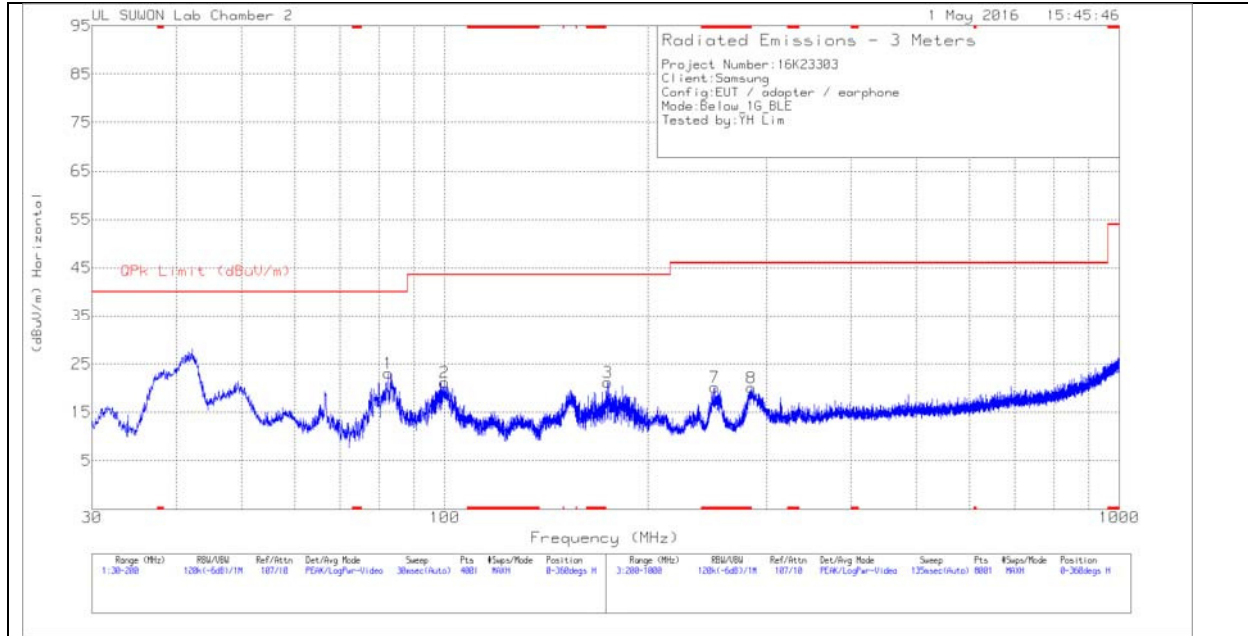
PK – Peak Detector

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

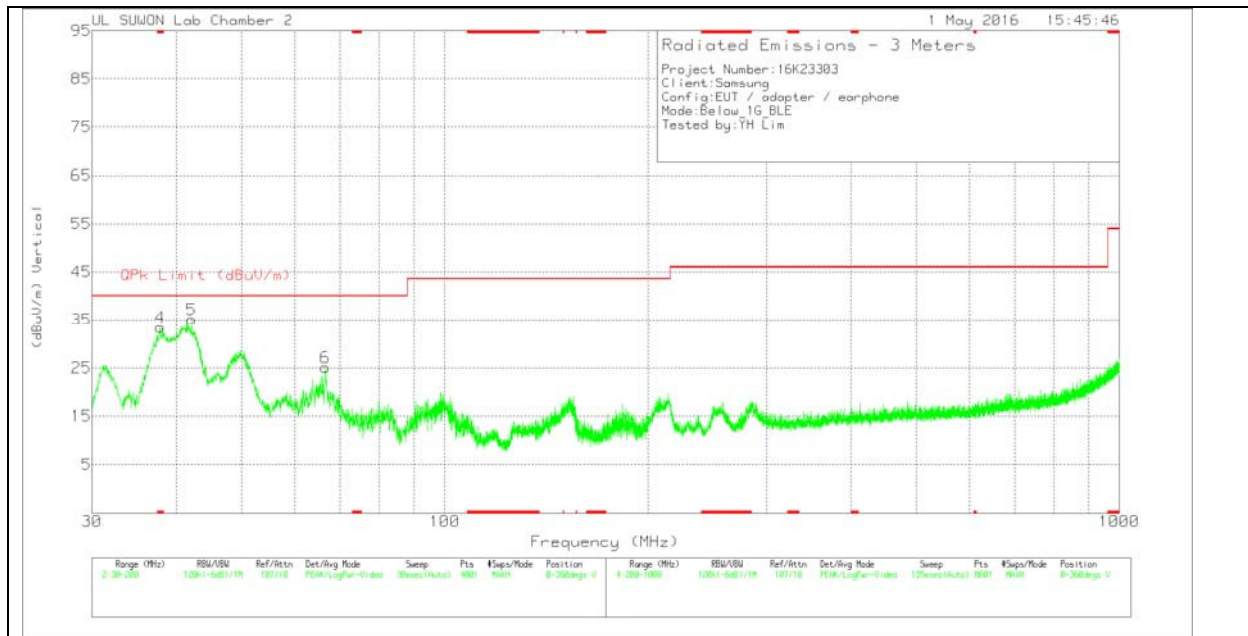
## 11.2. WORST-CASE BELOW 1 GHz

### 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	82.445	45.94	Pk	7.7	-30.6	23.04	40	-16.96	0-360	200	H
2	99.9975	40.14	Pk	11.6	-30.5	21.24	43.52	-22.28	0-360	300	H
3	174.4575	42.39	Pk	9.2	-30.4	21.19	43.52	-22.33	0-360	100	H
4	* 37.8625	52.35	Pk	11.9	-30.8	33.45	40	-6.55	0-360	100	V
5	42.1125	52.61	Pk	13.2	-30.7	35.11	40	-4.89	0-360	100	V
6	66.55	45.08	Pk	10.7	-30.7	25.08	40	-14.92	0-360	100	V
7	* 251.1	37.74	Pk	12.5	-30.1	20.14	46.02	-25.88	0-360	100	H
8	* 284.8	36.99	Pk	13.1	-30	20.09	46.02	-25.93	0-360	100	H

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 2009.

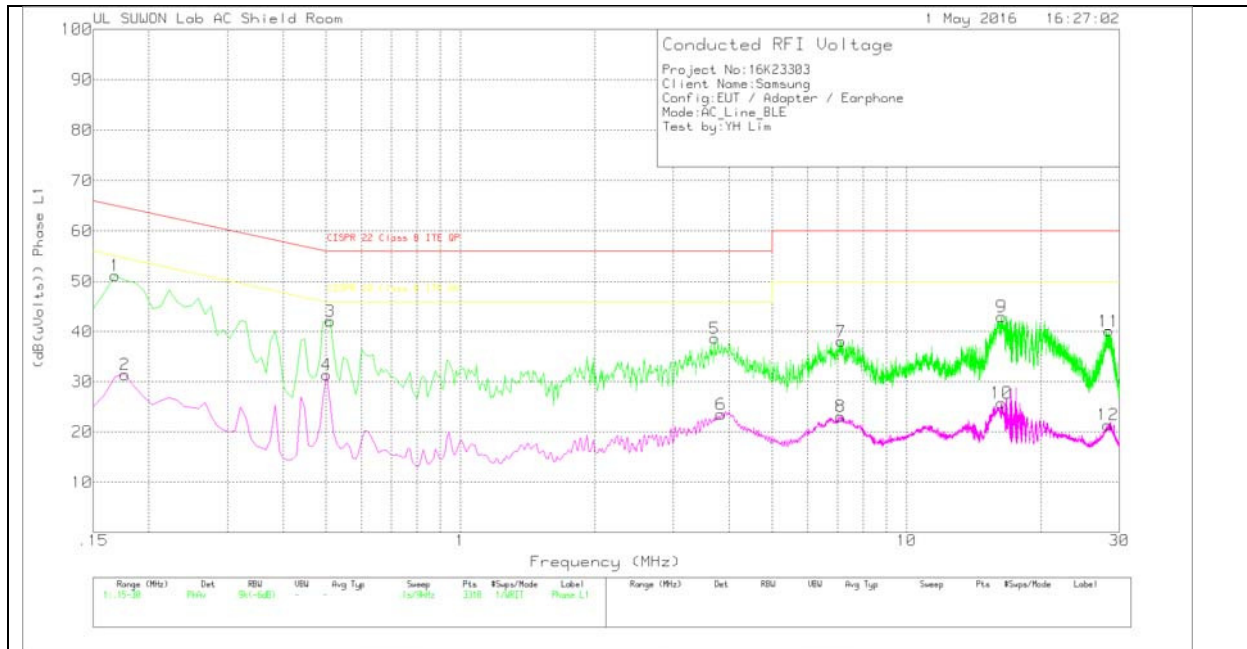
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

**RESULTS**

**6 WORST EMISSIONS**

**LINE 1 PLOT**



**LINE 1 RESULTS**

Trace Markers

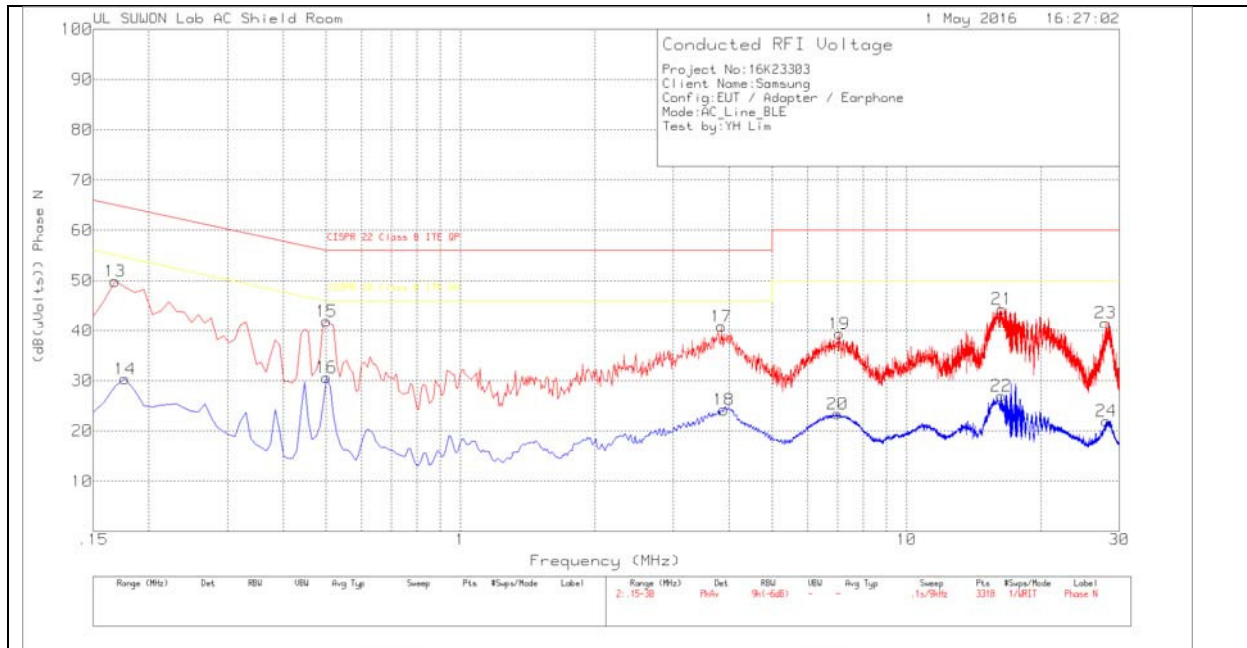
Phase L1 .15 - 30MHz

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	.168	40.98	Pk	10.2	0	51.18	65.06	-13.88	-	-
2	.177	21.2	Av	10.2	0	31.4	-	-	54.63	-23.23
3	.51	31.93	Pk	10.2	0	42.13	56	-13.87	-	-
4	.501	21.14	Av	10.2	0	31.34	-	-	46	-14.66
5	3.714	28.75	Pk	9.8	.1	38.65	56	-17.35	-	-
6	3.84	13.61	Av	9.8	.1	23.51	-	-	46	-22.49
7	7.134	28.06	Pk	9.9	.1	38.06	60	-21.94	-	-
8	7.107	13.09	Av	9.9	.1	23.09	-	-	50	-26.91
9	16.341	32.63	Pk	10.2	.2	43.03	60	-16.97	-	-
10	16.341	15.36	Av	10.2	.2	25.76	-	-	50	-24.24
11	28.41	29.12	Pk	10.7	.3	40.12	60	-19.88	-	-
12	28.293	10.4	Av	10.7	.3	21.4	-	-	50	-28.6

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	.168	39.7	Pk	10.2	0	49.9	65.06	-15.16	-	-
14	.177	20.23	Av	10.1	0	30.33	-	-	54.63	-24.3
15	.501	31.83	Pk	10.1	0	41.93	56	-14.07	-	-
16	.501	20.54	Av	10.1	0	30.64	-	-	46	-15.36
17	3.849	30.99	Pk	9.8	.1	40.89	56	-15.11	-	-
18	3.894	14.32	Av	9.8	.1	24.22	-	-	46	-21.78
19	7.071	29.41	Pk	9.9	.1	39.41	60	-20.59	-	-
20	7.008	13.4	Av	9.9	.1	23.4	-	-	50	-26.6
21	16.377	33.79	Pk	10.4	.2	44.39	60	-15.61	-	-
22	16.314	16.39	Av	10.4	.2	26.99	-	-	50	-23.01
23	27.942	30.41	Pk	10.9	.3	41.61	60	-18.39	-	-
24	28.059	10.8	Av	10.9	.3	22	-	-	50	-28

Pk - Peak detector

Av - Average detection