



**FCC CFR47 PART 15 SUBPART C**

**DTS Wireless LAN**

**CERTIFICATION TEST REPORT**

**FOR**

**GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS b/g/n and ANT+**

**MODEL NUMBER : SM-G610F/DD, SM-G610F/DS**

**FCC ID: A3LSMG610F**

**REPORT NUMBER: 16K23775-E1V2**

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	08/08/16	Initial issue	Junwhan Lee
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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS b/g/n and ANT+  
**MODEL NUMBER:** SM-G610F/DD, SM-G610F/DS  
**SERIAL NUMBER:** 5203a883e8304309, R38H70DHYVE (SM-G610F/DD, RADIATED);  
R38H60EJB6X (SM-G610F/DS, RADIATED);  
R38H60EJBGD (SM-G610F/DD, CONDUCTED)  
**DATE TESTED:** JUL 18, 2016 - AUG 08, 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:



Junwhan Lee  
Suwon Lab Engineer  
UL Korea, Ltd.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v03r05 and ANSI C63.10-2013.

## 3. FACILITIES AND ACCREDITATION

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

218 Maeyeong-ro
<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 Phone + Bluetooth/BLE, DTS b/g/n and ANT+. This test report addresses the DTS (WLAN) operational mode.

SM-G610F/DD and SM-G610F/DS are same hardware. But travel charger and data cable of these two model were different.

In accordance with difference of travel charger and data cable, AC power line conducted test and radiated emissions test below 1GHz were conducted by each model.

SM-G610F/DD was used for the other tests.

### 5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
2412 - 2462	802.11b	17.30	53.70
	802.11g	15.79	37.93
	802.11n HT20	15.70	37.15

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antennas, with a antenna's maximum gain of -2.1 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.

Based on the baseline scan, the worst-case data rates were:

802.11b mode: 1 Mbps  
802.11g mode: 6 Mbps  
802.11n HT20 mode: MCS0

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

#### ■ SM-G610F/DD

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA50IWE	DK2H418VS/A-E	N/A
Data Cable	SAMSUNG	EP-DG915UWE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

#### ■ SM-G610F/DS

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA50EWE	DK4H426VS/A-E	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

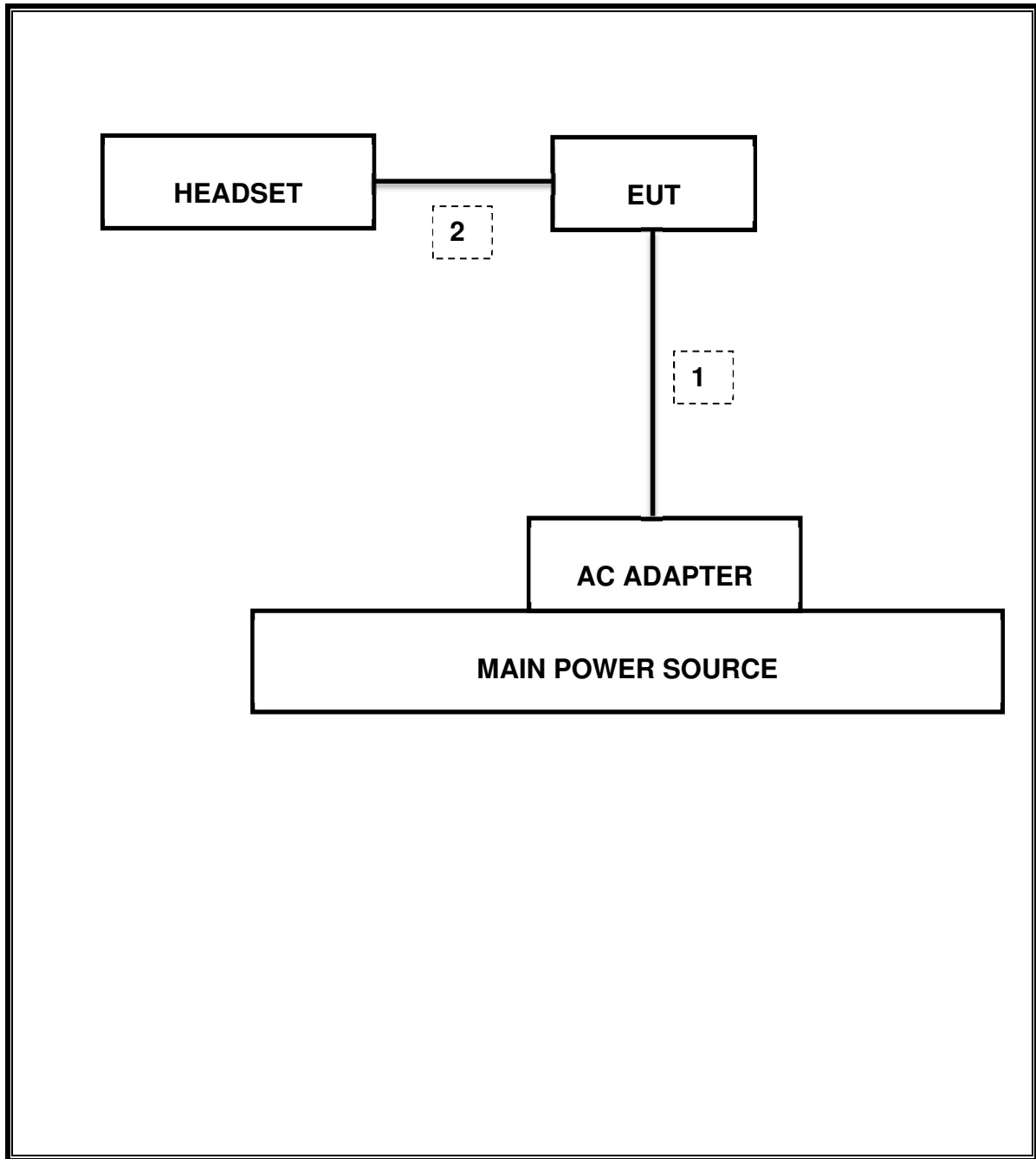
### I/O CABLES

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 DTS 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
Attenuator	PASTERNAK	PE7087-10	A009	08-19-16

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## 7. MEASUREMENT METHODS

KDB 558074 D01 DTS Meas Guidance v03r05: Measurement Procedure §9.2.3.1 AVGPM is used for average power and §10.5 AVGPS-2 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.

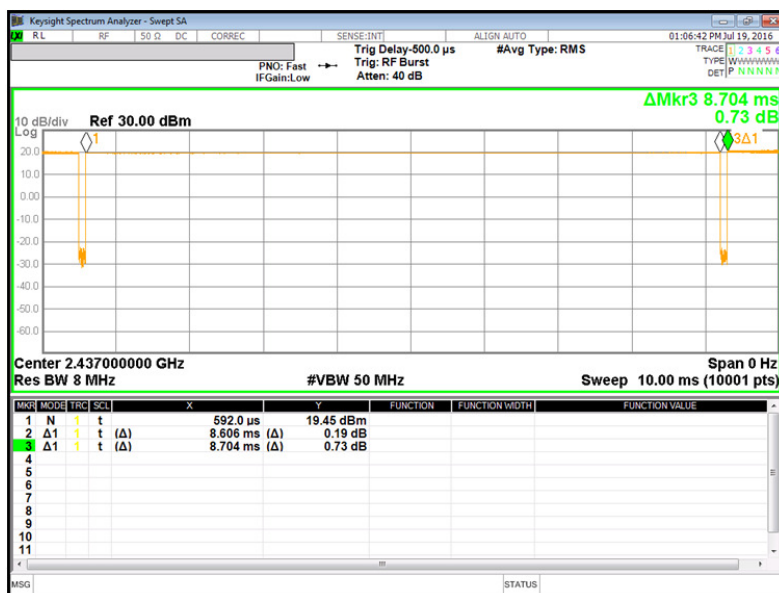
## 8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

### LIMITS

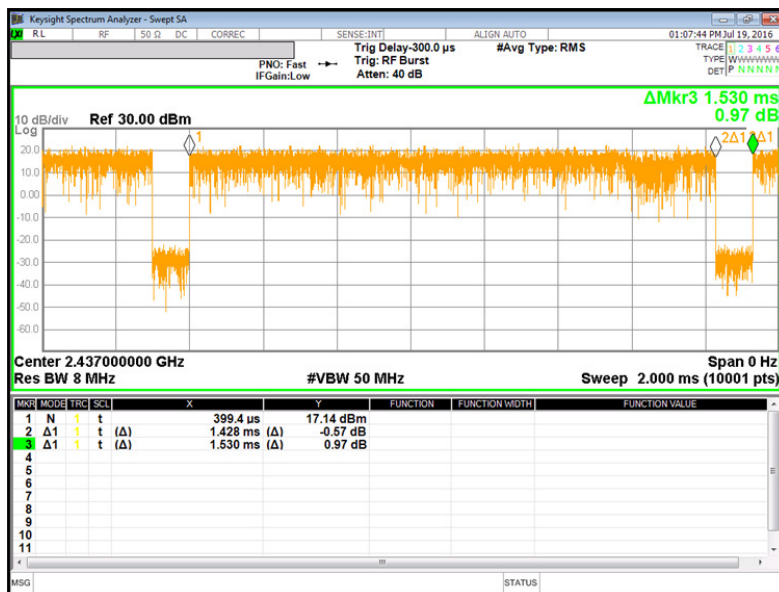
None; for reporting purposes only.

### 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>						
802.11b	8.606	8.704	0.989	98.9%	0.00	0.010
802.11g	1.428	1.53	0.933	93.3%	0.30	0.700
802.11n HT20	1.336	1.437	0.930	93.0%	0.32	0.749



[802.11b]



[802.11g]



[802.11n]

## 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	9.027 MHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-26.077 dBm
15.247	TX conducted output power	<30dBm		Pass	17.3 dBm
15.247	PSD	<8dBm		Pass	-13.642 dBm
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	53.83 dBuV (Qp)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	45.16 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

Reference to KDB 558074 D01 DTS Meas Guidance v03r05: The transmitter output is connected to a spectrum analyzer with the RBW set to 100kHz, the VBW  $\geq 3 \times$  RBW, peak detector and max hold.

#### RESULTS

##### 10.1.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	9.027	0.5
Mid	2437	9.061	0.5
High	2462	9.040	0.5
Worst		9.027	0.5

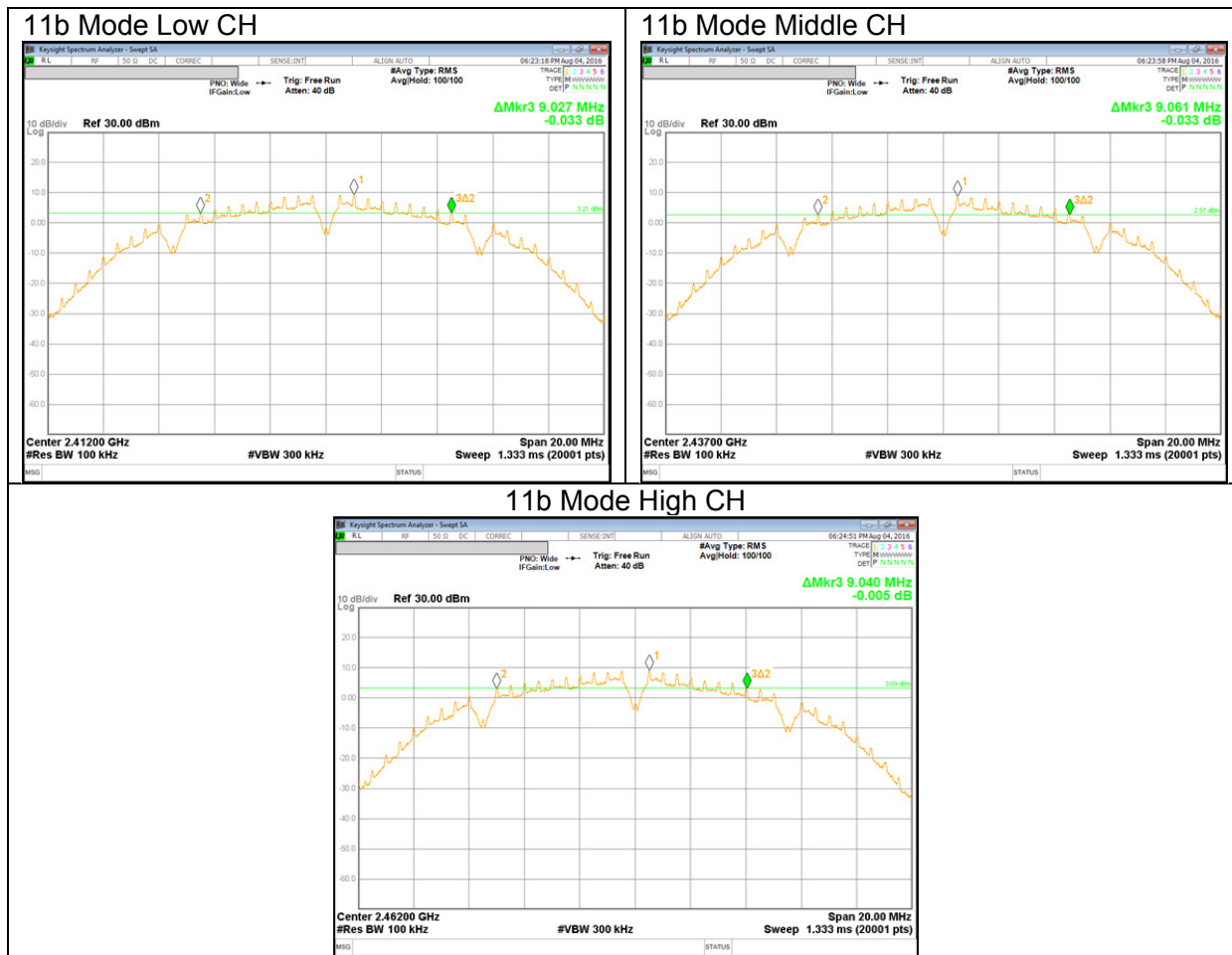
##### 10.1.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	15.800	0.5
Mid	2437	16.032	0.5
High	2462	15.717	0.5
Worst		15.717	0.5

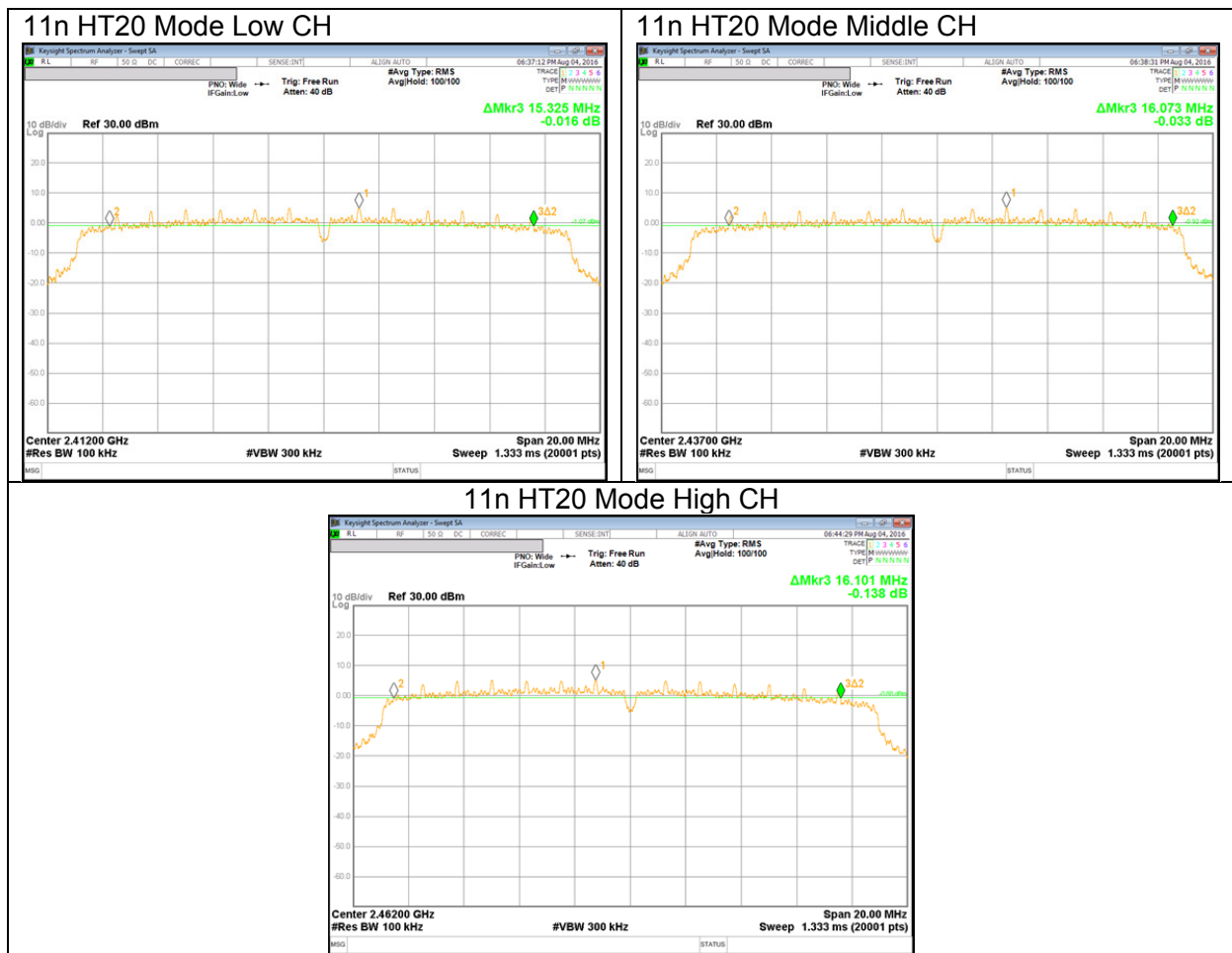
##### 10.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	15.325	0.5
Mid	2437	16.073	0.5
High	2462	16.101	0.5
Worst		15.325	0.5

### 10.1.4. 6 dB BANDWIDTH PLOTS







## 10.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

### RESULTS

#### 10.2.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	13.989
Mid	2437	14.170
High	2462	14.004
Worst		14.170

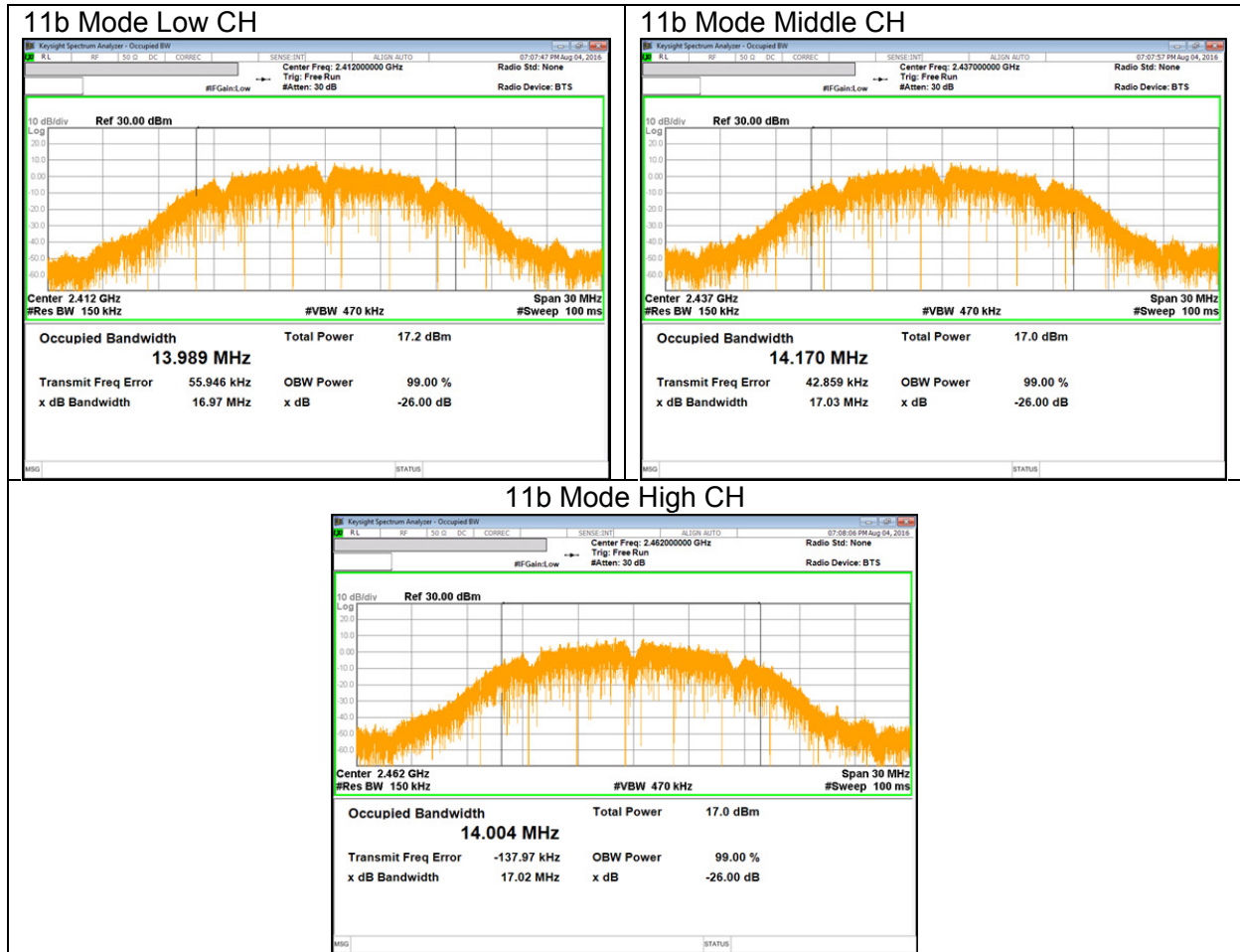
#### 10.2.2. 802.11g MODE IN THE 2.4 GHz BAND

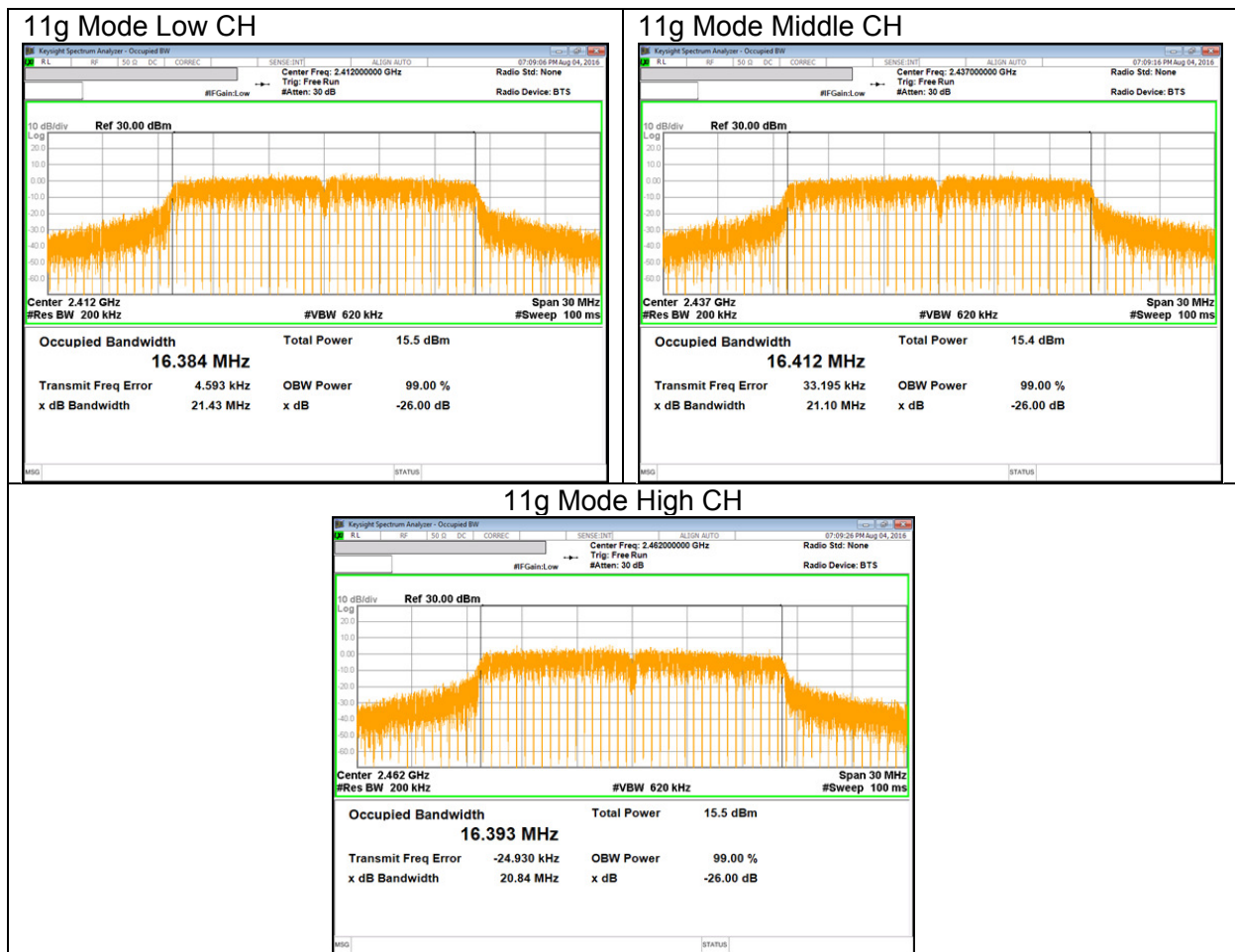
Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	16.384
Mid	2437	16.412
High	2462	16.393
Worst		16.412

#### 10.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	17.571
Mid	2437	17.626
High	2462	17.583
Worst		17.626

**10.2.4. 99% BANDWIDTH PLOTS**







### 10.3. OUTPUT POWER

#### LIMITS

FCC §15.247

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

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.

Duty cycle correction factor is already added to the average output power results for duty cycle factor < 98%. (802.11g, 802.11n mode)

#### RESULTS

##### 10.3.1. 802.11b MODE IN THE 2.4 GHz BAND

###### Limits

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	IC Power Limit [dBm]	IC EIRP Limit [dBm]	Max Power [dBm]
Low	2412	-2.10	30.00	30.00	36.00	30.00
Mid	2437	-2.10	30.00	30.00	36.00	30.00
High	2462	-2.10	30.00	30.00	36.00	30.00

###### Results

Channel	Frequency [MHz]	Primary Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	17.3	17.30	36.00	-18.70
Mid	2437	17.08	17.08	36.00	-18.92
High	2462	17.19	17.19	36.00	-18.81
Worst			17.30	36.00	-18.70

**10.3.2. 802.11g MODE IN THE 2.4 GHz BAND**

**Limits**

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	IC Power Limit [dBm]	IC EIRP Limit [dBm]	Max Power [dBm]
Low	2412	-2.10	30.00	30.00	36.00	30.00
Mid	2437	-2.10	30.00	30.00	36.00	30.00
High	2462	-2.10	30.00	30.00	36.00	30.00

**Results**

Channel	Frequency [MHz]	Primary Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	15.79	15.79	36.00	-20.21
Mid	2437	15.73	15.73	36.00	-20.27
High	2462	15.79	15.79	36.00	-20.21
Worst			15.79	36.00	-20.21

**10.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

**Limits**

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	IC Power Limit [dBm]	IC EIRP Limit [dBm]	Max Power [dBm]
Low	2412	-2.10	30.00	30.00	36.00	30.00
Mid	2437	-2.10	30.00	30.00	36.00	30.00
High	2462	-2.10	30.00	30.00	36.00	30.00

**Results**

Channel	Frequency [MHz]	Primary Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	15.70	15.70	36.00	-20.30
Mid	2437	15.65	15.65	36.00	-20.35
High	2462	15.68	15.68	36.00	-20.32
Worst			15.70	36.00	-20.30

## **10.4. 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 AVGPS-1" under KDB558074 D01 DTS Meas Guidance v03r05

**RESULTS**

**10.4.1. 802.11b MODE IN THE 2.4 GHz BAND**

**PSD Results**

Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-14.025	0.00	-14.025	8.00	-22.025
Mid	2437	-14.274	0.00	-14.274	8.00	-22.274
High	2462	-13.642	0.00	-13.642	8.00	-21.642

**10.4.2. 802.11g MODE IN THE 2.4 GHz BAND**

**PSD Results**

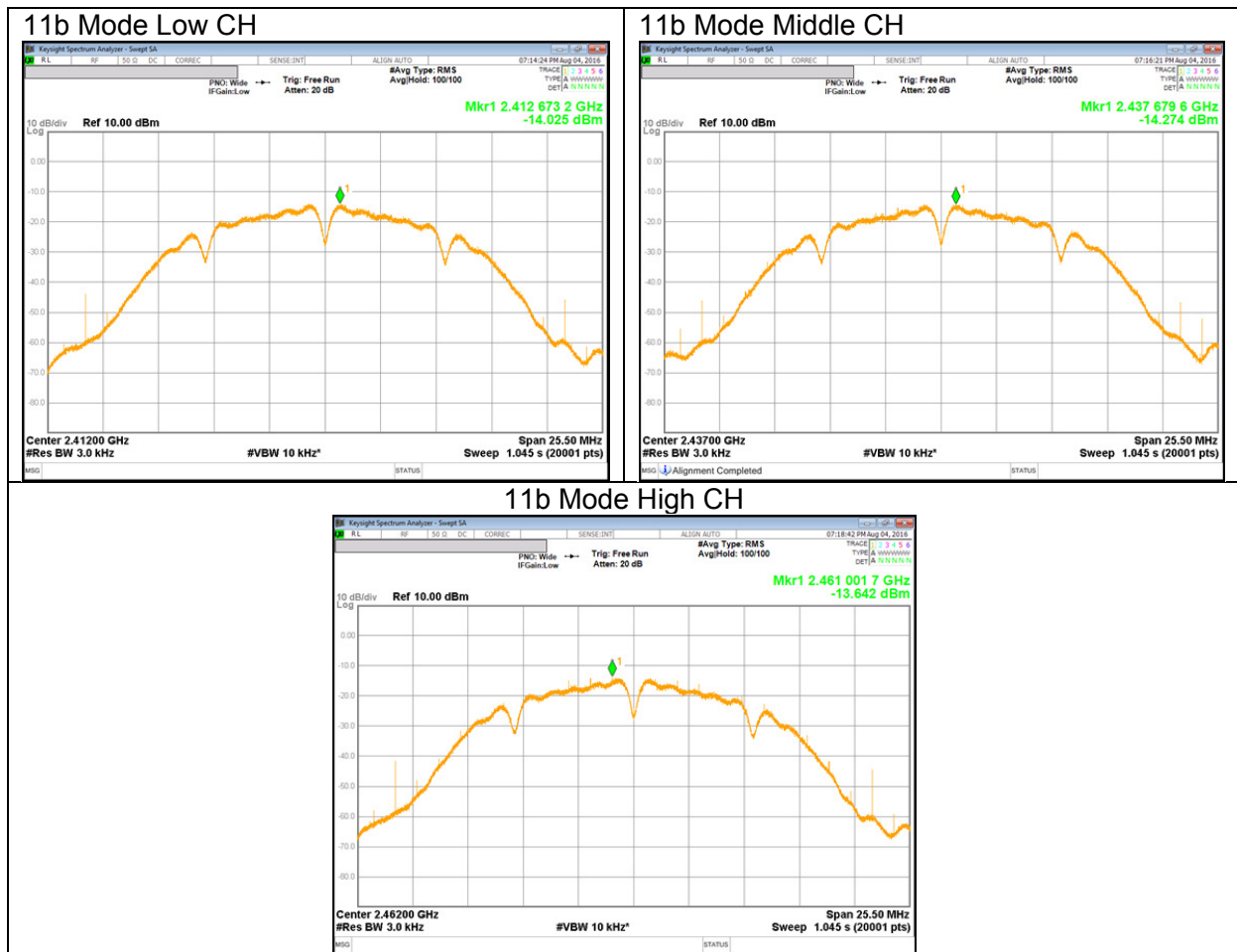
Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-18.058	0.30	-17.758	8.00	-26.058
Mid	2437	-18.342	0.30	-18.042	8.00	-26.342
High	2462	-17.744	0.30	-17.444	8.00	-25.744

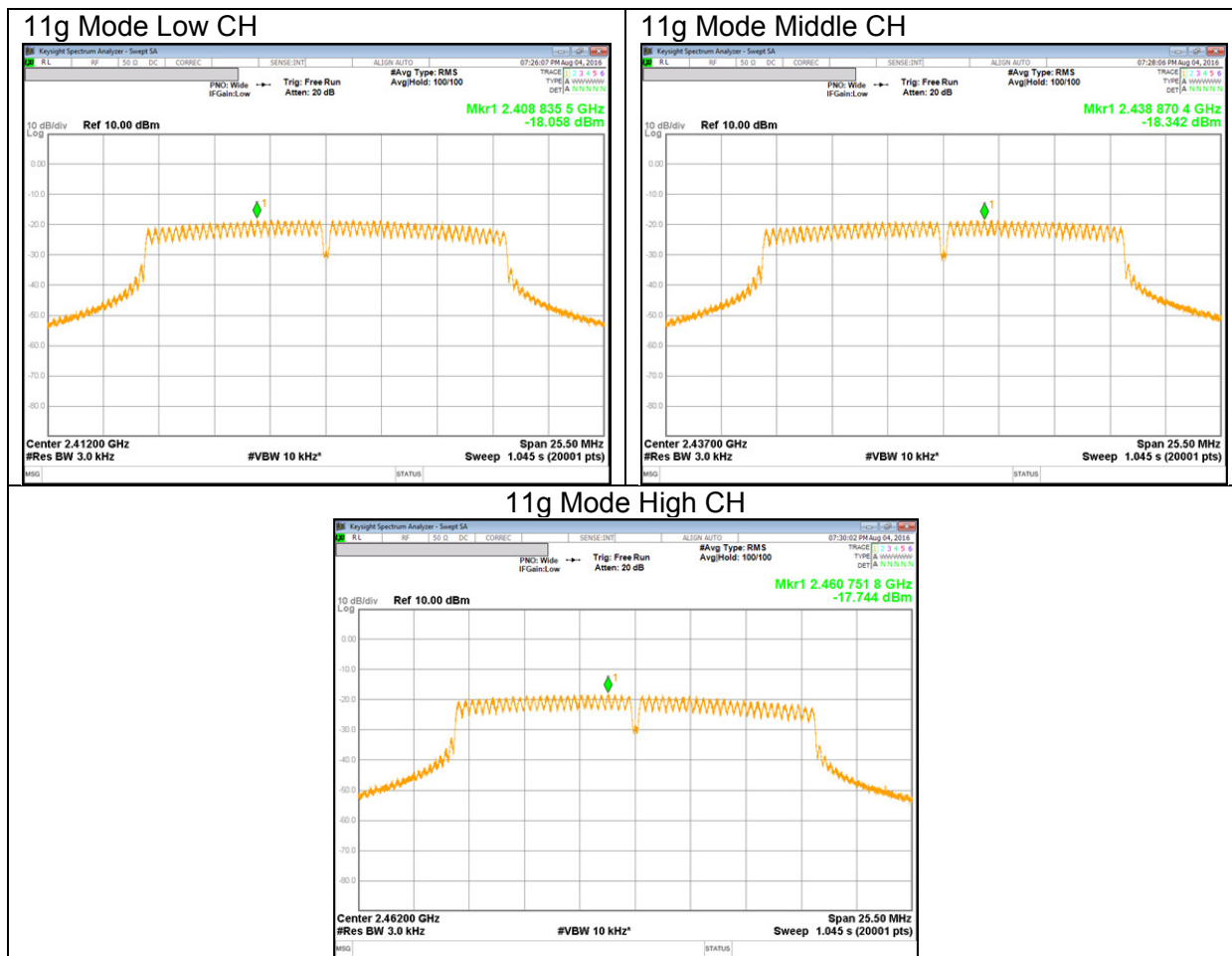
**10.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

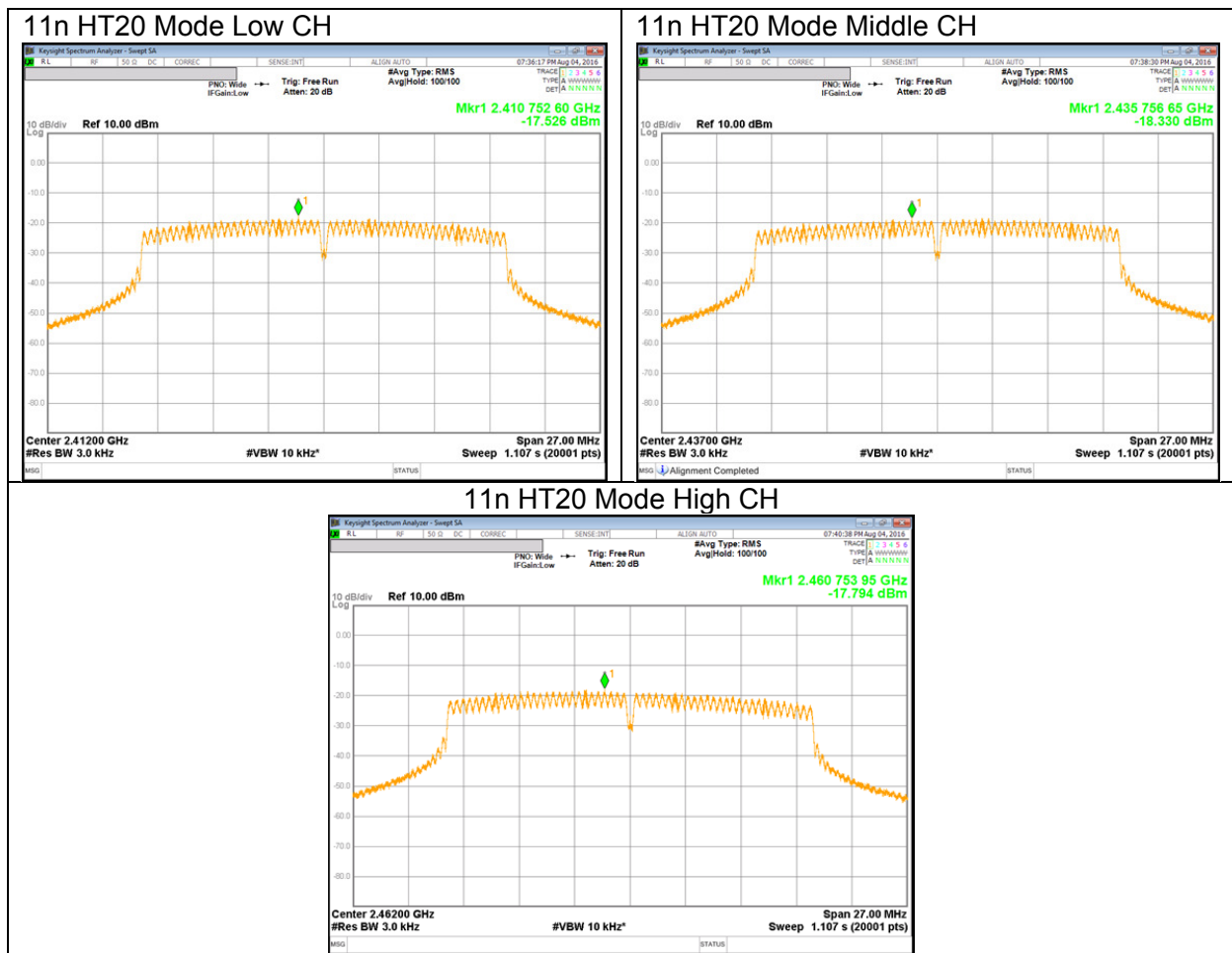
**PSD Results**

Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-17.526	0.32	-17.206	8.00	-25.526
Mid	2437	-18.33	0.32	-18.010	8.00	-26.330
High	2462	-17.794	0.32	-17.474	8.00	-25.794

### 10.4.4. PSD PLOTS







## 10.5. OUT-OF-BAND EMISSIONS

### LIMITS

FCC §15.247 (d)

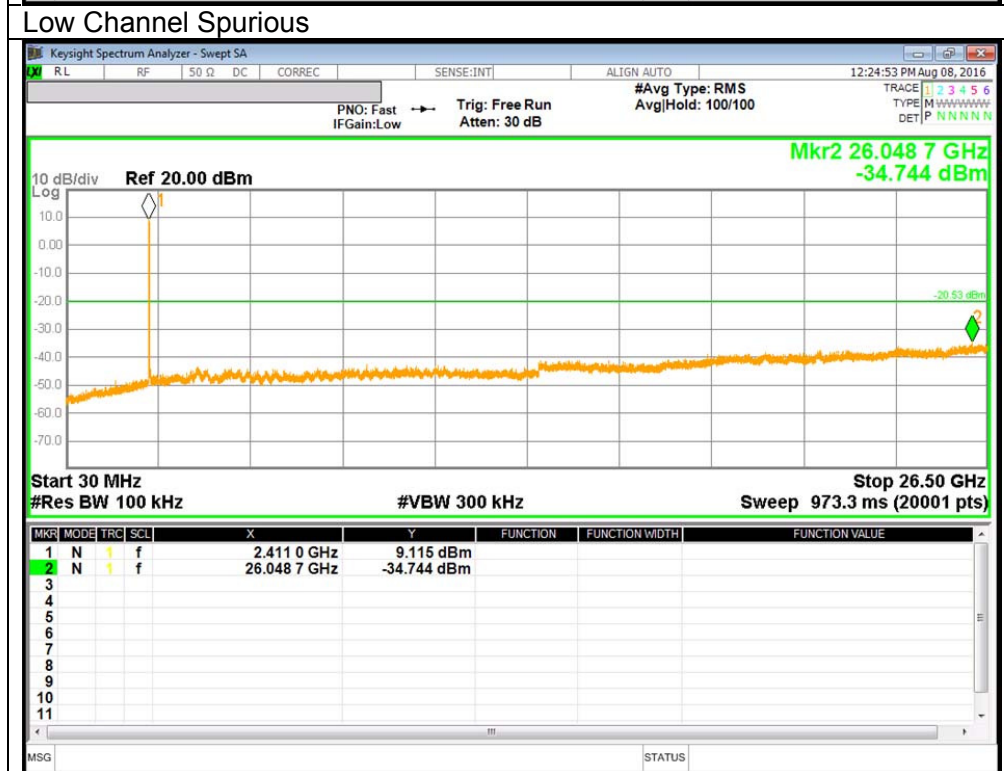
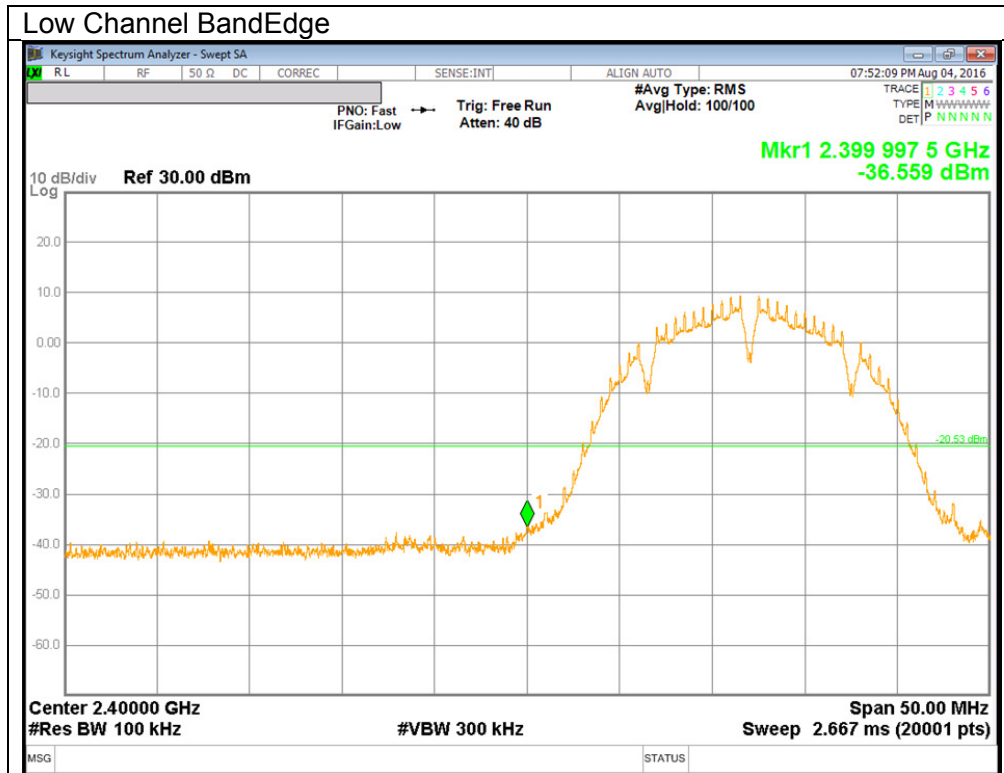
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

### TEST PROCEDURE

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

**RESULTS**

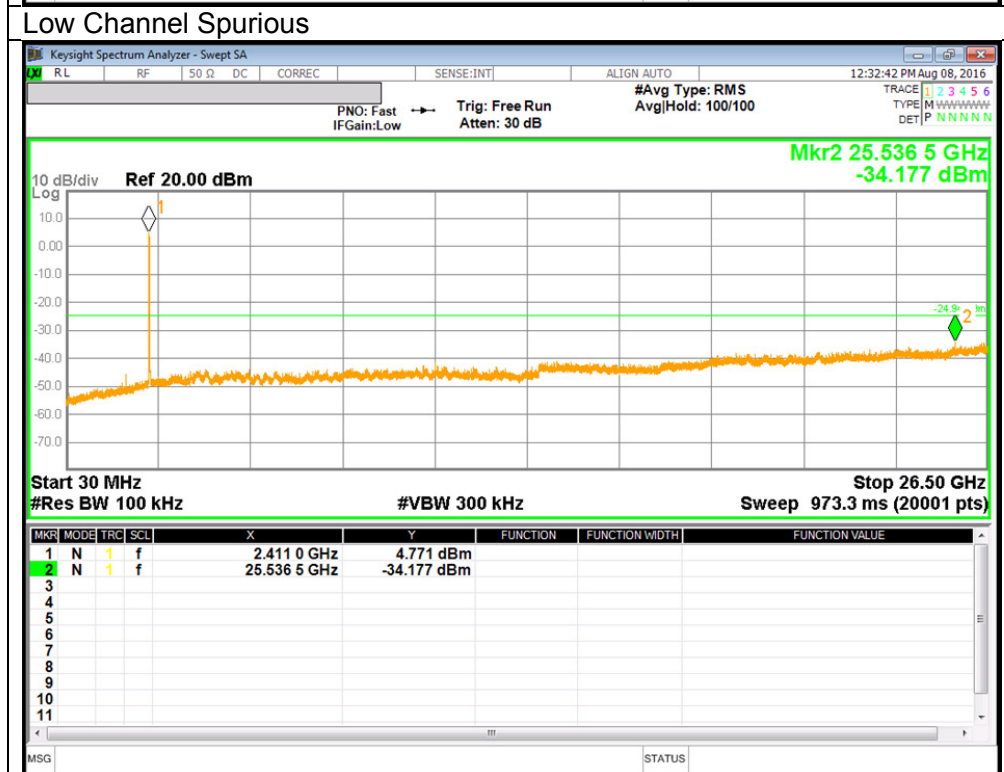
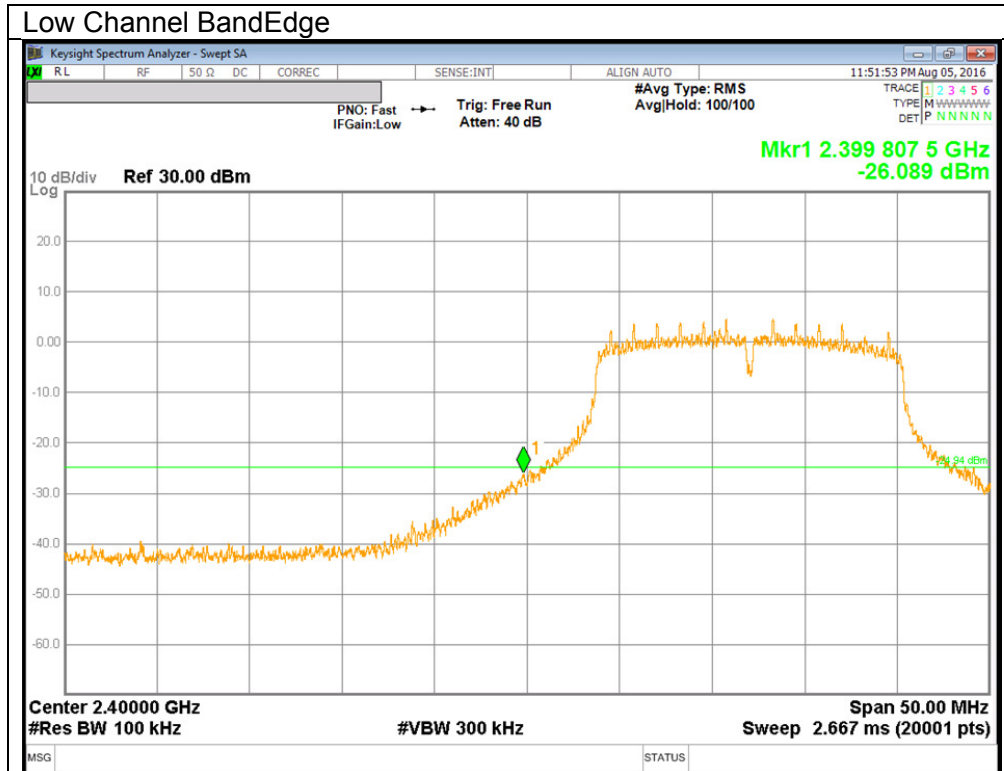
**10.5.1. 802.11b MODE IN THE 2.4 GHz BAND**

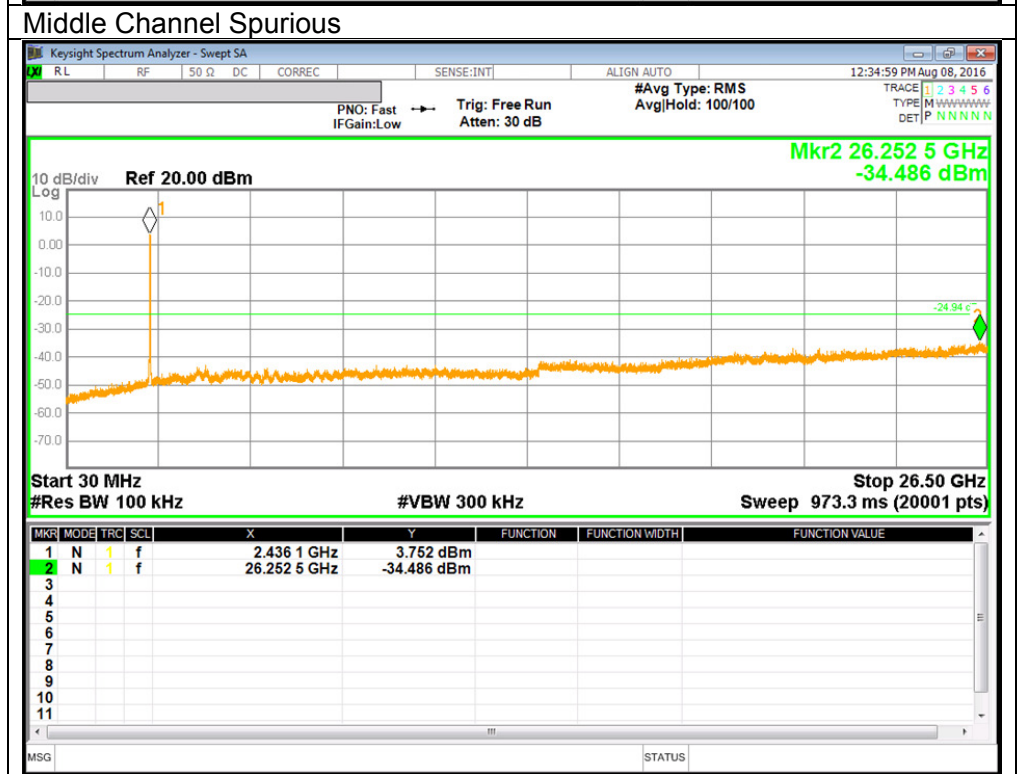
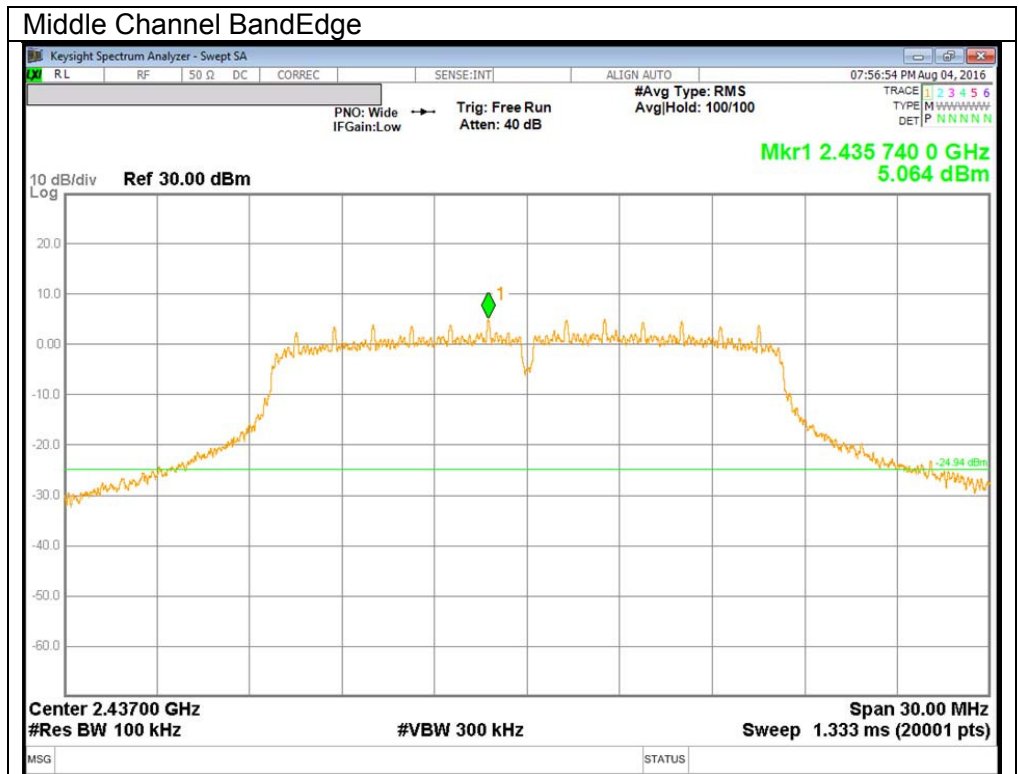






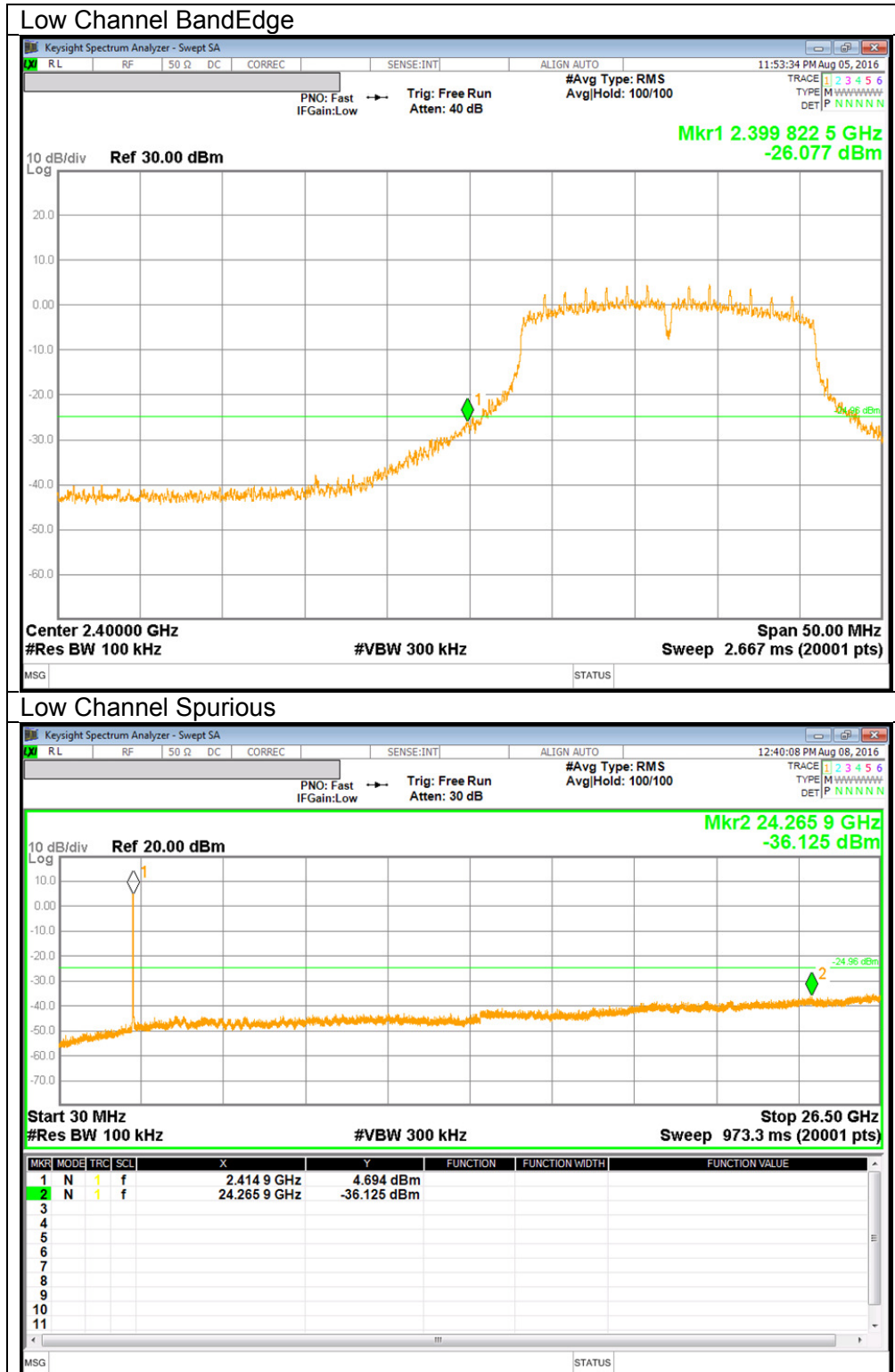
### 10.5.2. 802.11g MODE IN THE 2.4 GHz BAND







### 10.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND







## 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 ( $\mu\text{V}/\text{m}$ )	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; 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 B mode = 0dB (duty cycle >98%); G mode = 0.30dB; N mode = 0.32dB.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable 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.

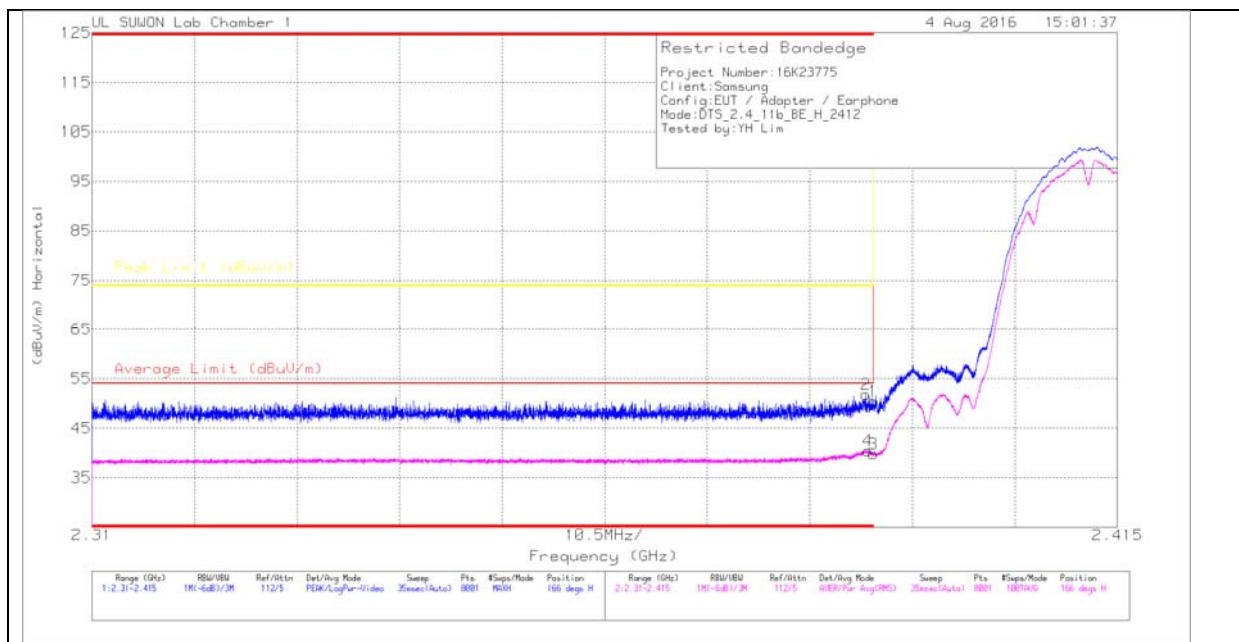
Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).  
Per FCC part 15.31(o), test results were not reported.

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

## 11.2. TRANSMITTER ABOVE 1 GHz

### 11.2.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### Trace Markers

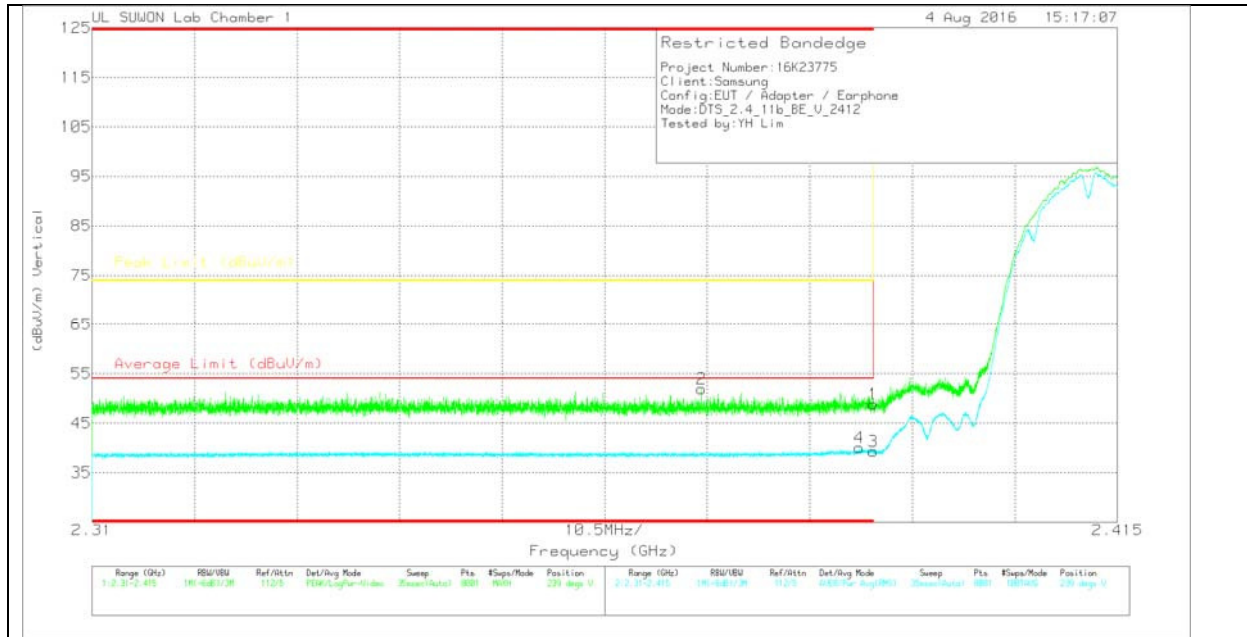
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17_150619)	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	47.62	Pk	31.8	-29	0	50.42	-	-	74	-23.58	166	380	H
2	* 2.389	49	Pk	31.8	-29	0	51.8	-	-	74	-22.2	166	380	H
3	* 2.39	37.07	RMS	31.8	-29	0	39.87	54	-14.13	-	-	166	380	H
4	* 2.389	37.65	RMS	31.8	-29	0	40.45	54	-13.55	-	-	166	380	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	46.1	PK	31.8	-29	0	48.9	-	-	74	-25.1	239	332	V
2	* 2.372	49.15	PK	31.8	-29	0	51.95	-	-	74	-22.05	239	332	V
3	* 2.39	36.47	RMS	31.8	-29	0	39.27	54	-14.73	-	-	239	332	V
4	* 2.389	37.31	RMS	31.8	-29	0	40.11	54	-13.89	-	-	239	332	V

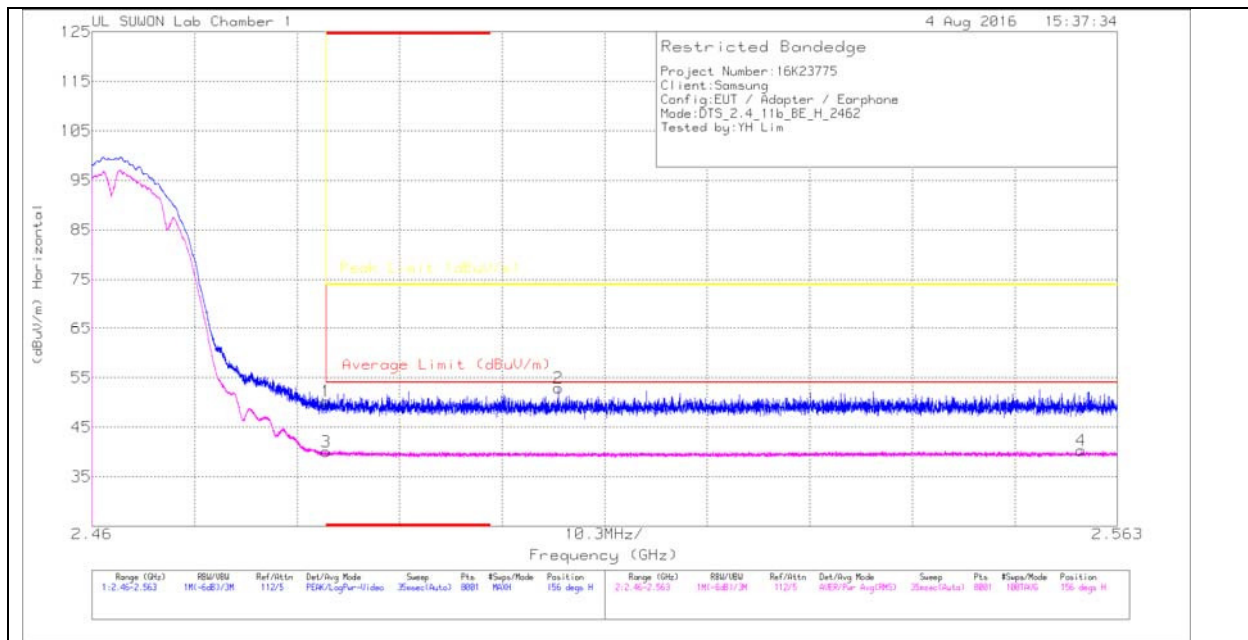
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

**Trace Markers**

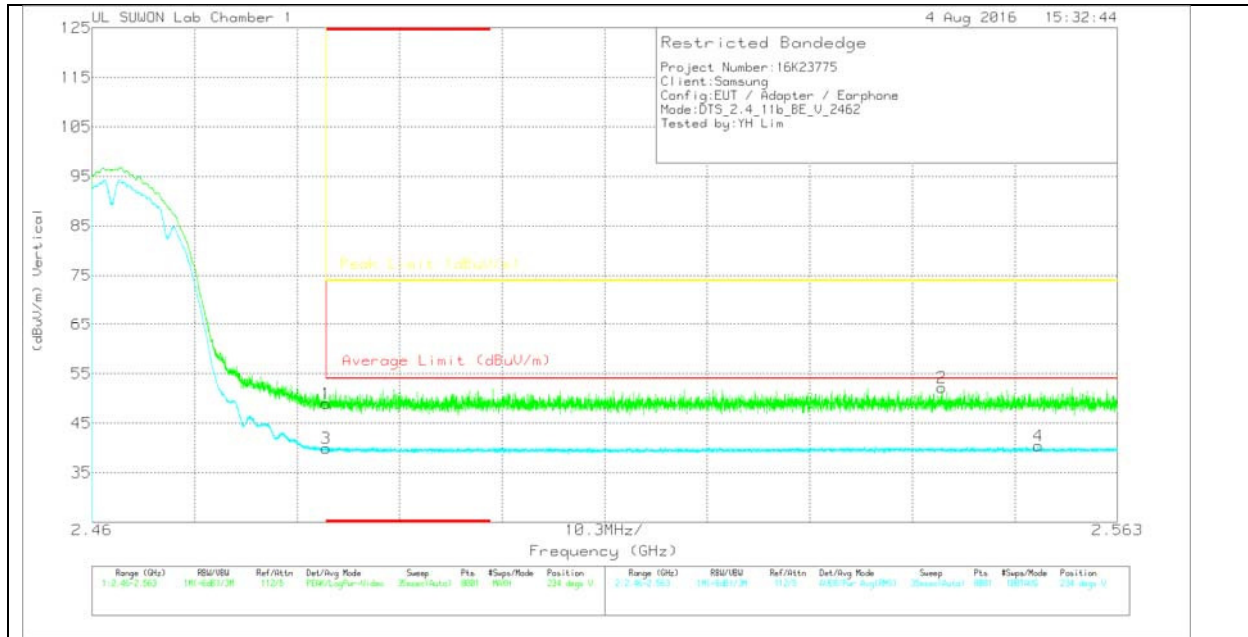
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17_150619)	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46.56	PK	32	-28.3	0	50.26	-	-	74	-23.74	156	360	H
2	2.507	49.19	PK	32	-28.3	0	52.89	-	-	74	-21.11	156	360	H
3	* 2.484	36.33	RMS	32	-28.3	0	40.03	54	-13.97	-	-	156	360	H
4	2.559	36.54	RMS	32	-28.2	0	40.34	54	-13.66	-	-	156	360	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	45.3	PK	32	-28.3	0	49	-	-	74	-25	234	399	V
2	2.545	48.43	PK	32	-28.2	0	52.23	-	-	74	-21.77	234	399	V
3	* 2.484	36.21	RMS	32	-28.3	0	39.91	54	-14.09	-	-	234	399	V
4	2.555	36.61	RMS	32	-28.2	0	40.41	54	-13.59	-	-	234	399	V

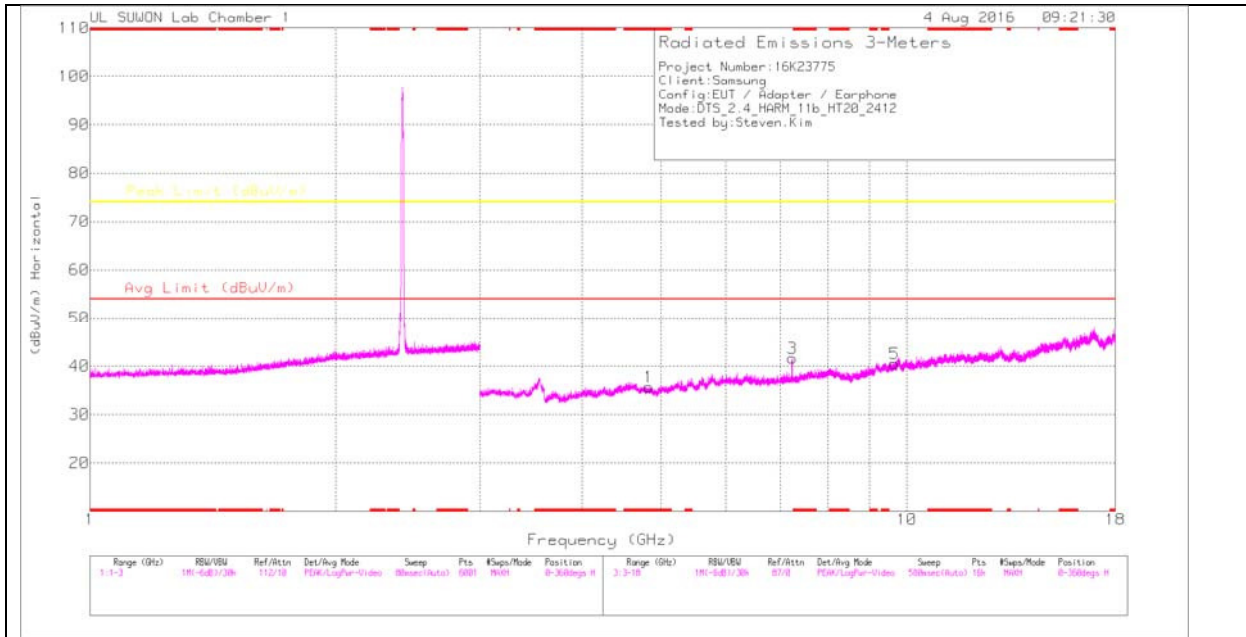
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

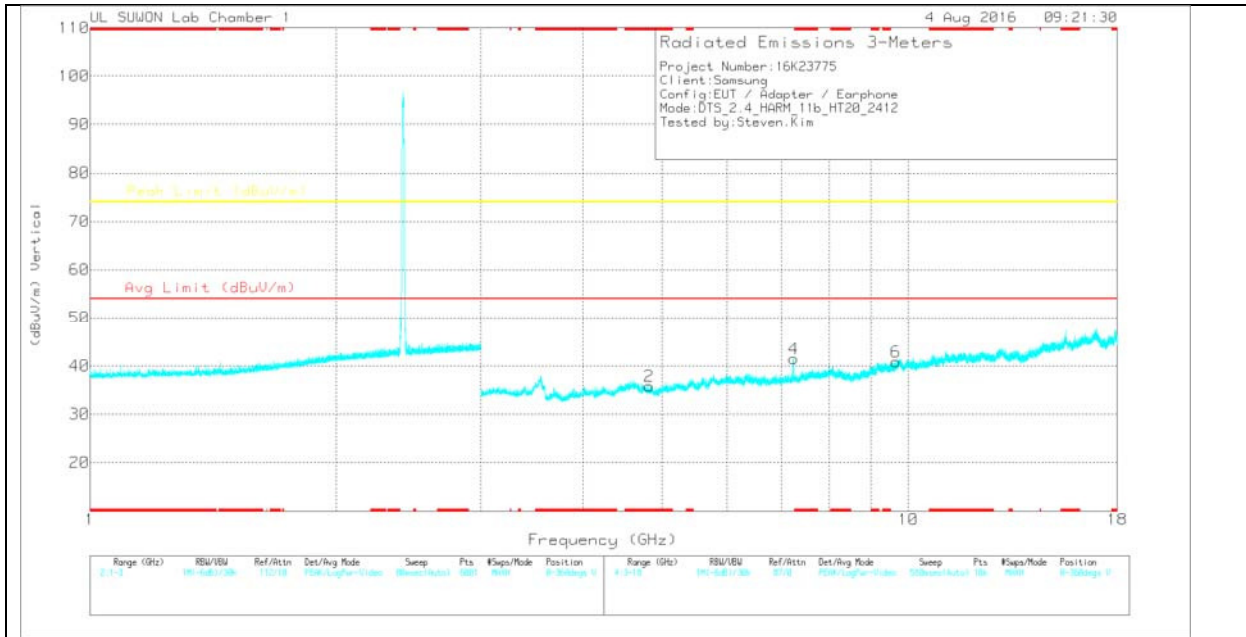
RMS - RMS detection

### 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	* 4.828	35.45	PK	34	-33.8	0	35.65	-	-	74	-38.35	0-360	253	H
3	7.235	36.85	PK	35.7	-30.9	0	41.65	-	-	74	-32.35	0-360	253	H
5	9.654	30.9	PK	37.1	-27.5	0	40.5	-	-	74	-33.5	0-360	150	H
2	* 4.824	35.56	PK	34	-33.8	0	35.76	-	-	74	-38.24	0-360	252	V
4	7.235	36.72	PK	35.7	-30.9	0	41.52	-	-	74	-32.48	0-360	149	V
6	9.656	31.24	PK	37.1	-27.5	0	40.84	-	-	74	-33.16	0-360	252	V

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

PK – Peak Detector

Radiated Emissions

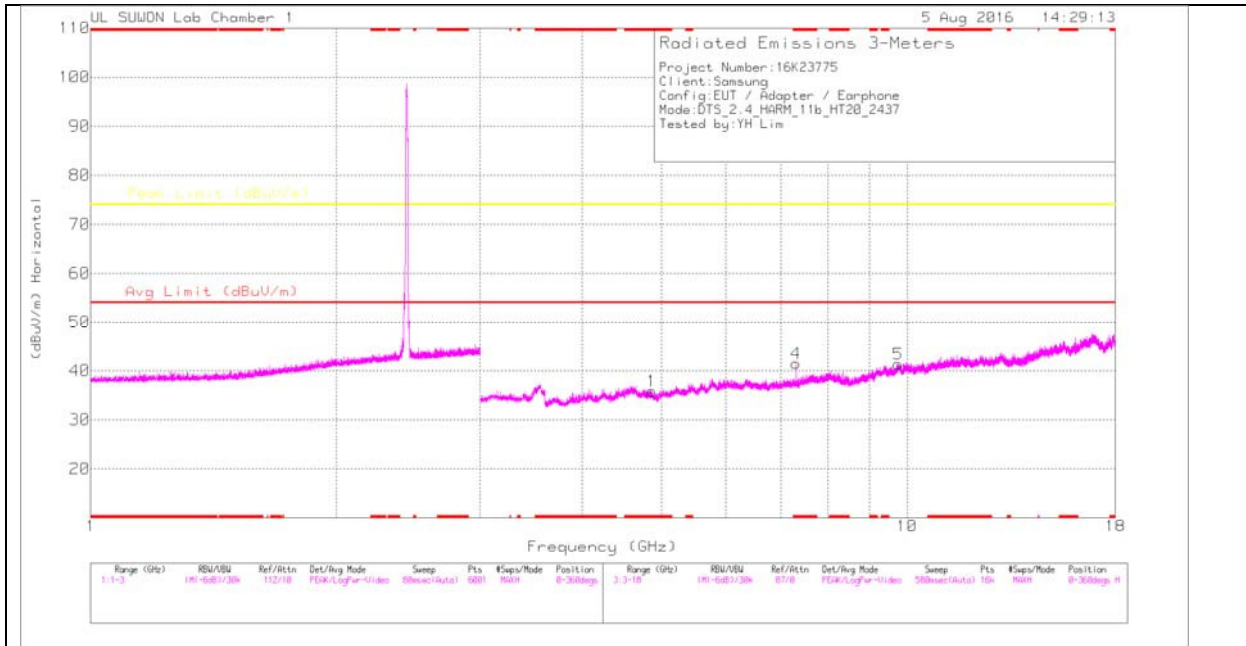
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7.235	34.82	Avg	35.7	-30.9	0	39.62	-	-	74	-34.38	304	118	H
7.236	46.61	PK2	35.7	-30.9	0	51.41	-	-	74	-22.59	304	118	H
7.235	46.2	PK2	35.7	-30.9	0	51	-	-	74	-23	28	272	V

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

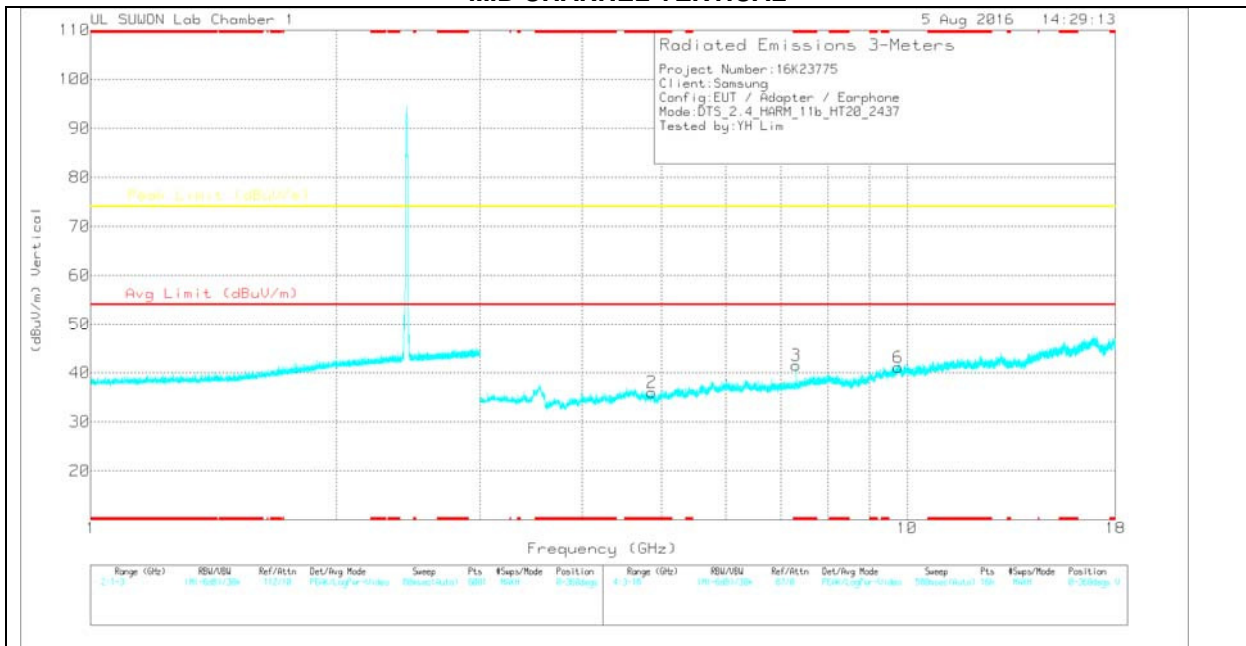
PK2 - KDB558074 Method: Maximum Peak

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(00168717)_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	* 4.87	35.82	PK	34	-34	0	35.82	-	-	74	-38.18	0-360	250	H
4	* 7.31	36.66	PK	35.7	-30.9	0	41.46	-	-	74	-32.54	0-360	250	H
5	9.751	30.99	PK	37.2	-26.8	0	41.39	-	-	74	-32.61	0-360	250	H
2	* 4.868	36.05	PK	34	-34	0	36.05	-	-	74	-37.95	0-360	150	V
3	* 7.31	36.74	PK	35.7	-30.9	0	41.54	-	-	74	-32.46	0-360	150	V
6	9.753	30.59	PK	37.2	-26.7	0	41.09	-	-	74	-32.91	0-360	150	V

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

PK - Peak detector

Radiated Emissions

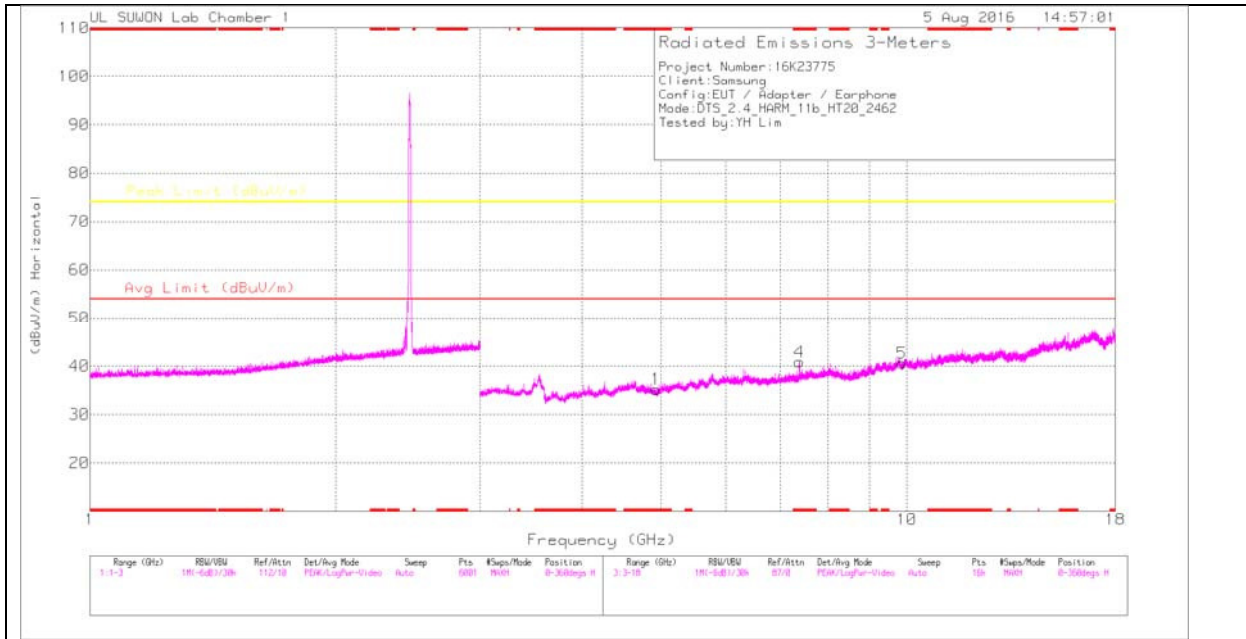
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 7.31	46.11	PK2	35.7	-30.9	0	50.91	-	-	74	-23.09	0	375	V
* 7.312	33.81	MAv1	35.7	-30.9	0	38.61	54	-15.39	-	-	0	375	V
* 7.312	46.67	PK2	35.7	-30.9	0	51.47	-	-	74	-22.53	310	100	H
* 7.312	36.58	MAv1	35.7	-30.9	0	41.38	54	-12.62	-	-	310	100	H

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

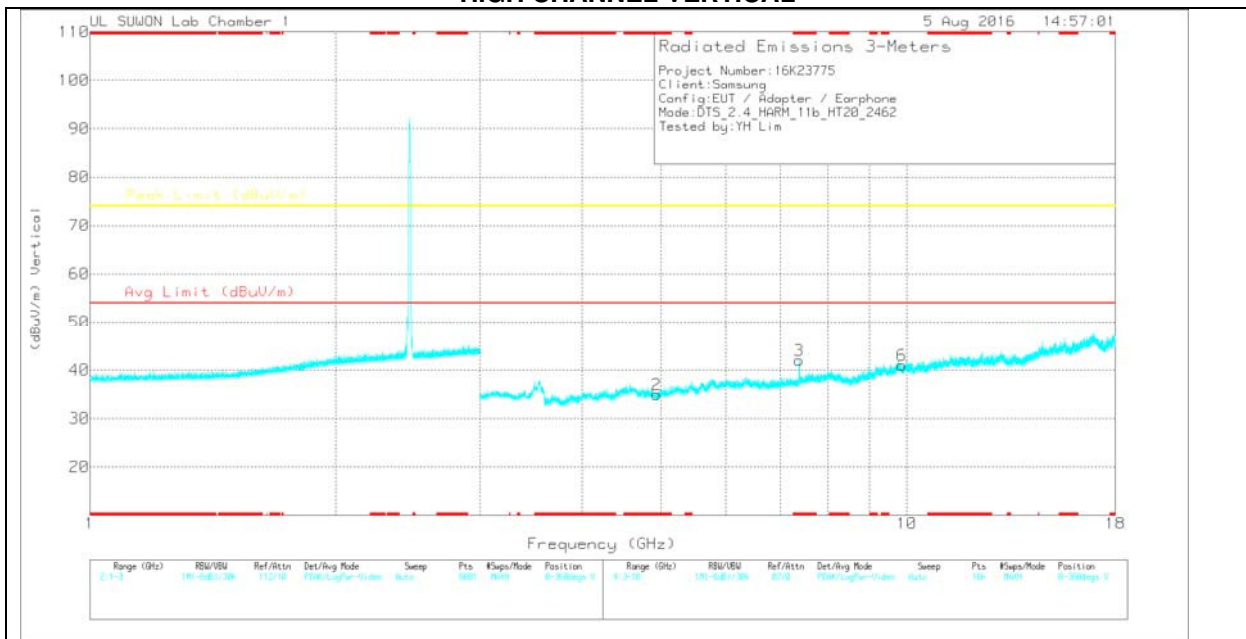
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 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.

**HIGH CHANNEL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168717)_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	* 4.933	35.24	PK	34	-34	0	35.24	-	-	74	-38.76	0-360	250	H
4	* 7.386	35.79	PK	35.8	-30.7	0	40.89	-	-	74	-33.11	0-360	150	H
5	9.852	31.07	PK	37.3	-27.7	0	40.67	-	-	74	-33.33	0-360	250	H
2	* 4.939	34.92	PK	34	-34	0	34.92	-	-	74	-39.08	0-360	250	V
3	* 7.385	36.94	PK	35.8	-30.7	0	42.04	-	-	74	-31.96	0-360	250	V
6	9.856	31.44	PK	37.3	-27.7	0	41.04	-	-	74	-32.96	0-360	250	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	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 7.386	46.79	PK2	35.8	-30.7	0	51.89	-	-	74	-22.11	313	113	H
* 7.385	37.21	MAv1	35.8	-30.7	0	42.31	54	-11.69	-	-	313	113	H
* 7.385	46.67	PK2	35.8	-30.7	0	51.77	-	-	74	-22.23	360	300	V
* 7.385	36.37	MAv1	35.8	-30.7	0	41.47	54	-12.53	-	-	360	300	V

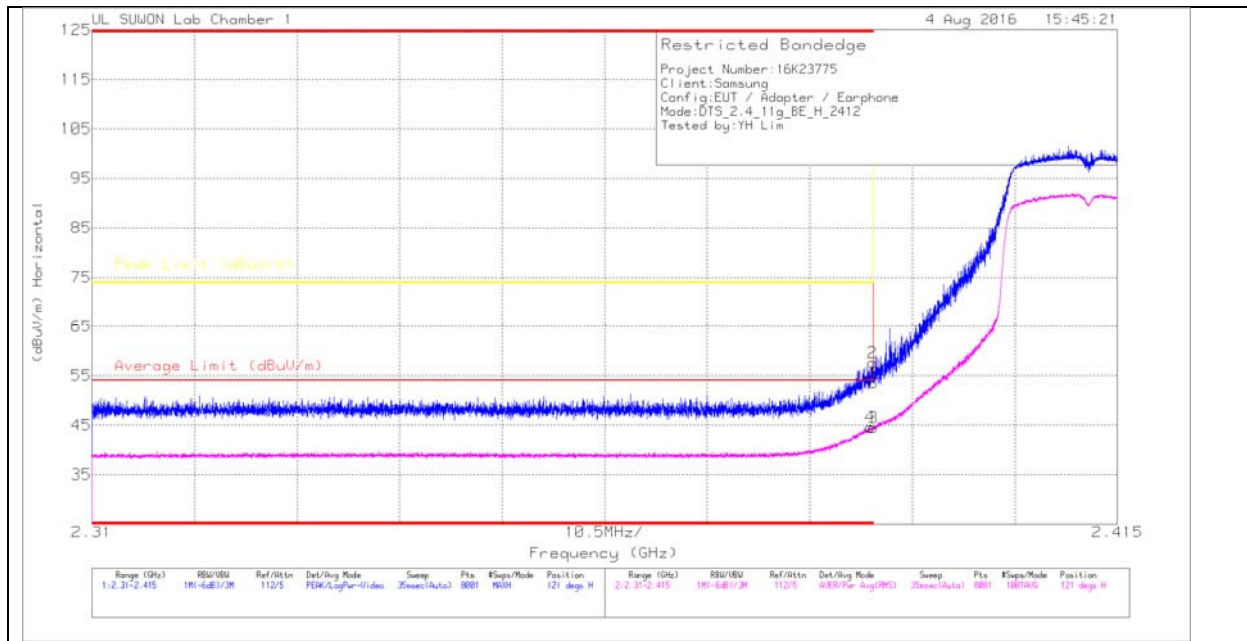
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

**11.2.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND**  
**RESTRICTED BANDEDGE (LOW CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

Trace Markers

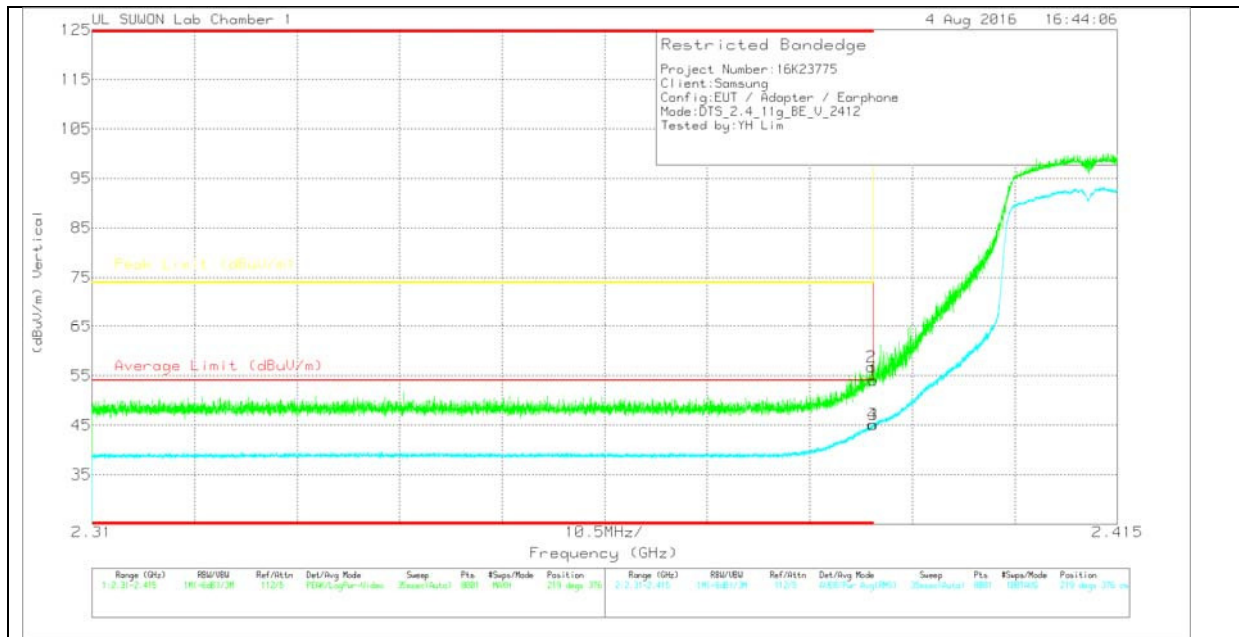
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17_150619)	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	50.77	PK	31.8	-29	0	53.57	-	-	74	-20.43	121	327	H
2	* 2.39	54.85	PK	31.8	-29	0	57.65	-	-	74	-16.35	121	327	H
3	* 2.39	41.36	RMS	31.8	-29	.3	44.46	54	-9.54	-	-	121	327	H
4	* 2.39	41.59	RMS	31.8	-29	.3	44.69	54	-9.31	-	-	121	327	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	51.27	Pk	31.8	-29	0	54.07	-	-	74	-19.93	219	376	V
2	* 2.39	53.92	Pk	31.8	-29	0	56.72	-	-	74	-17.28	219	376	V
3	* 2.39	42.06	RMS	31.8	-29	.3	45.16	54	-8.84	-	-	219	376	V
4	* 2.39	42	RMS	31.8	-29	.3	45.1	54	-8.9	-	-	219	376	V

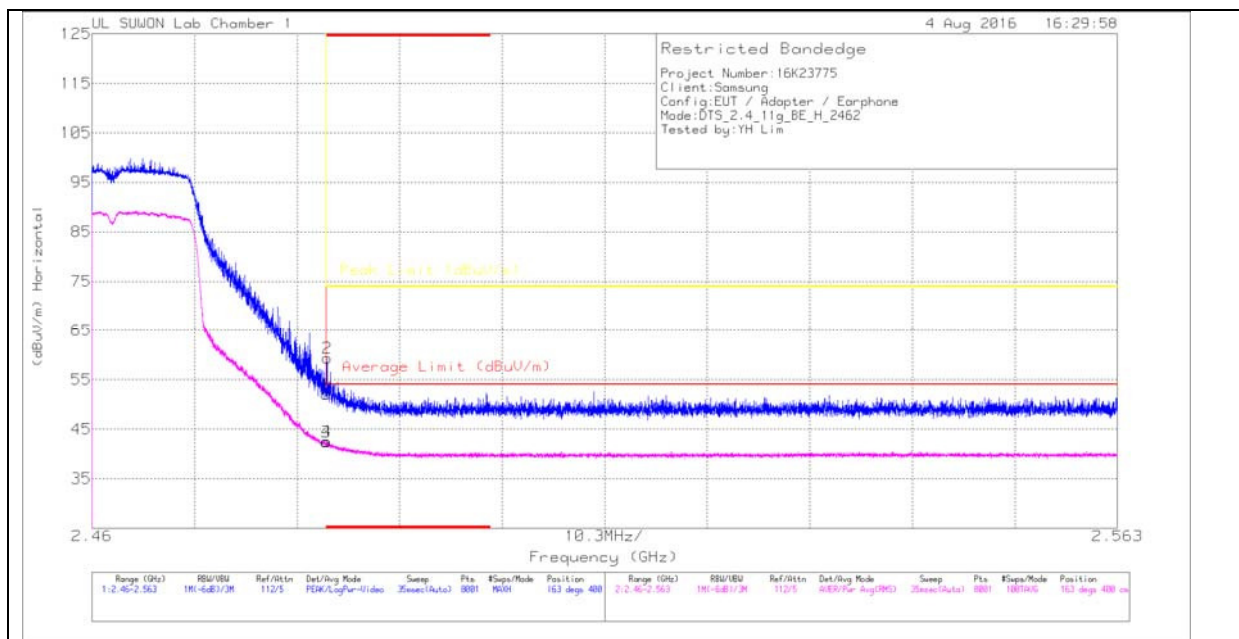
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

Trace Markers

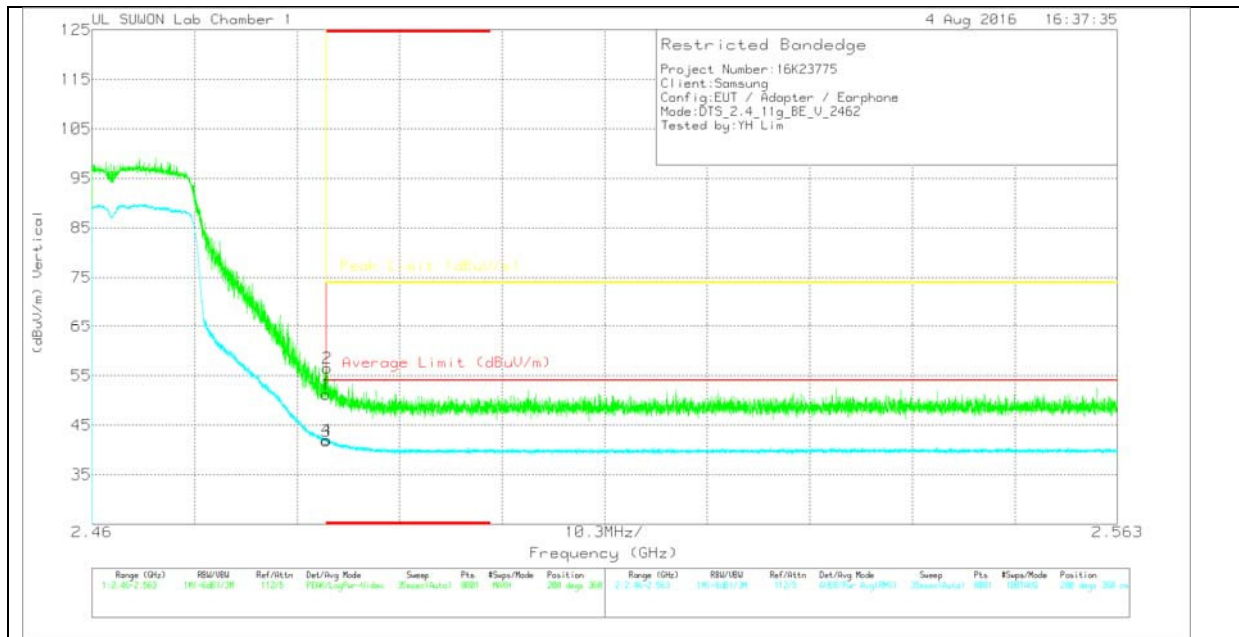
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17_150619)	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	48.31	Pk	32	-28.3	0	52.01	-	-	74	-21.99	163	400	H
2	* 2.484	55.62	Pk	32	-28.3	0	59.32	-	-	74	-14.68	163	400	H
3	* 2.484	38.4	RMS	32	-28.3	.3	42.4	54	-11.6	-	-	163	400	H
4	* 2.484	38.52	RMS	32	-28.3	.3	42.52	54	-11.48	-	-	163	400	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	47.47	Pk	32	-28.3	0	51.17	-	-	74	-22.83	200	360	V
2	* 2.484	52.85	Pk	32	-28.3	0	56.55	-	-	74	-17.45	200	360	V
3	* 2.484	38.1	RMS	32	-28.3	.3	42.1	54	-11.9	-	-	200	360	V
4	* 2.484	38.39	RMS	32	-28.3	.3	42.39	54	-11.61	-	-	200	360	V

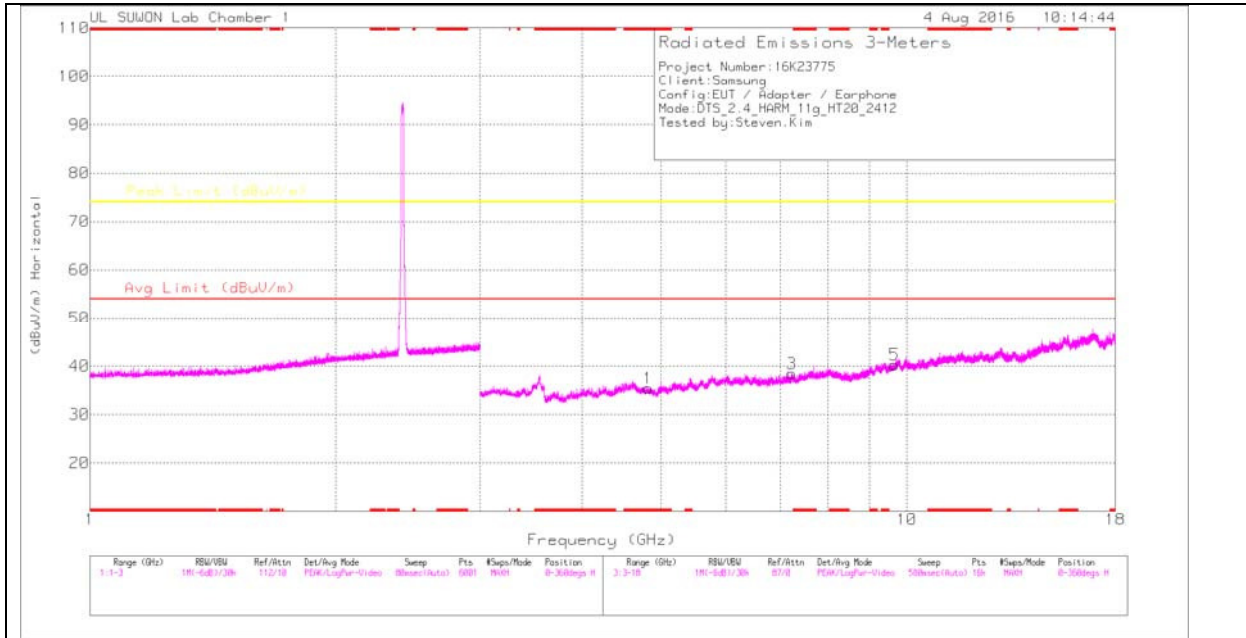
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

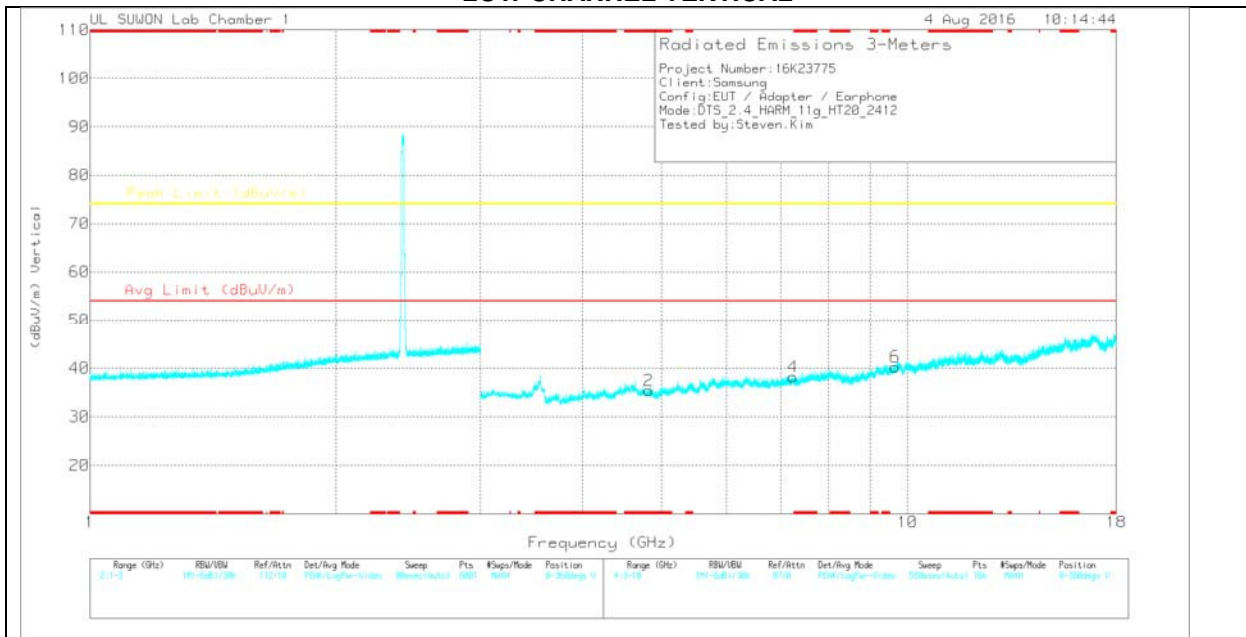
RMS - RMS detection

### 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

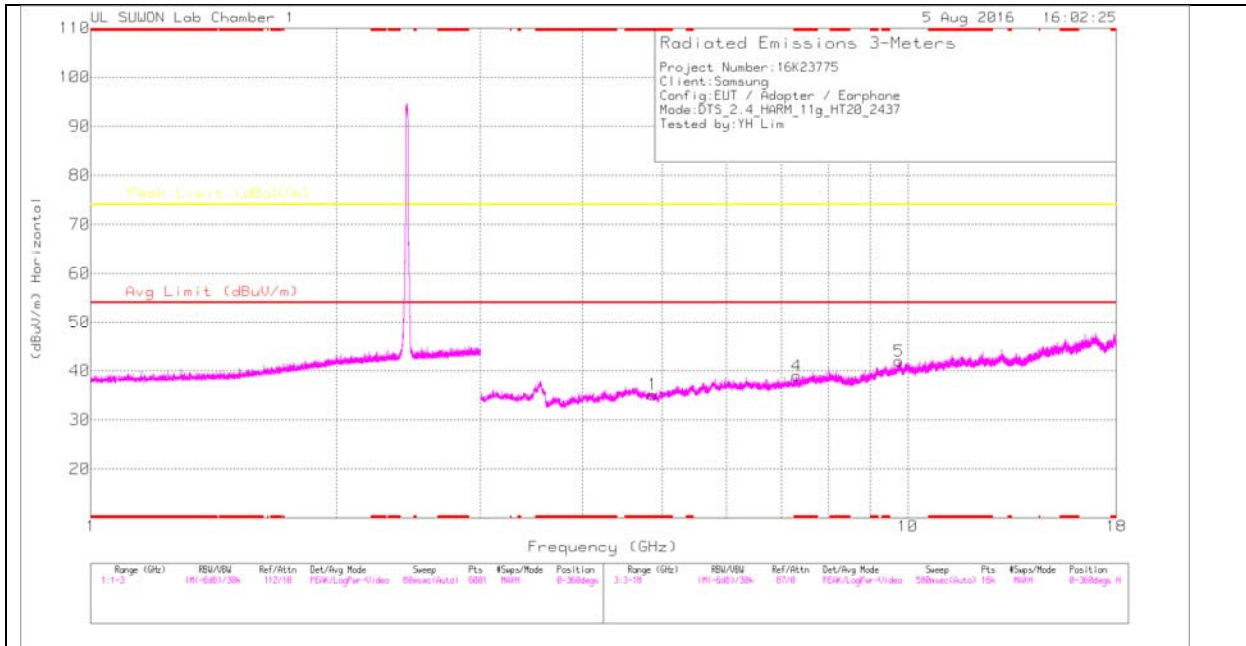
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.823	35.26	PK	34	-33.8	0	35.46	-	-	74	-38.54	0-360	150	H
3	7.229	33.79	PK	35.7	-31	0	38.49	-	-	74	-35.51	0-360	250	H
5	9.658	30.7	PK	37.1	-27.5	0	40.3	-	-	74	-33.7	0-360	150	H
2	* 4.821	35.2	PK	34	-33.8	0	35.4	-	-	74	-38.6	0-360	250	V
4	7.236	33.43	PK	35.7	-30.9	0	38.23	-	-	74	-35.77	0-360	250	V
6	9.656	30.7	PK	37.1	-27.5	0	40.3	-	-	74	-33.7	0-360	250	V

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

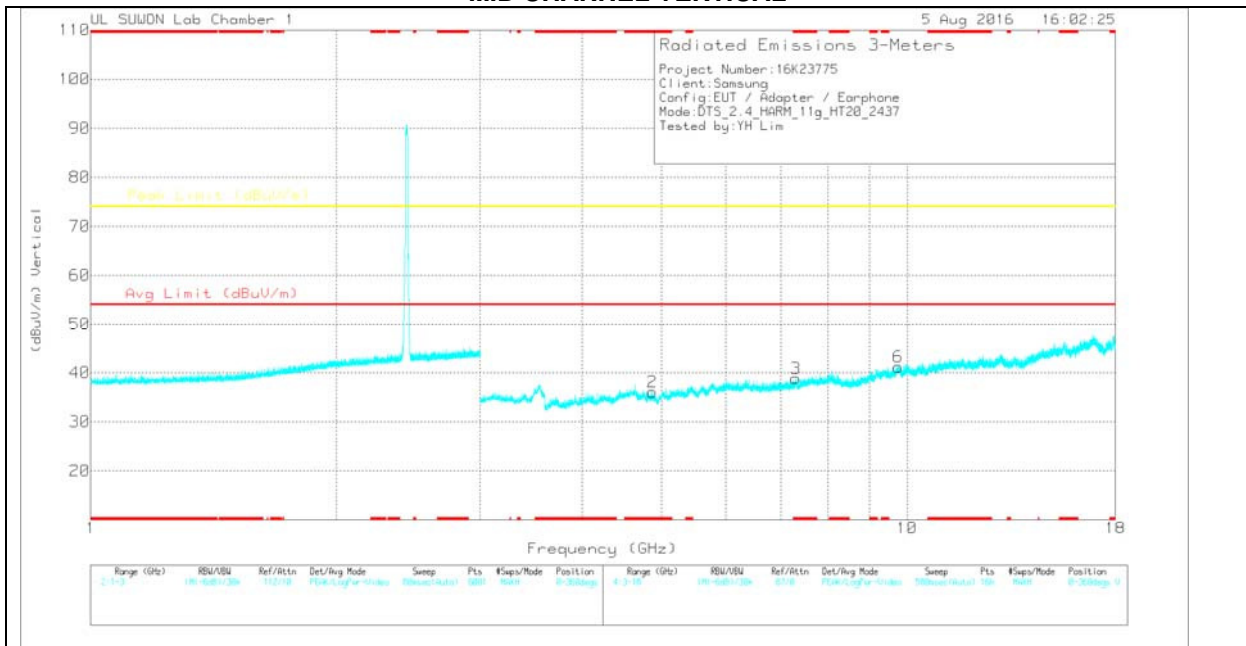
PK – Peak Detector

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

**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

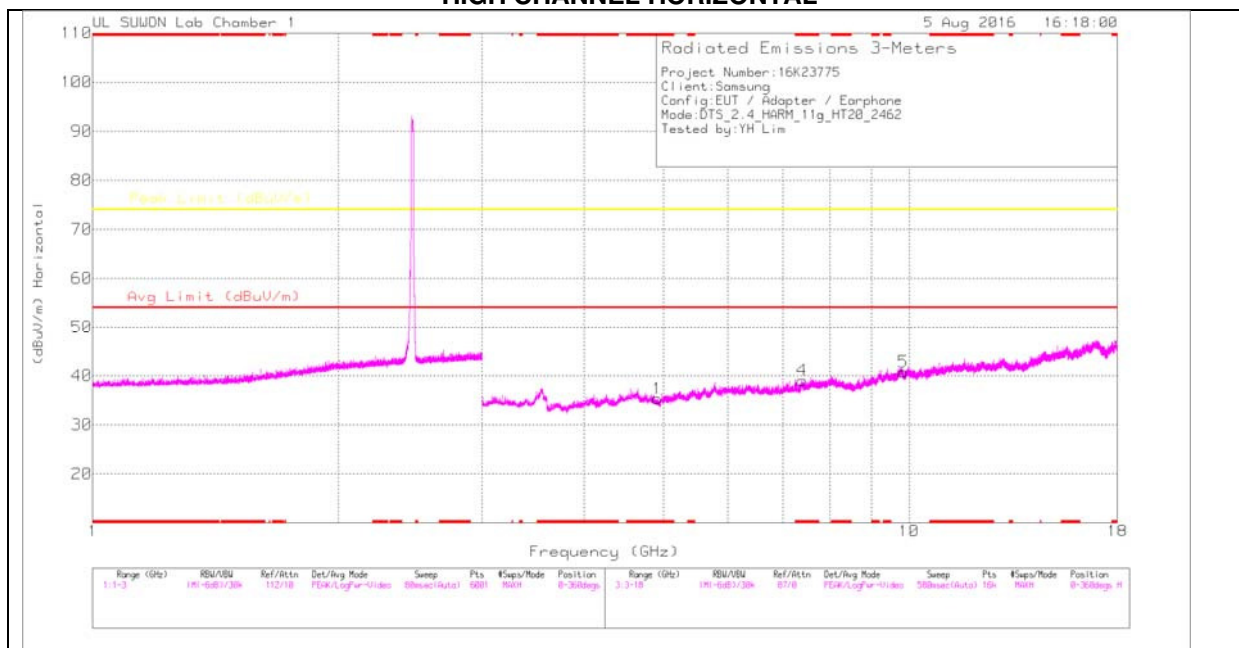
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.874	35.19	PK	34	-34	0	35.19	-	-	74	-38.81	0-360	250	H
4	* 7.308	34.18	PK	35.7	-30.9	0	38.98	-	-	74	-35.02	0-360	250	H
5	9.747	31.66	PK	37.2	-26.9	0	41.96	-	-	74	-32.04	0-360	250	H
2	* 4.876	36.08	PK	34	-34	0	36.08	-	-	74	-37.92	0-360	250	V
3	* 7.306	34.07	PK	35.7	-30.9	0	38.87	-	-	74	-35.13	0-360	250	V
6	9.75	30.79	PK	37.2	-26.8	0	41.19	-	-	74	-32.81	0-360	150	V

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

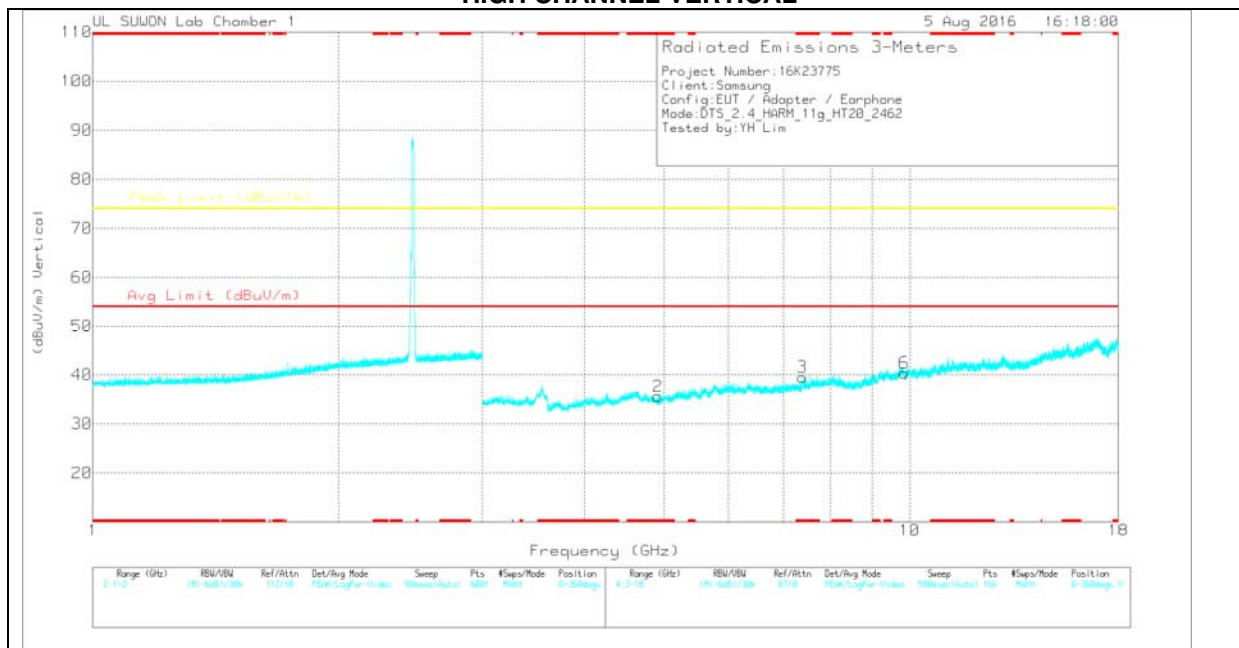
PK – Peak detector

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

### 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	* 4.917	35.39	PK	34	-34	0	35.39	-	-	74	-38.61	0-360	150	H
4	* 7.394	33.86	PK	35.8	-30.6	0	39.06	-	-	74	-34.94	0-360	250	H
5	9.843	30.99	PK	37.3	-27.5	0	40.79	-	-	74	-33.21	0-360	250	H
2	* 4.919	35.62	PK	34	-34	0	35.62	-	-	74	-38.38	0-360	150	V
3	* 7.383	34.44	PK	35.8	-30.7	0	39.54	-	-	74	-34.46	0-360	250	V
6	9.846	30.71	PK	37.3	-27.6	0	40.41	-	-	74	-33.59	0-360	250	V

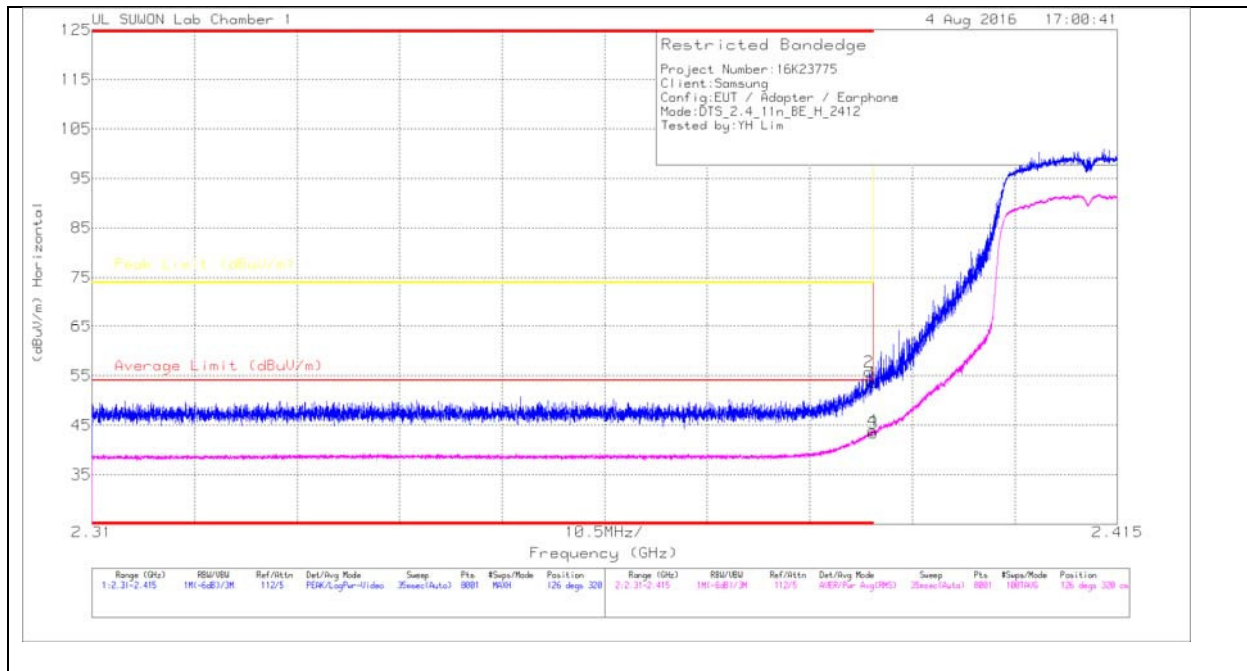
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

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

### 11.2.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### Trace Markers

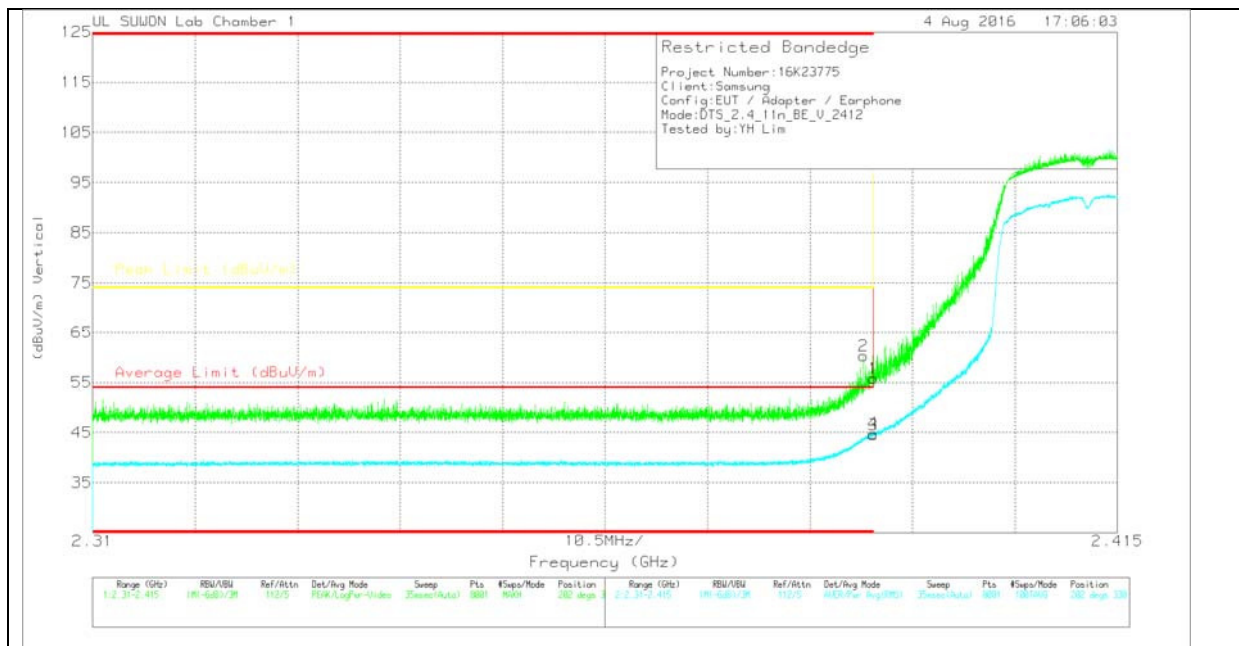
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17_150619)	Path_2	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	50.73	PK	31.8	-29	0	53.53	-	-	74	-20.47	126	320	H
2	* 2.39	53.01	PK	31.8	-29	0	55.81	-	-	74	-18.19	126	320	H
3	* 2.39	40.27	RMS	31.8	-29	.32	43.39	54	-10.61	-	-	126	320	H
4	* 2.39	40.74	RMS	31.8	-29	.32	43.86	54	-10.14	-	-	126	320	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	53.01	PK	31.8	-29	0	55.81	-	-	74	-18.19	202	330	V
2	* 2.389	57.53	PK	31.8	-29	0	60.33	-	-	74	-13.67	202	330	V
3	* 2.39	41.42	RMS	31.8	-29	.32	44.54	54	-9.46	-	-	202	330	V
4	* 2.39	41.71	RMS	31.8	-29	.32	44.83	54	-9.17	-	-	202	330	V

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

Pk - Peak detector

RMS - RMS detection