



FCC CFR47 PART 15 SUBPART C

DTS Wireless LAN

CERTIFICATION TEST REPORT

FOR

LTE Watch + Bluetooth/BLE and DTS b/g/n

MODEL NUMBER : SM-R775S

FCC ID: A3LSMR775S

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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



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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: LTE Watch + Bluetooth/BLE and DTS b/g/n
MODEL NUMBER: SM-R775S
SERIAL NUMBER: R3AH800PHH, R3AHA006PM (RADIATED);
R3AHA006PH (CONDUCTED)
DATE TESTED: OCT 26, 2016 - NOV 03, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:



CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

218 Maeyeong-ro	
☒	Chamber 1
☒	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 LTE Watch + Bluetooth/BLE and DTS b/g/n.
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	17.37	54.58
	802.11g	15.26	33.57
	802.11n HT20	14.22	26.42

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antennas, with a antenna's maximum gain of -4.5 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

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Adapter	SAMSUNG	EP-TA60KBK	R73H58A0B72DK3	N/A
Wireless Charger	SAMSUNG	EP-YO760	N/A	A3LEPYO760

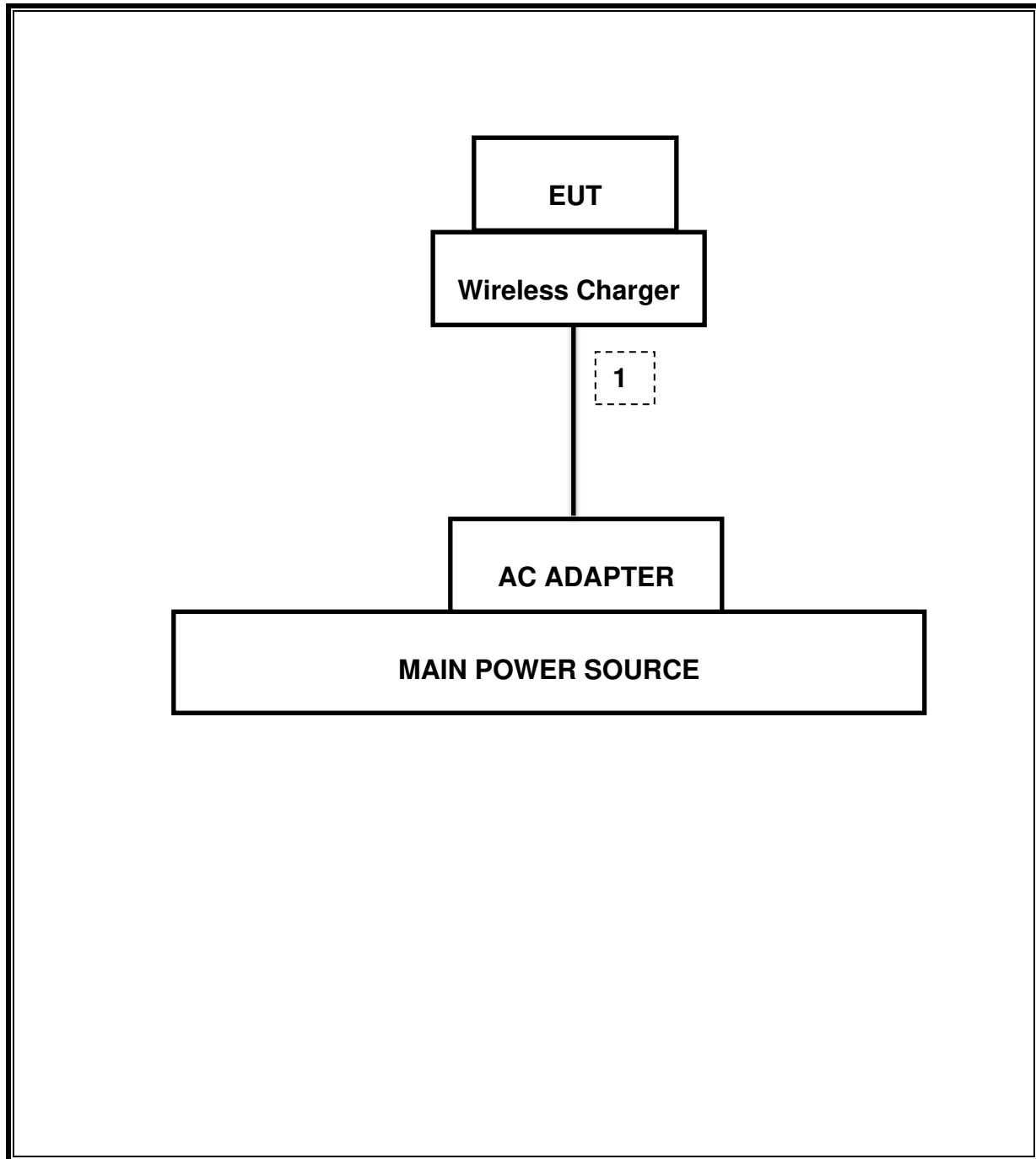
I/O CABLES

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

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	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-16-17
Preamplifier	ETS	3115-PA	00167475	08-17-17
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-16-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-17-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-16-17
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-17
Average Power Sensor	R&S	NRZ-Z91	102681	08-16-17
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-16-17
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-16-17
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-17-17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-16-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-17-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-16-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-17-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	08-16-17
LISN	R&S	ENV-216	101836	08-16-17
LISN	R&S	ENV-216	101837	08-16-17
Attenuator	PASTERNAK	PE7087-10	A009	08-16-17
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17

7. MEASUREMENT METHODS

KDB 558074 D01 DTS Meas Guidance v03r05: Measurement Procedure §9.2.3.1 AVGPM is used for average power and §10.3 AVGPDS-1, §10.5 AVGPDS-2 are 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.

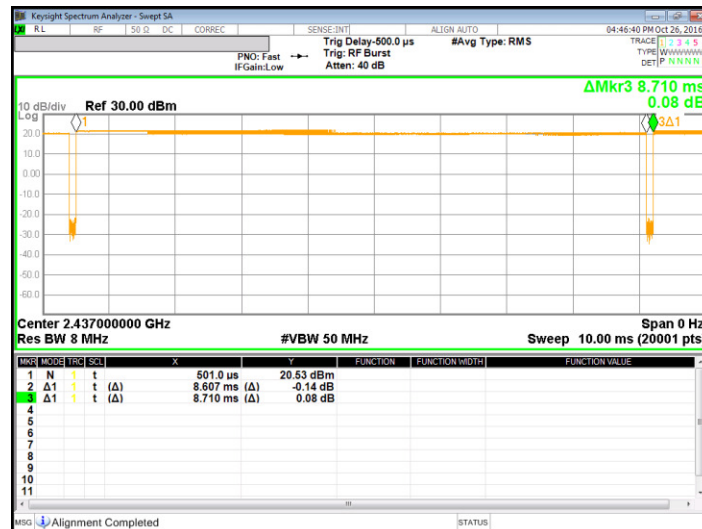
8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

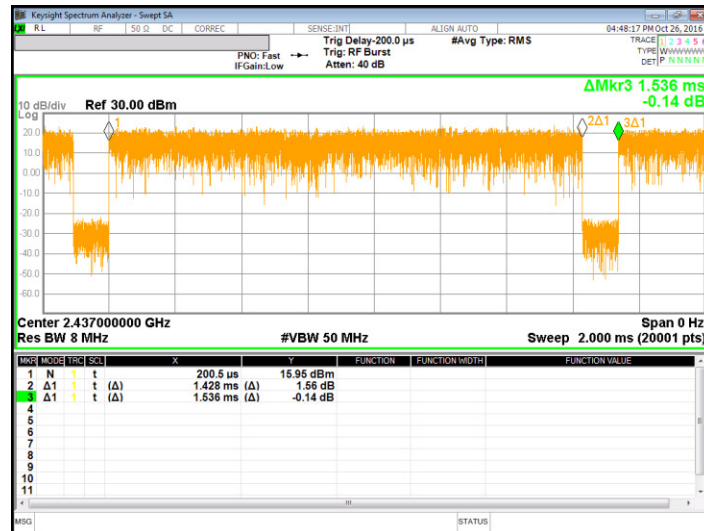
None; for reporting purposes only.

8.1. ON TIME AND DUTY CYCLE RESULTS

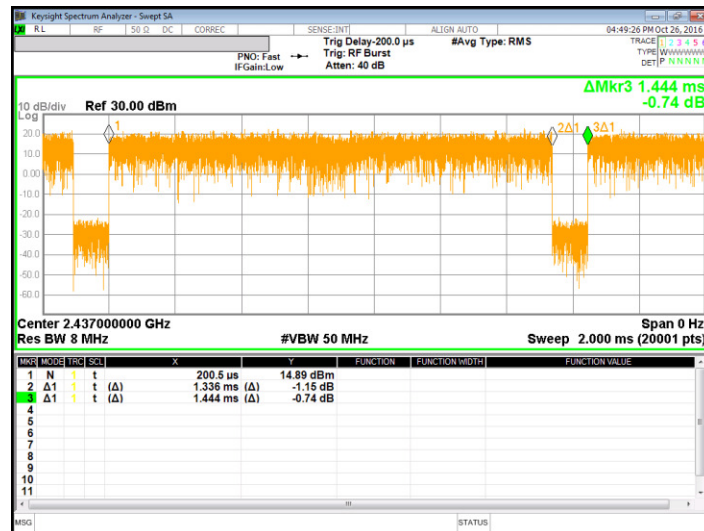
Mode	ON Time B [msec]	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
2400MHz Bands						
802.11b	8.607	8.71	0.988	98.8%	0.00	0.010
802.11g	1.428	1.536	0.930	93.0%	0.32	0.700
802.11n HT20	1.336	1.444	0.925	92.5%	0.34	0.749



[802.11b]



[802.11g]



[802.11n]

9. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	8.544 MHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-28.784 dBm
15.247	TX conducted output power	<30dBm		Pass	17.39 dBm
15.247	PSD	<8dBm		Pass	-14.162 dBm
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	38.33 dBuV (Pk)
15.205, 15.209	Radiated Spurious Emission	< 74dBuV/m	Radiated	Pass	69.99 dBuV/m (Pk)

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

TEST PROCEDURE

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

RESULTS

10.1.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	8.544	0.5
Mid	2437	8.573	0.5
High	2462	8.563	0.5
12	2467	9.046	0.5
13	2472	8.571	0.5
Worst		8.544	0.5

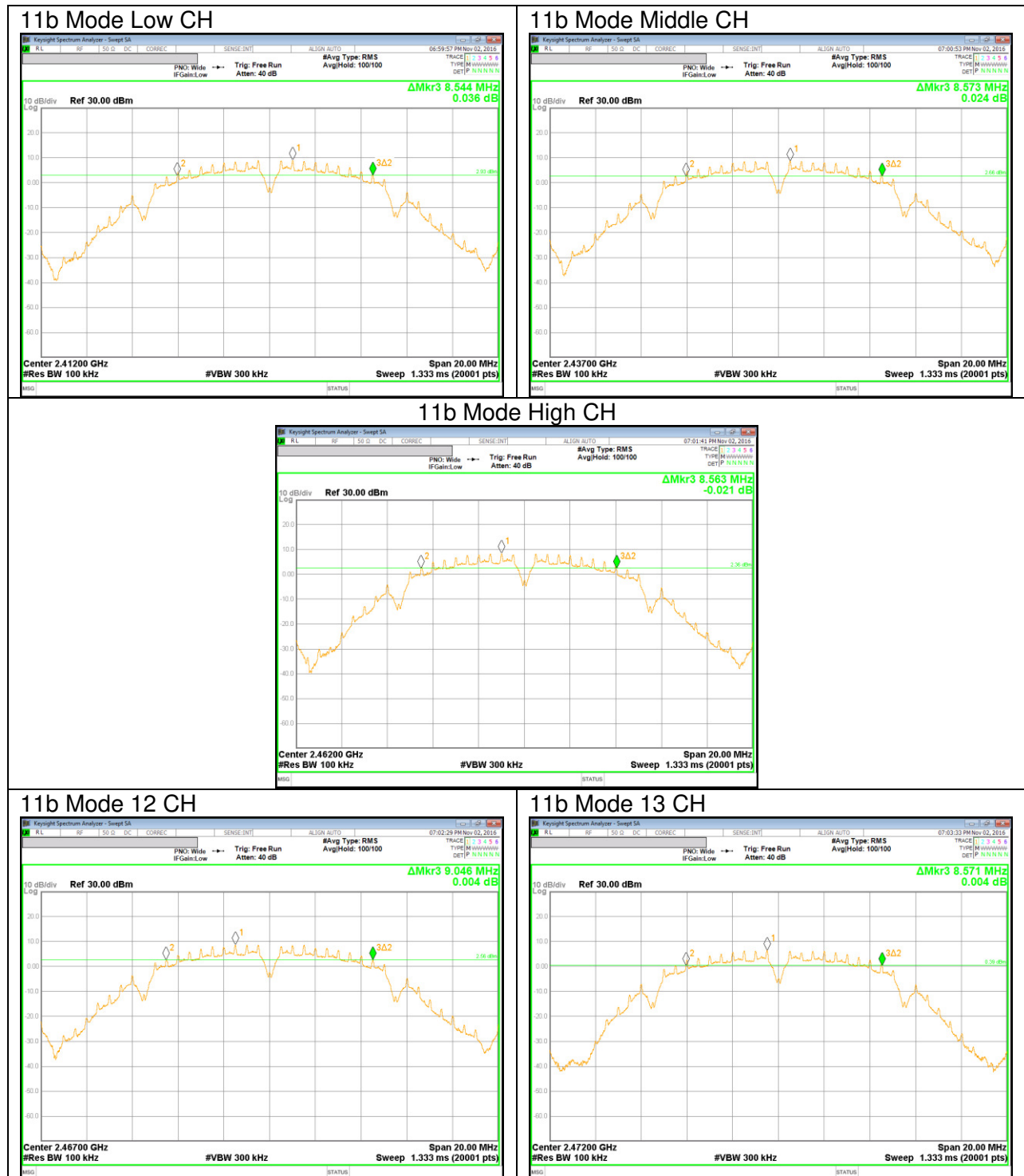
10.1.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	15.439	0.5
Mid	2437	15.671	0.5
High	2462	15.440	0.5
12	2467	16.060	0.5
13	2472	15.752	0.5
Worst		15.439	0.5

10.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	2412	15.284	0.5
Mid	2437	16.070	0.5
High	2462	15.933	0.5
12	2467	16.641	0.5
13	2472	16.007	0.5
Worst		15.284	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	11.748
Mid	2437	12.033
High	2462	11.391
12	2467	11.948
13	2472	11.365
Worst		12.033

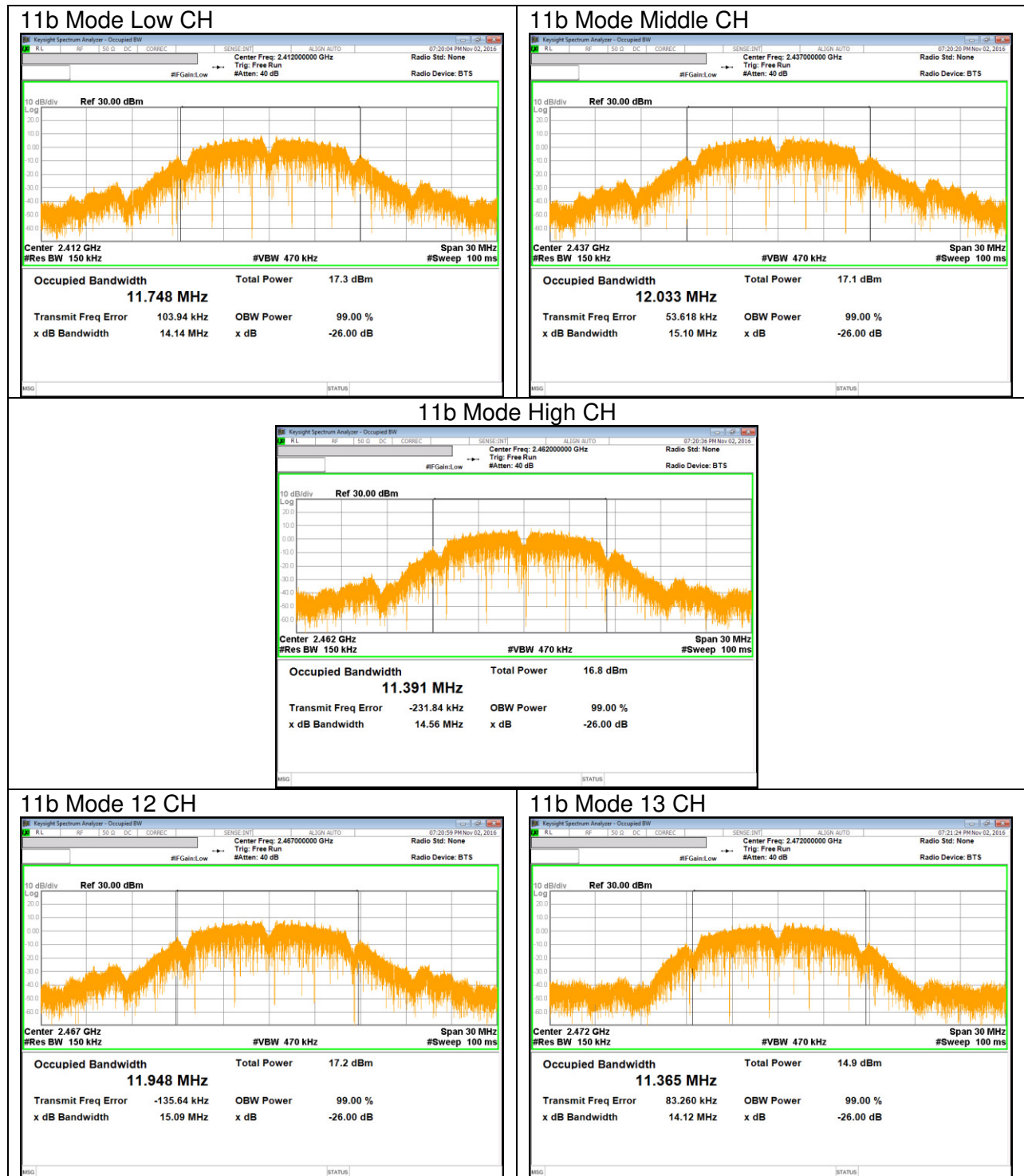
10.2.2. 802.11g MODE IN THE 2.4 GHz BAND

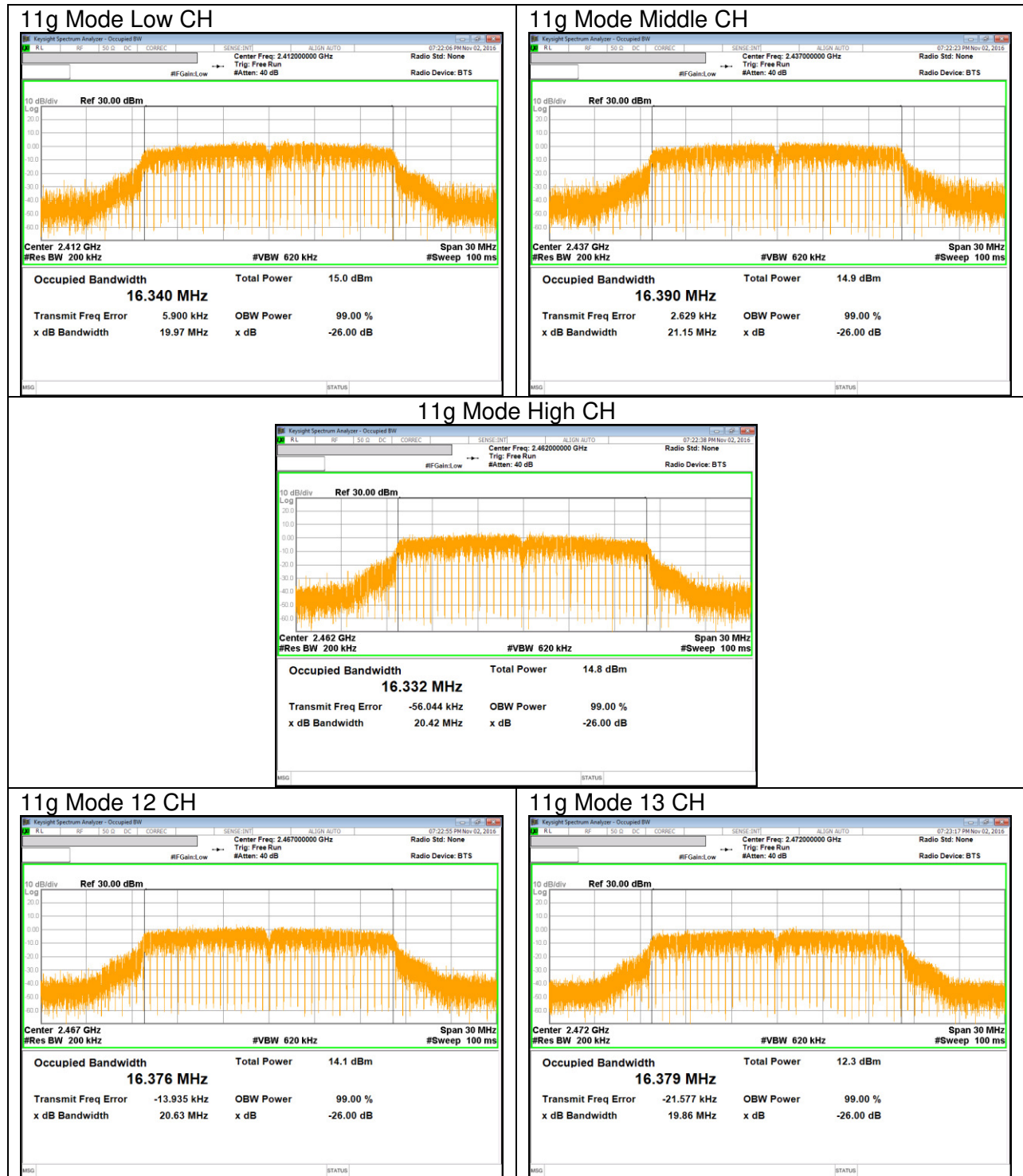
Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	16.340
Mid	2437	16.390
High	2462	16.332
12	2467	16.376
13	2472	16.379
Worst		16.390

10.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

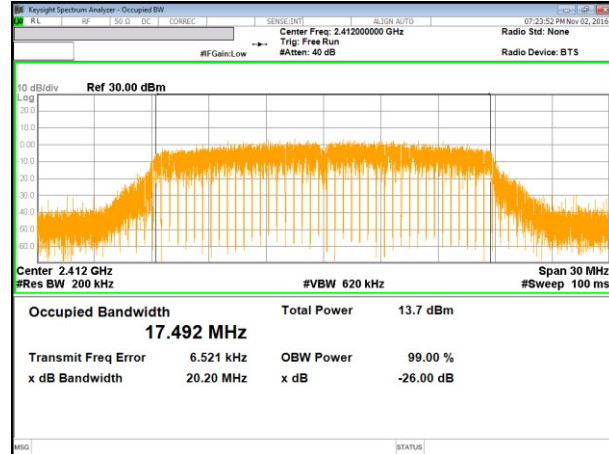
Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	2412	17.492
Mid	2437	17.541
High	2462	17.520
12	2467	17.599
13	2472	17.568
Worst		17.599

10.2.4. 99% BANDWIDTH PLOTS

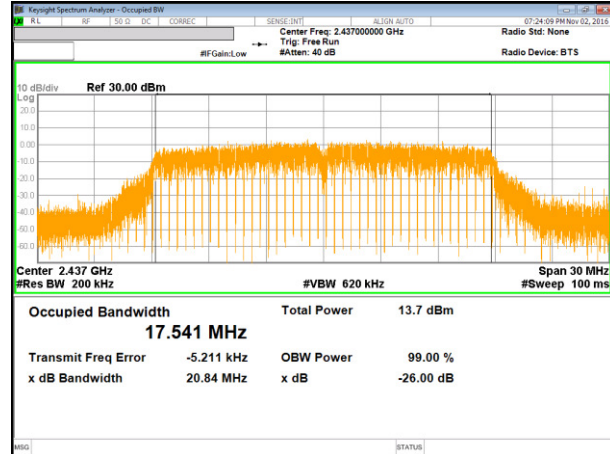




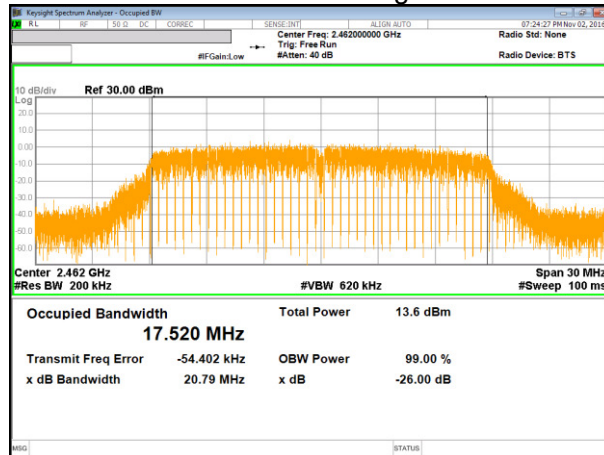
11n HT20 Mode Low CH



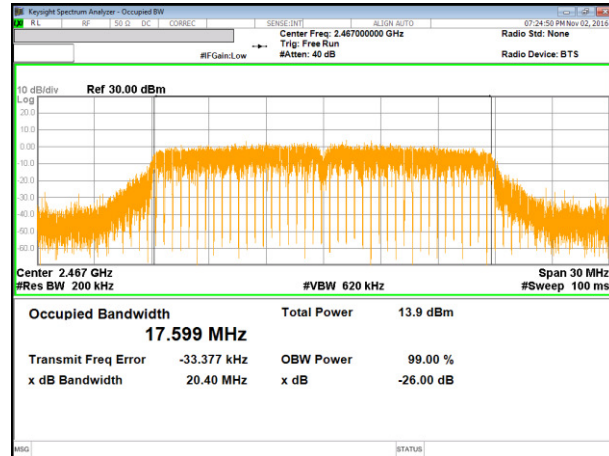
11n HT20 Mode Middle CH



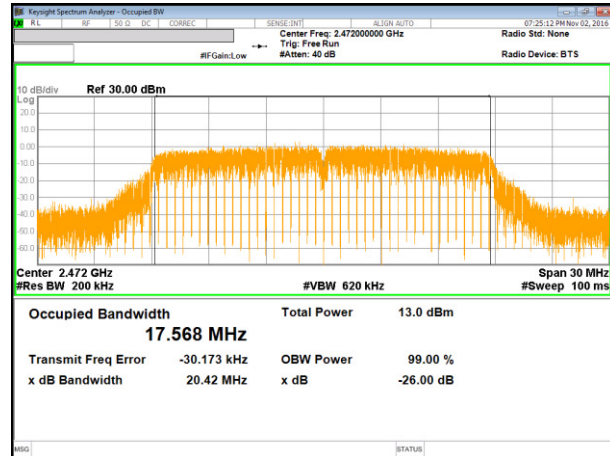
11n HT20 Mode High CH



11n HT20 Mode 12 CH



11n HT20 Mode 13 CH



10.3. OUTPUT POWER

LIMITS

FCC §15.247

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

DIRECTIONAL ANTENNA GAIN

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.1 dB (including 10 dB pad and 0.1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

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

RESULTS

10.3.1. 802.11b MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	IC Power Limit [dBm]	IC EIRP Limit [dBm]	Max Power [dBm]
Low	2412	-4.50	30.00	30.00	36.00	30.00
Mid	2437	-4.50	30.00	30.00	36.00	30.00
High	2462	-4.50	30.00	30.00	36.00	30.00
12	2467	-4.50	30.00	30.00	36.00	30.00
13	2472	-4.50	30.00	30.00	36.00	30.00

Results

Channel	Frequency [MHz]	Primary Meas Power [dBm]	Final Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	17.33	17.33	30.00	-12.67
Mid	2437	17.37	17.37	30.00	-12.63
High	2462	17.06	17.06	30.00	-12.94
12	2467	17.39	17.39	30.00	-12.61
13	2472	15.06	15.06	30.00	-14.94
Worst			17.39	30.00	-12.61

10.3.2. 802.11g MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	IC Power Limit [dBm]	IC EIRP Limit [dBm]	Max Power [dBm]
Low	2412	-4.50	30.00	30.00	36.00	30.00
Mid	2437	-4.50	30.00	30.00	36.00	30.00
High	2462	-4.50	30.00	30.00	36.00	30.00
12	2467	-4.50	30.00	30.00	36.00	30.00
13	2472	-4.50	30.00	30.00	36.00	30.00

Results

Channel	Frequency [MHz]	Primary Meas Power [dBm]	Final Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	15.26	15.26	30.00	-14.74
Mid	2437	15.07	15.07	30.00	-14.93
High	2462	14.96	14.96	30.00	-15.04
12	2467	14.40	14.40	30.00	-15.60
13	2472	12.60	12.60	30.00	-17.40
Worst			15.26	30.00	-14.74

10.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency [MHz]	Directional Gain Primary [dBi]	FCC Power Limit [dBm]	IC Power Limit [dBm]	IC EIRP Limit [dBm]	Max Power [dBm]
Low	2412	-4.50	30.00	30.00	36.00	30.00
Mid	2437	-4.50	30.00	30.00	36.00	30.00
High	2462	-4.50	30.00	30.00	36.00	30.00
12	2467	-4.50	30.00	30.00	36.00	30.00
13	2472	-4.50	30.00	30.00	36.00	30.00

Results

Channel	Frequency [MHz]	Primary Meas Power [dBm]	Final Power [dBm]	Power Limit [dBm]	Margin [dB]
Low	2412	13.94	13.94	30.00	-16.06
Mid	2437	13.90	13.90	30.00	-16.10
High	2462	14.01	14.01	30.00	-15.99
12	2467	14.22	14.22	30.00	-15.78
13	2472	13.45	13.45	30.00	-16.55
Worst			14.22	30.00	-15.78

10.4. PSD

LIMITS

FCC §15.247

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Power Spectral Density was performed utilizing the "Method AVGPS-1(802.11 b mode), AVGPS-2(802.11 g/n mode)" under KDB558074 D01 DTS Meas Guidance v03r05

RESULTS

10.4.1. 802.11b MODE IN THE 2.4 GHz BAND

PSD Results

Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-14.162	0.00	-14.162	8.00	-22.162
Mid	2437	-14.165	0.00	-14.165	8.00	-22.165
High	2462	-14.647	0.00	-14.647	8.00	-22.647
12	2467	-14.368	0.00	-14.368	8.00	-22.368
13	2472	-16.814	0.00	-16.814	8.00	-24.814

10.4.2. 802.11g MODE IN THE 2.4 GHz BAND

PSD Results

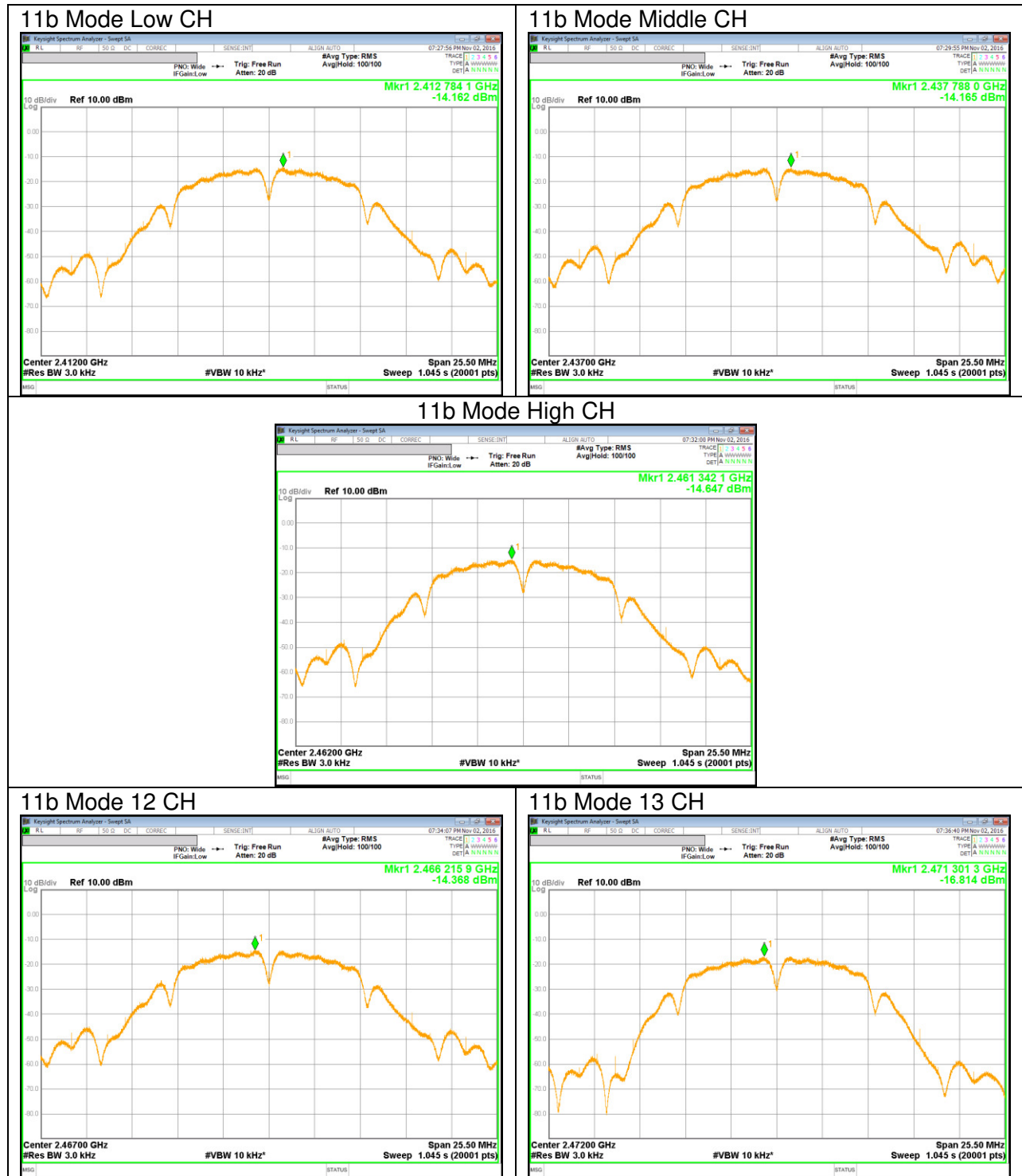
Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-15.302	0.32	-14.982	8.00	-23.302
Mid	2437	-15.515	0.32	-15.195	8.00	-23.515
High	2462	-14.999	0.32	-14.679	8.00	-22.999
12	2467	-15.935	0.32	-15.615	8.00	-23.935
13	2472	-18.190	0.32	-17.870	8.00	-26.190

10.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

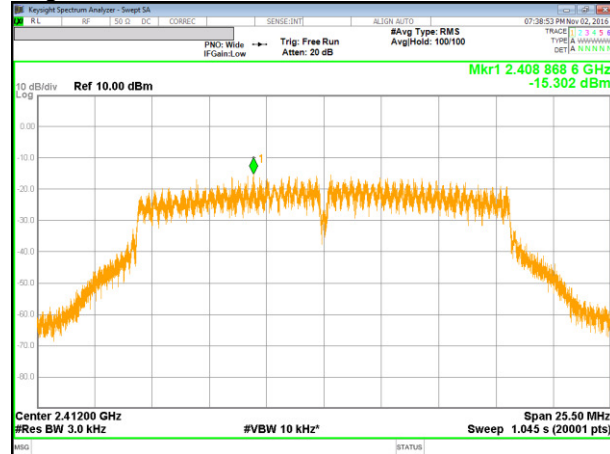
PSD Results

Channel	Frequency [MHz]	PSD Meas [dBm]	Duty Factor [dB]	Final PSD [dBm]	Limit [dBm]	Margin [dB]
Low	2412	-19.528	0.34	-19.188	8.00	-27.528
Mid	2437	-19.535	0.34	-19.195	8.00	-27.535
High	2462	-19.535	0.34	-19.195	8.00	-27.535
12	2467	-19.480	0.34	-19.140	8.00	-27.480
13	2472	-20.060	0.34	-19.720	8.00	-28.060

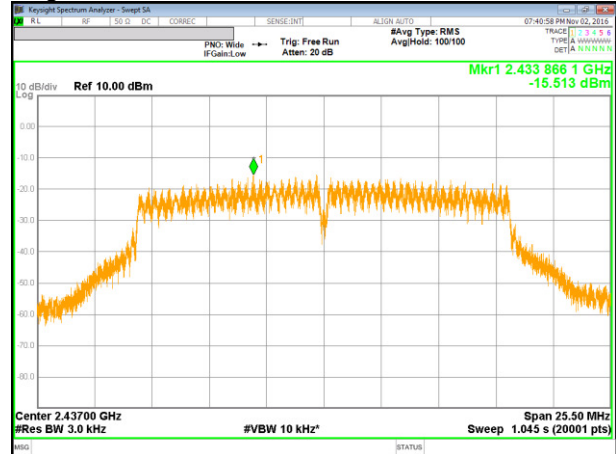
10.4.4. PSD PLOTS



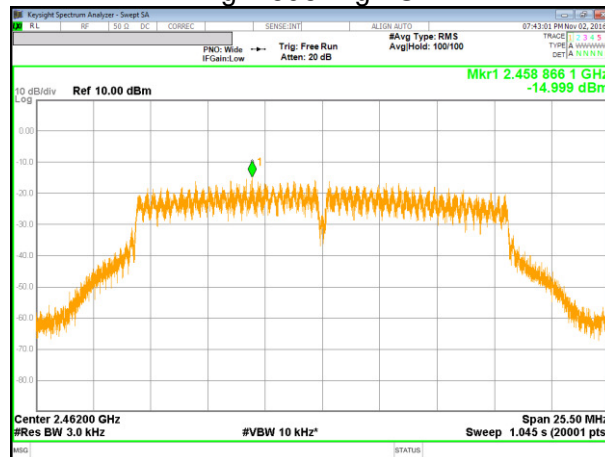
11g Mode Low CH



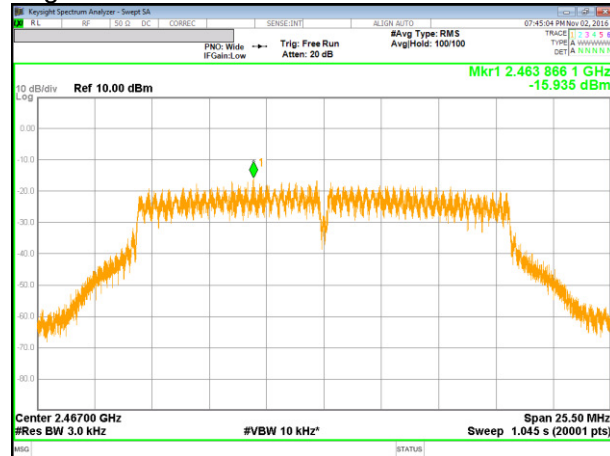
11g Mode Middle CH



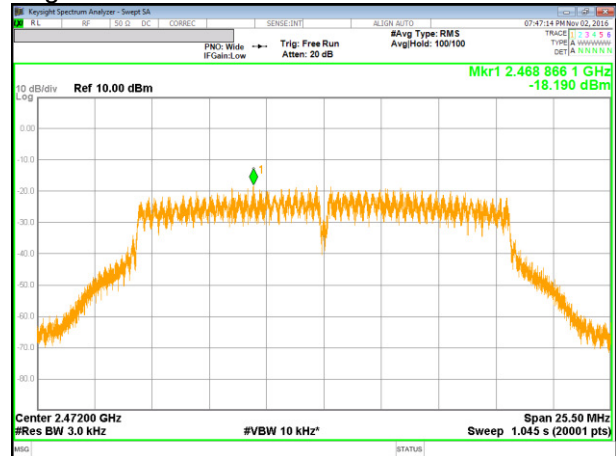
11g Mode High CH



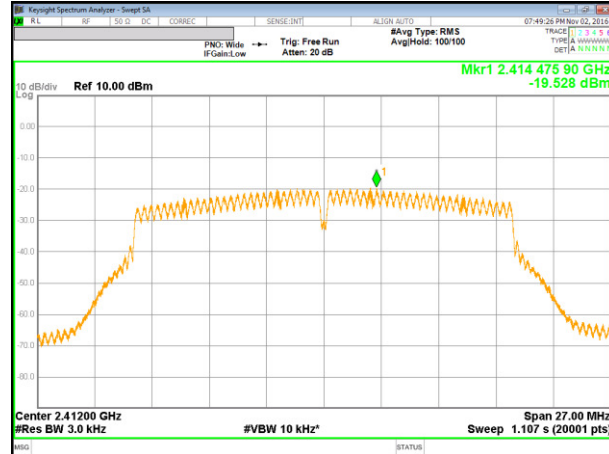
11g Mode 12 CH



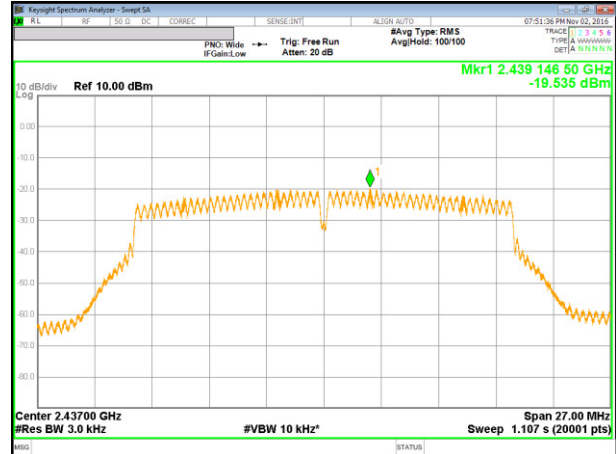
11g Mode 13 CH



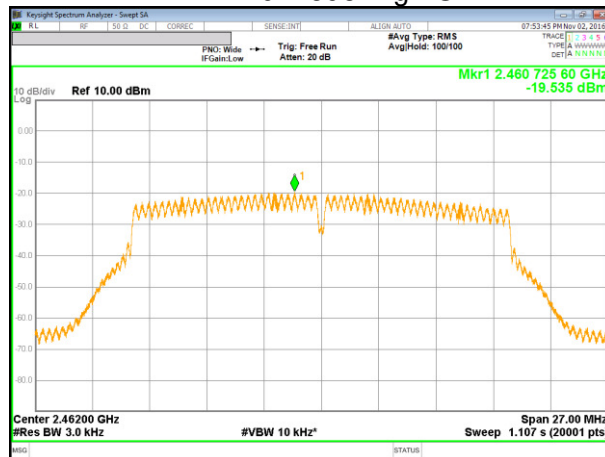
11n HT20 Mode Low CH



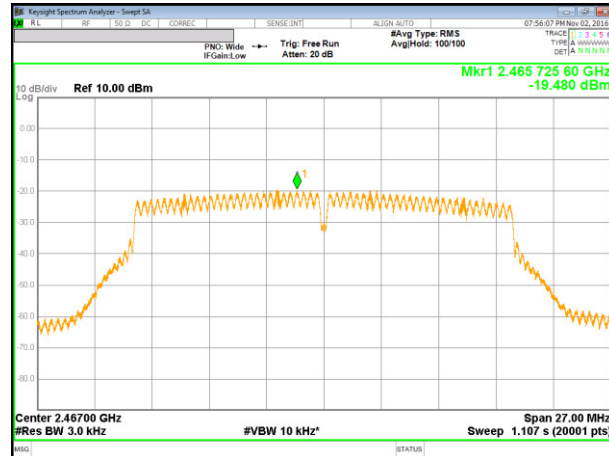
11n HT20 Mode Middle CH



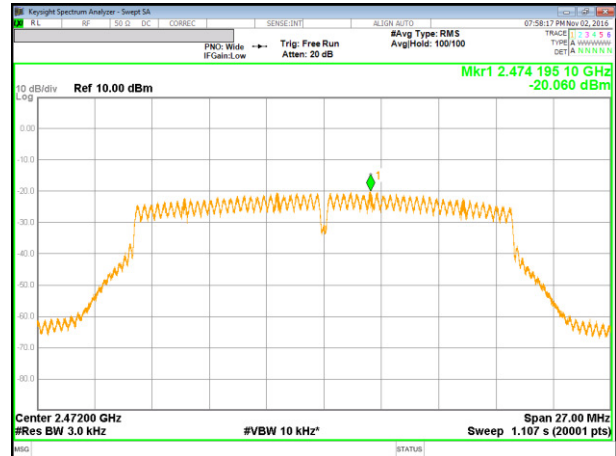
11n HT20 Mode High CH



11n HT20 Mode 12 CH



11n HT20 Mode 13 CH



10.5. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

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

TEST PROCEDURE

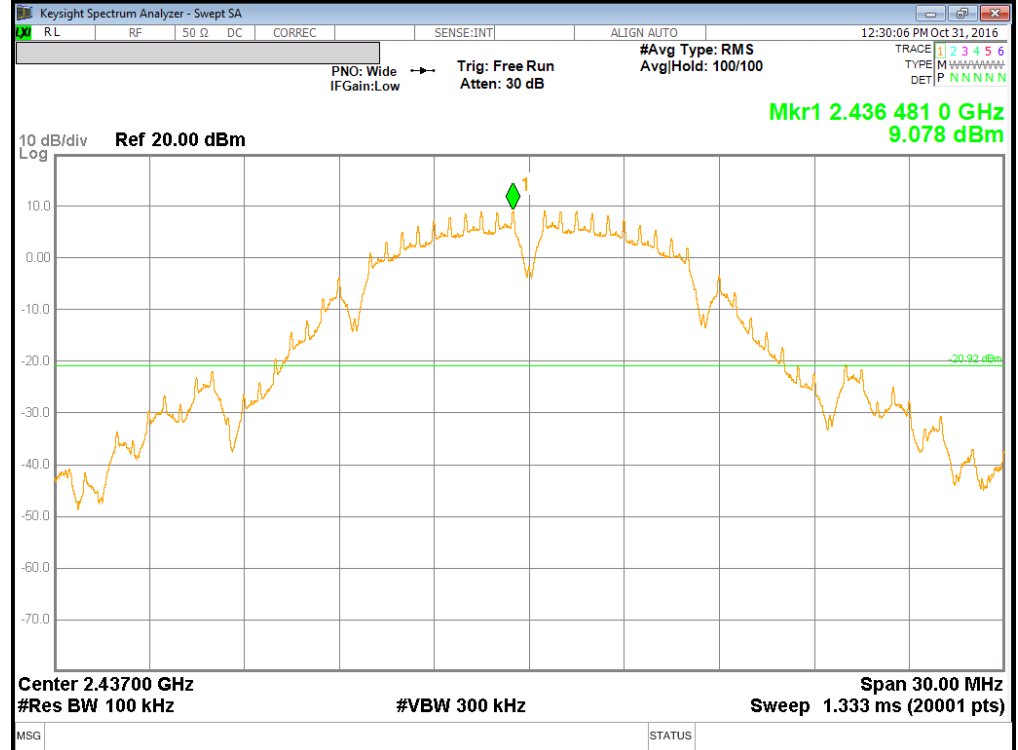
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

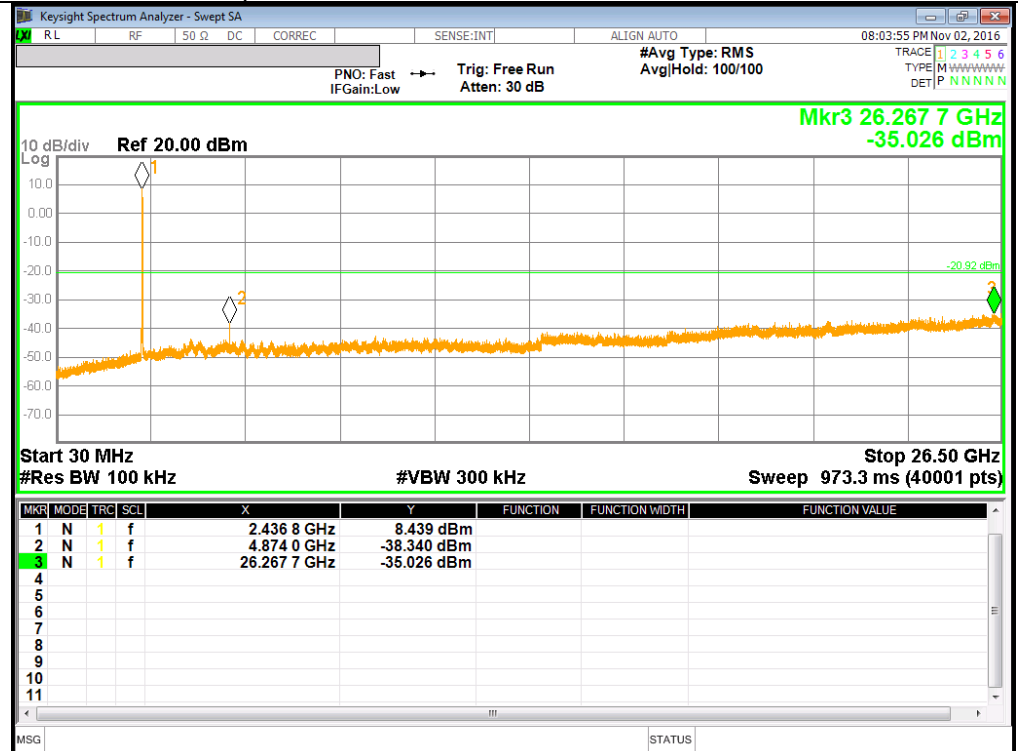
10.5.1. 802.11b MODE IN THE 2.4 GHz BAND



Middle Channel BandEdge



Middle Channel Spurious

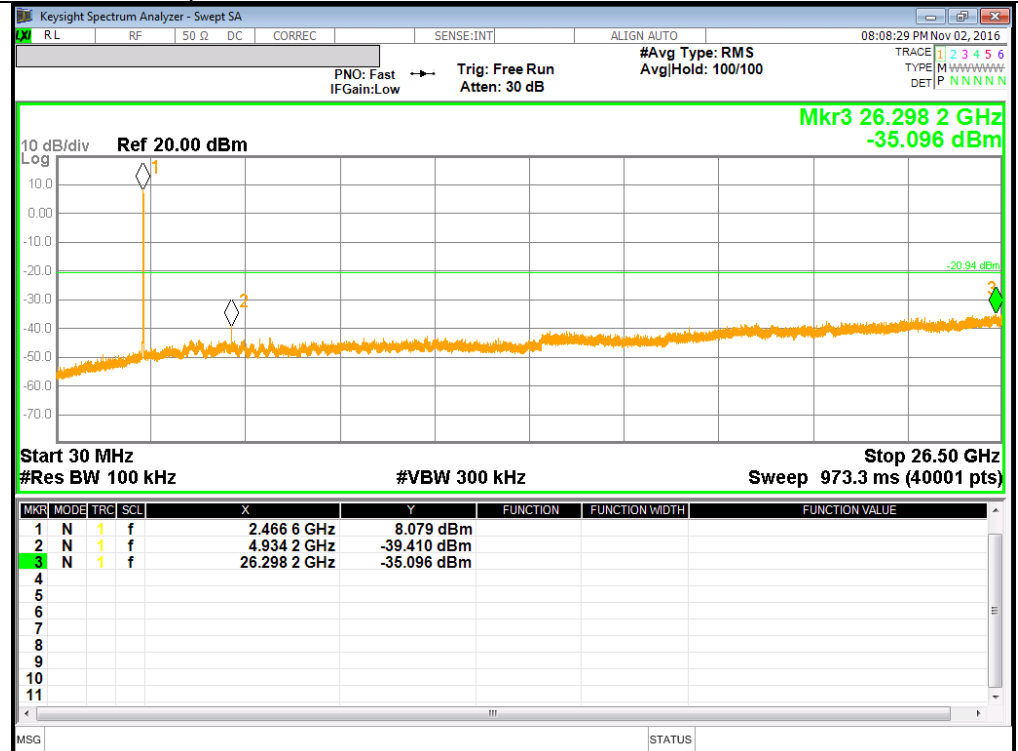




12 Channel BandEdge



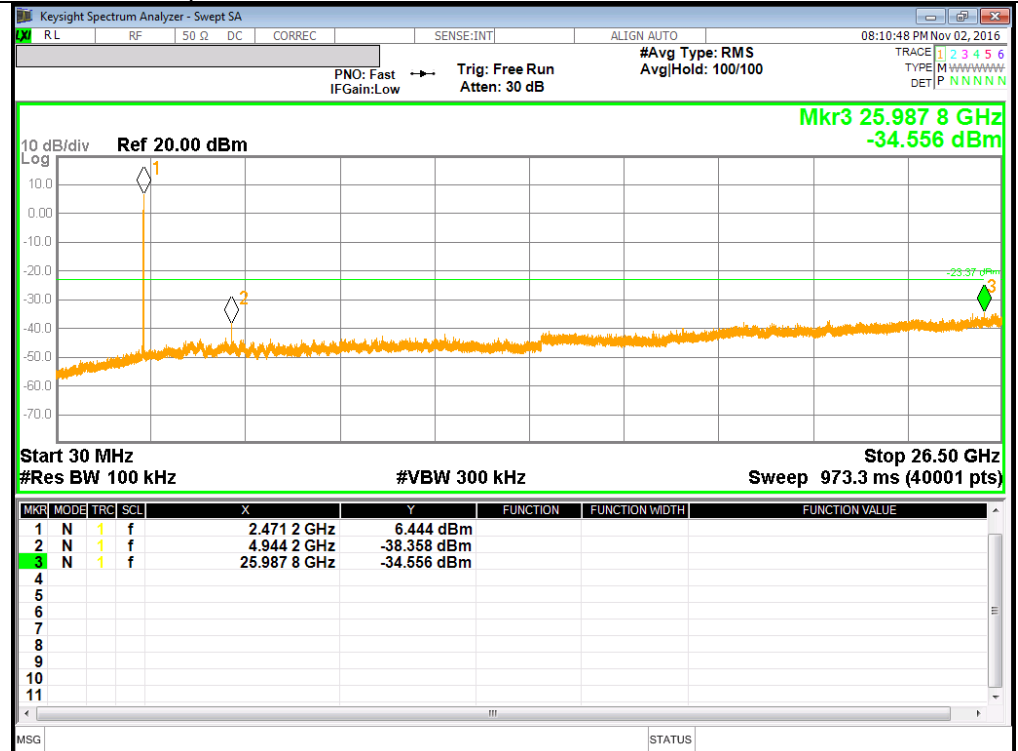
12 Channel Spurious



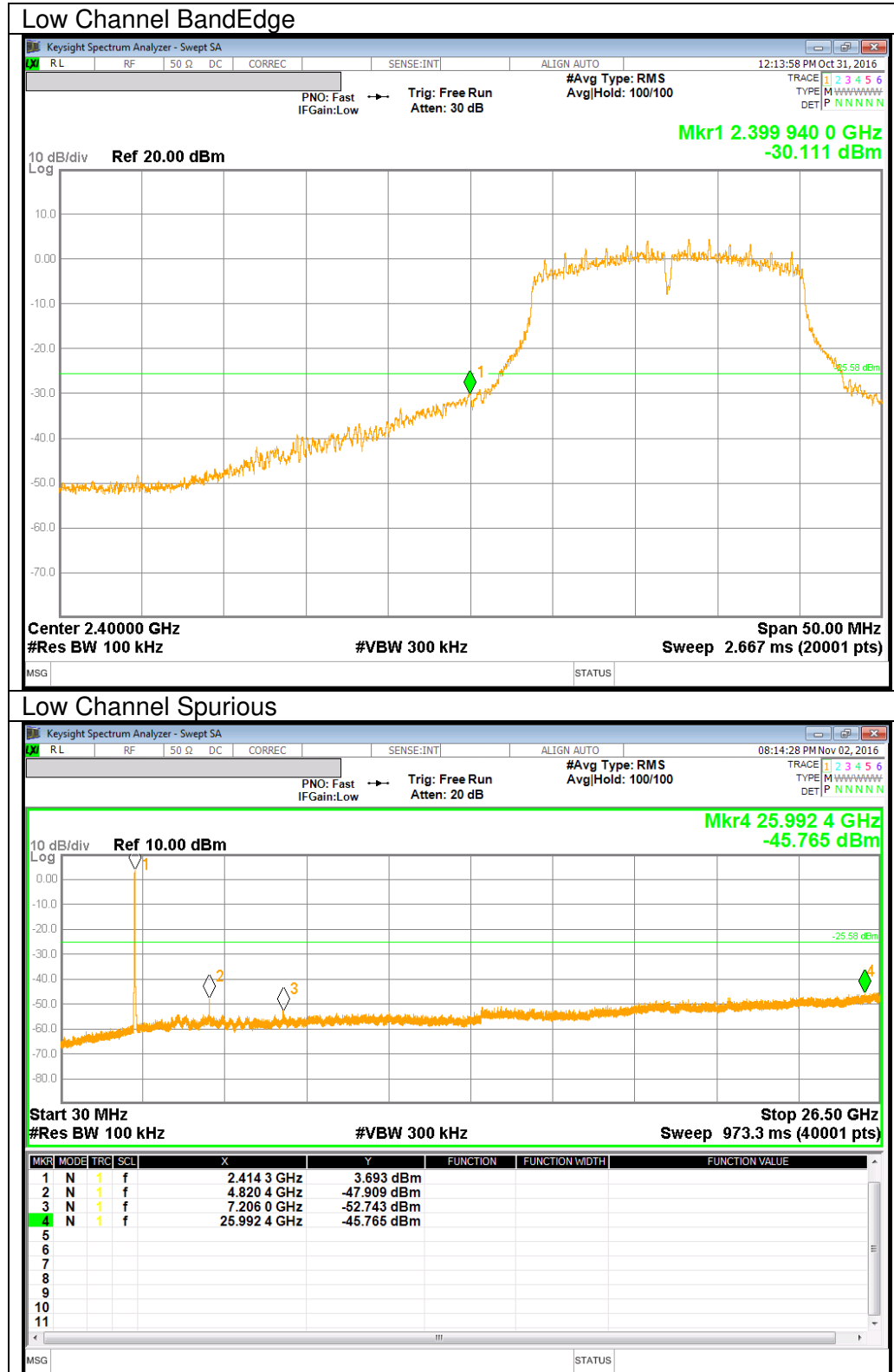
13 Channel BandEdge



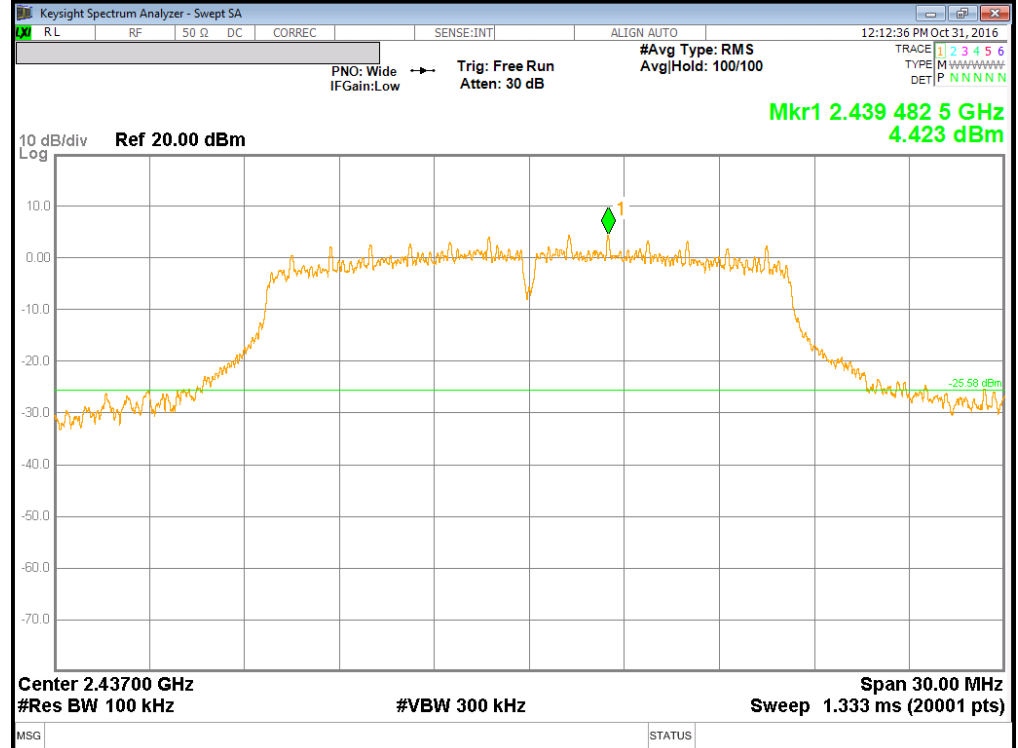
13 Channel Spurious



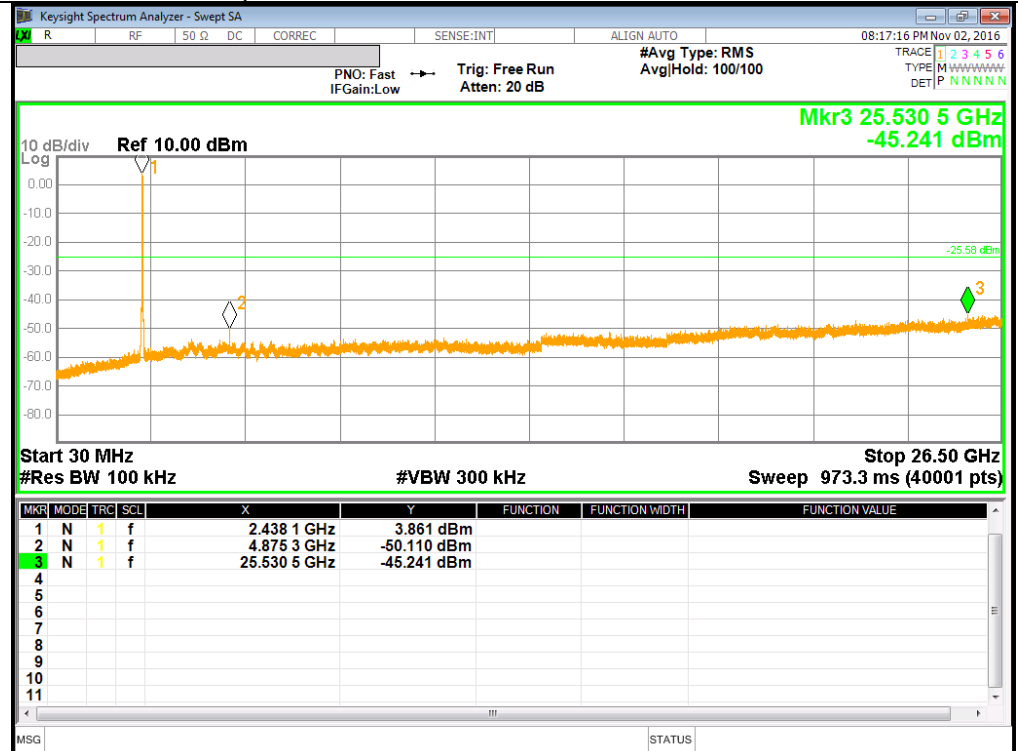
10.5.2. 802.11g MODE IN THE 2.4 GHz BAND

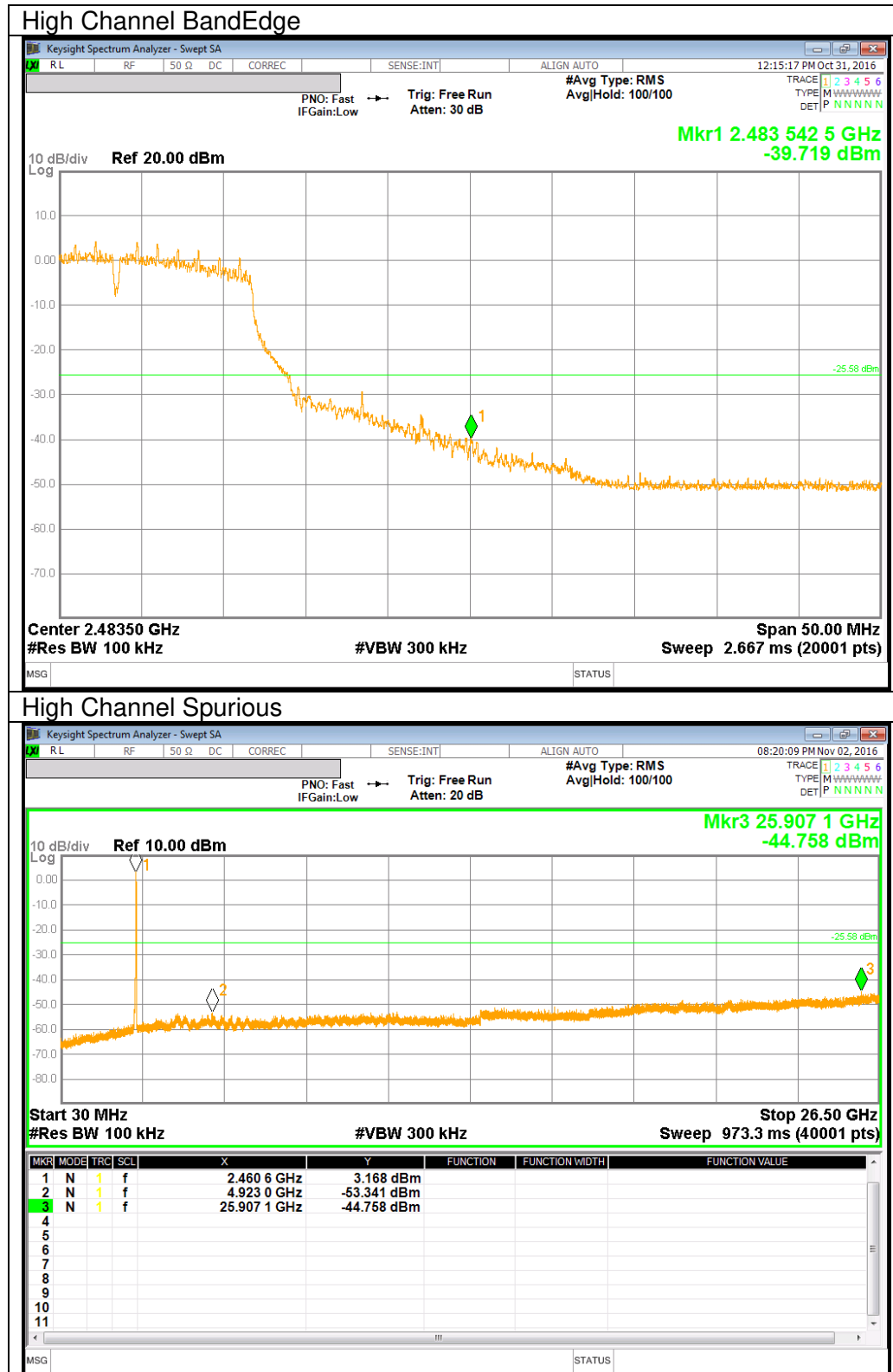


Middle Channel BandEdge



Middle Channel Spurious

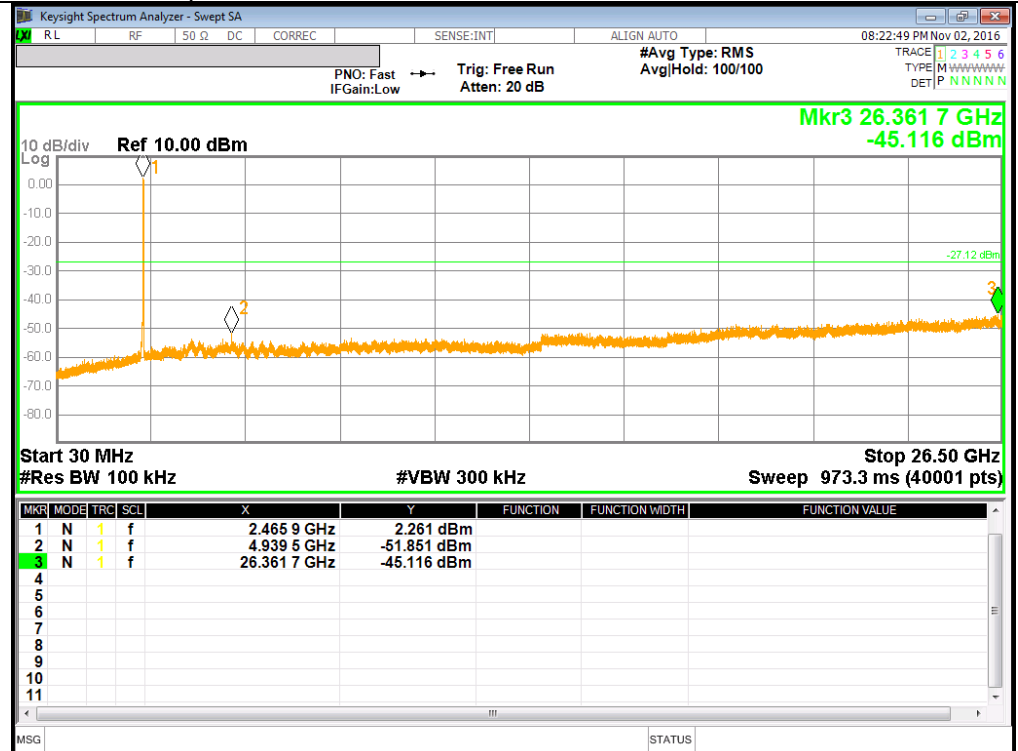




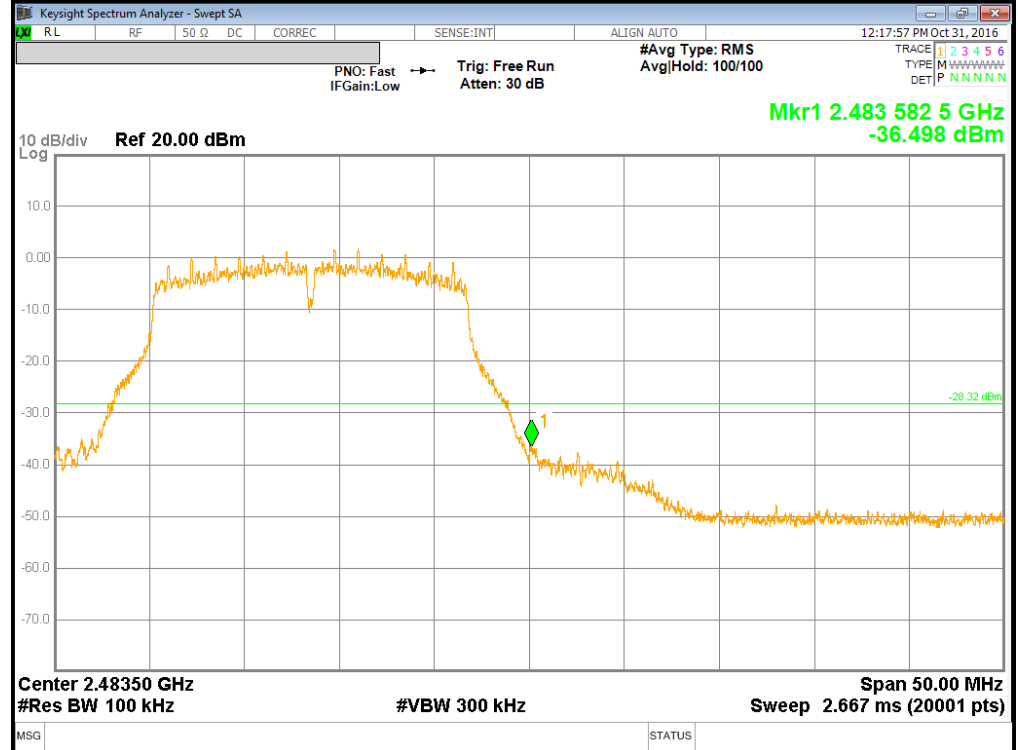
12 Channel BandEdge



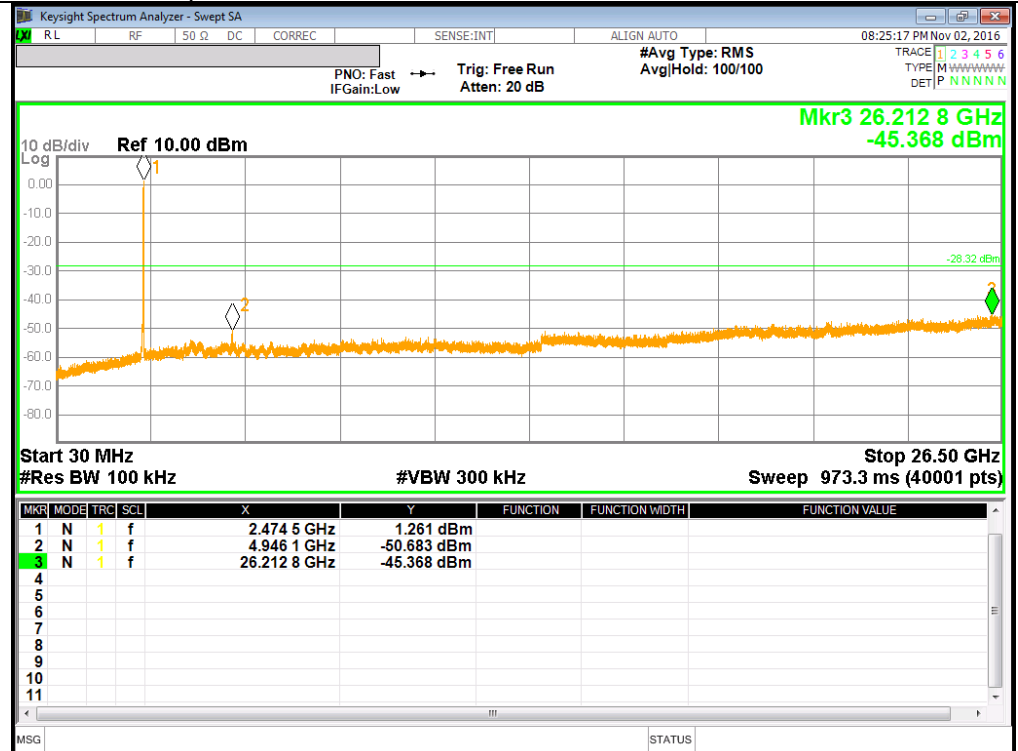
12 Channel Spurious



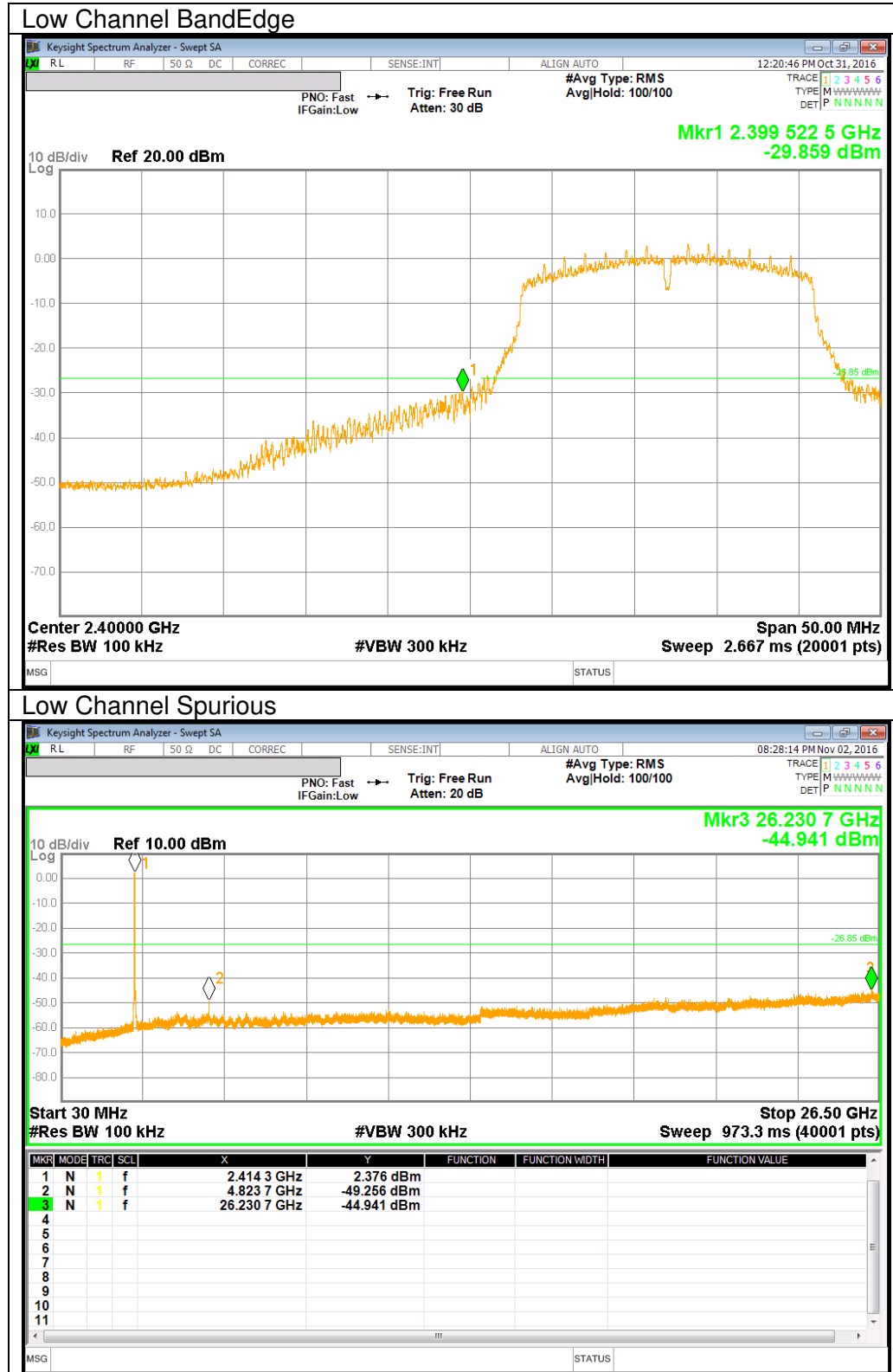
13 Channel BandEdge



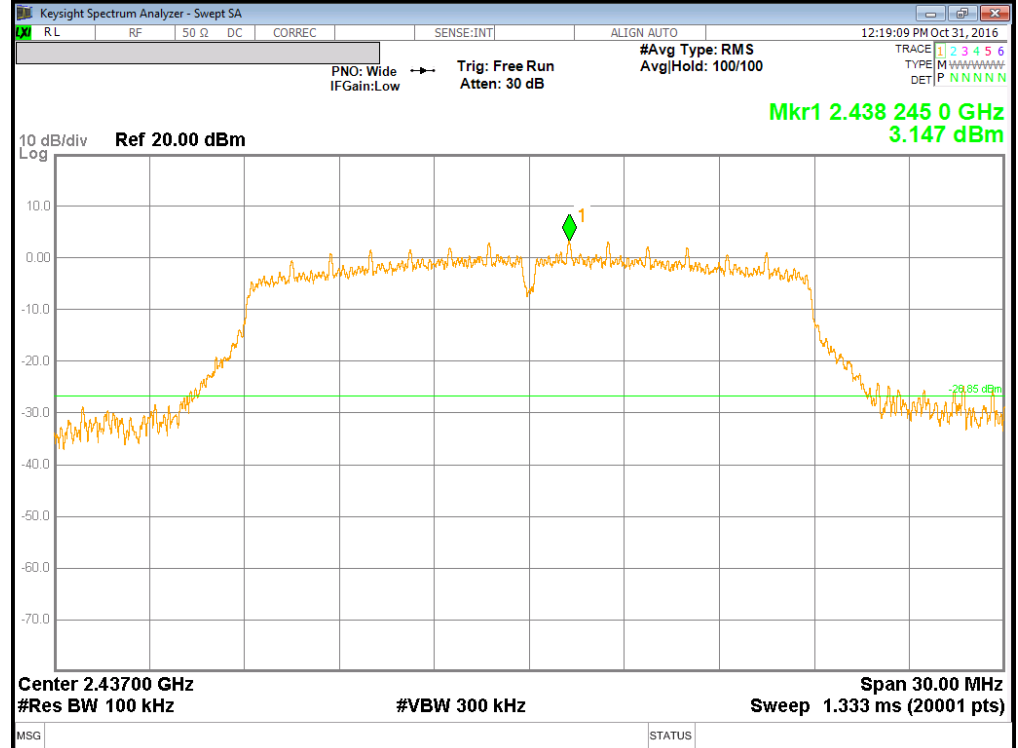
13 Channel Spurious



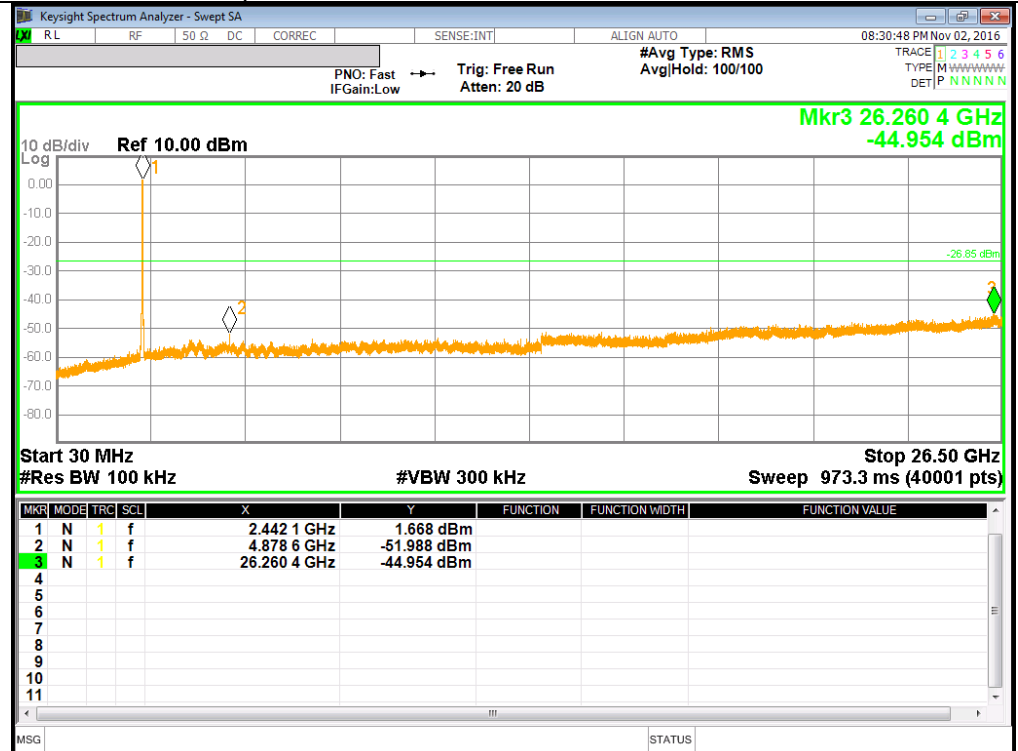
10.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

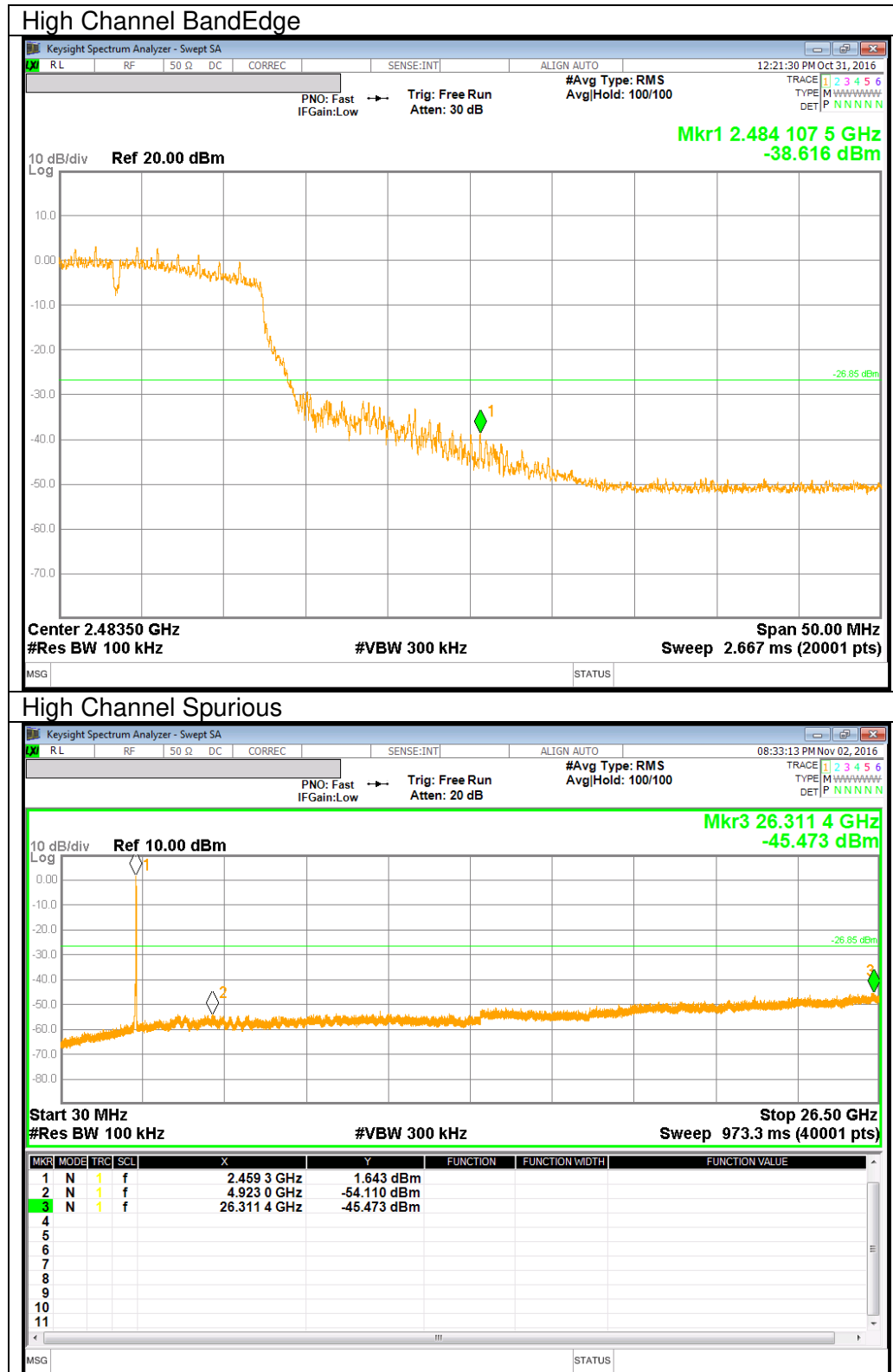


Middle Channel BandEdge



Middle Channel Spurious

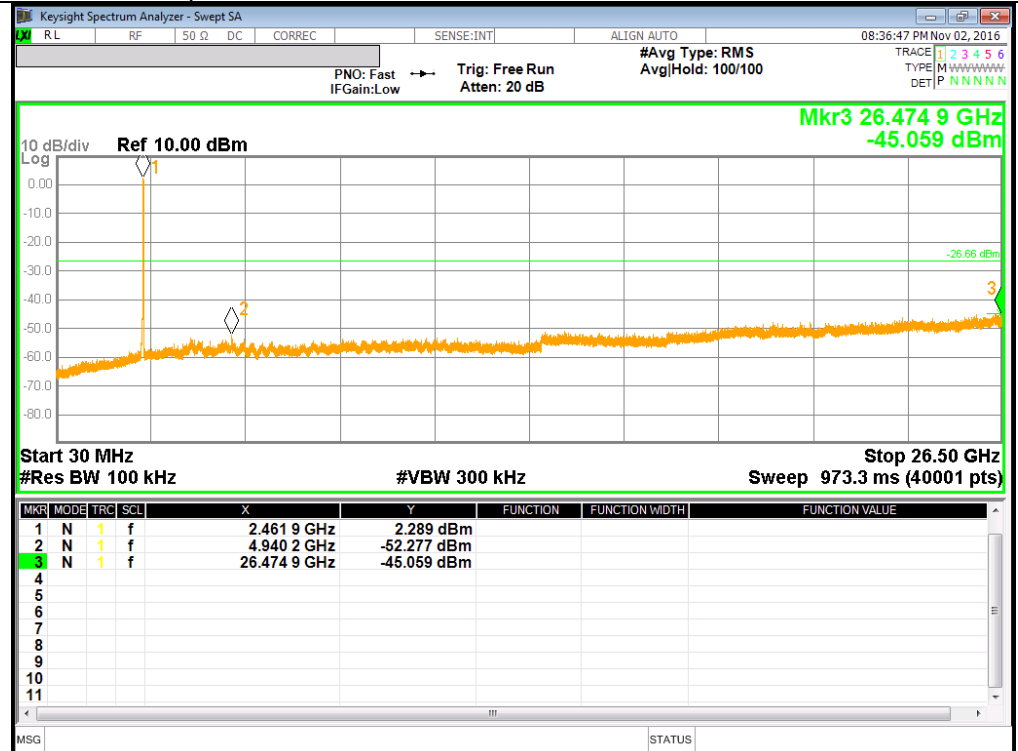




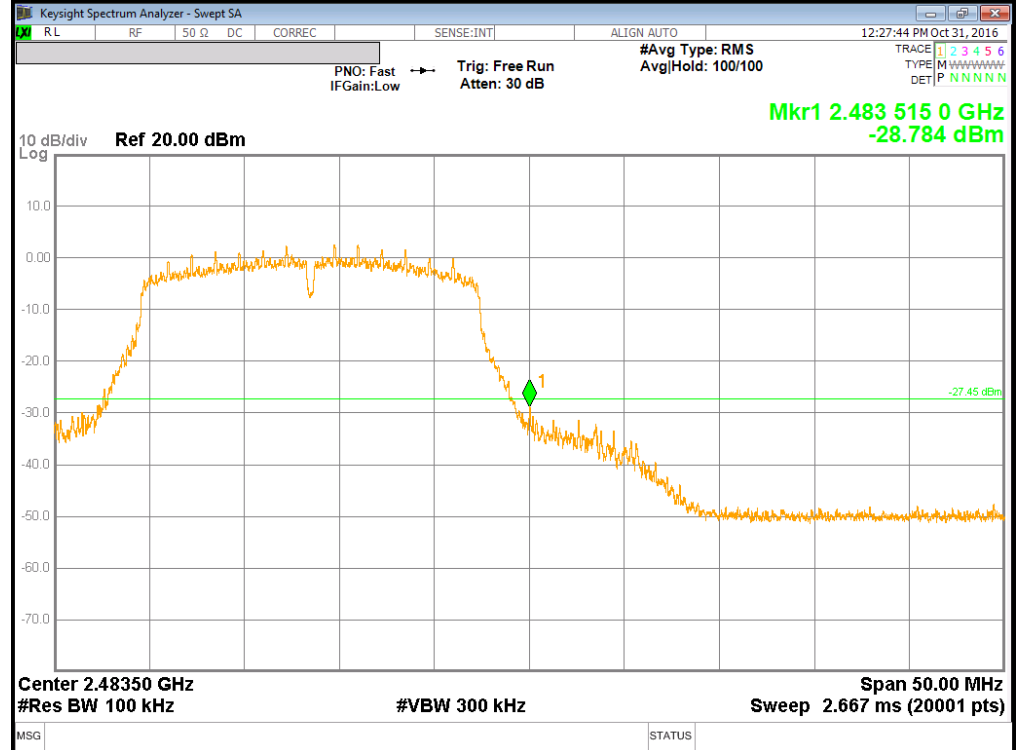
12 Channel BandEdge



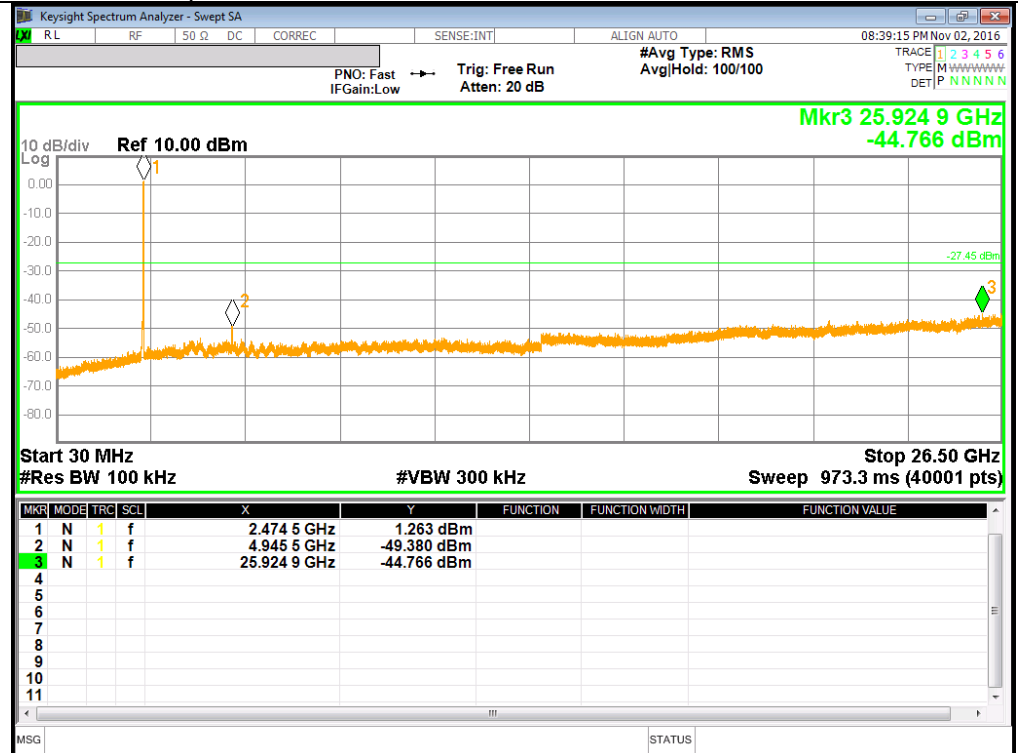
12 Channel Spurious



13 Channel BandEdge



13 Channel Spurious



11. RADIATED TEST RESULTS

11.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (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 = 0.32dB; N mode = 0.34dB.

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.

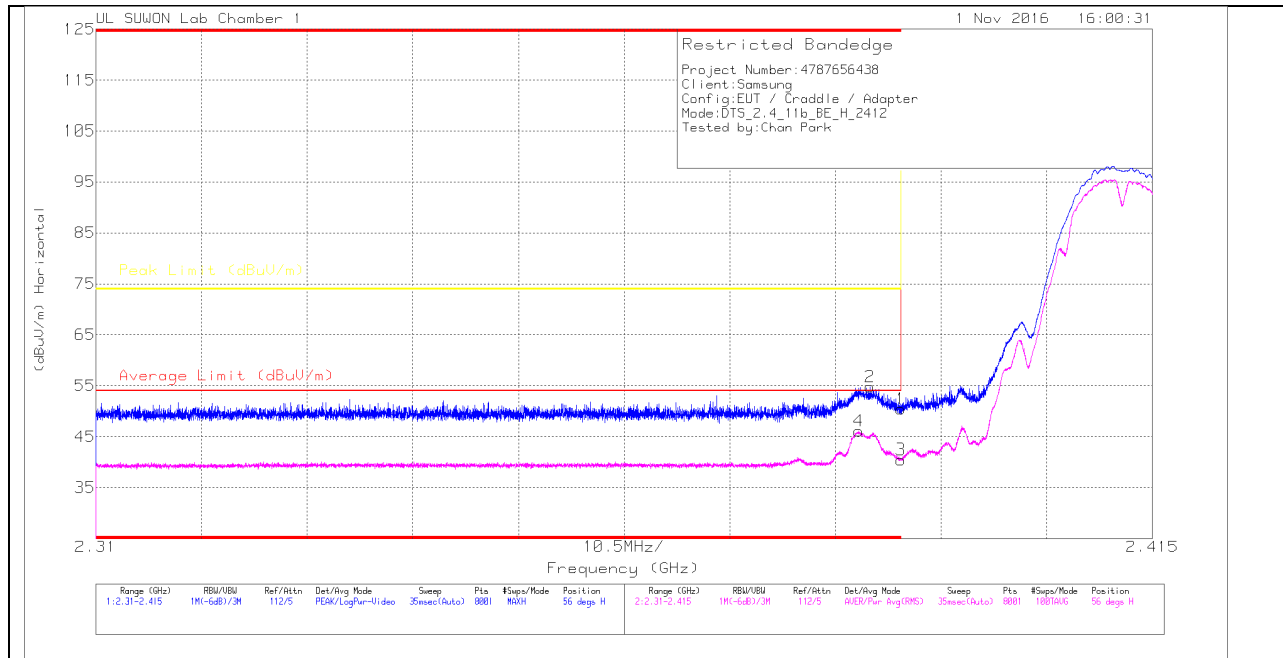
Formula for converting the field strength from uV/m to dBuV/m is:
Limit (dBuV/m) = $20 \log \text{limit (uV/m)}$

11.2. TRANSMITTER ABOVE 1 GHz

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

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

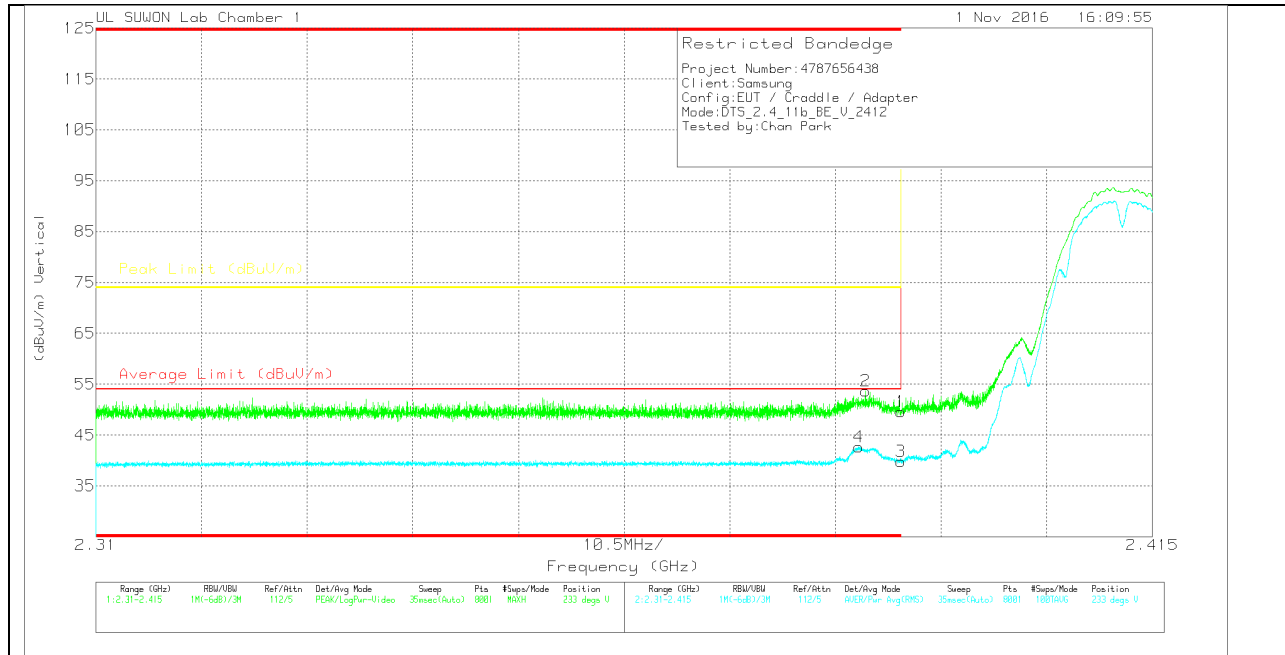
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117/00168 717_15061 9	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	47.04	Pk		-28.4	0	50.44	-	-	74	-23.56	56	174	H
2	* 2.387	51.52	Pk		-28.5	0	54.82	-	-	74	-19.18	56	174	H
3	* 2.39	37.09	RMS		-28.4	0	40.49	54	-13.51	-	-	56	174	H
4	* 2.386	42.84	RMS		-28.5	0	46.14	54	-7.86	-	-	56	174	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	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	46.2	Pk	31.8	-28.4	0	49.6	-	-	74	-24.4	233	102	V
2	* 2.386	50.38	Pk	31.8	-28.5	0	53.68	-	-	74	-20.32	233	102	V
3	* 2.39	36.4	RMS	31.8	-28.4	0	39.8	54	-14.2	-	-	233	102	V
4	* 2.386	39.37	RMS	31.8	-28.5	0	42.67	54	-11.33	-	-	233	102	V

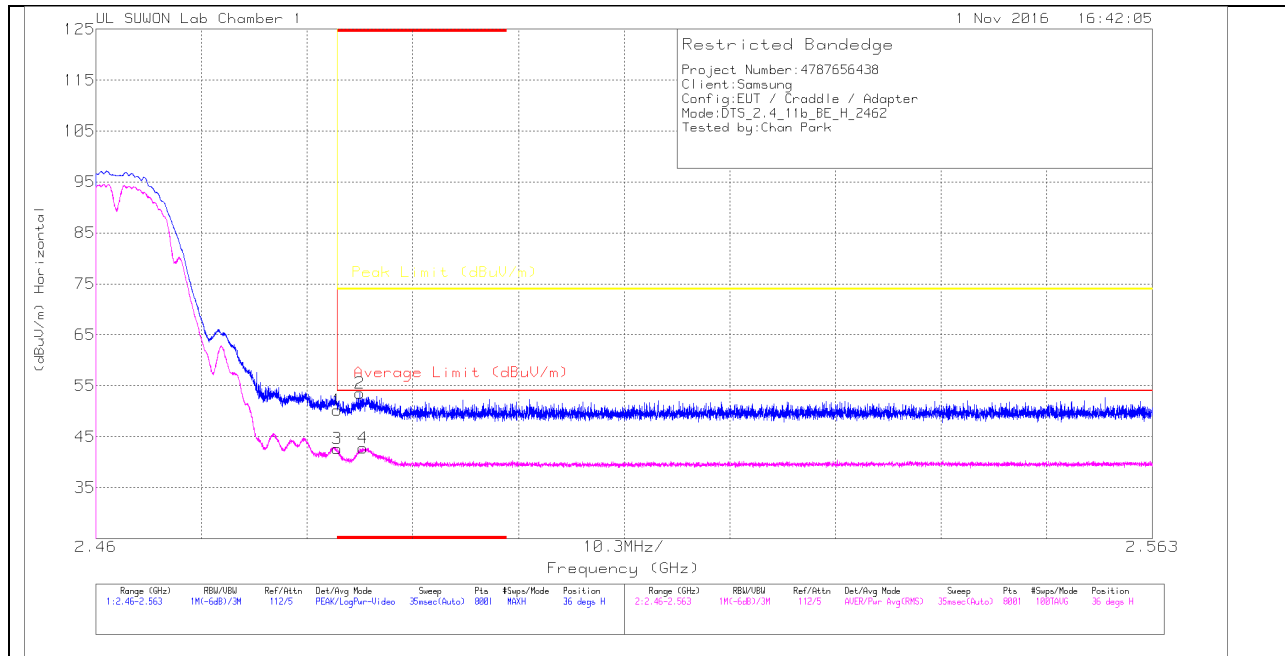
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

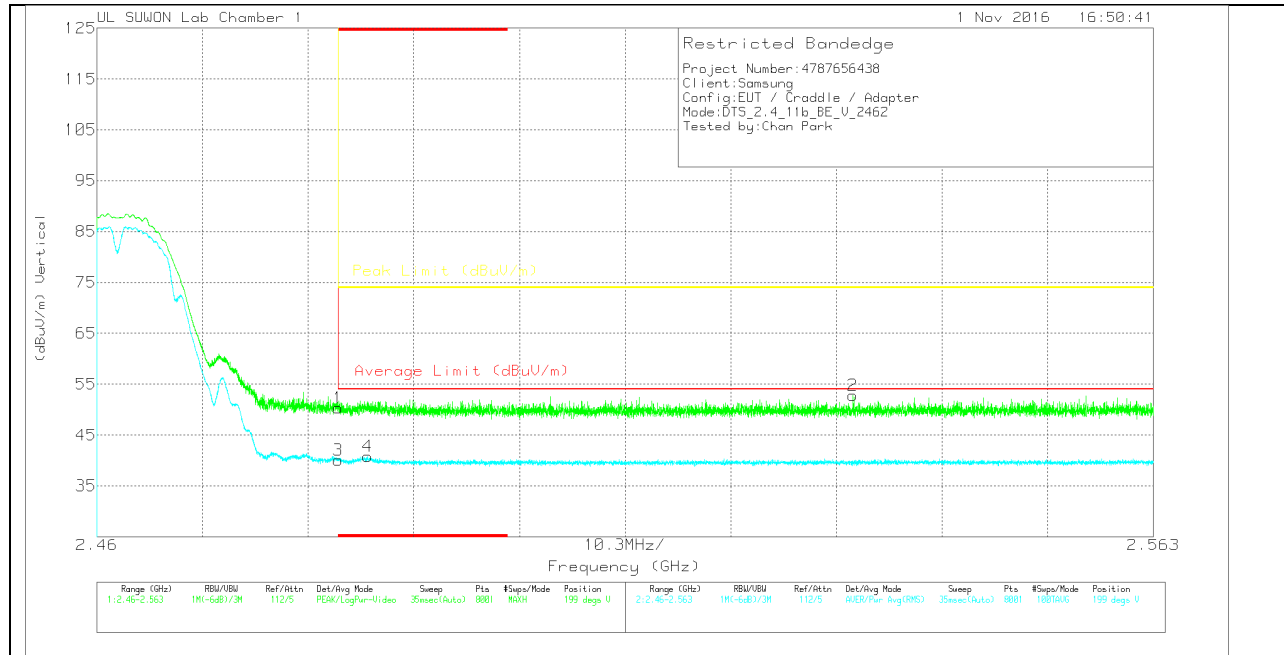
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168 717)_15061 9	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46.55	Pk	32	-28.3	0	50.25	-	-	74	-23.75	36	100	H
2	* 2.486	49.81	Pk	32	-28.3	0	53.51	-	-	74	-20.49	36	100	H
3	* 2.484	39	RMS	32	-28.3	0	42.7	54	-11.3	-	-	36	100	H
4	* 2.486	39.05	RMS	32	-28.3	0	42.75	54	-11.25	-	-	36	100	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	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	46.61	Pk	32	-28.3	0	50.31	-	-	74	-23.69	199	263	V
2	2.534	49.06	Pk	32	-28.3	0	52.76	-	-	74	-21.24	199	263	V
3	* 2.484	36.31	RMS	32	-28.3	0	40.01	54	-13.99	-	-	199	263	V
4	* 2.486	37.11	RMS	32	-28.3	0	40.81	54	-13.19	-	-	199	263	V

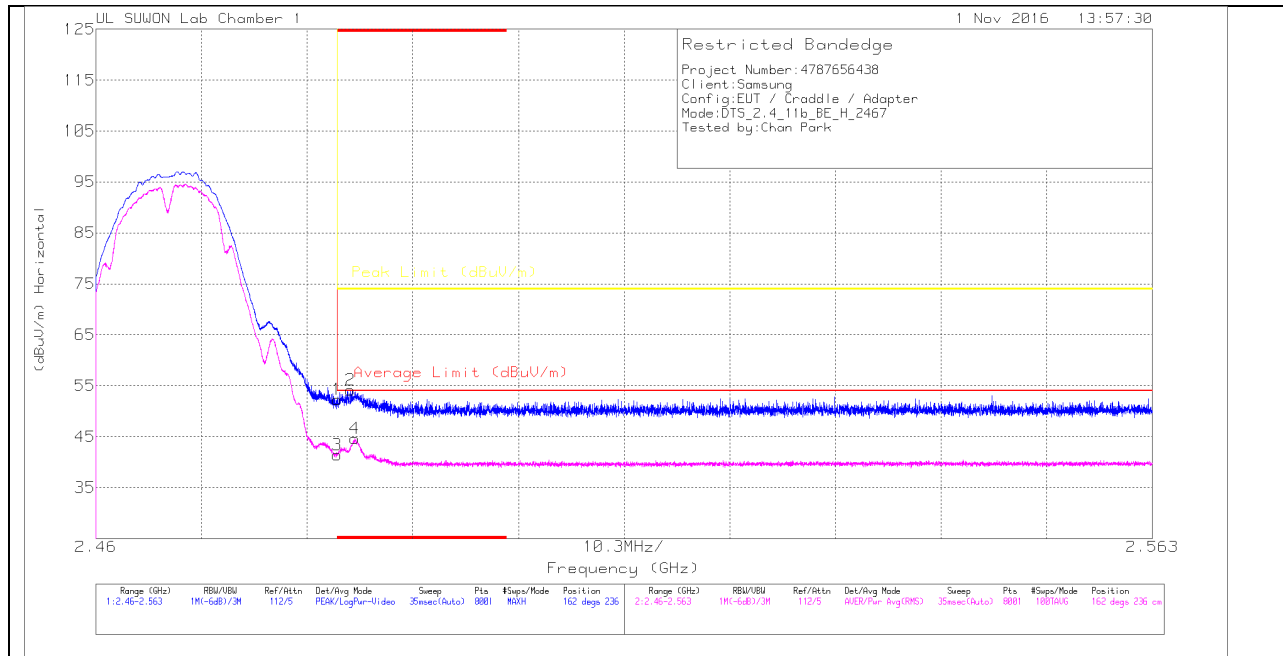
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (12 CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

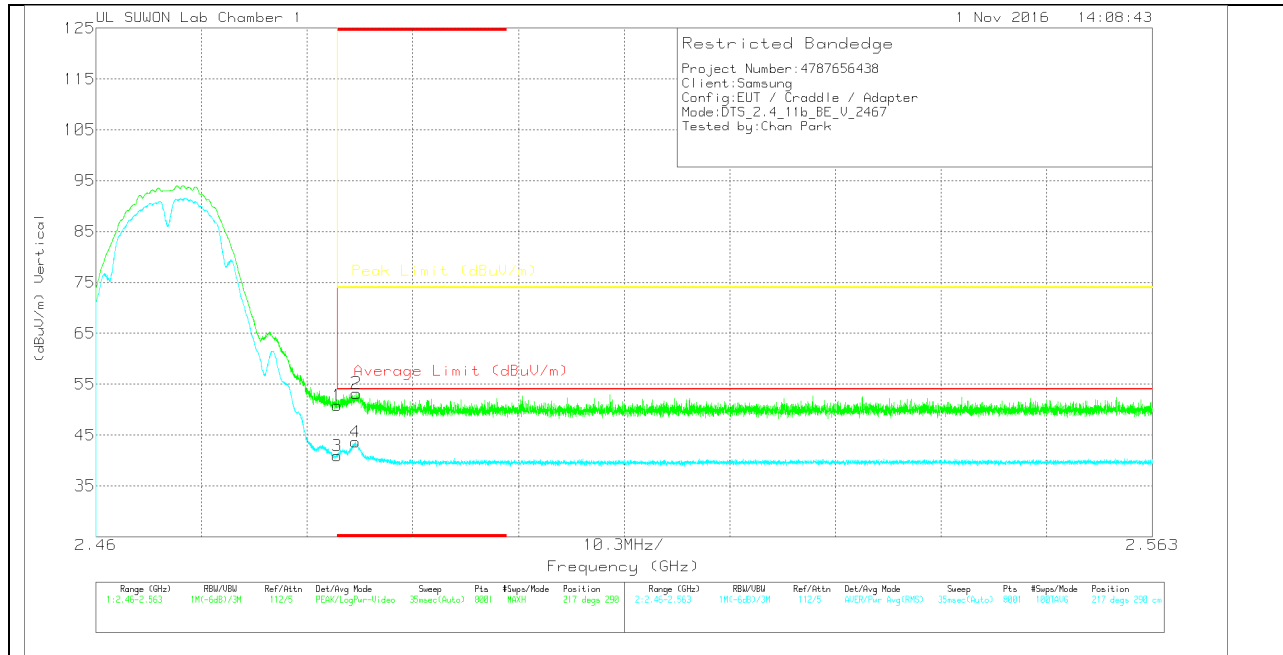
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117/001687 171_150619	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	48.64	Pk	32	-28.3	0	52.34	-	-	74	-21.66	162	236	H
2	* 2.485	50.51	Pk	32	-28.3	0	54.21	-	-	74	-19.79	162	236	H
3	* 2.484	37.7	RMS	32	-28.3	0	41.4	54	-12.6	-	-	162	236	H
4	* 2.485	40.9	RMS	32	-28.3	0	44.6	54	-9.4	-	-	162	236	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	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	47.07	Pk	32	-28.3	0	50.77	-	-	74	-23.23	217	290	V
2	* 2.485	49.53	Pk	32	-28.3	0	53.23	-	-	74	-20.77	217	290	V
3	* 2.484	37.21	RMS	32	-28.3	0	40.91	54	-13.09	-	-	217	290	V
4	* 2.485	39.94	RMS	32	-28.3	0	43.64	54	-10.36	-	-	217	290	V

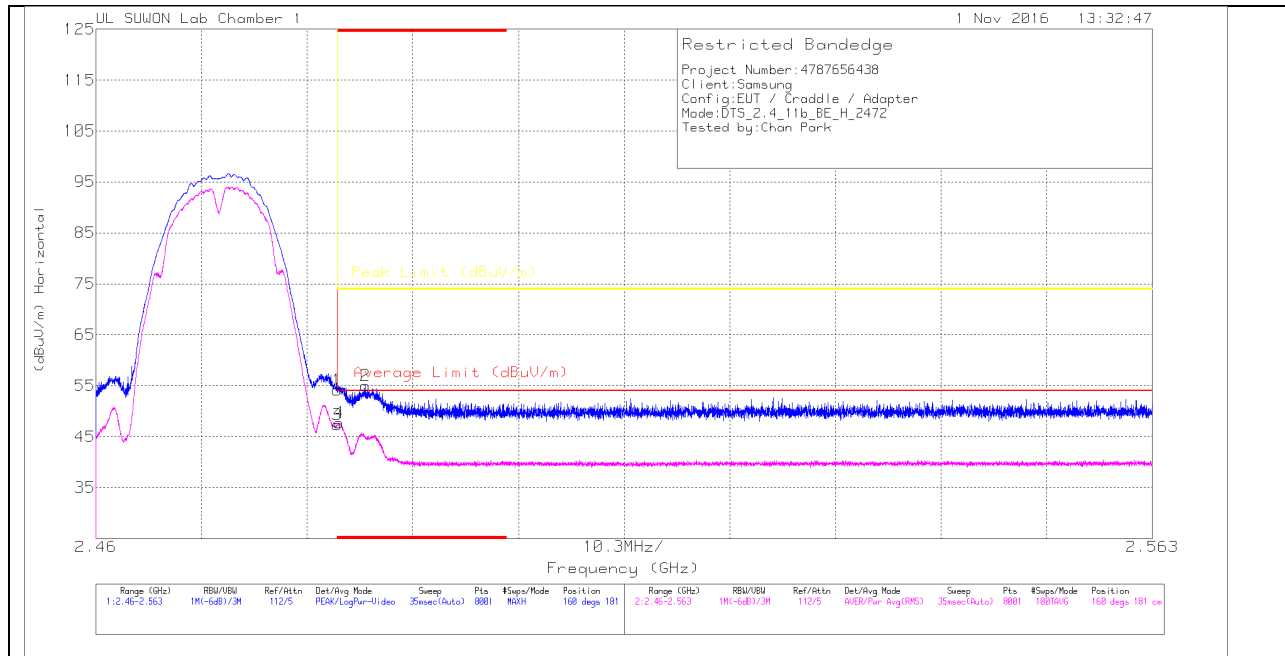
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (13 CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

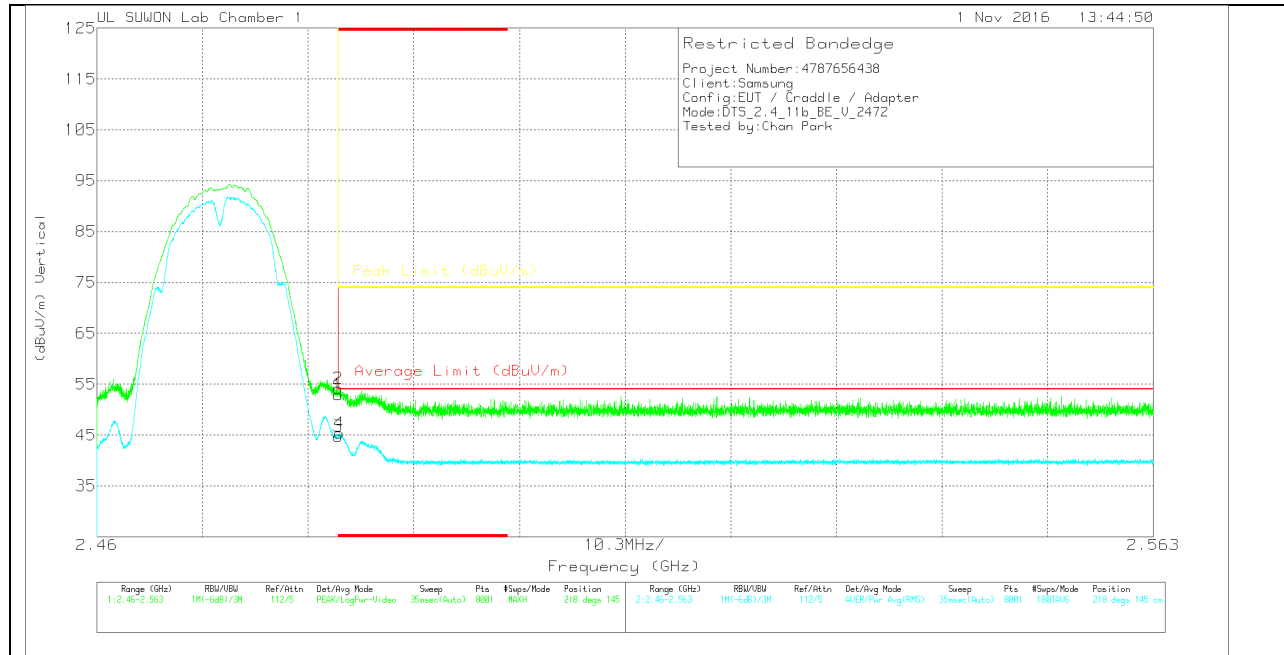
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117/001687 171_150619	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	50.51	Pk	32	-28.3	0	54.21	-	-	74	-19.79	160	181	H
2	* 2.486	51.31	Pk	32	-28.3	0	55.01	-	-	74	-18.99	160	181	H
3	* 2.484	43.68	RMS	32	-28.3	0	47.38	54	-6.62	-	-	160	181	H
4	* 2.484	44.03	RMS	32	-28.3	0	47.73	54	-6.27	-	-	160	181	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	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	49.2	Pk	32	-28.3	0	52.9	-	-	74	-21.1	218	145	V
2	* 2.484	50.49	Pk	32	-28.3	0	54.19	-	-	74	-19.81	218	145	V
3	* 2.484	41.02	RMS	32	-28.3	0	44.72	54	-9.28	-	-	218	145	V
4	* 2.484	41.73	RMS	32	-28.3	0	45.43	54	-8.57	-	-	218	145	V

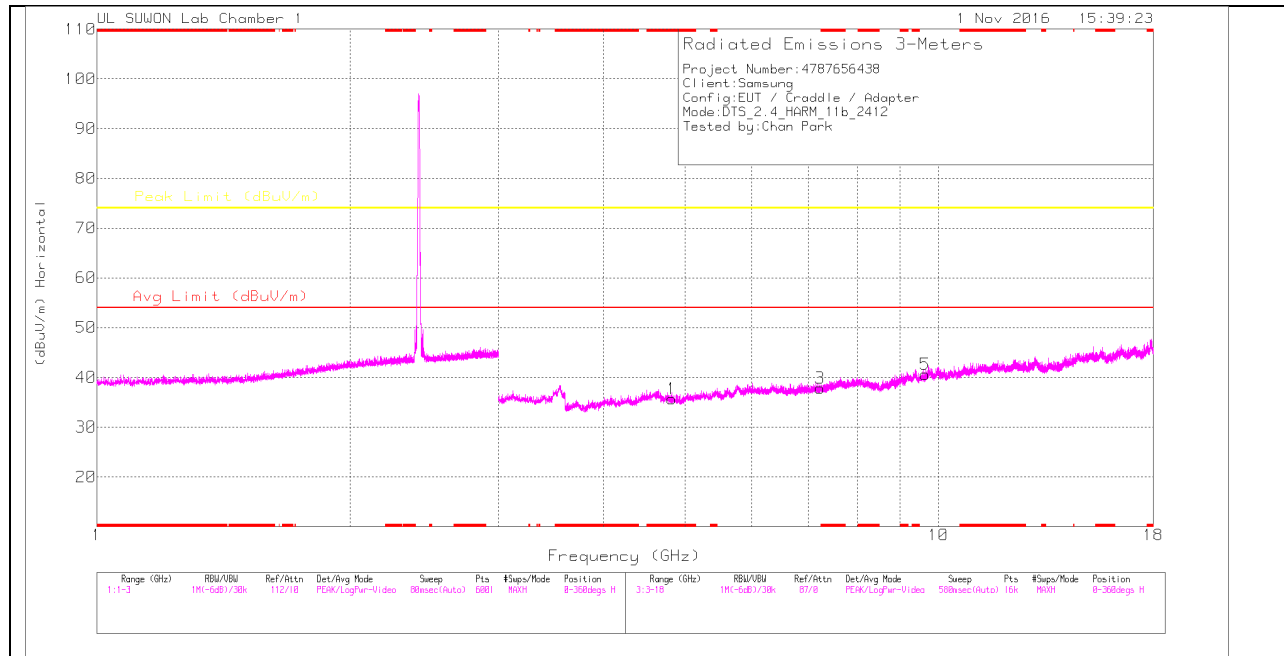
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

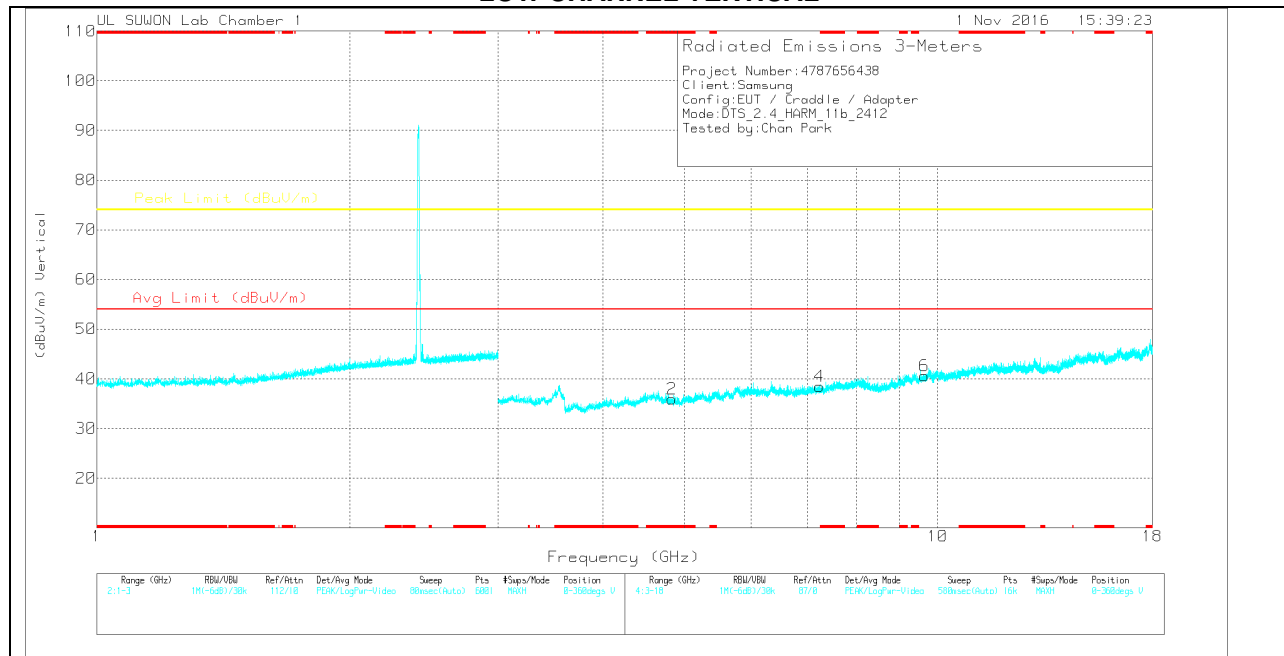
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

Trace Markers

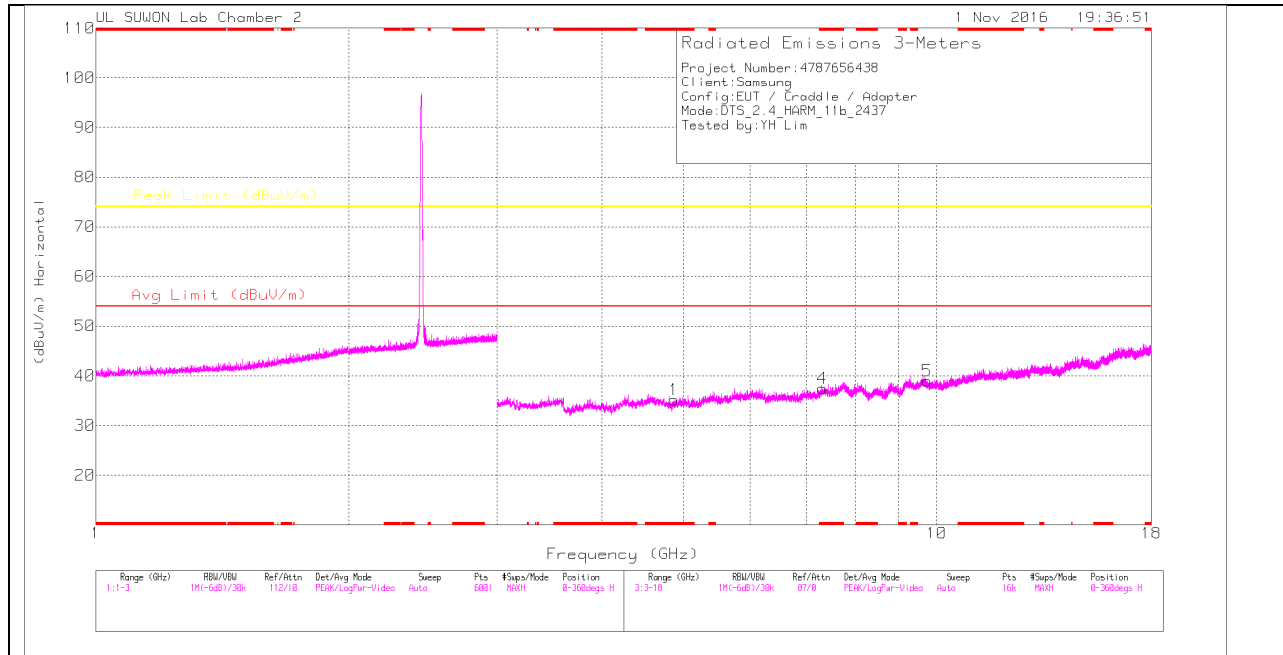
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117[001687 17]_150619	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.825	35.22	PK	34	-33.5	0	35.72	-	-	74	-38.28	0-360	250	H
3	7.235	32.92	PK	35.7	-30.8	0	37.82	-	-	74	-36.18	0-360	250	H
5	9.648	30.95	PK	37.1	-27.4	0	40.65	-	-	74	-33.35	0-360	150	H
2	* 4.828	35.44	PK	34	-33.5	0	35.94	-	-	74	-38.06	0-360	250	V
4	7.237	33.52	PK	35.7	-30.7	0	38.52	-	-	74	-35.48	0-360	250	V
6	9.647	30.91	PK	37.1	-27.4	0	40.61	-	-	74	-33.39	0-360	250	V

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

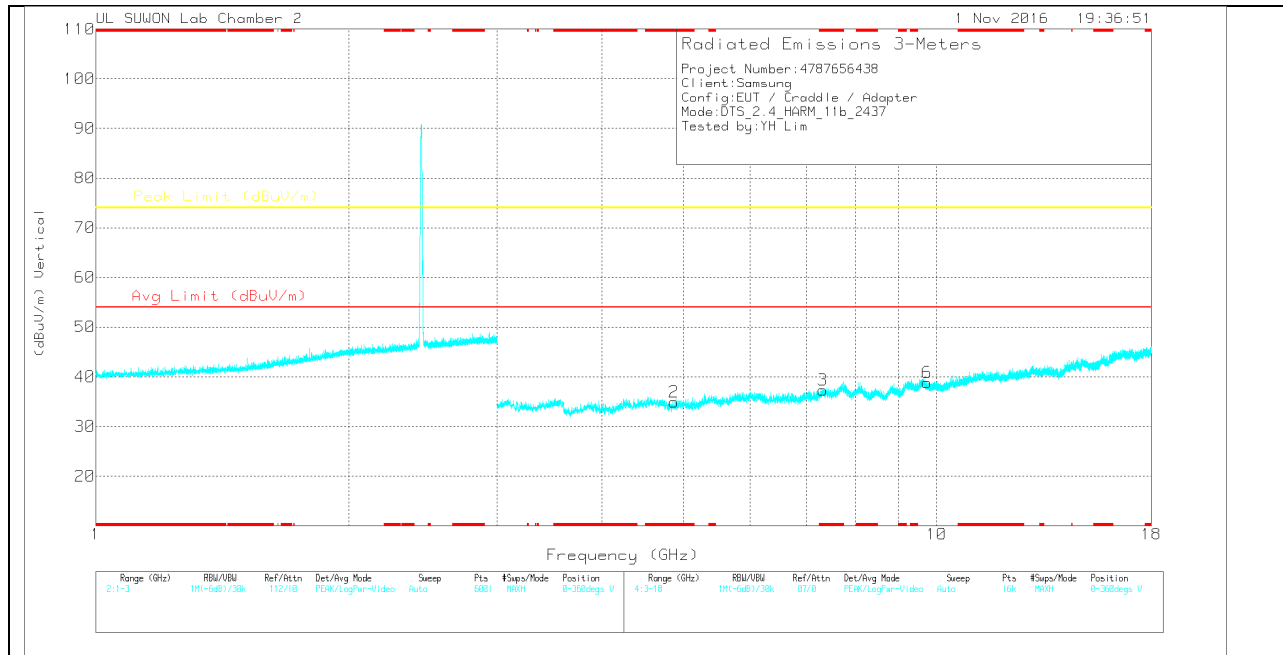
PK – Peak detector

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

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

Trace Markers

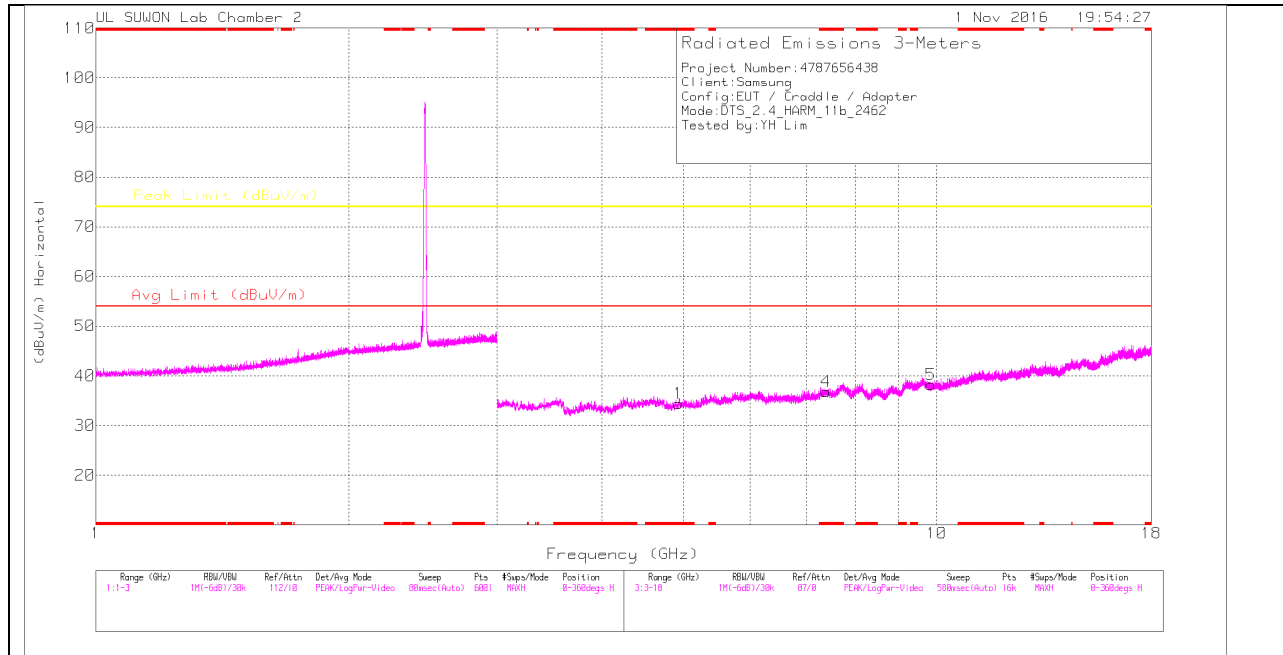
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016872 4)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.874	26.48	Pk	33.9	-25.2	0	35.18	-	-	74	-38.82	0-360	150	H
4	* 7.315	24.19	Pk	35.9	-22.6	0	37.49	-	-	74	-36.51	0-360	150	H
5	9.737	21.24	Pk	37	-19.3	0	38.94	-	-	74	-35.06	0-360	150	H
2	* 4.875	26.26	Pk	33.9	-25.2	0	34.96	-	-	74	-39.04	0-360	250	V
3	* 7.323	23.97	Pk	35.9	-22.5	0	37.37	-	-	74	-36.63	0-360	250	V
6	9.739	21.18	Pk	37	-19.3	0	38.88	-	-	74	-35.12	0-360	250	V

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

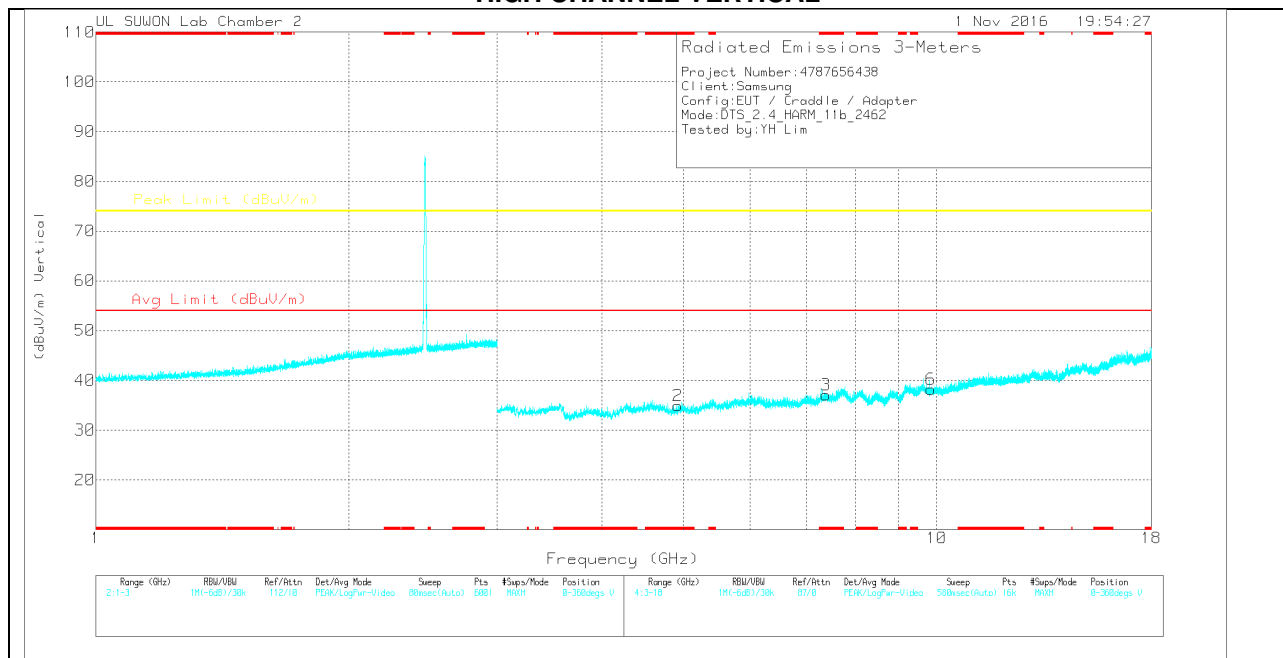
Pk – Peak detector

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

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL DATA

Trace Markers

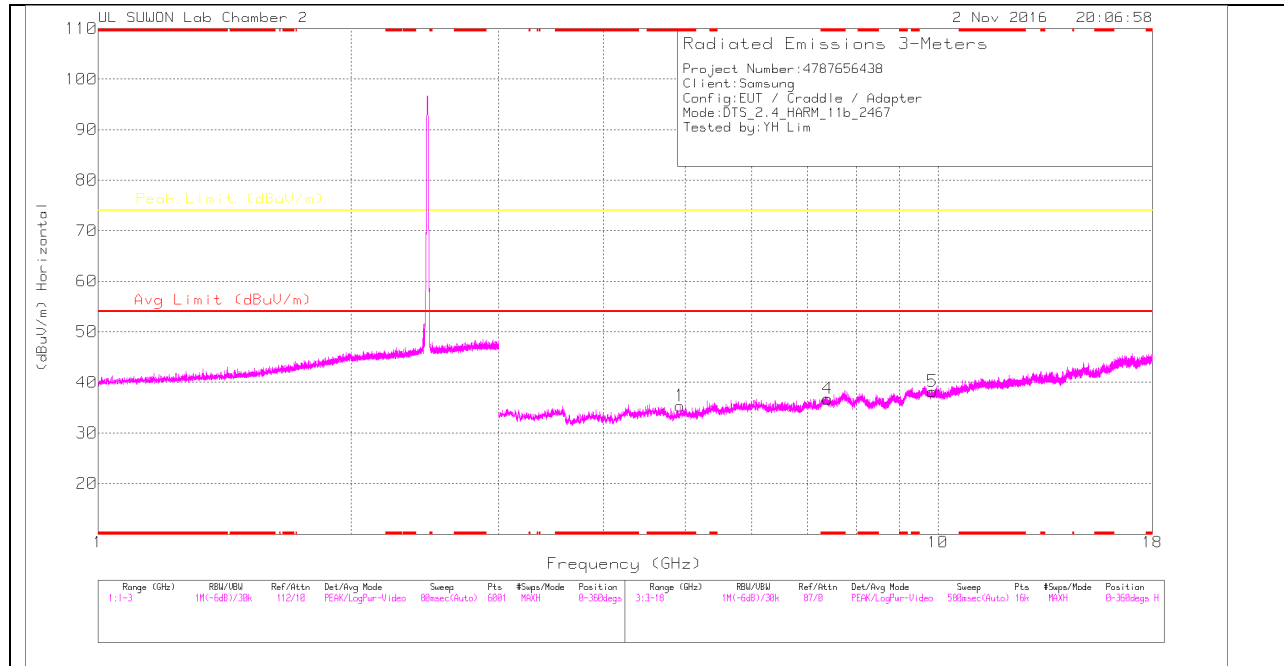
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016872 4)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.926	25.58	Pk	33.9	-25.1	0	34.38	-	-	74	-39.62	0-360	150	H
4	* 7.383	23.08	Pk	35.9	-22.2	0	36.78	-	-	74	-37.22	0-360	150	H
5	9.845	20.3	Pk	37.1	-19.2	0	38.2	-	-	74	-35.8	0-360	250	H
2	* 4.924	26.08	Pk	33.9	-25.1	0	34.88	-	-	74	-39.12	0-360	250	V
3	* 7.383	23.38	Pk	35.9	-22.2	0	37.08	-	-	74	-36.92	0-360	150	V
6	9.845	20.34	Pk	37.1	-19.2	0	38.24	-	-	74	-35.76	0-360	150	V

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

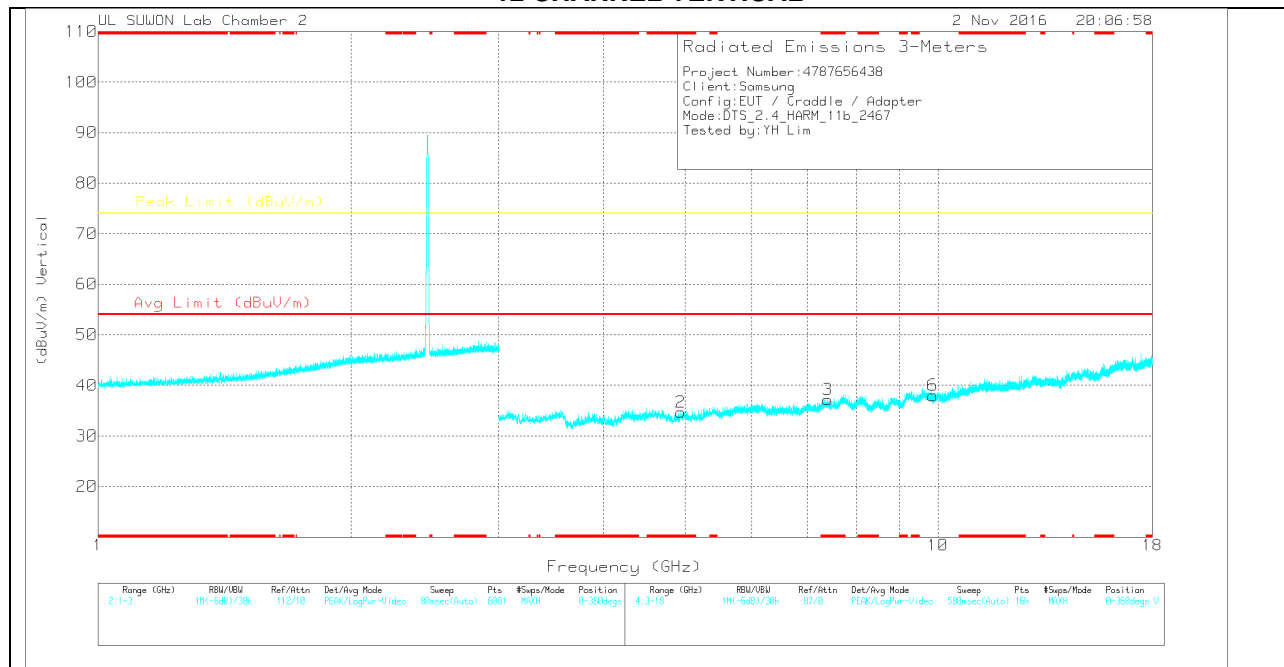
Pk – Peak detector

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

12 CHANNEL HORIZONTAL



12 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.

12 CHANNEL DATA

Trace Markers

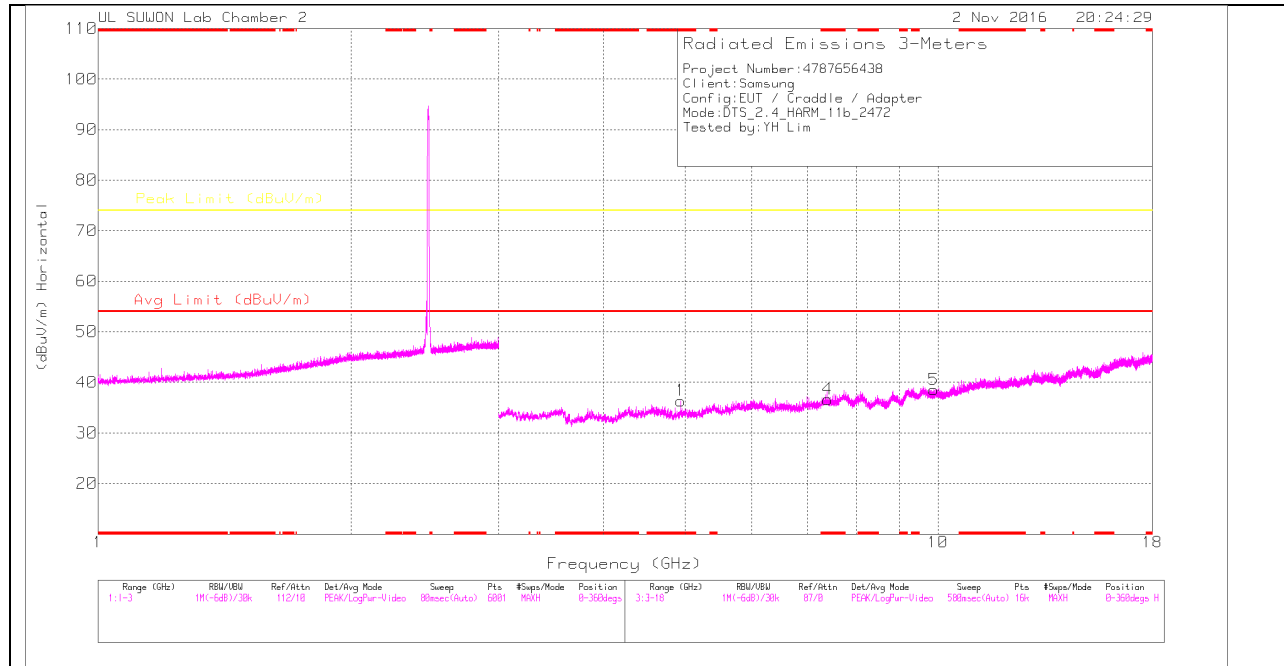
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016872 4)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.934	26.55	Pk	33.9	-25.1	0	35.35	-	-	74	-38.65	0-360	150	H
4	* 7.396	22.87	Pk	36	-22.1	0	36.77	-	-	74	-37.23	0-360	250	H
5	9.853	20.3	Pk	37.1	-19.2	0	38.2	-	-	74	-35.8	0-360	250	H
2	* 4.939	25.86	Pk	33.9	-25.1	0	34.66	-	-	74	-39.34	0-360	250	V
3	* 7.396	23.29	Pk	36	-22.1	0	37.19	-	-	74	-36.81	0-360	150	V
6	9.863	20.1	Pk	37.1	-19.2	0	38	-	-	74	-36	0-360	150	V

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

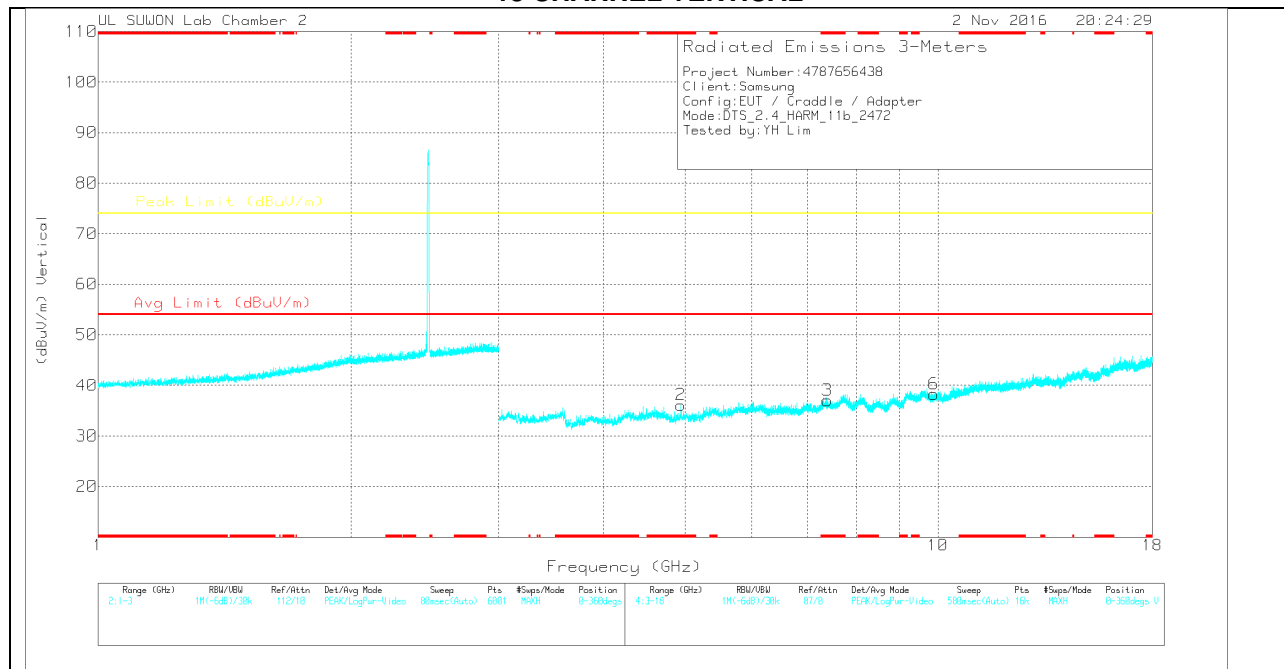
Pk – Peak detector

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

13 CHANNEL HORIZONTAL



13 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.

13 CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016872 4)_150619	Path_3	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.943	27.57	Pk	33.9	-25.1	0	36.37	-	-	74	-37.63	0-360	150	H
4	* 7.392	22.83	Pk	35.9	-22.1	0	36.63	-	-	74	-37.37	0-360	150	H
5	9.886	20.65	Pk	37.1	-19.2	0	38.55	-	-	74	-35.45	0-360	250	H
2	* 4.943	27.32	Pk	33.9	-25.1	0	36.12	-	-	74	-37.88	0-360	250	V
3	* 7.385	23.32	Pk	35.9	-22.2	0	37.02	-	-	74	-36.98	0-360	150	V
6	9.888	20.36	Pk	37.1	-19.2	0	38.26	-	-	74	-35.74	0-360	250	V

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

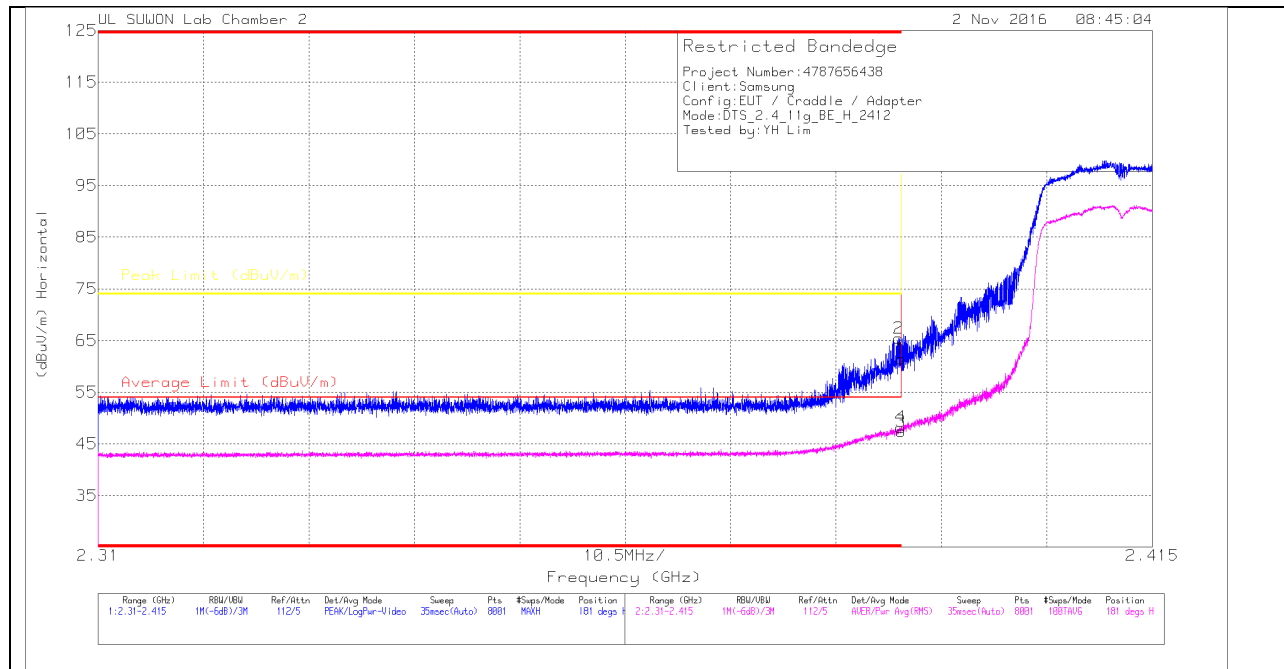
Pk – Peak detector

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

11.2.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(001687 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	49.23	Pk	31.7	-19.5	0	61.43	-	-	74	-12.57	181	179	H
2	* 2.39	53.26	Pk	31.7	-19.5	0	65.46	-	-	74	-8.54	181	179	H
3	* 2.39	34.93	RMS	31.7	-19.5	.32	47.45	54	-6.55	-	-	181	179	H
4	* 2.39	35.69	RMS	31.7	-19.5	.32	48.21	54	-5.79	-	-	181	179	H

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

Pk - Peak detector

RMS - RMS detection