FCC 47 CFR PART 15 SUBPART E

UNII

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE and DTS/UNII a/b/g/n

MODEL NUMBER : SM-G615F/DS, SM-G615FU/DS

FCC ID: A3LSMG615F

REPORT NUMBER: 4787892916-E4V2

ISSUE DATE: APR 10, 2017

Prepared for
SAMSUNG ELECTRONICS CO., LTD.
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ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	04/07/17	Initial issue	Junwhan Lee
V2	04/10/17	Revised section 9.2, 9.2.1	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone + BT/BLE and DTS/UNII a/b/g/n
MODEL NUMBER:	SM-G615F/DS, SM-G615FU/DS
SERIAL NUMBER:	R38J10CMN2H, R38J10CLZQK (RADIATED); 4210c557ce68b36b (CONDUCTED)
DATE TESTED:	MAR 14, 2017 – APR 07, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	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 following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 789033 D02 General UNII Test Procedures New Rules v01r03
4. KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
5. KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02
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
☒ 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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE and DTS/UNII a/b/g/n.
This test report addresses the NII (UNII) operational mode.

SM-G615F/DS and SM-G615FU/DS are same H/W and only difference is Main camera led and Deco of rear side. PED document described the differences in detail.
SM-G615F/DS was used for the test.

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]
5180 - 5240	802.11a	15.940	39.26
	802.11n HT20	15.960	39.45
5190 - 5230	802.11n HT40	11.140	13.00
5260 - 5320	802.11a	15.610	36.39
	802.11n HT20	15.690	37.07
5270 - 5310	802.11n HT40	10.930	12.39
5500 - 5700	802.11a	15.680	36.98
	802.11n HT20	15.680	36.98
5510 - 5670	802.11n HT40	11.130	12.97
5745 - 5825	802.11a	16.330	42.95
	802.11n HT20	16.320	42.85
5755 - 5795	802.11n HT40	10.760	11.91

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of:

Frequency Range [MHz]	Antenna Gain [dBi]
UNII 1 5150 – 5250	-1.48
UNII 2A 5250 – 5350	-1.61
UNII 2C 5470 – 5725	-0.34
UNII 3 5725 – 5850	-0.45

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,Z, it was determined that the X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in the X orientation.

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

802.11a mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11n HT40 mode: MCS0

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA50IWE	RC3J202AS/A -E	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

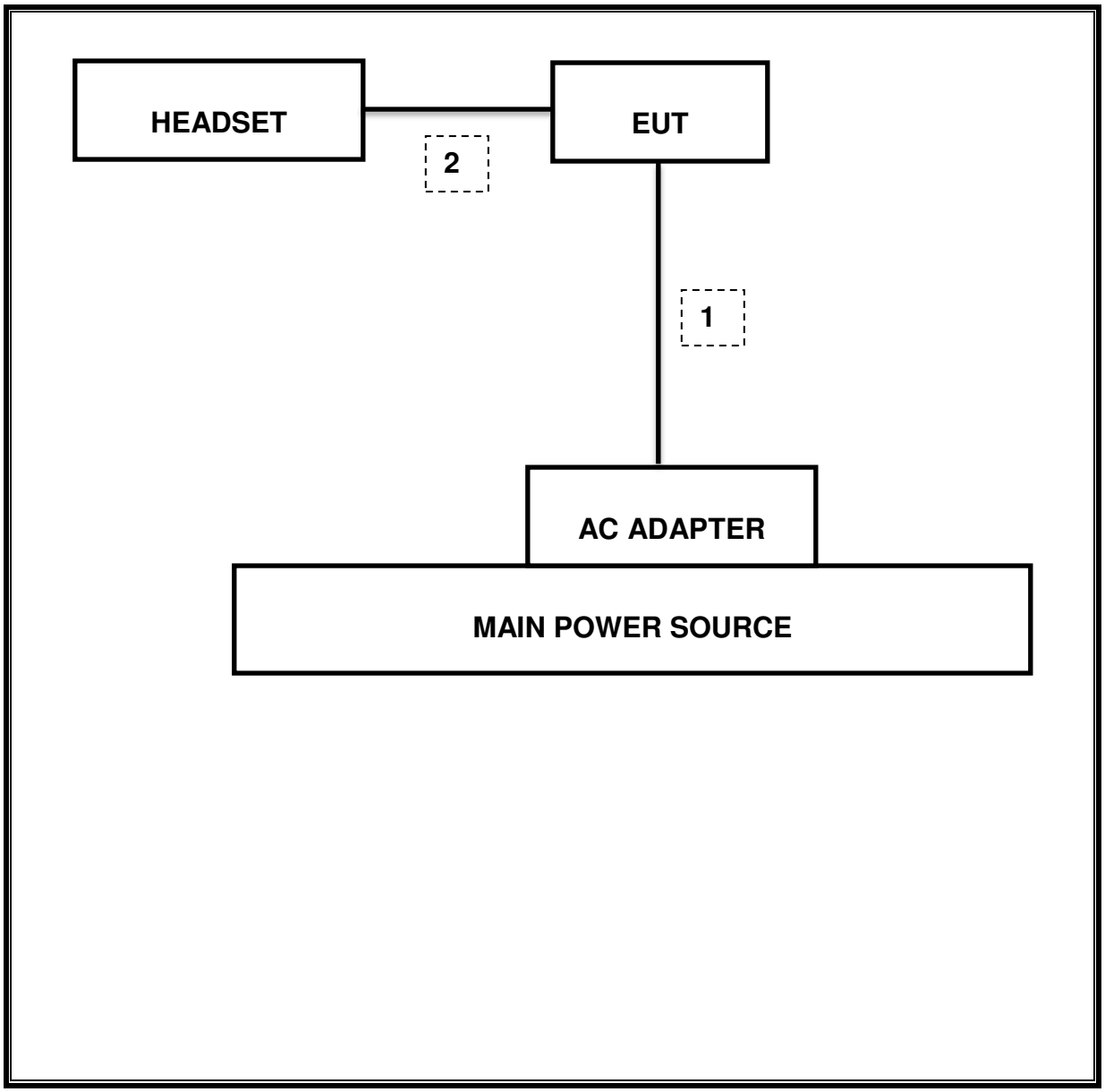
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	0.8m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.5m	N/A

TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software in hidden menu exercised the EUT to enable NII 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	10-14-18
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
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	03-09-18
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17
Average Power Sensor	R&S	NRP-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
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	101837	08-16-17
Attenuator	PASTERNACK	PE7087-10	A009	08-16-17
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. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.407	6dB Band width (5.8Ghz)	500KHz		15.01 MHz
15.407 (a)(2)	TX Cond. Power 5.15-2.25, 5.25-5.35 & 5.47-5.725	<24dBm or 11+10Log(OBW)		15.96 dBm
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm or 17+10Log(OBW)		16.33 dBm
15.407 (a)(5)	PSD (5.2,5.3,5.5GHz)	<11dBm		6.67 dBm
15.407 (a)(5)	PSD (5.8GHz)	30dBm per 500kHz		4.11 dBm
15.207 (a)	AC Power Line conducted emissions	Section 10	Radiated	33.65 dBuV (Av)
15.407 (b) & 15.209	Radiated Spurious Emission	< 68.2dBuV/m		65.13 dBuV/m (Pk)
15.407 (h)(2)	Dynamic Frequency Selection	N/A	Condcuted	Pass

8. REFERENCE MEASUREMENTS RESULTS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 D02 v01r03 Zero-Span Spectrum Analyzer Method.

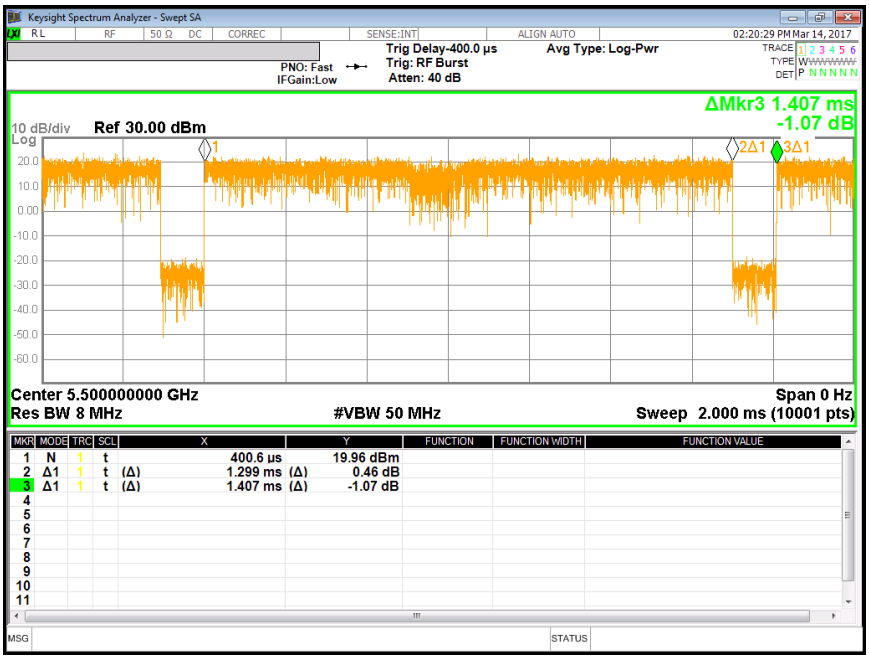
8.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B [msec)	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
802.11a	1.392	1.500	0.928	92.8%	0.32	0.718
802.11n HT20	1.299	1.407	0.923	92.3%	0.35	0.770
802.11n HT40	0.648	0.755	0.858	85.8%	0.67	1.544

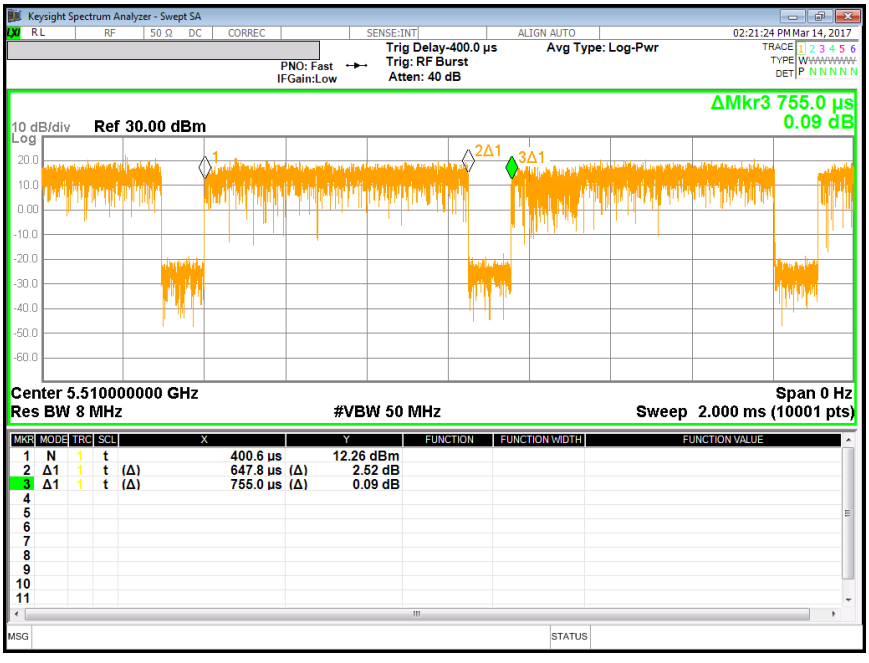
8.2. DUTY CYCLE PLOTS

DUTY CYCLE 802.11a MODE

DUTY CYCLE 802.11n HT20 MODE



DUTY CYCLE 802.11n HT40 MODE



8.3. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v01r03: The transmitter output is connected to a spectrum analyzer with the RBW set to approximately 1% of EBW, the VBW > RBW, peak detector and max hold.

ESULTS

8.3.1. 802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5180	19.87
Mid	5200	19.65
High	5240	20.45
Worst		20.45

8.3.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5180	20.45
Mid	5200	23.48
High	5240	25.16
Worst		25.16

8.3.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5190	39.92
High	5230	39.94
Worst		39.94

8.3.4. 802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5260	20.70
Mid	5300	21.36
High	5320	20.35
Worst		21.36

8.3.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5260	23.50
Mid	5300	21.99
High	5320	20.48
Worst		23.50

8.3.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5270	39.69
High	5310	39.37
Worst		39.69

8.3.7. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5500	22.87
Mid	5580	23.93
High	5700	21.06
Worst		23.93

8.3.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5500	24.43
Mid	5580	22.33
High	5700	22.86
Worst		24.43

8.3.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5510	39.72
Mid	5590	39.59
High	5670	39.77
Worst		39.77

8.3.10. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5745	23.69
Mid	5785	24.62
High	5825	24.72
Worst		24.72

8.3.11. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5745	21.96
Mid	5785	23.70
High	5825	26.70
Worst		26.70

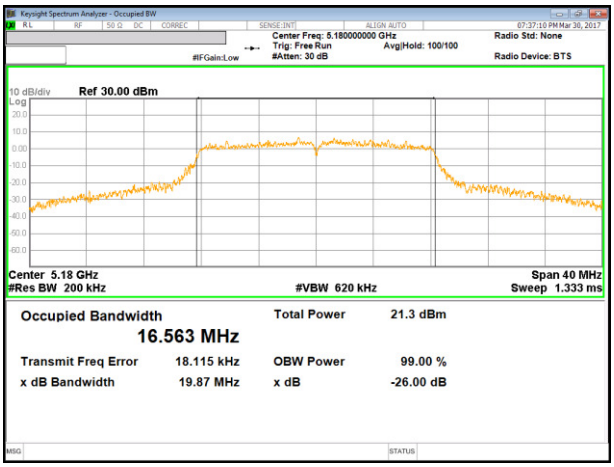
8.3.12. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5755	39.86
High	5795	39.72
Worst		39.86

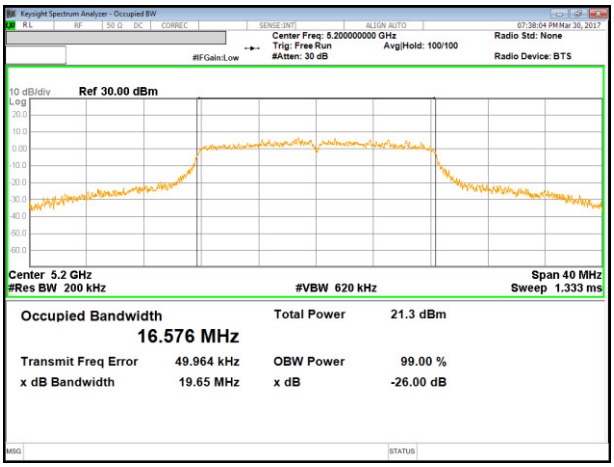
8.3.13. 26 dB BANDWIDTH PLOTS

UNII 5.2 GHz IEEE 802.11a mode

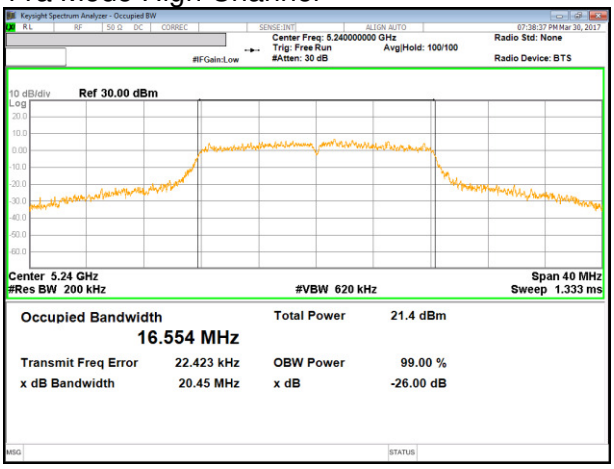
11a Mode Low Channel



11a Mode Middle Channel

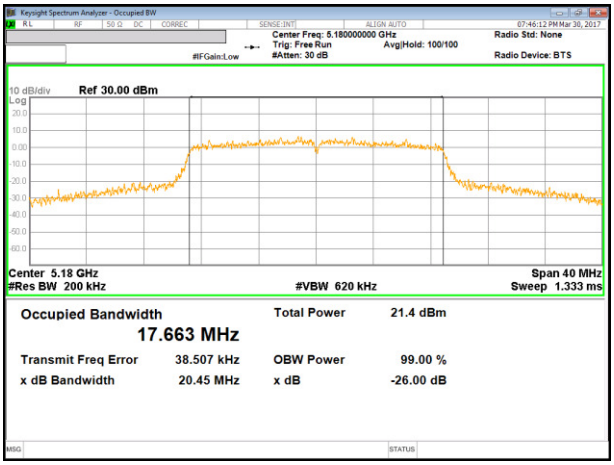


11a Mode High Channel

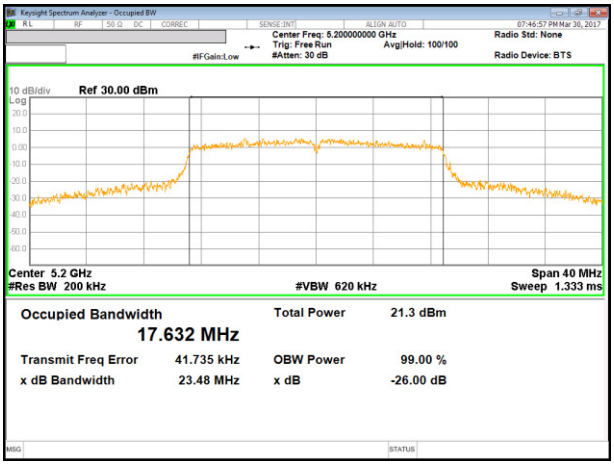


UNII 5.2 GHz IEEE 802.11n HT20 mode

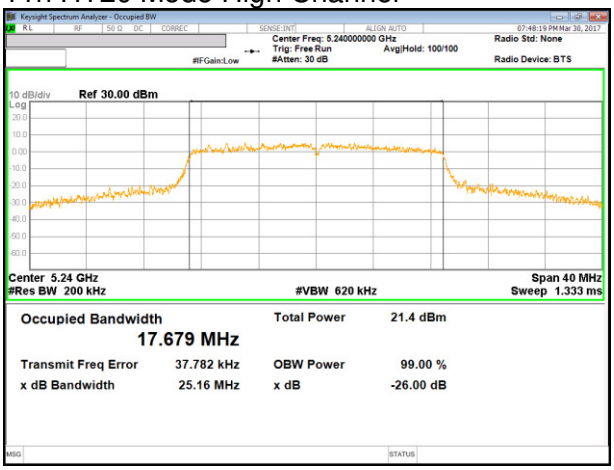
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel

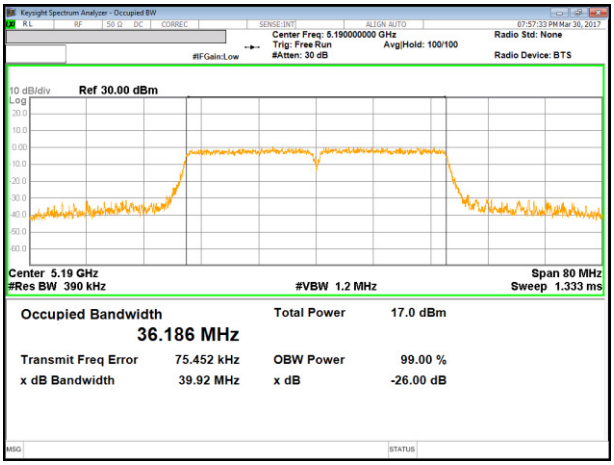


11n HT20 Mode High Channel

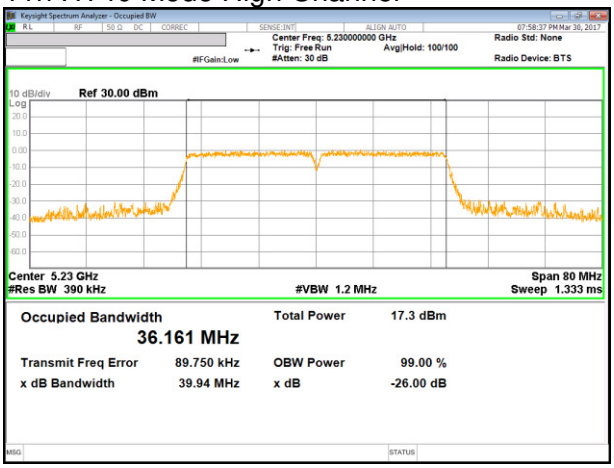


UNII 5.2 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel

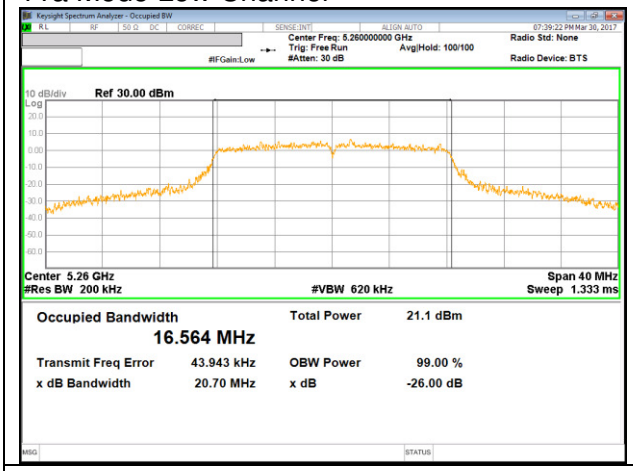


11n HT40 Mode High Channel

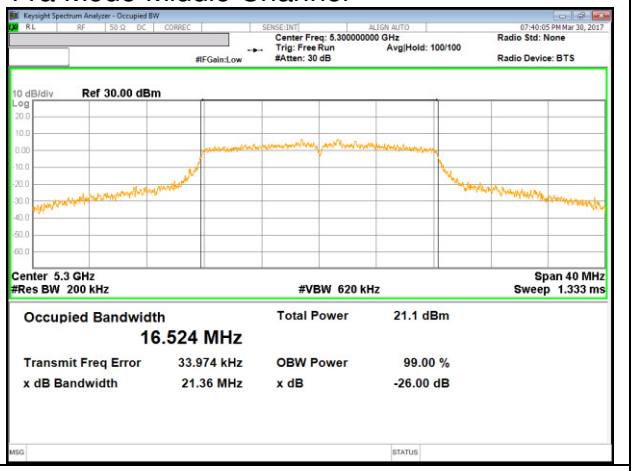


UNII 5.3 GHz IEEE 802.11a mode

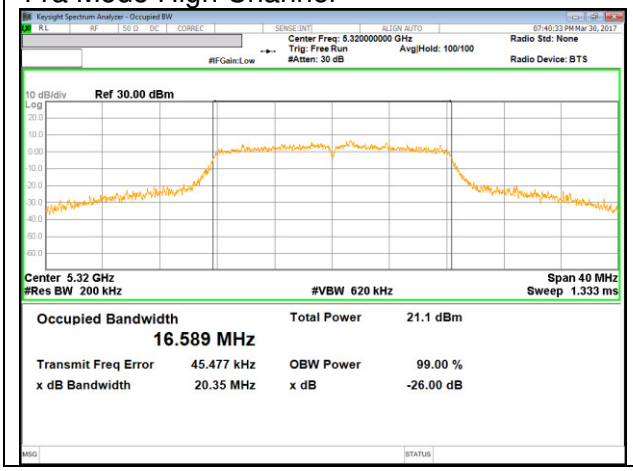
11a Mode Low Channel



11a Mode Middle Channel

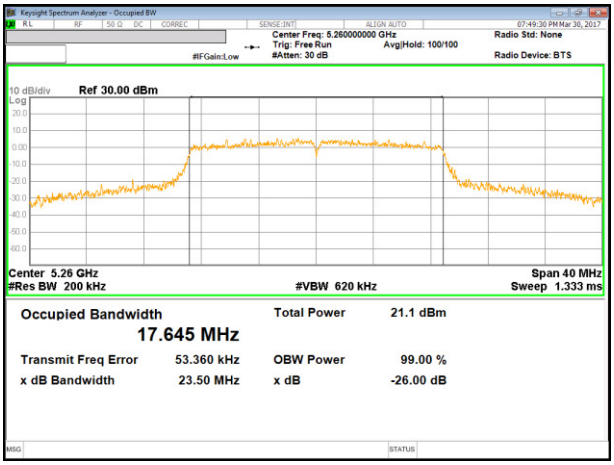


11a Mode High Channel

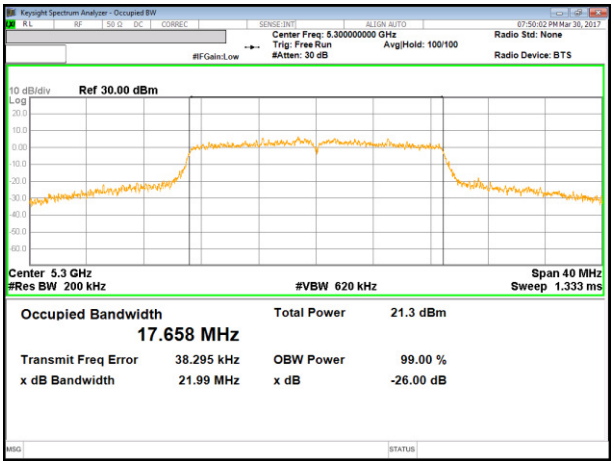


UNII 5.3 GHz IEEE 802.11n HT20 mode

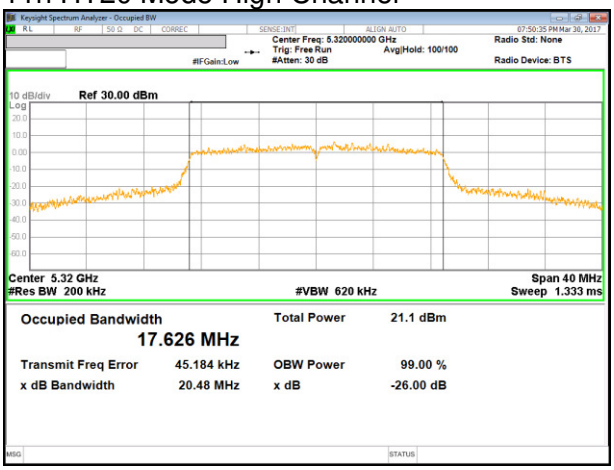
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel

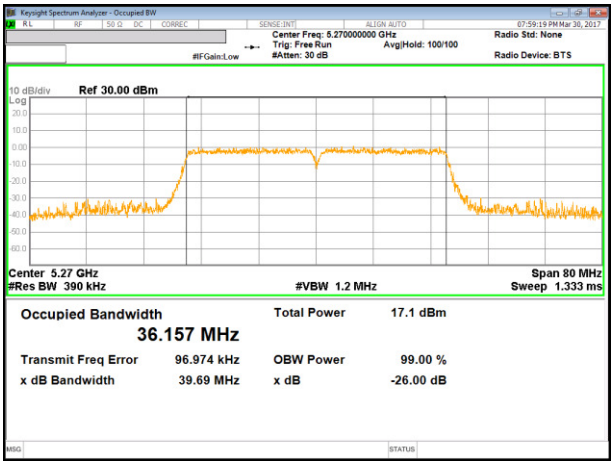


11n HT20 Mode High Channel

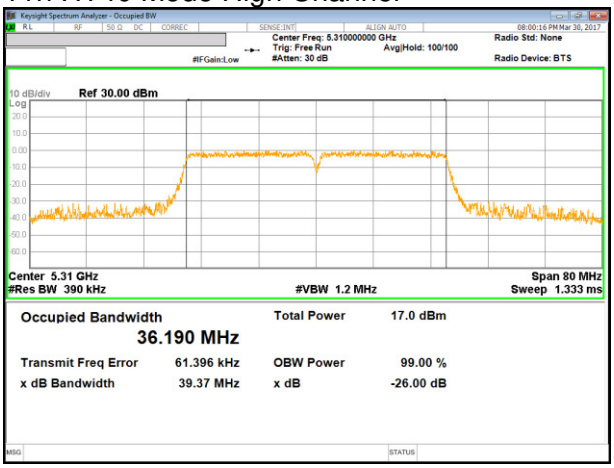


UNII 5.3 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel

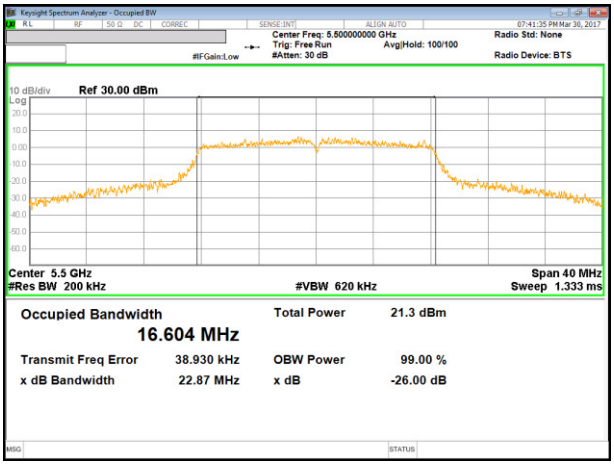


11n HT40 Mode High Channel

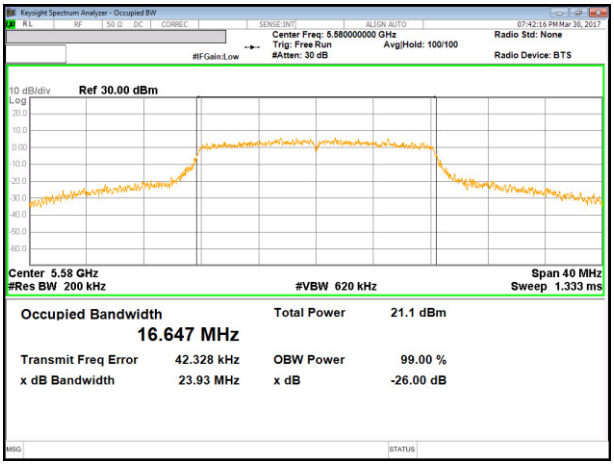


UNII 5.5 GHz IEEE 802.11a mode

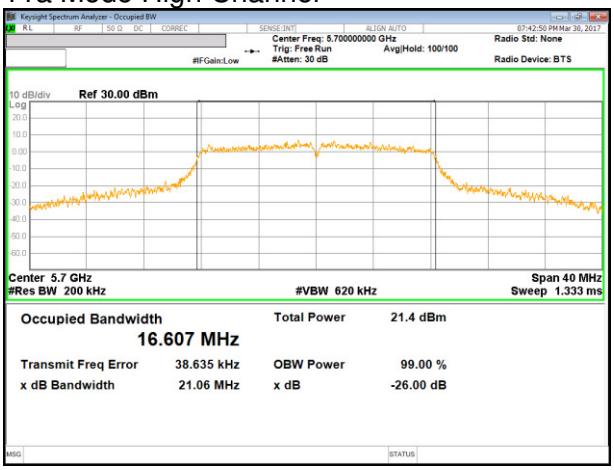
11a Mode Low Channel



11a Mode Middle Channel

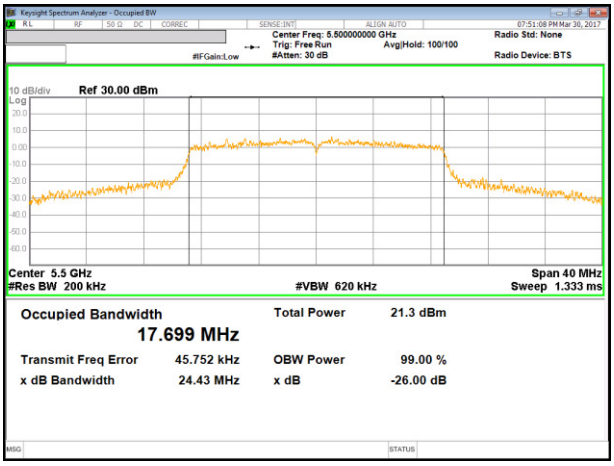


11a Mode High Channel

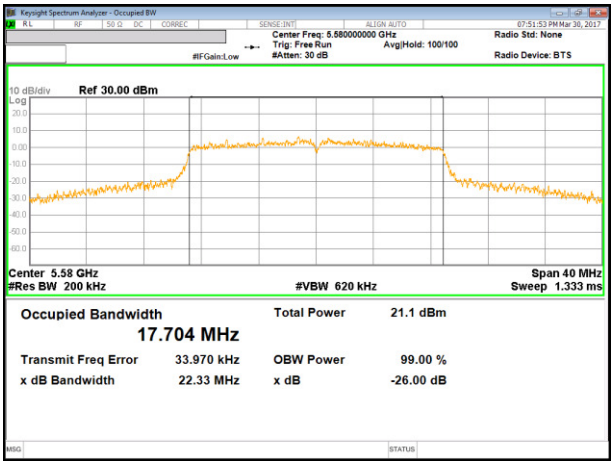


UNII 5.5 GHz IEEE 802.11n HT20 mode

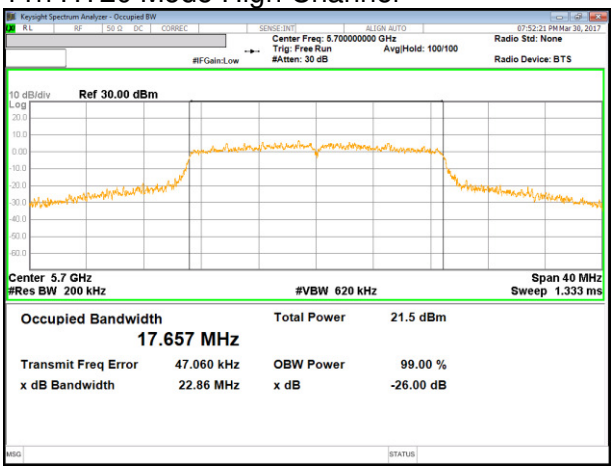
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel

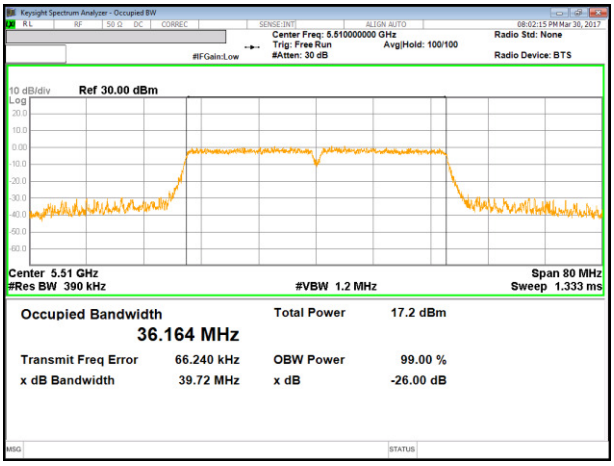


11n HT20 Mode High Channel

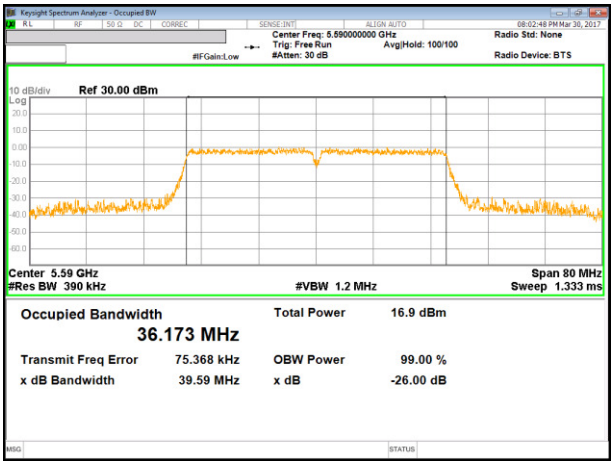


UNII 5.5 GHz IEEE 802.11n HT40 mode

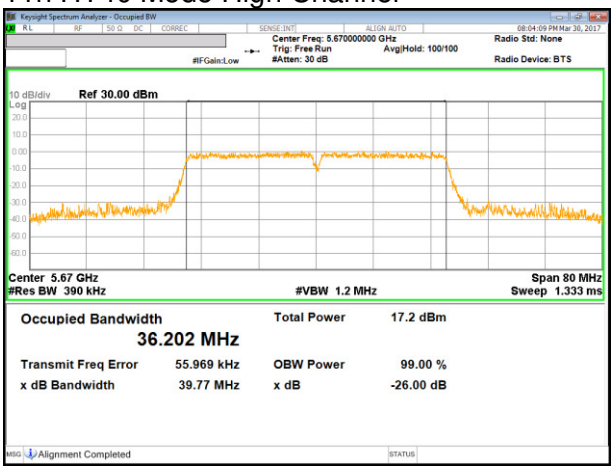
11n HT40 Mode Low Channel



11n HT40 Mode Middle Channel

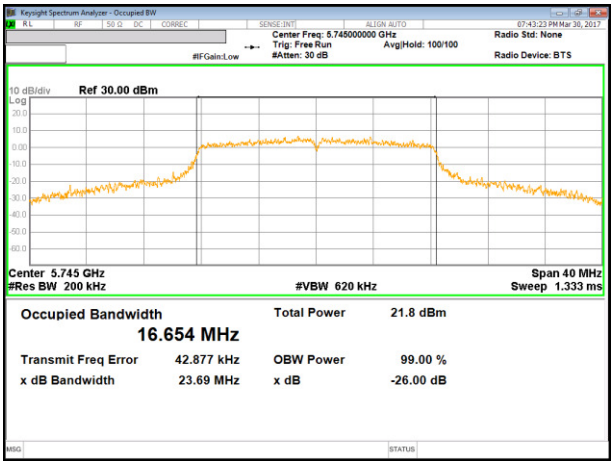


11n HT40 Mode High Channel

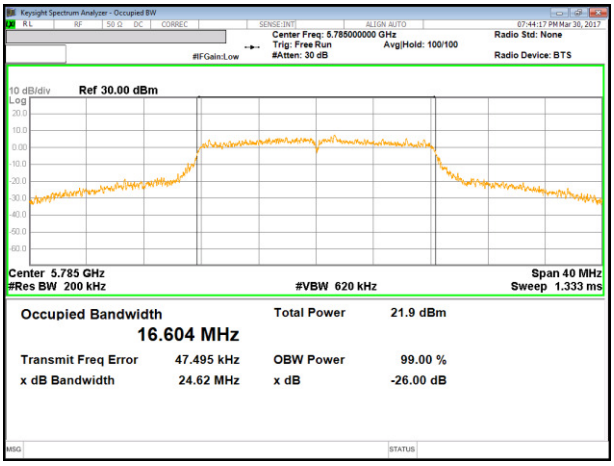


UNII 5.8 GHz IEEE 802.11a mode

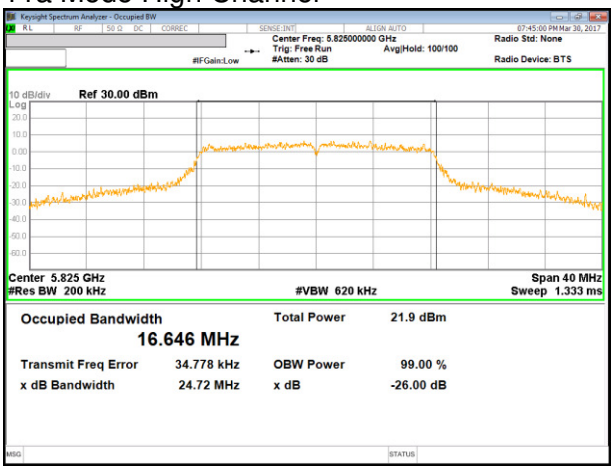
11a Mode Low Channel



11a Mode Middle Channel

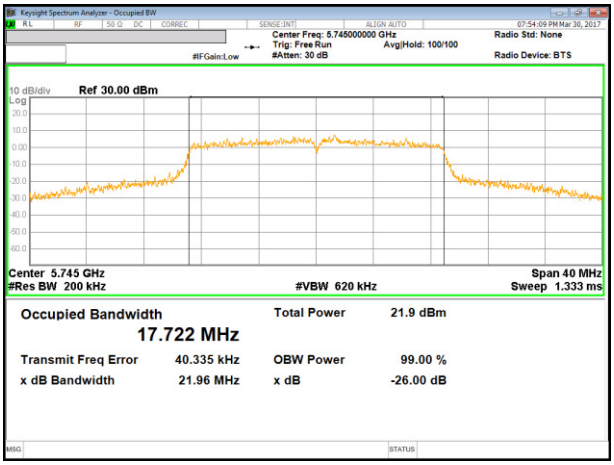


11a Mode High Channel

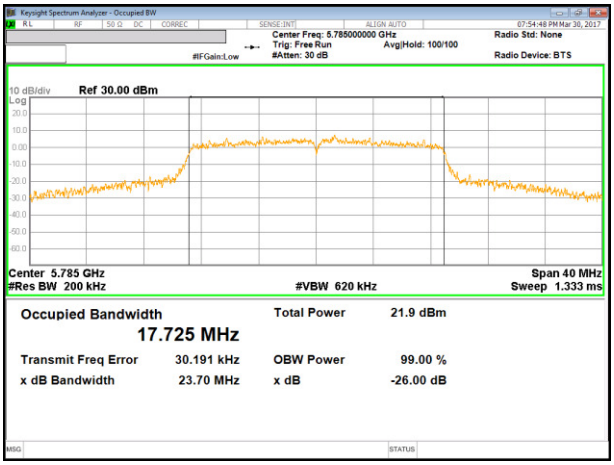


UNII 5.8 GHz IEEE 802.11n HT20 mode

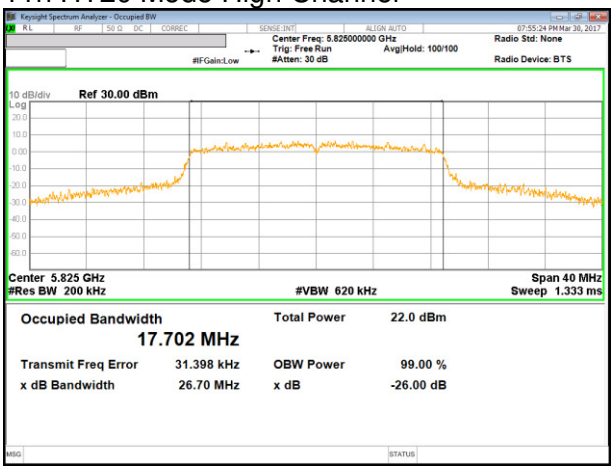
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel

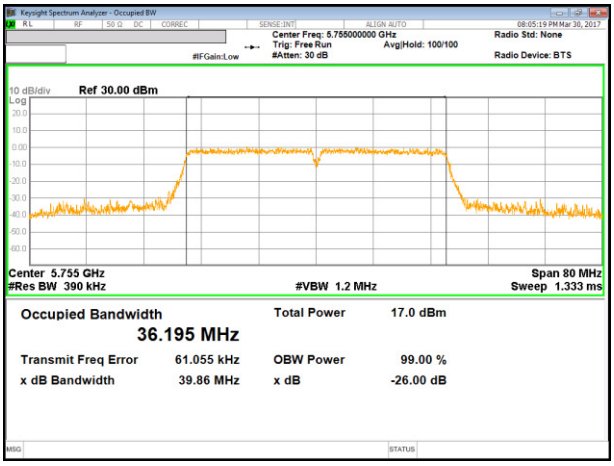


11n HT20 Mode High Channel

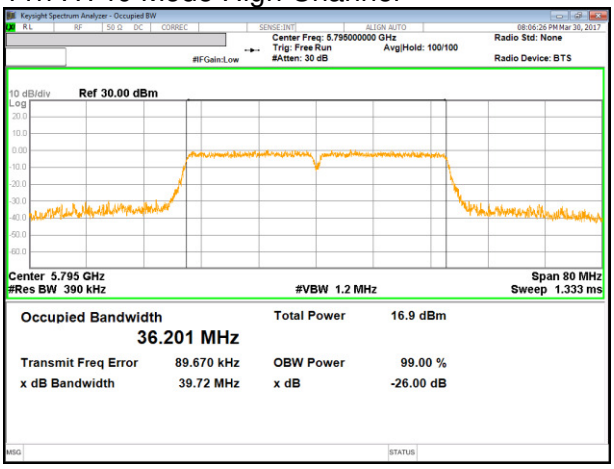


UNII 5.8 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel



11n HT40 Mode High Channel



9. ANTENNA PORT TEST RESULTS

9.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407

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

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v01r03: The transmitter output is connected to a spectrum analyzer with the RBW set to100KHz, the VBW >= 3 x RBW, peak detector and max hold.

RESULTS

9.1.1. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	5745	15.900	0.5
Mid	5785	15.070	0.5
High	5825	15.130	0.5
Worst		15.070	

9.1.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	5745	15.040	0.5
Mid	5785	15.760	0.5
High	5825	15.010	0.5
Worst		15.010	

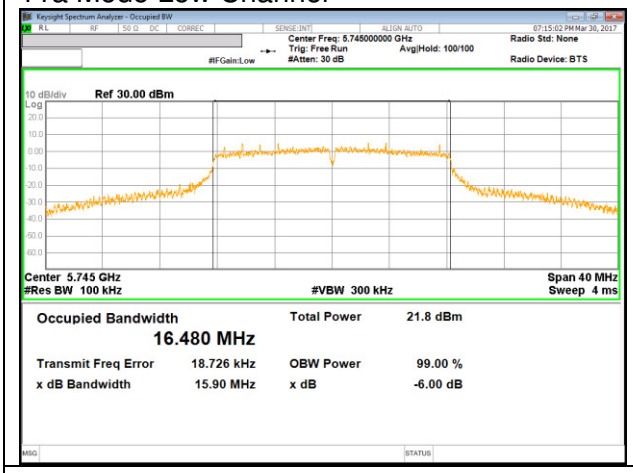
9.1.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Low	5755	35.740	0.5
High	5795	36.050	0.5
Worst		35.740	

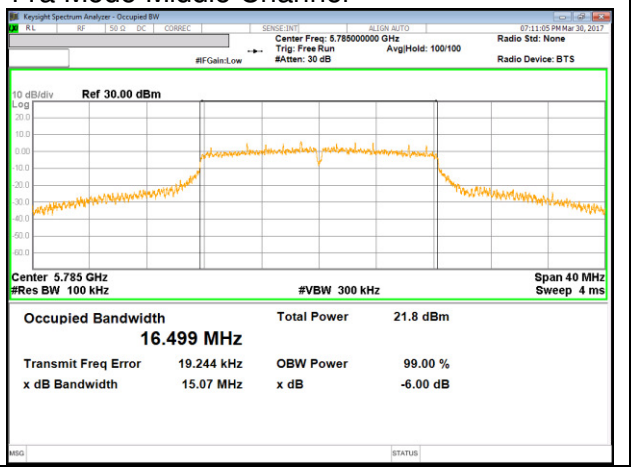
9.1.4. 6 dB BANDWIDTH PLOTS

IEEE 802.11a mode

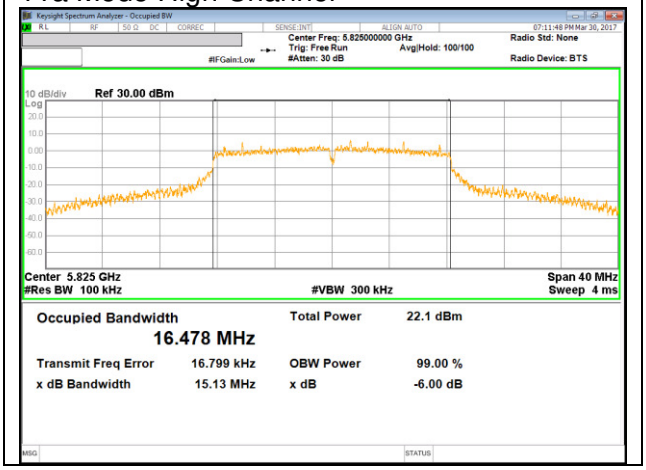
11a Mode Low Channel



11a Mode Middle Channel

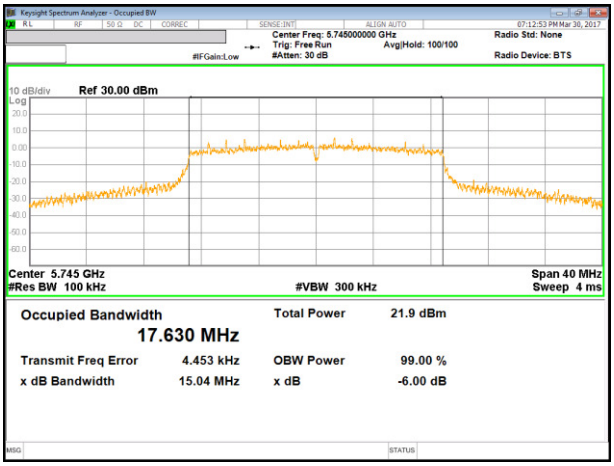


11a Mode High Channel

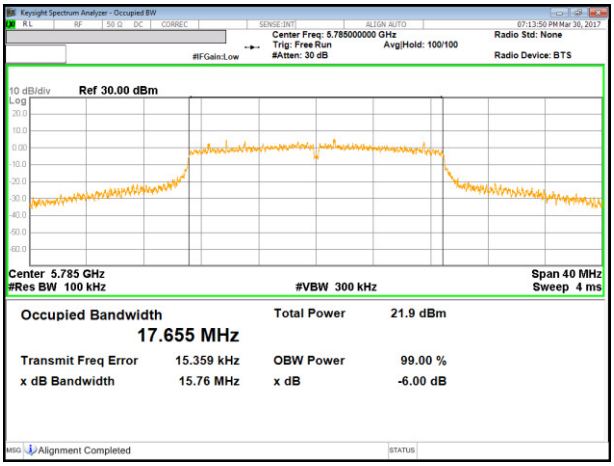


IEEE 802.11n HT20 mode

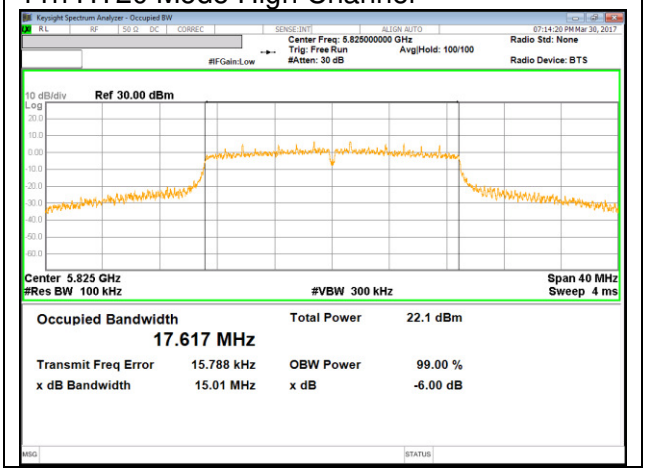
11n HT20 Mode Low Channel



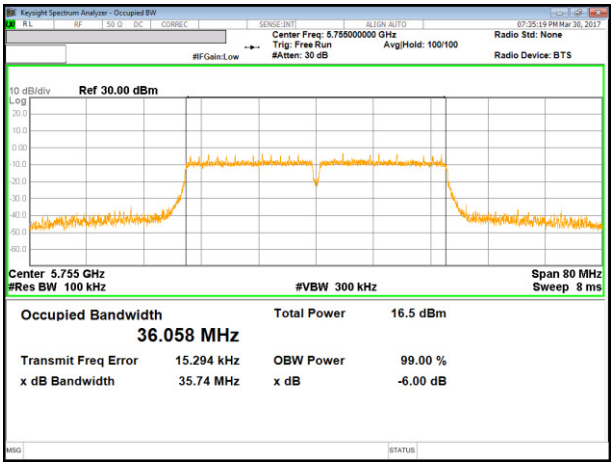
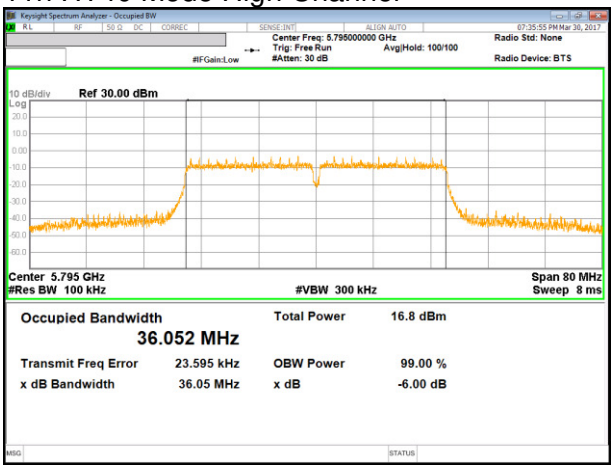
11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel	11n HT40 Mode High Channel
	

9.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1) (2) (3)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

TEST PROCEDURE

KDB 789033 Method SA-2 is used for PPSD. RBW set to 1MHz(500kHz for the band 5.725-5.85 GHz, the VBW >= 3 x RBW, RMS detector and trace averaging). Peak marker value of the spectrum is used for PSD. Add duty cycle correction factor.

KDB 789033 Method PM is used for output power. Duty cycle correction factor is already added to the average output power results.

DIRECTIONAL ANTENNA GAIN

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

5 GHz

Frequency Band [MHz]	Antenna Gain [dBi]
5150 - 5250	-1.48
5250 - 5350	-1.61
5470 - 5725	-0.34
5725 - 5850	-0.45

RESULTS

9.2.1. 802.11a MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5180	19.87	-1.48	-1.48
Mid	5200	19.65	-1.48	-1.48
High	5240	20.45	-1.48	-1.48

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5180	24.00	24.00	11.00
Mid	5200	24.00	24.00	11.00
High	5240	24.00	24.00	11.00

Duty Cycle CF [dB]	0.32	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5180	15.94	24.00	-8.06
Mid	5200	15.87	24.00	-8.13
High	5240	15.88	24.00	-8.12

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5180	6.30	6.62	11.00	-4.38
Mid	5200	6.35	6.67	11.00	-4.33
High	5240	6.25	6.57	11.00	-4.43

9.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5180	20.45	-1.48	-1.48
Mid	5200	23.48	-1.48	-1.48
High	5240	25.16	-1.48	-1.48

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5180	24.00	24.00	11.00
Mid	5200	24.00	24.00	11.00
High	5240	24.00	24.00	11.00

Duty Cycle CF [dB]	0.35	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5180	15.88	24.00	-8.12
Mid	5200	15.96	24.00	-8.04
High	5240	15.91	24.00	-8.09

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5180	6.10	6.45	11.00	-4.55
Mid	5200	5.89	6.24	11.00	-4.76
High	5240	6.07	6.41	11.00	-4.59

9.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5190	39.92	-1.48	-1.48
High	5230	39.94	-1.48	-1.48

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5190	24.00	24.00	11.00
High	5230	24.00	24.00	11.00

Duty Cycle CF [dB]	0.67	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5190	11.11	24.00	-12.89
High	5230	11.14	24.00	-12.86

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5190	-2.62	-1.96	11.00	-12.96
High	5230	-2.08	-1.42	11.00	-12.42

9.2.4. 802.11a MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5260	20.70	-1.61	-1.61
Mid	5300	21.36	-1.61	-1.61
High	5320	20.35	-1.61	-1.61

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5260	24.00	24.00	11.00
Mid	5300	24.00	24.00	11.00
High	5320	24.00	24.00	11.00

Duty Cycle CF [dB]	0.32	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5260	15.58	24.00	-8.42
Mid	5300	15.59	24.00	-8.41
High	5320	15.61	24.00	-8.39

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5260	5.94	6.26	11.00	-4.74
Mid	5300	6.08	6.40	11.00	-4.60
High	5320	6.00	6.33	11.00	-4.67

9.2.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5260	23.50	-1.61	-1.61
Mid	5300	21.99	-1.61	-1.61
High	5320	20.48	-1.61	-1.61

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5260	24.00	24.00	11.00
Mid	5300	24.00	24.00	11.00
High	5320	24.00	24.00	11.00

Duty Cycle CF [dB]	0.35	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5260	15.67	24.00	-8.33
Mid	5300	15.64	24.00	-8.36
High	5320	15.69	24.00	-8.31

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5260	5.50	5.85	11.00	-5.15
Mid	5300	5.76	6.11	11.00	-4.89
High	5320	5.85	6.20	11.00	-4.80

9.2.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5270	39.69	-1.61	-1.61
High	5310	39.37	-1.61	-1.61

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5270	24.00	24.00	11.00
High	5310	24.00	24.00	11.00

Duty Cycle CF [dB]	0.67	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5270	10.93	24.00	-13.07
High	5310	10.90	24.00	-13.10

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5270	-2.64	-1.97	11.00	-12.97
High	5310	-2.23	-1.56	11.00	-12.56

9.2.7. 802.11a MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5500	22.87	-0.34	-0.34
Mid	5580	23.93	-0.34	-0.34
High	5700	21.06	-0.34	-0.34

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5500	24.00	24.00	11.00
Mid	5580	24.00	24.00	11.00
High	5700	24.00	24.00	11.00

Duty Cycle CF [dB]	0.32	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5500	15.67	24.00	-8.33
Mid	5580	15.68	24.00	-8.32
High	5700	15.66	24.00	-8.34

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5500	5.88	6.20	11.00	-4.80
Mid	5580	5.67	6.00	11.00	-5.00
High	5700	6.29	6.61	11.00	-4.39

9.2.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5500	24.43	-0.34	-0.34
Mid	5580	22.33	-0.34	-0.34
High	5700	22.86	-0.34	-0.34

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5500	24.00	24.00	11.00
Mid	5580	24.00	24.00	11.00
High	5700	24.00	24.00	11.00

Duty Cycle CF [dB]	0.35	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5500	15.66	24.00	-8.34
Mid	5580	15.68	24.00	-8.32
High	5700	15.66	24.00	-8.34

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5500	5.32	5.66	11.00	-5.34
Mid	5580	5.68	6.03	11.00	-4.97
High	5700	6.19	6.53	11.00	-4.47

9.2.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5510	39.72	-0.34	-0.34
Mid	5590	39.59	-0.34	-0.34
High	5670	39.77	-0.34	-0.34

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5510	24.00	24.00	11.00
Mid	5590	24.00	24.00	11.00
High	5670	24.00	24.00	11.00

Duty Cycle CF [dB]	0.67	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5510	11.01	24.00	-12.99
Mid	5590	11.03	24.00	-12.97
High	5670	11.13	24.00	-12.87

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5510	-2.49	-1.82	11.00	-12.82
Mid	5590	-2.97	-2.31	11.00	-13.31
High	5670	-2.65	-1.99	11.00	-12.99

9.2.10. 802.11a MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5745	23.69	-0.45	-0.45
Mid	5785	24.62	-0.45	-0.45
High	5825	24.72	-0.45	-0.45

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5745	30.00	30.00	30.00
Mid	5785	30.00	30.00	30.00
High	5825	30.00	30.00	30.00

Duty Cycle CF [dB]	0.32	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5745	16.25	30.00	-13.75
Mid	5785	16.29	30.00	-13.71
High	5825	16.33	30.00	-13.67

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5745	3.72	4.04	30.00	-25.96
Mid	5785	3.26	3.59	30.00	-26.41
High	5825	3.56	3.89	30.00	-26.11

9.2.11. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5745	21.96	-0.45	-0.45
Mid	5785	23.70	-0.45	-0.45
High	5825	26.70	-0.45	-0.45

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5745	30.00	30.00	30.00
Mid	5785	30.00	30.00	30.00
High	5825	30.00	30.00	30.00

Duty Cycle CF [dB]	0.35	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5745	16.22	30.00	-13.78
Mid	5785	16.28	30.00	-13.72
High	5825	16.32	30.00	-13.68

PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5745	3.77	4.11	30.00	-25.89
Mid	5785	3.43	3.77	30.00	-26.23
High	5825	3.71	4.06	30.00	-25.94

9.2.12. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5755	39.86	-0.45	-0.45
High	5795	39.72	-0.45	-0.45

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5755	30.00	30.00	30.00
High	5795	30.00	30.00	30.00

Duty Cycle CF [dB]	0.67	Included in Calculations of PPSD

Output Power Results

Channel	Frequency [MHz]	Meas Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5755	10.76	30.00	-19.24
High	5795	10.62	30.00	-19.38

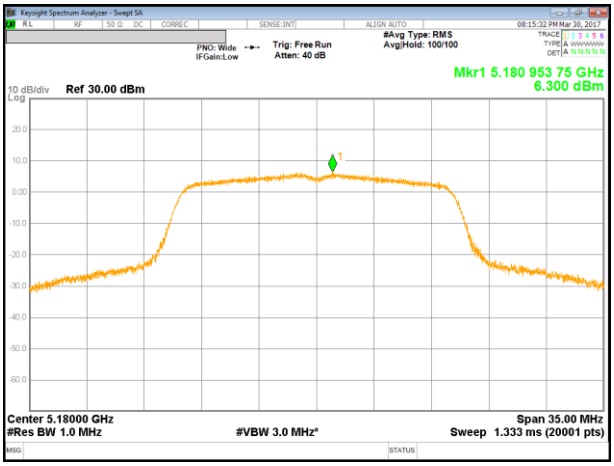
PPSD Results

Channel	Frequency [MHz]	Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5755	-5.56	-4.89	30.00	-34.89
High	5795	-5.67	-5.00	30.00	-35.00

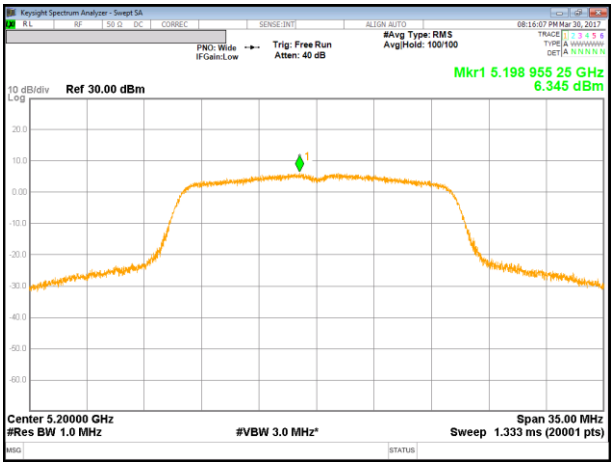
9.2.13. OUTPUT POWER AND PPSD PLOTS

UNII 5.2 GHz IEEE 802.11a mode

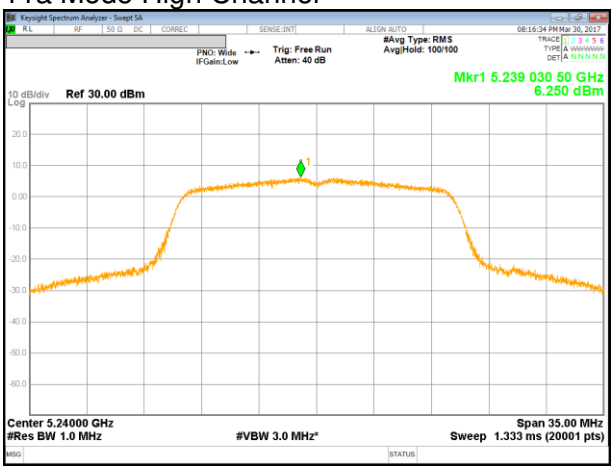
11a Mode Low Channel



11a Mode Middle Channel

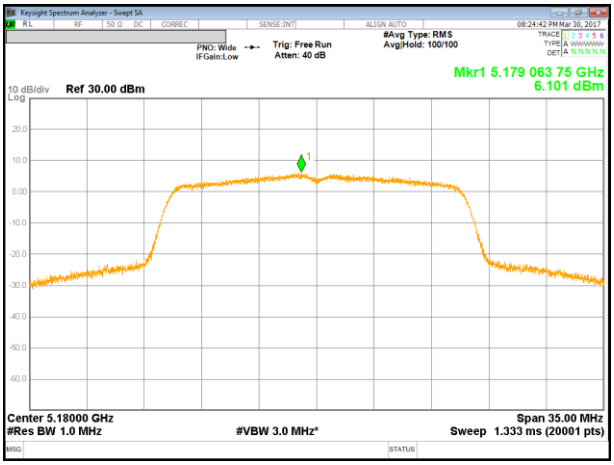


11a Mode High Channel

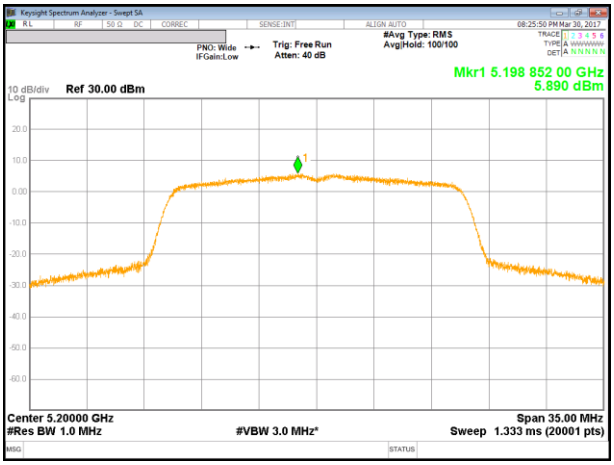


UNII 5.2 GHz IEEE 802.11n HT20 mode

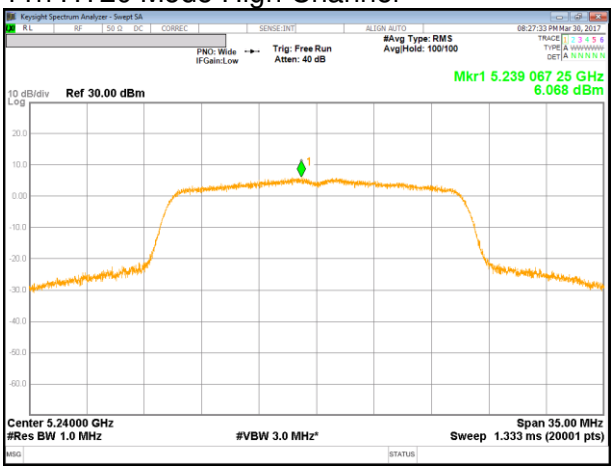
11n HT20 Mode Low Channel



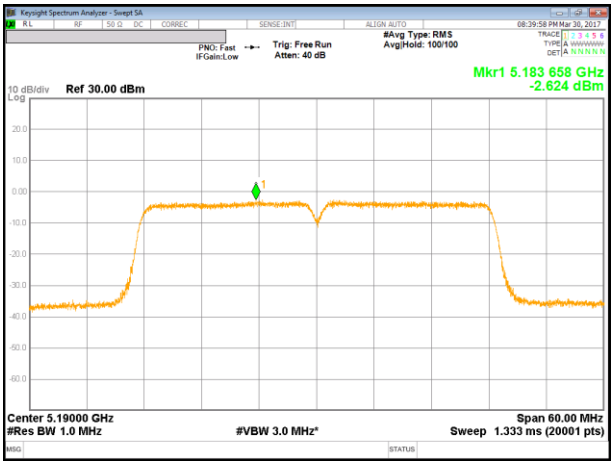
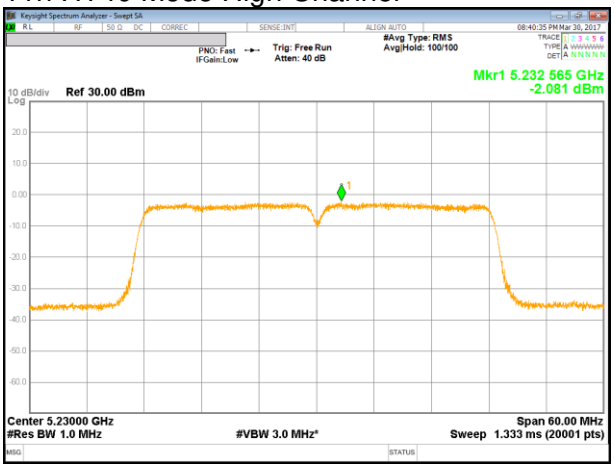
11n HT20 Mode Middle Channel



11n HT20 Mode High Channel

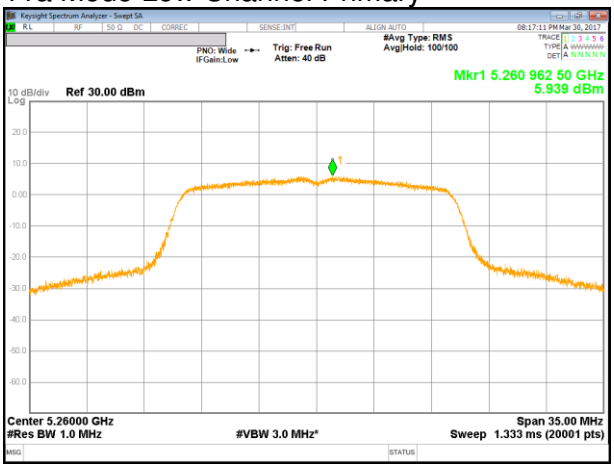


UNII 5.2 GHz IEEE 802.11n HT40 mode

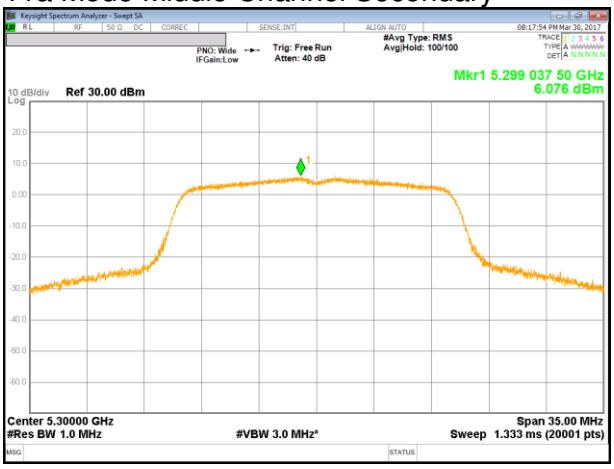
11n HT40 Mode Low Channel	11n HT40 Mode High Channel
	

UNII 5.3 GHz IEEE 802.11a mode

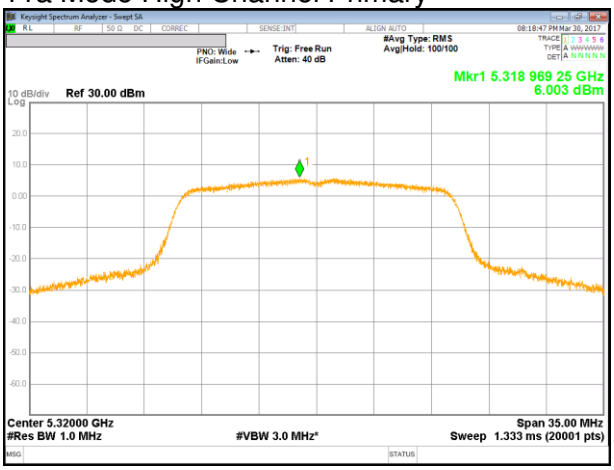
11a Mode Low Channel Primary



11a Mode Middle Channel Secondary

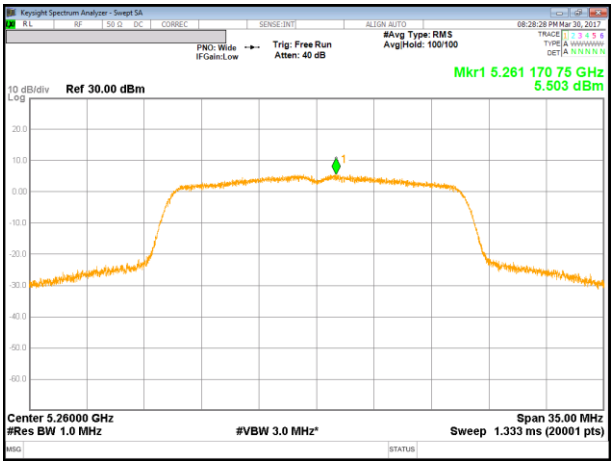


11a Mode High Channel Primary

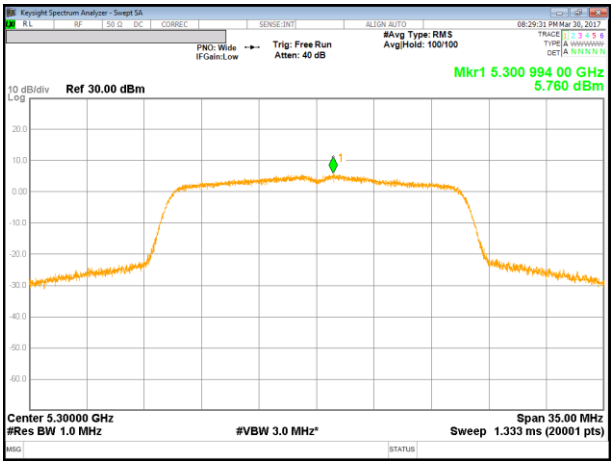


UNII 5.3 GHz IEEE 802.11n HT20 mode

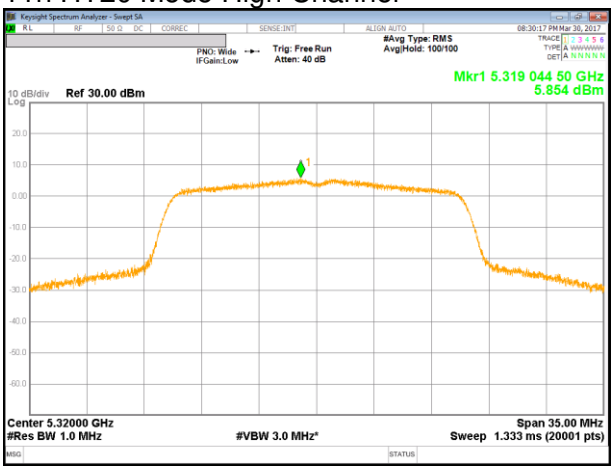
11n HT20 Mode Low Channel



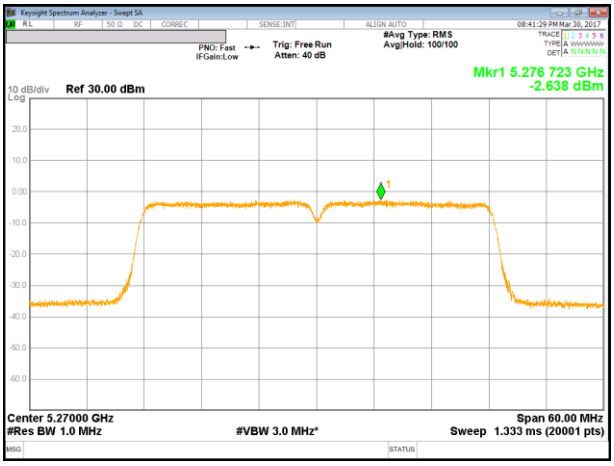
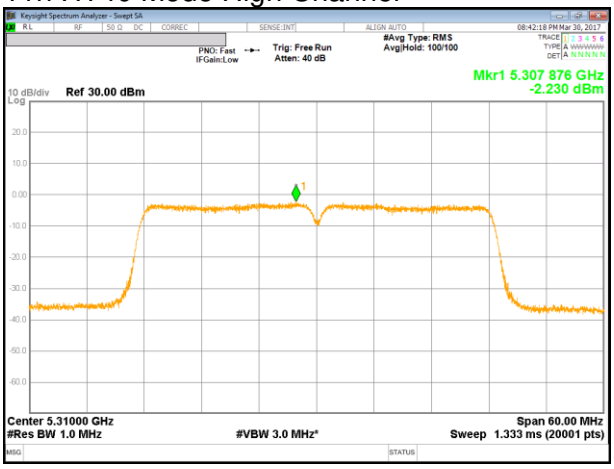
11n HT20 Mode Middle Channel



11n HT20 Mode High Channel

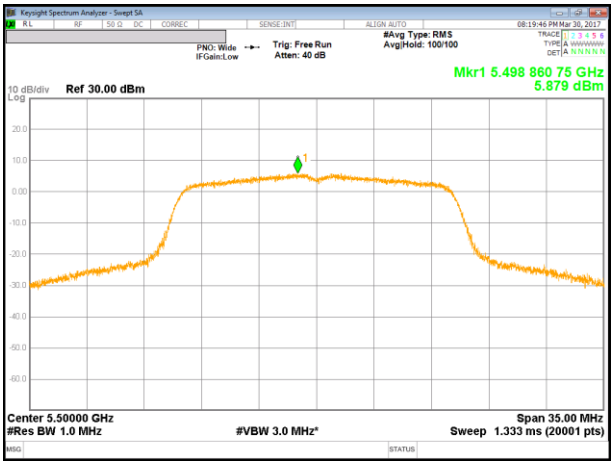


UNII 5.3 GHz IEEE 802.11n HT40 mode

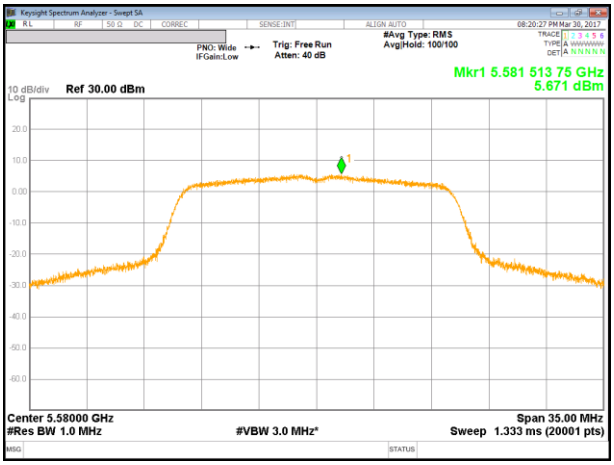
11n HT40 Mode Low Channel	11n HT40 Mode High Channel
	

UNII 5.5 GHz IEEE 802.11a mode

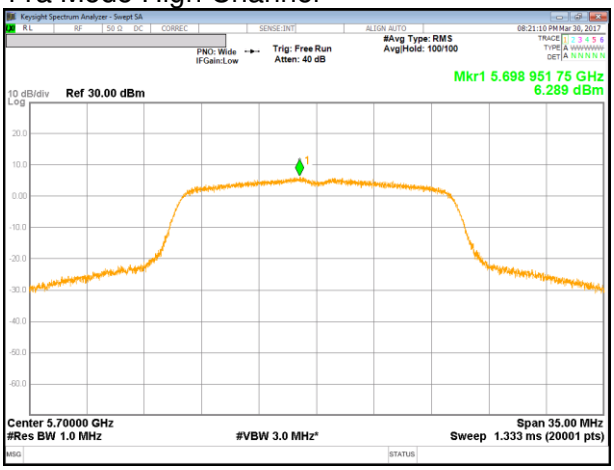
11a Mode Low Channel



11a Mode Middle Channel

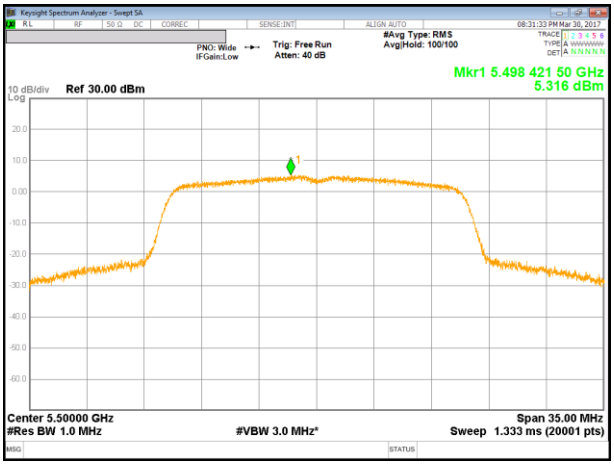


11a Mode High Channel

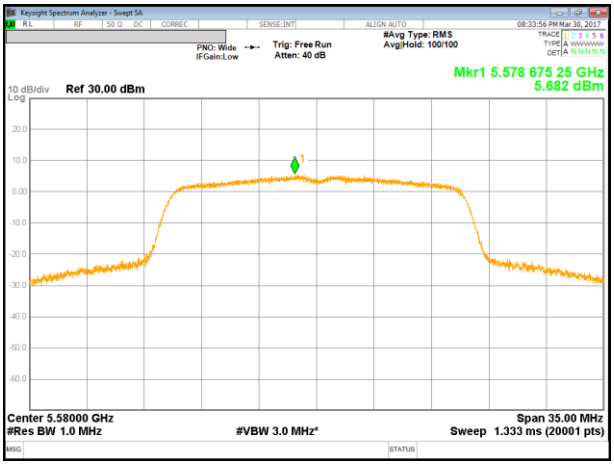


UNII 5.5 GHz IEEE 802.11n HT20 mode

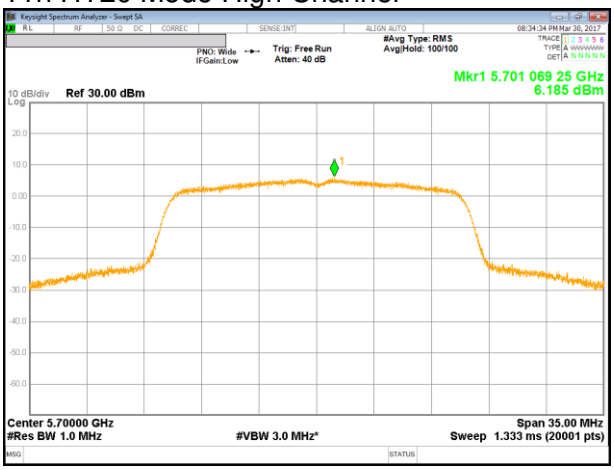
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel

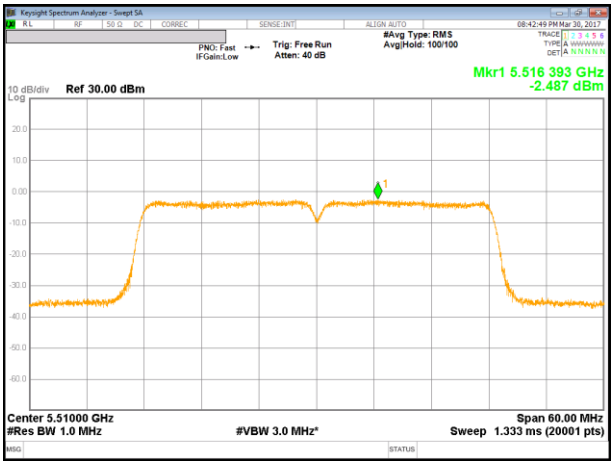


11n HT20 Mode High Channel

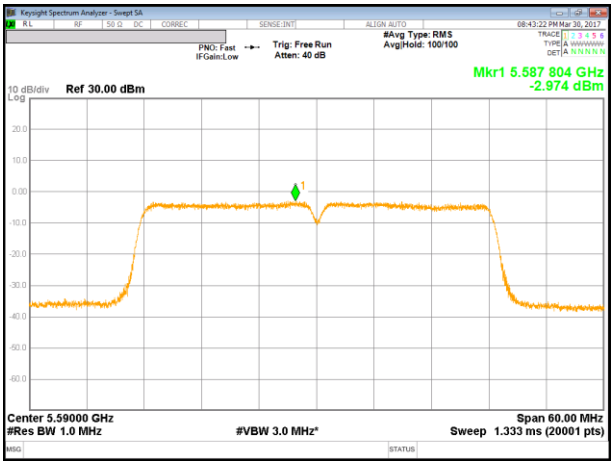


UNII 5.5 GHz IEEE 802.11n HT40 mode

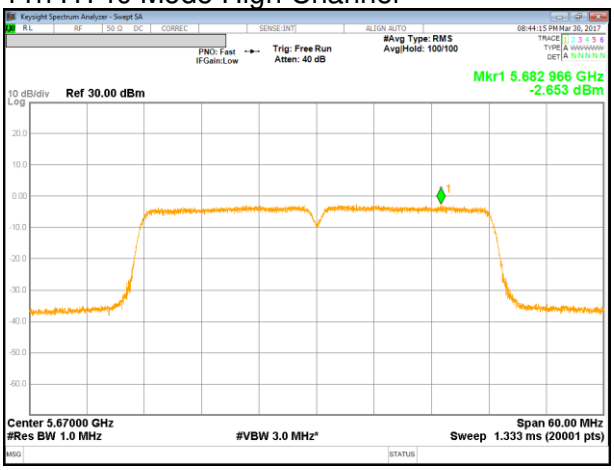
11n HT40 Mode Low Channel



11n HT40 Mode Middle Channel

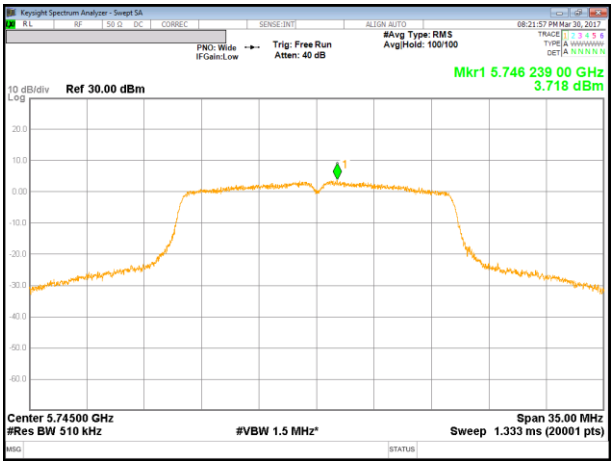


11n HT40 Mode High Channel

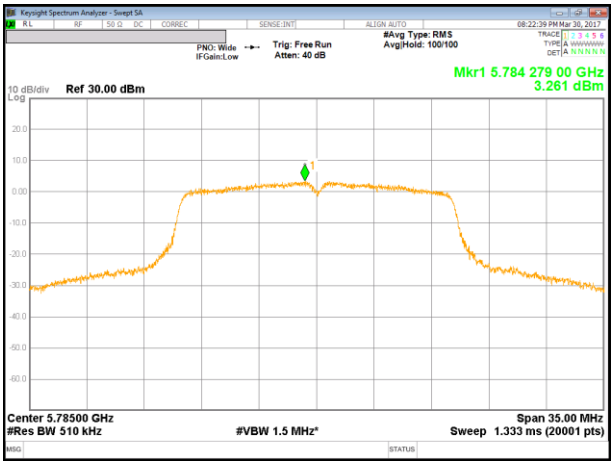


UNII 5.8 GHz IEEE 802.11a mode

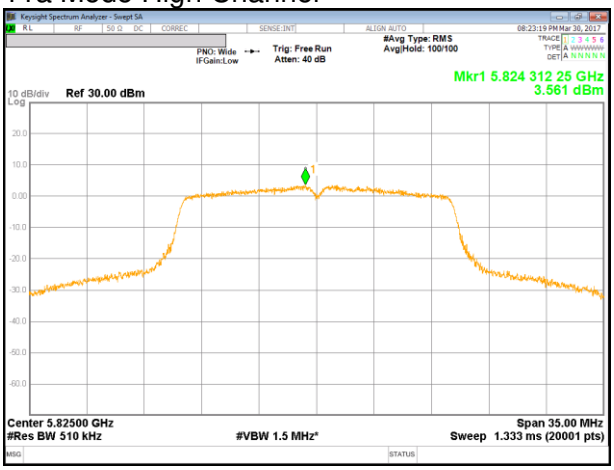
11a Mode Low Channel



11a Mode Middle Channel

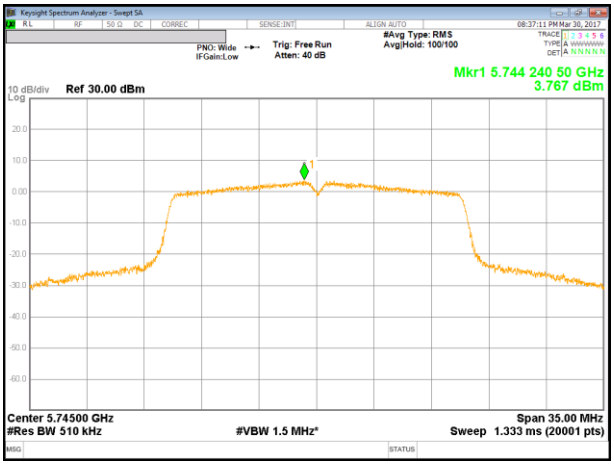


11a Mode High Channel

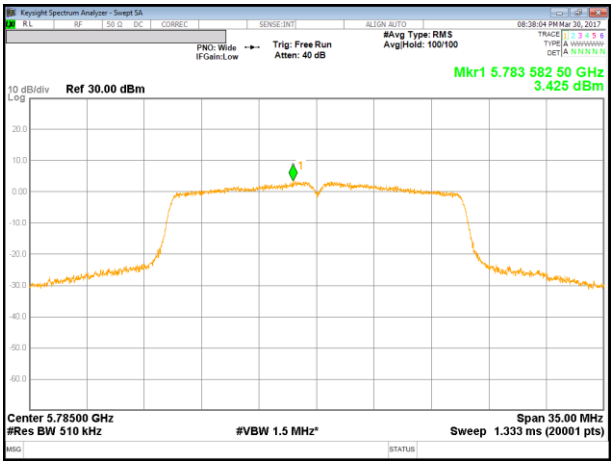


UNII 5.8 GHz IEEE 802.11n HT20 mode

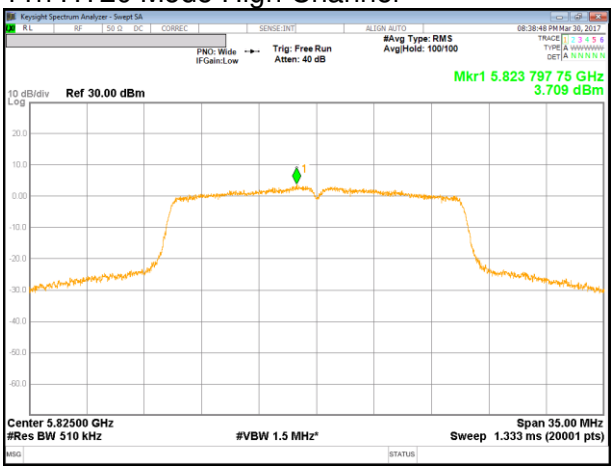
11n HT20 Mode Low Channel



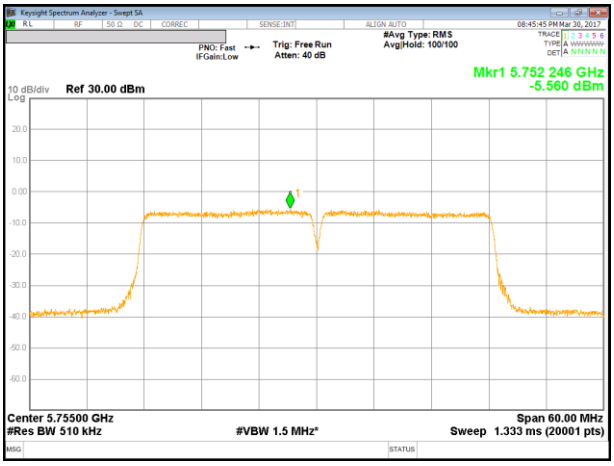
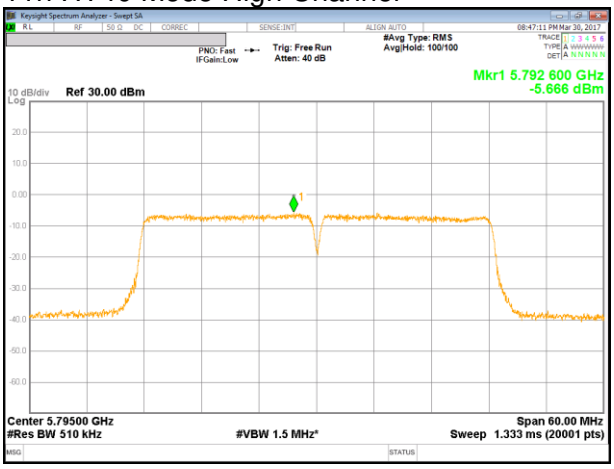
11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



UNII 5.8 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel	11n HT40 Mode High Channel
	

10. TRANSMITTER ABOVE 1 GHz

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.

FCC §15.407 (b)

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth

in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
(7) The provisions of §15.205 apply to intentional radiators operating under this section.
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Note

- Limit translation to field strength level (FCC §15.407)

E[dBuV/m] = EIRP[dBm] + 95.2 = -27dBm + 95.2 = 68.2dBuV/m
E[dBuV/m] = EIRP[dBm] + 95.2 = -17dBm + 95.2 = 78.2dBuV/m

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.

Reference to KDB 789033 D02 v01r03 UNII part G) 6) c) Method AD:
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 to the reading offset for average measurements.
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 40 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.

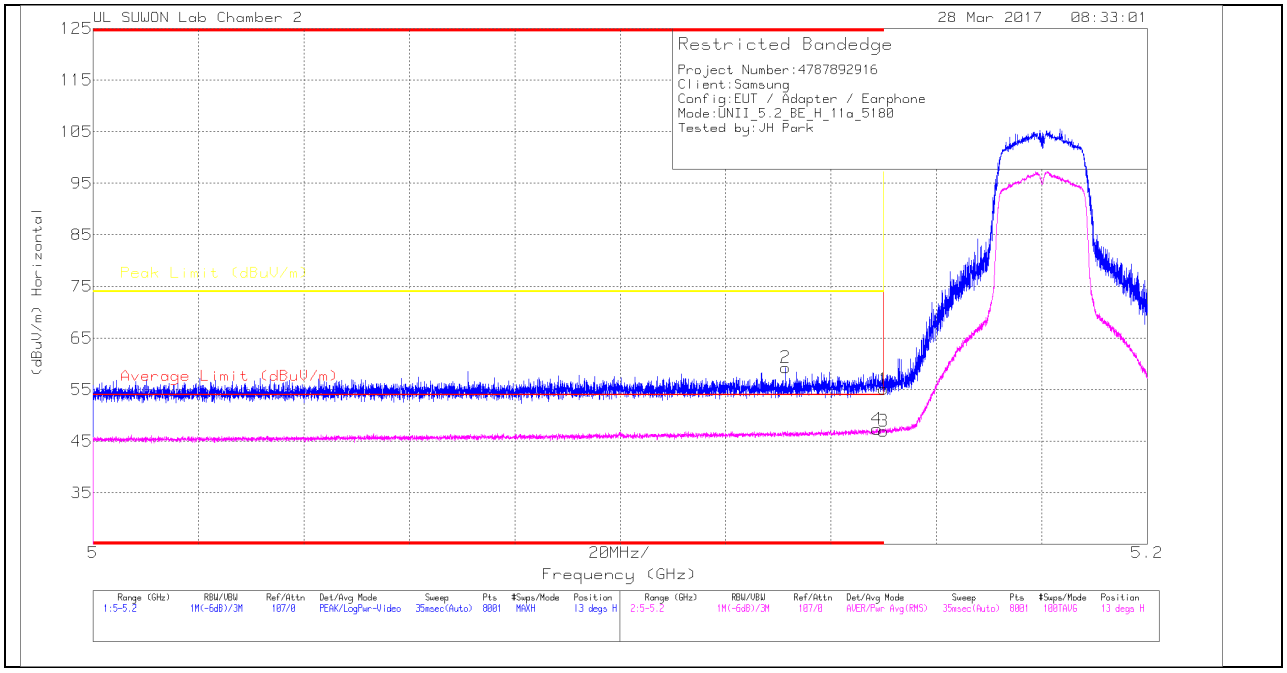
Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

10.1. 5.2 GHz

10.1.1. TX Above 1GHz 802.11a MODE IN THE 5.2GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

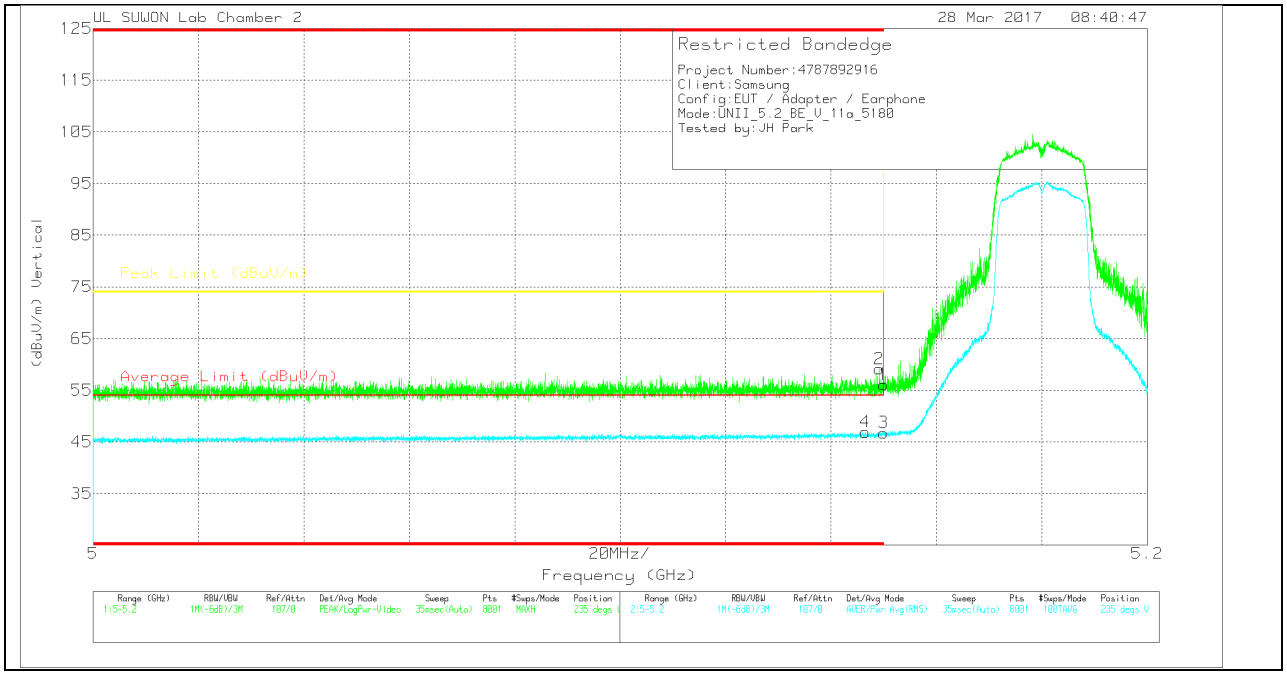
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.15	36.31	Pk	34.1	-15.3	0	55.11	-	-	74	-18.89	13	189	H
2	* 5.131	40.49	Pk	34.1	-15.3	0	59.29	-	-	74	-14.71	13	189	H
3	* 5.15	27.85	RMS	34.1	-15.3	.32	46.97	54	-7.03	-	-	13	189	H
4	* 5.149	28.27	RMS	34.1	-15.3	.32	47.39	54	-6.61	-	-	13	189	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(00168724)_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	* 5.15	37.32	Pk	34.1	-15.3	0	56.12	-	-	74	-17.88	235	349	V
2	* 5.149	40.3	Pk	34.1	-15.3	0	59.1	-	-	74	-14.9	235	349	V
3	* 5.15	27.65	RMS	34.1	-15.3	.32	46.77	54	-7.23	-	-	235	349	V
4	* 5.146	27.78	RMS	34.1	-15.3	.32	46.9	54	-7.1	-	-	235	349	V

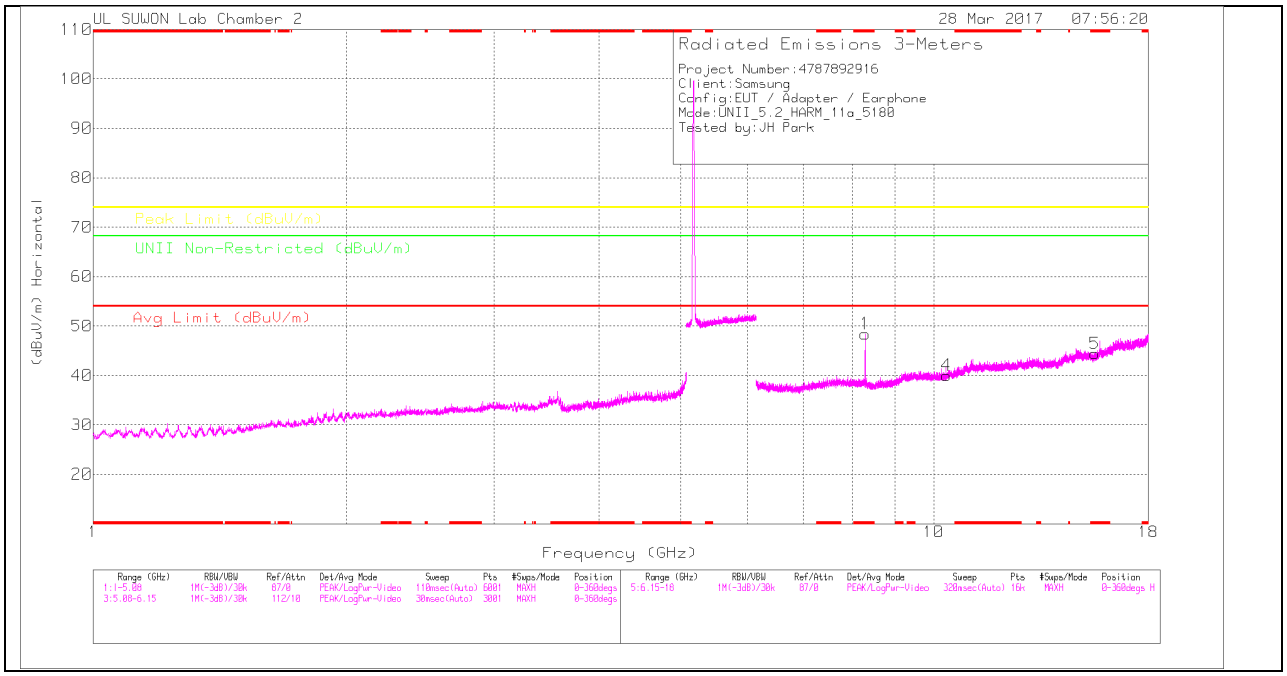
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

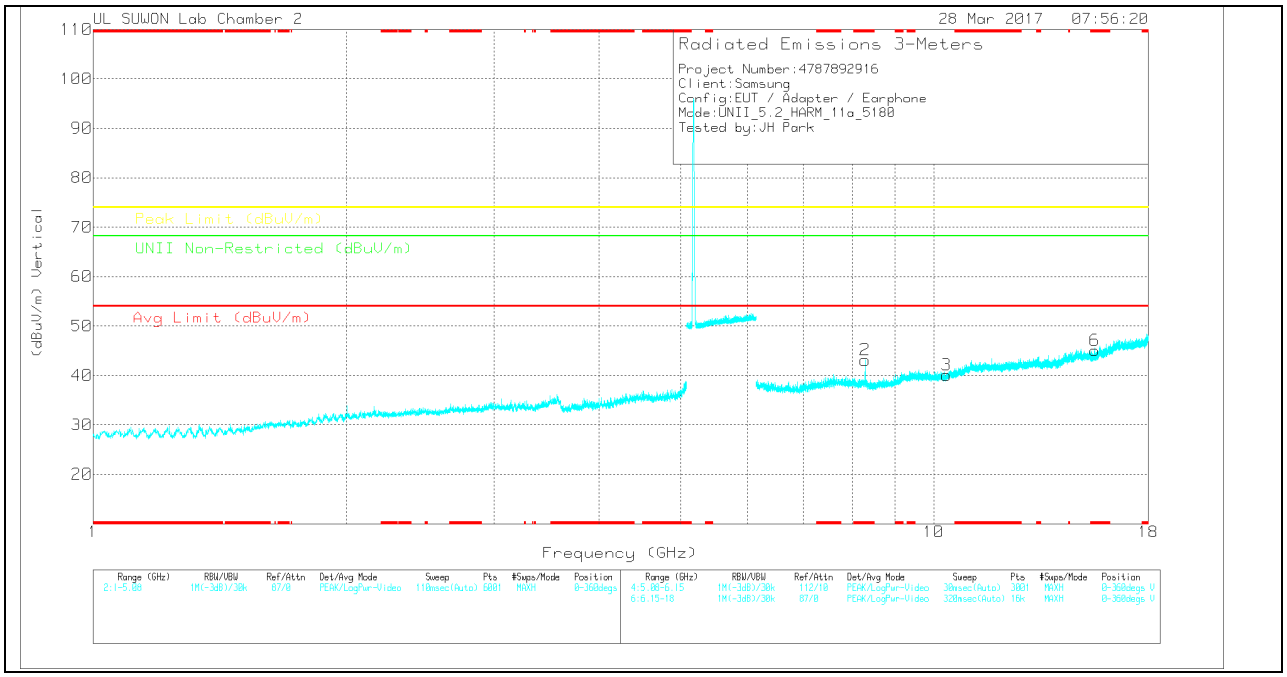
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; 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(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 8.288	31.32	PK	36	-18.9	0	48.42	-	-	74	-25.58	-	-	0-360	150	H
4	10.359	19.1	PK	37.6	-16.7	0	40	-	-	-	-	68.2	-28.2	0-360	150	H
5	* 15.54	18.91	PK	39.9	-14.4	0	44.41	-	-	74	-29.59	-	-	0-360	150	H
2	* 8.288	26.01	PK	36	-18.9	0	43.11	-	-	74	-30.89	-	-	0-360	150	V
3	10.359	19.16	PK	37.6	-16.7	0	40.06	-	-	-	-	68.2	-28.14	0-360	150	V
6	* 15.541	19.56	PK	39.9	-14.4	0	45.06	-	-	74	-28.94	-	-	0-360	250	V

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

PK – Peak Detector

Radiated Emissions

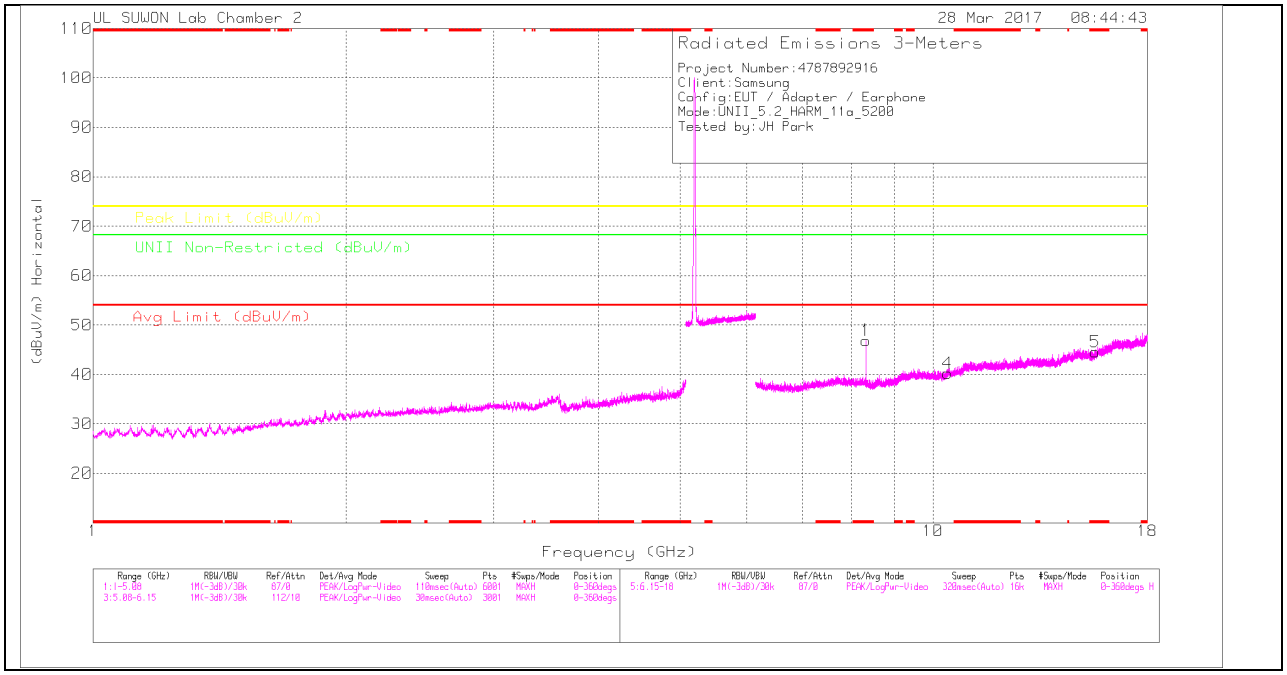
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 8.288	36.41	PK-U	36	-18.9	0	53.51	-	-	74	-20.49	-	-	34	262	H
* 8.288	30.36	ADR	36	-18.9	0	47.46	54	-6.54	-	-	-	-	34	262	H
* 8.288	34.68	PK-U	36	-18.9	0	51.78	-	-	74	-22.22	-	-	35	385	V
* 8.288	25.27	ADR	36	-18.9	0	42.37	54	-11.63	-	-	-	-	35	385	V

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

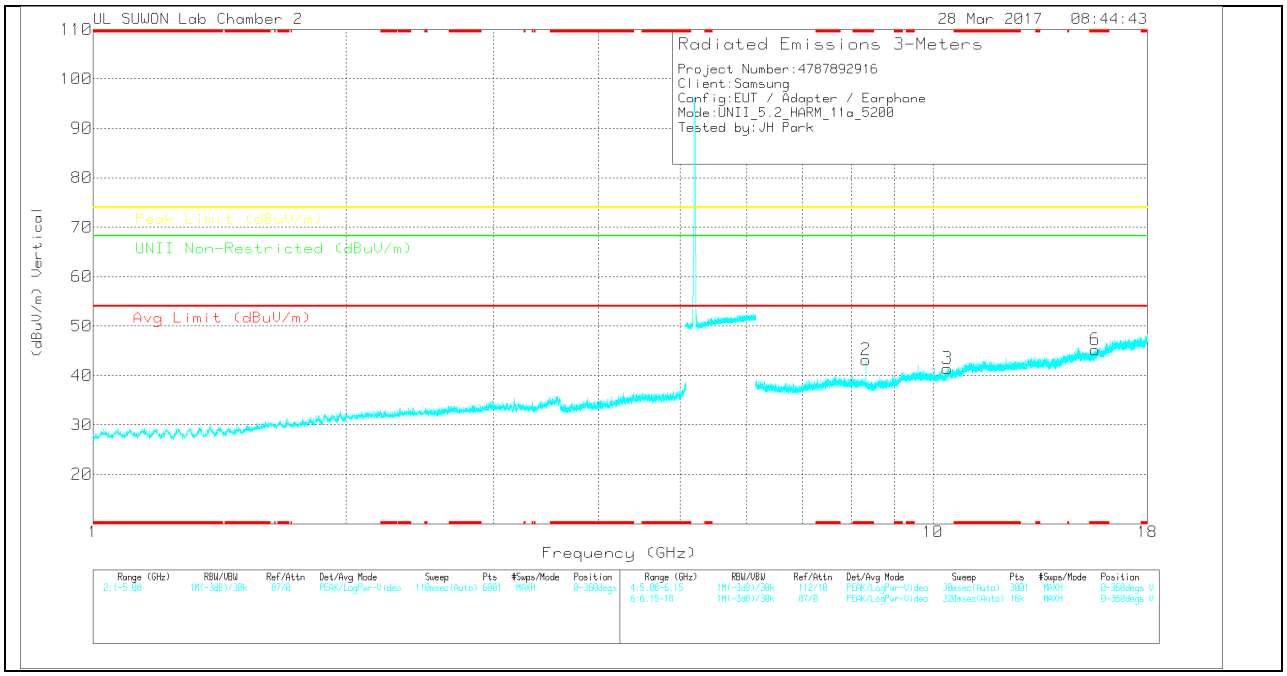
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; 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(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 8.32	29.77	PK	36	-18.9	0	46.87	-	-	74	-27.13	-	-	0-360	150	H
4	10.406	18.94	PK	37.6	-16.3	0	40.24	-	-	-	-	68.2	-27.96	0-360	250	H
5	* 15.599	19.04	PK	40	-14.5	0	44.54	-	-	74	-29.46	-	-	0-360	150	H
2	* 8.32	26.1	PK	36	-18.9	0	43.2	-	-	74	-30.8	-	-	0-360	250	V
3	10.402	20.23	PK	37.6	-16.4	0	41.43	-	-	-	-	68.2	-26.77	0-360	250	V
6	* 15.597	19.84	PK	40	-14.6	0	45.24	-	-	74	-28.76	-	-	0-360	250	V

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

PK – Peak Detector

Radiated Emissions

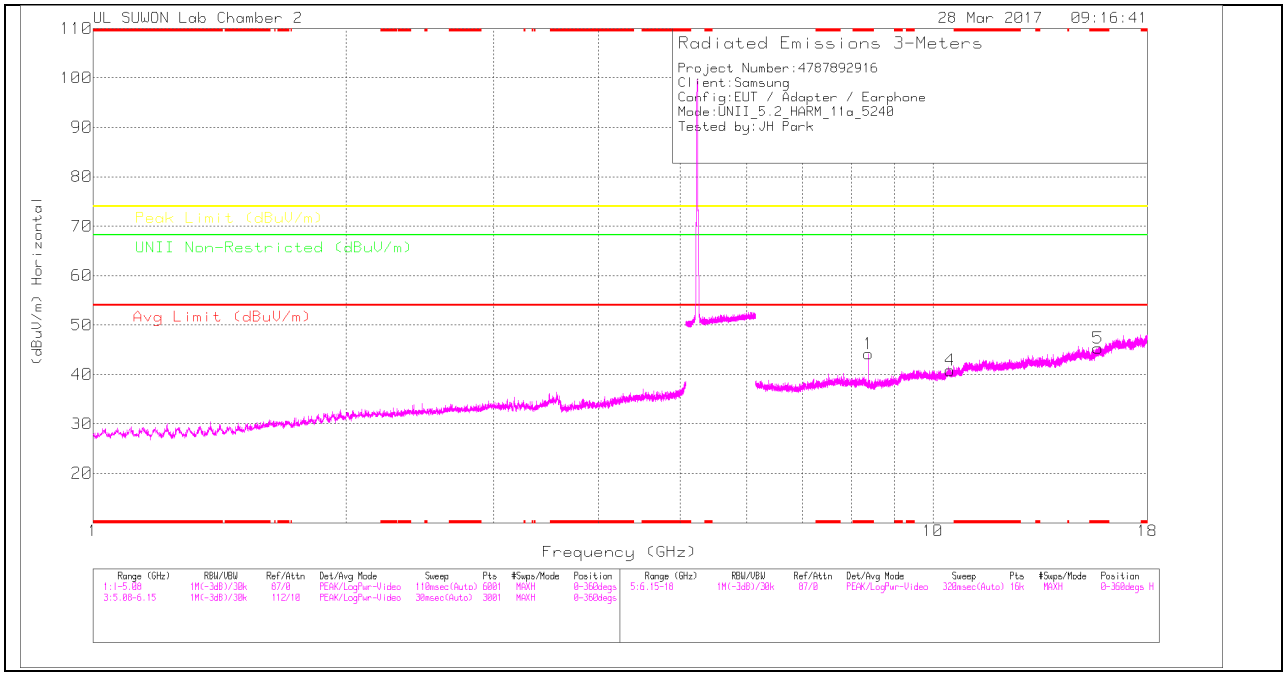
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 8.32	36.31	PK-U	36	-18.9	0	53.41	-	-	74	-20.59	-	-	41	160	H
* 8.32	29.46	ADR	36	-18.9	0	46.56	54	-7.44	-	-	-	-	41	160	H
* 8.32	34.28	PK-U	36	-18.9	0	51.38	-	-	74	-22.62	-	-	0	189	V
* 8.32	24.36	ADR	36	-18.9	0	41.46	54	-12.54	-	-	-	-	0	189	V

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

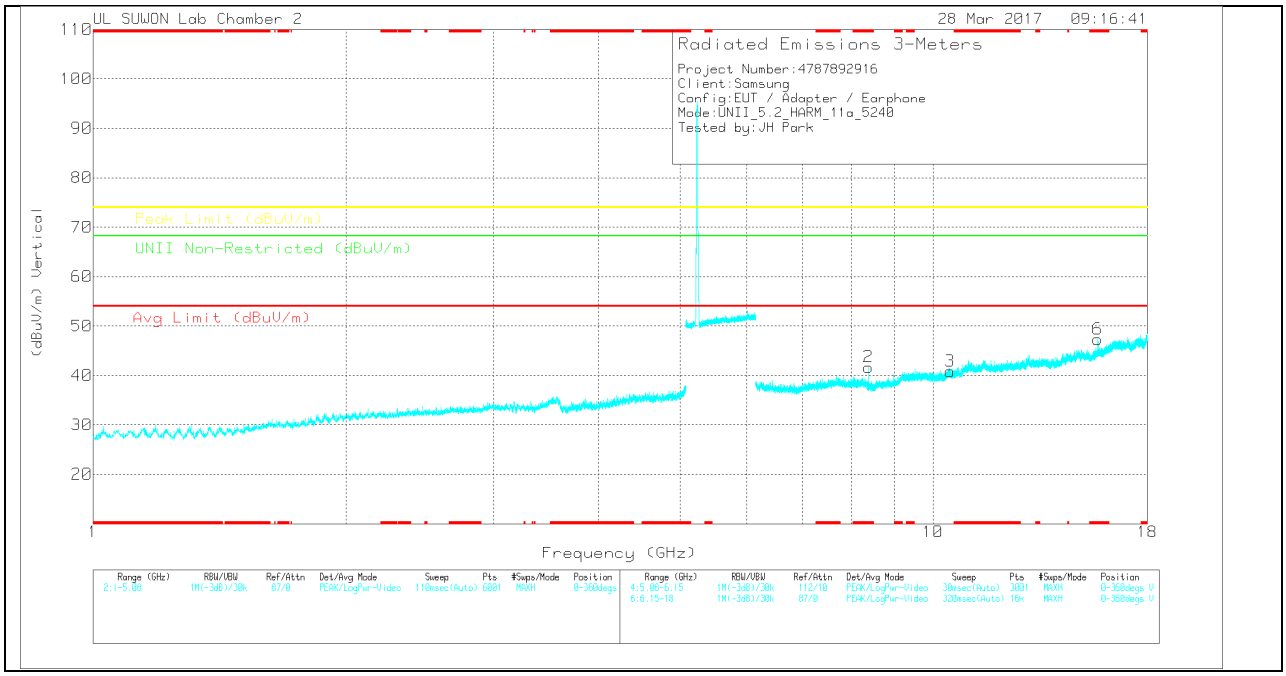
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; 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(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 8.384	27.68	PK	35.9	-19.4	0	44.18	-	-	74	-29.82	-	-	0-360	250	H
4	10.483	19.63	PK	37.7	-16.5	0	40.83	-	-	-	-	68.2	-27.37	0-360	250	H
5	* 15.725	19.93	PK	40.2	-14.8	0	45.33	-	-	74	-28.67	-	-	0-360	150	H
2	* 8.384	25.19	PK	35.9	-19.4	0	41.69	-	-	74	-32.31	-	-	0-360	250	V
3	10.478	19.52	PK	37.7	-16.4	0	40.82	-	-	-	-	68.2	-27.38	0-360	150	V
6	* 15.717	22.12	PK	40.1	-14.9	0	47.32	-	-	74	-26.68	-	-	0-360	150	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 8.384	35.3	PK-U	35.9	-19.4	0	51.8	-	-	74	-22.2	-	-	37	195	H
* 8.384	26.56	ADR	35.9	-19.4	0	43.06	54	-10.94	-	-	-	-	37	195	H
* 8.384	33.26	PK-U	35.9	-19.4	0	49.76	-	-	74	-24.24	-	-	325	145	V
* 8.384	22.73	ADR	35.9	-19.4	0	39.23	54	-14.77	-	-	-	-	325	145	V
* 15.718	34.48	PK-U	40.1	-14.9	0	59.68	-	-	74	-14.32	-	-	11	225	V
* 15.72	20.78	ADR	40.1	-14.8	.32	46.4	54	-7.6	-	-	-	-	11	225	V
* 15.72	30.19	PK-U	40.1	-14.8	0	55.49	-	-	74	-18.51	-	-	35	294	H
* 15.725	17.39	ADR	40.2	-14.8	.32	43.11	54	-10.89	-	-	-	-	35	294	H

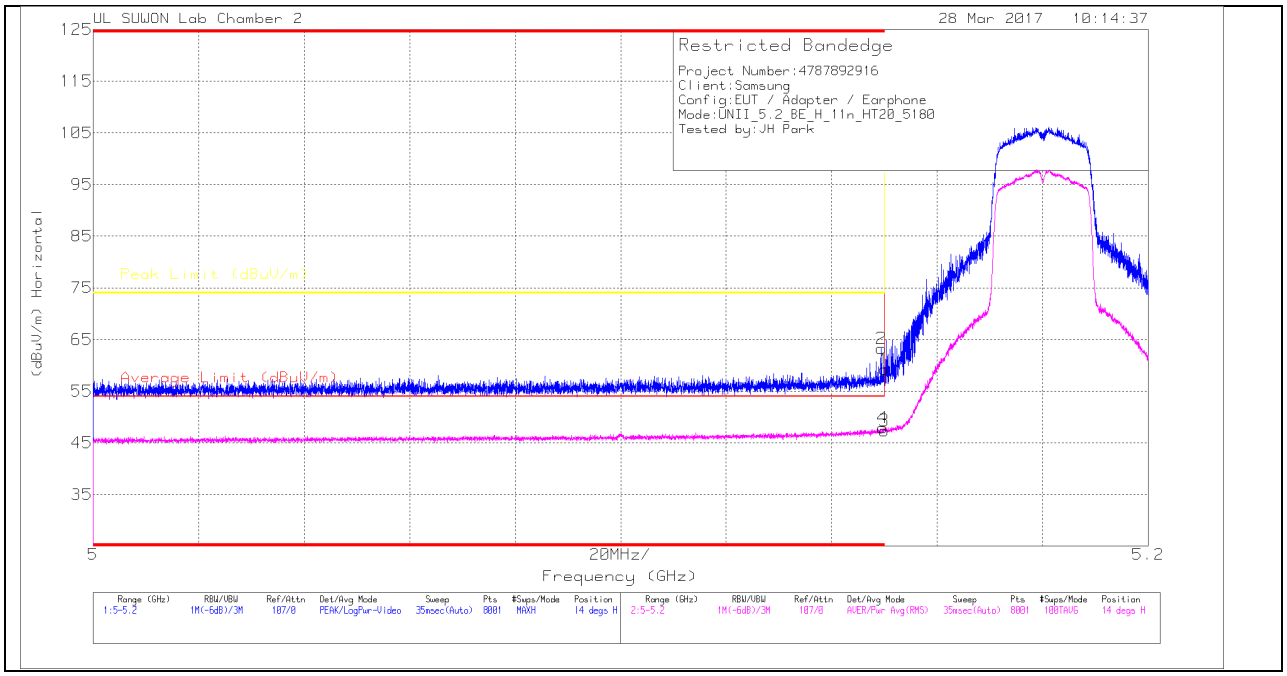
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

10.1.2. TX Above 1GHz 802.11n HT20 MODE IN THE 5.2GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

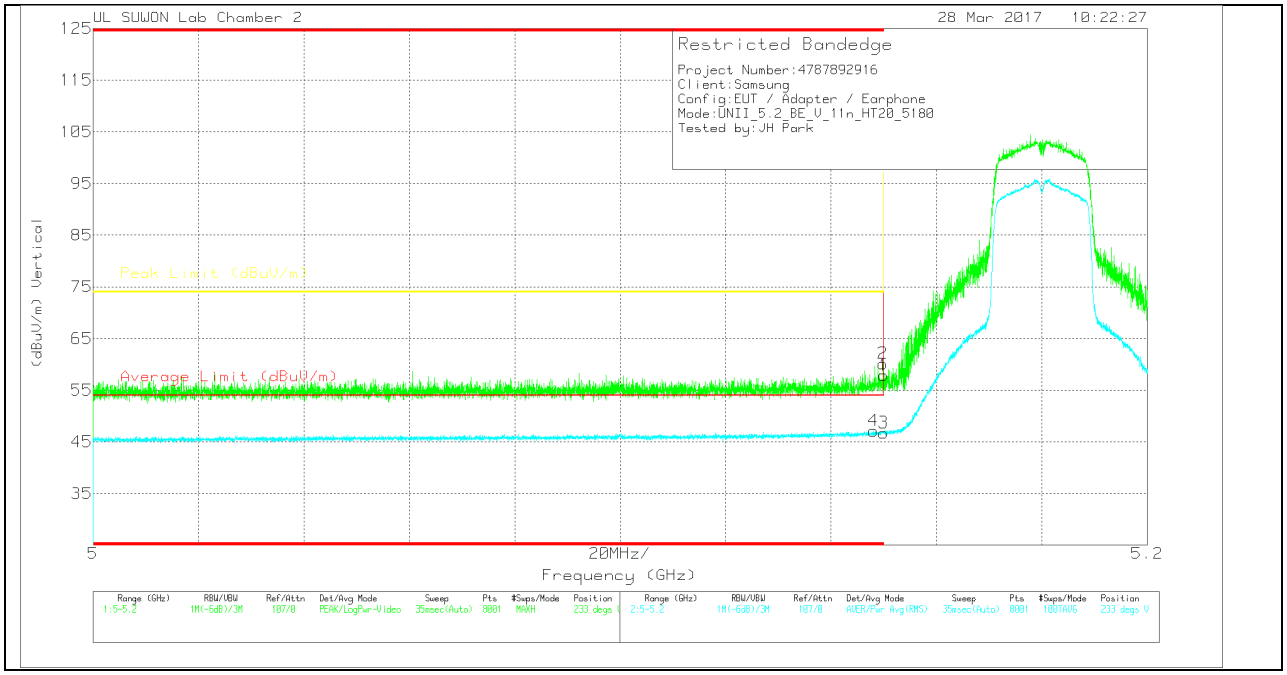
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.15	40.44	Pk	34.1	-15.3	0	59.24	-	-	74	-14.76	14	175	H
2	* 5.149	44.47	Pk	34.1	-15.3	0	63.27	-	-	74	-10.73	14	175	H
3	* 5.15	28.19	RMS	34.1	-15.3	.35	47.34	54	-6.66	-	-	14	175	H
4	* 5.15	28.75	RMS	34.1	-15.3	.35	47.9	54	-6.1	-	-	14	175	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(00168724)_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	* 5.15	39.08	Pk	34.1	-15.3	0	57.88	-	-	74	-16.12	233	349	V
2	* 5.15	41.36	Pk	34.1	-15.3	0	60.16	-	-	74	-13.84	233	349	V
3	* 5.15	27.61	RMS	34.1	-15.3	.35	46.76	54	-7.24	-	-	233	349	V
4	* 5.148	28	RMS	34.1	-15.3	.35	47.15	54	-6.85	-	-	233	349	V

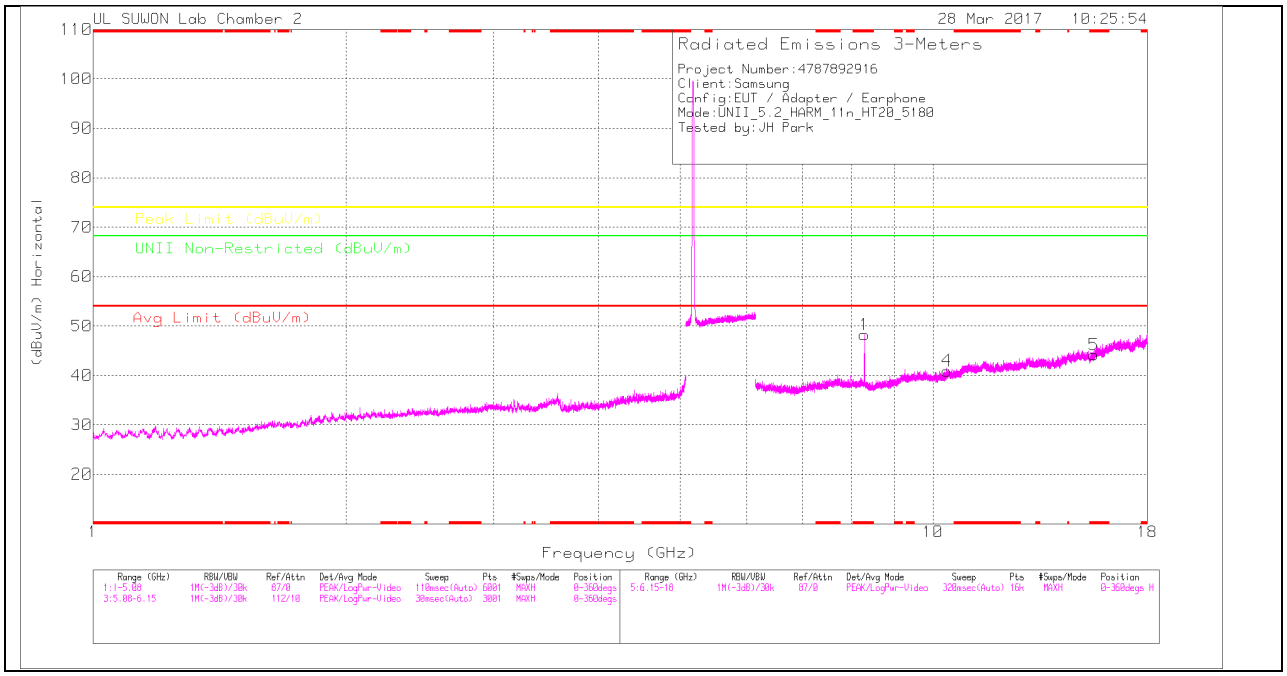
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

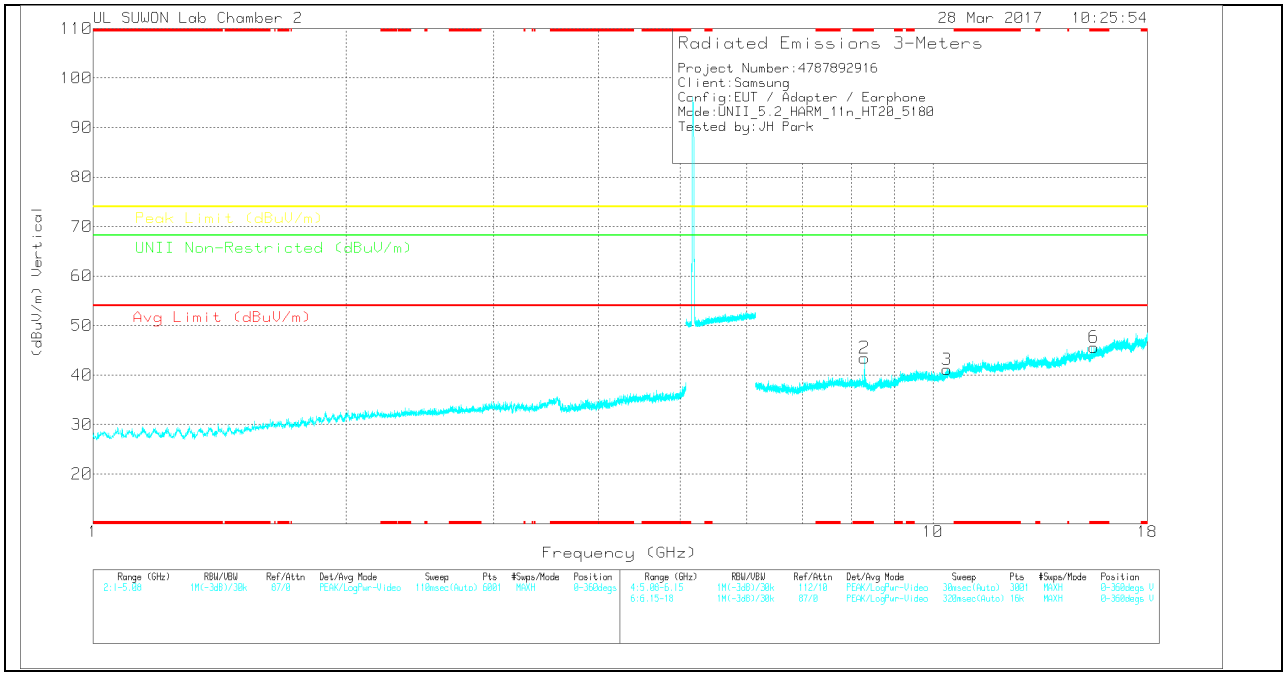
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; 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(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 8.288	31.14	PK	36	-18.9	0	48.24	-	-	74	-25.76	-	-	0-360	150	H
4	10.389	19.72	PK	37.6	-16.4	0	40.92	-	-	-	-	68.2	-27.28	0-360	150	H
5	* 15.542	18.68	PK	39.9	-14.4	0	44.18	-	-	74	-29.82	-	-	0-360	150	H
2	* 8.288	26.34	PK	36	-18.9	0	43.44	-	-	74	-30.56	-	-	0-360	250	V
3	10.386	19.9	PK	37.6	-16.4	0	41.1	-	-	-	-	68.2	-27.1	0-360	250	V
6	* 15.541	20.13	PK	39.9	-14.4	0	45.63	-	-	74	-28.37	-	-	0-360	150	V

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

PK – Peak Detector

Radiated Emissions

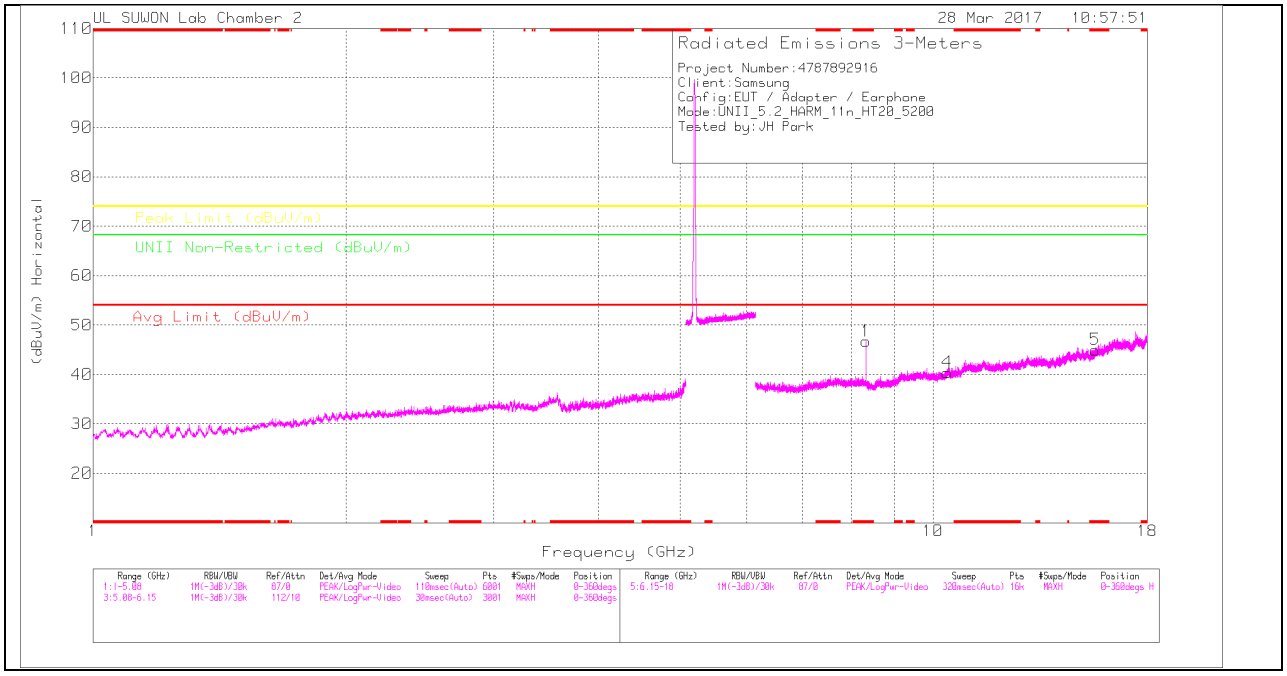
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 8.288	36.39	PK-U	36	-18.9	0	53.49	-	-	74	-20.51	-	-	42	173	H
* 8.288	27.97	ADR	36	-18.9	0	45.07	54	-8.93	-	-	-	-	42	173	H
* 8.288	34.18	PK-U	36	-18.9	0	51.28	-	-	74	-22.72	-	-	331	156	V
* 8.288	24.81	ADR	36	-18.9	0	41.91	54	-12.09	-	-	-	-	331	156	V

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

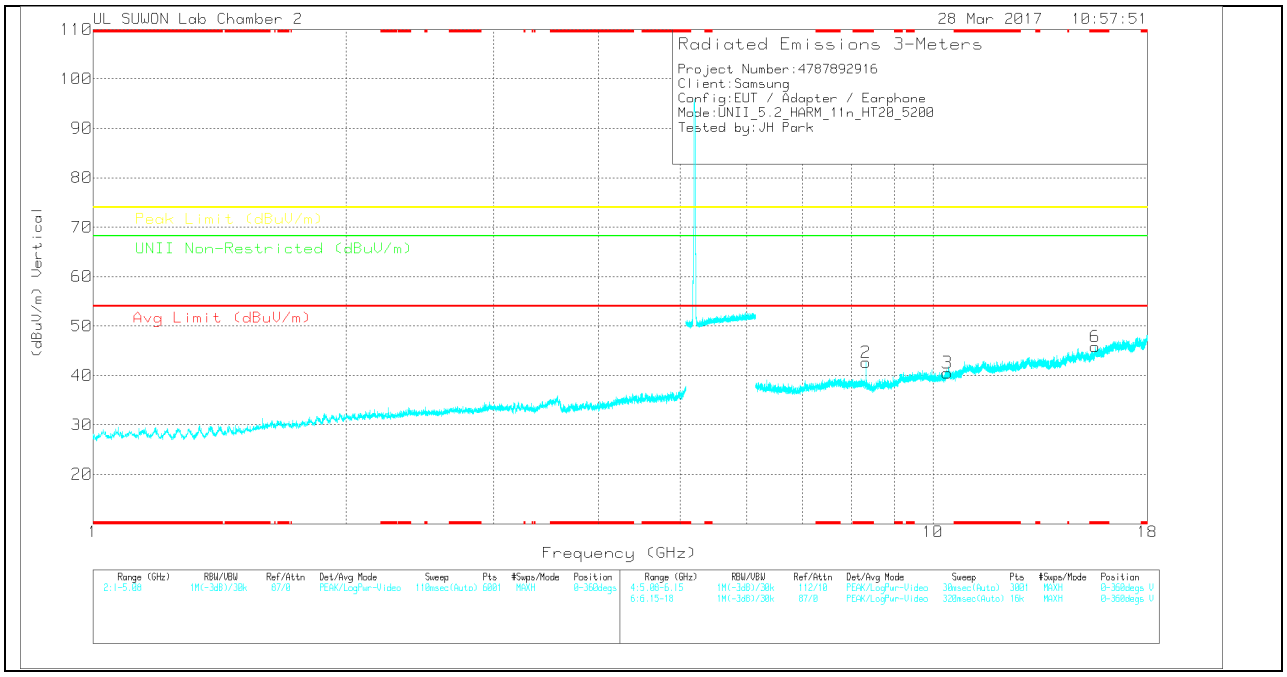
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; 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(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 8.32	29.64	PK	36	-18.9	0	46.74	-	-	74	-27.26	-	-	0-360	150	H
4	10.403	19.11	PK	37.6	-16.3	0	40.41	-	-	-	-	68.2	-27.79	0-360	150	H
5	* 15.601	19.5	PK	40	-14.5	0	45	-	-	74	-29	-	-	0-360	250	H
2	* 8.32	25.53	PK	36	-18.9	0	42.63	-	-	74	-31.37	-	-	0-360	250	V
3	10.401	19.31	PK	37.6	-16.4	0	40.51	-	-	-	-	68.2	-27.69	0-360	250	V
6	* 15.6	20.33	PK	40	-14.5	0	45.83	-	-	74	-28.17	-	-	0-360	250	V

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

PK – Peak Detector

Radiated Emissions

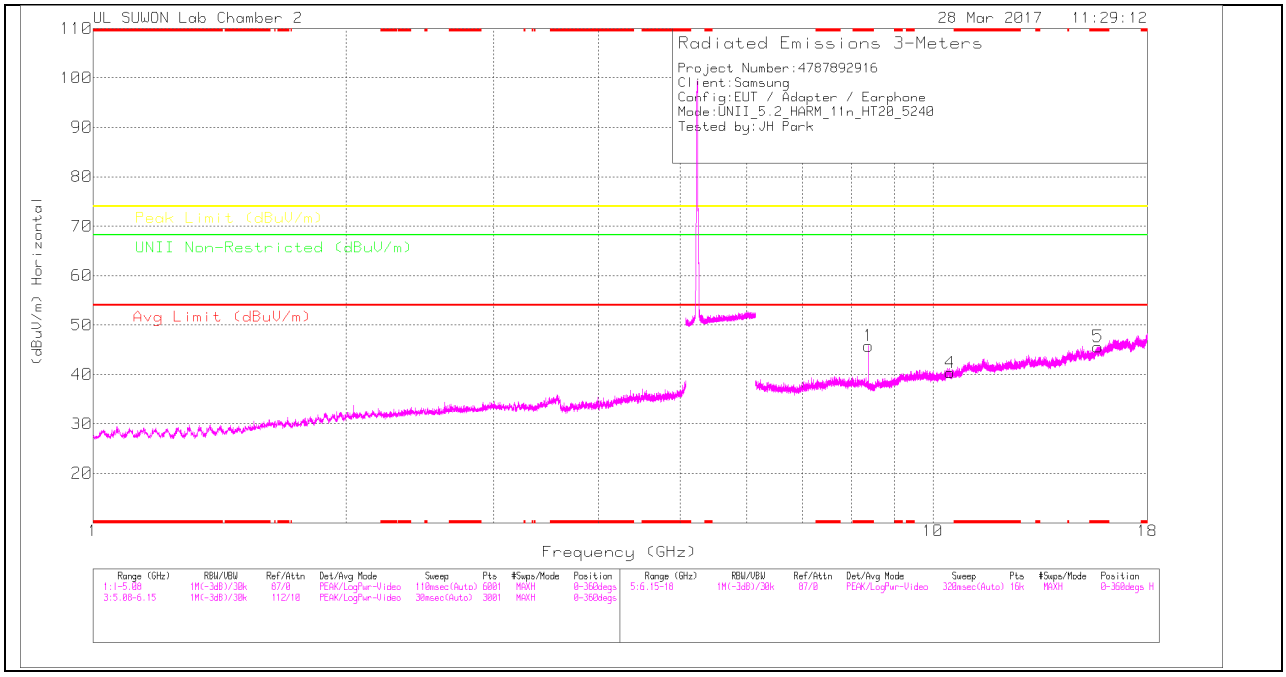
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 8.32	36.56	PK-U	36	-18.9	0	53.66	-	-	74	-20.34	-	-	42	164	H
* 8.32	28.88	ADR	36	-18.9	0	45.98	54	-8.02	-	-	-	-	42	164	H
* 8.32	33.22	PK-U	36	-18.9	0	50.32	-	-	74	-23.68	-	-	328	172	V
* 8.32	23.11	ADR	36	-18.9	0	40.21	54	-13.79	-	-	-	-	328	172	V

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

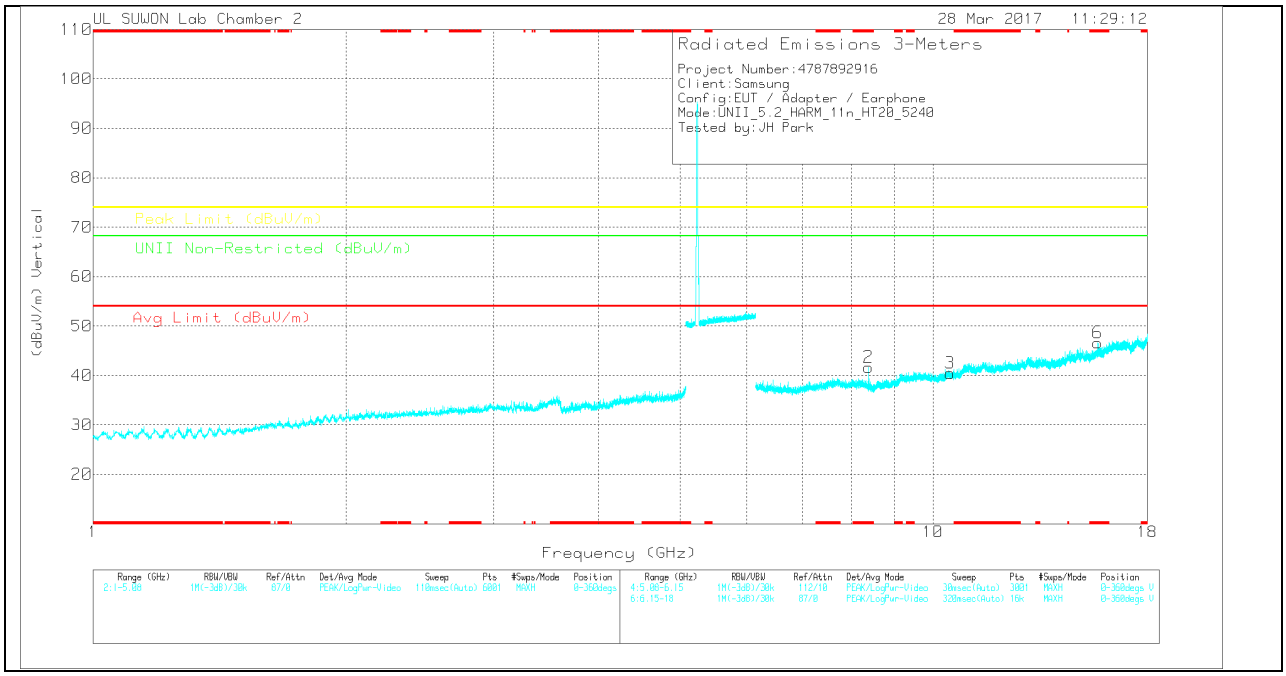
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; 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(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 8.384	29.29	PK	35.9	-19.4	0	45.79	-	-	74	-28.21	-	-	0-360	150	H
4	10.482	19.14	PK	37.7	-16.5	0	40.34	-	-	-	-	68.2	-27.86	0-360	150	H
5	* 15.723	20.23	PK	40.2	-14.8	0	45.63	-	-	74	-28.37	-	-	0-360	150	H
2	* 8.384	25.17	PK	35.9	-19.4	0	41.67	-	-	74	-32.33	-	-	0-360	250	V
3	10.482	19.23	PK	37.7	-16.5	0	40.43	-	-	-	-	68.2	-27.77	0-360	250	V
6	* 15.719	21.31	PK	40.1	-14.8	0	46.61	-	-	74	-27.39	-	-	0-360	250	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 8.384	35.09	PK-U	35.9	-19.4	0	51.59	-	-	74	-22.41	-	-	41	173	H
* 8.384	27.57	ADR	35.9	-19.4	0	44.07	54	-9.93	-	-	-	-	41	173	H
* 8.384	34.04	PK-U	35.9	-19.4	0	50.54	-	-	74	-23.46	-	-	317	142	V
* 8.384	23.32	ADR	35.9	-19.4	0	39.82	54	-14.18	-	-	-	-	317	142	V

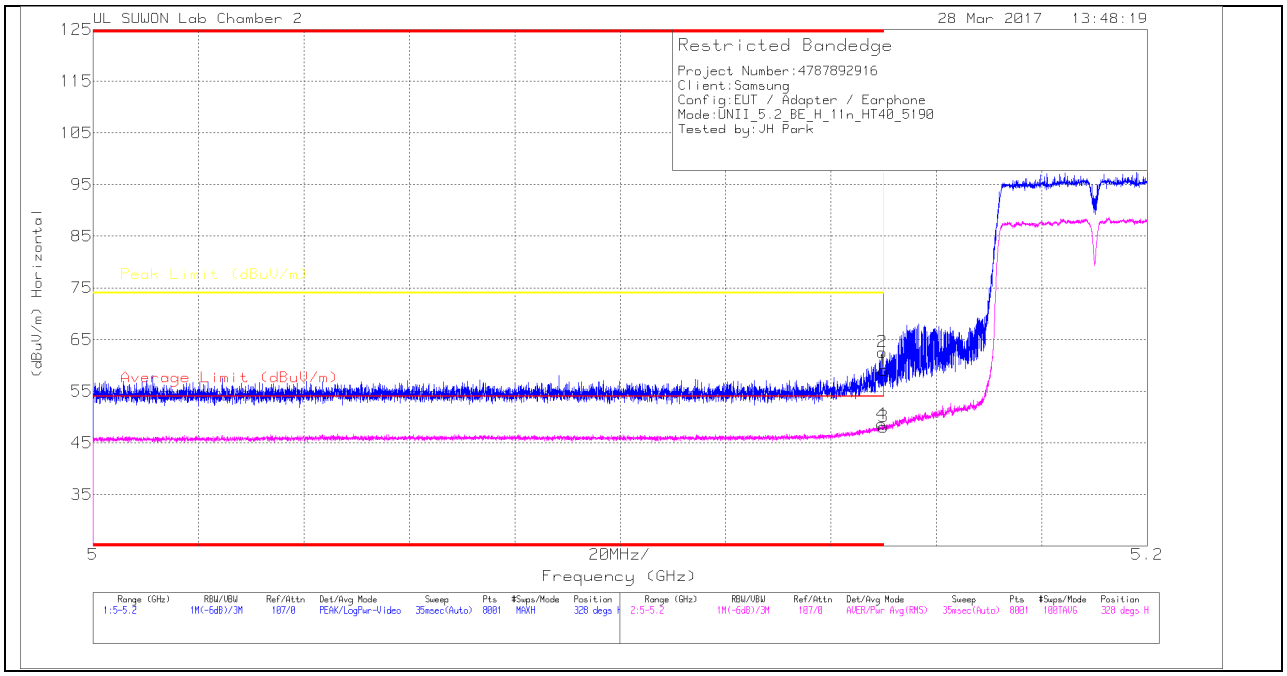
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

10.1.3. TX Above 1GHz 802.11n HT40 MODE IN THE 5.2GHz BAND RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

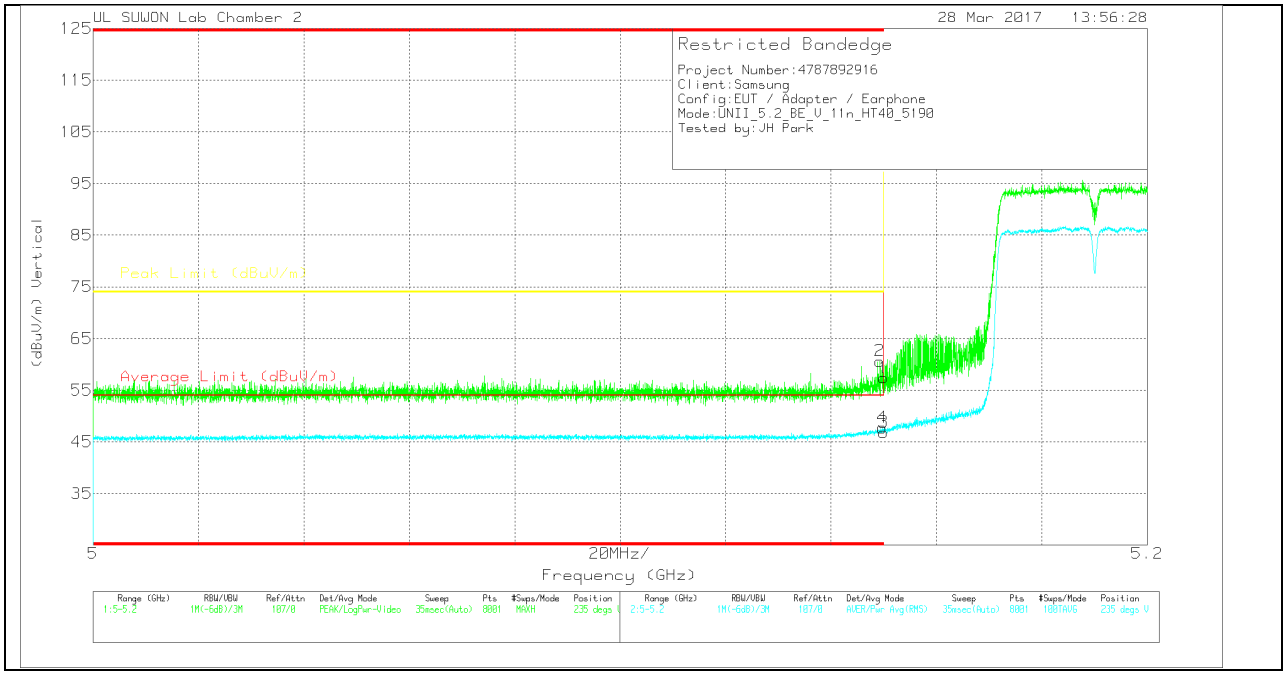
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	10dB[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.15	40.27	Pk	34.1	-15.3	0	59.07	-	-	74	-14.93	328	149	H
2	* 5.15	43.79	Pk	34.1	-15.3	0	62.59	-	-	74	-11.41	328	149	H
3	* 5.15	28.65	RMS	34.1	-15.3	.67	48.12	54	-5.88	-	-	328	149	H
4	* 5.15	29.18	RMS	34.1	-15.3	.67	48.65	54	-5.35	-	-	328	149	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(00168724)_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	* 5.15	38.59	Pk	34.1	-15.3	0	57.39	-	-	74	-16.61	235	351	V
2	* 5.149	41.85	Pk	34.1	-15.3	0	60.65	-	-	74	-13.35	235	351	V
3	* 5.15	27.41	RMS	34.1	-15.3	.67	46.88	54	-7.12	-	-	235	351	V
4	* 5.15	28.29	RMS	34.1	-15.3	.67	47.76	54	-6.24	-	-	235	351	V

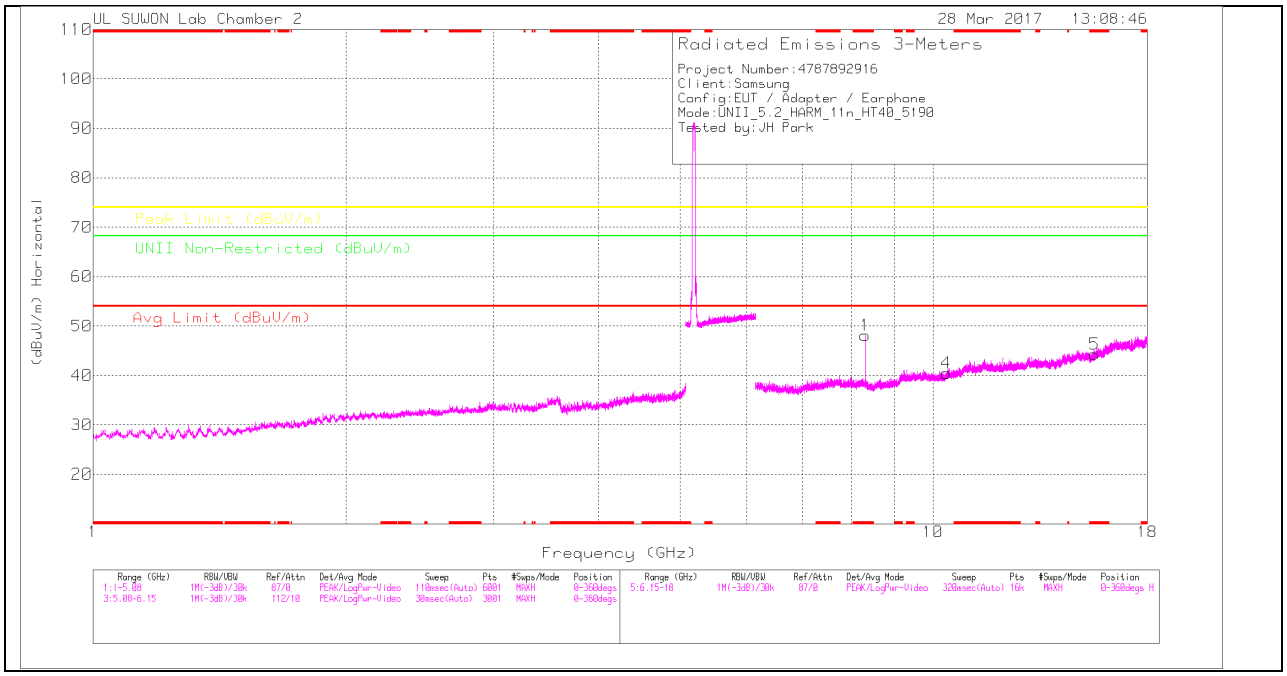
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

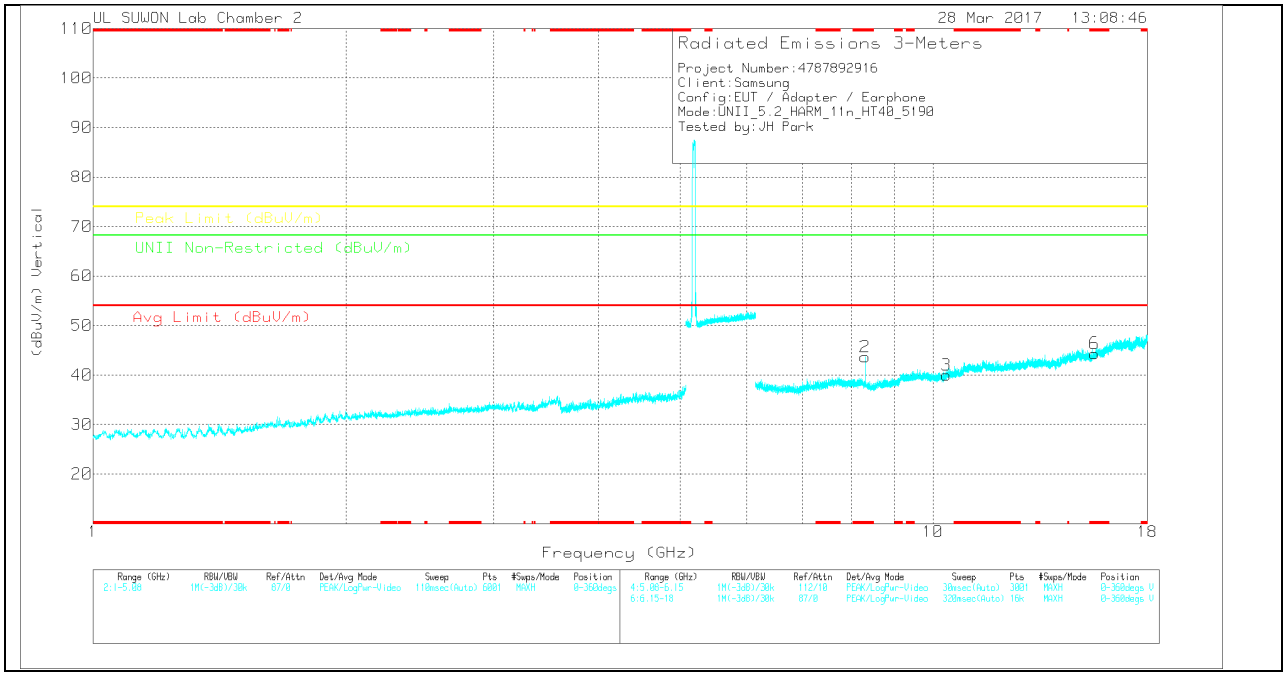
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Note: Emission was scanned up to 40GHz; 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(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 8.304	30.91	PK	36	-18.8	0	48.11	-	-	74	-25.89	-	-	0-360	150	H
4	10.379	19.33	PK	37.6	-16.5	0	40.43	-	-	-	-	68.2	-27.77	0-360	150	H
5	* 15.572	18.9	PK	40	-14.6	0	44.3	-	-	74	-29.7	-	-	0-360	150	H
2	* 8.304	26.44	PK	36	-18.8	0	43.64	-	-	74	-30.36	-	-	0-360	150	V
3	10.379	18.89	PK	37.6	-16.5	0	39.99	-	-	-	-	68.2	-28.21	0-360	250	V
6	* 15.575	18.82	PK	40	-14.5	0	44.32	-	-	74	-29.68	-	-	0-360	150	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	6GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 8.304	36.94	PK-U	36	-18.8	0	54.14	-	-	74	-19.86	-	-	39	191	H
* 8.304	31.13	ADR	36	-18.8	0	48.33	54	-5.67	-	-	-	-	39	191	H
* 8.304	34.19	PK-U	36	-18.8	0	51.39	-	-	74	-22.61	-	-	360	153	V
* 8.304	23.32	ADR	36	-18.8	0	40.52	54	-13.48	-	-	-	-	360	153	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average