



**FCC CFR47 PART 15 SUBPART C  
INDUSTRY CANADA RSS-247 ISSUE 2**

**DTS Wireless LAN**

**CERTIFICATION TEST REPORT**

**FOR**

**DTS b/g/n Wrist device and BT/BLE**

**MODEL NUMBER : SM-R500, SM-R500X**

**FCC ID: A3LSMR500**

**IC: 649E-SMR500**

**REPORT NUMBER: 4788805488-E1V3**

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Testing  
Laboratory

**TL-637**

Revision History

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V1	01/09/19	Initial issue	Hoonpyo Lee
V2	01/10/19	Updated about the TCB's question.	Hoonpyo Lee
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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** DTS b/g/n Wrist device and BT/BLE  
**MODEL NUMBER:** SM-R500, SM-R500X  
**SERIAL NUMBER:** R3AKC0086QK, R3AKC0086EY, R3AKC0086YR (RADIATED);  
1991707 (CONDUCTED)  
**DATE TESTED:** JAN 02, 2019 - JAN 09, 2019

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 2	Pass
INDUSTRY CANADA RSS-GEN Issue 5	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:

Tested By:



SungGil Park  
Suwon Lab Engineer  
UL Korea, Ltd.

Hoonpyo Lee  
Suwon Lab Engineer  
UL Korea, Ltd.

## 2. TEST METHODOLOGY

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

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. IC RSS-GEN Issue 5
4. IC RSS-247 Issue 2
5. KDB 558074 D01 15.247 Meas Guidance v05.
6. 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
<input type="checkbox"/>	Chamber 3

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	3.86 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 DTS b/g/n Wrist device and BT/BLE.  
This test report addresses the DTS (WLAN) operational mode.

### 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 - 2472	802.11b	17.65	58.21
	802.11g	15.65	36.73
	802.11n HT20	14.36	27.29

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antennas, with a antenna's maximum gain of -3.61 dBi.

### 5.4. WORST-CASE CONFIGURATION AND MODE

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

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

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

Note : All radiated and power line conducted tests were performed connected with wireless charger for evaluation of worst case mode.



## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA50KWK	DK5K820VS/A-E	N/A
Wireless Charger	SAMSUNG	EP-QR500	N/A	A3LEPOR500

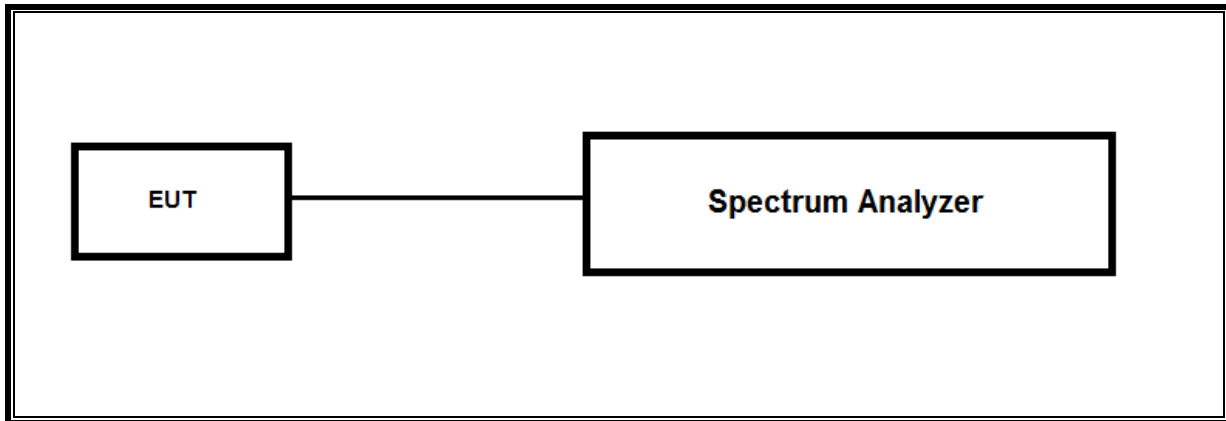
### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	NONE	1	Wireless	Shielded	1m	Charger to Wireless Charger

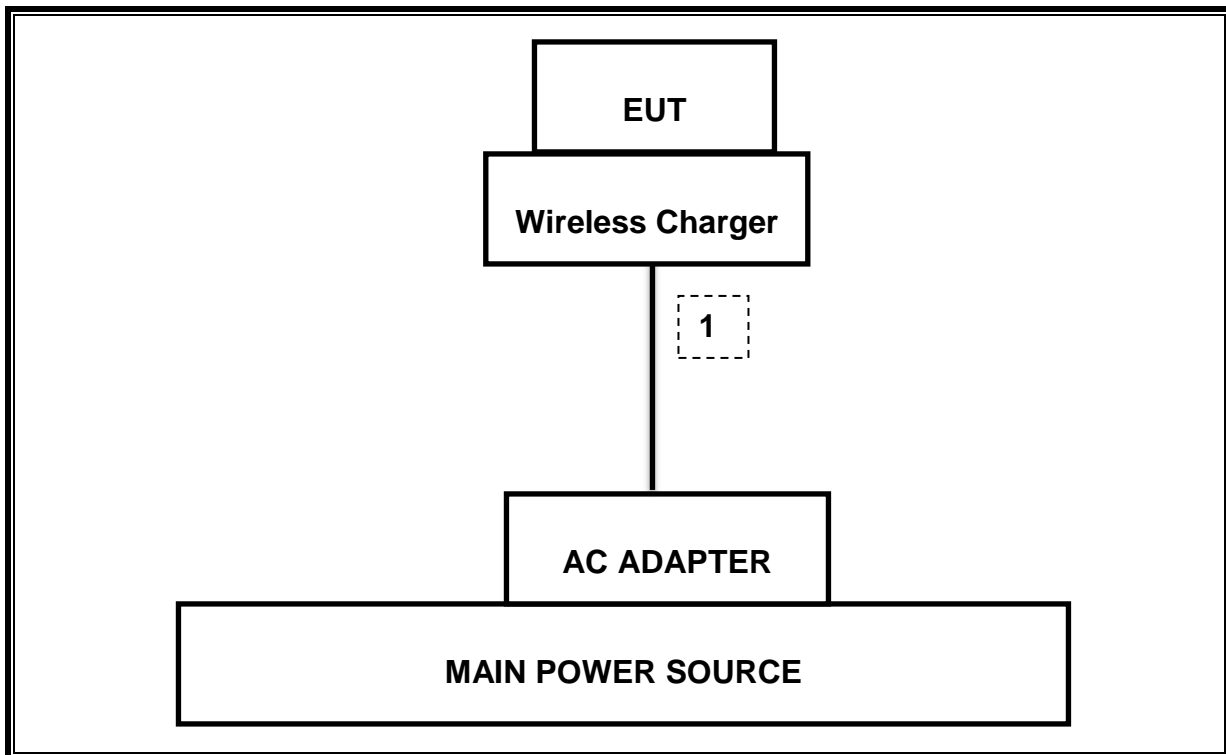
### TEST SETUP

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 (CONDUCTED TEST SETUP)**



**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



## 6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-09-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-19
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	08-06-19
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-07-19
Attenuator	PASTERNAK	PE7087-10	A001	08-08-19
Attenuator	PASTERNAK	PE7087-10	A008	08-08-19
Attenuator	PASTERNAK	PE7004-10	2	08-07-19
Attenuator	PASTERNAK	PE7087-10	A009	08-08-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-06-19
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-06-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-06-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-06-19
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-26-19
LISN	R&S	ENV-216	101837	08-09-19
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

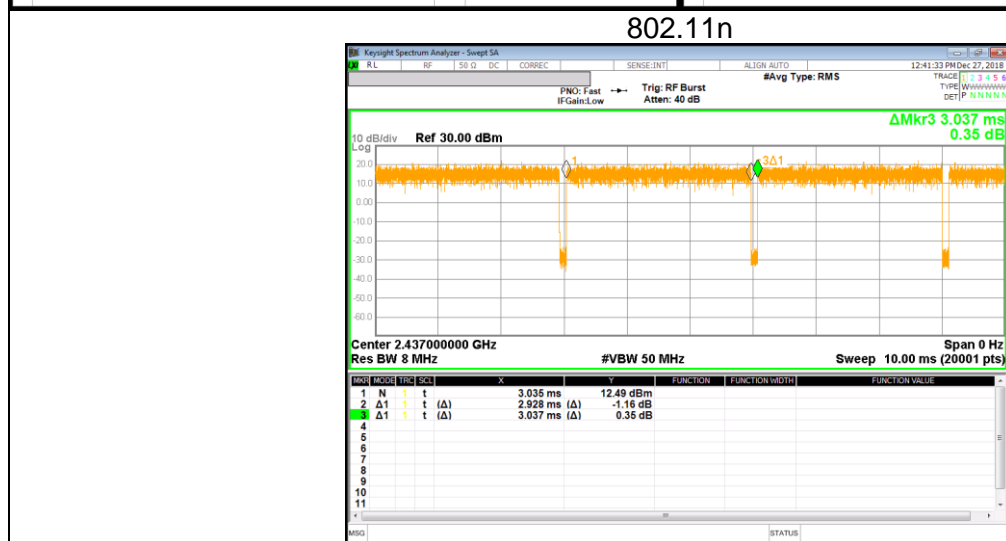
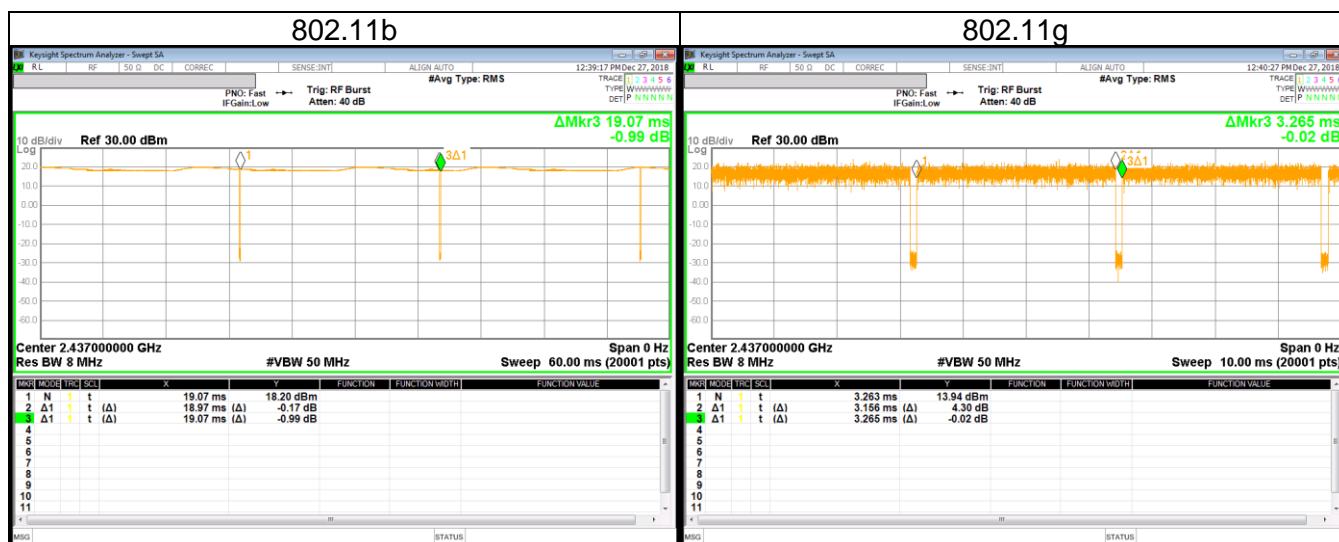
## 7. REFERENCE MEASUREMENT RESULTS

### 7.1. ON TIME AND DUTY CYCLE RESULTS

#### LIMITS

None; for reporting purposes only.

Mode	On Time [mS]	Period [mS]	Duty Cycle X [linear]	Duty Cycle X [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
802.11b	18.970	19.070	0.995	99.5	0.00	0.010
802.11g	3.156	3.265	0.967	96.7	0.15	0.317
802.11n HT20	2.928	3.037	0.964	96.4	0.16	0.342



## 7.1. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

### RESULTS

#### 7.1.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
1	2412	11.705
6	2437	11.803
11	2462	11.832
12	2467	10.989
13	2472	10.681
Worst		<b>11.832</b>

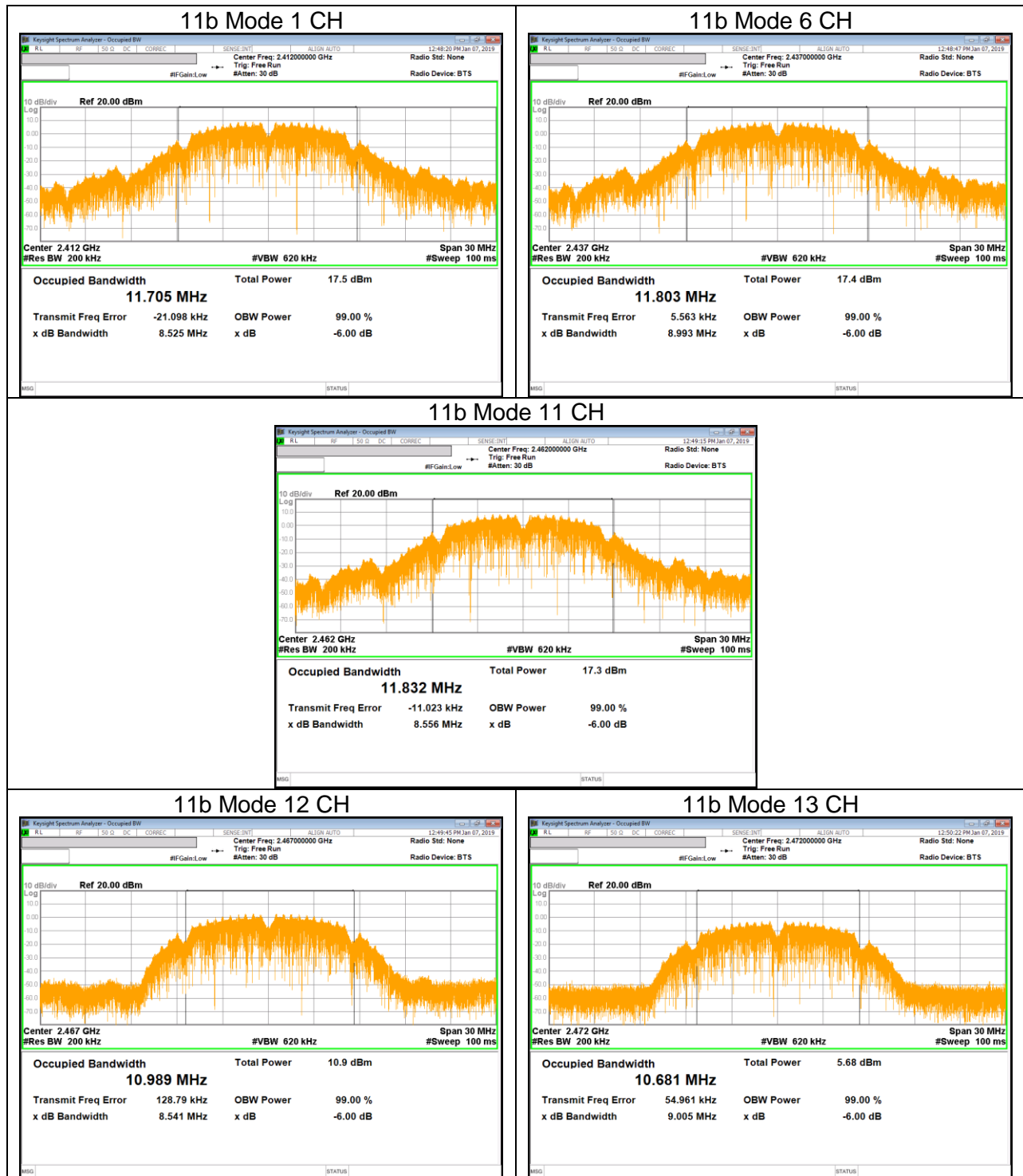
#### 7.1.2. 802.11g MODE IN THE 2.4 GHz BAND

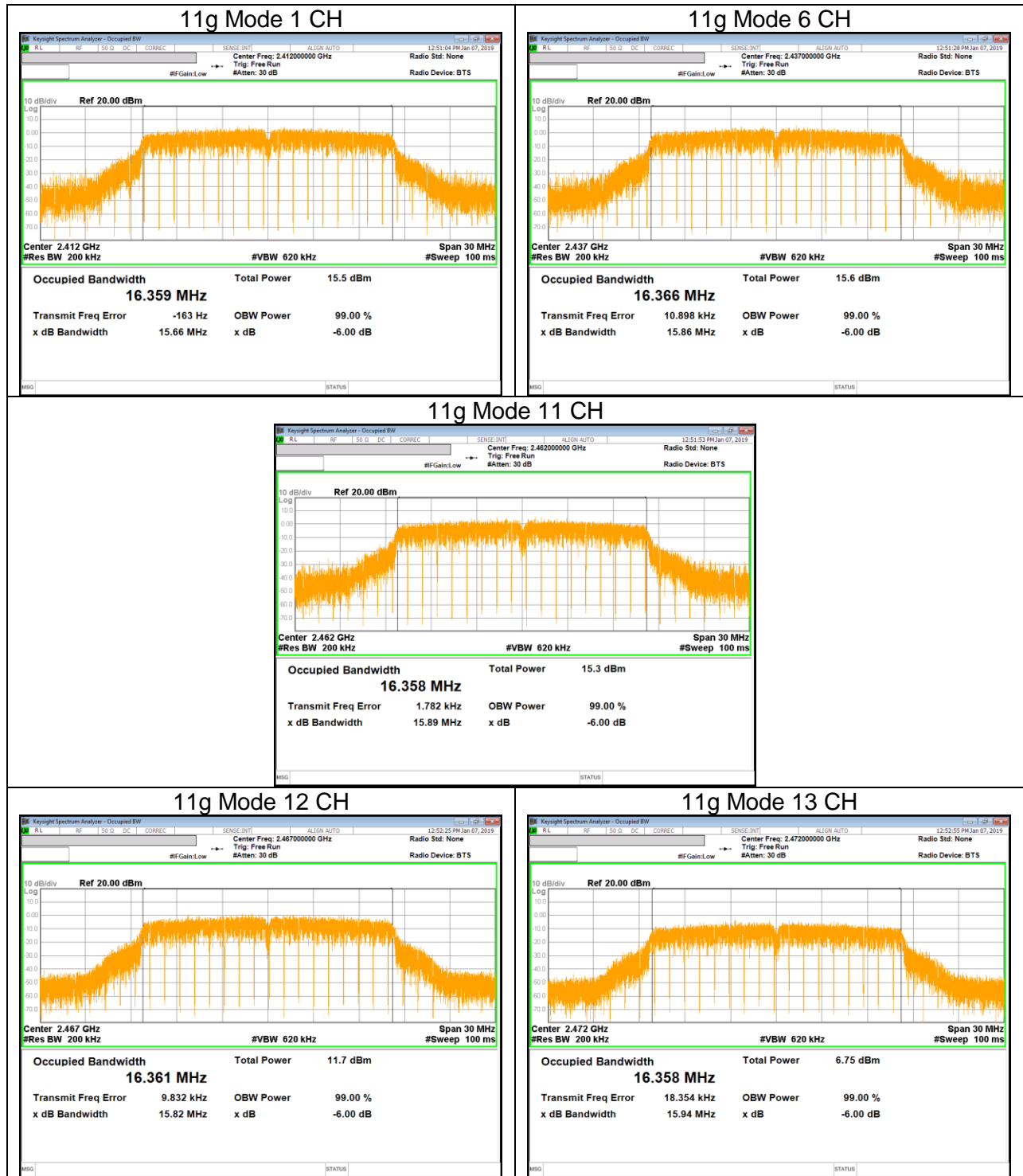
Channel	Frequency [MHz]	6 dB Bandwidth [MHz]
1	2412	16.359
6	2437	16.366
11	2462	16.358
12	2467	16.361
13	2472	16.358
Worst		<b>16.366</b>

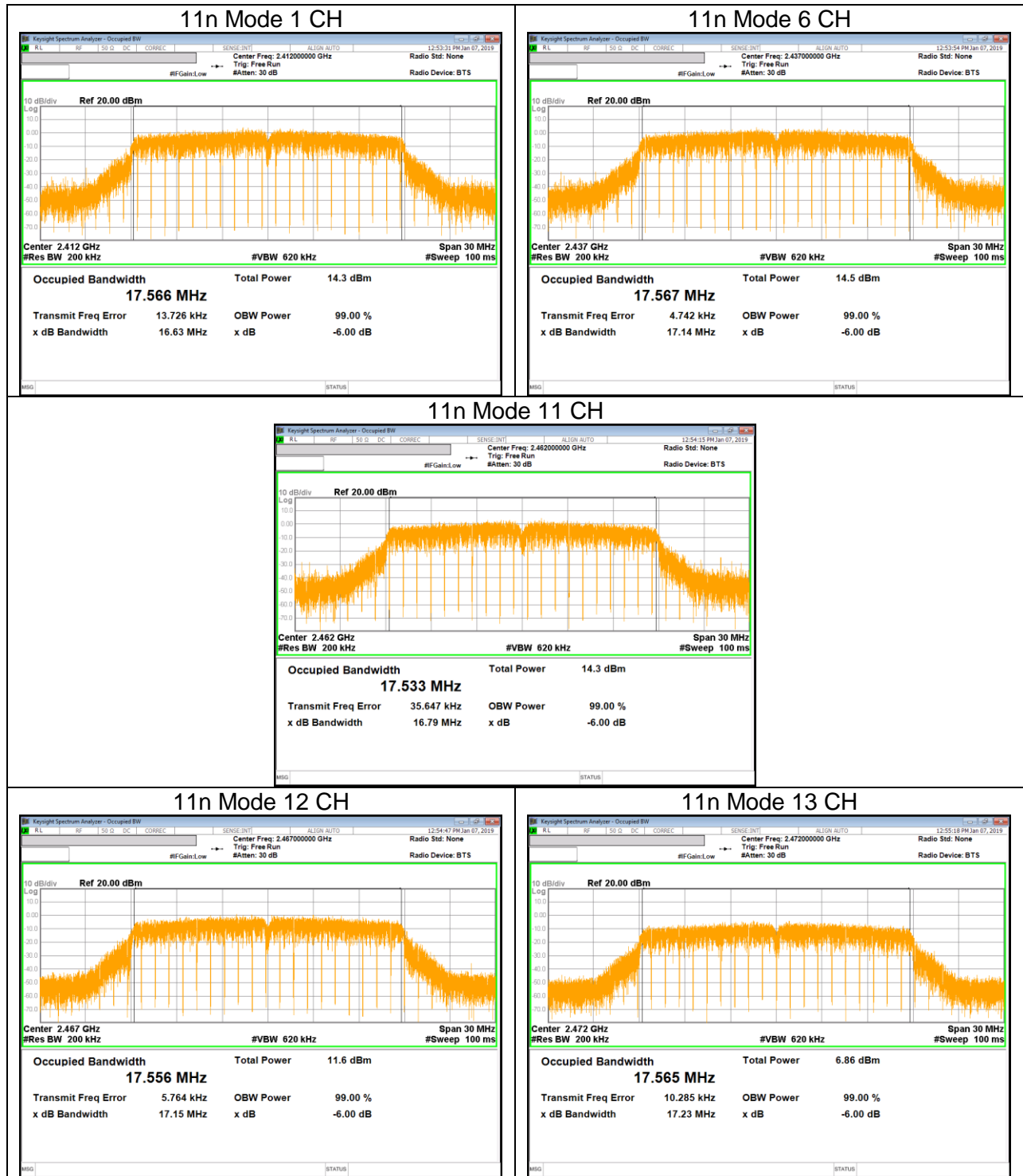
#### 7.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]
1	2412	17.566
6	2437	17.567
11	2462	17.533
12	2467	17.556
13	2472	17.565
Worst		<b>17.567</b>

### 7.1.4. 99% BANDWIDTH PLOTS









## 8. MEASUREMENT METHODS

6 dB BW : KDB 558074 D01 v05, Section 8.2.

OUTPUT POWER : KDB 558074 D01 v05, Section 8.3.2.3.

POWER SPECTRAL DENSITY : KDB 558074 D01 v05, Section 8.4.

Out-of-band EMISSIONS (Conducted) : KDB 558074 D01 v05, Section 8.5, 8.7.

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: KDB 558074 D01 v05, Section 8.5.

Out-of-band EMISSIONS IN RESTRICTED BANDS : KDB 558074 D01 v05, Section 8.6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.

## 9. SUMMARY TABLE

FCC Part Section	IC Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	RSS-247 5.2(a)	Occupied Band width (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-30dBc		Pass
15.247 (b)(3)	RSS-247 5.4(d)	TX conducted output power	<30dBm		Pass
15.247 (e)	RSS-247 5.2(b)	PSD	<8dBm		Pass
15.207 (a)	RSS-GEN Clause 8.8	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass
15.205, 15.209	RSS-GEN Clause 7 & 8.9	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

## 10. ANTENNA PORT TEST RESULTS

### 10.1. 6 dB BANDWIDTH

#### LIMITS

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

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

#### TEST PROCEDURE

Reference to KDB 558074 D01 15.247 Meas Guidance v05: 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]
1	2412	8.543	0.5
6	2437	9.008	0.5
11	2462	8.539	0.5
12	2467	8.079	0.5
13	2472	8.559	0.5
Worst		<b>8.079</b>	0.5

**10.1.2.802.11g MODE IN THE 2.4 GHz BAND**

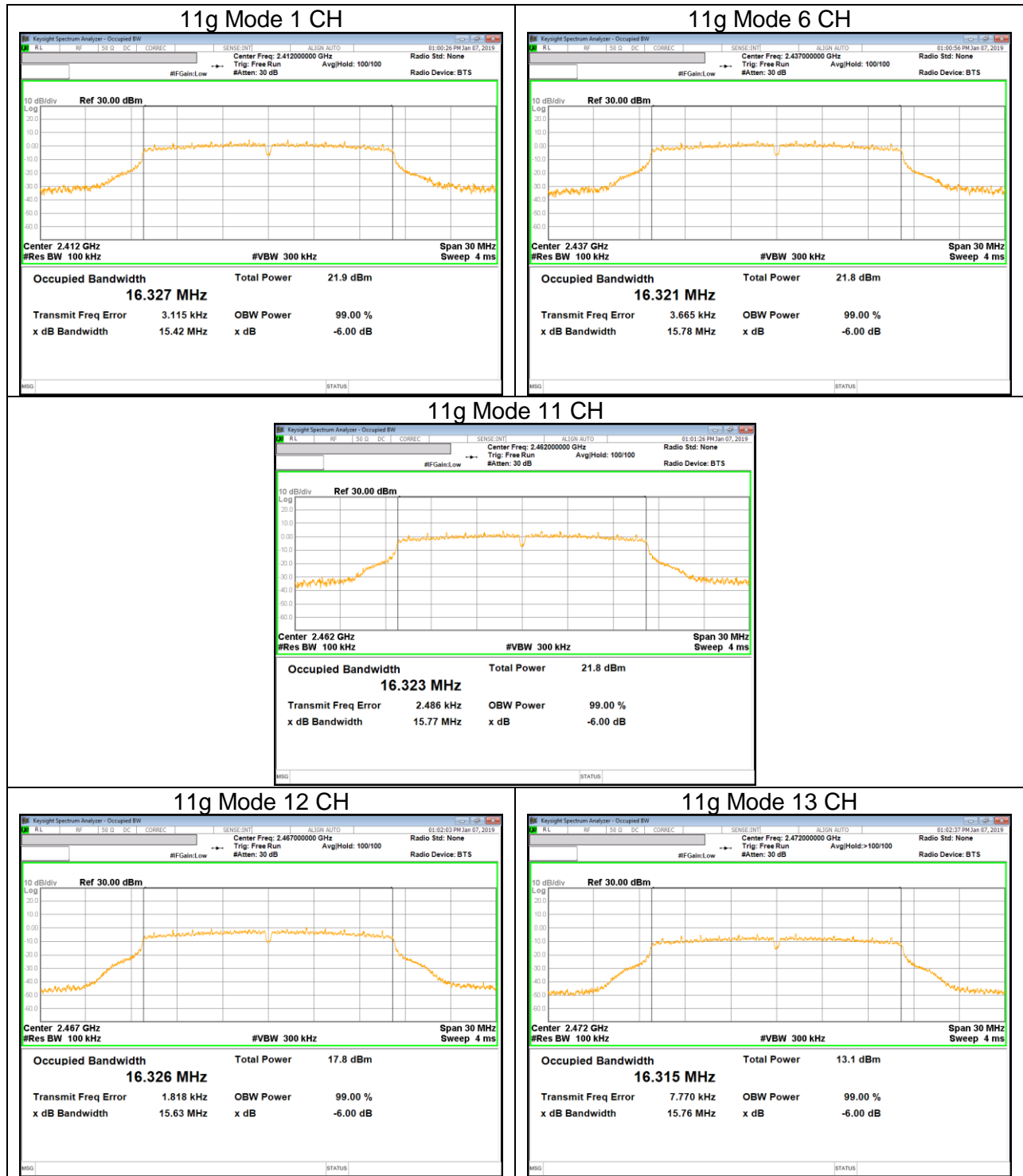
Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	2412	15.420	0.5
6	2437	15.780	0.5
11	2462	15.770	0.5
12	2467	15.630	0.5
13	2472	15.760	0.5
Worst		<b>15.420</b>	0.5

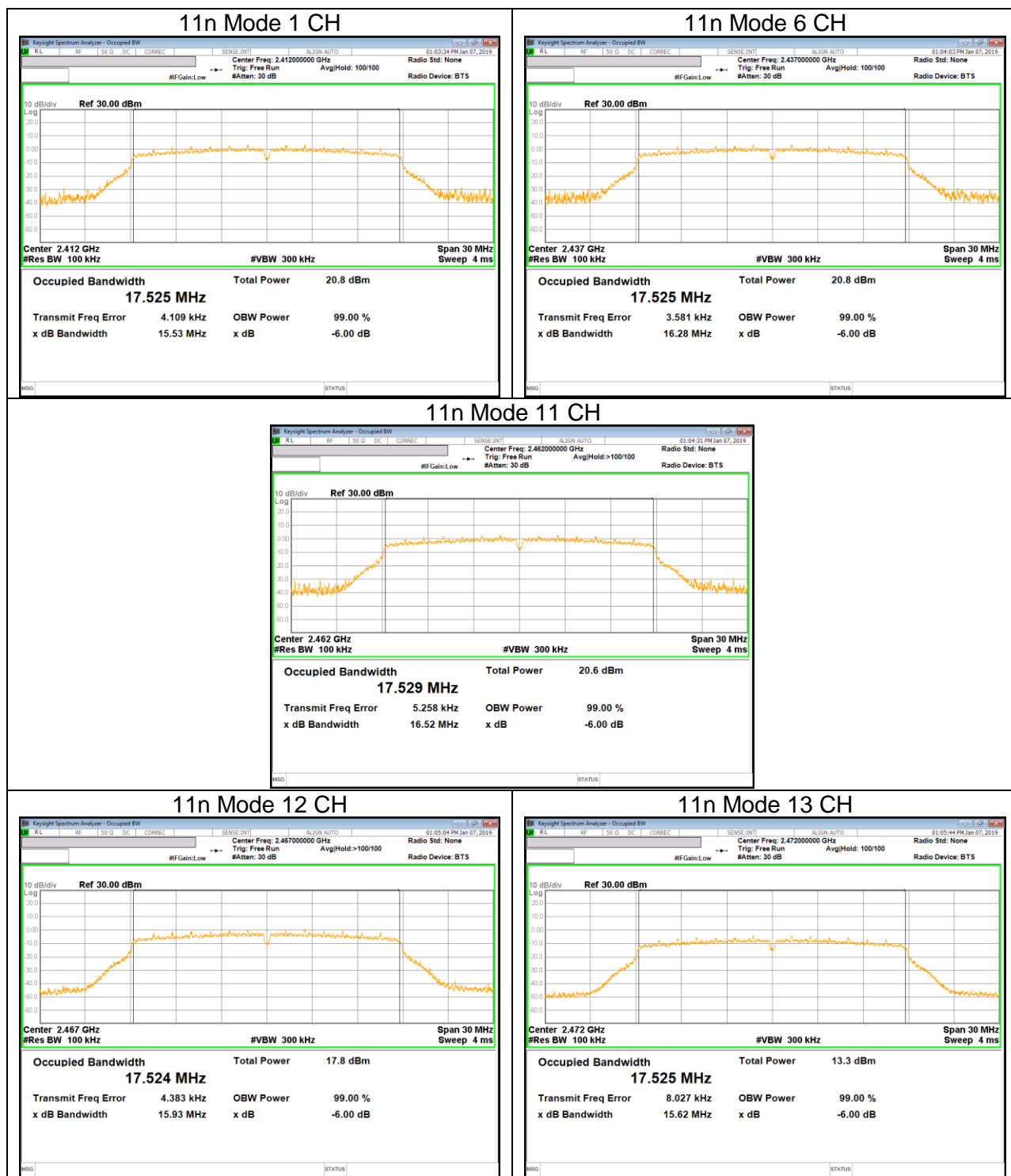
**10.1.3.802.11n HT20 MODE IN THE 2.4 GHz BAND**

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	2412	15.530	0.5
6	2437	16.280	0.5
11	2462	16.520	0.5
12	2467	15.930	0.5
13	2472	15.620	0.5
Worst		<b>15.530</b>	0.5

### 10.1.4. 6 dB BANDWIDTH PLOTS







## 10.2. OUTPUT POWER

### LIMITS

FCC §15.247 / IC RSS-247 §5.4 (d)

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 was entered as an offset in the power meter to allow for direct reading of power.

Output power measurement was performed utilizing the 8.3.2.3 under KDB558074 D01 15.247 Meas Guidance.

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

#### Limits

Frequency Range [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
2412 - 2472	-3.61	30.00	30.00



### 10.2.1.802.11b MODE IN THE 2.4 GHZ BAND

#### Output Power Results

Mode	Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Margin [dB]
802.11b	1	2412	17.65	30.00	-12.35
	6	2437	17.42	30.00	-12.58
	11	2462	17.25	30.00	-12.75
	12	2467	10.76	30.00	-19.24
	13	2472	5.72	30.00	-24.28
Worst Case				30.00	-12.35

### 10.2.2.802.11g MODE IN THE 2.4 GHZ BAND

#### Output Power Results

Mode	Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Margin [dB]
802.11g	1	2412	15.65	30.00	-14.35
	6	2437	15.58	30.00	-14.42
	11	2462	15.48	30.00	-14.52
	12	2467	11.68	30.00	-18.32
	13	2472	6.87	30.00	-23.13
Worst Case				30.00	-14.35

### 10.2.3.802.11n HT20 MODE IN THE 2.4 GHZ BAND

#### Output Power Results

Mode	Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Margin [dB]
802.11n (HT20)	1	2412	14.32	30.00	-15.68
	6	2437	14.36	30.00	-15.64
	11	2462	14.26	30.00	-15.74
	12	2467	11.51	30.00	-18.49
	13	2472	6.77	30.00	-23.23
Worst Case				30.00	-15.64

### **10.3. PSD**

#### **LIMITS**

FCC §15.247 / IC RSS-247 §5.2 (b)

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 section 8.4 under KDB558074 D01 15.247 Meas Guidance.

**RESULTS**

**10.3.1.802.11b MODE IN THE 2.4 GHZ BAND**

PSD Results

Mode	Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
802.11b	1	2412	-13.863	0.00	<b>-13.863</b>	8.00	<b>-21.863</b>
	6	2437	-14.155	0.00	-14.155	8.00	-22.155
	11	2462	-14.022	0.00	-14.022	8.00	-22.022
	12	2467	-20.693	0.00	-20.693	8.00	-28.693
	13	2472	-25.785	0.00	-25.785	8.00	-33.785

**10.3.2.802.11g MODE IN THE 2.4 GHZ BAND**

PSD Results

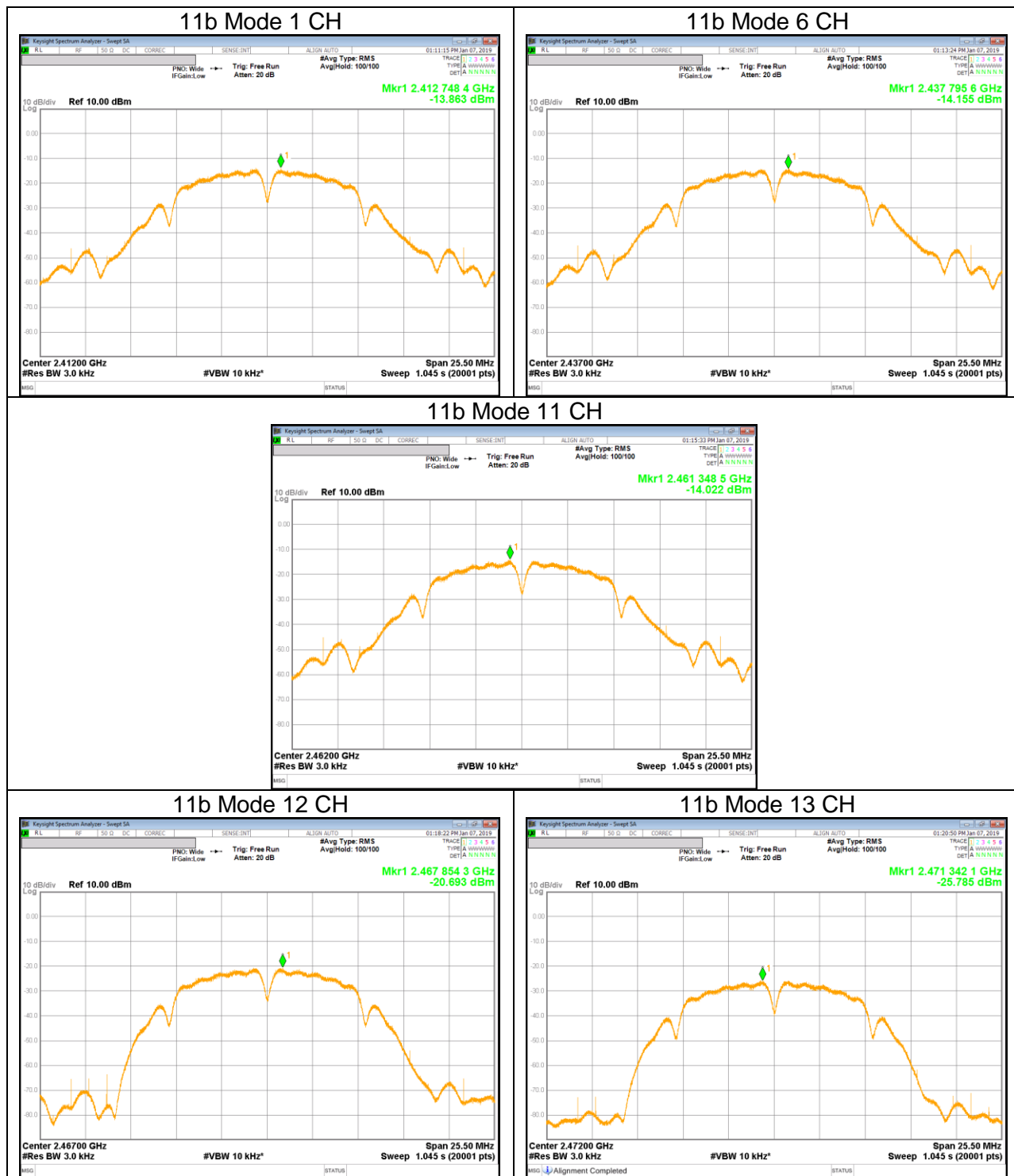
Mode	Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
802.11g	1	2412	-16.302	0.15	-16.152	8.00	-24.152
	6	2437	-16.086	0.15	<b>-15.936</b>	8.00	<b>-23.936</b>
	11	2462	-16.528	0.15	-16.378	8.00	-24.378
	12	2467	-20.483	0.15	-20.333	8.00	-28.333
	13	2472	-25.075	0.15	-24.925	8.00	-32.925

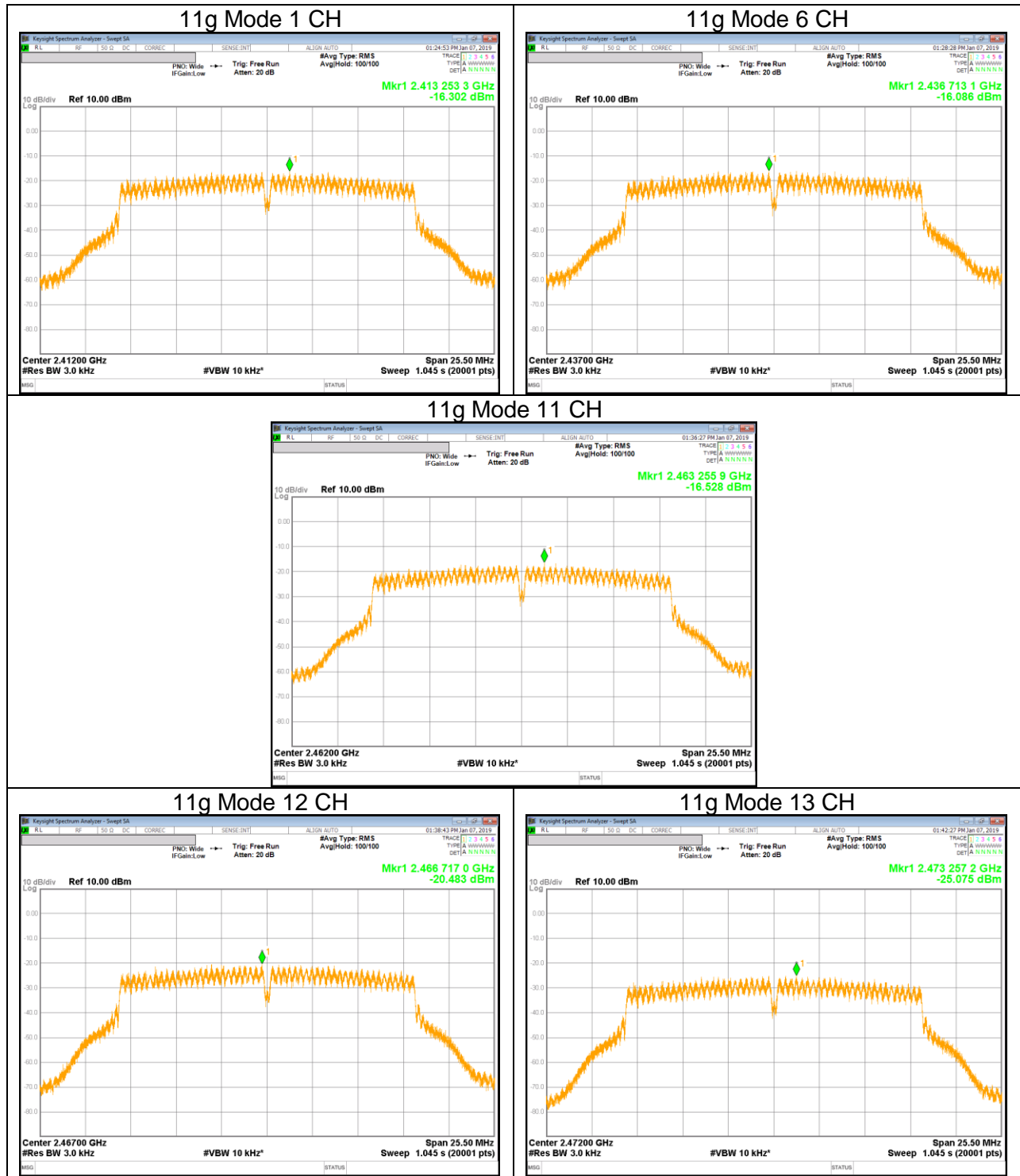
**10.3.3.802.11n HT20 MODE IN THE 2.4 GHZ BAND**

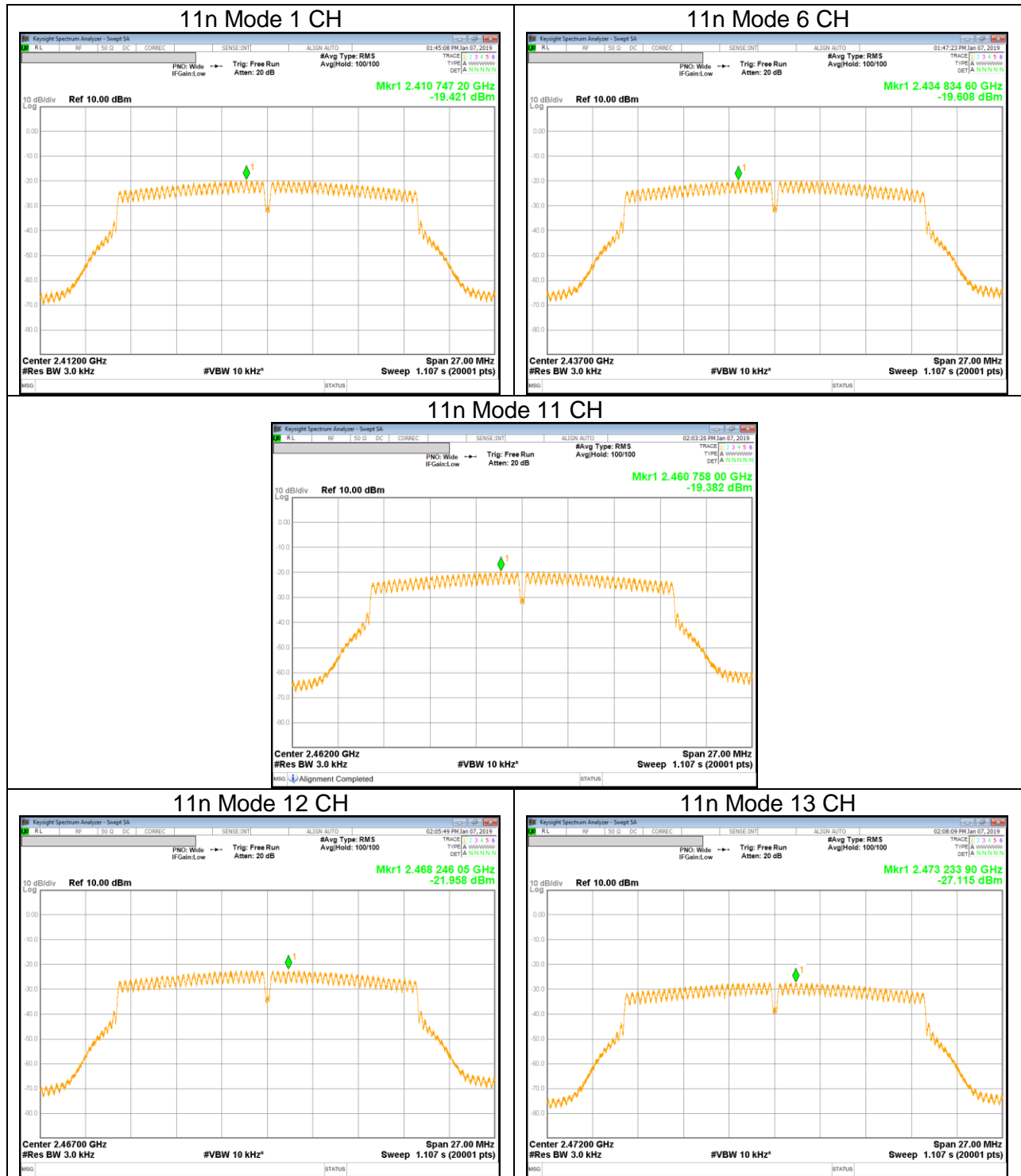
PSD Results

Mode	Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
802.11n (HT20)	1	2412	-19.421	0.16	-19.261	8.00	-27.261
	6	2437	-19.608	0.16	-19.448	8.00	-27.448
	11	2462	-19.382	0.16	<b>-19.222</b>	8.00	<b>-27.222</b>
	12	2467	-21.958	0.16	-21.798	8.00	-29.798
	13	2472	-27.115	0.16	-26.955	8.00	-34.955

### 10.3.4.PSD PLOTS







## 10.4. OUT-OF-BAND EMISSIONS

### LIMITS

FCC §15.247 (d) / IC RSS-247 §5.5

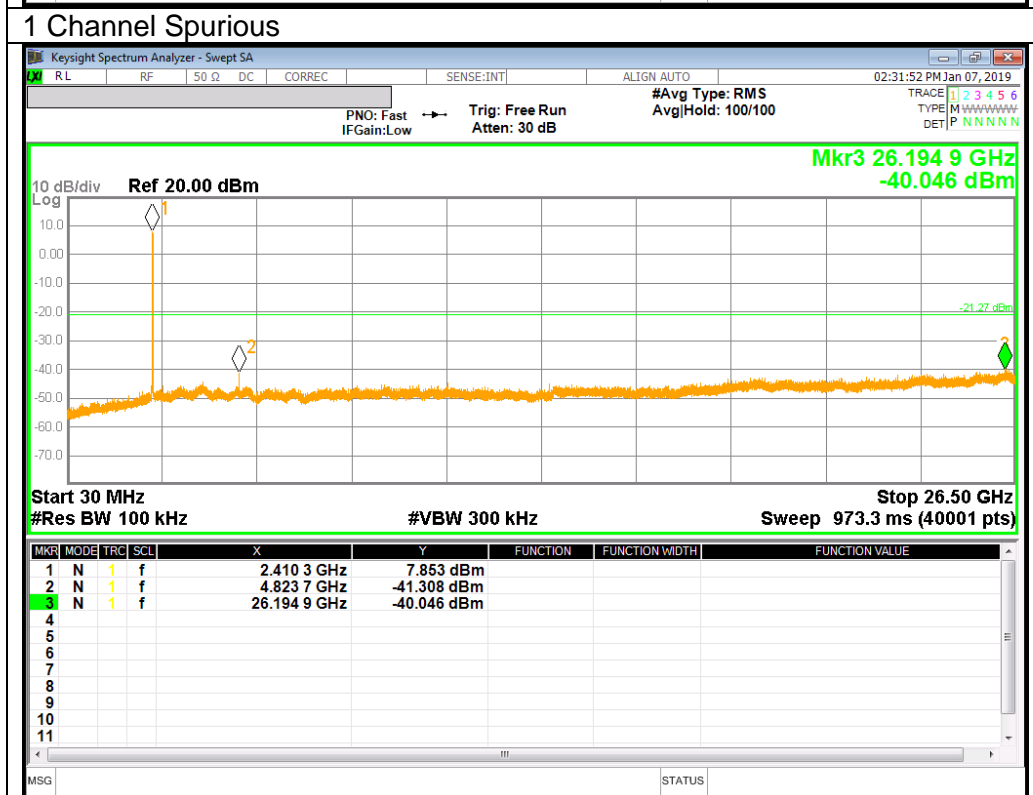
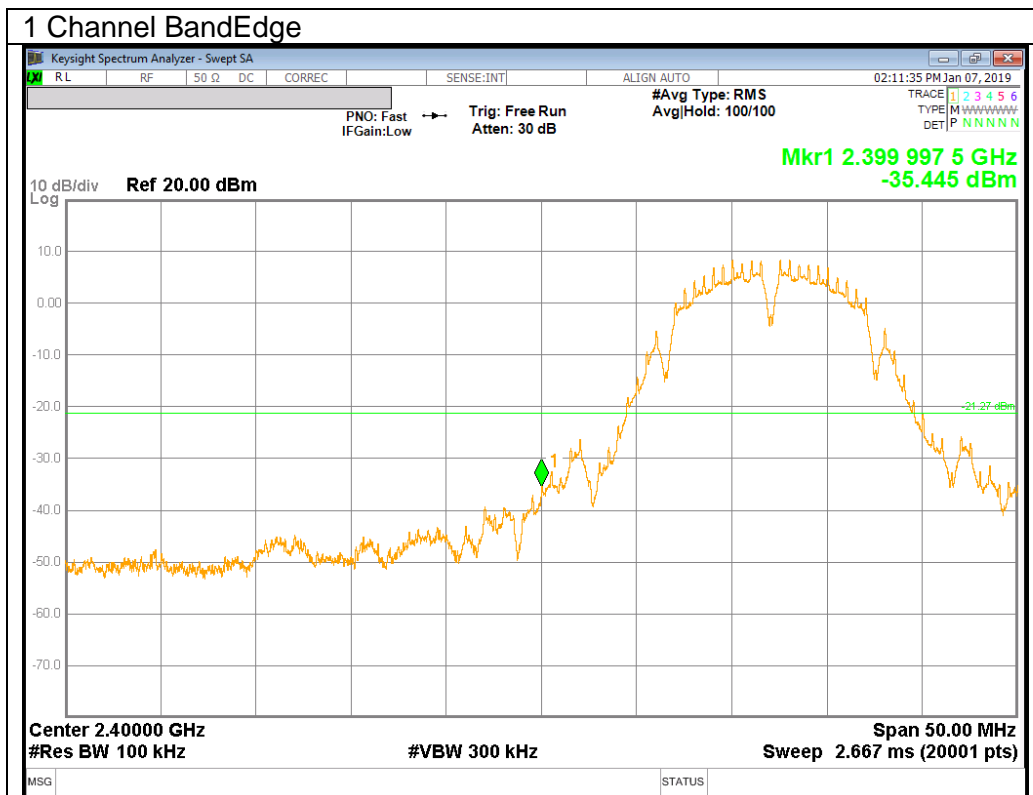
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

### TEST PROCEDURE

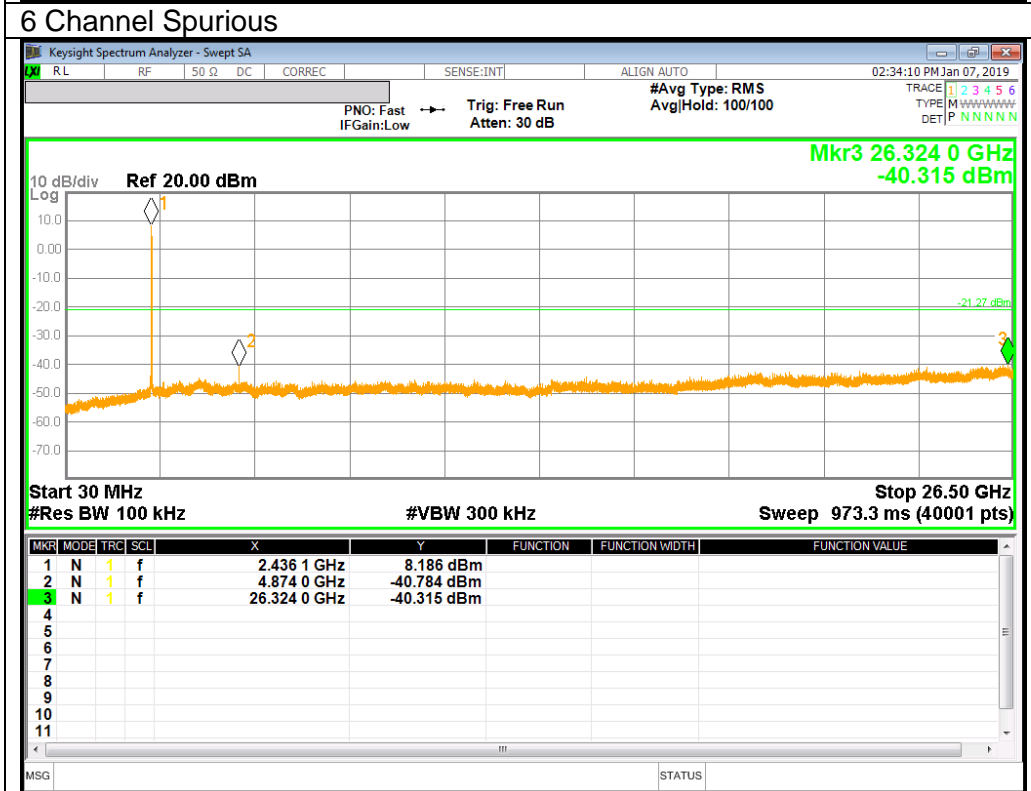
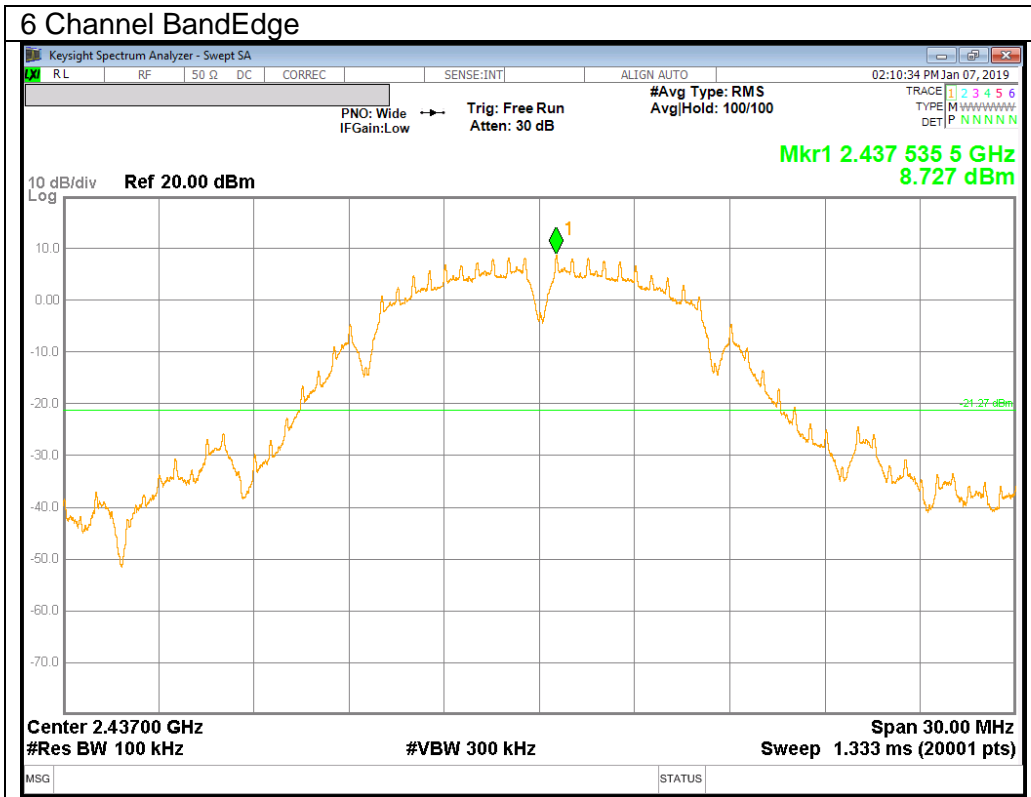
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge, out-of-band emissions (where measurements to the general radiated limits will not be made)

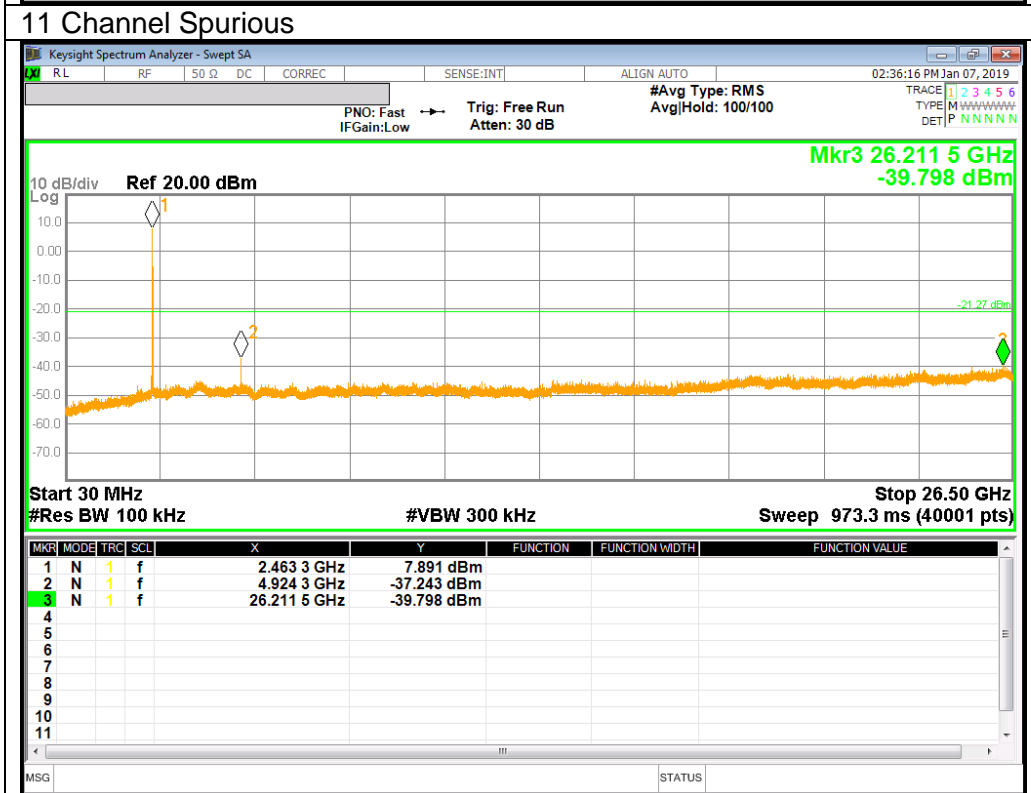
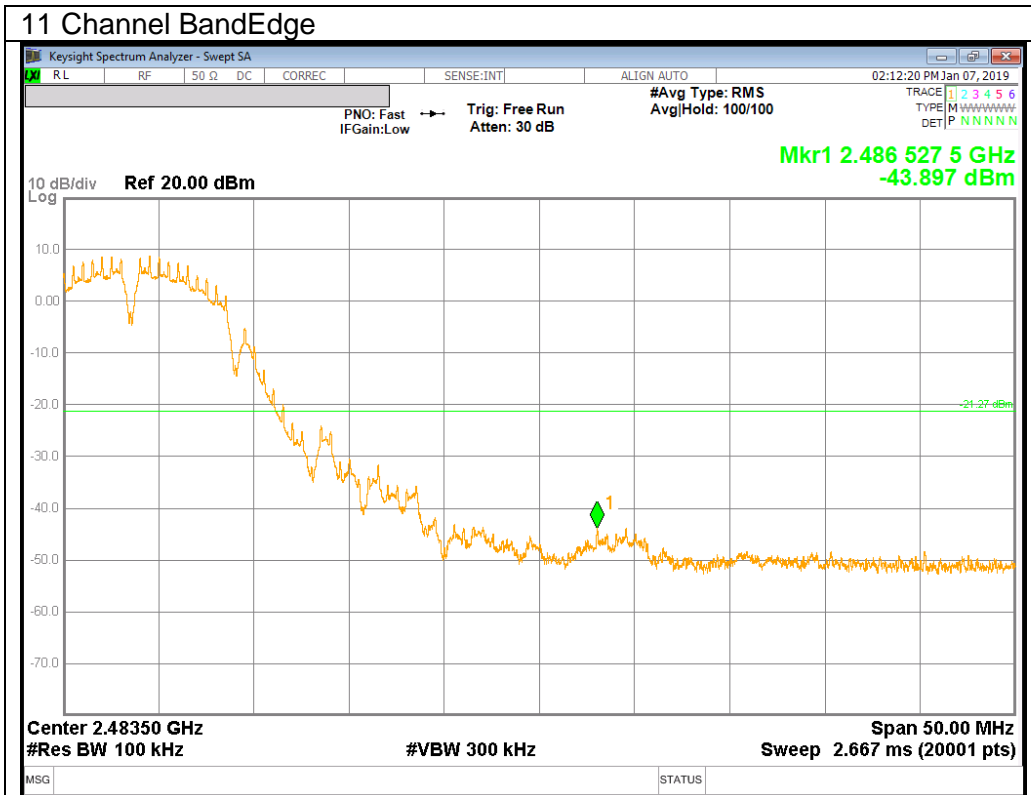
**RESULTS**

**10.4.1.802.11b MODE IN THE 2.4 GHz BAND**

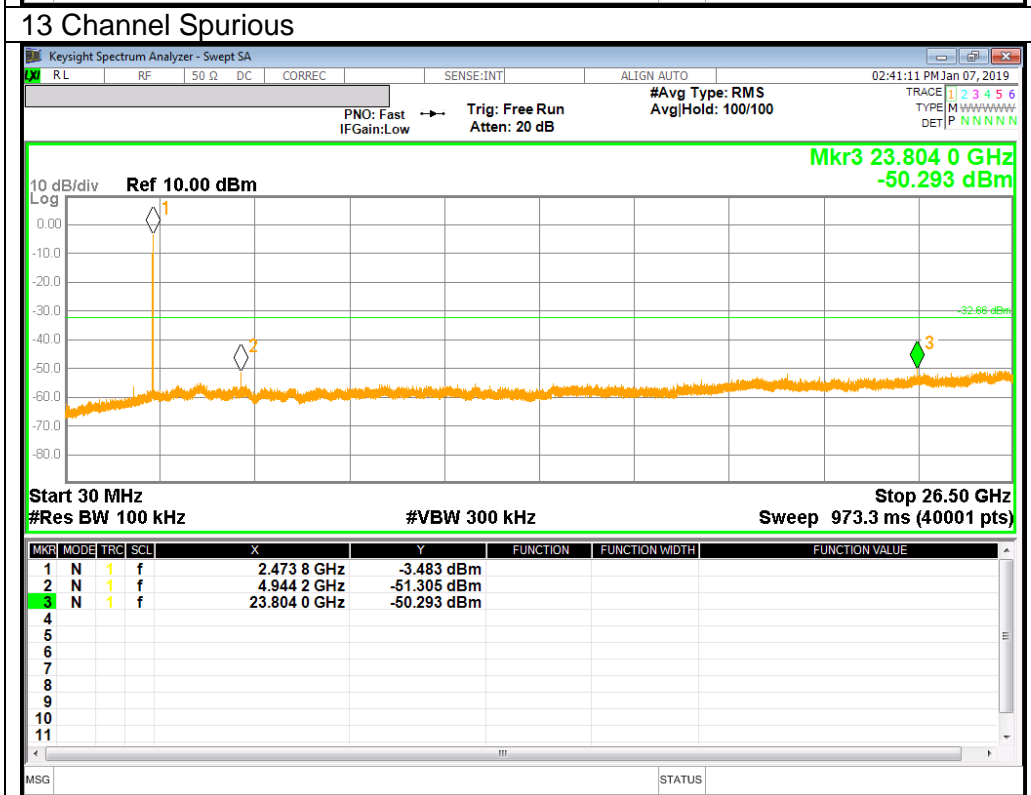
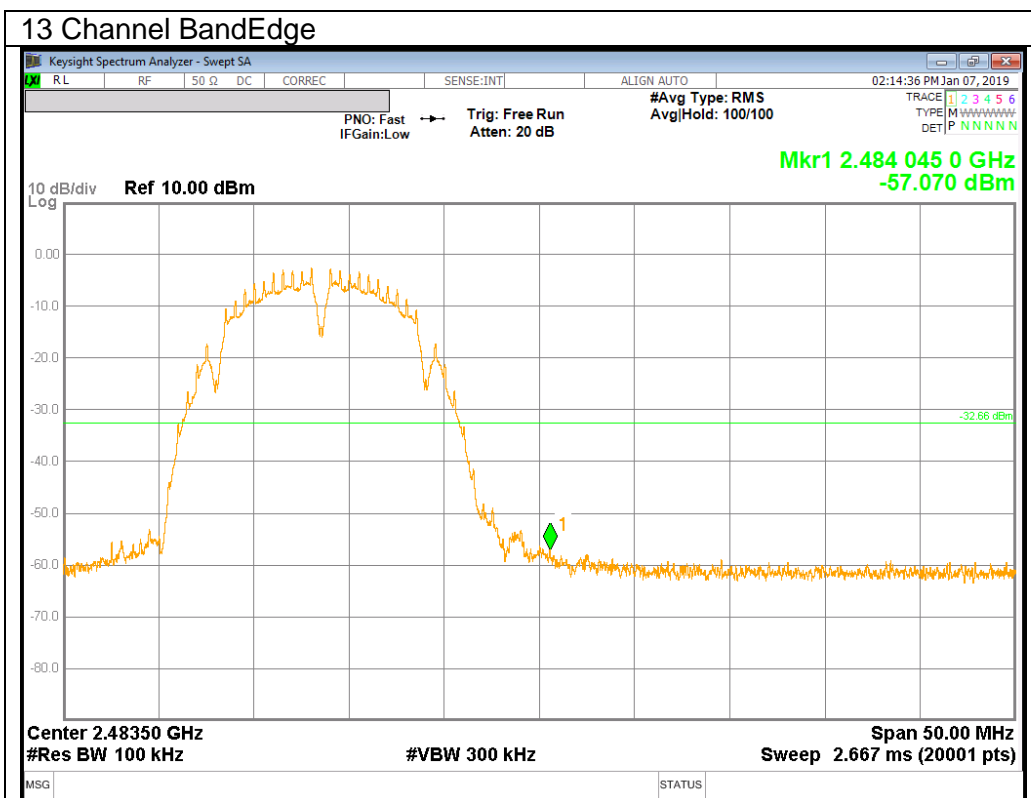




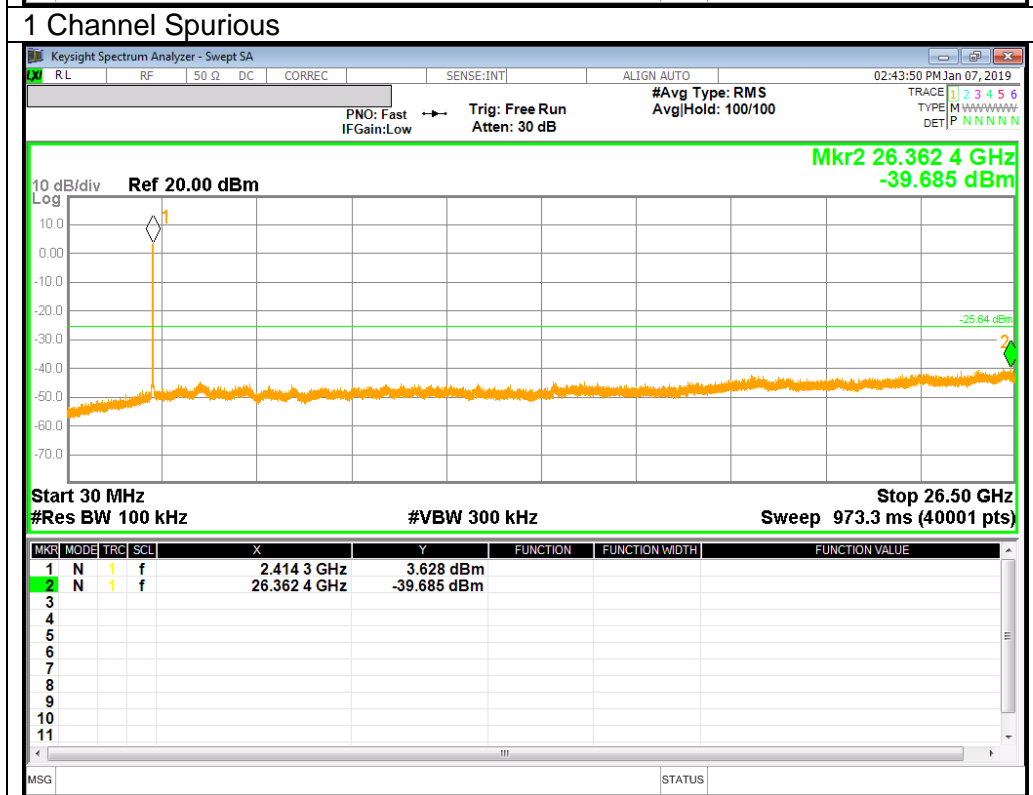
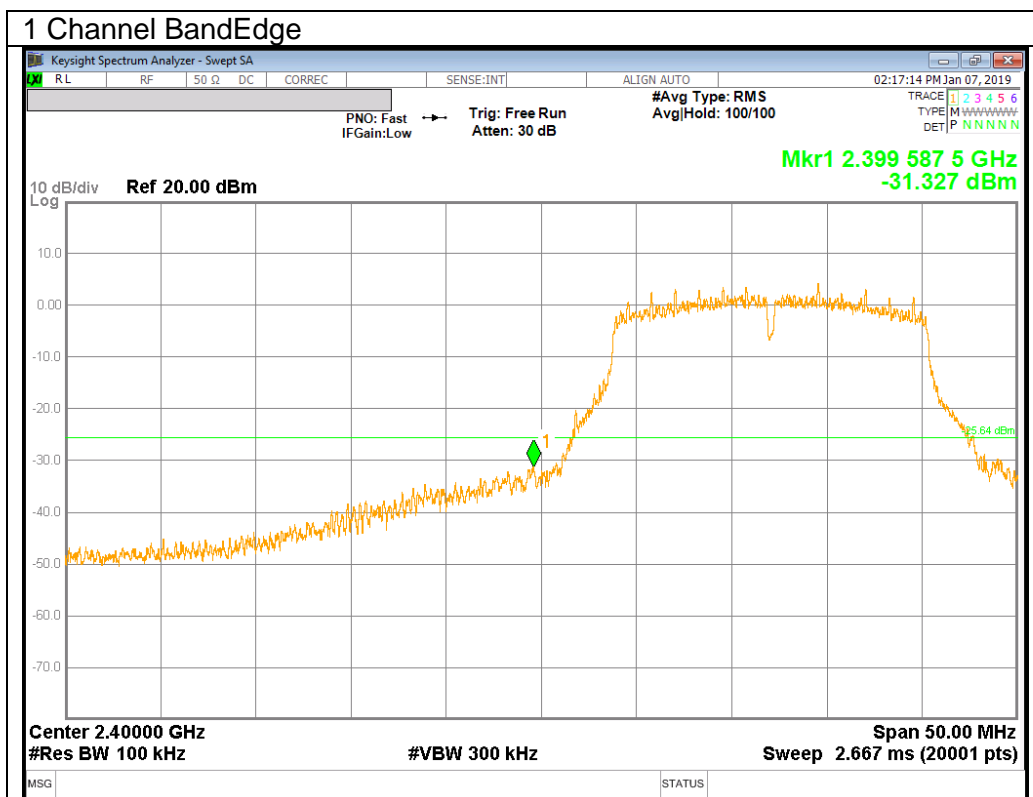


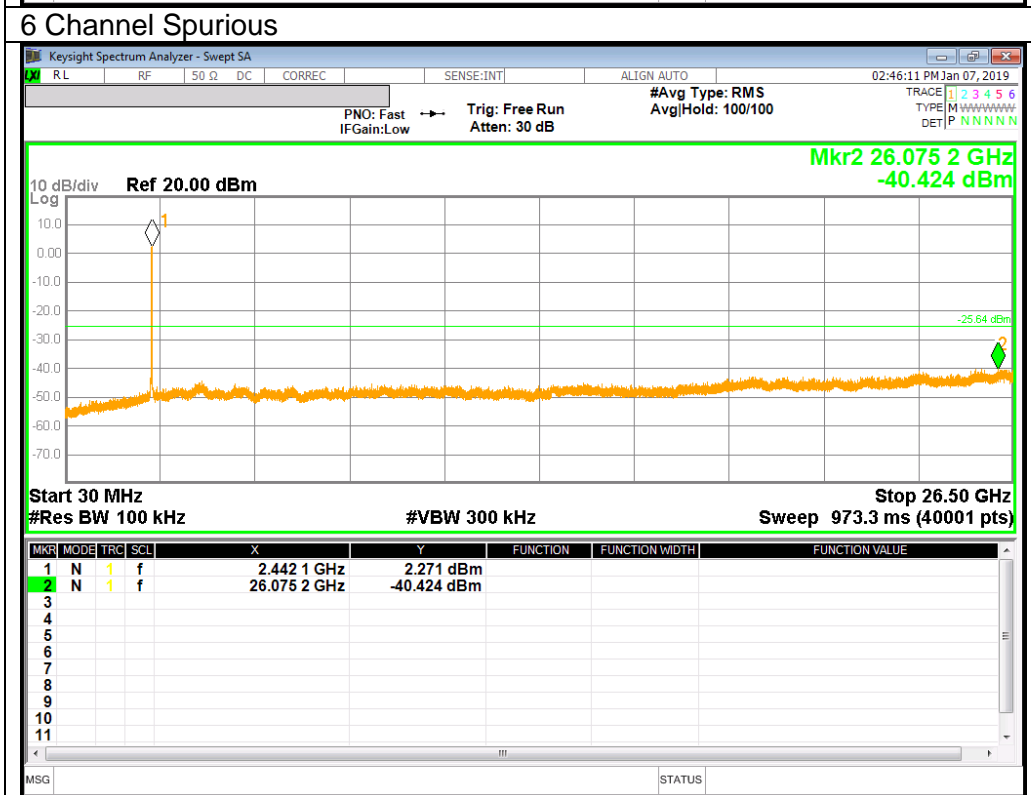
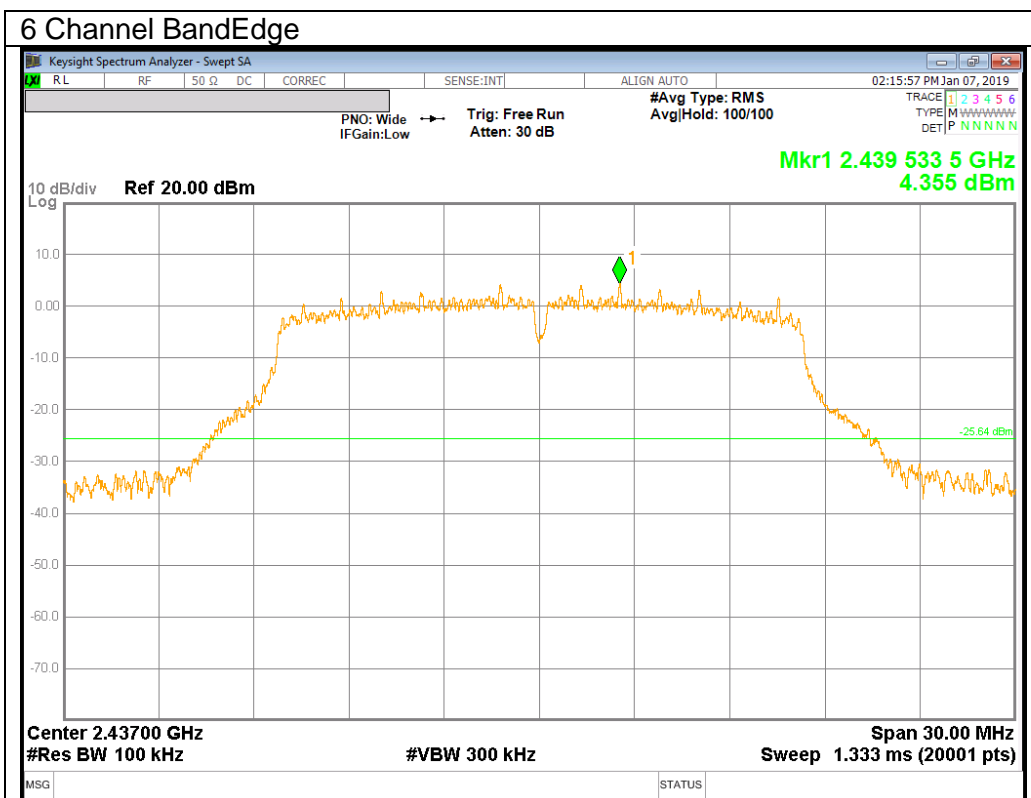


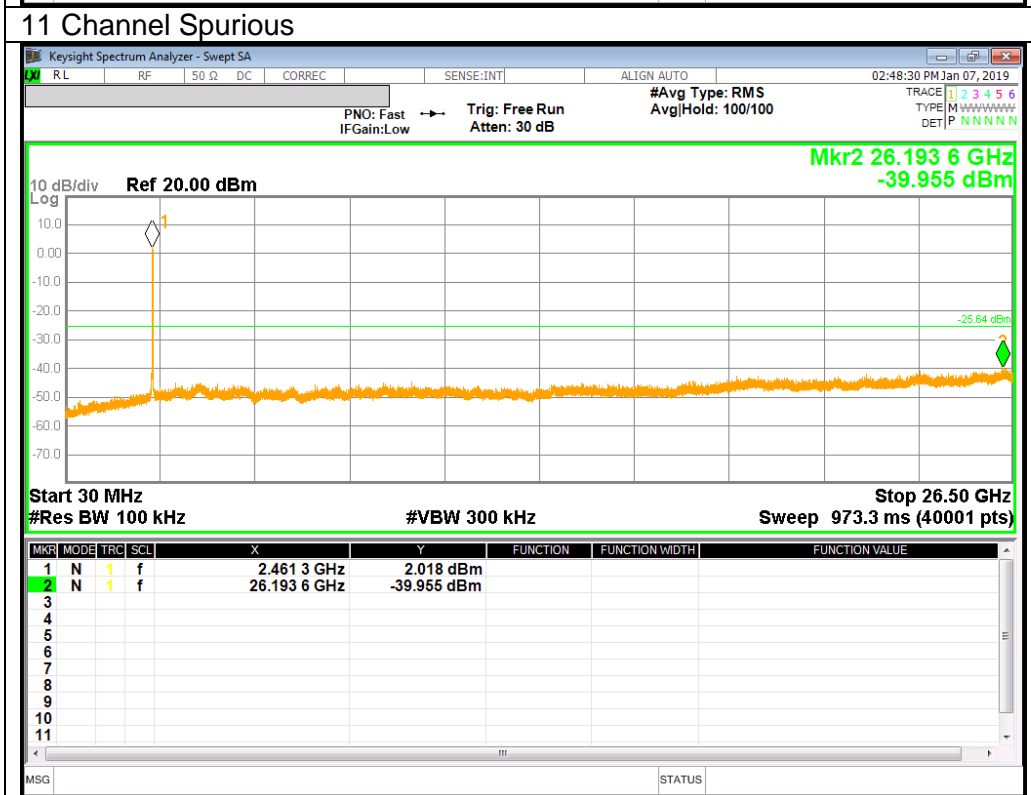
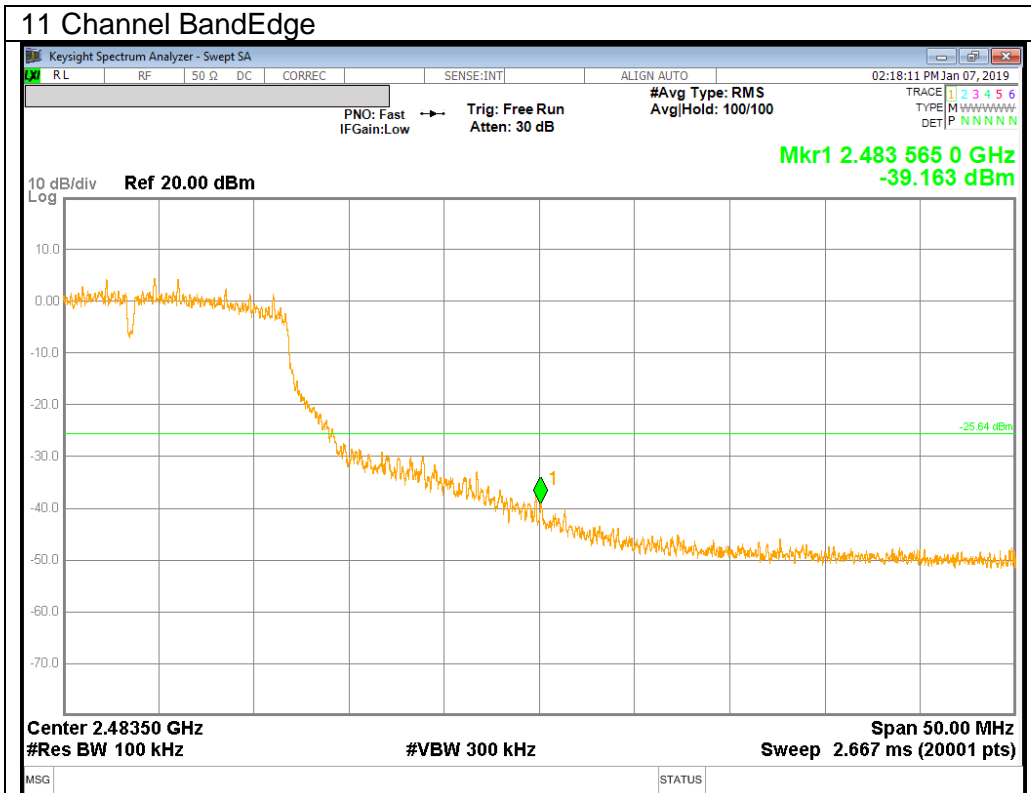


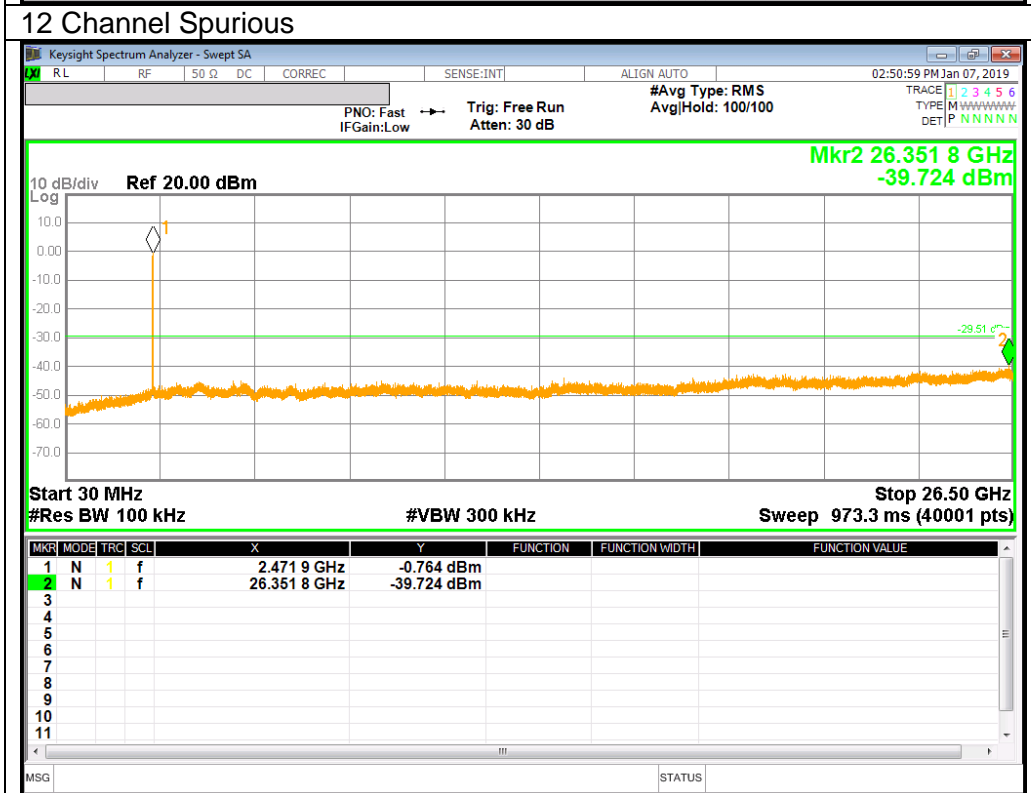
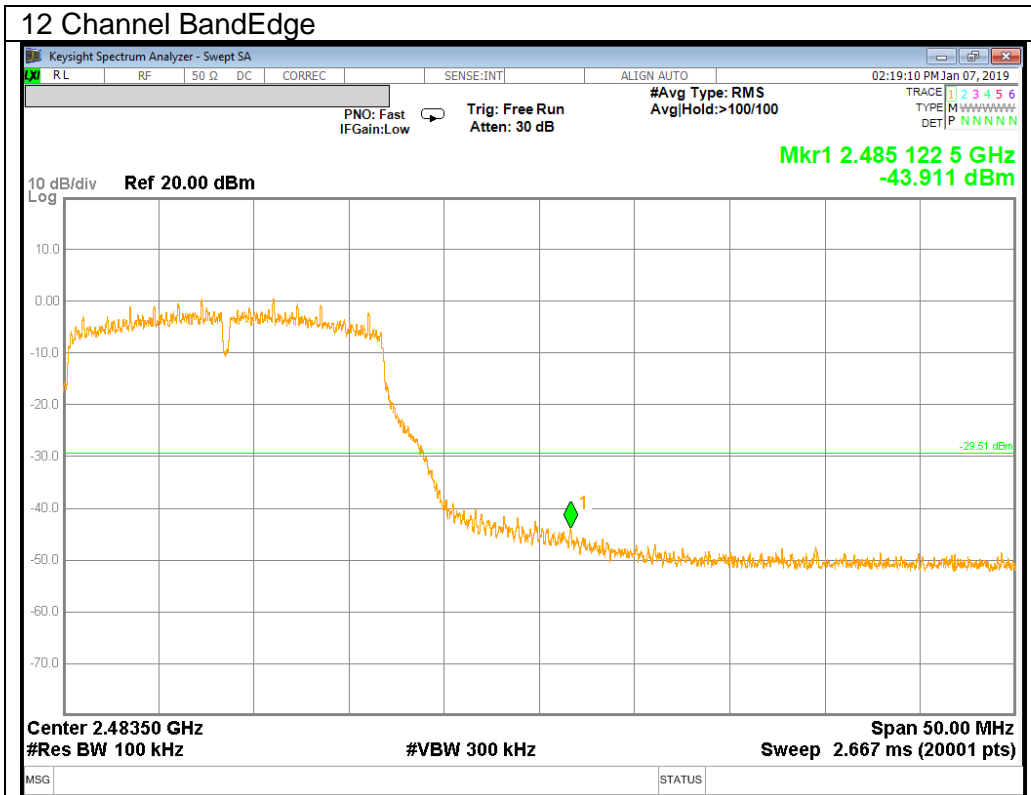


### 10.4.2.802.11g MODE IN THE 2.4 GHz BAND

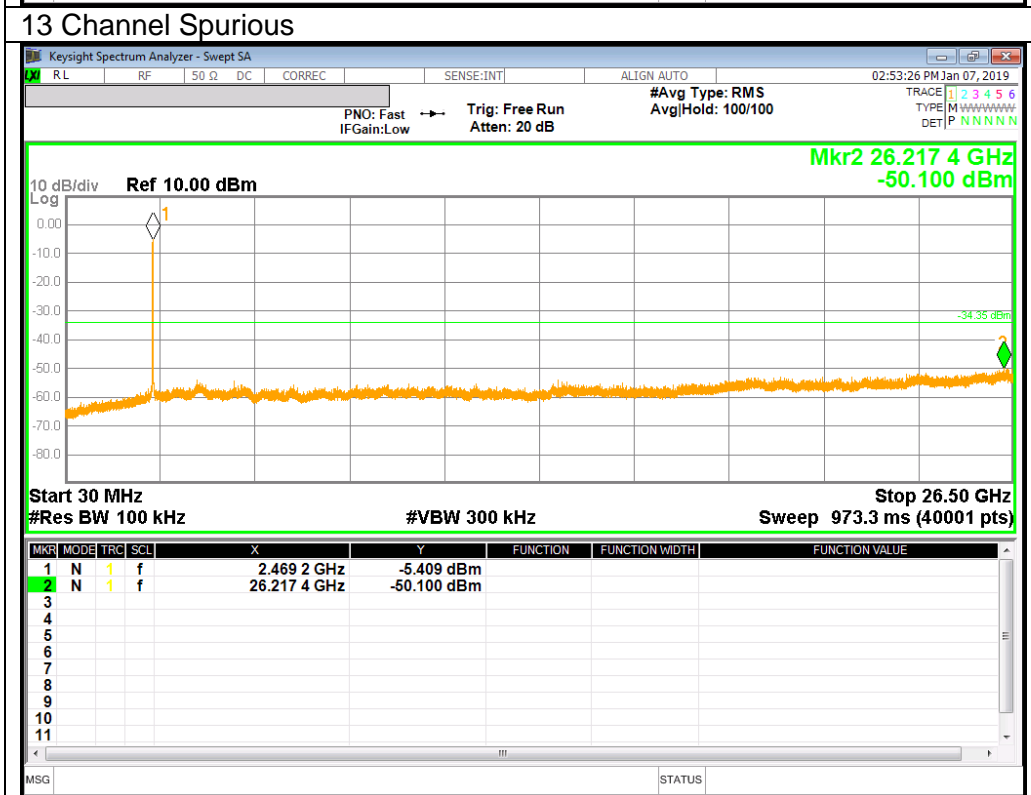
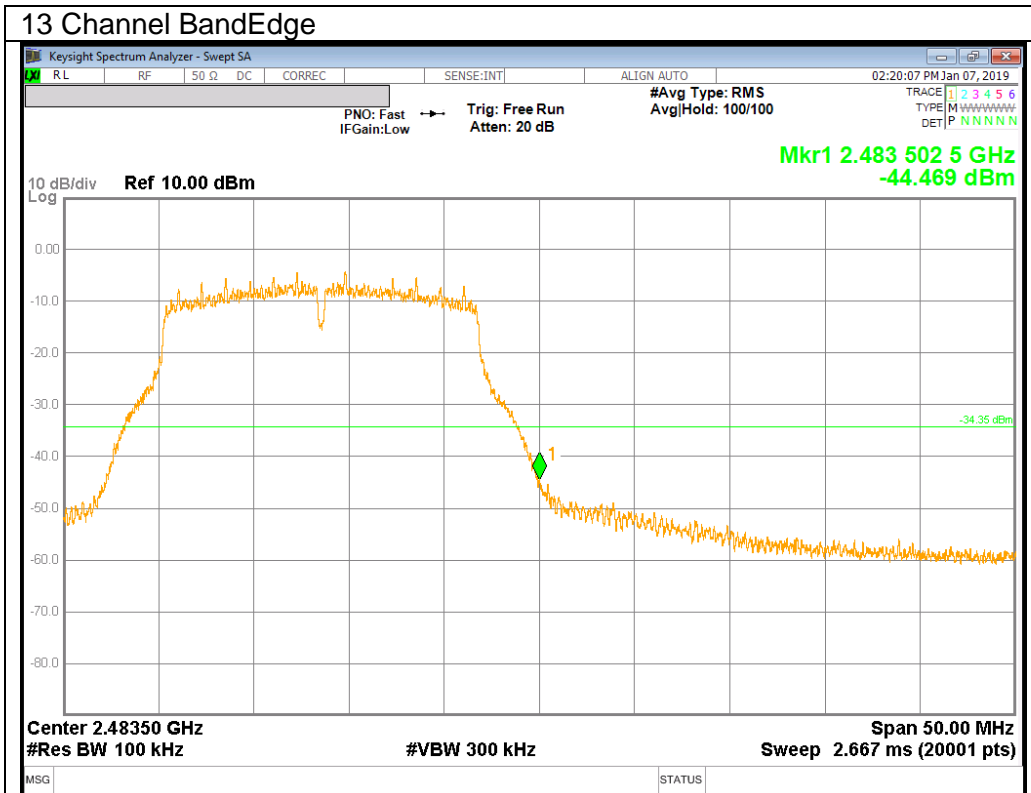




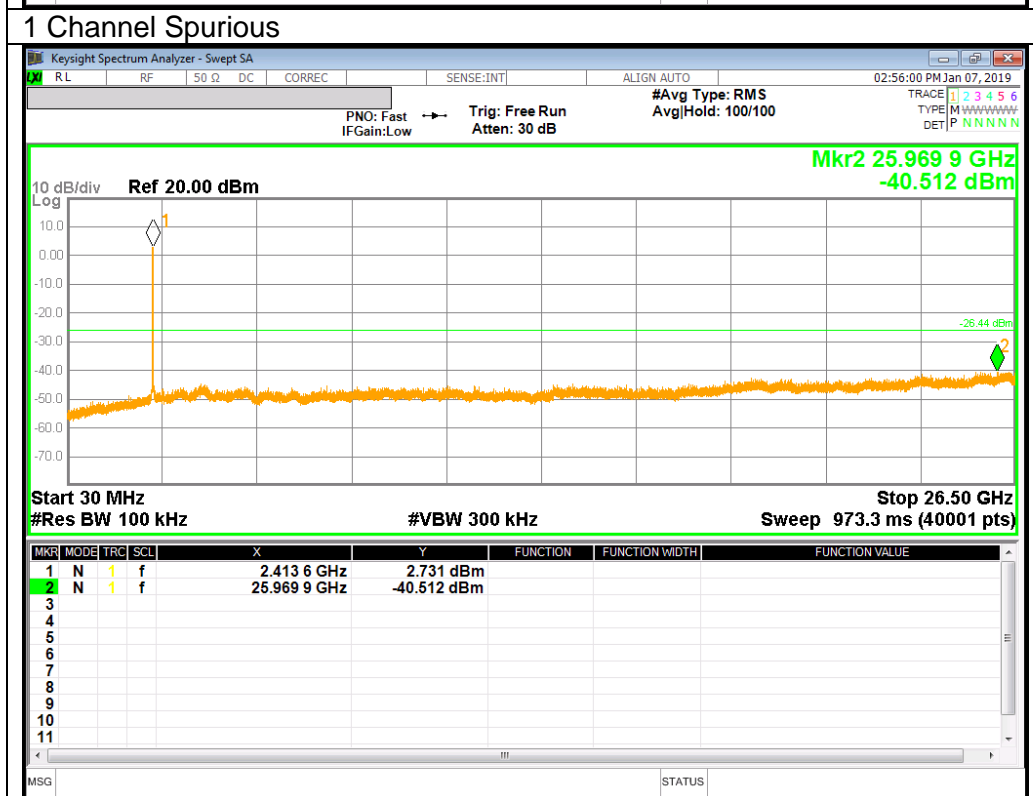
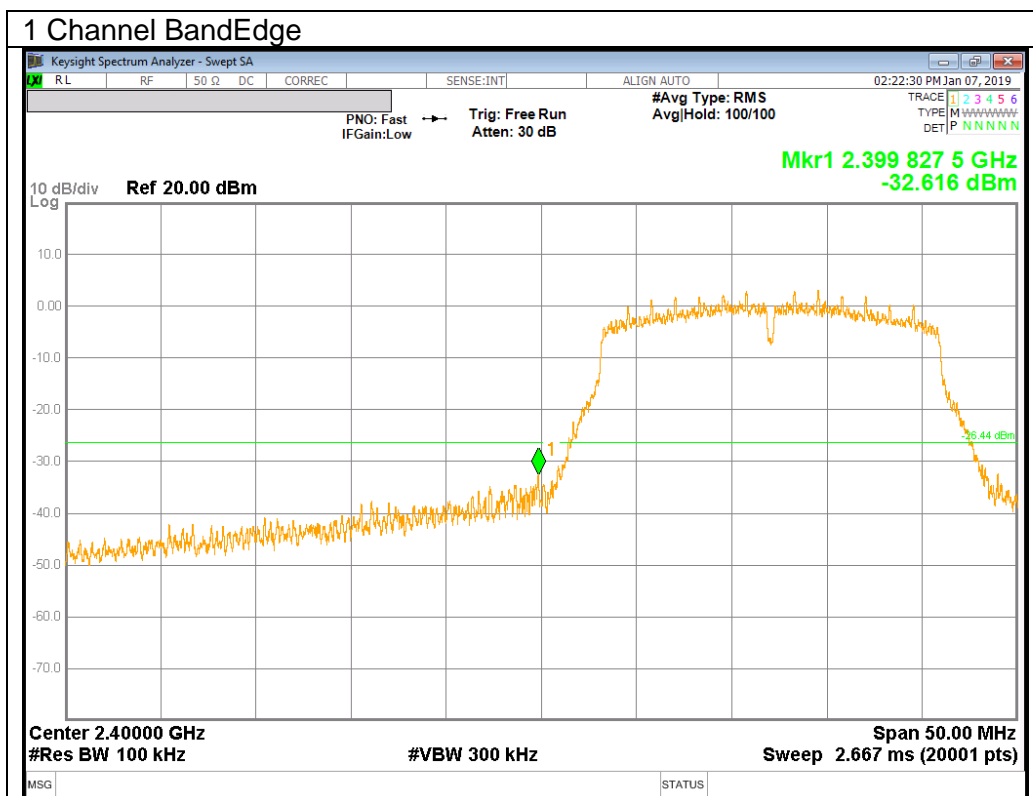




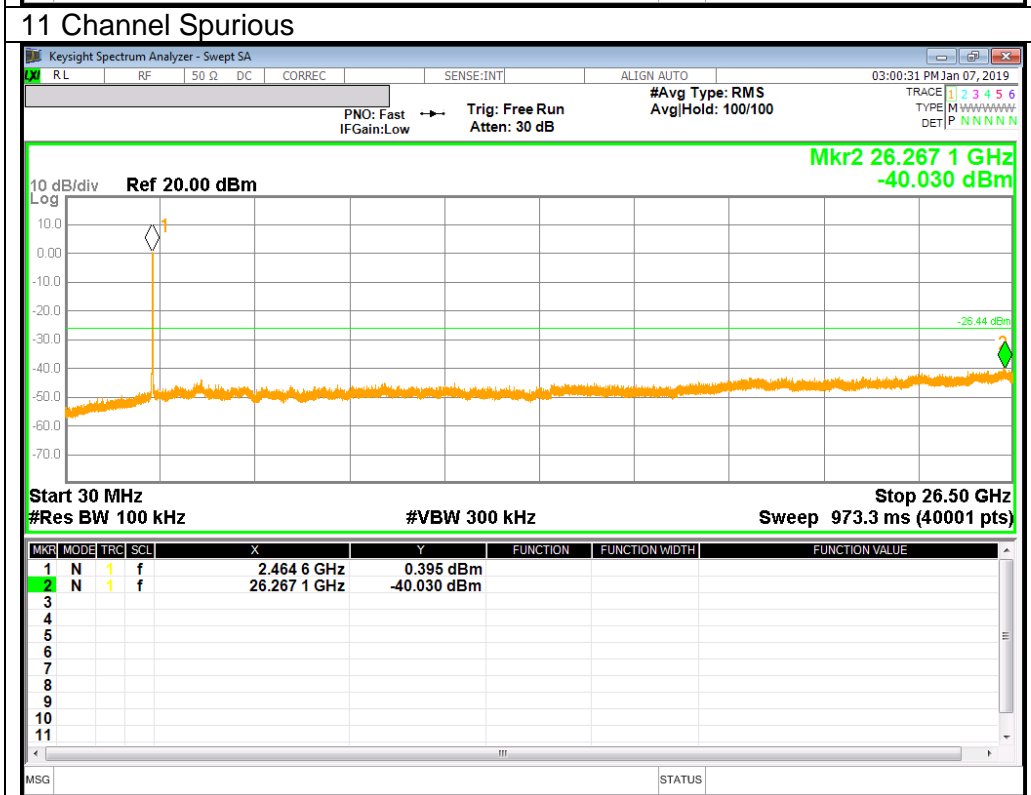
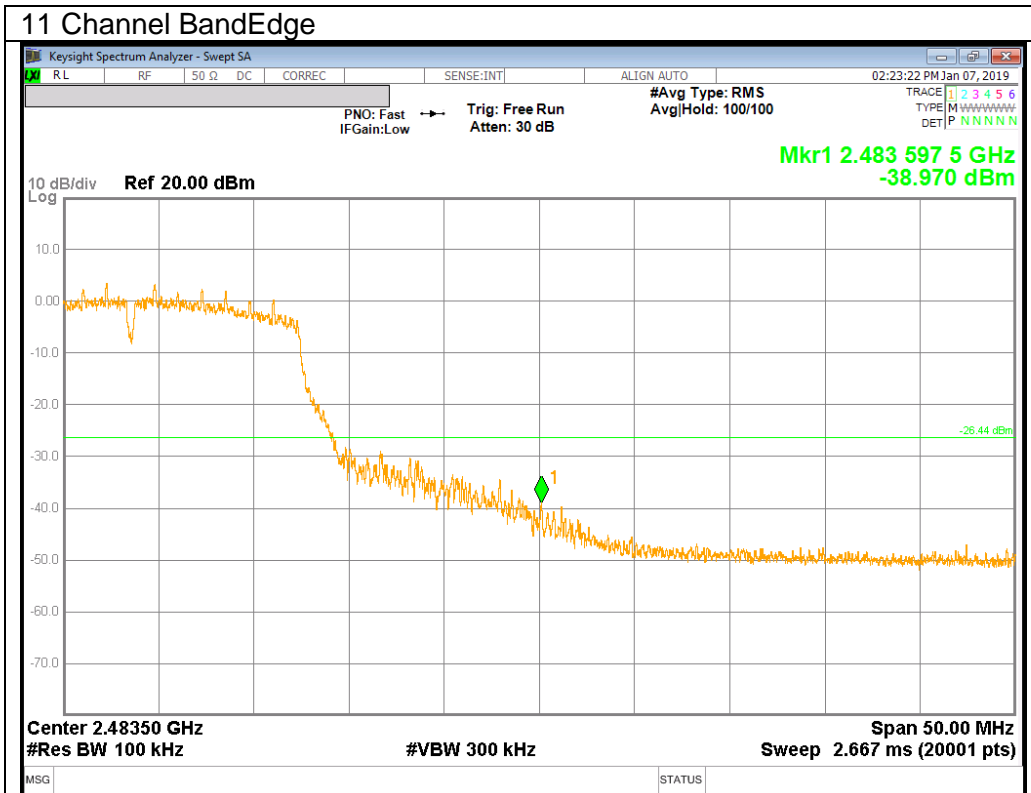




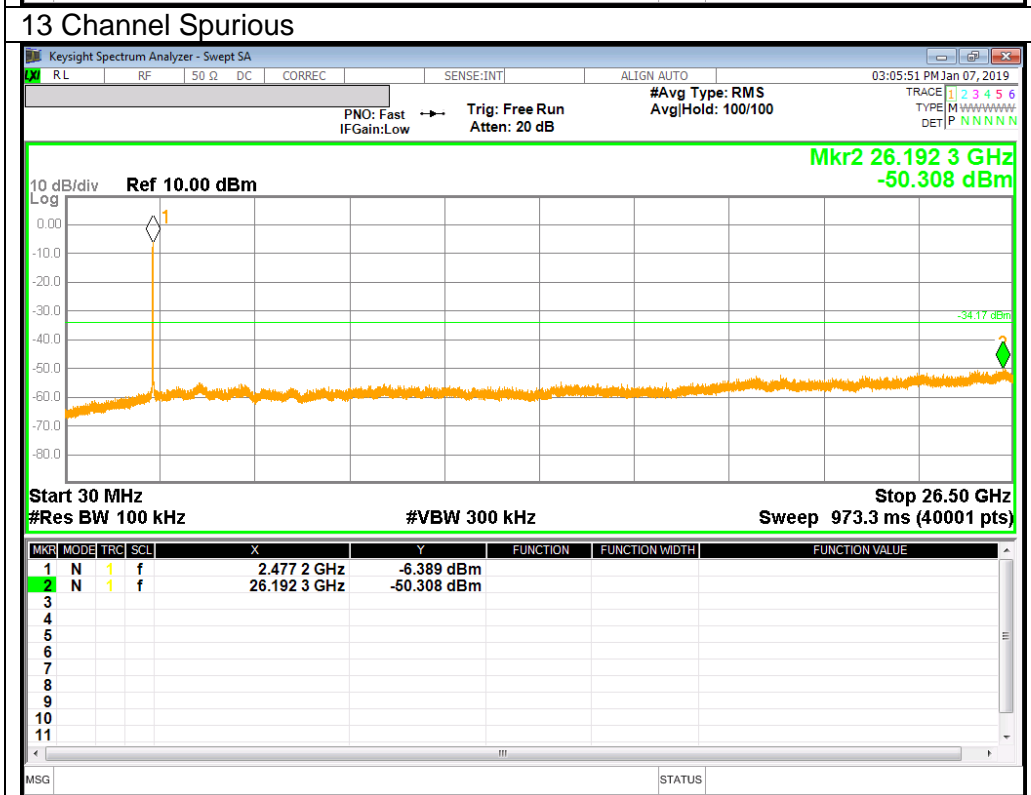
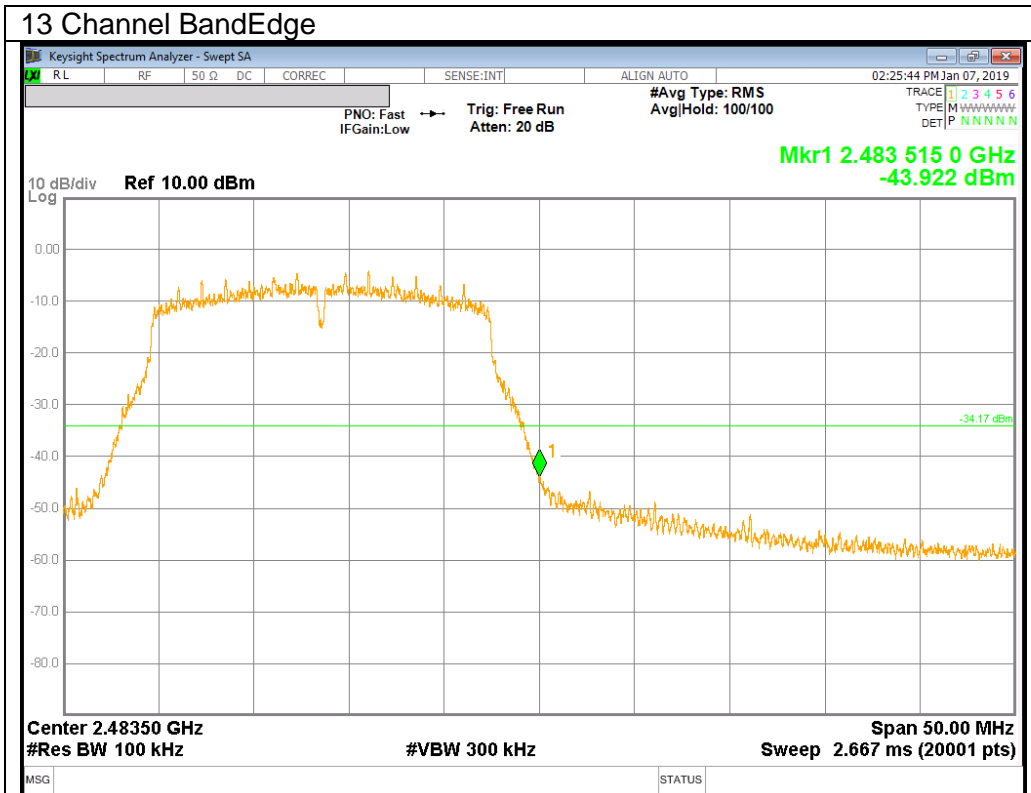
### 10.4.3.802.11n HT20 MODE IN THE 2.4 GHz BAND











## 11. RADIATED TEST RESULTS

### 11.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209  
IC RSS-GEN Clause 8.9 (Transmitter)  
IC RSS-GEN Clause 7 (Receiver)  
IC RSS-GEN Clause 8.10

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits ( $\mu\text{V/m}$ )	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. (Restricted bandedge, Final detection of spurious harmonic emissions)  
Duty cycle factor=  $10\log(1/x)$  For this sample B mode = 0dB (duty cycle >98%); G mode = 0.15dB (duty cycle <98%); N mode = 0.16dB (duty cycle <98%).

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

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

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

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.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site.  
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

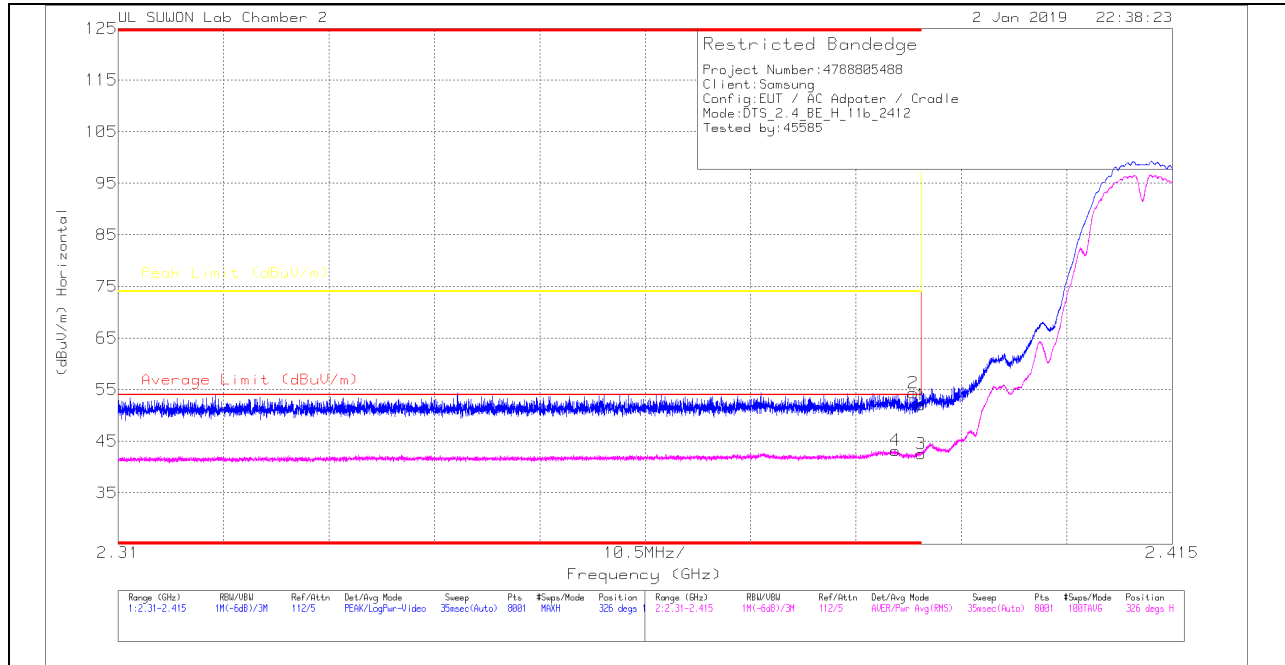


## 11.2. TRANSMITTER ABOVE 1 GHz

### 11.2.1.TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

#### RESTRICTED BANDEDGE (1 CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### Trace Markers

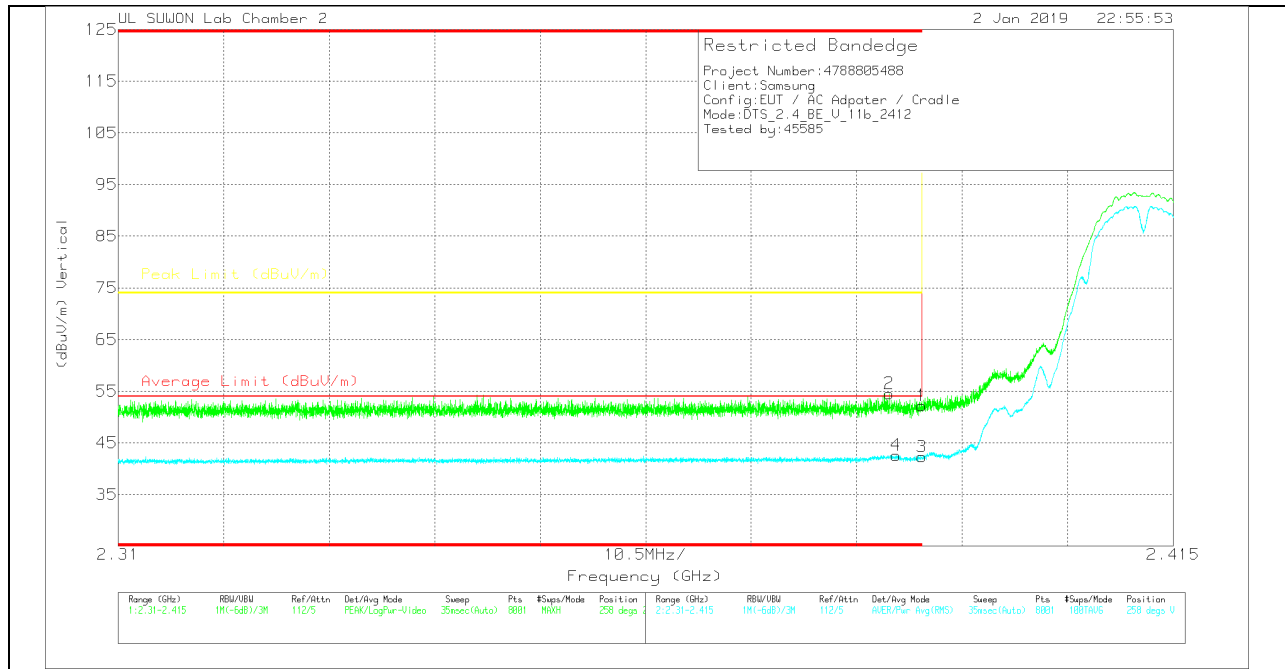
Marker	Frequency (GHz)	Meter Reading (dBu)	Det	3117_00168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBu/m)	Average Limit (dBu/m)	Margin (dB)	Peak Limit (dBu/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.27	Pk	31.6	-20.8	0	52.07	-	-	74	-21.93	326	114	H
2	* 2.389	43.58	Pk	31.6	-20.8	0	54.38	-	-	74	-19.62	326	114	H
3	* 2.39	31.74	RMS	31.6	-20.8	0	42.54	54	-11.46	-	-	326	114	H
4	* 2.387	32.43	RMS	31.6	-20.8	0	43.23	54	-10.77	-	-	326	114	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB(dB)	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	41.4	Pk	31.6	-20.8	0	52.2	-	-	74	-21.8	258	225	V
2	* 2.387	43.74	Pk	31.6	-20.8	0	54.54	-	-	74	-19.46	258	225	V
3	* 2.39	31.51	RMS	31.6	-20.8	0	42.31	54	-11.69	-	-	258	225	V
4	* 2.387	31.82	RMS	31.6	-20.8	0	42.62	54	-11.38	-	-	258	225	V

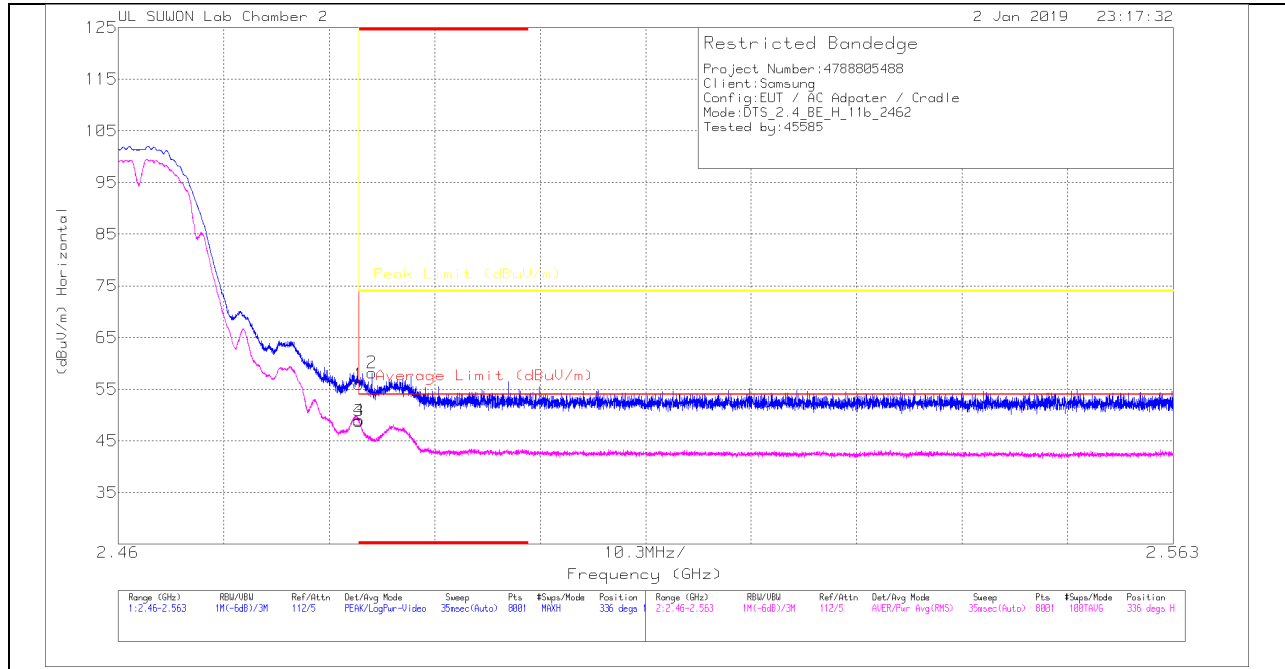
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (11 CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

**Trace Markers**

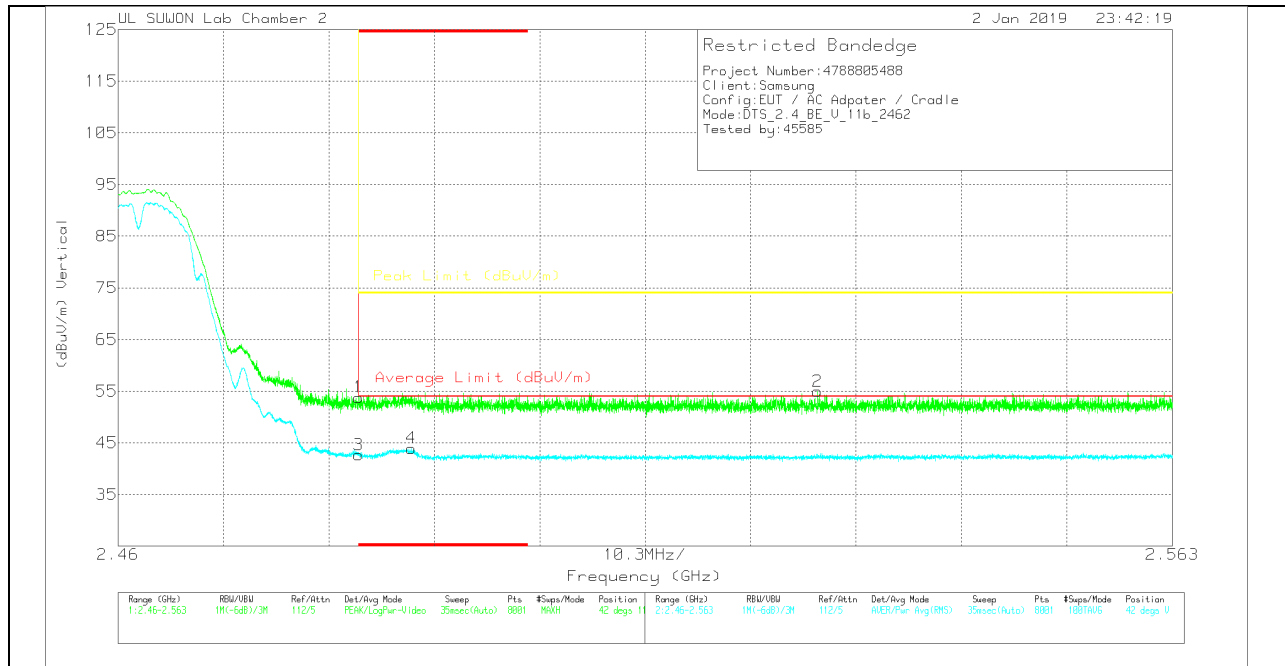
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	44.65	Pk	31.9	-20.6	0	55.95	-	-	74	-18.05	336	108	H
2	* 2.485	46.89	Pk	31.9	-20.6	0	58.19	-	-	74	-15.81	336	108	H
3	* 2.484	37.56	RMS	31.9	-20.6	0	48.86	54	-5.14	-	-	336	108	H
4	* 2.484	37.69	RMS	31.9	-20.6	0	48.99	54	-5.01	-	-	336	108	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuU)	Det	3117_00168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuU/m)	Average Limit (dBuU/m)	Margin (dB)	Peak Limit (dBuU/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	42.53	Pk	31.9	-20.6	0	53.83	-	-	74	-20.17	42	111	V
2	2.528	43.48	Pk	32	-20.5	0	54.98	-	-	74	-19.02	42	111	V
3	* 2.484	31.37	RMS	31.9	-20.6	0	42.67	54	-11.33	-	-	42	111	V
4	* 2.489	32.67	RMS	31.9	-20.6	0	43.97	54	-10.03	-	-	42	111	V

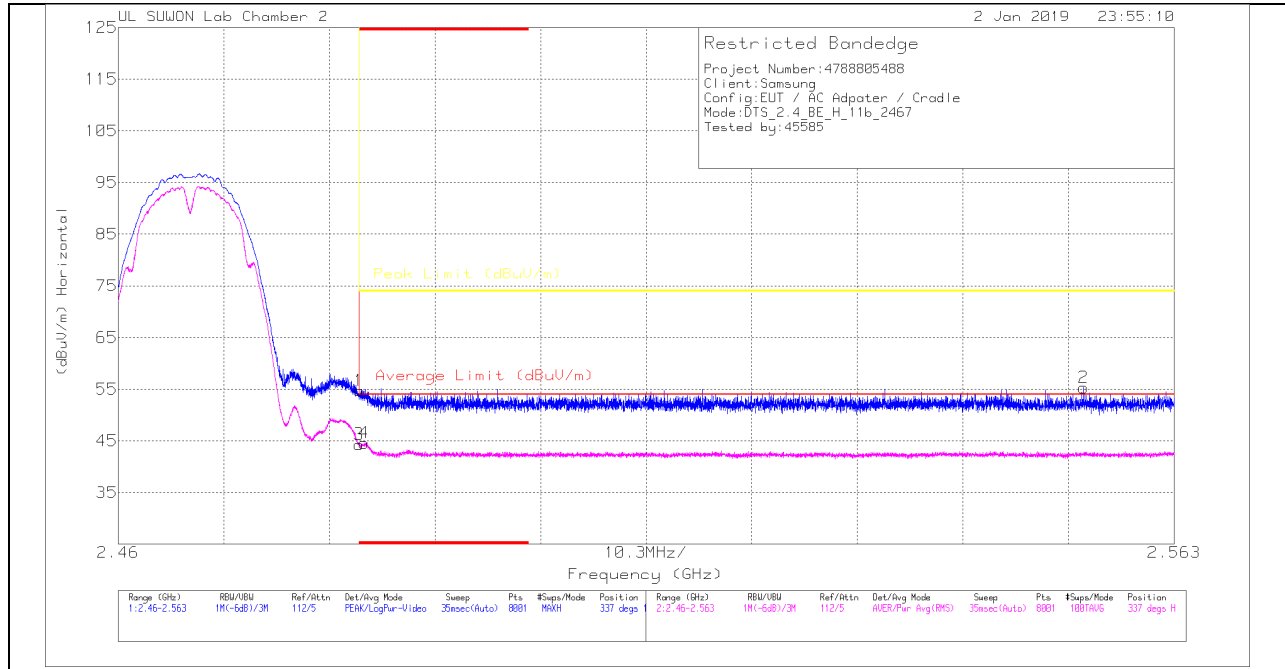
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEGE (12 CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



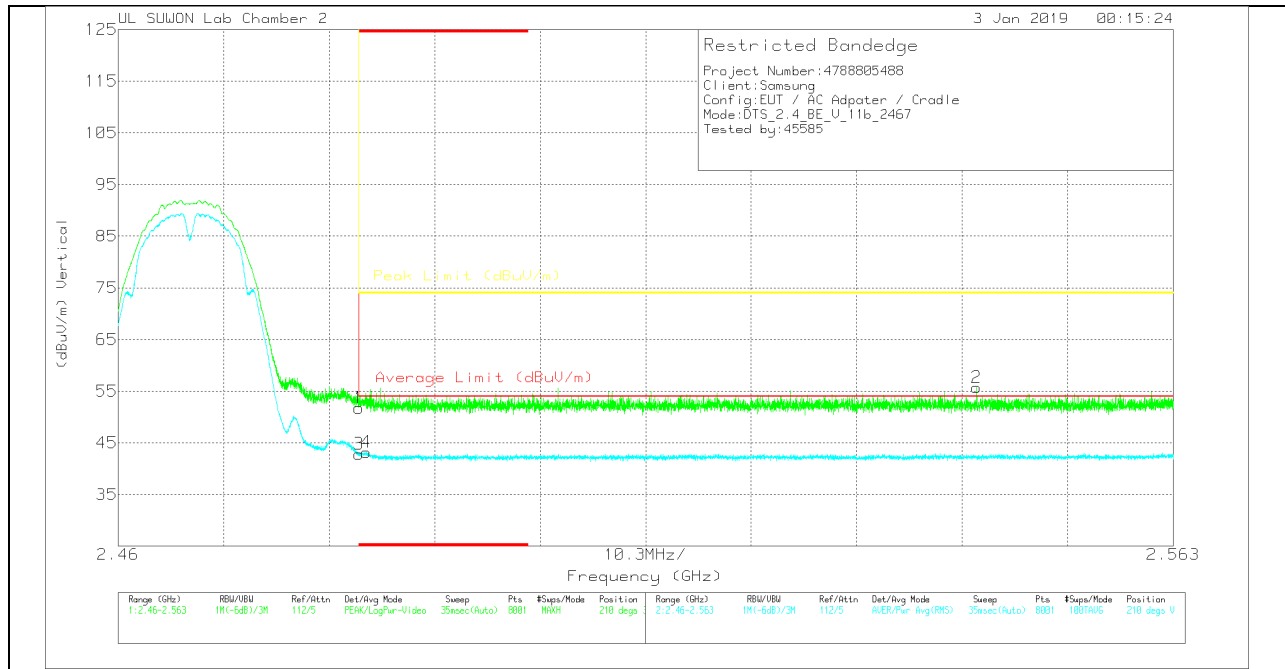
**HORIZONTAL DATA**

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.44	Pk	31.9	-20.6	0	54.74	-	-	74	-19.26	337	179	H
2	2.554	43.71	Pk	32	-20.4	0	55.31	-	-	74	-18.69	337	179	H
3	* 2.484	32.99	RMS	31.9	-20.6	0	44.29	54	-9.71	-	-	337	179	H
4	* 2.484	33.29	RMS	31.9	-20.6	0	44.59	54	-9.41	-	-	337	179	H

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

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB(dB)	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	40.48	Pk	31.9	-20.6	0	51.78	-	-	74	-22.22	210	331	V
2	2.544	44.33	Pk	32	-20.6	0	55.73	-	-	74	-18.27	210	331	V
3	* 2.484	31.55	RMS	31.9	-20.6	0	42.85	54	-11.15	-	-	210	331	V
4	* 2.484	31.91	RMS	31.9	-20.6	0	43.21	54	-10.79	-	-	210	331	V

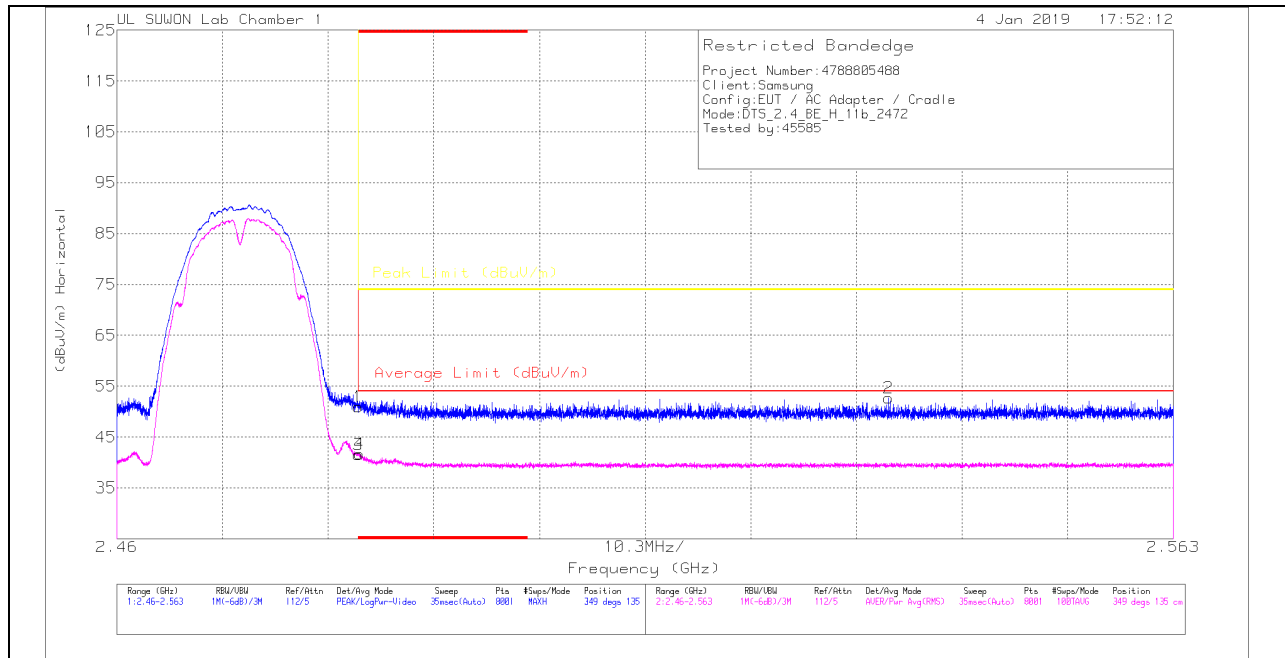
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (13 CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

**Trace Markers**

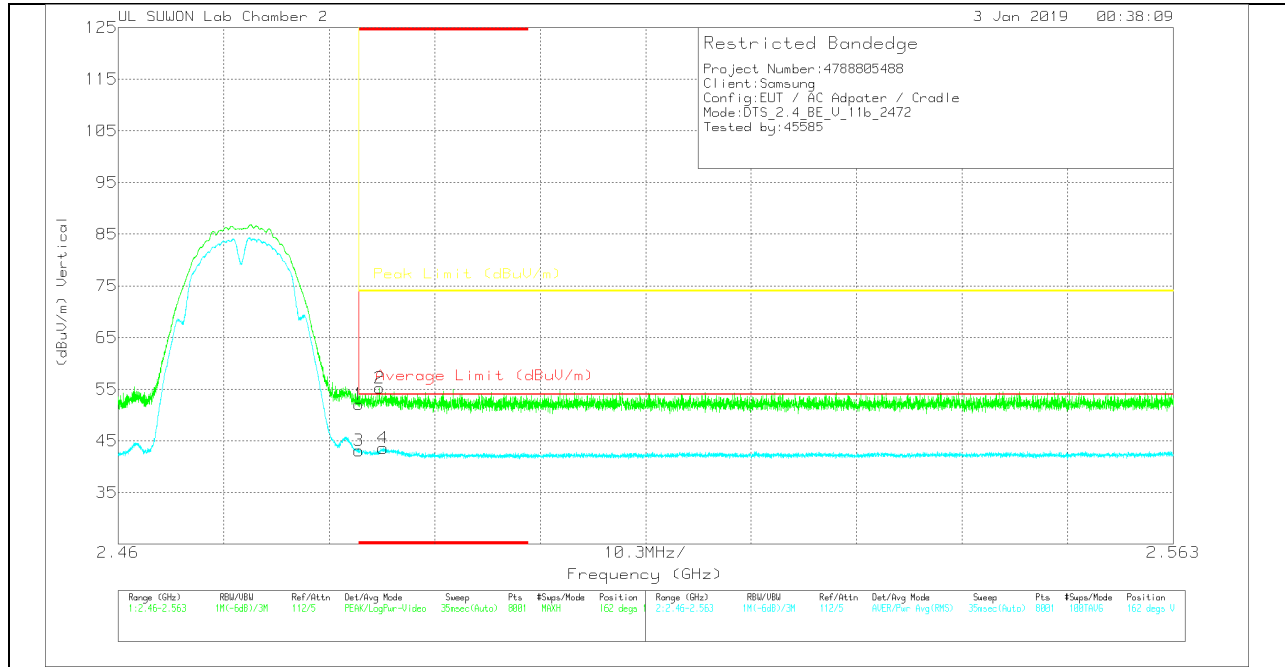
Marker	Frequency (GHz)	Meter Reading (dBu)	Det	3117_00168717	10dB(dB)	DC Corr (dB)	Corrected Reading (dBu/m)	Average Limit (dBu/m)	Margin (dB)	Peak Limit (dBu/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	44.33	Pk	31.9	-25.3	0	50.93	-	-	74	-23.07	349	135	H
2	2.535	45.88	Pk	32	-25.2	0	52.68	-	-	74	-21.32	349	135	H
3	* 2.484	34.99	RMS	31.9	-25.3	0	41.59	54	-12.41	-	-	349	135	H
4	* 2.484	35.12	RMS	31.9	-25.3	0	41.72	54	-12.28	-	-	349	135	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB(dB)	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	40.73	Pk	31.9	-20.6	0	52.08	-	-	74	-21.82	162	113	V
2	* 2.486	43.9	Pk	31.9	-20.6	0	55.2	-	-	74	-18.8	162	113	V
3	* 2.484	31.84	RMS	31.9	-20.6	0	43.14	54	-10.86	-	-	162	113	V
4	* 2.486	32.32	RMS	31.9	-20.6	0	43.62	54	-10.38	-	-	162	113	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

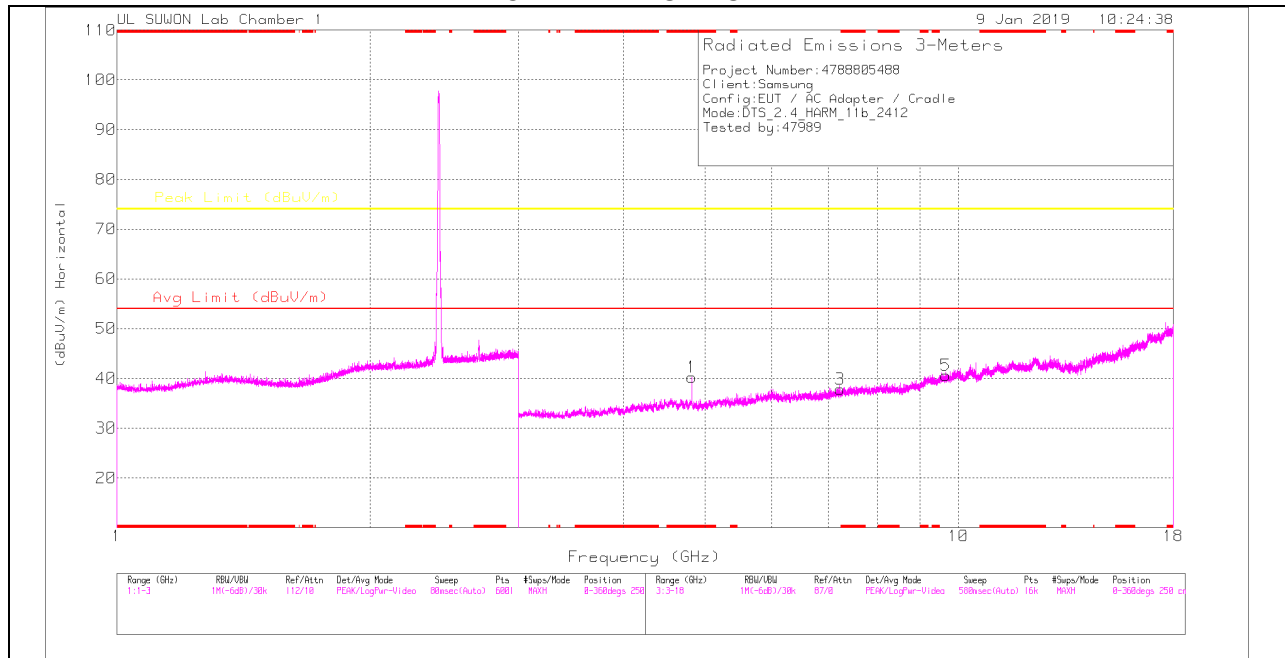
Pk - Peak detector

RMS - RMS detection

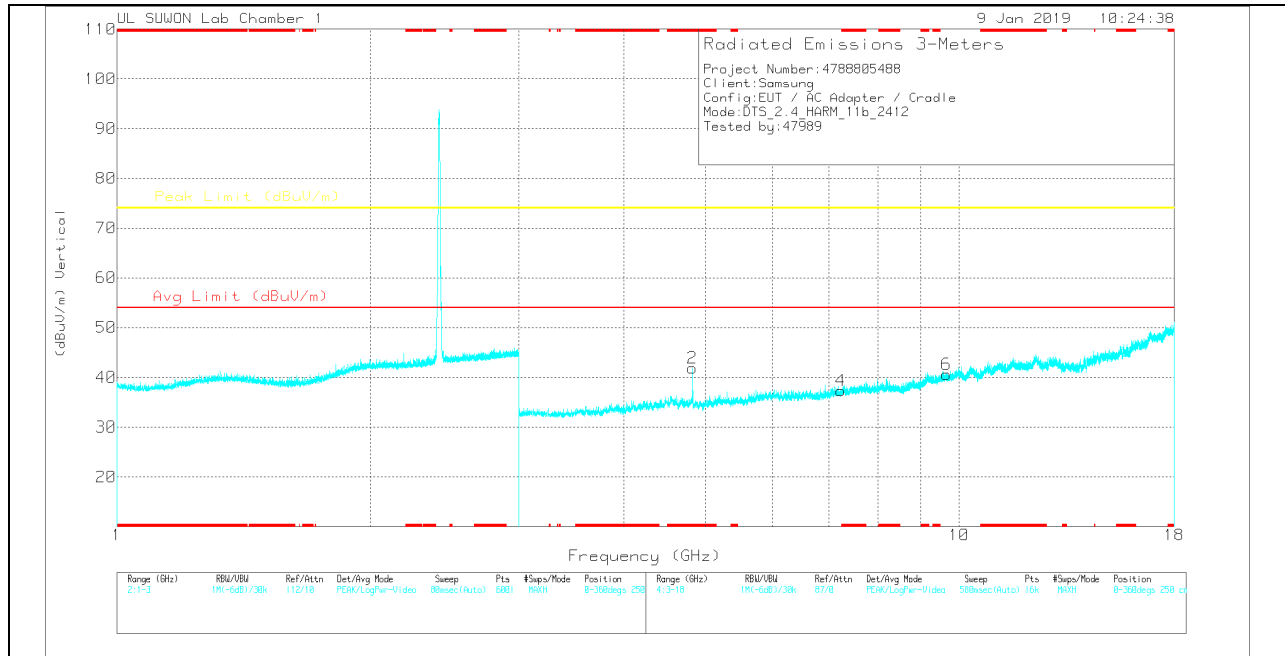


### HARMONICS AND SPURIOUS EMISSIONS

#### 1 CHANNEL HORIZONTAL



#### 1 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.

**1 CHANNEL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	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	37.39	PK	34.2	-31.4	0	40.19	-	-	74	-33.81	0-360	250	H
3	7.233	29.92	PK	35.8	-27.9	0	37.82	-	-	74	-36.18	0-360	150	H
5	9.649	26.81	PK	37.1	-23.3	0	40.61	-	-	74	-33.39	0-360	150	H
2	* 4.823	39.11	PK	34.2	-31.4	0	41.91	-	-	74	-32.09	0-360	150	V
4	7.233	29.43	PK	35.8	-27.9	0	37.33	-	-	74	-36.67	0-360	250	V
6	9.649	26.79	PK	37.1	-23.3	0	40.59	-	-	74	-33.41	0-360	250	V

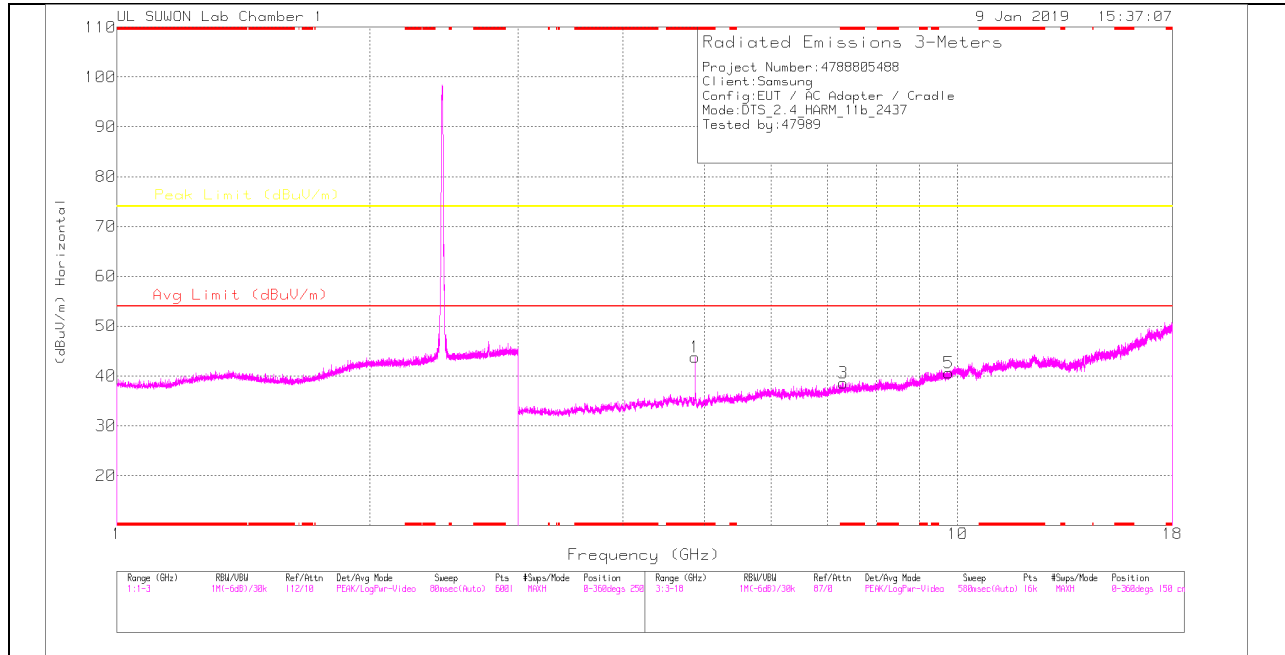
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK – Peak Detector

Radiated Emissions

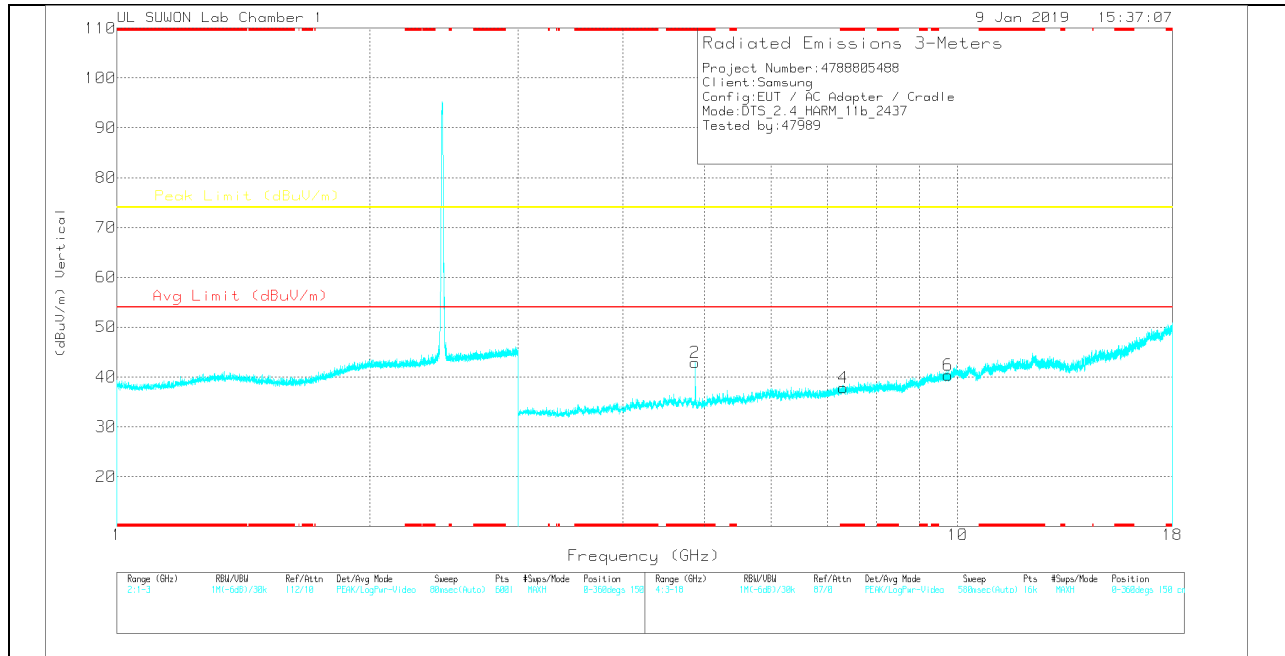
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.824	43.76	PK2	34.2	-31.4	0	46.56	-	-	74	-27.44	169	105	H
* 4.824	36.62	MAv1	34.2	-31.4	0	39.42	54	-14.58	-	-	169	105	H
* 4.824	45.68	PK2	34.2	-31.4	0	48.48	-	-	74	-25.52	186	162	V
* 4.824	39.68	MAv1	34.2	-31.4	0	42.48	54	-11.52	-	-	186	162	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK2 - KDB558074 Method: Maximum Peak  
 MAv1 - KDB558074 Option 1 Maximum RMS Average

6 CHANNEL HORIZONTAL



6 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.

**6 CHANNEL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	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	41.08	PK	34.2	-31.5	0	43.78	-	-	74	-30.22	0-360	250	H
3	* 7.309	30.22	PK	35.8	-27.4	0	38.62	-	-	74	-35.38	0-360	150	H
5	9.751	27.29	PK	37.2	-23.9	0	40.59	-	-	74	-33.41	0-360	150	H
2	* 4.874	40.23	PK	34.2	-31.5	0	42.93	-	-	74	-31.07	0-360	150	V
4	* 7.311	29.42	PK	35.8	-27.4	0	37.82	-	-	74	-36.18	0-360	150	V
6	9.745	27.12	PK	37.2	-23.9	0	40.42	-	-	74	-33.58	0-360	150	V

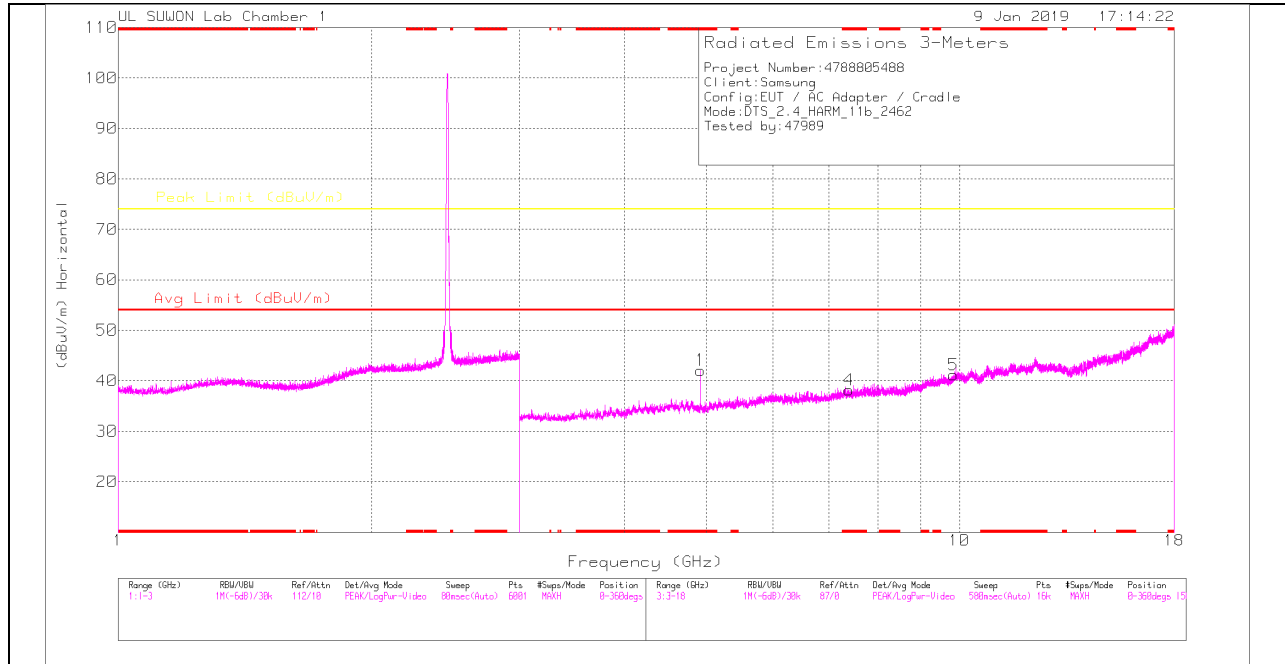
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK – Peak Detector

Radiated Emissions

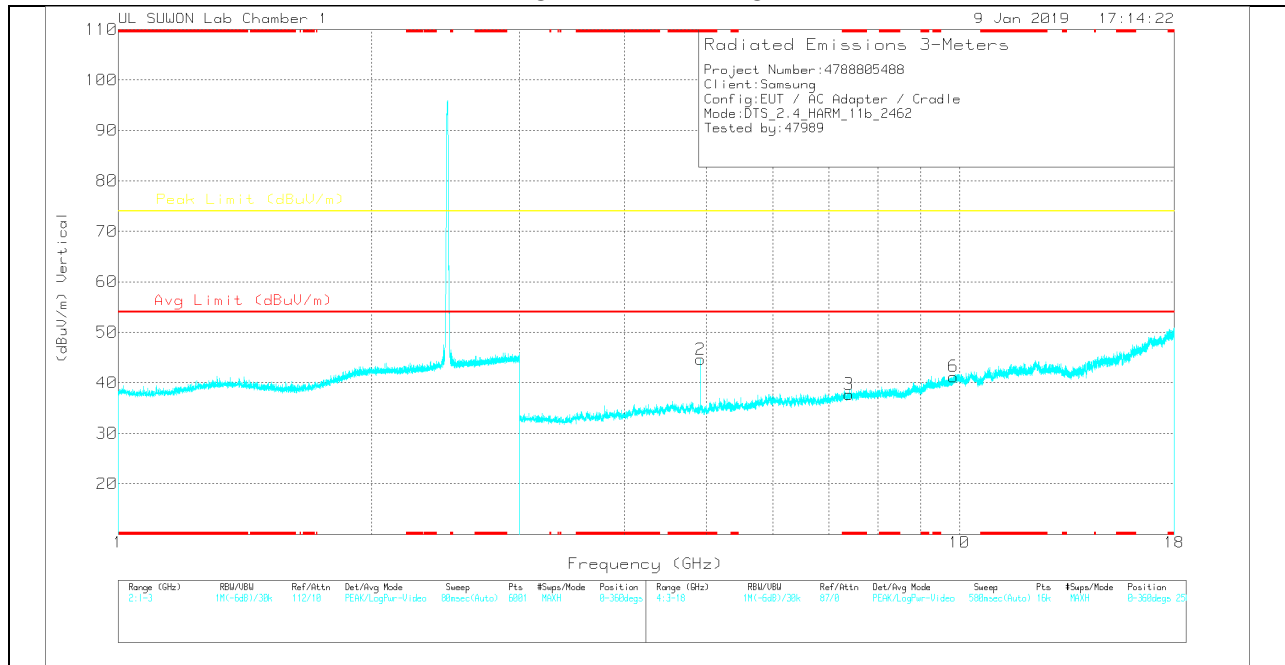
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.874	44.83	PK2	34.2	-31.5	0	47.53	-	-	74	-26.47	164	110	H
* 4.874	38.66	MAv1	34.2	-31.5	0	41.36	54	-12.64	-	-	164	110	H
* 4.874	46.18	PK2	34.2	-31.5	0	48.88	-	-	74	-25.12	189	140	V
* 4.874	40.77	MAv1	34.2	-31.5	0	43.47	54	-10.53	-	-	189	140	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK2 - KDB558074 Method: Maximum Peak  
 MAv1 - KDB558074 Option 1 Maximum RMS Average

### 11 CHANNEL HORIZONTAL



### 11 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.

**11 CHANNEL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	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	* 4.924	39.47	PK	34.2	-31.6	0	42.07	-	-	74	-31.93	0-360	250	H
4	* 7.394	29.28	PK	35.8	-26.9	0	38.18	-	-	74	-35.82	0-360	150	H
5	9.833	27.16	PK	37.4	-23.4	0	41.16	-	-	74	-32.84	0-360	250	H
2	* 4.924	42.04	PK	34.2	-31.6	0	44.64	-	-	74	-29.36	0-360	250	V
3	* 7.39	28.91	PK	35.8	-27	0	37.71	-	-	74	-36.29	0-360	250	V
6	9.842	27.02	PK	37.4	-23.2	0	41.22	-	-	74	-32.78	0-360	250	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK – Peak detector

Radiated Emissions

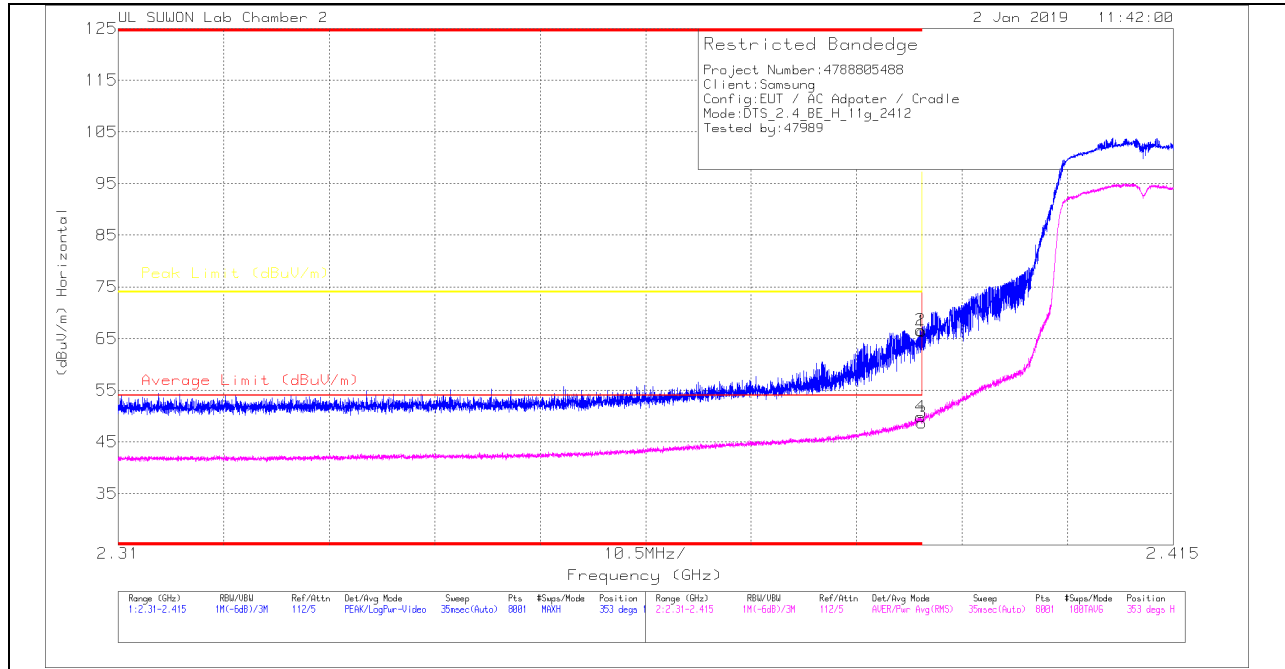
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.924	45.9	PK2	34.2	-31.6	0	48.5	-	-	74	-25.5	129	239	H
* 4.924	40.42	MAv1	34.2	-31.6	0	43.02	54	-10.98	-	-	129	239	H
* 4.924	46.74	PK2	34.2	-31.6	0	49.34	-	-	74	-24.66	294	145	V
* 4.924	41.85	MAv1	34.2	-31.6	0	44.45	54	-9.55	-	-	294	145	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-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 (1 CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### Trace Markers

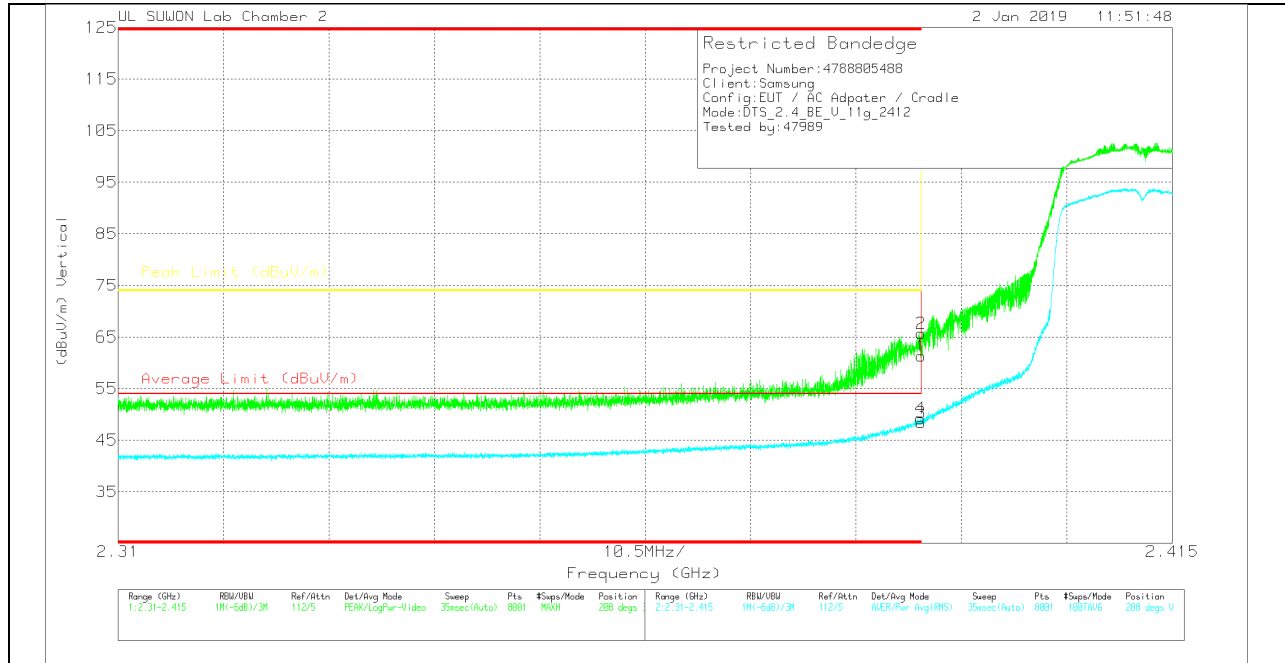
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	55.61	Pk	31.6	-20.8	0	66.41	-	-	74	-7.59	353	123	H
2	* 2.39	55.83	Pk	31.6	-20.8	0	66.63	-	-	74	-7.37	353	123	H
3	* 2.39	37.77	RMS	31.6	-20.8	.15	48.72	54	-5.28	-	-	353	123	H
4	* 2.39	38.91	RMS	31.6	-20.8	.15	49.86	54	-4.14	-	-	353	123	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**Trace Markers**

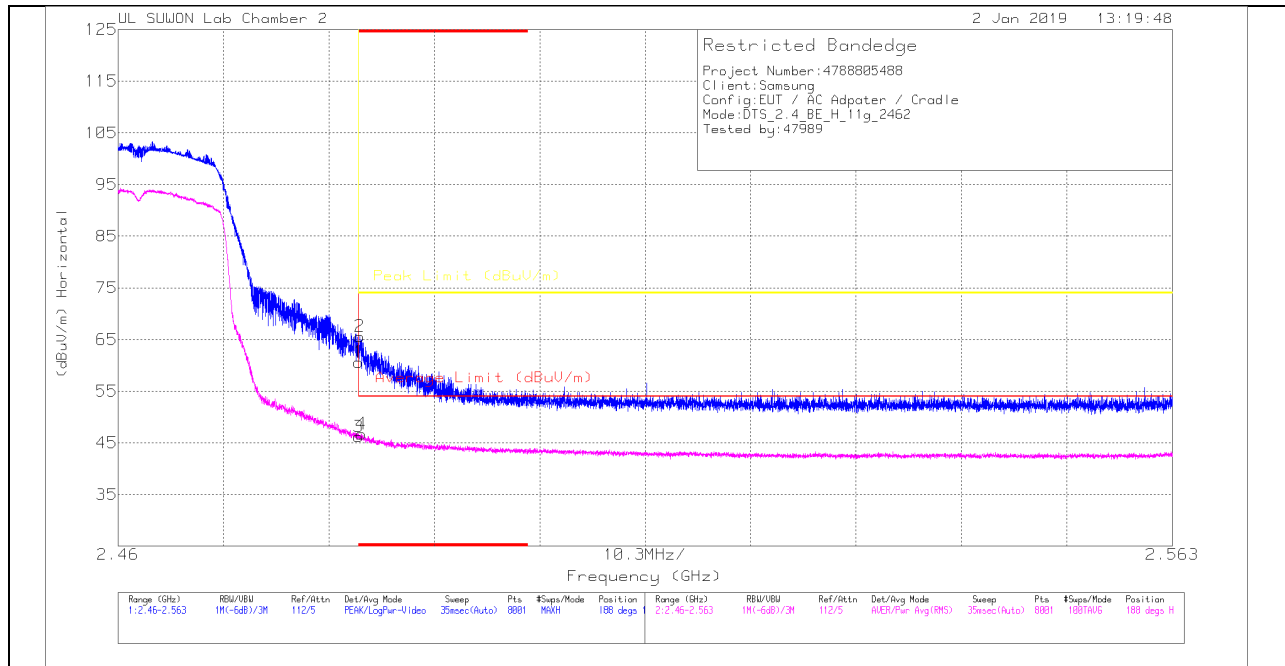
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	50.5	Pk	31.6	-20.8	0	61.3	-	-	74	-12.7	208	300	V
2	* 2.39	54.89	Pk	31.6	-20.8	0	65.69	-	-	74	-8.31	208	300	V
3	* 2.39	37.44	RMS	31.6	-20.8	.15	48.39	54	-5.61	-	-	208	300	V
4	* 2.39	38.28	RMS	31.6	-20.8	.15	49.23	54	-4.77	-	-	208	300	V

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



### AUTHORIZED BANDEDGE (11 CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### Trace Markers

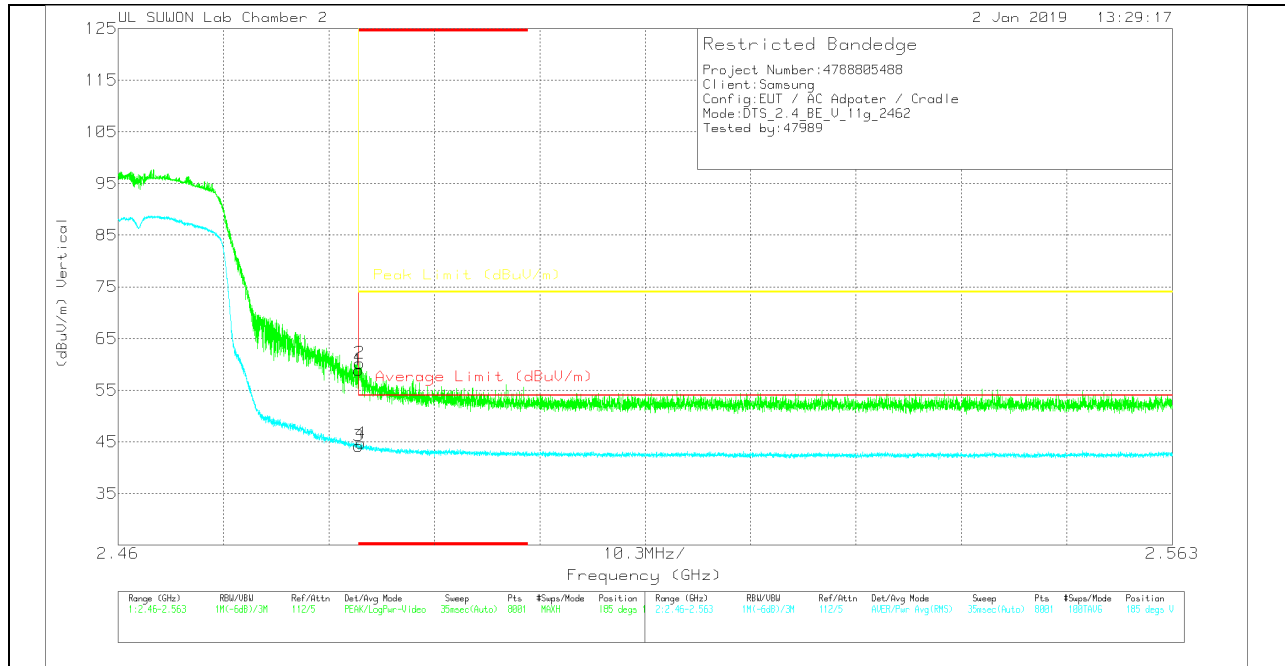
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	49.33	Pk	31.9	-20.6	0	60.63	-	-	74	-13.37	188	190	H
2	* 2.484	54.31	Pk	31.9	-20.6	0	65.61	-	-	74	-8.39	188	190	H
3	* 2.484	34.76	RMS	31.9	-20.6	.15	46.21	54	-7.79	-	-	188	190	H
4	* 2.484	35.28	RMS	31.9	-20.6	.15	46.73	54	-7.27	-	-	188	190	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBu/m)	Det	3117_00168724	10dB(dB)	DC Corr (dB)	Corrected Reading (dBu/m)	Average Limit (dBu/m)	Margin (dB)	Peak Limit (dBu/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	47.56	Pk	31.9	-20.6	0	58.86	-	-	74	-15.14	185	123	V
2	* 2.484	48.97	Pk	31.9	-20.6	0	60.27	-	-	74	-13.73	185	123	V
3	* 2.484	32.79	RMS	31.9	-20.6	.15	44.24	54	-9.76	-	-	185	123	V
4	* 2.484	33.28	RMS	31.9	-20.6	.15	44.73	54	-9.27	-	-	185	123	V

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