



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

**DTS Wireless LAN**

**CERTIFICATION TEST REPORT**

**FOR**

**BT/BLE and DTS b/g/n Tablet**

**MODEL NUMBER : SM-T230NZ**

**FCC ID: A3LSMT230NZ**

**IC : 649E-SMT230NZ**

**REPORT NUMBER: 4788321149-E1V1**

**ISSUE DATE: FEB 22, 2018**

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**ACCREDITED\***

Testing  
Laboratory

**TL-637**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	02/22/18	Initial issue	Junwhan Lee

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** BT/BLE and DTS b/g/n Tablet  
**MODEL NUMBER:** SM-T230NZ  
**SERIAL NUMBER:** R32K100140R (CONDUCTED);  
R32K100146E (RADIATED);  
**DATE TESTED:** FEB 02, 2018 - FEB 20, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 2	Pass
INDUSTRY CANADA RSS-GEN Issue 4	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.

Junwhan 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 4
4. IC RSS-247 Issue 2
5. KDB 558074 D01 DTS Meas Guidance v04.
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 BT/BLE and DTS b/g/n Tablet.  
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	15.39	34.59
	802.11g	14.10	25.70
	802.11n HT20	14.27	26.73

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antennas, with a antenna's maximum gain of 0.0 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 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

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

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	ETA0U83EWE	DK2K109VS/A -E	N/A
Data Cable	SAMSUNG	EP-DN930CWE	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	N/A	N/A

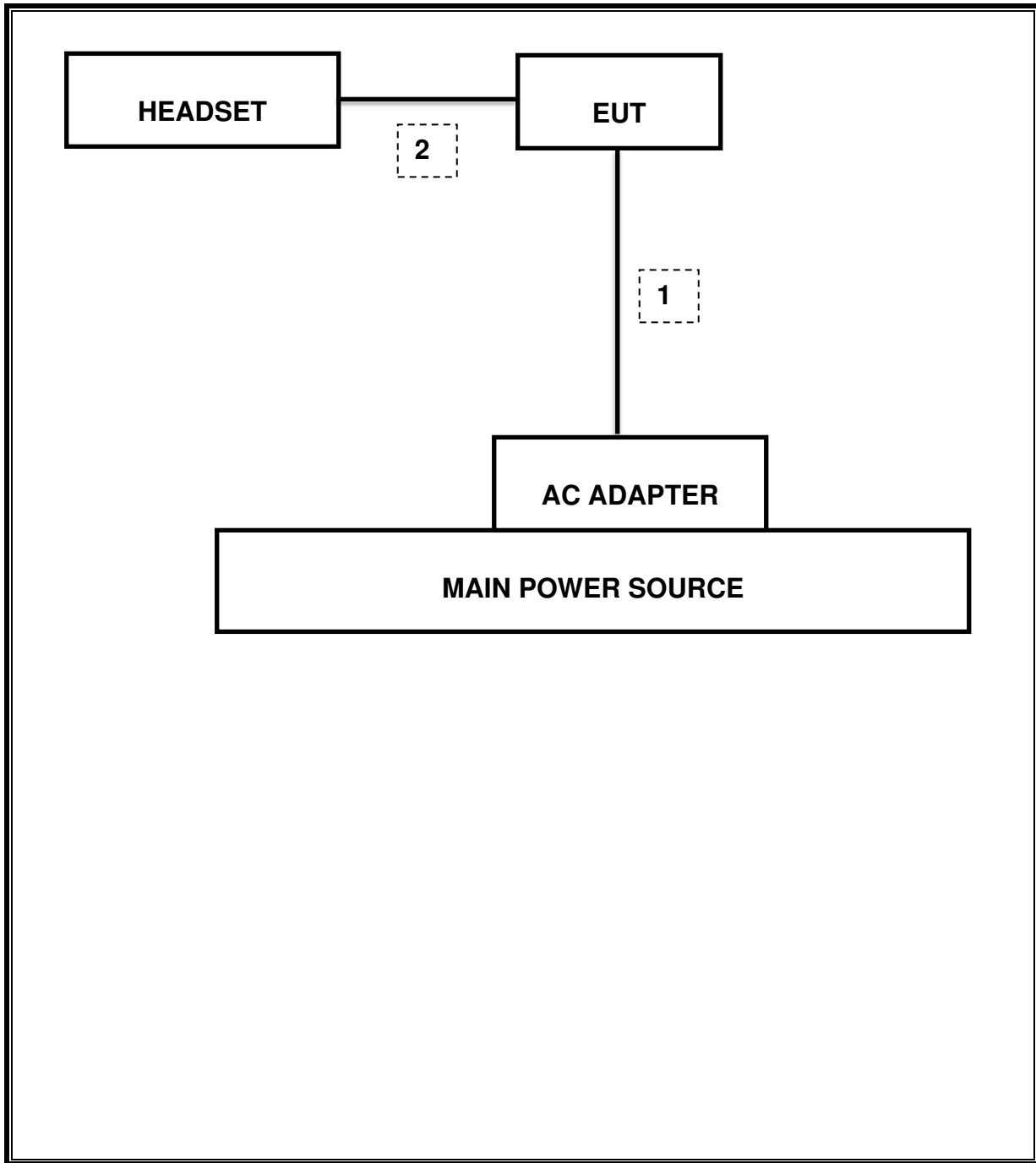
### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.2m	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	08-31-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-14-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-31-19
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
Antenna, Horn, 18 GHz	ETS	3115	00161451	03-10-19
Antenna, Horn, 18 GHz	ETS	3117	00168724	05-31-19
Antenna, Horn, 18 GHz	ETS	3117	00168717	11-29-18
Antenna, Horn, 18 GHz	ETS	3117	00205959	05-31-19
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	11-13-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-09-18
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-18
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-10-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-08-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-08-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-11-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-08-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-08-18
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-08-18
Attenuator	PASTERNAK	PE7087-10	A001	08-08-18
Attenuator	PASTERNAK	PE7087-10	A008	08-08-18
Attenuator	PASTERNAK	PE7087-10	2	08-10-18
Attenuator	PASTERNAK	PE7087-10	A009	08-10-18
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-08-18
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-09-18
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-07-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-08-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-08-18
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-11-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-08-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-08-18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-11-18
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-08-18
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-08-18
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-11-18
LISN	R&S	ENV-216	101837	08-09-18
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

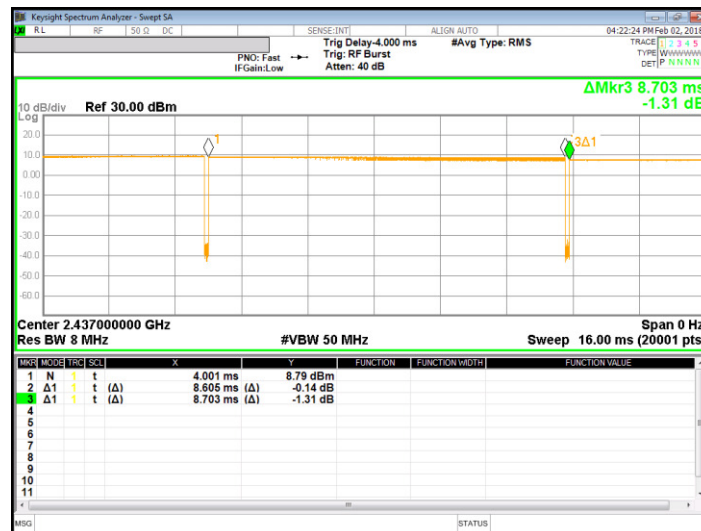
## 7. REFERENCE MEASUREMENT RESULTS

### 7.1. ON TIME AND DUTY CYCLE RESULTS

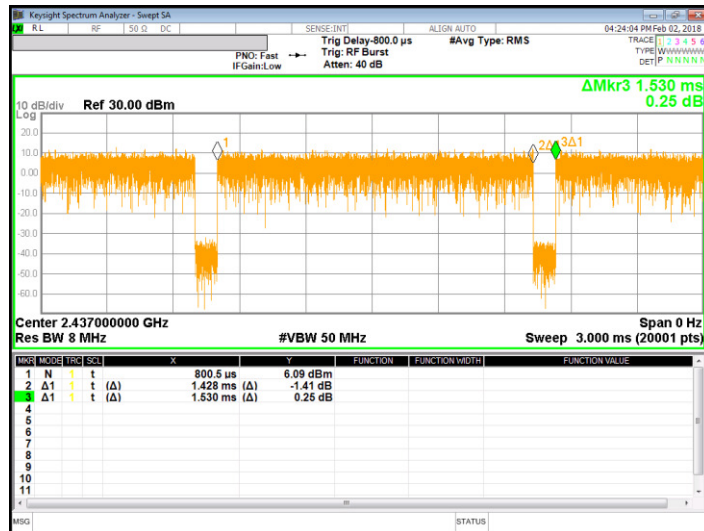
#### LIMITS

None; for reporting purposes only.

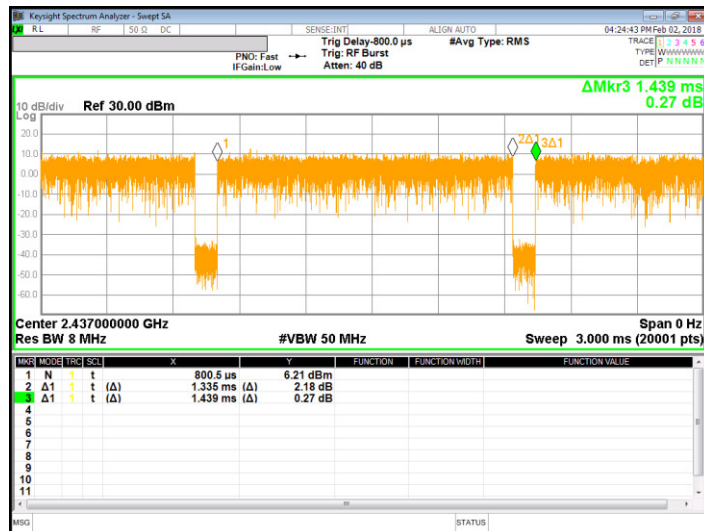
Mode	ON Time B [msec]	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
<b>2400MHz Bands</b>						
802.11b	8.605	8.703	0.989	98.9%	0.00	0.010
802.11g	1.428	1.53	0.933	93.3%	0.30	0.700
802.11n HT20	1.335	1.439	0.928	92.8%	0.33	0.749



[802.11b]



[802.11g]



[802.11n]

**7.2. 99% BANDWIDTH**

**LIMITS**

None; for reporting purposes only.

**RESULTS**

**7.2.1. 802.11b MODE IN THE 2.4 GHz BAND**

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	12.090
Mid	2437	12.069
High	2462	12.055
12	2467	11.352
13	2472	11.133
Worst		12.090

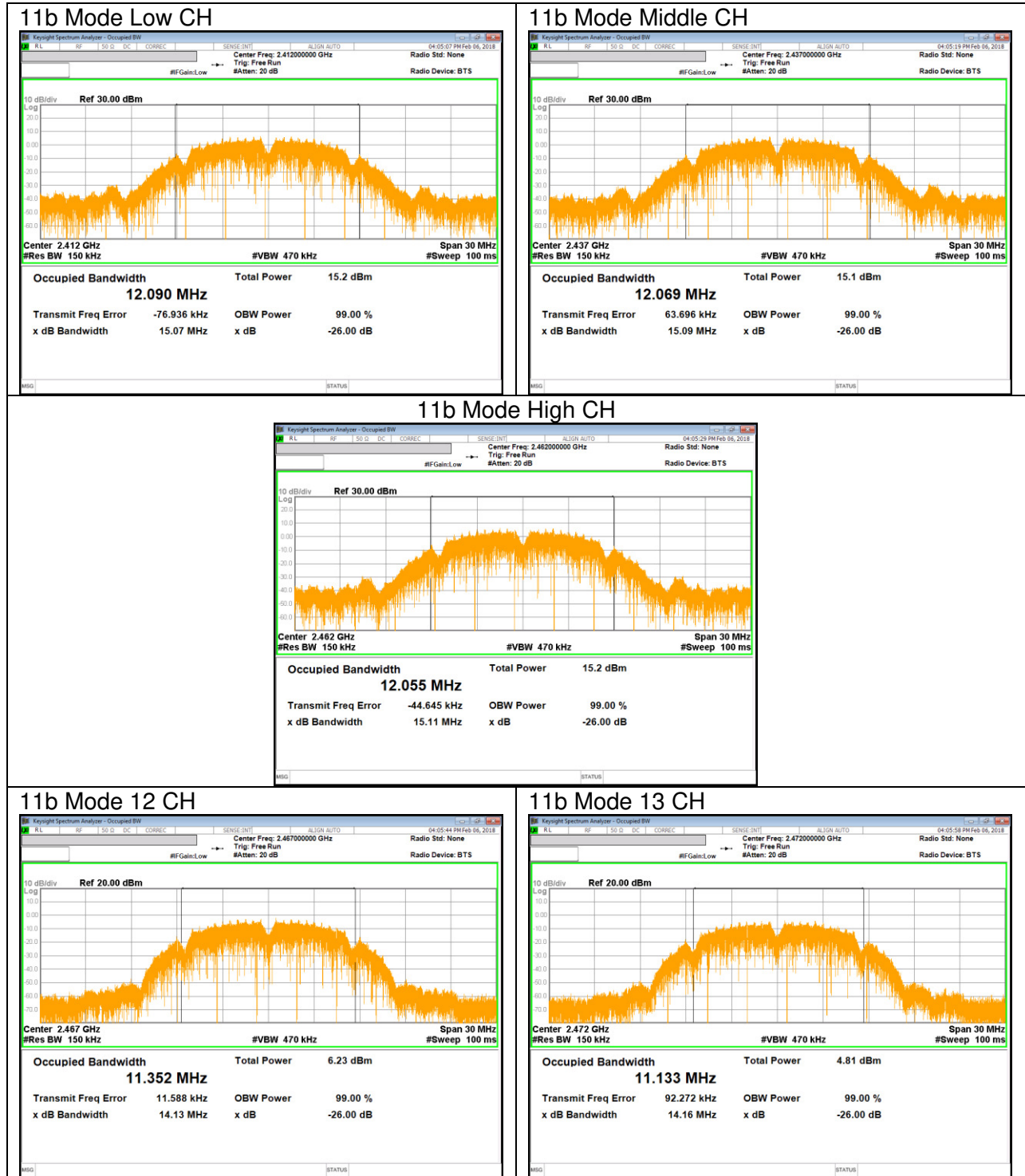
**7.2.2. 802.11g MODE IN THE 2.4 GHz BAND**

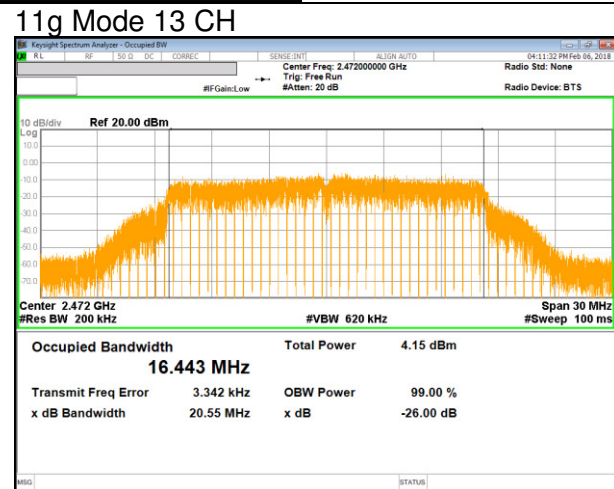
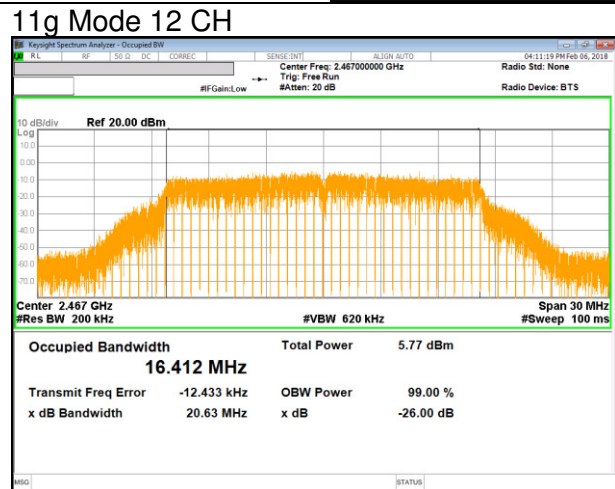
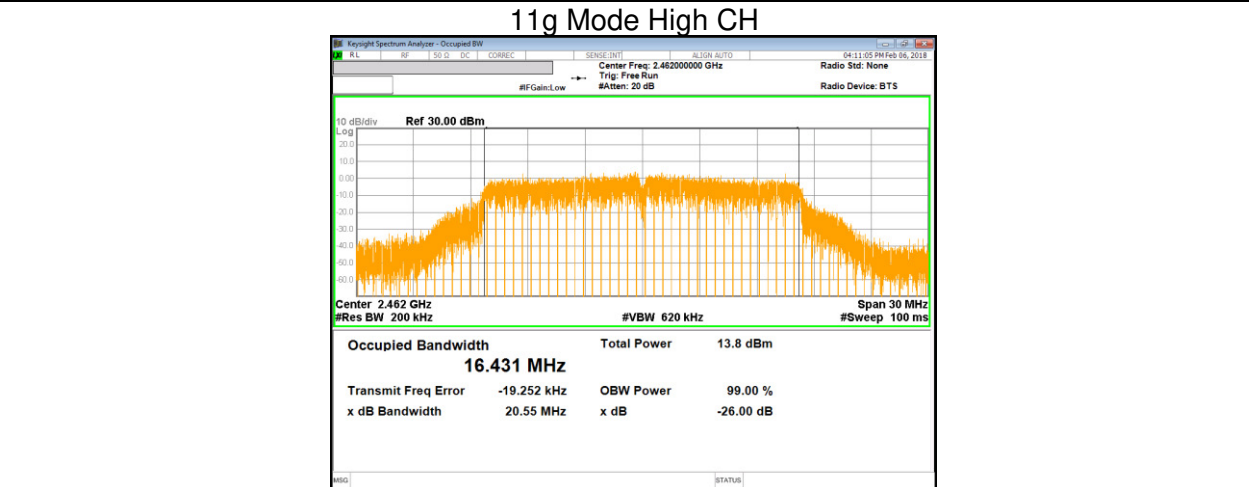
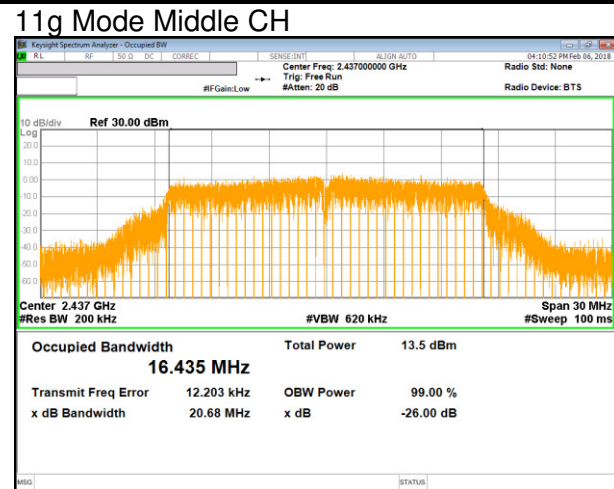
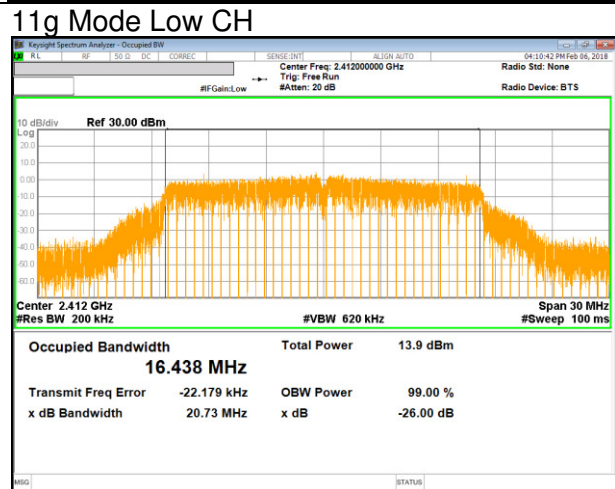
Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	16.438
Mid	2437	16.435
High	2462	16.431
12	2467	16.412
13	2472	16.443
Worst		16.443

**7.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

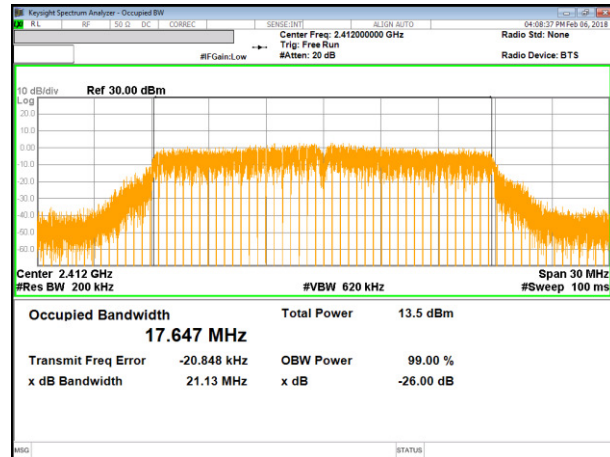
Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	17.647
Mid	2437	17.658
High	2462	17.637
12	2467	17.641
13	2472	17.658
Worst		17.658

### 7.2.4. 99% BANDWIDTH PLOTS

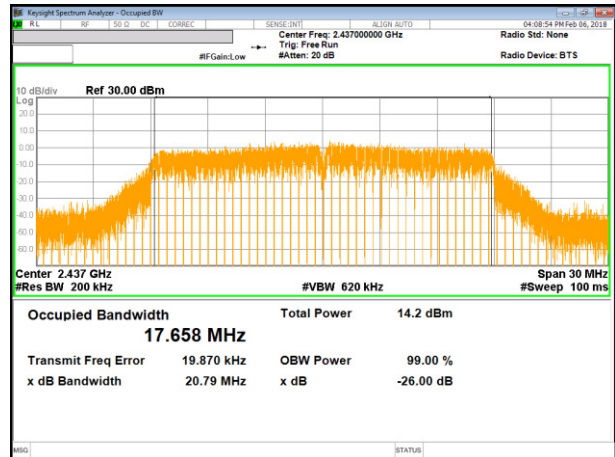




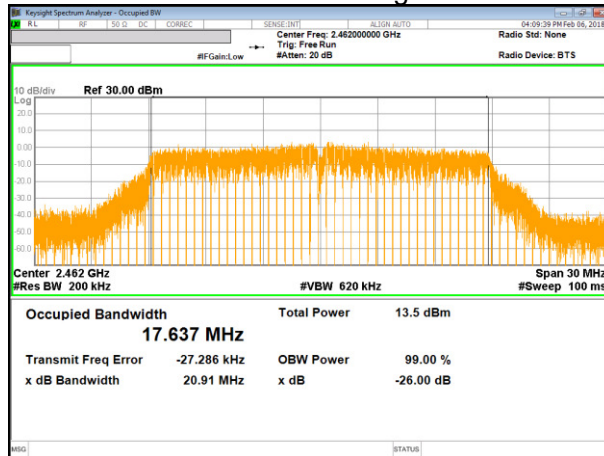
### 11n HT20 Mode Low CH



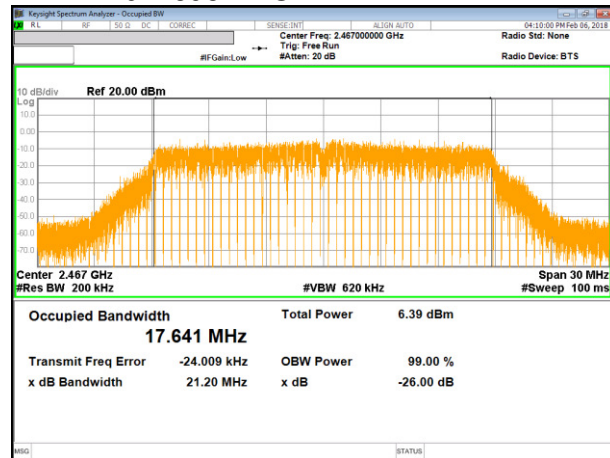
### 11n HT20 Mode Middle CH



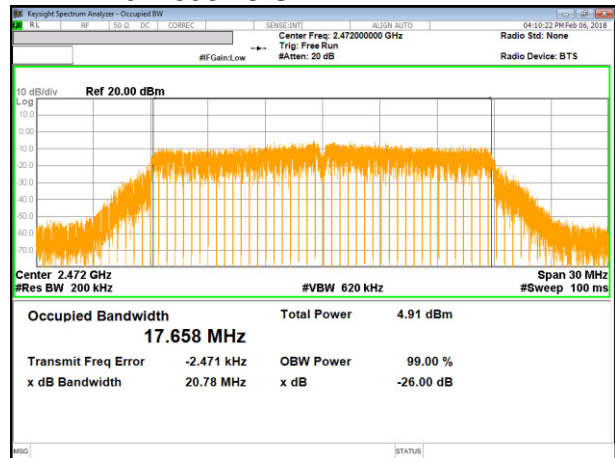
### 11n HT20 Mode High CH



### 11n HT20 Mode 12 CH



### 11n HT20 Mode 13 CH



## 8. SUMMARY TABLE

FCC Part Section	IC Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	RSS-247 5.2(a)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	8.1 MHz
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-30dBc		Pass	-34.459 dBm
15.247 (b)(3)	RSS-247 5.4(d)	TX conducted output power	<30dBm		Pass	15.39 dBm (Average)
15.247 (e)	RSS-247 5.2(b)	PSD	<8dBm		Pass	-14.802 dBm (Average)
15.207 (a)	RSS-GEN Clause 7 & 8.9	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	50.43 dBuV (Pk)
15.205, 15.209	RSS-GEN Clause 8.8	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	51.86 dBuV/m (Av)

## 9. ANTENNA PORT TEST RESULTS

### 9.1. 6 dB BANDWIDTH

#### LIMITS

FCC §15.247 (a) (2)  
IC RSS-247 §5.2 (1)

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

#### TEST PROCEDURE

Reference to KDB 558074 D01 DTS Meas Guidance v04: 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**

**9.1.1. 802.11b MODE IN THE 2.4 GHz BAND**

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	9.046	0.5
Mid	2437	8.100	0.5
High	2462	8.534	0.5
12	2467	8.560	0.5
13	2472	8.556	0.5
Worst		8.100	0.5

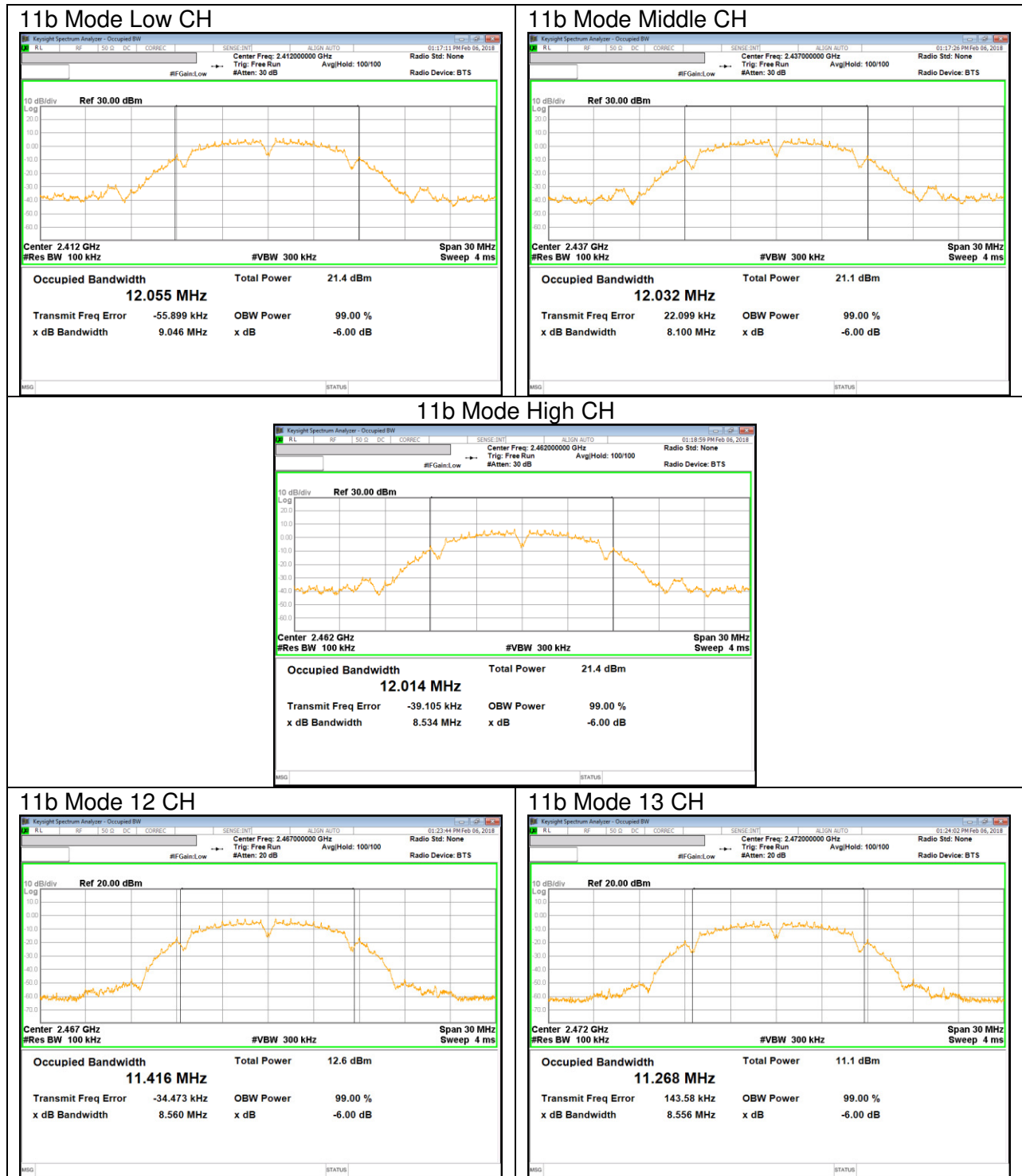
**9.1.2. 802.11g MODE IN THE 2.4 GHz BAND**

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	15.730	0.5
Mid	2437	16.030	0.5
High	2462	16.280	0.5
12	2467	16.300	0.5
13	2472	16.290	0.5
Worst		15.730	0.5

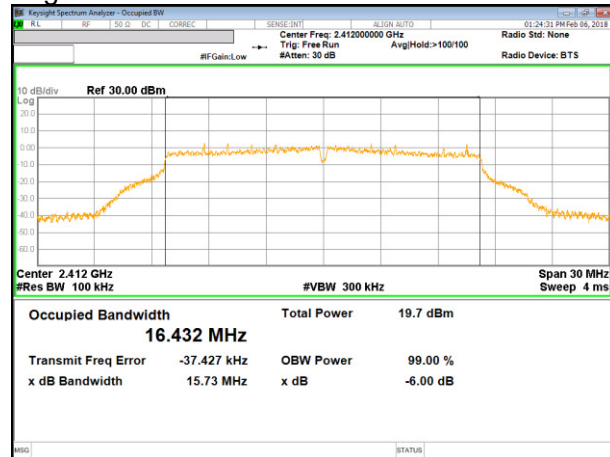
**9.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	17.290	0.5
Mid	2437	17.270	0.5
High	2462	15.880	0.5
12	2467	16.660	0.5
13	2472	17.260	0.5
Worst		15.880	0.5

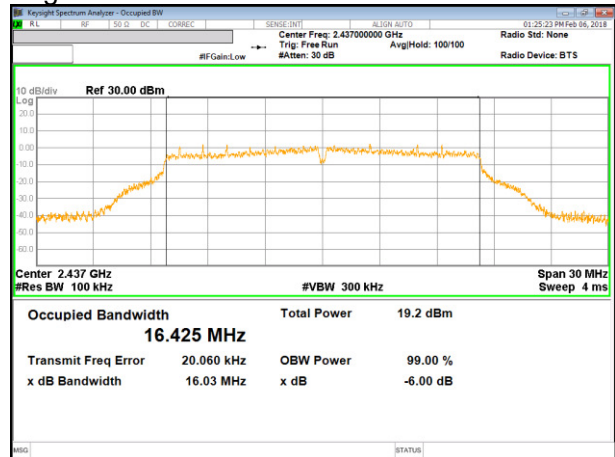
### 9.1.4. 6 dB BANDWIDTH PLOTS



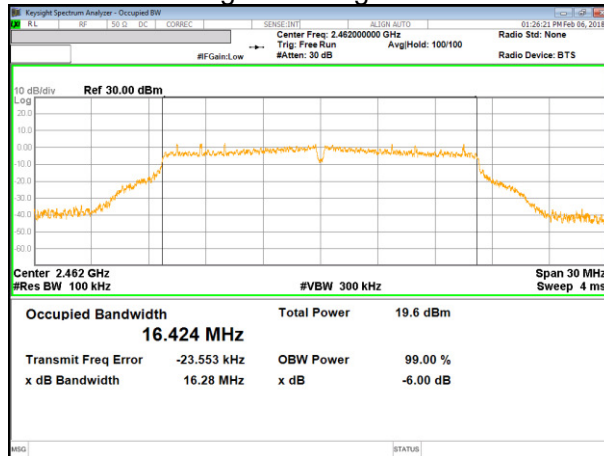
### 11g Mode Low CH



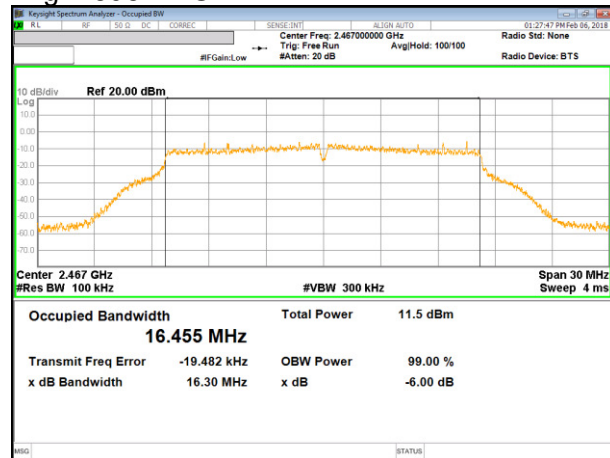
### 11g Mode Middle CH



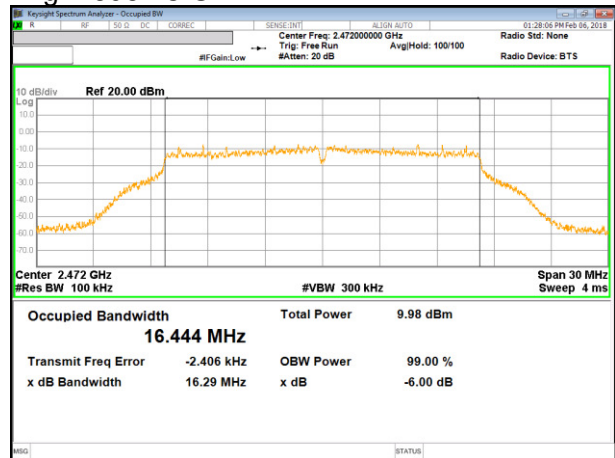
### 11g Mode High CH



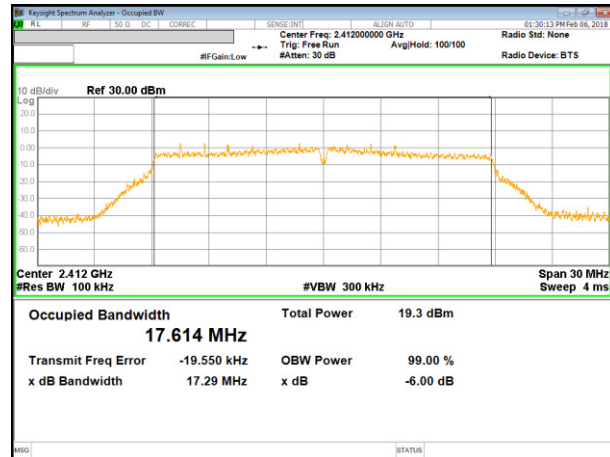
### 11g Mode 12 CH



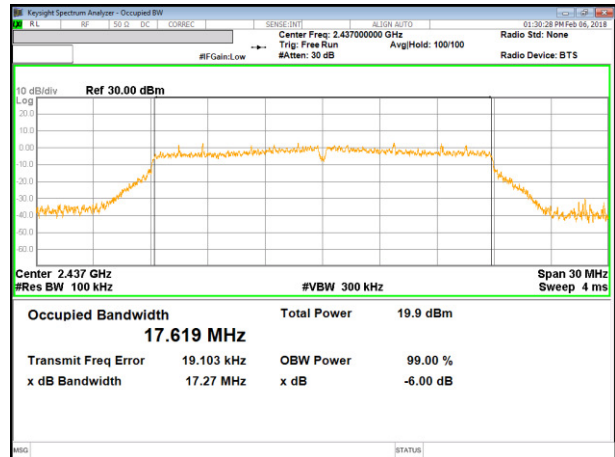
### 11g Mode 13 CH



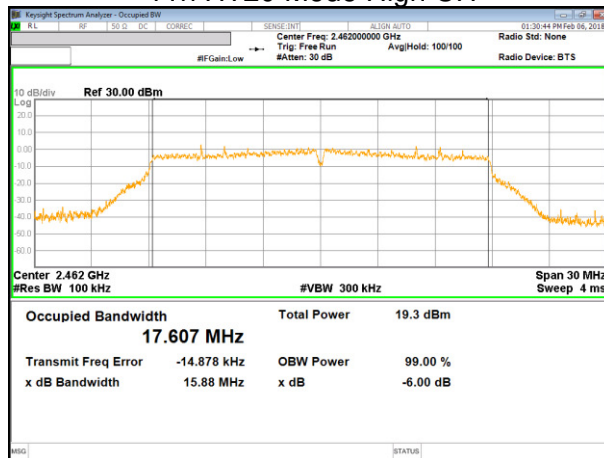
### 11n HT20 Mode Low CH



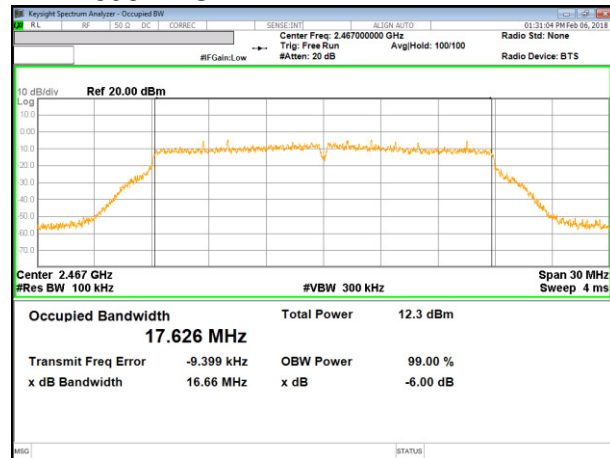
### 11n HT20 Mode Middle CH



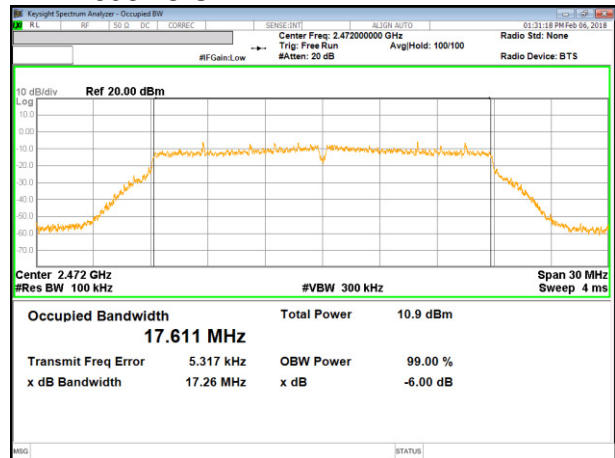
### 11n HT20 Mode High CH



### 11n Mode 12 CH



### 11n Mode 13 CH



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## **9.2. OUTPUT POWER**

### **LIMITS**

FCC §15.247  
IC RSS-247 §5.4 (4)

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 “§9.2.3.1 AVGPM” under KDB558074 D01 DTS Meas Guidance v04.

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

**RESULTS**

**9.2.1. 802.11b MODE IN THE 2.4 GHz BAND**

**Limits**

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
Low	2412	0.00	30.00	30.00
Mid	2437	0.00	30.00	30.00
High	2462	0.00	30.00	30.00
12	2467	0.00	30.00	30.00
13	2472	0.00	30.00	30.00

**Results**

Channel	Frequency [MHz]	Meas Power [dBm]	Total Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	15.39	15.39	30.00	-14.61
Mid	2437	14.95	14.95	30.00	-15.05
High	2462	15.28	15.28	30.00	-14.72
12	2467	6.38	6.38	30.00	-23.62
13	2472	5.00	5.00	30.00	-25.00
Worst			15.39	30.00	-14.61

**9.2.2. 802.11g MODE IN THE 2.4 GHz BAND**

**Limits**

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
Low	2412	0.00	30.00	30.00
Mid	2437	0.00	30.00	30.00
High	2462	0.00	30.00	30.00
12	2467	0.00	30.00	30.00
13	2472	0.00	30.00	30.00

**Results**

Channel	Frequency [MHz]	Meas Power [dBm]	Total Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	14.10	14.10	30.00	-15.90
Mid	2437	13.62	13.62	30.00	-16.38
High	2462	13.93	13.93	30.00	-16.07
12	2467	5.92	5.92	30.00	-24.08
13	2472	4.49	4.49	30.00	-25.51
Worst			14.10	30.00	-15.90

**9.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

**Limits**

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
Low	2412	0.00	30.00	30.00
Mid	2437	0.00	30.00	30.00
High	2462	0.00	30.00	30.00
12	2467	0.00	30.00	30.00
13	2472	0.00	30.00	30.00

**Results**

Channel	Frequency [MHz]	Meas Power [dBm]	Total Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	13.63	13.63	30.00	-16.37
Mid	2437	14.27	14.27	30.00	-15.73
High	2462	13.67	13.67	30.00	-16.33
12	2467	6.49	6.49	30.00	-23.51
13	2472	5.21	5.21	30.00	-24.79
Worst			14.27	30.00	-15.73

### **9.3. PSD**

#### **LIMITS**

FCC §15.247  
IC RSS-247 §5.2 (2)

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 §10.3 AVGPSD-1 (802.11 b mode) and §10.5 AVGPSD-2(802.11 g/n mode)” under KDB558074 D01 DTS Meas Guidance v04.

**RESULTS**

**9.3.1. 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	-15.817	0.00	-15.817	8.00	-23.817
Mid	2437	-16.194	0.00	-16.194	8.00	-24.194
High	2462	-16.123	0.00	-16.123	8.00	-24.123
12	2467	-25.200	0.00	-25.200	8.00	-33.200
13	2472	-25.971	0.00	-25.971	8.00	-33.971

**9.3.2. 802.11g MODE IN THE 2.4 GHz BAND**

**PSD Results**

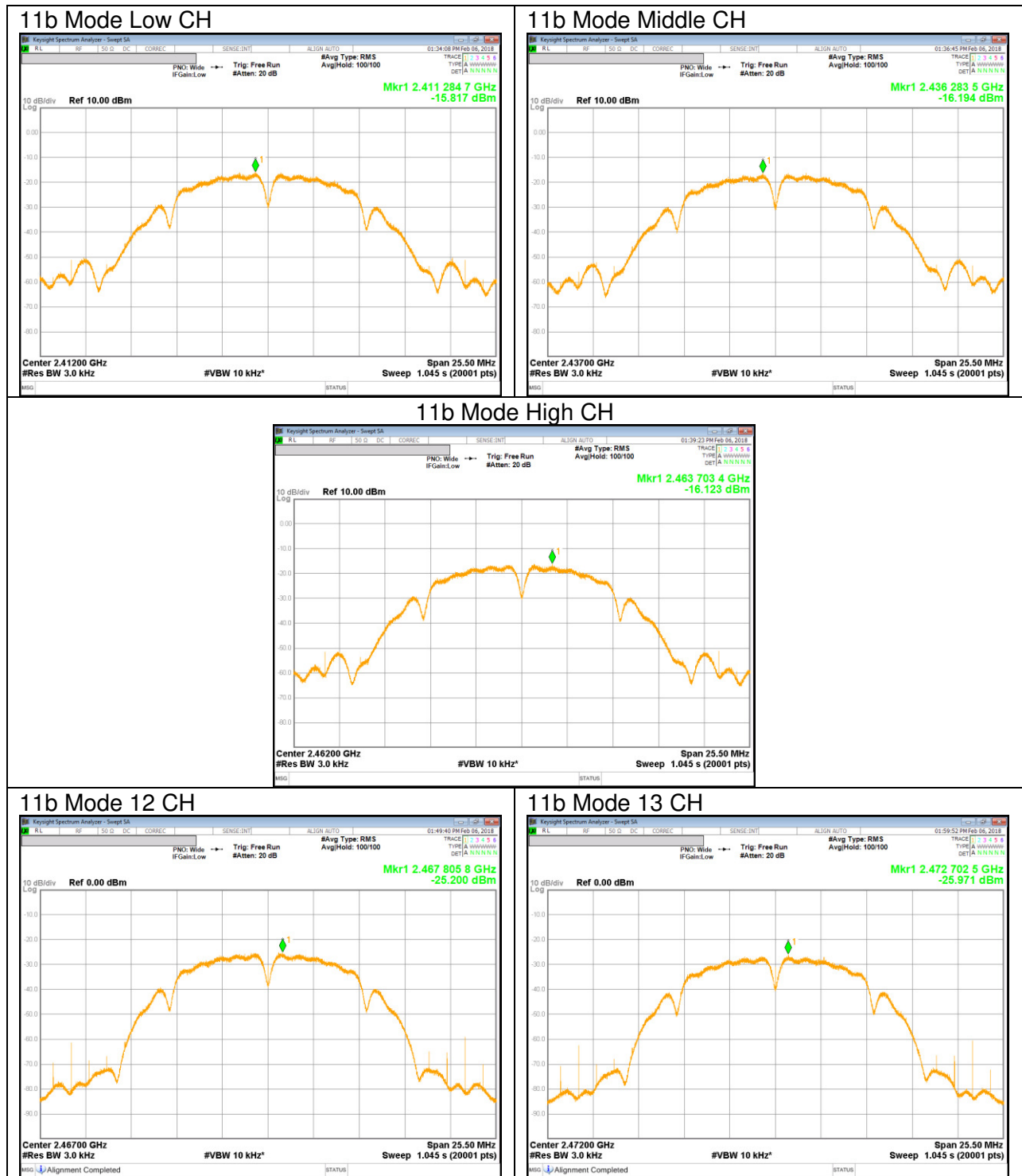
Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-15.102	0.30	-14.802	8.00	-23.102
Mid	2437	-15.434	0.30	-15.134	8.00	-23.434
High	2462	-15.242	0.30	-14.942	8.00	-23.242
12	2467	-23.523	0.30	-23.223	8.00	-31.523
13	2472	-24.423	0.30	-24.123	8.00	-32.423

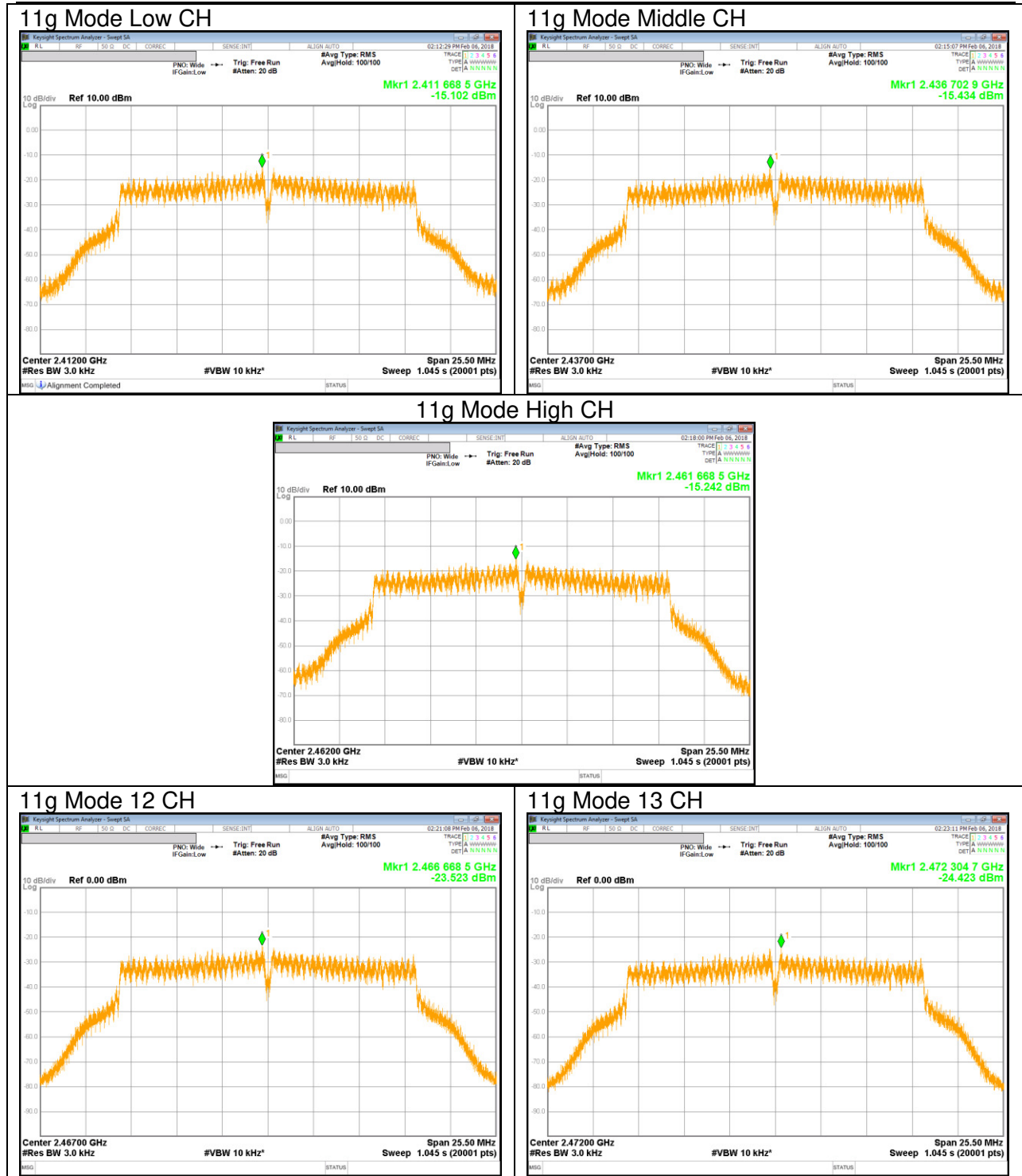
**9.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

**PSD Results**

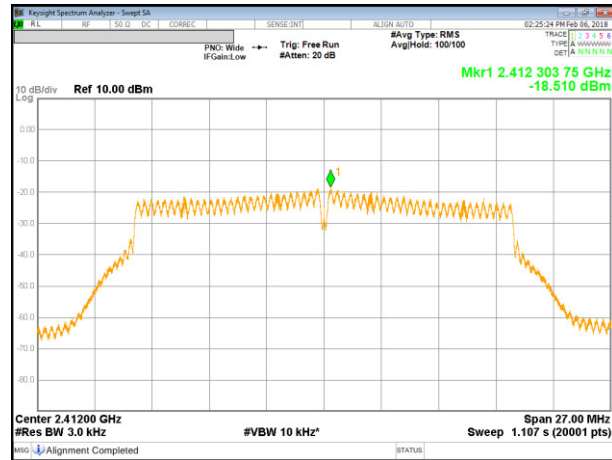
Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-18.51	0.33	-18.180	8.00	-26.510
Mid	2437	-18.391	0.33	-18.061	8.00	-26.391
High	2462	-18.489	0.33	-18.159	8.00	-26.489
12	2467	-25.915	0.33	-25.585	8.00	-33.915
13	2472	-27.738	0.33	-27.408	8.00	-35.738

### 9.3.4. PSD PLOTS

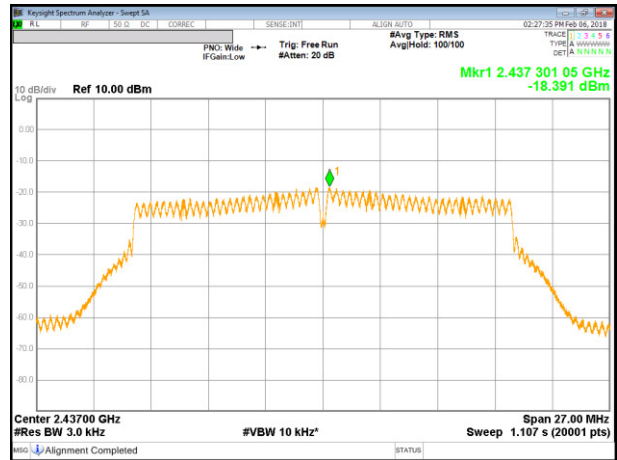




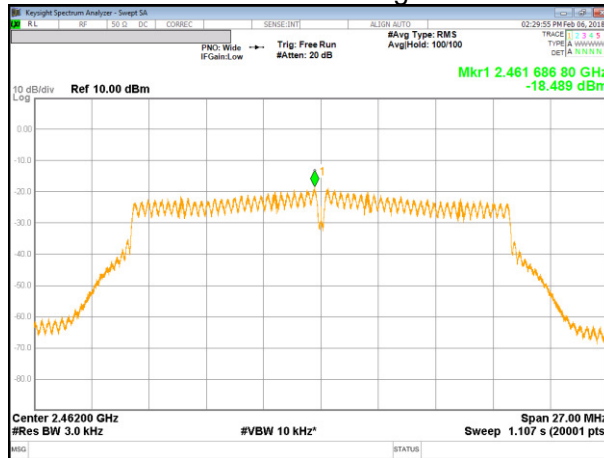
### 11n HT20 Mode Low CH



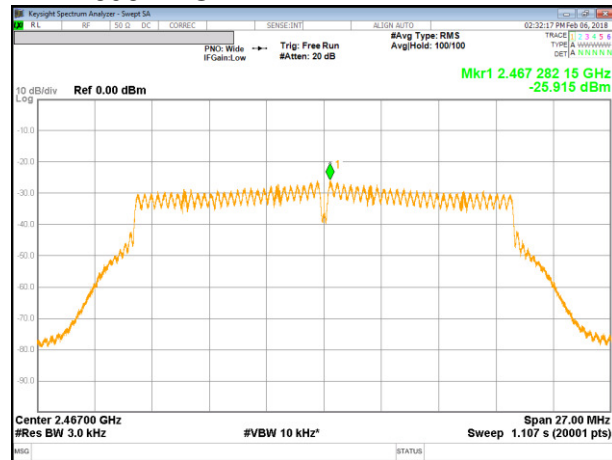
### 11n HT20 Mode Middle CH



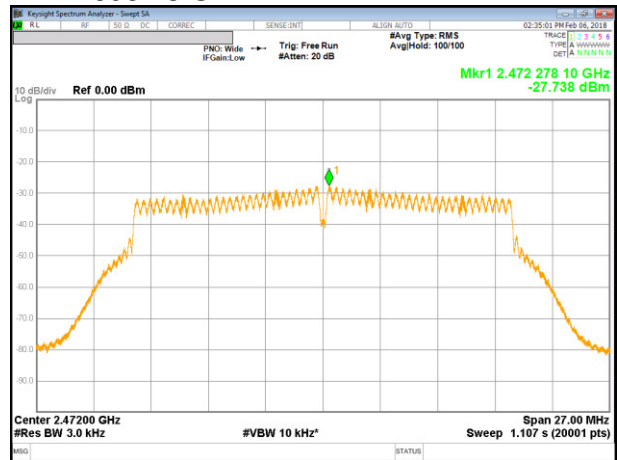
### 11n HT20 Mode High CH



### 11n Mode 12 CH



### 11n Mode 13 CH



## **9.4. OUT-OF-BAND EMISSIONS**

### **LIMITS**

FCC §15.247 (d)  
IC RSS-247 §5.5

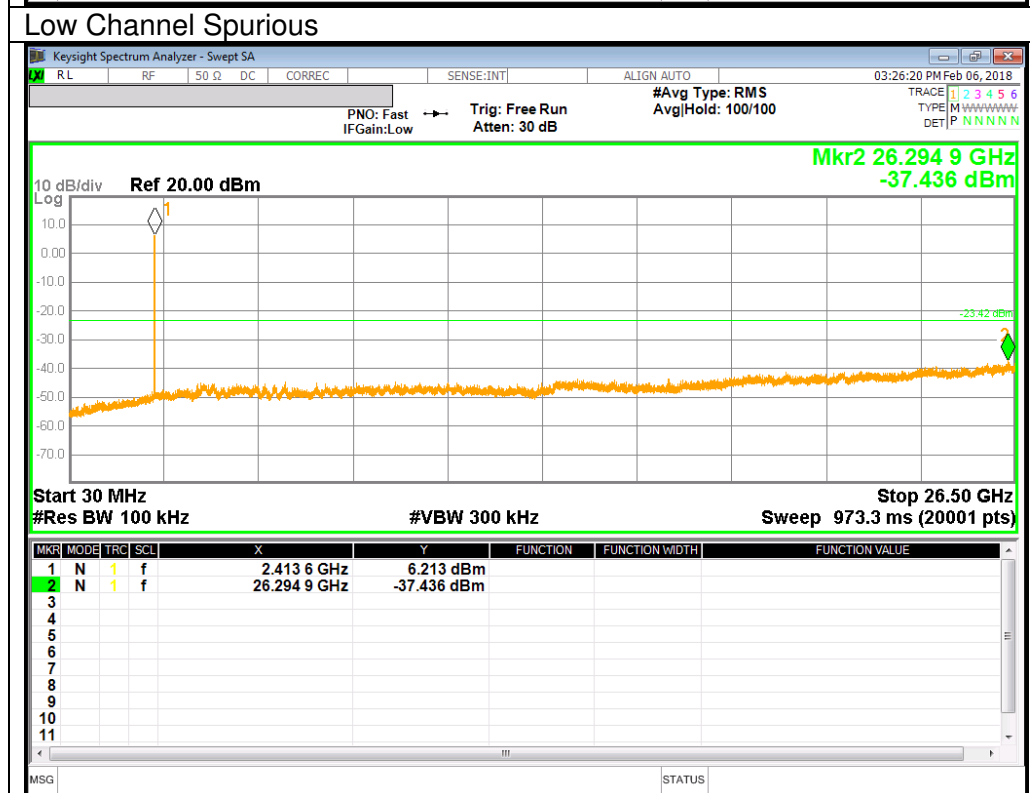
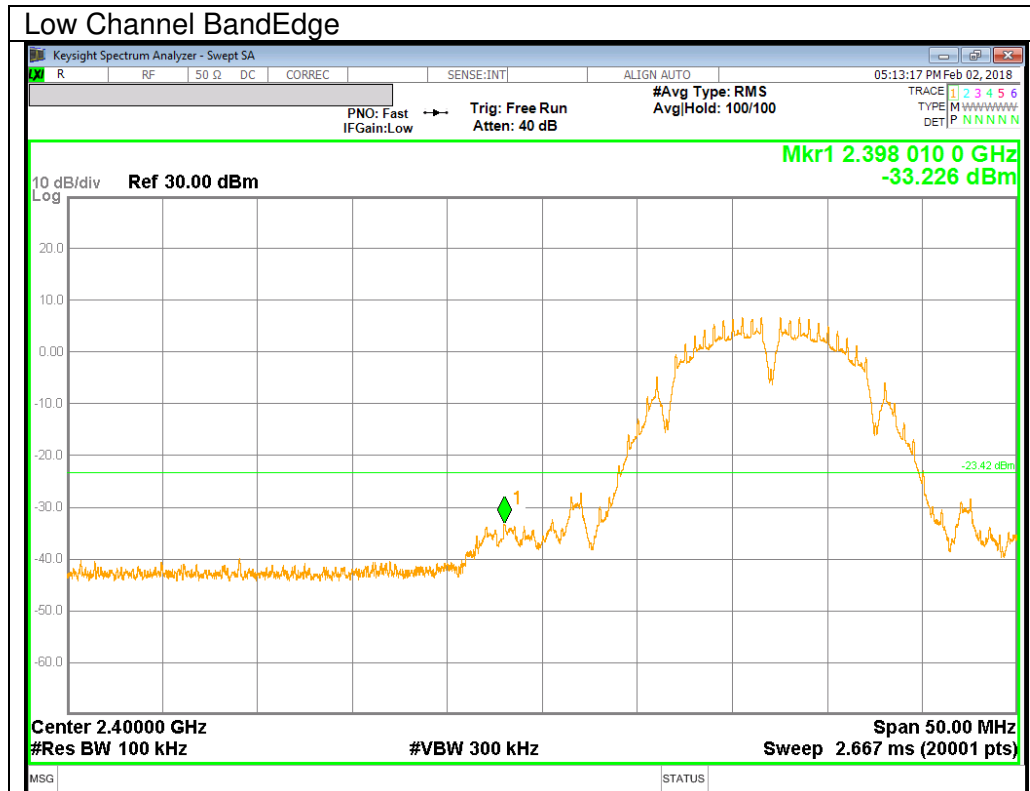
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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**

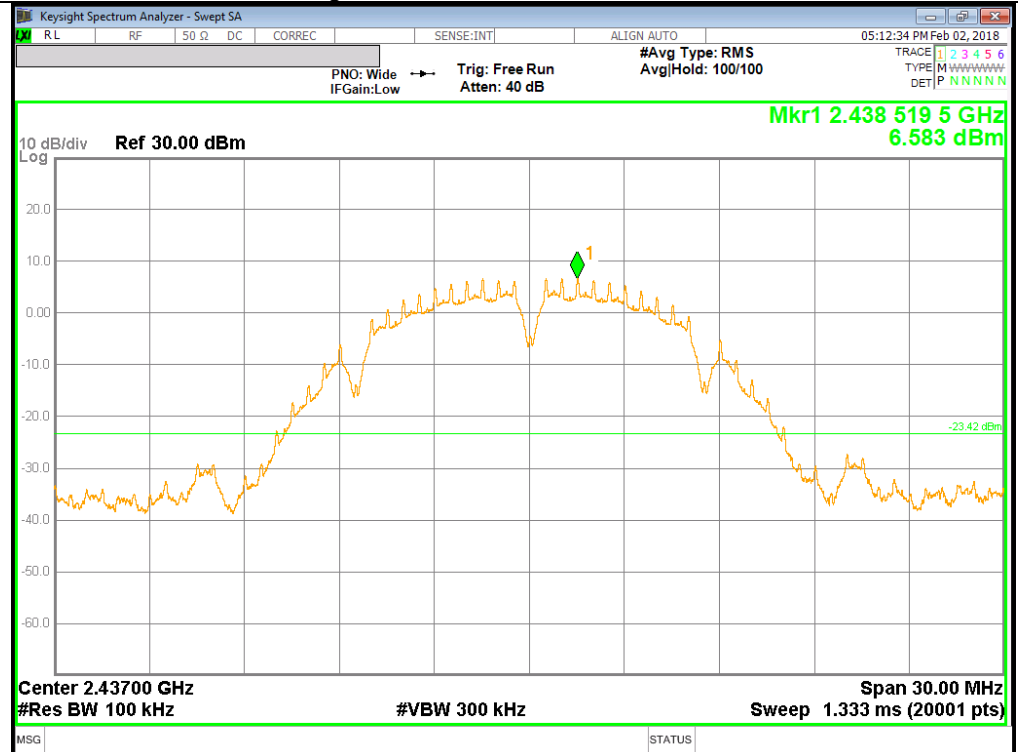
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

**RESULTS**

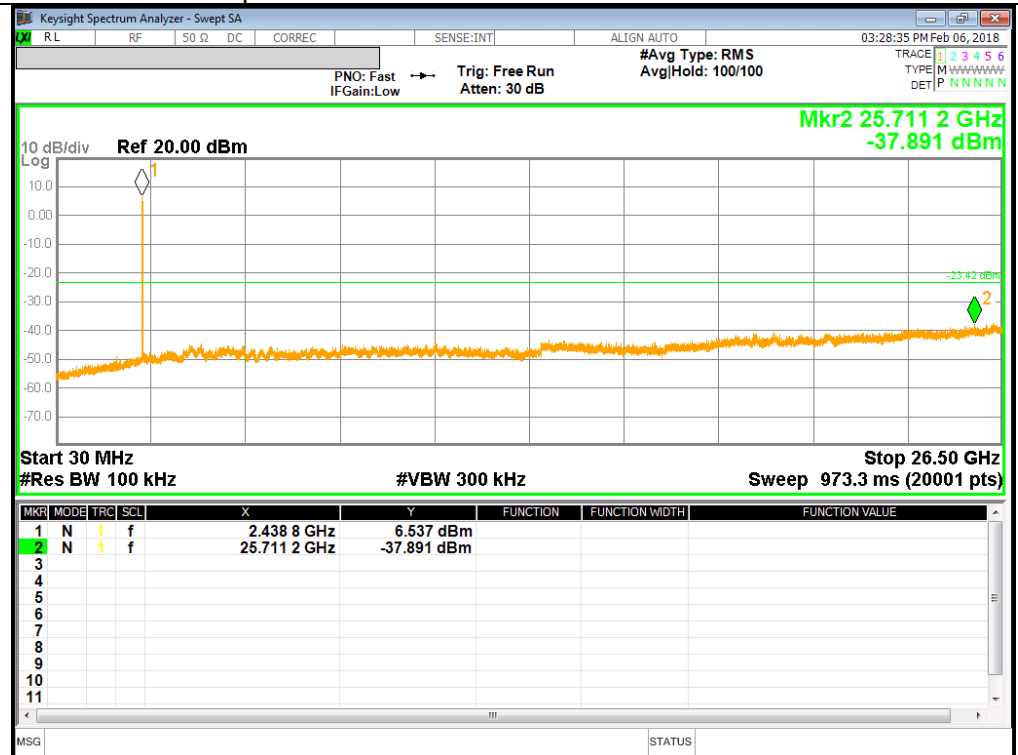
**9.4.1. 802.11b MODE IN THE 2.4 GHz BAND**



### Middle Channel BandEdge



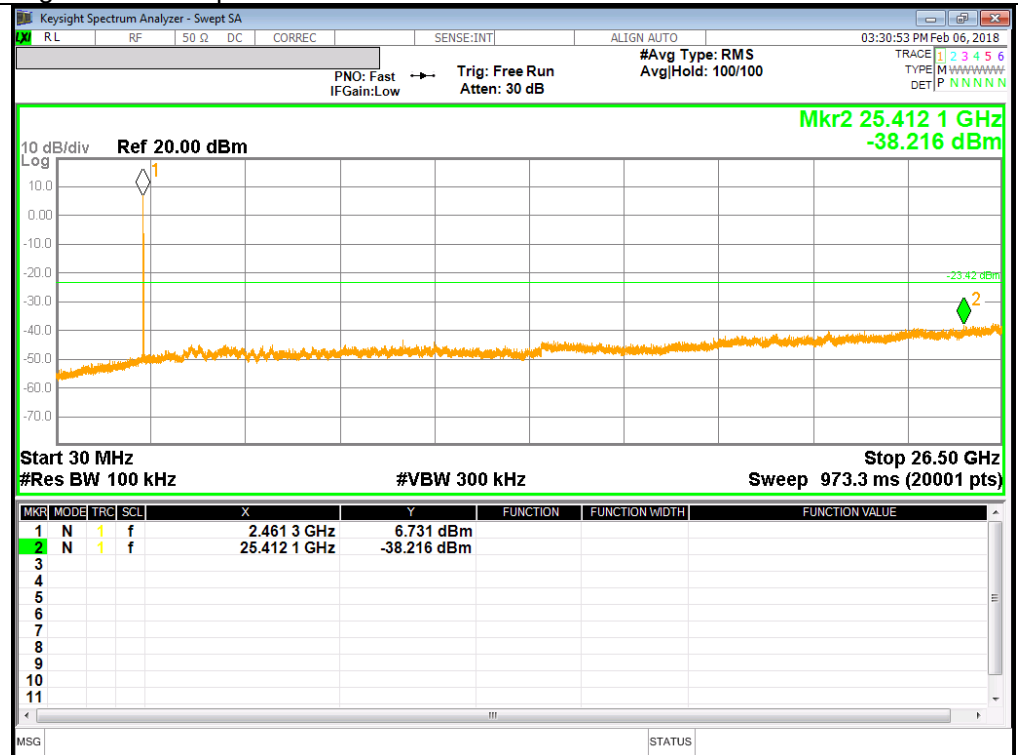
### Middle Channel Spurious



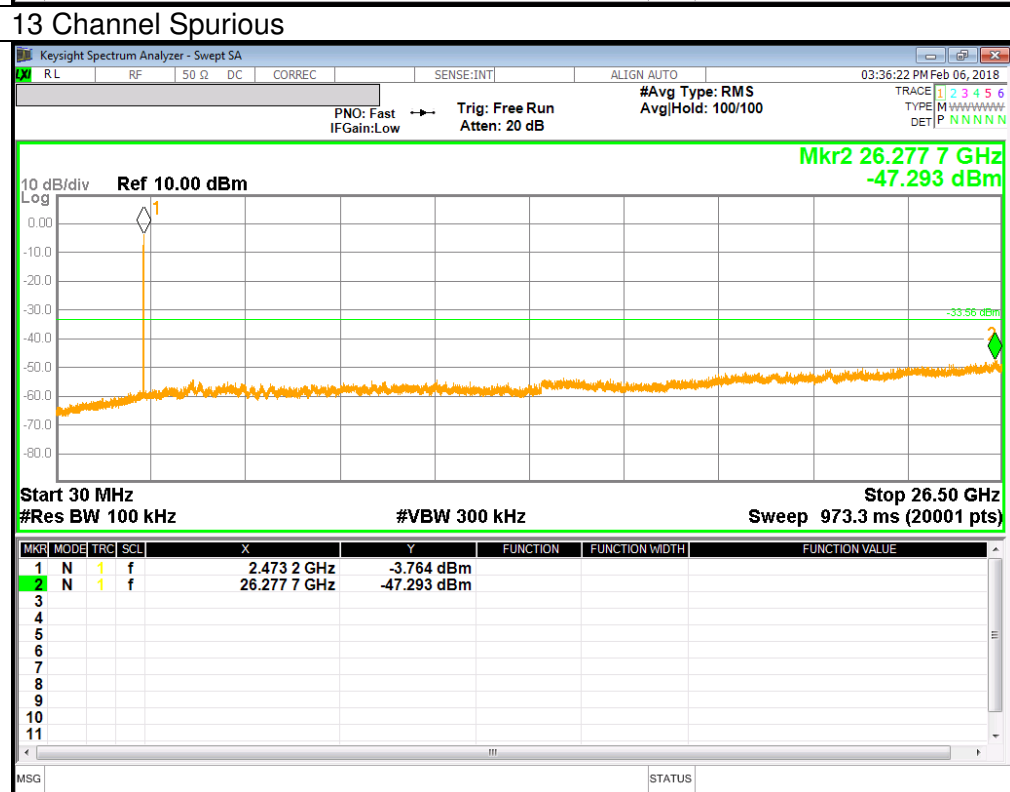
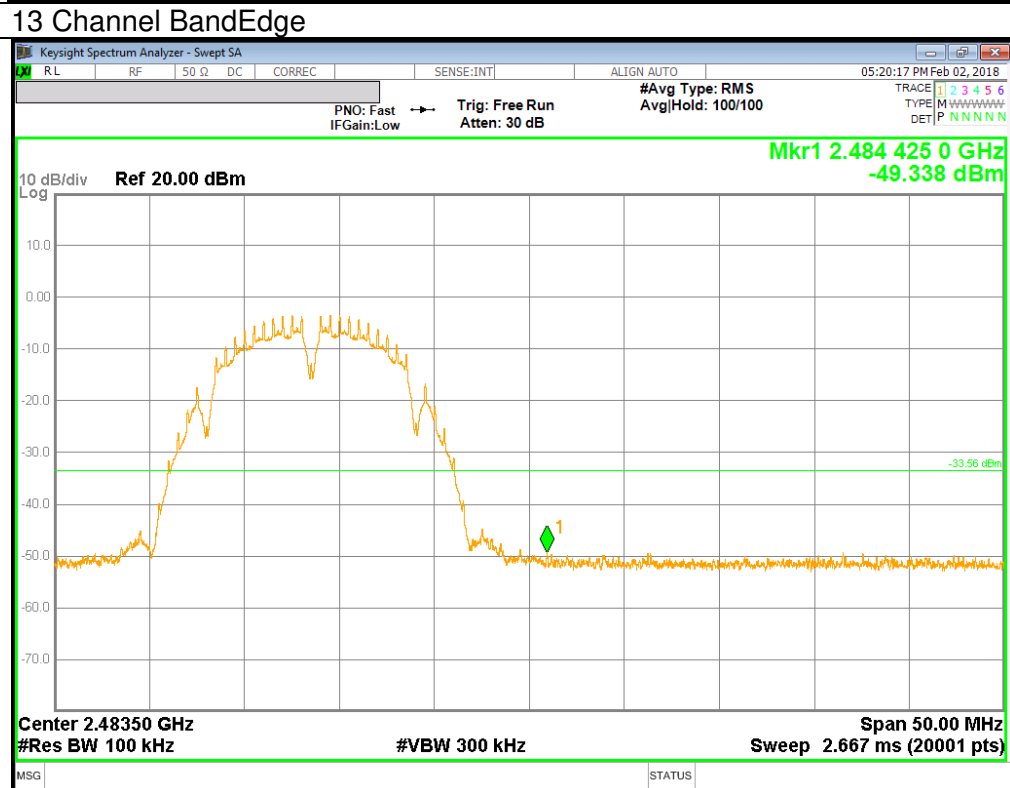
### High Channel BandEdge



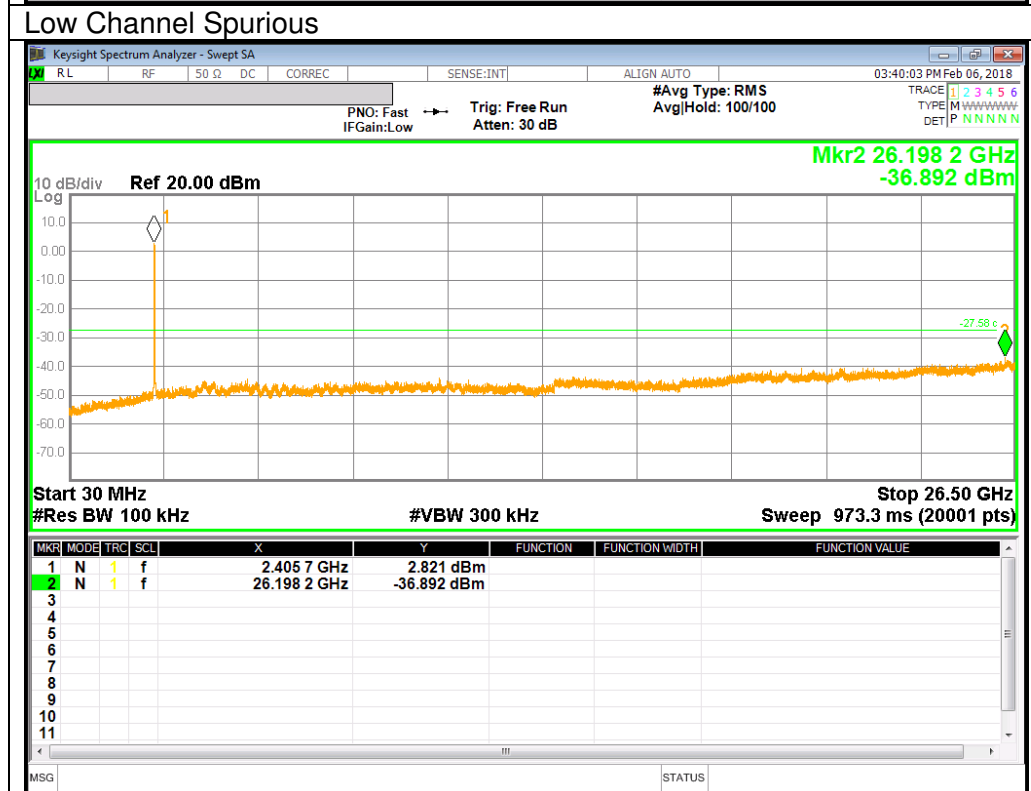
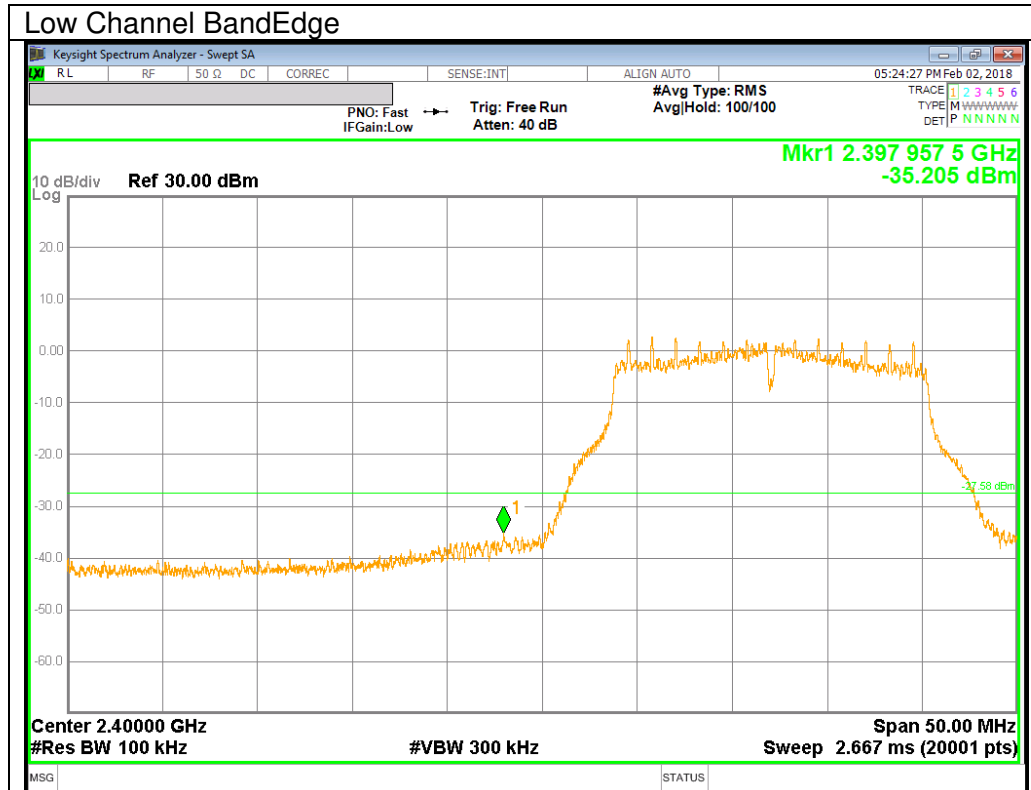
### High Channel Spurious



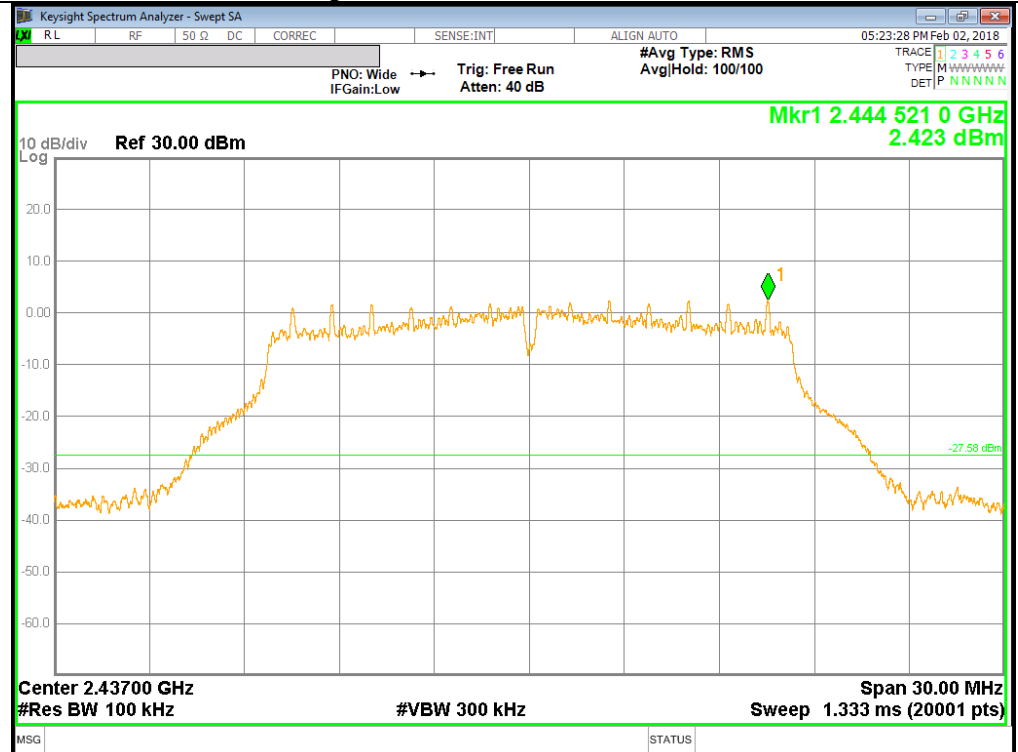




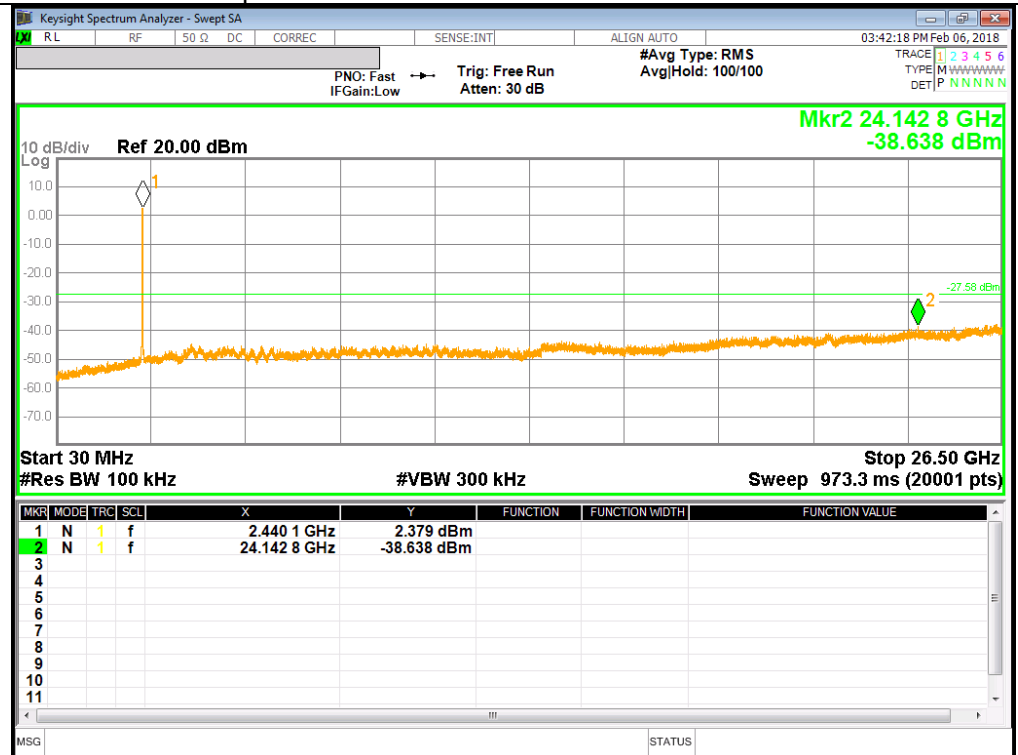
### 9.4.2. 802.11g MODE IN THE 2.4 GHz BAND



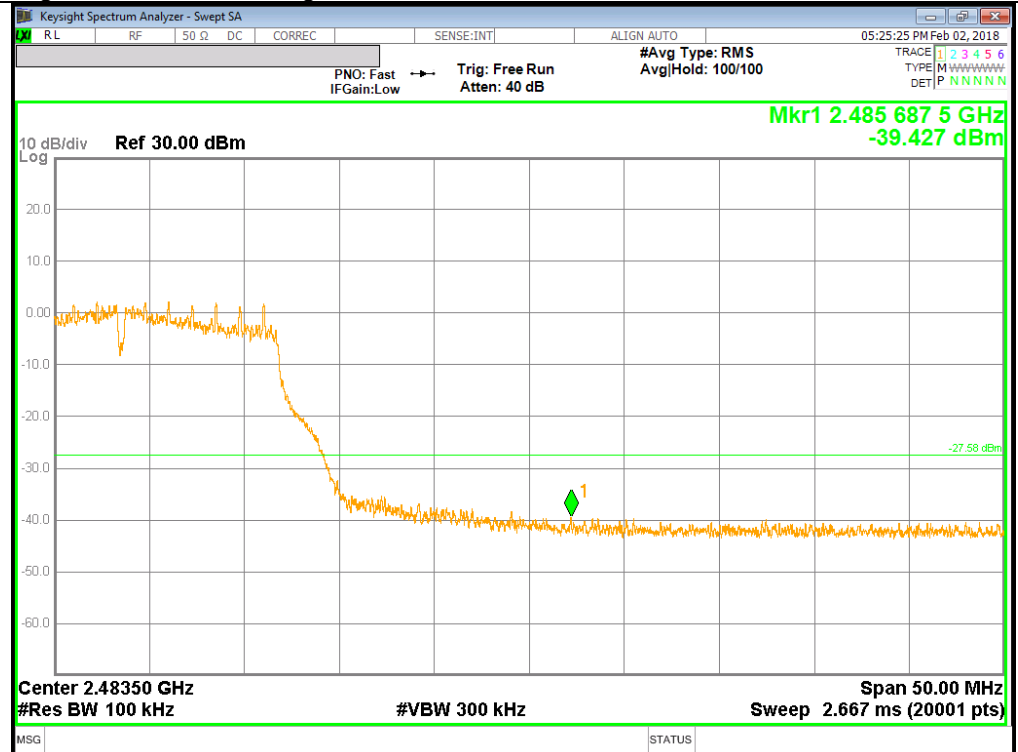
### Middle Channel BandEdge



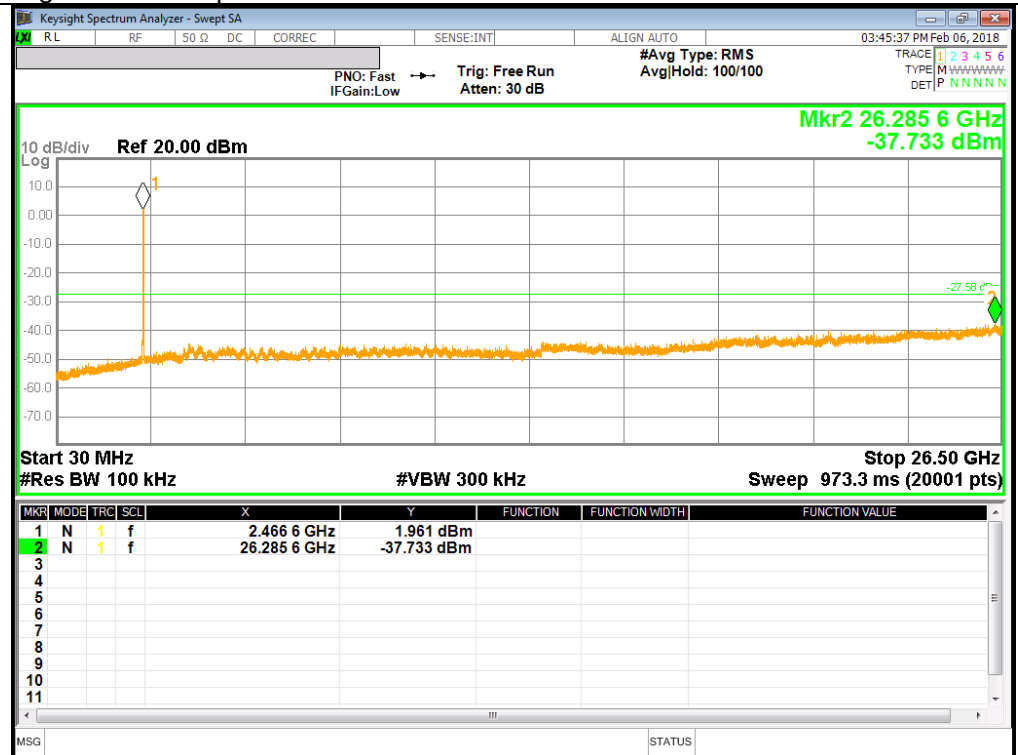
### Middle Channel Spurious

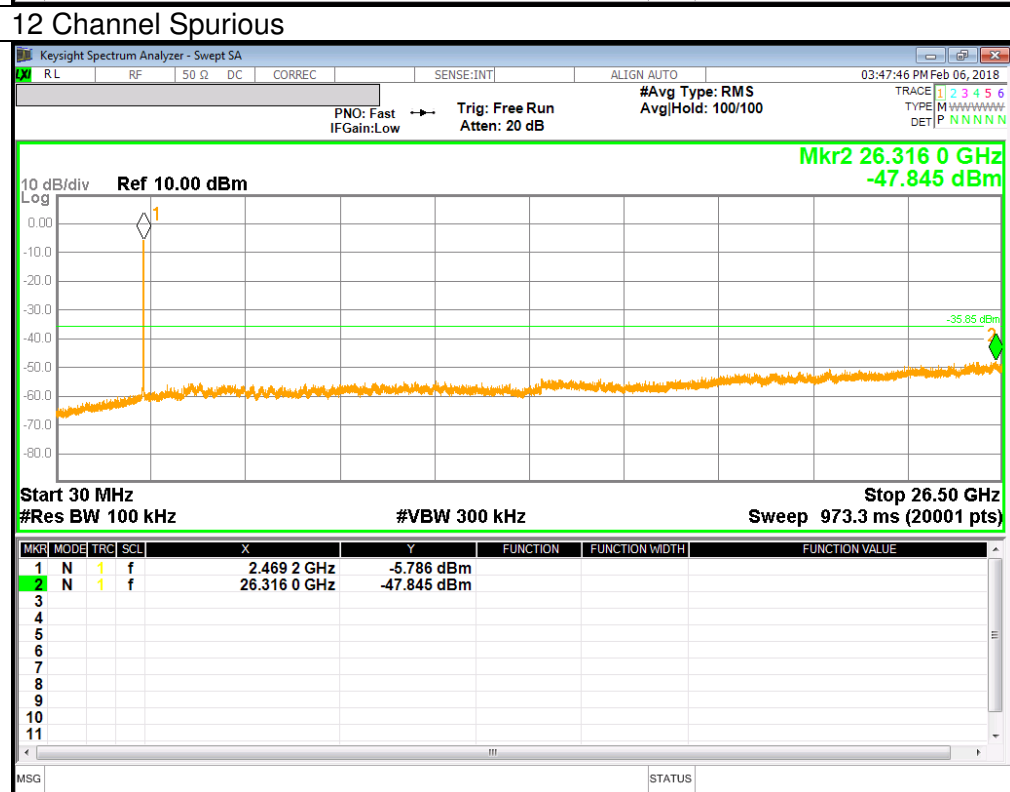
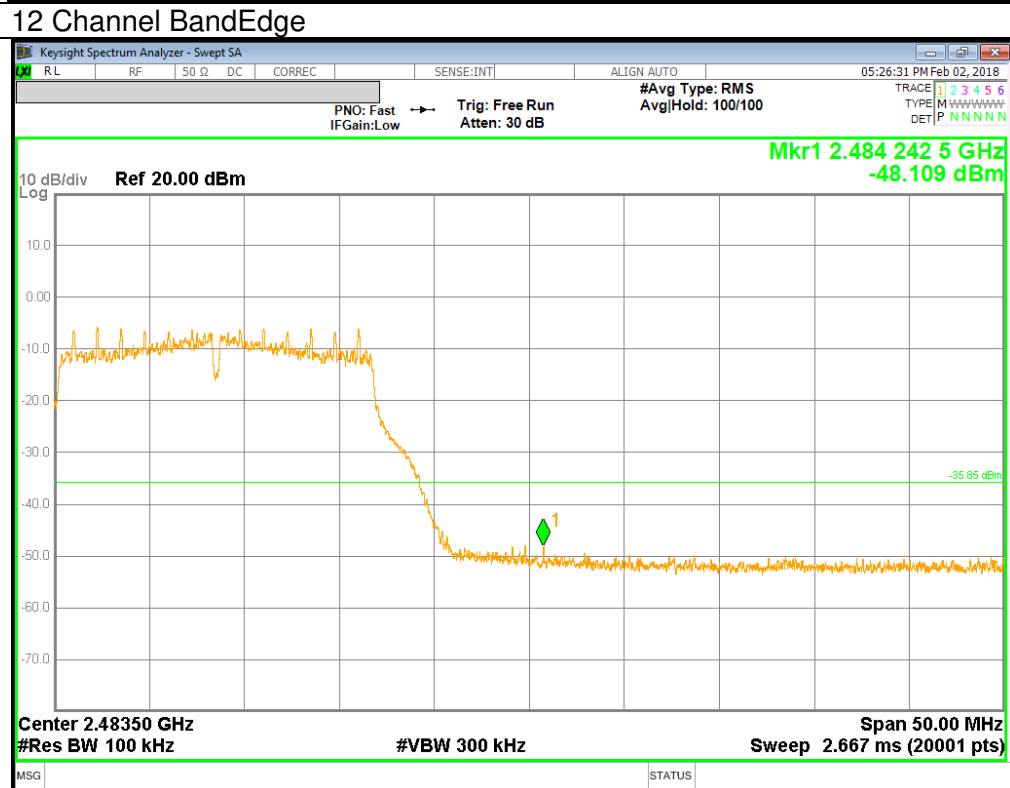


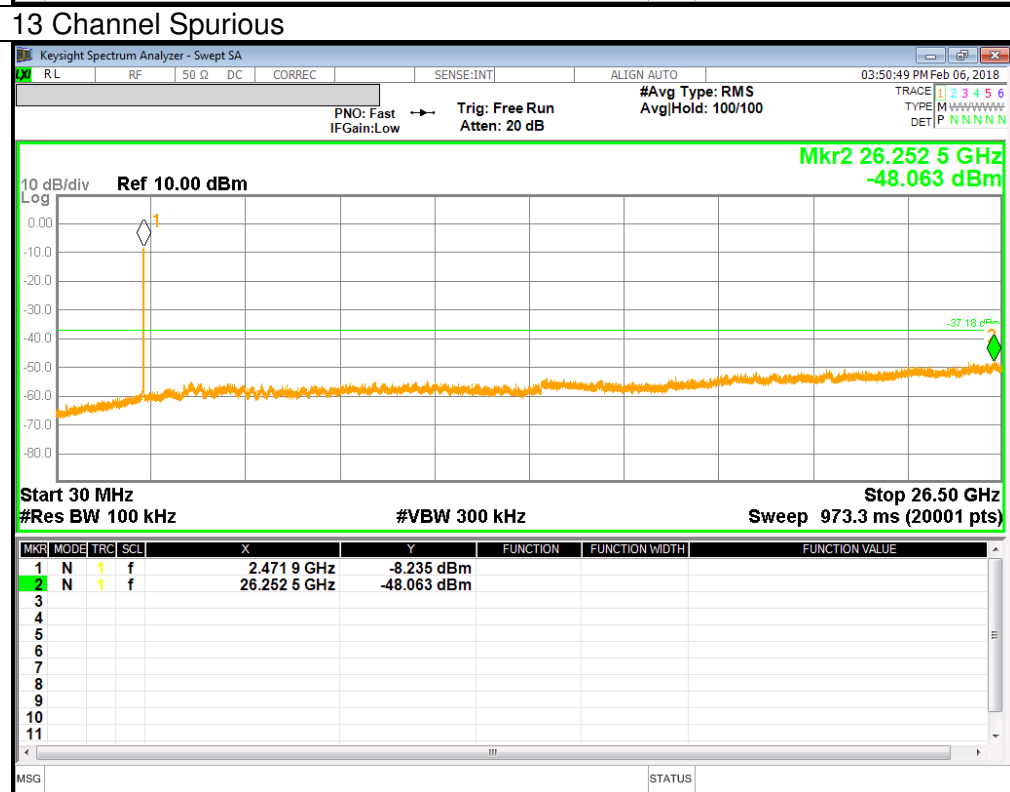
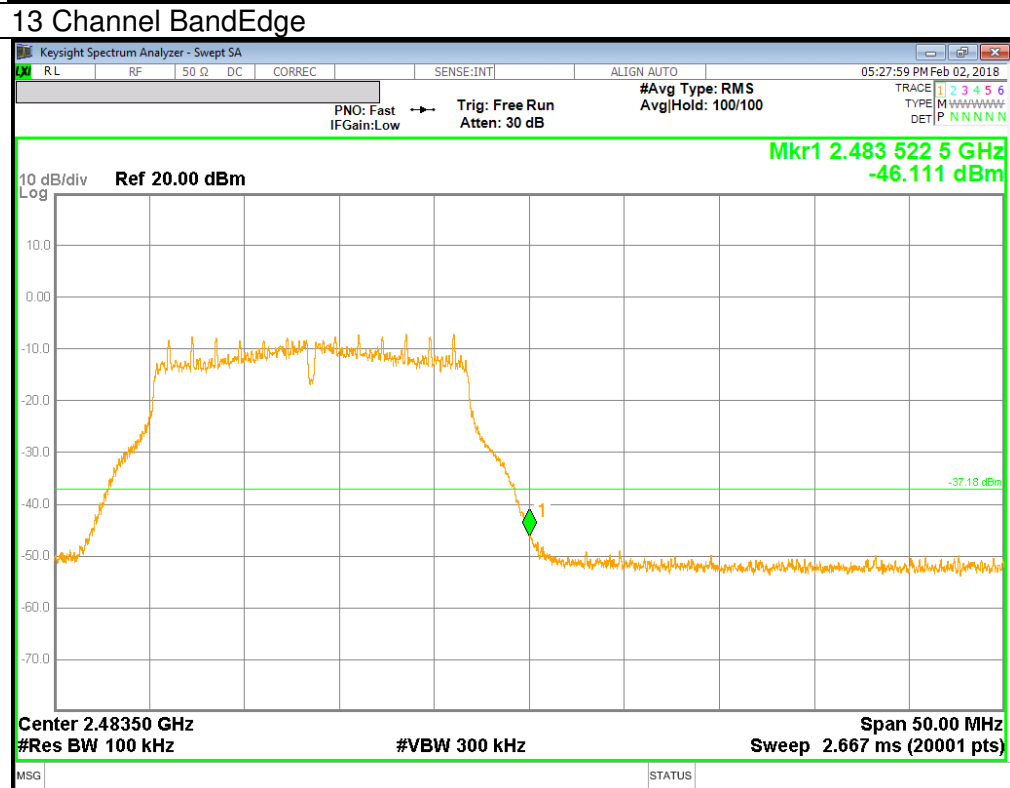
### High Channel BandEdge



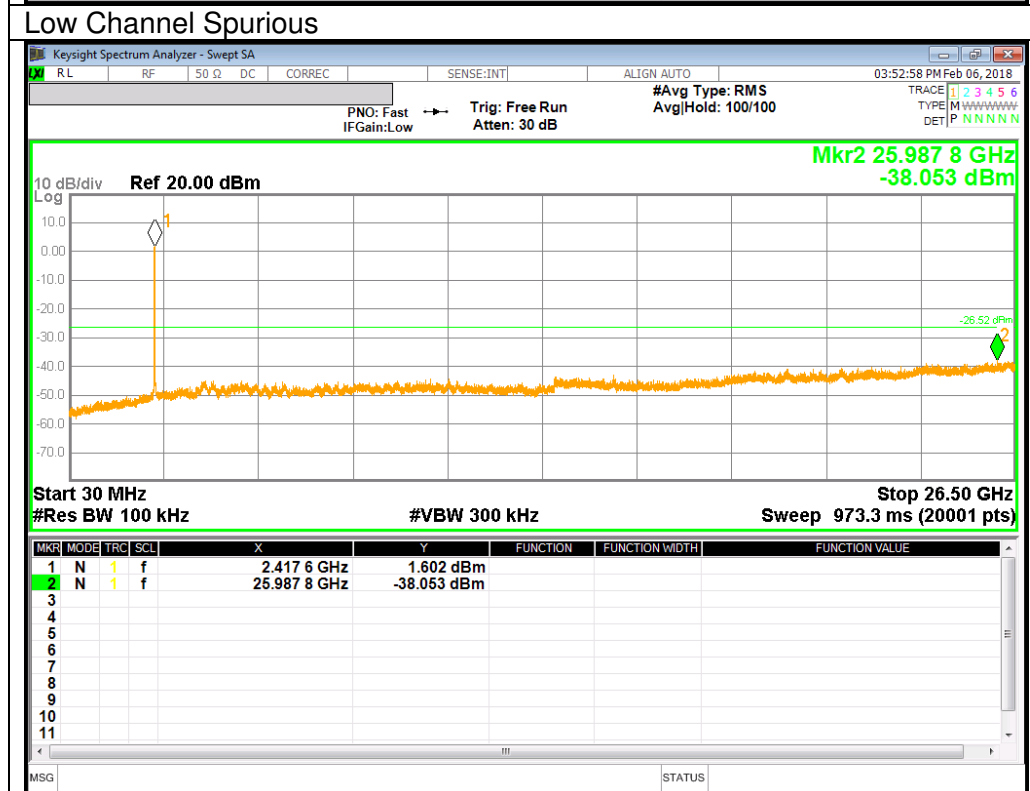
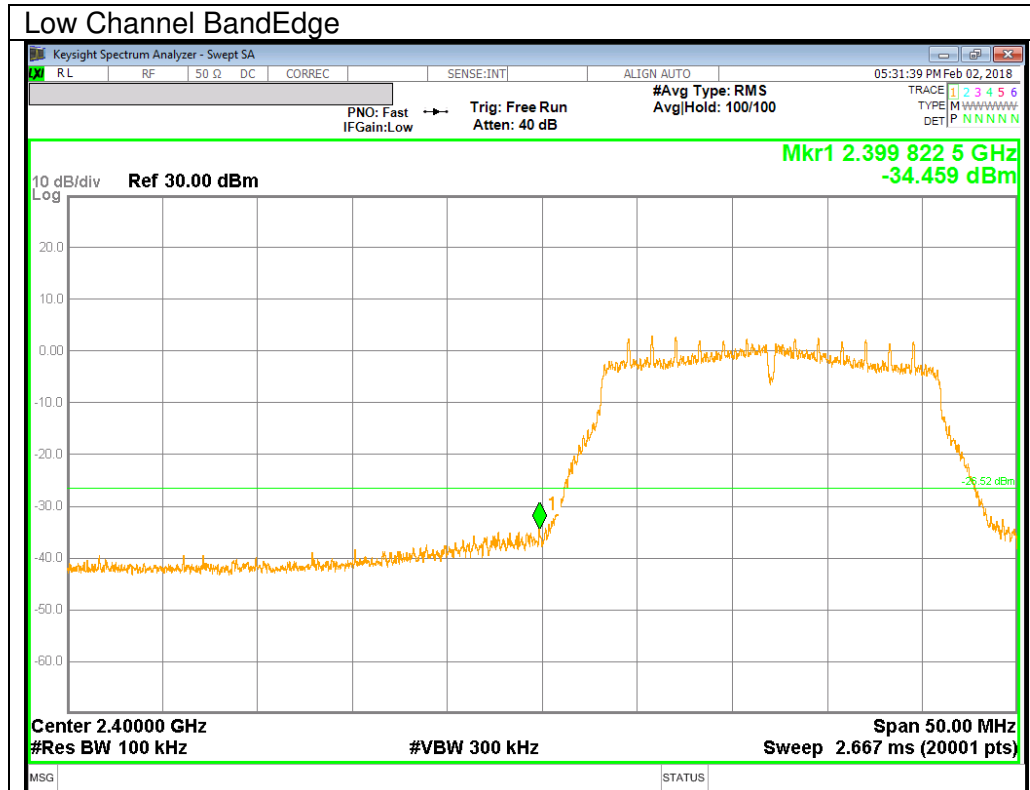
### High Channel Spurious



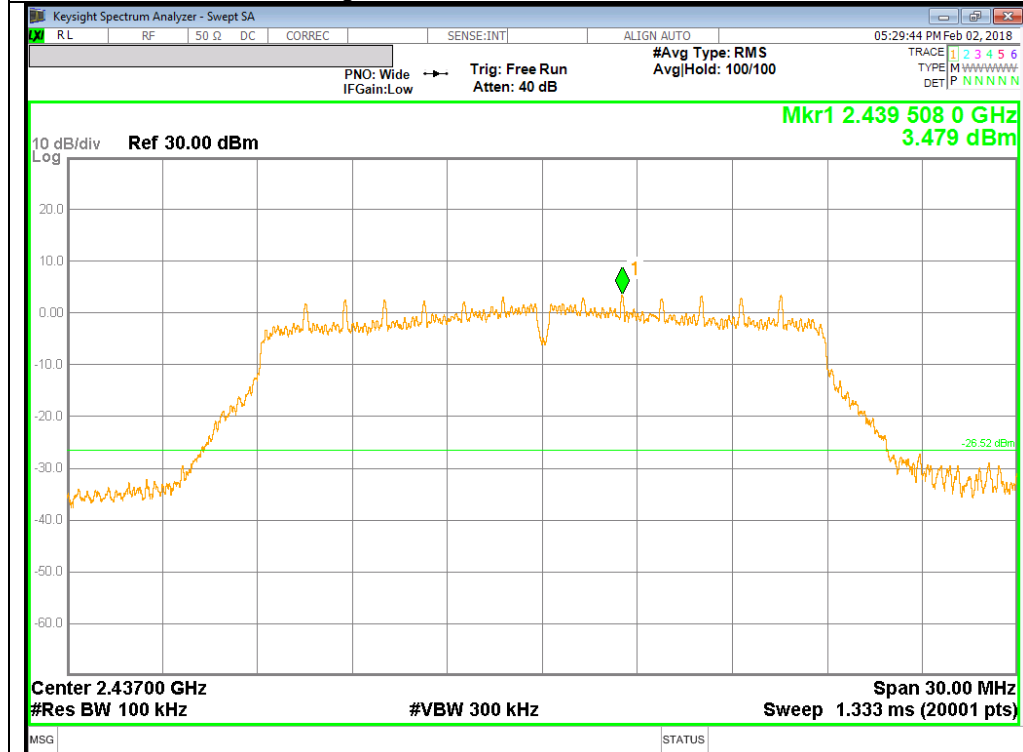




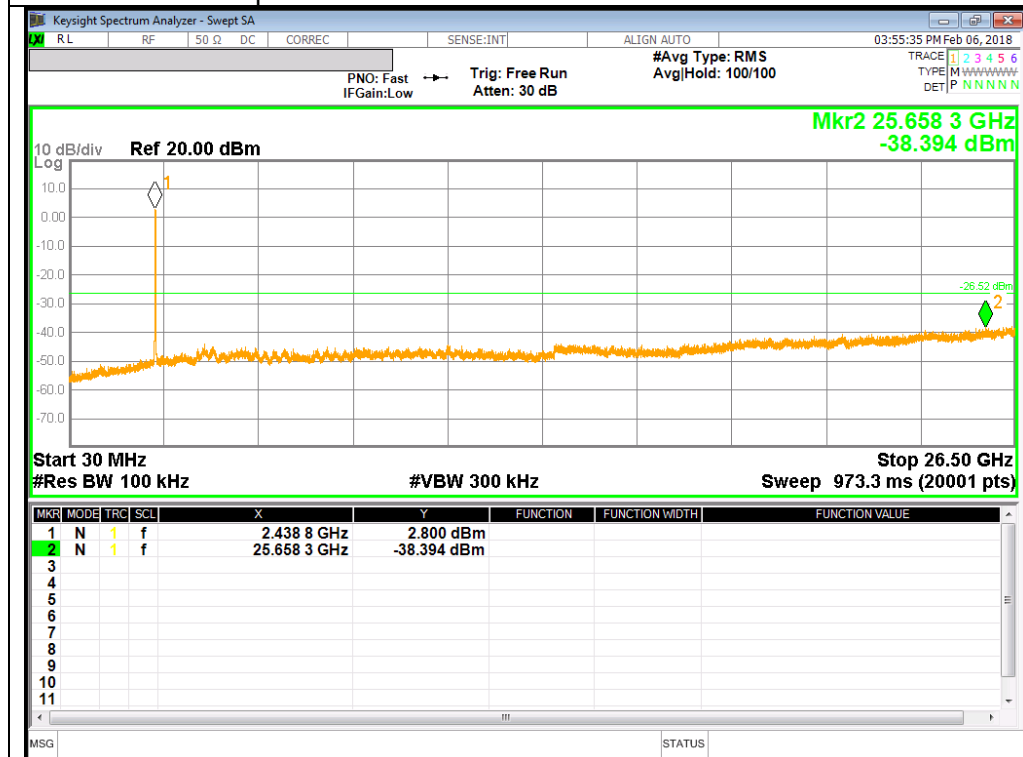
### 9.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND



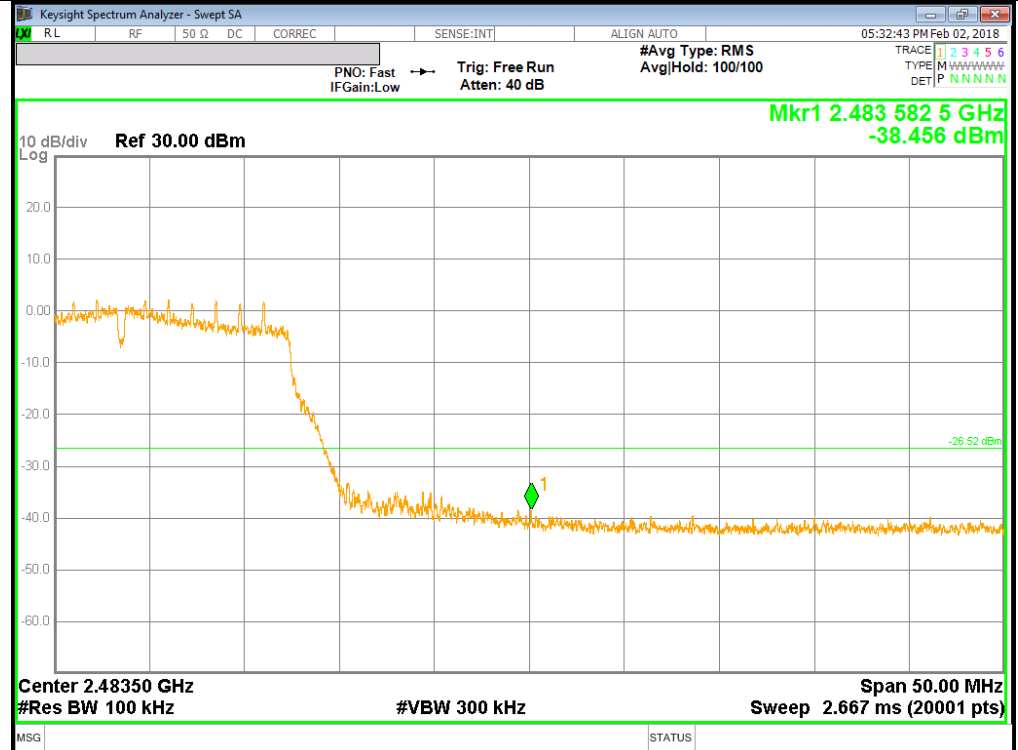
### Middle Channel BandEdge



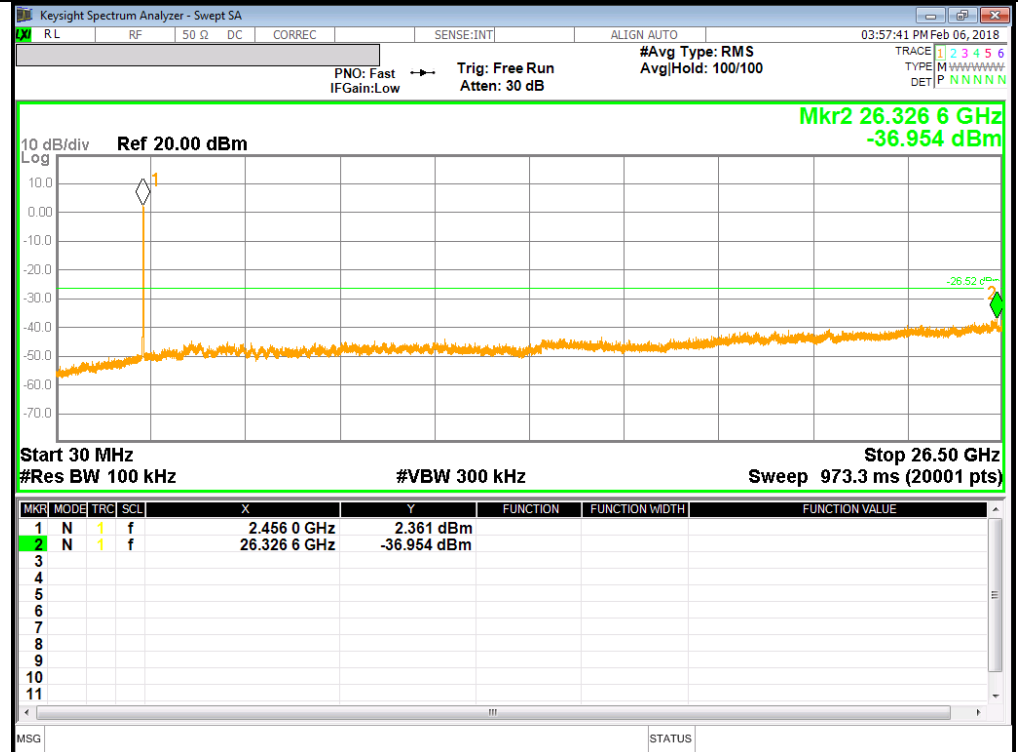
### Middle Channel Spurious

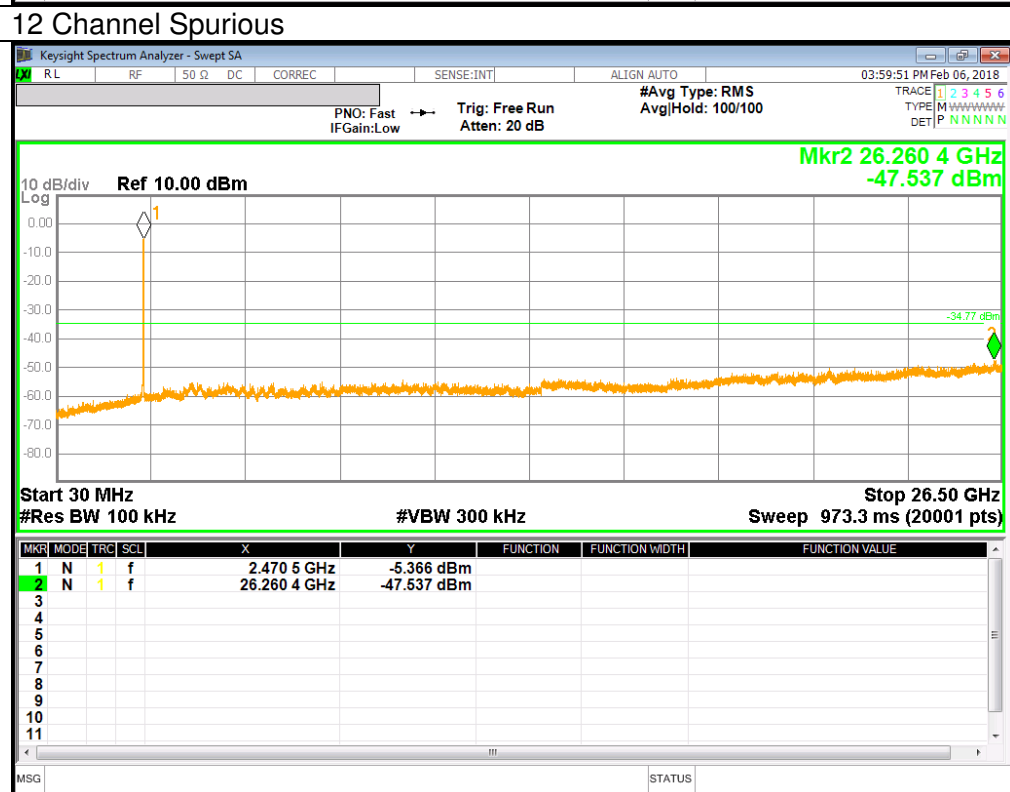
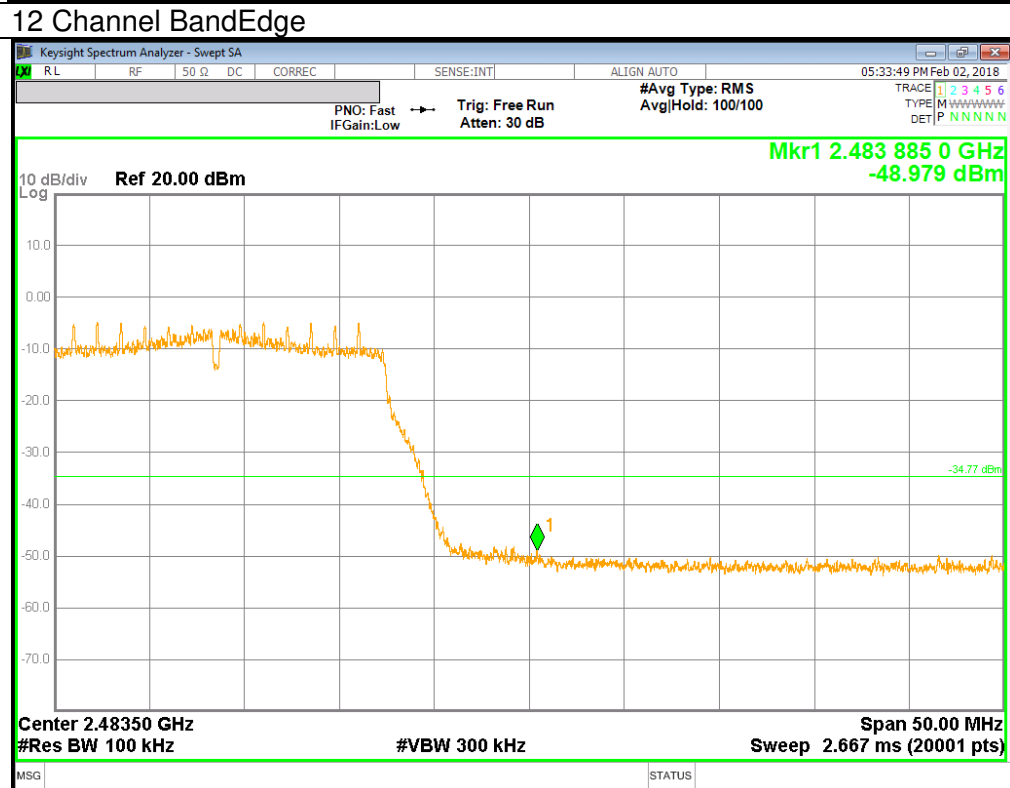


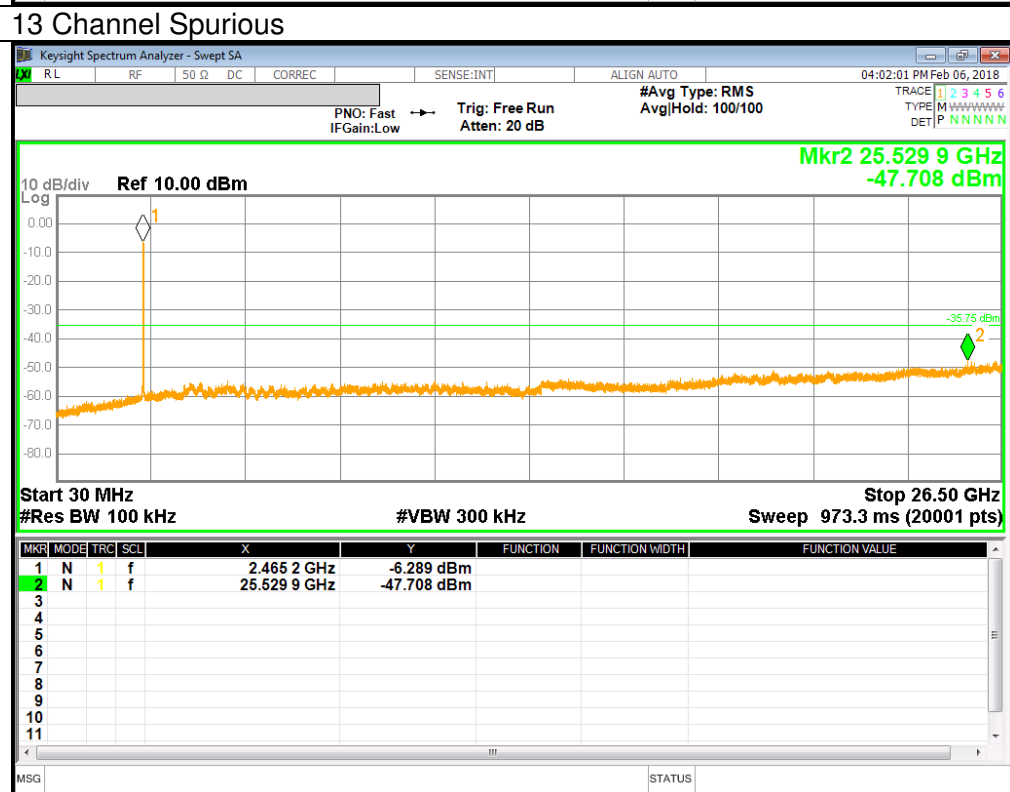
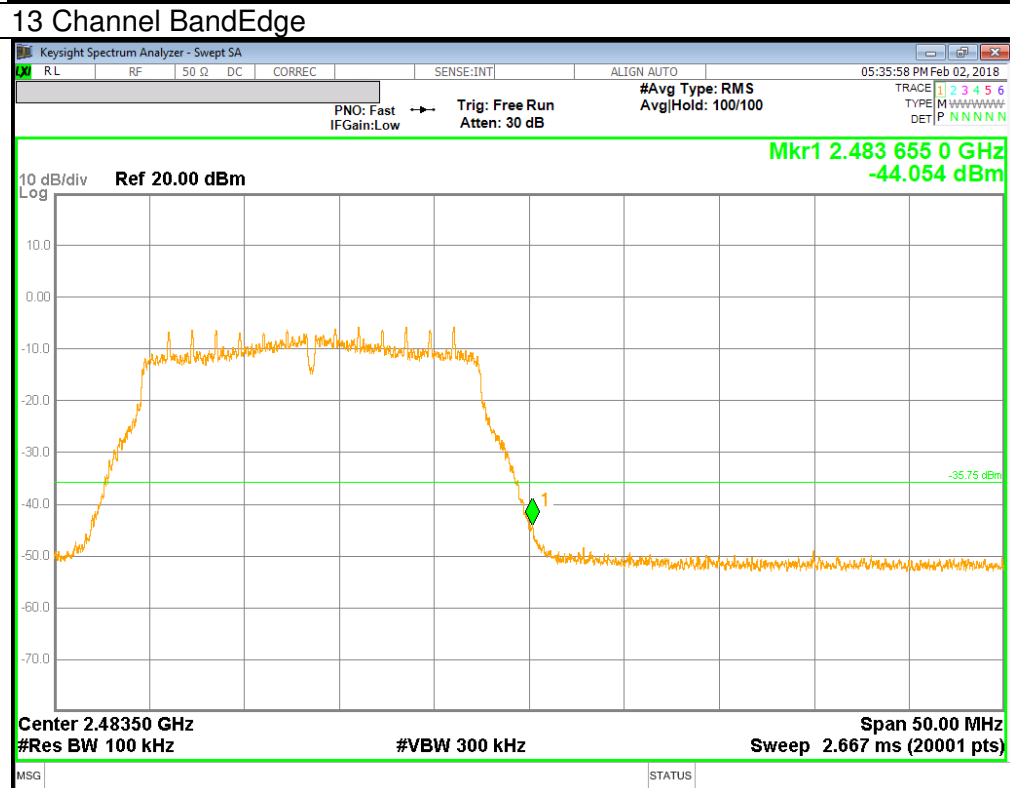
### High Channel BandEdge



### High Channel Spurious







## 10. RADIATED TEST RESULTS

### 10.1. LIMITS AND PROCEDURE

#### LIMITS

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

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

**TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; 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 = 0.30dB; N mode = 0.33dB.

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)

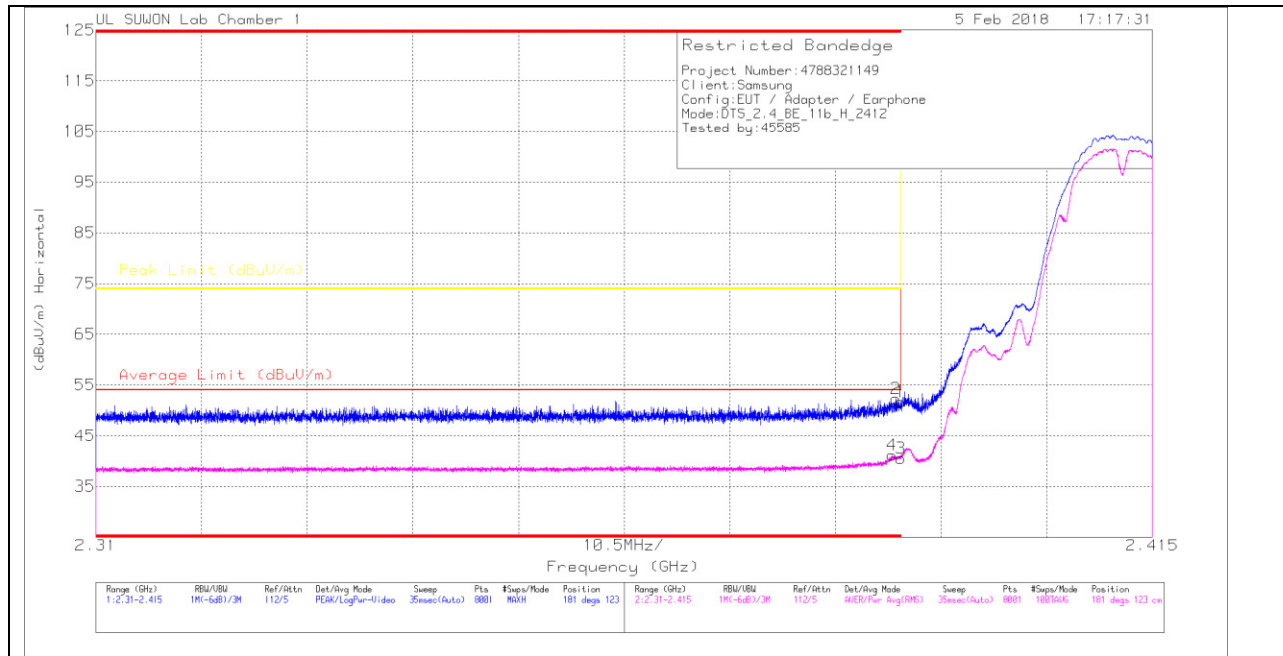
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

## 10.2. TRANSMITTER ABOVE 1 GHz

### 10.2.1.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

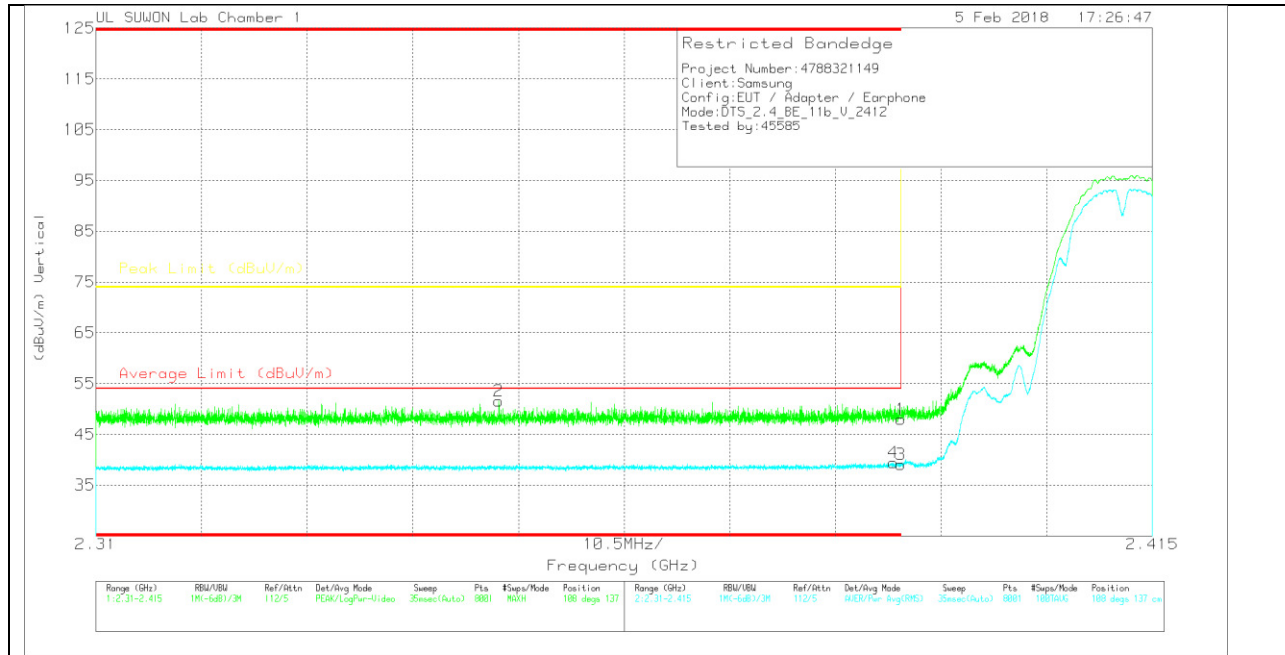
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	20170531_3117_00168 717	10dB_ATT(dB)_170809	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	46.13	Pk	31.3	-25.7	0	51.73	-	-	74	-22.27	181	123	H
2	* 2.39	46.66	Pk	31.3	-25.7	0	52.26	-	-	74	-21.74	181	123	H
3	* 2.39	34.93	RMS	31.3	-25.7	0	40.53	54	-13.47	-	-	181	123	H
4	* 2.389	35.55	RMS	31.3	-25.7	0	41.15	54	-12.85	-	-	181	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	20170531_3117_00168 717	10dB_ATT(dB)_170809	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	42.32	Pk	31.3	-25.7	0	47.92	-	-	74	-26.08	108	137	V
2	* 2.35	46.16	Pk	31.2	-25.8	0	51.56	-	-	74	-22.44	108	137	V
3	* 2.39	33.47	RMS	31.3	-25.7	0	39.07	54	-14.93	-	-	108	137	V
4	* 2.389	33.85	RMS	31.3	-25.7	0	39.45	54	-14.55	-	-	108	137	V

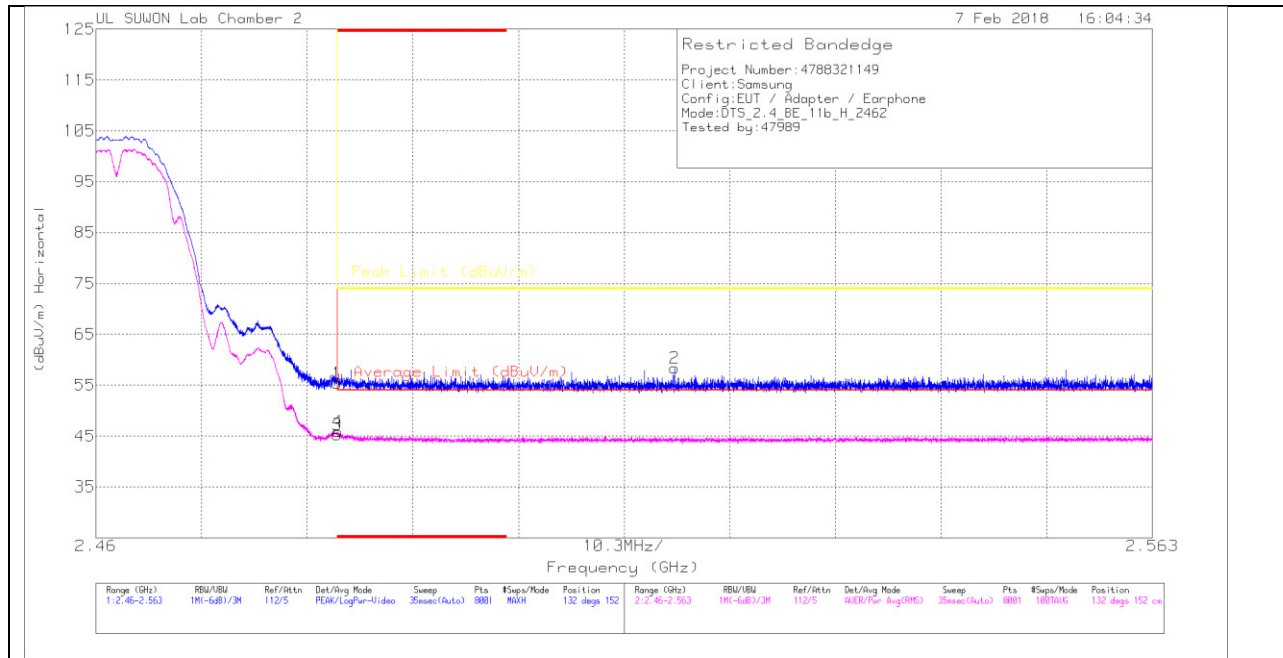
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

**Trace Markers**

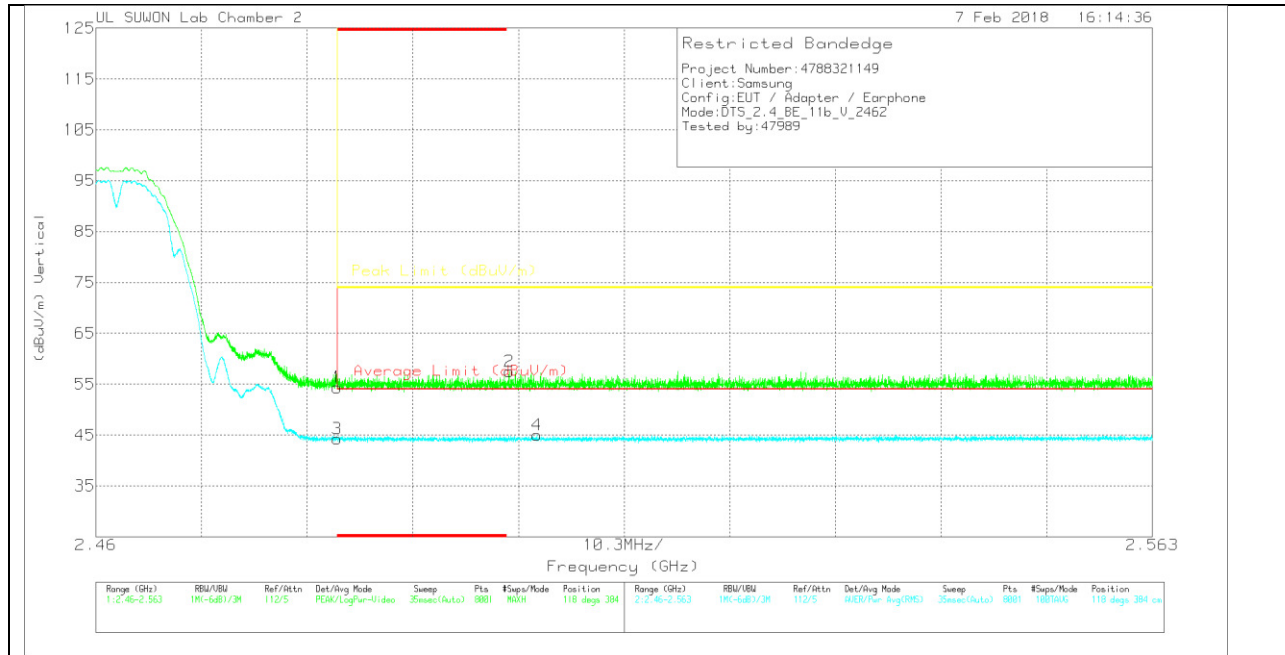
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117(00168724)	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.84	Pk		31.6	-18	55.44	-	-	74	-18.56	132	152	H
2	2.516	44.76	Pk		31.6	-18	58.36	-	-	74	-15.64	132	152	H
3	* 2.484	31.69	RMS		31.6	-18	45.29	54	-8.71	-	-	132	152	H
4	* 2.484	32.24	RMS		31.6	-18	45.84	54	-8.16	-	-	132	152	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	170531_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	40.75	Pk		-18	0	54.35	-	-	74	-19.65	118	384	V
2	2.5	43.9	Pk		-18	0	57.5	-	-	74	-16.5	118	384	V
3	* 2.484	30.7	RMS		-18	0	44.3	54	-9.7	-	-	118	384	V
4	2.503	31.38	RMS		-18	0	44.98	54	-9.02	-	-	118	384	V

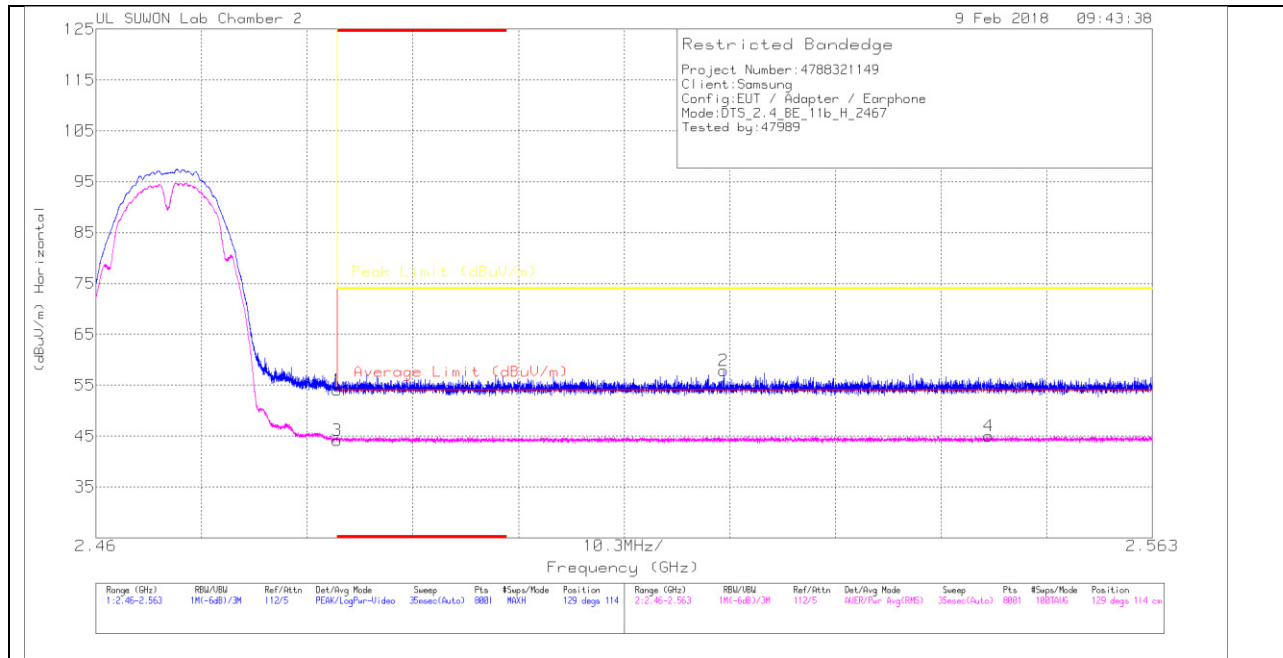
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (12 CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

**Trace Markers**

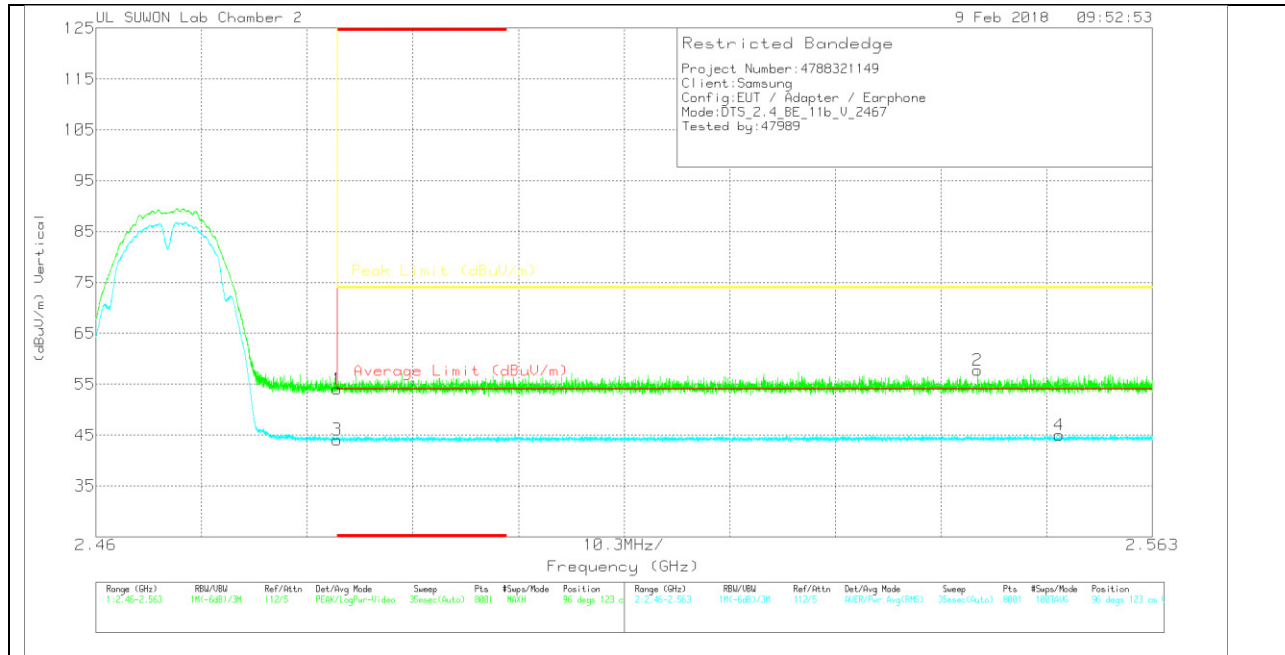
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117(00168724)	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.39	Pk		31.6	-18	53.99	-	-	74	-20.01	129	114	H
2	2.521	44.32	Pk		31.6	-18	57.92	-	-	74	-16.08	129	114	H
3	* 2.484	30.49	RMS		31.6	-18	44.09	54	-9.91	-	-	129	114	H
4	2.547	31.36	RMS		31.7	-18	45.06	54	-8.94	-	-	129	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	170531_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		-18	0	54.08	-	-	74	-19.92	96	123	V
2	2.546	44.06	Pk		-18	0	57.76	-	-	74	-16.24	96	123	V
3	* 2.484	30.48	RMS		-18	0	44.08	54	-9.92	-	-	96	123	V
4	2.554	31.26	RMS		-18	0	44.96	54	-9.04	-	-	96	123	V

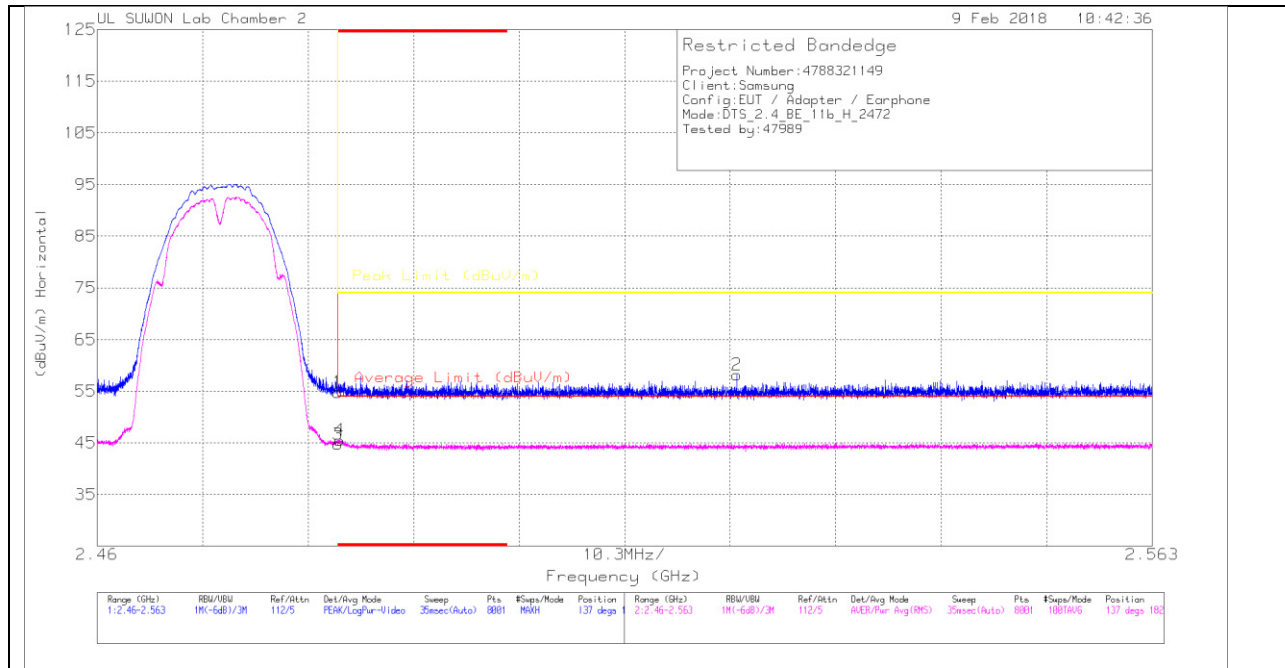
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (13 CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

**Trace Markers**

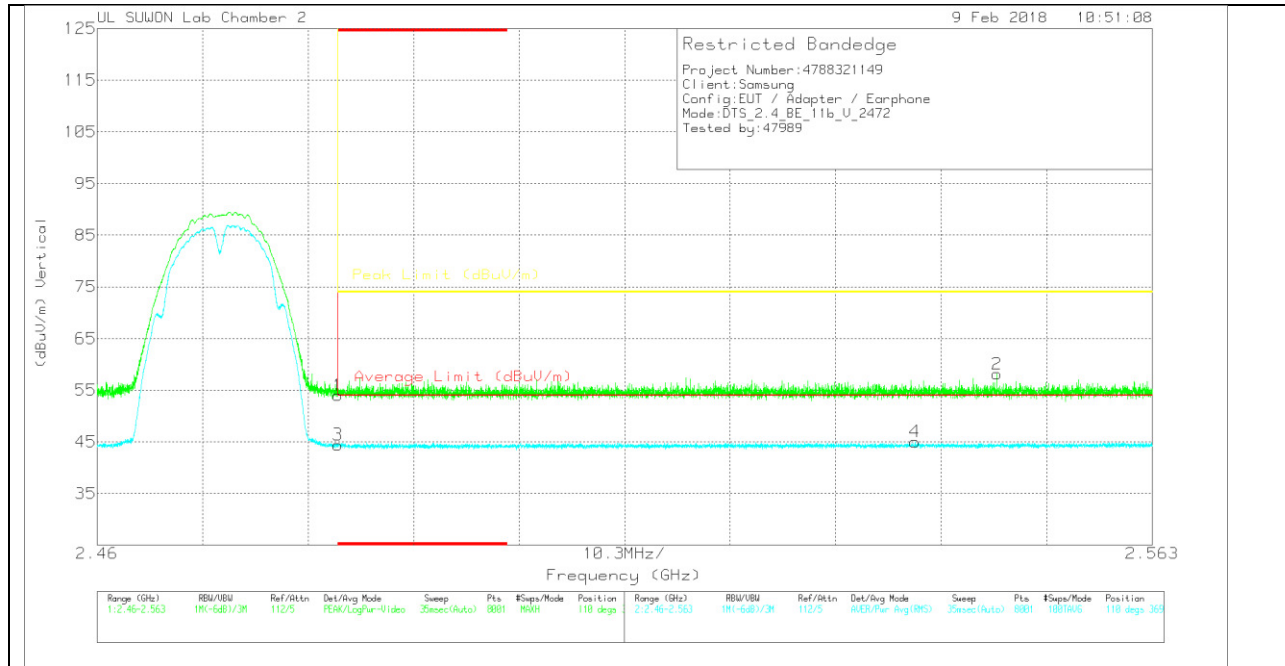
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	170531_3117(00168724)	10dB(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.22	PK	31.6	-18	0	54.82	-	-	74	-19.18	137	182	H
2	2.522	44.57	PK	31.6	-18	0	58.17	-	-	74	-15.83	137	182	H
3	* 2.484	31.16	RMS	31.6	-18	0	44.76	54	-9.24	-	-	137	182	H
4	* 2.484	31.94	RMS	31.6	-18	0	45.54	54	-8.46	-	-	137	182	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	170531_311700168724	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	40.42	Pk		-18	0	54.02	-	-	74	-19.98	110	369	V
2	2.548	44.44	PK		-18	0	58.14	-	-	74	-15.86	110	369	V
3	* 2.484	30.83	RMS		-18	0	44.43	54	-9.57	-	-	110	369	V
4	2.54	31.34	RMS		-18	0	45.04	54	-8.96	-	-	110	369	V

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