



**FCC CFR47 PART 15 SUBPART C  
INDUSTRY CANADA RSS-247 ISSUE 1**

**DTS Wireless LAN**

**C2PC CERTIFICATION TEST REPORT**

**FOR**

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

**MODEL NUMBER : SM-T670**

**FCC ID: A3LSMT670**

**IC ID: 649E-SMT670**

**REPORT NUMBER: 15K21882-E1**

**ISSUE DATE: OCT 02, 2015**

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

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



Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	10/01/15	Initial issue	Junwhan Lee
A	10/02/15	Revised page 36	Junwhan Lee

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS</b> .....	<b>5</b>
<b>2. TEST METHODOLOGY</b> .....	<b>6</b>
<b>3. FACILITIES AND ACCREDITATION</b> .....	<b>6</b>
<b>4. CALIBRATION AND UNCERTAINTY</b> .....	<b>6</b>
4.1. <i>MEASURING INSTRUMENT CALIBRATION</i> .....	6
4.2. <i>SAMPLE CALCULATION</i> .....	6
4.3. <i>MEASUREMENT UNCERTAINTY</i> .....	7
<b>5. EQUIPMENT UNDER TEST</b> .....	<b>8</b>
5.1. <i>DESCRIPTION OF EUT</i> .....	8
5.2. <i>MAXIMUM OUTPUT POWER</i> .....	8
5.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i> .....	8
5.4. <i>WORST-CASE CONFIGURATION AND MODE</i> .....	8
5.5. <i>DESCRIPTION OF TEST SETUP</i> .....	9
<b>6. TEST AND MEASUREMENT EQUIPMENT</b> .....	<b>11</b>
<b>7. MEASUREMENT METHODS</b> .....	<b>12</b>
<b>8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS</b> .....	<b>12</b>
8.1. <i>ON TIME AND DUTY CYCLE RESULTS</i> .....	12
<b>9. SUMMARY TABLE</b> .....	<b>13</b>
<b>10. ANTENNA PORT TEST RESULTS</b> .....	<b>14</b>
10.1. <i>6 dB BANDWIDTH</i> .....	14
10.1.1. 802.11b MODE IN THE 2.4 GHz BAND.....	15
10.1.2. 802.11g MODE IN THE 2.4 GHz BAND.....	15
10.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND.....	15
10.1.4. 6 dB BANDWIDTH PLOTS.....	16
10.2. <i>99% BANDWIDTH</i> .....	19
10.2.1. 802.11b MODE IN THE 2.4 GHz BAND.....	19
10.2.2. 802.11g MODE IN THE 2.4 GHz BAND.....	19
10.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND.....	19
10.2.4. 99% BANDWIDTH PLOTS.....	20
10.3. <i>AVERAGE POWER</i> .....	23
10.3.1. 802.11b MODE IN THE 2.4 GHz BAND.....	24
10.3.2. 802.11g MODE IN THE 2.4 GHz BAND.....	24
10.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND.....	24
10.4. <i>OUTPUT POWER(Peak)</i> .....	25

10.4.1.	802.11b MODE IN THE 2.4 GHz BAND .....	25
10.4.2.	802.11g MODE IN THE 2.4 GHz BAND .....	26
10.4.3.	802.11n HT20 MODE IN THE 2.4 GHz BAND .....	26
10.5.	<i>PSD</i> .....	27
10.5.1.	802.11b MODE IN THE 2.4 GHz BAND .....	28
10.5.2.	802.11g MODE IN THE 2.4 GHz BAND .....	28
10.5.3.	802.11n HT20 MODE IN THE 2.4 GHz BAND .....	28
10.5.4.	PSD PLOTS .....	29
10.6.	<i>OUT-OF-BAND EMISSIONS</i> .....	32
10.6.1.	802.11b MODE IN THE 2.4 GHz BAND .....	33
10.6.2.	802.11g MODE IN THE 2.4 GHz BAND .....	35
10.6.3.	802.11n HT20 MODE IN THE 2.4 GHz BAND .....	37
<b>11.</b>	<b>RADIATED TEST RESULTS</b> .....	<b>39</b>
11.1.	<i>LIMITS AND PROCEDURE</i> .....	39
11.2.	<i>TRANSMITTER ABOVE 1 GHz</i> .....	40
11.2.1.	TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND .....	40
11.2.2.	TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND .....	58
11.2.3.	TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND .....	76
11.3.	<i>WORST-CASE BELOW 1 GHz</i> .....	94
<b>12.</b>	<b>AC POWER LINE CONDUCTED EMISSIONS</b> .....	<b>96</b>
<b>13.</b>	<b>SETUP PHOTOS</b> .....	<b>101</b>

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+ Tablet  
**MODEL NUMBER:** SM-T670  
**SERIAL NUMBER:** R32G8008T9F (RADIATED); R32G800900V (CONDUCTED)  
**DATE TESTED:** AUG 21, 2015 - SEP 30, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	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:



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, and KDB 558074 D01 v03r03, ANSI C63.10-2009 for FCC and ANSI C63.10-2013 for IC, RSS-GEN Issue 4, and RSS-247 Issue 1.

### ANSI C63.10-2009 Deviation

Radiated spurious emission above 1GHz EUT height is 1.5m not 0.8m.

## 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 Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+ Tablet.

This test report addresses the DTS (WLAN) operational mode.

### 5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Average Power [dBm]	Average Power [mW]	Output Power [dBm] (Peak)	Output Power [mW] (Peak)
2412 - 2472	802.11b	16.32	42.85	19.27	84.53
	802.11g	14.26	26.67	22.29	169.43
	802.11n HT20	13.02	20.04	21.19	131.52

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antennas, with a antenna's maximum gain of 2.94 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

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	KSAS0501900200HU	R37G819A01R0KT3	N/A
Data Cable	SAMSUNG	EP-DG925UWE	N/A	N/A
Earphone	SAMSUNG	GH59-13967A	N/A	N/A

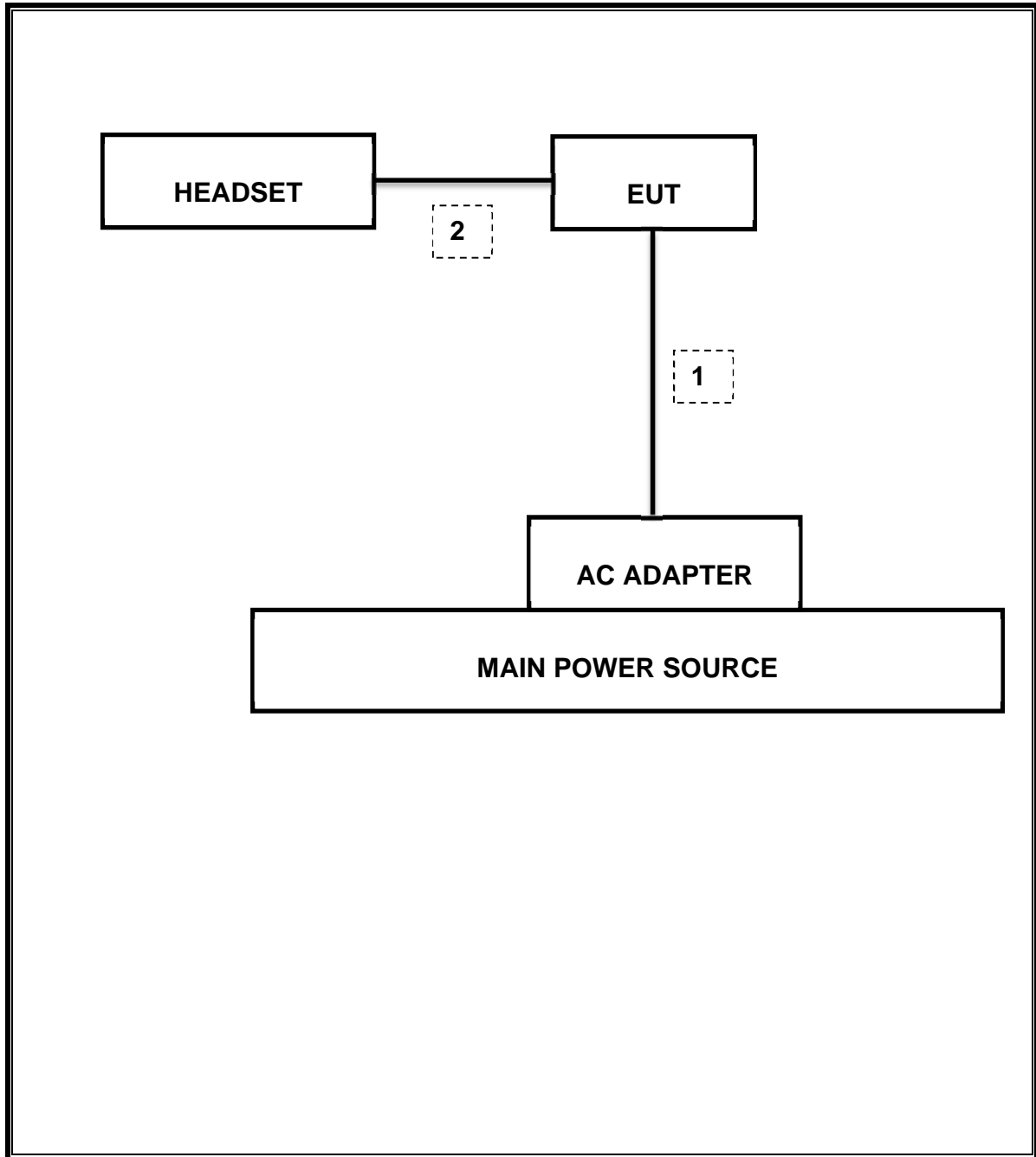
### I/O CABLES

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 exercised the radio card.

**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	11-17-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-16
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-16
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-16
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-16
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-18-16
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-18-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-19-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-19-16
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-16
Average Power Sensor	R&S	NRZ-Z91	102681	08-18-16
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-18-16
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-19-16
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-19-16
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-19-16
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	009	08-18-16
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	015	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	009	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	010	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	016	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	015	08-18-16
LISN	R&S	ENV-216	101836	08-19-16
LISN	R&S	ENV-216	101837	08-19-16

## 7. MEASUREMENT METHODS

KDB 558074 D01 DTS Meas Guidance v03r03: Measurement Procedure §9.1.1 is used for peak power and §9.2.3.1 AVGPM is used for average power and §10.2 AVGPSD-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.

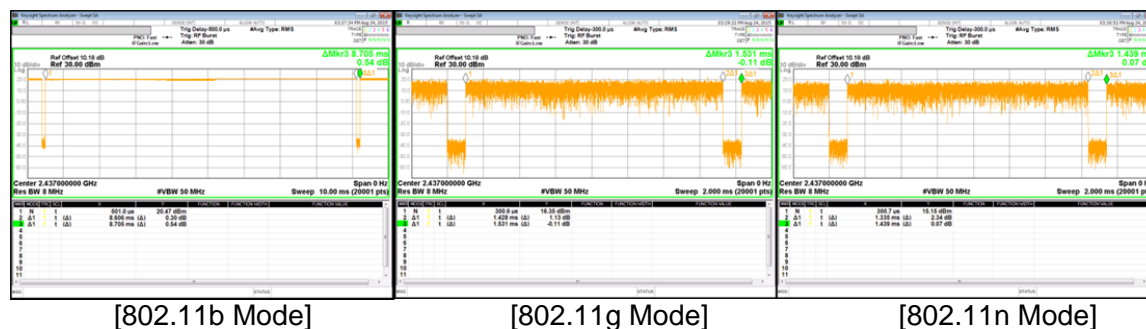
## 8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

### 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	8.705	0.989	98.9%	0.00	0.010
802.11g	1.428	1.531	0.933	93.3%	0.30	0.700
802.11n HT20	1.335	1.439	0.928	92.8%	0.33	0.749



## 9. 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(1)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	8.572 MHz
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-28.582 dBm
15.247	RSS-247 5.4(4)	TX conducted output power	<30dBm		Pass	22.29 dBm
15.247	RSS-247 5.2(2)	PSD	<8dBm		Pass	-13.969 dBm
15.207 (a)	RSS-GEN Clause 8.8	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	48.66 dBuV (QP)
15.205, 15.209	RSS-GEN Clause 7 & 8.9	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	70.28 dBuV/m (QP)

## 10. ANTENNA PORT TEST RESULTS

### 10.1. 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 v03r03: 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	9.037	0.5
Mid	2437	9.052	0.5
High	2462	9.046	0.5
12	2467	9.061	0.5
13	2472	8.572	0.5
Worst		8.572	0.5

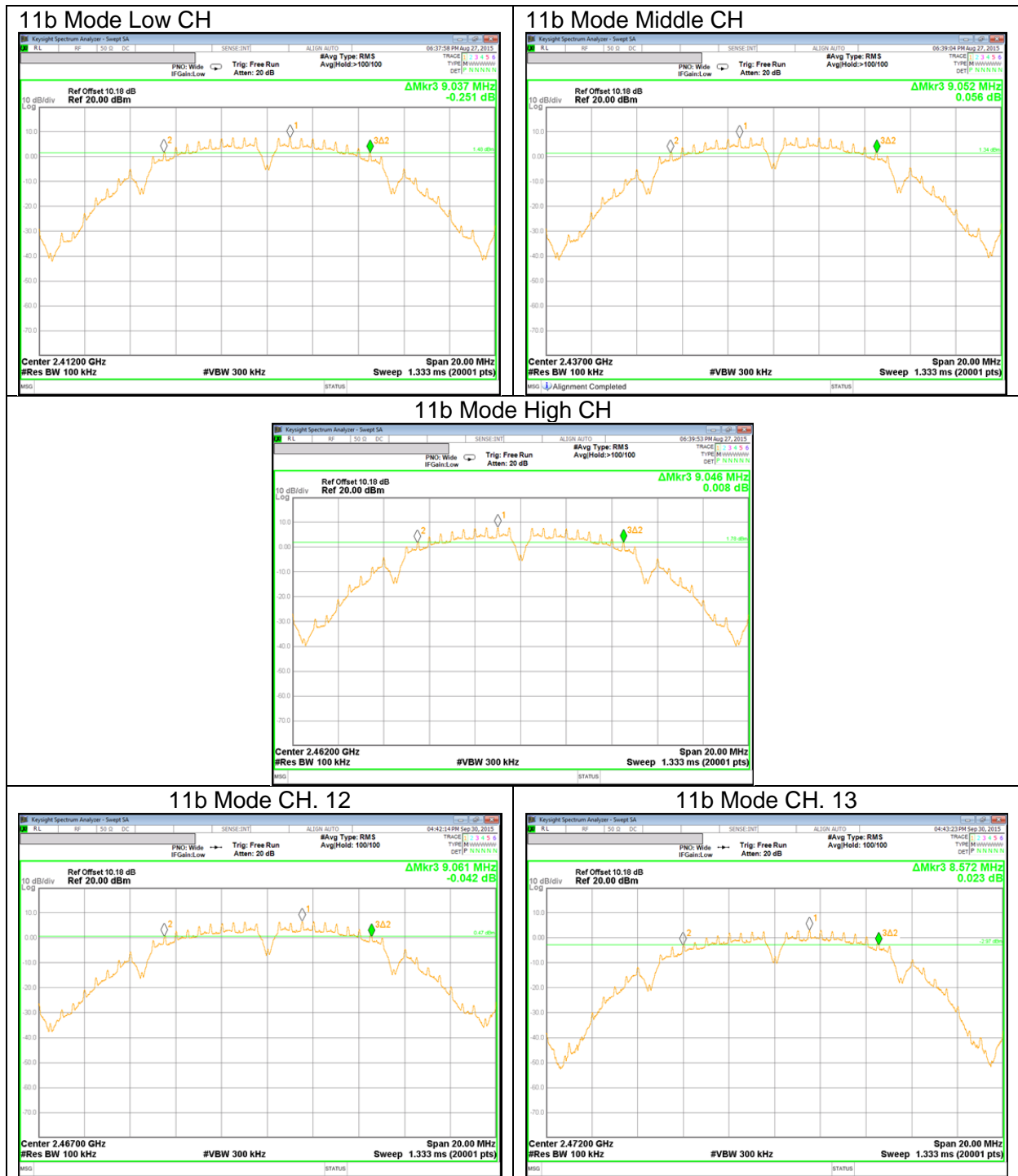
**10.1.2. 802.11g MODE IN THE 2.4 GHz BAND**

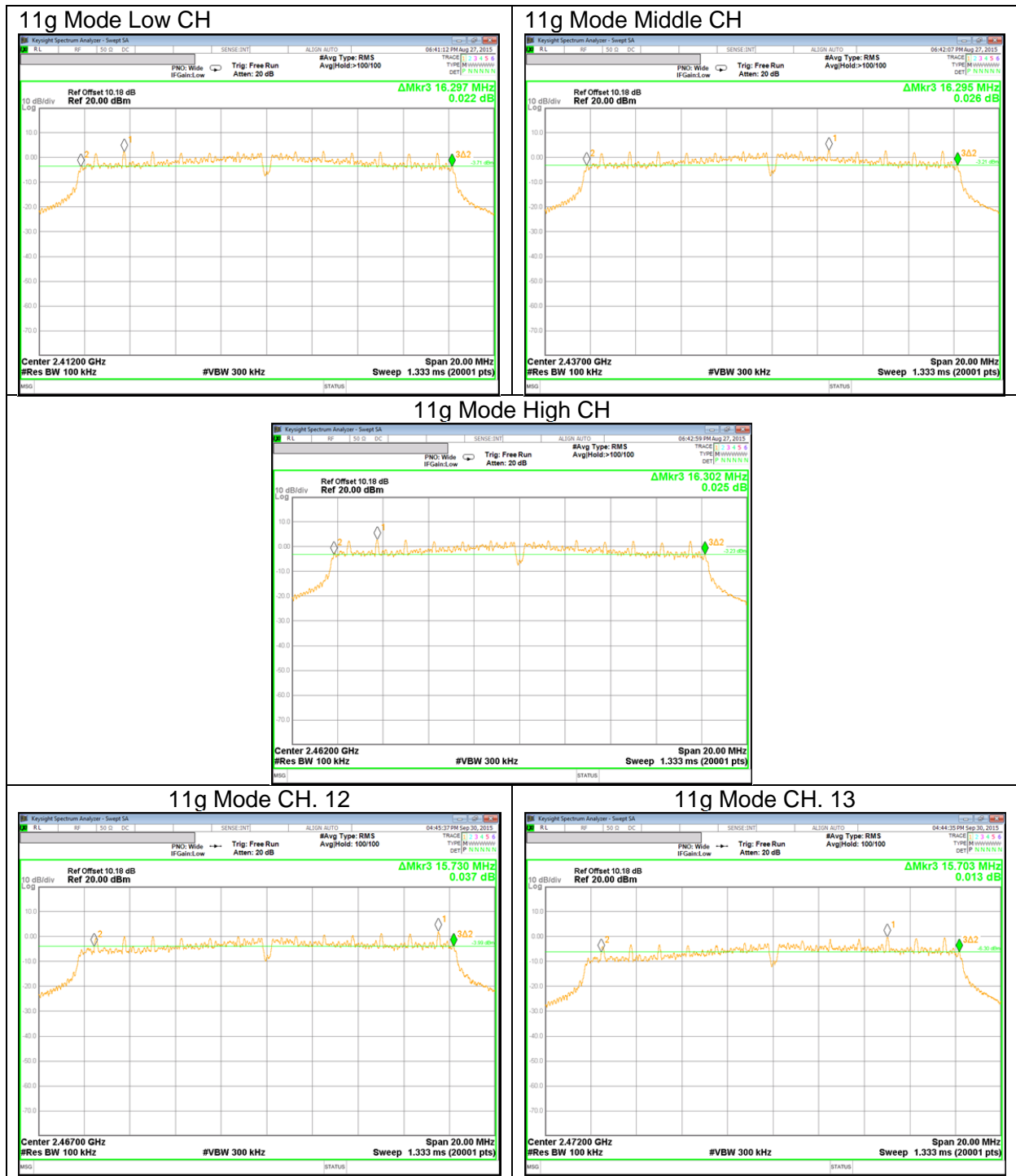
Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	16.297	0.5
Mid	2437	16.295	0.5
High	2462	16.302	0.5
12	2467	15.730	0.5
13	2472	15.703	0.5
Worst		15.703	0.5

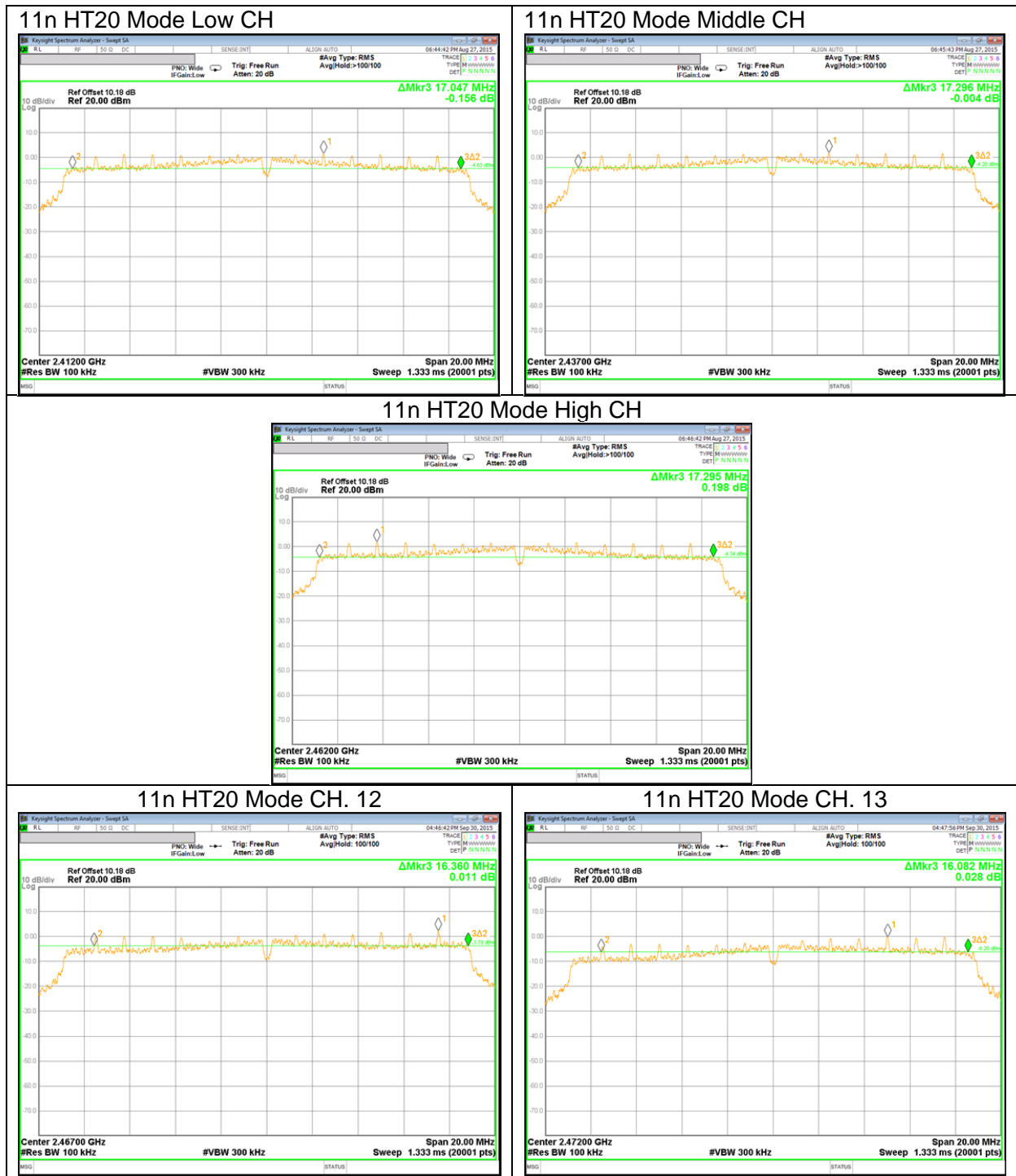
**10.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	17.047	0.5
Mid	2437	17.296	0.5
High	2462	17.295	0.5
12	2467	16.360	0.5
13	2472	16.082	0.5
Worst		16.082	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	11.947
Mid	2437	12.041
High	2462	12.084
12	2467	12.300
13	2472	11.500
Worst		12.300

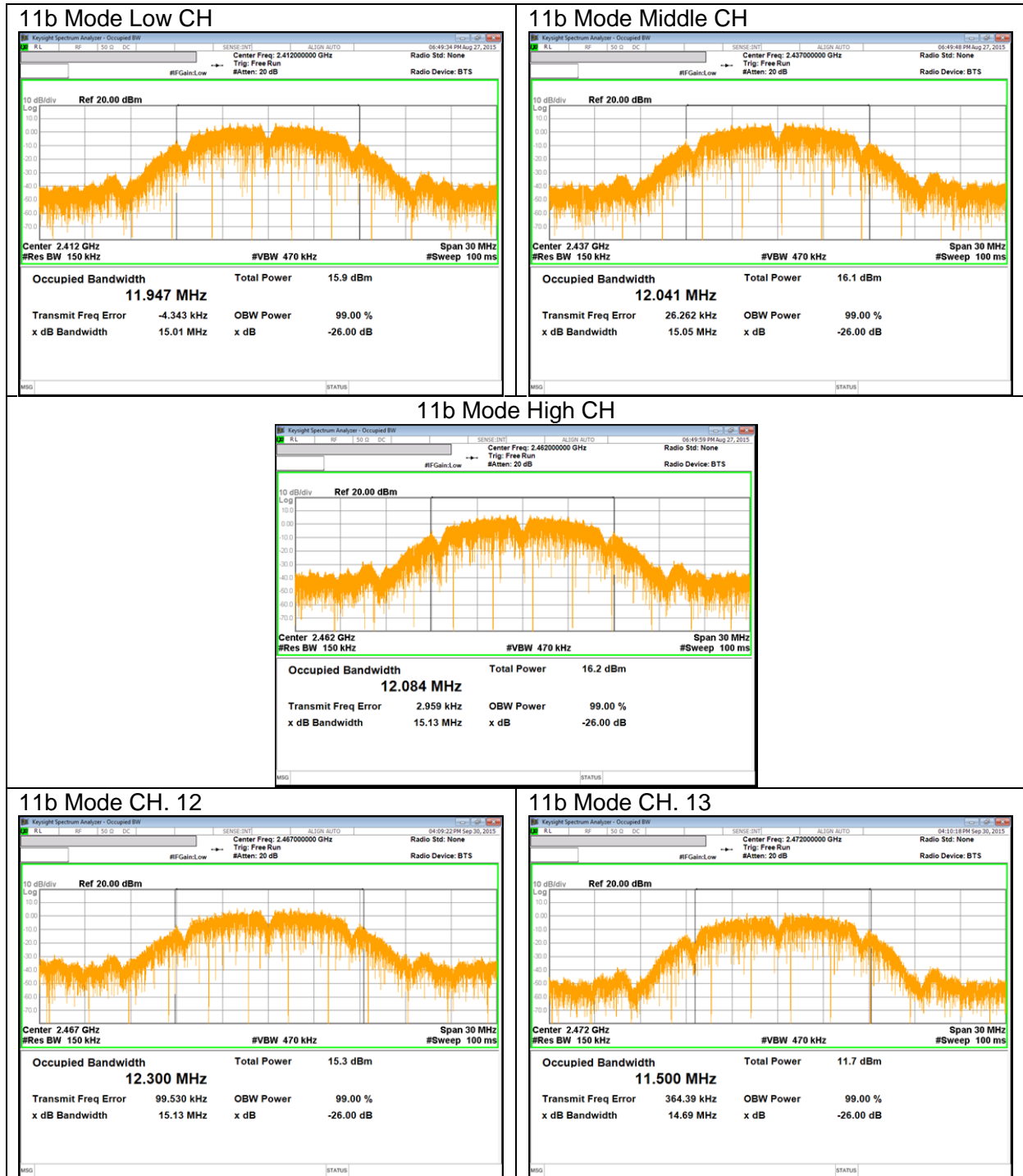
#### 10.2.2. 802.11g MODE IN THE 2.4 GHz BAND

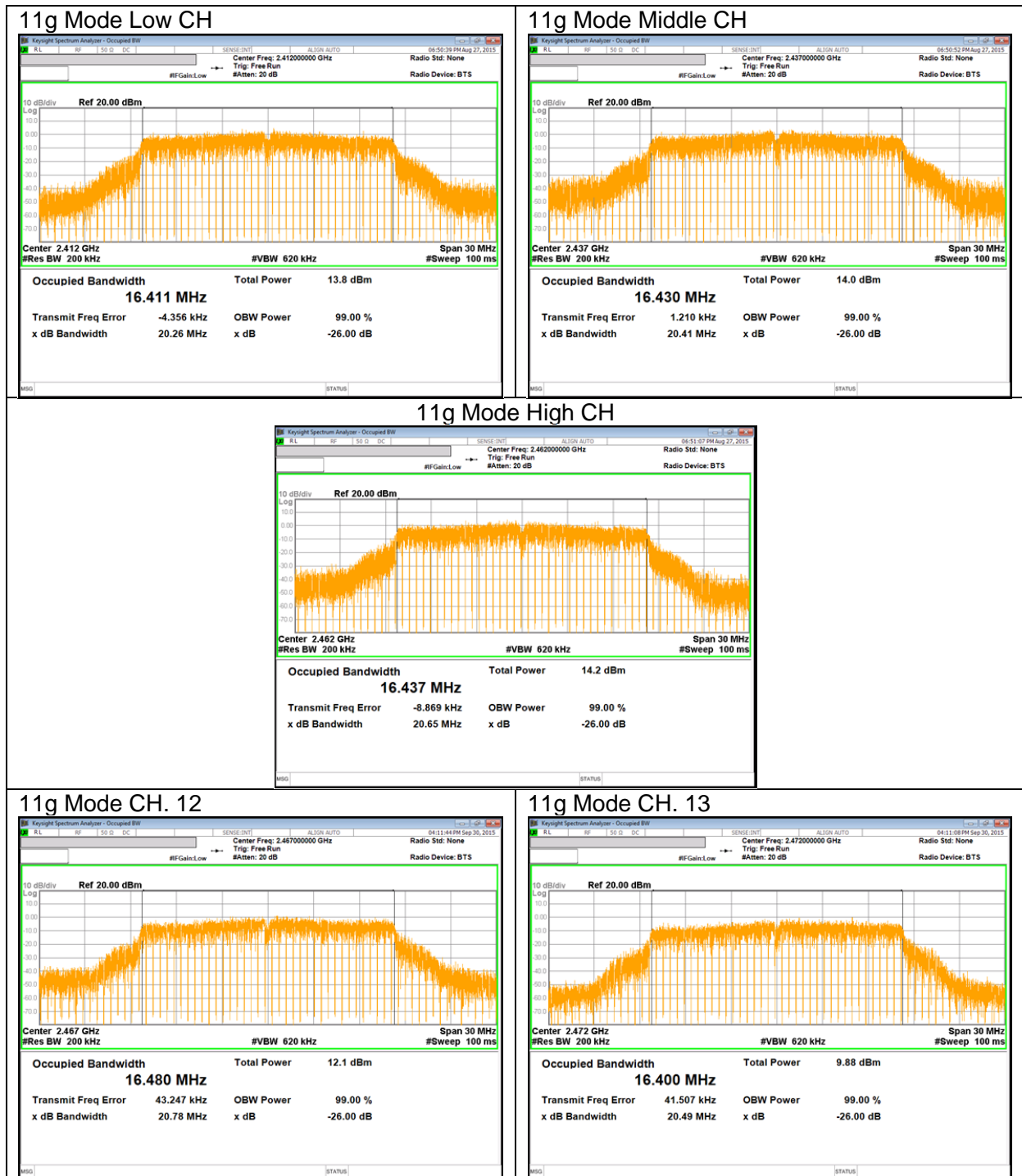
Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	16.411
Mid	2437	16.430
High	2462	16.437
12	2467	16.480
13	2472	16.400
Worst		16.480

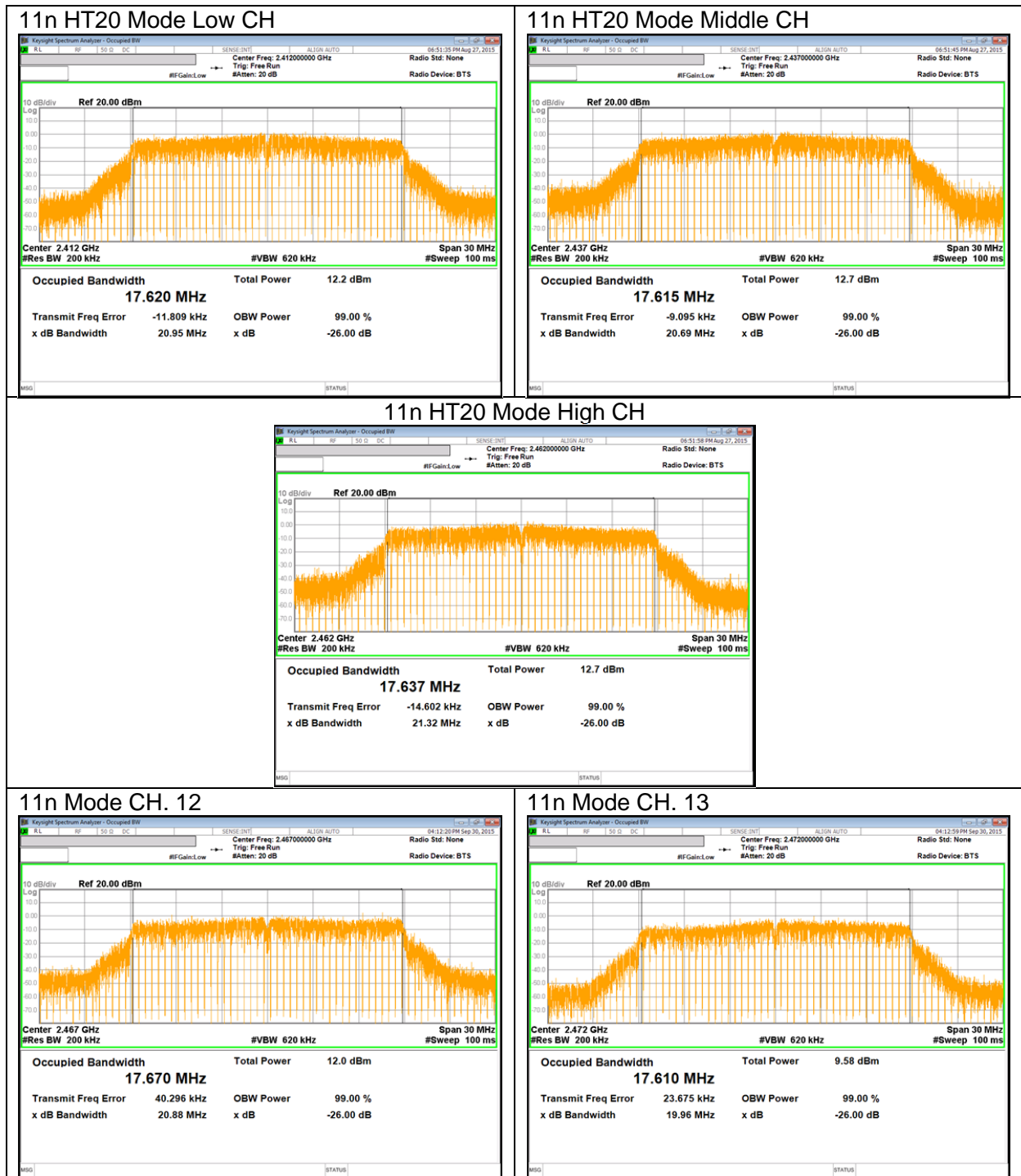
#### 10.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	17.620
Mid	2437	17.615
High	2462	17.637
12	2467	17.670
13	2472	17.610
Worst		17.670

### 10.2.4. 99% BANDWIDTH PLOTS







### **10.3. AVERAGE POWER**

#### **LIMITS**

None; for reporting purposes only.

#### **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.

**RESULTS**

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

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	16.08
Mid	2437	16.14
High	2462	16.32
12	2467	15.27
13	2472	11.94
Worst		16.32

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

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	13.83
Mid	2437	14.18
High	2462	14.26
12	2467	12.79
13	2472	10.45
Worst		14.26

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

Channel	Frequency (MHz)	Avg Power (dBm)
Low	2412	12.52
Mid	2437	12.77
High	2462	13.02
12	2467	12.14
13	2472	9.87
Worst		13.02

## 10.4. OUTPUT POWER(Peak)

### 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.

### RESULTS

#### 10.4.1. 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	2.94	30.00	30.00	36.00	30.00
Mid	2437	2.94	30.00	30.00	36.00	30.00
High	2462	2.94	30.00	30.00	36.00	30.00
12	2467	2.94	30.00	30.00	36.00	30.00
13	2472	2.94	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	18.62	18.62	36.00	-17.38
Mid	2437	19.27	19.27	36.00	-16.73
High	2462	18.39	18.39	36.00	-17.61
12	2467	18.26	18.26	36.00	-17.74
13	2472	13.24	13.24	36.00	-22.76
Worst			19.27	36.00	-16.73

### 10.4.2. 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	2.94	30.00	30.00	36.00	30.00
Mid	2437	2.94	30.00	30.00	36.00	30.00
High	2462	2.94	30.00	30.00	36.00	30.00
12	2467	2.94	30.00	30.00	36.00	30.00
13	2472	2.94	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	21.55	21.55	36.00	-14.45
Mid	2437	22.29	22.29	36.00	-13.71
High	2462	21.57	21.57	36.00	-14.43
12	2467	20.57	20.57	36.00	-15.43
13	2472	18.02	18.02	36.00	-17.98
Worst			22.29	36.00	-13.71

### 10.4.3. 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	2.94	30.00	30.00	36.00	30.00
Mid	2437	2.94	30.00	30.00	36.00	30.00
High	2462	2.94	30.00	30.00	36.00	30.00
12	2467	2.94	30.00	30.00	36.00	30.00
13	2472	2.94	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	20.72	20.72	36.00	-15.28
Mid	2437	21.19	21.19	36.00	-14.81
High	2462	20.55	20.55	36.00	-15.45
12	2467	20.03	20.03	36.00	-15.97
13	2472	17.78	17.78	36.00	-18.22
Worst			21.19	36.00	-14.81

## **10.5. 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 AVGPS-2" under KDB558074 D01 DTS Meas Guidance v03r03

**RESULTS**

**10.5.1. 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	-15.582	0.00	-15.582	8.00	-23.582
Mid	2437	-15.340	0.00	-15.340	8.00	-23.340
High	2462	-15.497	0.00	-15.497	8.00	-23.497
12	2467	-16.143	0.00	-16.143	8.00	-24.143
13	2472	-19.832	0.00	-19.832	8.00	-27.832

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

**PSD Results**

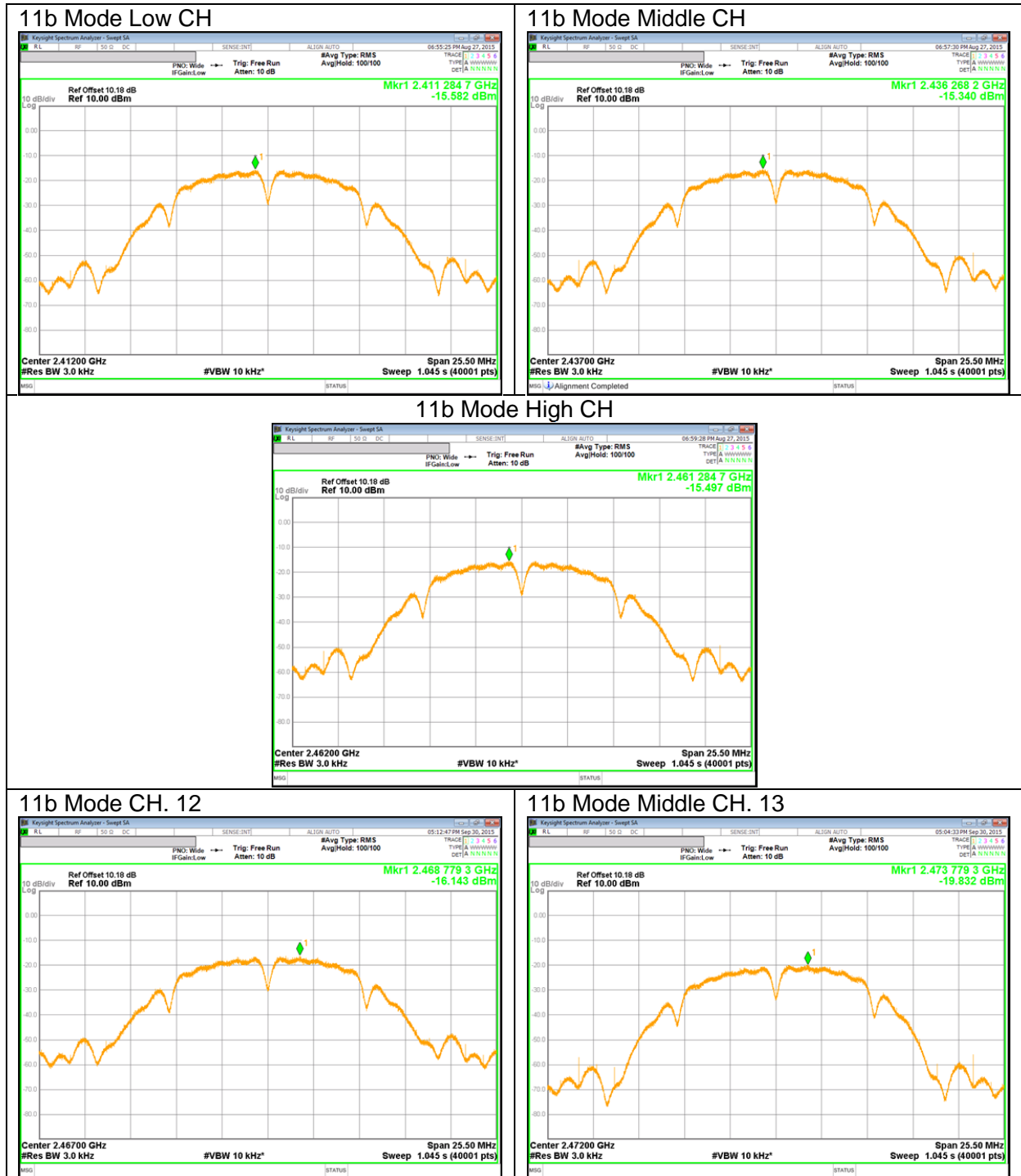
Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-14.673	0.30	-14.373	8.00	-22.673
Mid	2437	-14.607	0.30	-14.307	8.00	-22.607
High	2462	-14.269	0.30	-13.969	8.00	-22.269
12	2467	-17.014	0.30	-16.714	8.00	-25.014
13	2472	-19.191	0.30	-18.891	8.00	-27.191

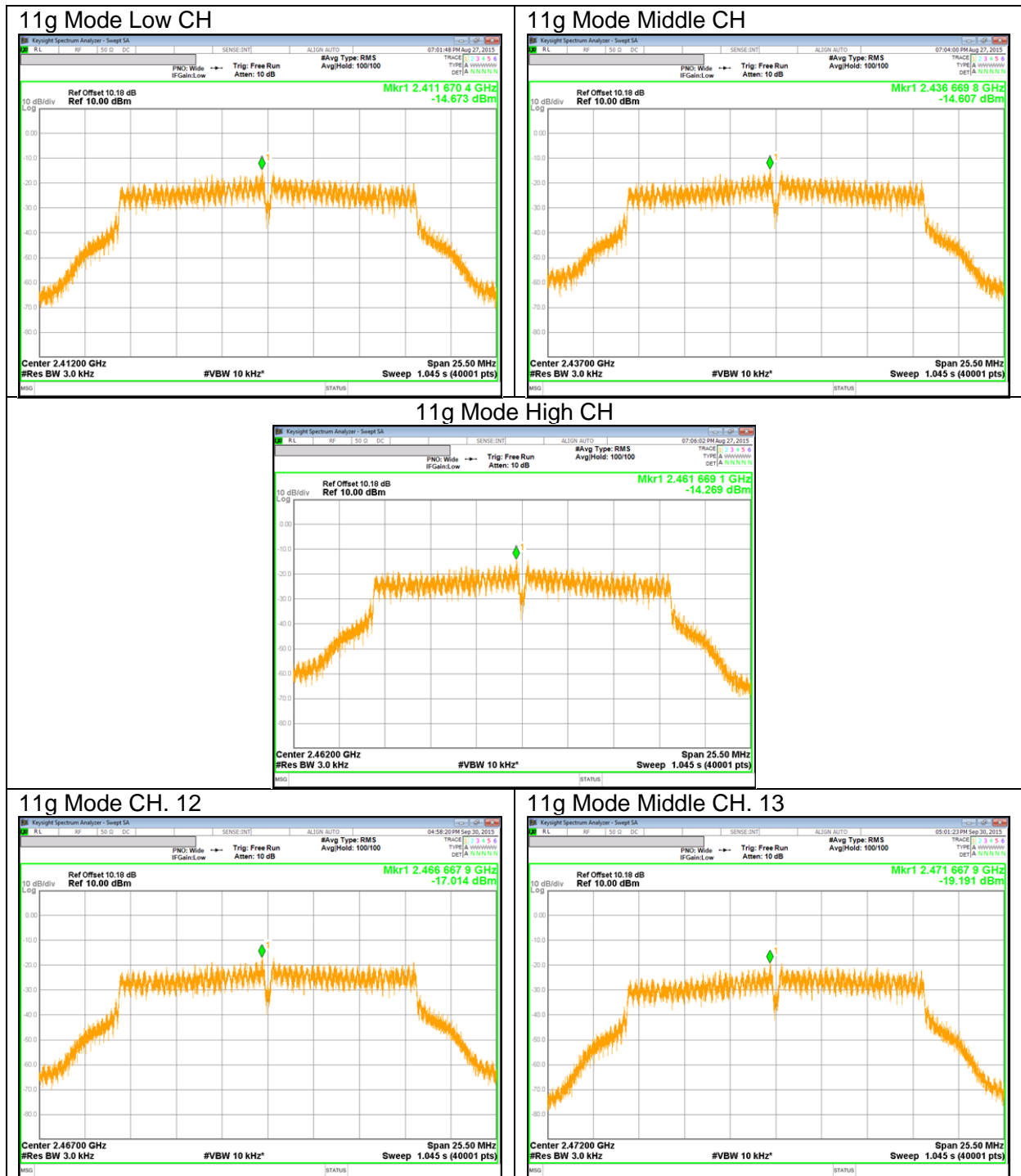
**10.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND**

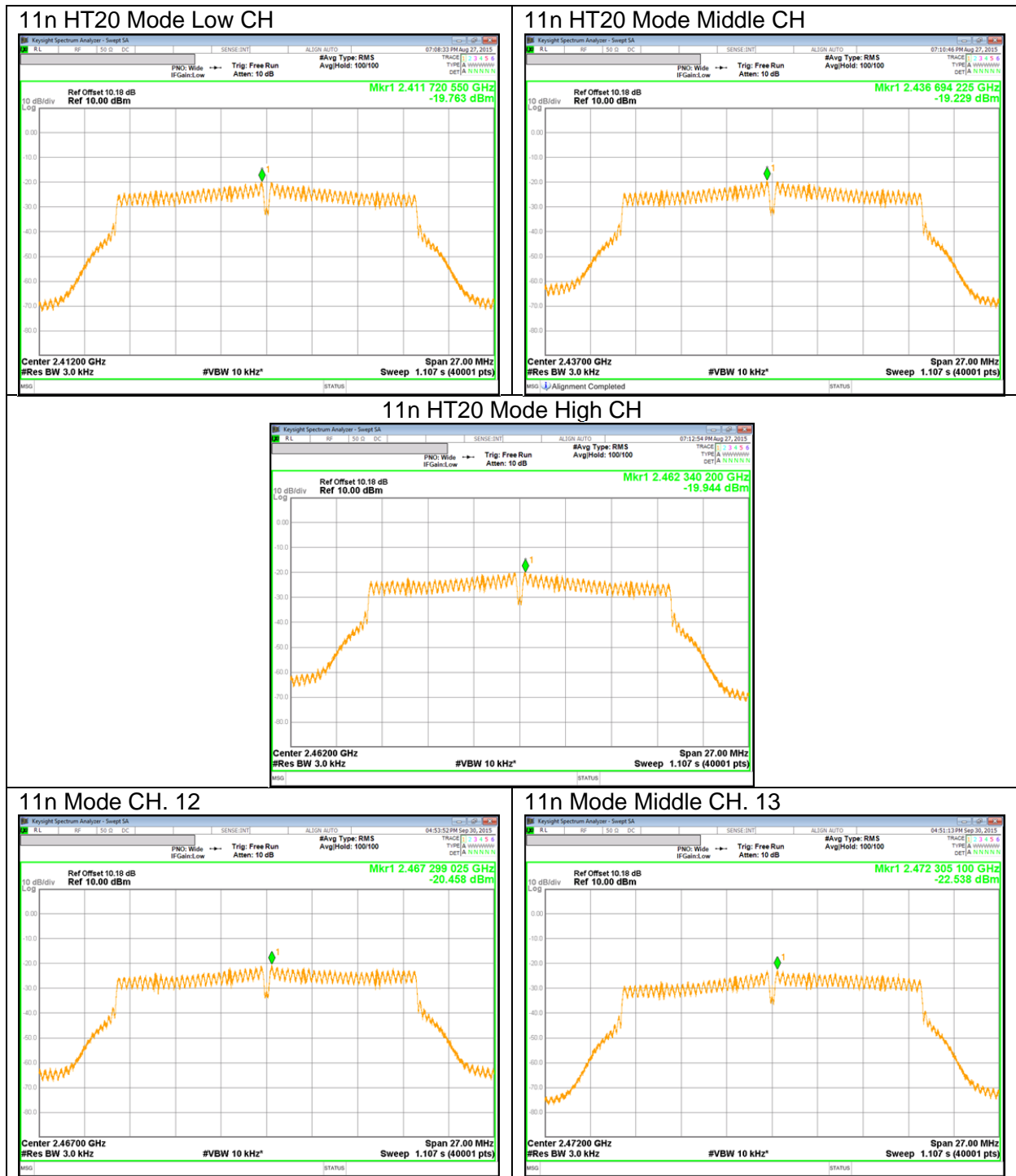
**PSD Results**

Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-19.763	0.33	-19.433	8.00	-27.763
Mid	2437	-19.229	0.33	-18.899	8.00	-27.229
High	2462	-19.944	0.33	-19.614	8.00	-27.944
12	2467	-20.458	0.33	-20.128	8.00	-28.458
13	2472	-22.538	0.33	-22.208	8.00	-30.538

### 10.5.4. PSD PLOTS







## 10.6. OUT-OF-BAND EMISSIONS

### LIMITS

FCC §15.247 (d)  
IC RSS-247 §5.5

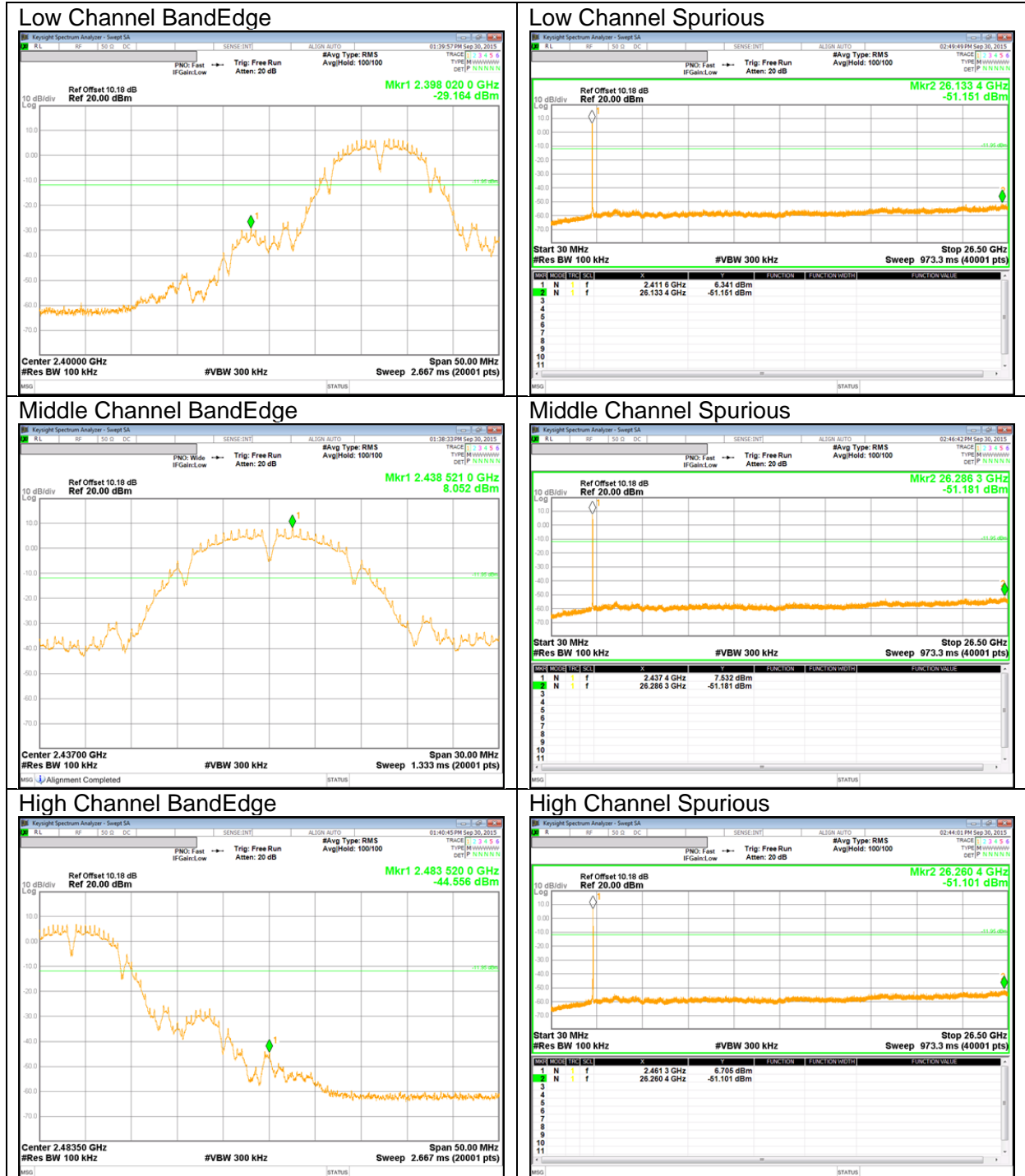
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

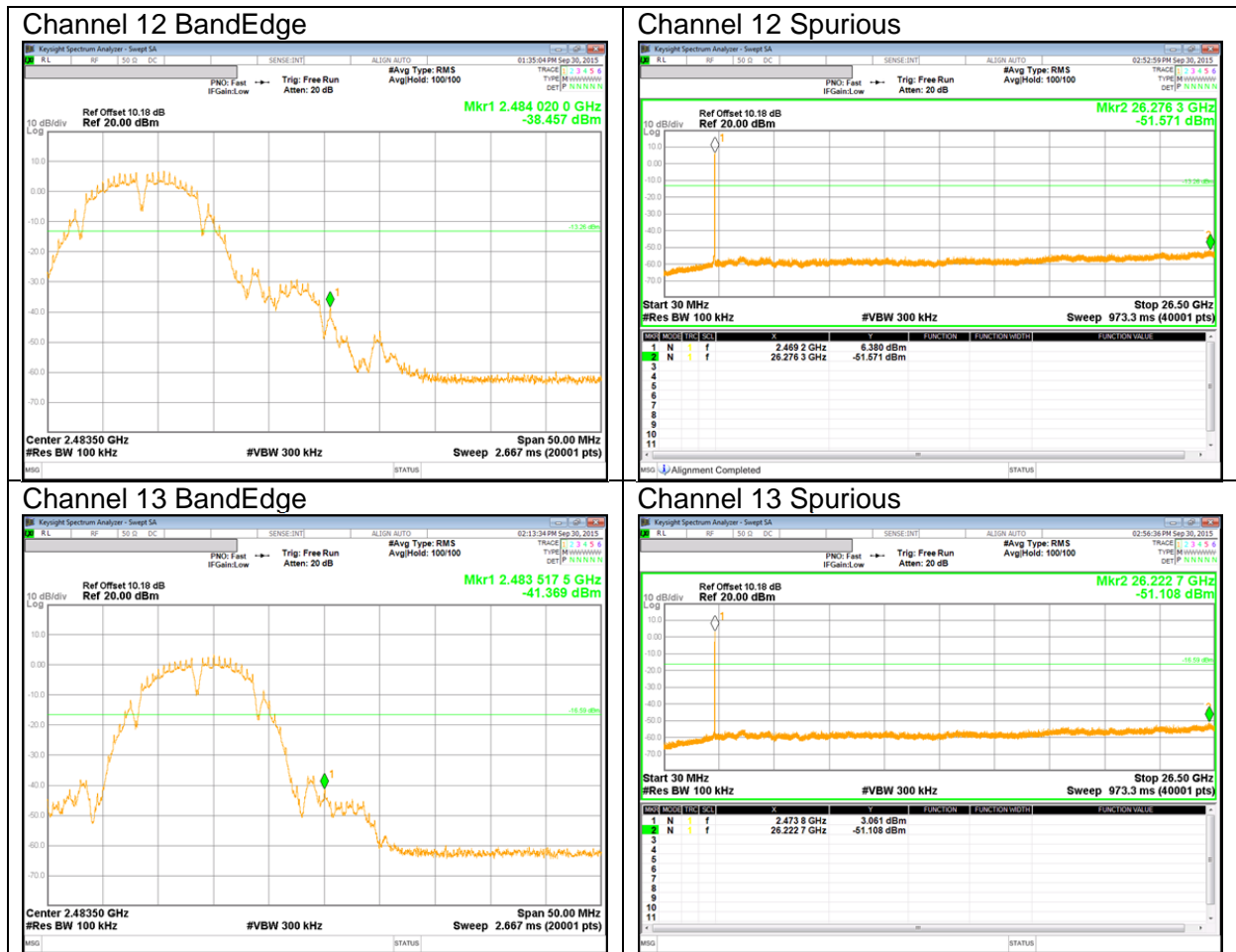
### TEST PROCEDURE

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**

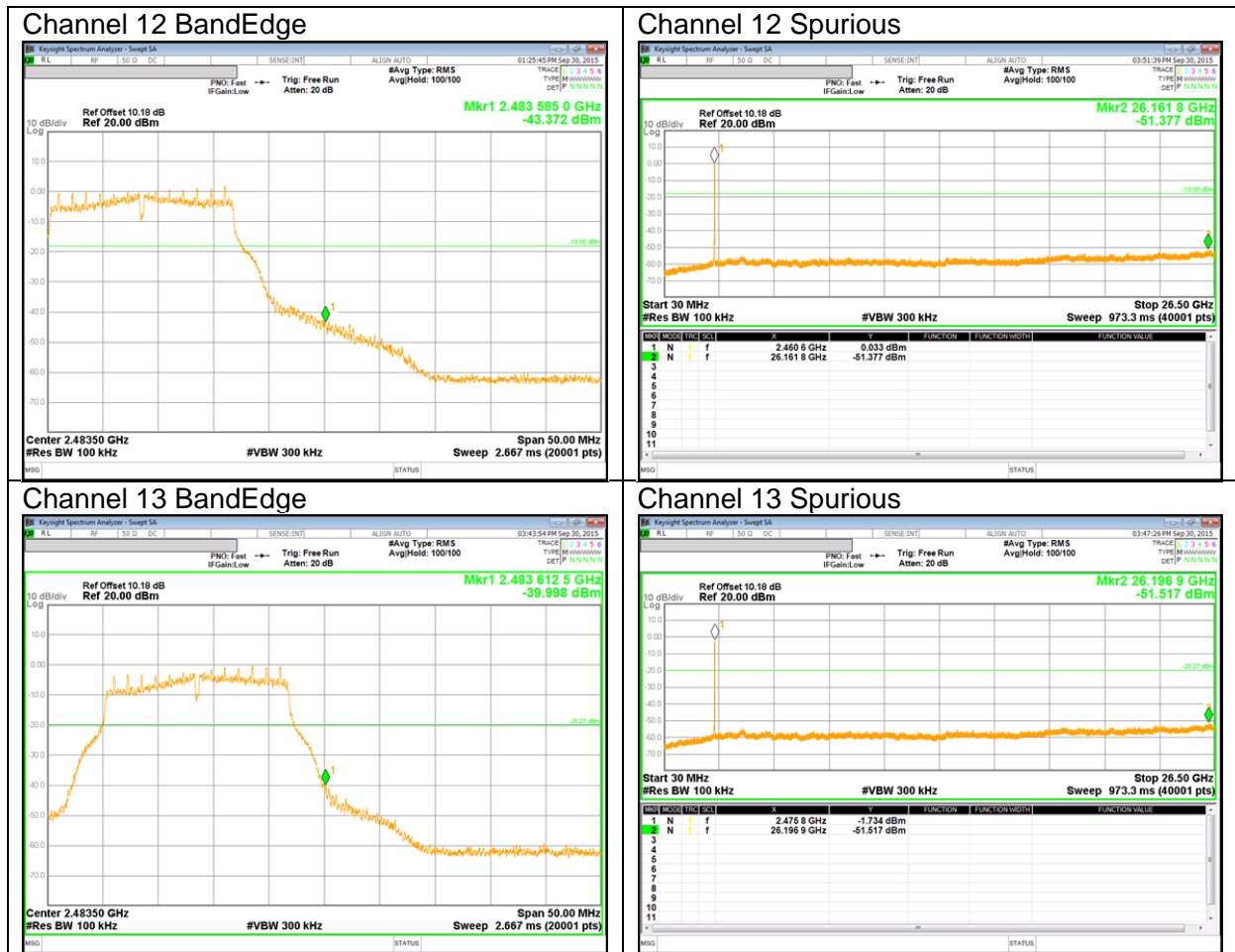
**10.6.1. 802.11b MODE IN THE 2.4 GHz BAND**



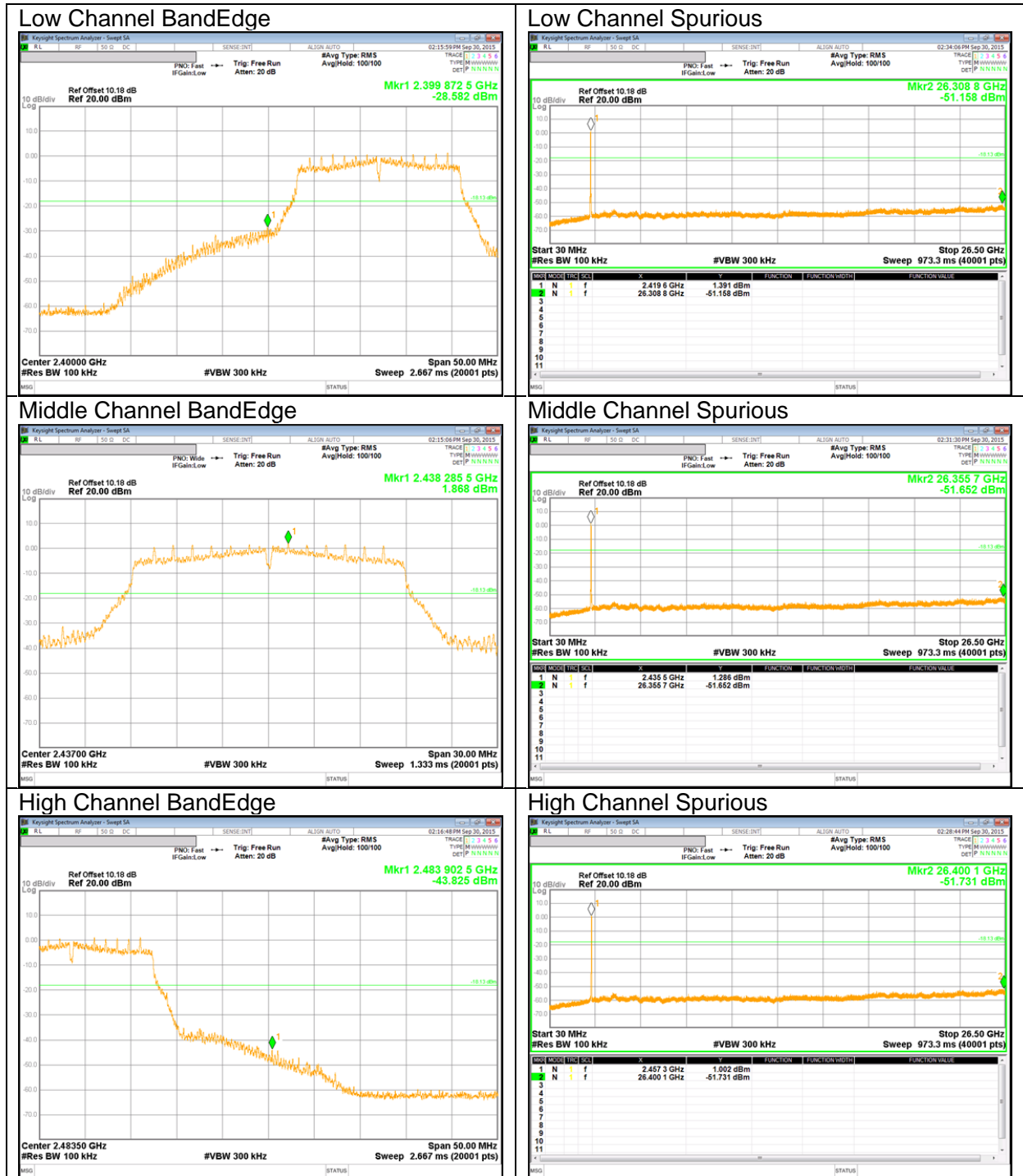


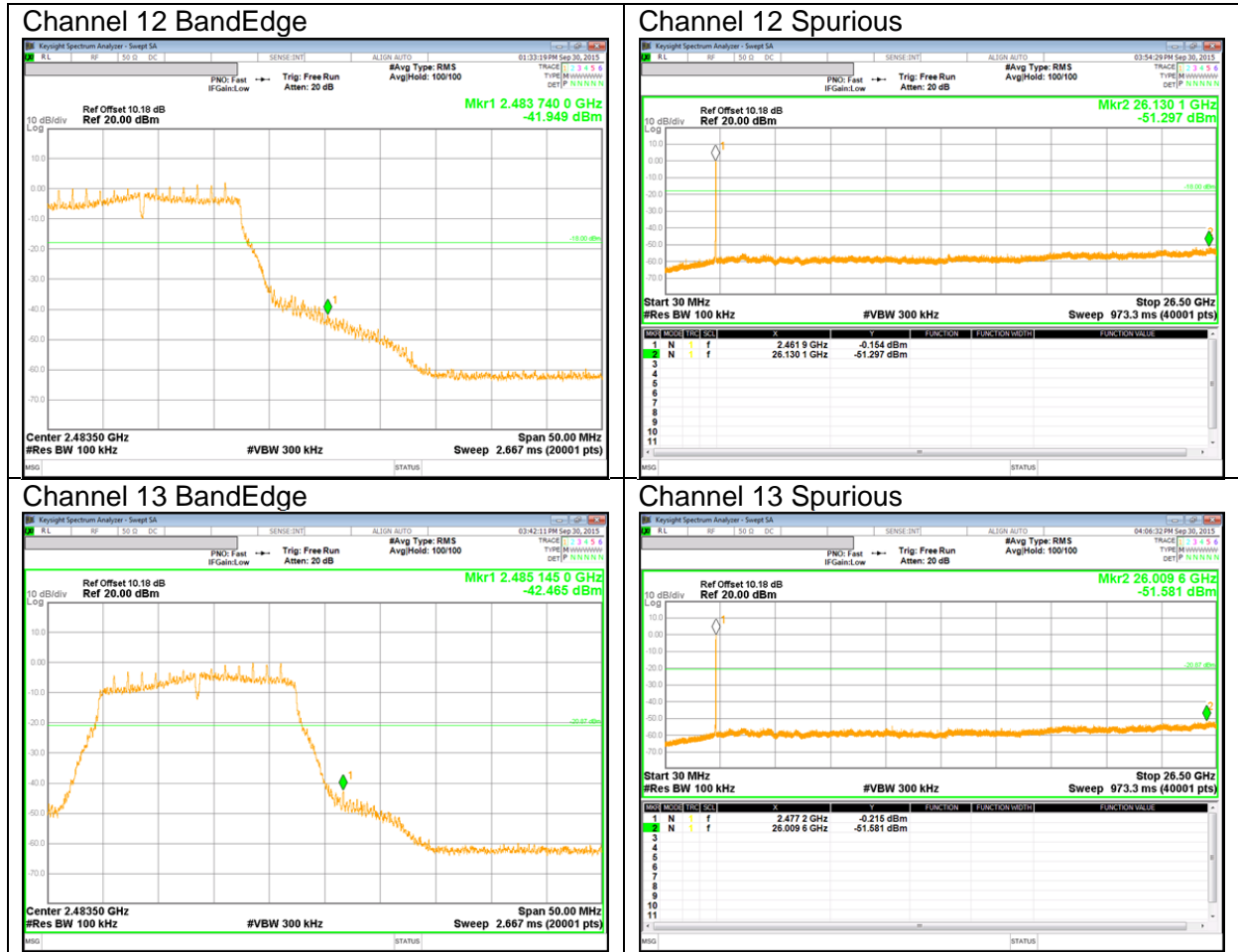
### 10.6.2. 802.11g MODE IN THE 2.4 GHz BAND





### 10.6.3. 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)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

#### TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters.

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 = 0.33dB.

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.

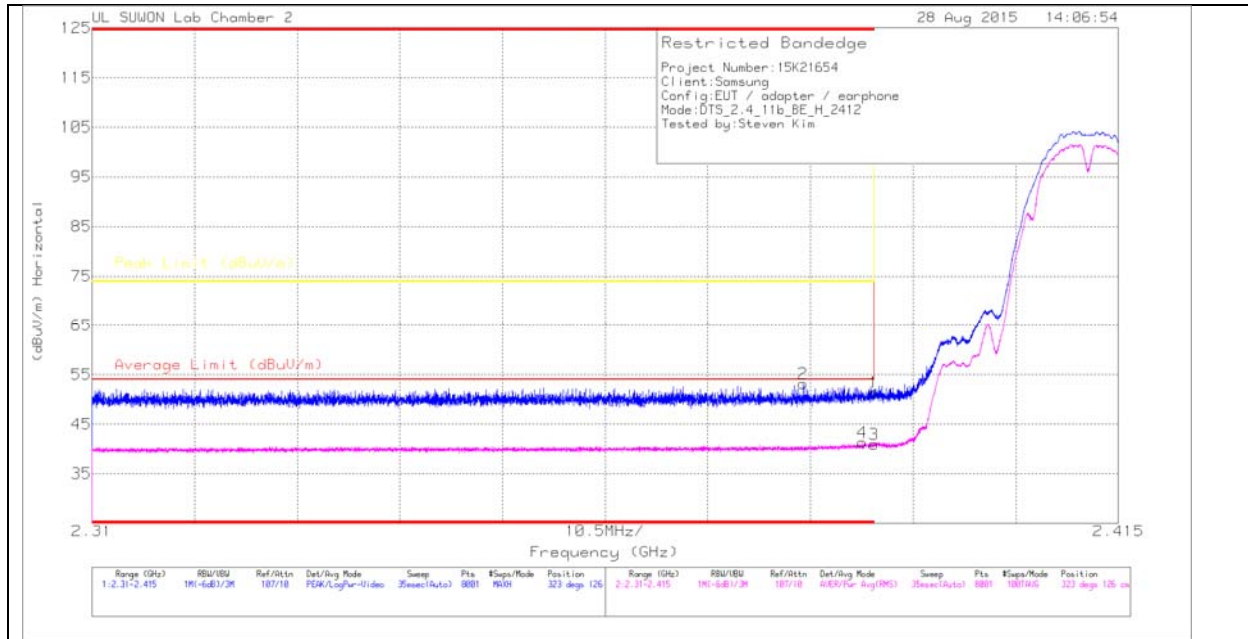
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

## 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

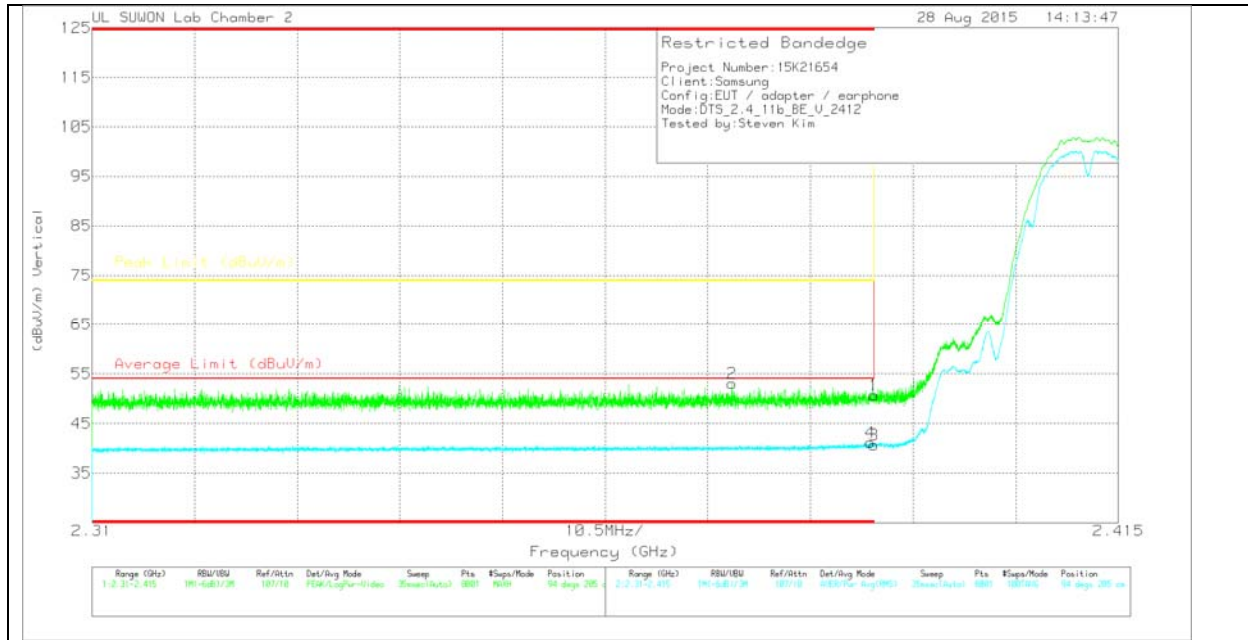
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.23	Pk	31.7	-19.5	0	51.43	-	-	74	-22.57	323	126	H
2	* 2.383	40.97	Pk	31.7	-19.5	0	53.17	-	-	74	-20.83	323	126	H
3	* 2.39	28.71	RMS	31.7	-19.5	0	40.91	54	-13.09	-	-	323	126	H
4	* 2.389	29.06	RMS	31.7	-19.5	0	41.26	54	-12.74	-	-	323	126	H

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

Pk - Peak detector

RMS - RMS detection

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 24)_150619	Path_2_10dB	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.55	Pk	31.7	-19.5	0	50.75	-	-	74	-23.25	94	205	V
2	* 2.375	40.94	Pk	31.7	-19.6	0	53.04	-	-	74	-20.96	94	205	V
3	* 2.39	28.45	RMS	31.7	-19.5	0	40.65	54	-13.35	-	-	94	205	V
4	* 2.39	28.92	RMS	31.7	-19.5	0	41.12	54	-12.88	-	-	94	205	V

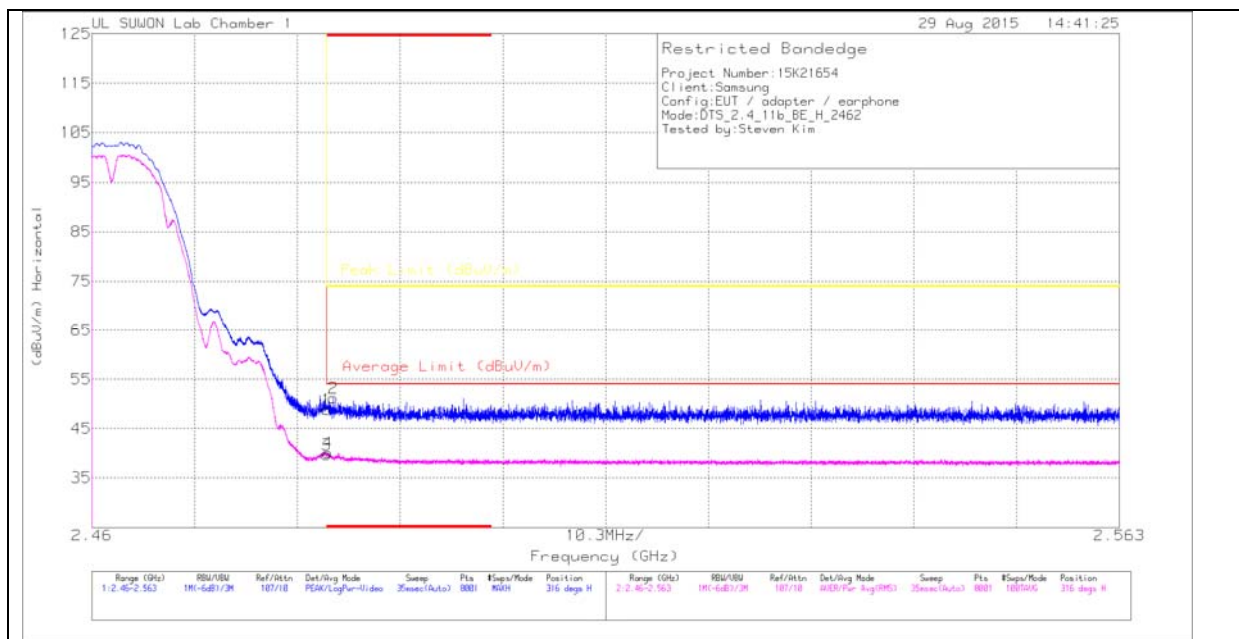
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

### AUTHORIZED BANDEDGE (HIGH CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### Trace Markers

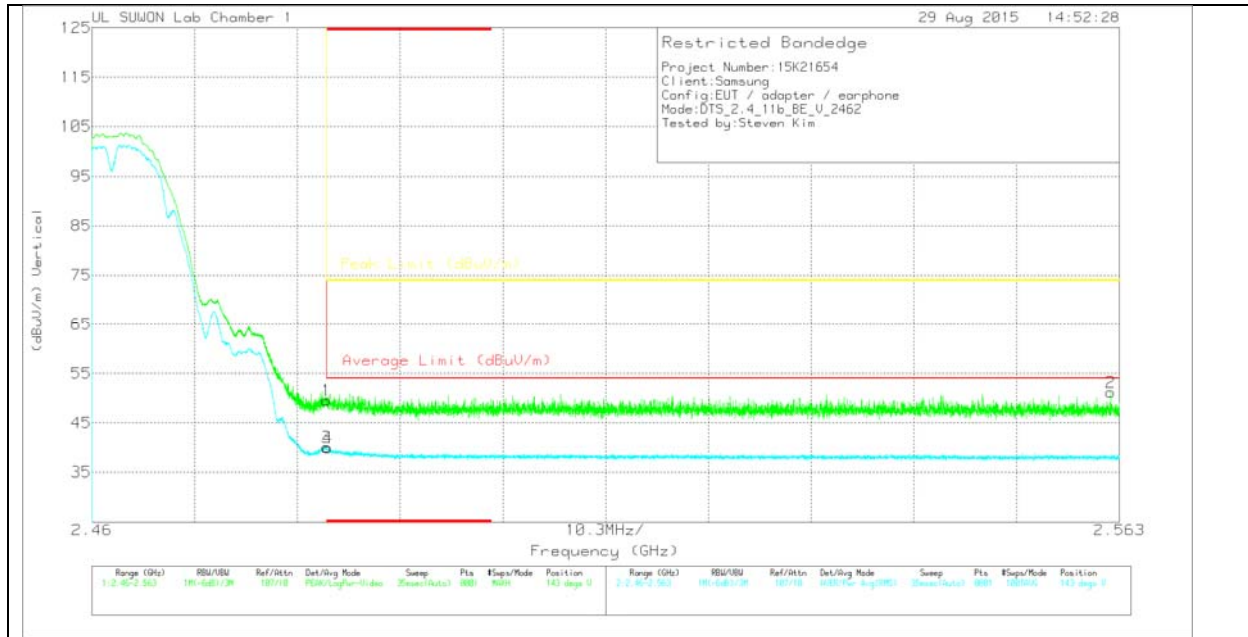
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168 717)_15061 9	Path_2_10d B	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.48	PK	32	-22.6	0	48.88	-	-	74	-25.12	316	269	H
2	* 2.484	41.75	PK	32	-22.6	0	51.15	-	-	74	-22.85	316	269	H
3	* 2.484	30.31	RMS	32	-22.6	0	39.71	54	-14.29	-	-	316	269	H
4	* 2.484	30.7	RMS	32	-22.6	0	40.1	54	-13.9	-	-	316	269	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(00168 717)_15061 9	Path_2_10d B	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	40.2	PK	32	-22.6	0	49.6	-	-	74	-24.4	143	349	V
2	2.562	41.8	PK	32	-22.6	0	51.2	-	-	74	-22.8	143	349	V
3	* 2.484	30.7	RMS	32	-22.6	0	40.1	54	-13.9	-	-	143	349	V
4	* 2.484	30.54	RMS	32	-22.6	0	39.94	54	-14.06	-	-	143	349	V

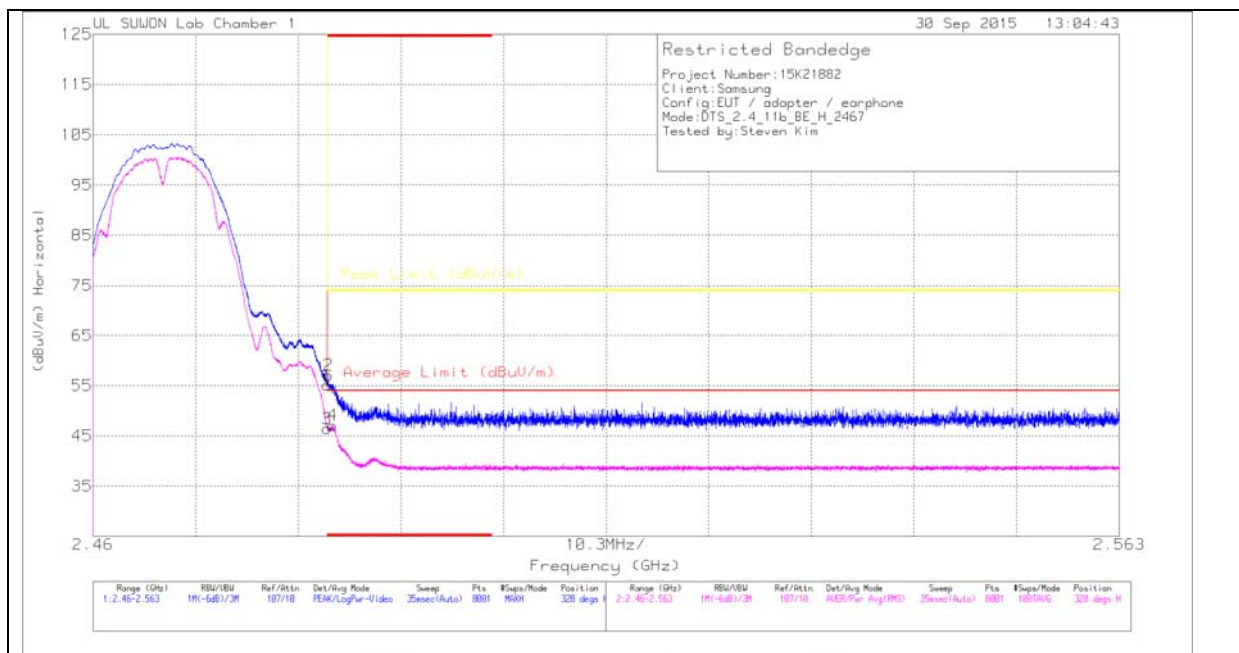
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

RMS - RMS detection

**AUTHORIZED BANDEDGE (12 CHANNEL)**

**HORIZONTAL PEAK AND AVERAGE PLOT**



**HORIZONTAL DATA**

Trace Markers

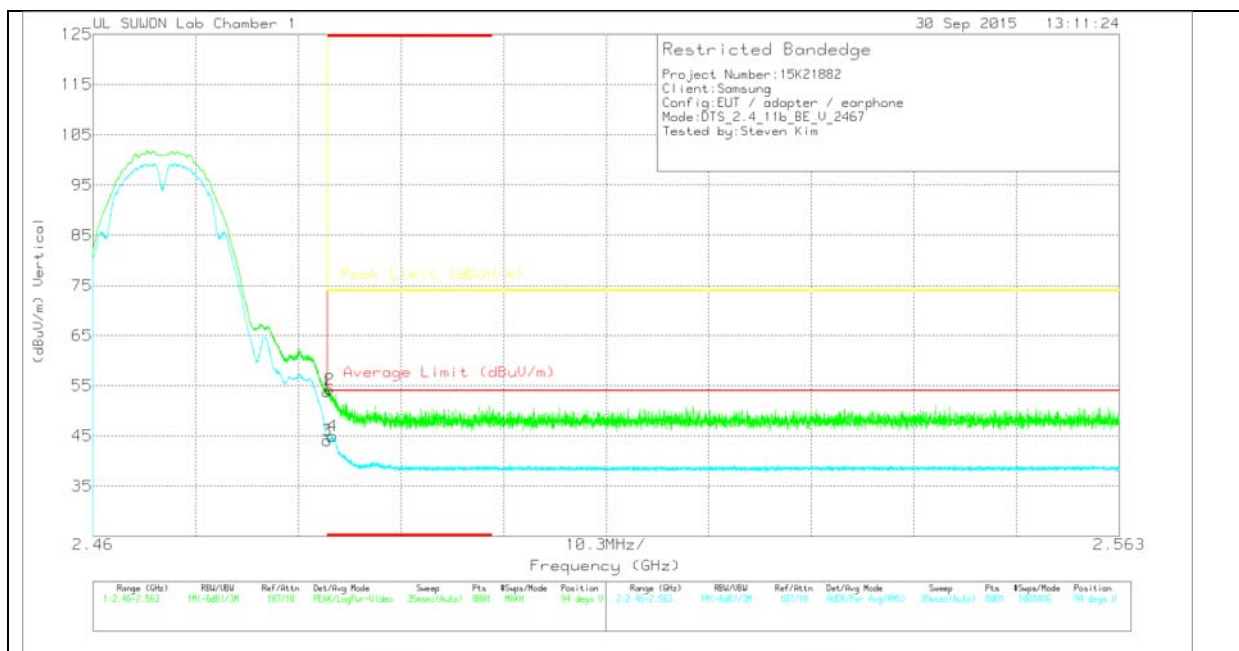
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 17)_150619	Path_2_10d B	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.69	PK	32	-22.6	0	55.09	-	-	74	-18.91	328	102	H
2	* 2.484	47.67	PK	32	-22.6	0	57.07	-	-	74	-16.93	328	102	H
3	* 2.484	37.04	RMS	32	-22.6	0	46.44	54	-7.56	-	-	328	102	H
4	* 2.484	37.72	RMS	32	-22.6	0	47.12	54	-6.88	-	-	328	102	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_10d B	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	44.39	Pk	32	-22.6	0	53.79	-	-	74	-20.21	94	238	V
2	* 2.484	44.86	PK	32	-22.6	0	54.26	-	-	74	-19.74	94	238	V
3	* 2.484	34.7	RMS	32	-22.6	0	44.1	54	-9.9	-	-	94	238	V
4	* 2.484	35.56	RMS	32	-22.6	0	44.96	54	-9.04	-	-	94	238	V

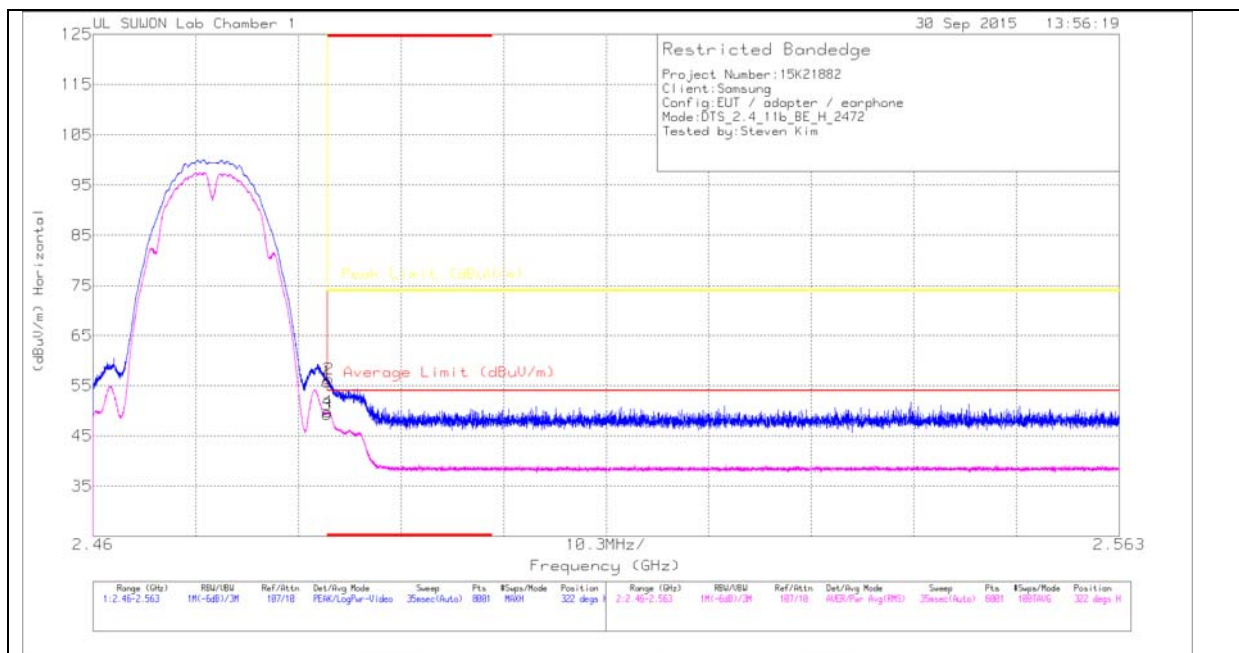
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

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	3117(001687 17)_150619	Path_2_10d B	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	46.39	PK	32	-22.6	0	55.79	-	-	74	-18.21	322	269	H
2	* 2.484	46.9	PK	32	-22.6	0	56.3	-	-	74	-17.7	322	269	H
3	* 2.484	39.84	RMS	32	-22.6	0	49.24	54	-4.76	-	-	322	269	H
4	* 2.484	40.4	RMS	32	-22.6	0	49.8	54	-4.2	-	-	322	269	H

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

Pk - Peak detector

RMS - RMS detection