Test Report of FCC CFR 47 Part 15 Subpart E

On Behalf of

SHENZHEN NED OPTICS CO .,LTD.

Rm W101, 1/F, West Block, PKU-HKUST SZ-HK Institution, No 15, Gaoxinnan 7th Rd, Nanshan District, Shenzhen, P.R. China

Product Name:	**Personal Theater**
Model/Type No.:	**G1**
FCC ID:	**2AL39-GOOVISG1**
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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	**SHENZHEN NED OPTICS CO.,LTD.**
Address of Applicant:	Rm W101, 1/F, West Block, PKU-HKUST SZ-HK Institution, No 15, Gaoxinnan 7th Rd, Nanshan District, Shenzhen, P.R. China
Manufacturer:	**SHENZHEN NED OPTICS CO.,LTD.**
Address of Manufacturer:	Rm W101, 1/F, West Block, PKU-HKUST SZ-HK Institution, No 15, Gaoxinnan 7th Rd, Nanshan District, Shenzhen, P.R. China

General Description of E.U.T

Items	Description
EUT Description:	Personal Theater
Brand Name:	GOOVIS
Model No.:	G1
Operation Frequency:	For 802.11a/n HT20: 5180~5240MHz, 5745~5825MHz
Channel numbers:	802.11a/802.11n HT20: 9
Channel separation:	802.11a/802.11n HT20:20MHz
Modulation technology: (IEEE 802.11a)	BPSK,QPSK,16-QAM,64-QAM
Modulation technology: (IEEE 802.11n HT20)	BPSK,QPSK,16-QAM,64-QAM
Data speed (IEEE 802.11a):	6Mbps,9Mbps,12Mbps,18Mbps,24Mbps,36Mbps,48Mbps,54Mbps
Data speed (IEEE 802.11n HT20):	MCS0: 6.5Mbps,MCS1:13Mbps,MCS2:19.5Mbps,MCS3:26Mbps, MCS4:39Mbps,MCS5:52Mbps,MCS6:58.5Mbps,MCS7:65Mbps
Antenna Type:	Internal ANTENNA
Antenna Gain:	2dBi
Adapter Information:	Adapter : Input: AC 100V~240V, 50/60Hz, 0.35A Output: DC 5V, 2A

Remark: * The test data gathered are from the production sample provided by the manufacturer.

Operation Frequency:

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	**MHz**
36	5180
40	5200
44	5220
48	5240
149	5745
153	5765
157	5785
161	5805
165	5825

Remark:
The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

802.11a/802.11n HT20

Channel	Frequency	Frequency
The lowest channel	5180MHz	5745MHz
The middle channel	5220MHz	5785MHz
The Highest channel	5240MHz	5825MHz

1.2 Test Standards

The tests were performed based on the Electromagnetic Interference (EMI) tests performed on the EUT. Both conducted and radiated testing were performed according to the procedures in ANSI C63.10-2013 Radiated testing was performed at an antenna to EUT distance 3 meters.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, and section 15.203, 15.207, 15.209 and 15.407 rules and the FCC publication KDB789033, KDB662911, KDB558074 of Guidance on Measurements for Digital Transmission Systems (47 CFR 15.407) .

1.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December, 2013.

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

Support equipments or special accessories in test configuration：

AUX Description:	Manufacturer	Model No.	Certificate	CABLE
Host Computer	Dell	78MD82X	CE, FCC	1.5m Unshielded Power Cord
Monitor	Dell	E178Pc	CE, FCC	1.5m Unshielded Power Cord 1.8m shielded data Cable with core
Keyboard	Dell	L100	CE, FCC	1.8m shielded data Cable with core
Mouse	Dell	OCJ339	CE, FCC	1.8m shielded data Cable with core

2.3 General Test Procedures

Conducted Emissions :The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions: The EUT is a placed on as turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013

2.4 Measurement Uncertainty

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

Parameter	Uncertainty
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

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

2.5 List of Measuring Equipments Used

Test equipments list of Shenzhen CTL Testing Technology Co., Ltd.

No.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	EMI Test Receiver	R&S	ESCI	100687	2016-7-25	2017-7-24
2	EMI Test Receiver	R&S	ESPI	100097	2016-10-1	2017-10-31
3	Amplifier	HP	8447D	1937A02492	2016-7-25	2017-7-24
4	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2016-7-25	2017-7-24
5	Triple-Loop Antenna	EVERFINE	LLA-2	711002	2016-10-1	2017-10-31
6	RF POWER AMPLIFIER	FRANKONIA	FLL-75	1020A1109	2016-7-25	2017-7-24
7	6DB Attenuator	FRANKONIA	N/A	1001698	2016-7-25	2017-7-24
8	10dB attenuator	ELECTRO-METRICS	EM-7600	836	2016-7-25	2017-7-24
9	Spectrum Analyzer	R&S	FSP	100397	2016-10-1	2017-10-31
10	Broadband preamplifier	SCH WARZBECK	BBV9718	9718-182	2016-7-25	2017-7-24
11	Broadband preamplifier	Burgeon	BPA-530	SN:100219	2016-7-25	2017-7-24
12	Horn Antenna	SCHWARZBECK	BBHA 9120D	0437	2016-7-25	2017-7-24
13	Horn Antenna	SCHWARZBECK	BBHA9170	0483	2016-7-25	2017-7-24

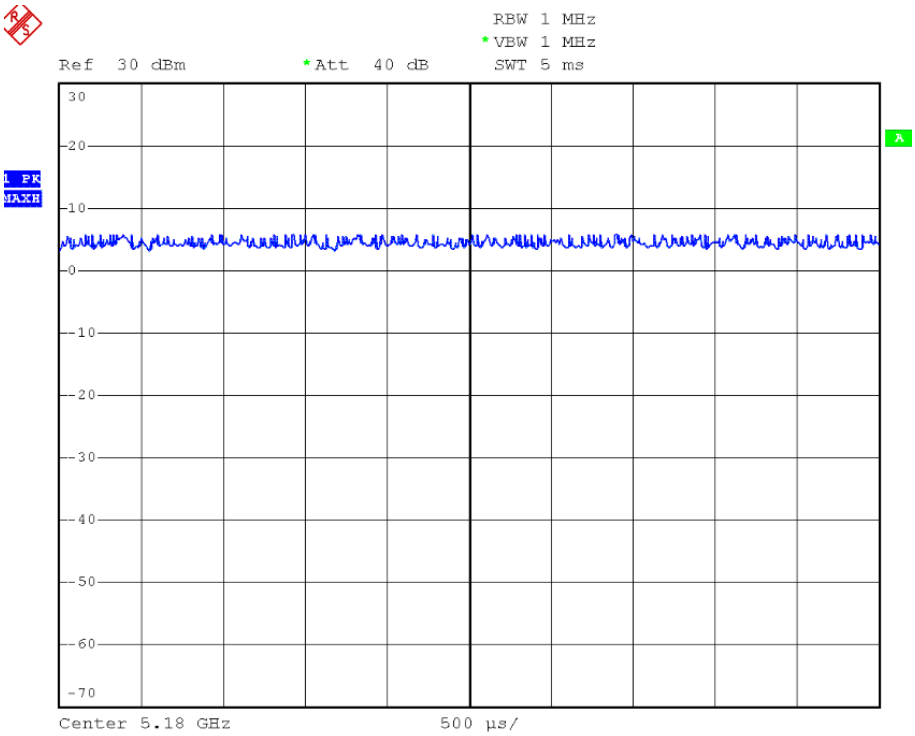
3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Test Limit	Result
N/A	Duty Cycle	>99%	Pass
FCC §15.407(a)	26dB Bandwidth	N/A	Pass
FCC §15.407(e)	6dB Bandwidth	≥ 500kHz	Pass
FCC §15.407(a)	Maximum Conducted Output Power	< 30 dBm	Pass
FCC §15.407(a)	Power Spectral Density	< 17 dBm/MHz < 30 dBm/MHz	Pass
FCC §15.407(b)	Band Edges Measurement	< -27dBm/MHz EIRP < -17dBm/MHz EIRP	Pass
FCC §15.407(g)	Frequency Stability	within the band of operation	Pass
FCC §15.209(a)	Radiated Undesirable Emission	Emissions in restricted bands must meet the radiated limits detailed in15.209	Pass
FCC §15.407(b)	Conducted Undesirable Emission	< -27dBm/MHz	Pass
FCC §15.207(a)	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits	Pass

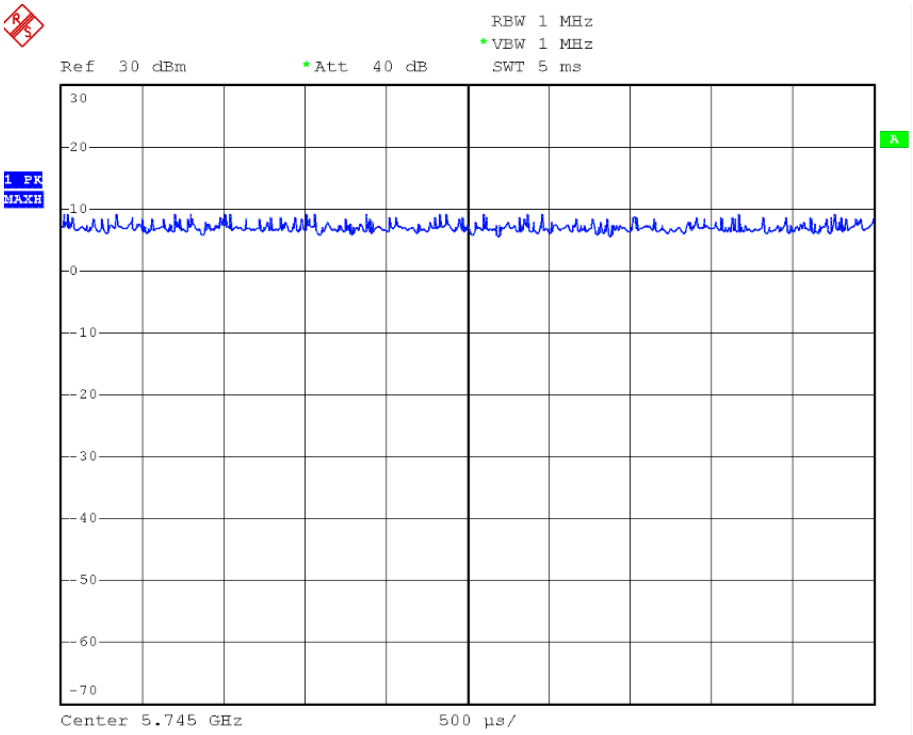
4. DUTY CYCLE

A mode duty cycle
Duty cycle > 99%

5180MHz

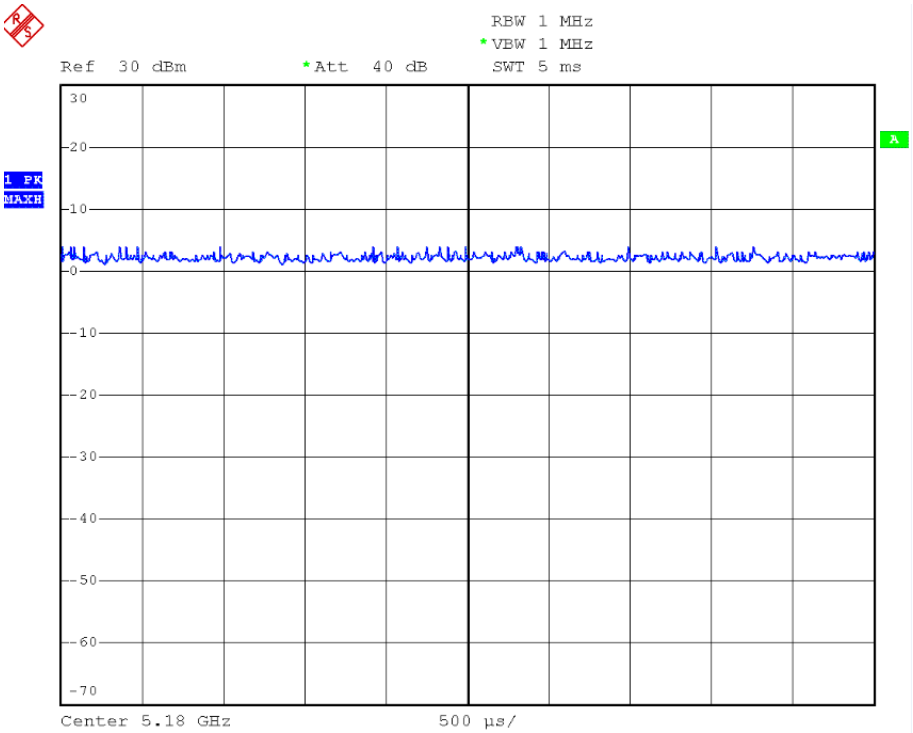


5745MHz

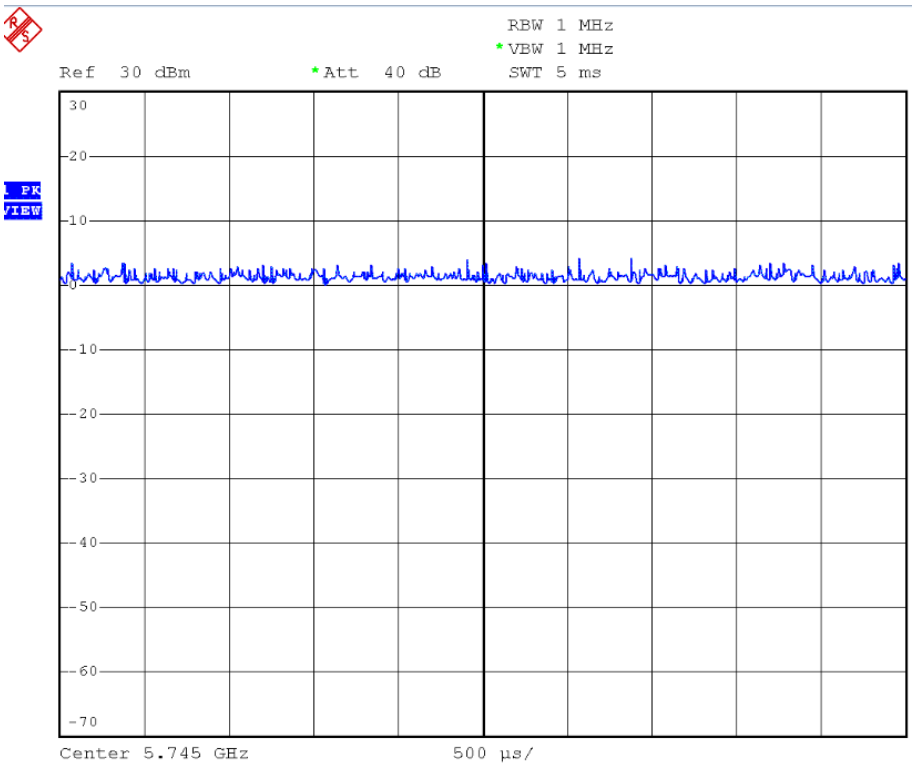


N20 mode duty cycle
Duty cycle > 99%

5180MHz



5745MHz



5. 26 dB EMISSION BANDWIDTH

5.1 LIMIT

According to §15.303(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Test Procedure used is KDB 789033 D02v01 – Section C.1

5.2 Test Configuration

Spectrum Analyzer

5.3 Test Procedure

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW ≥ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.

5.4 Test Results

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Bandwidth (MHz)	99%Bandwidth (MHz)
Low	5180	21.92	16.88
Mid	5220	21.52	16.88
High	5240	22.56	16.88

Test mode: IEEE 802.11nHT 20 mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	Bandwidth (MHz)	99%Bandwidth (MHz)
Low	5180	23.92	18.08
Mid	5220	23.44	18.00
High	5240	22.96	18.00

Test mode: IEEE 802.11a mode / 5745 ~ 5825MHz

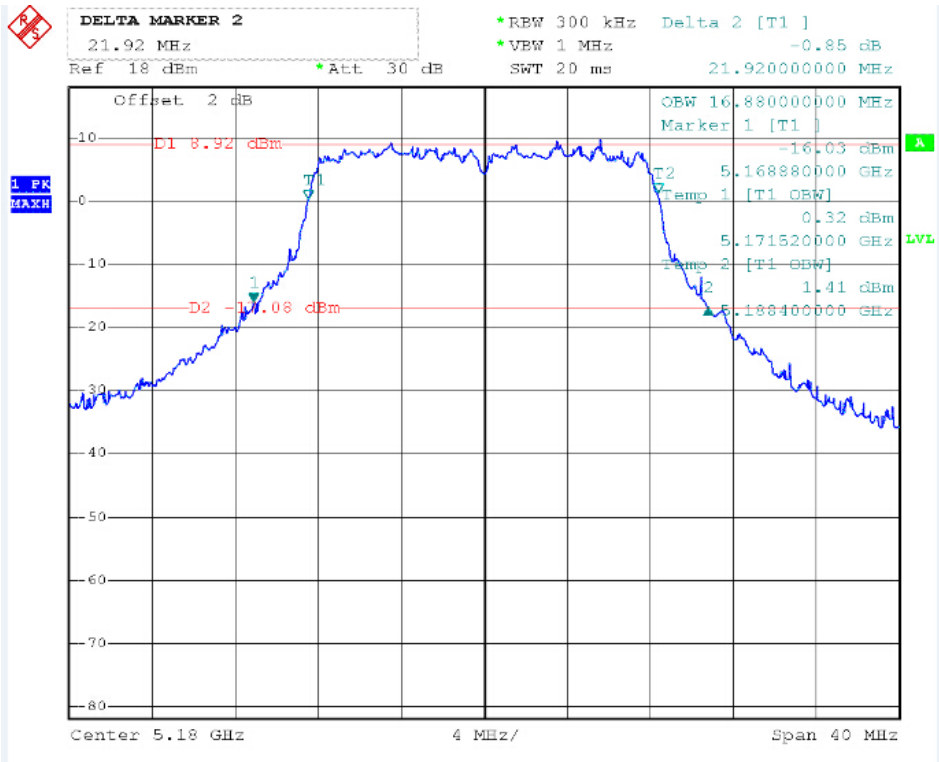
Channel	Frequency (MHz)	Bandwidth (MHz)	99%Bandwidth (MHz)
Low	5745	23.12	17.20
Mid	5785	24.72	17.36
High	5825	28.40	17.36

Test mode: IEEE 802.11n HT20 mode / 5745 ~ 5825MHz

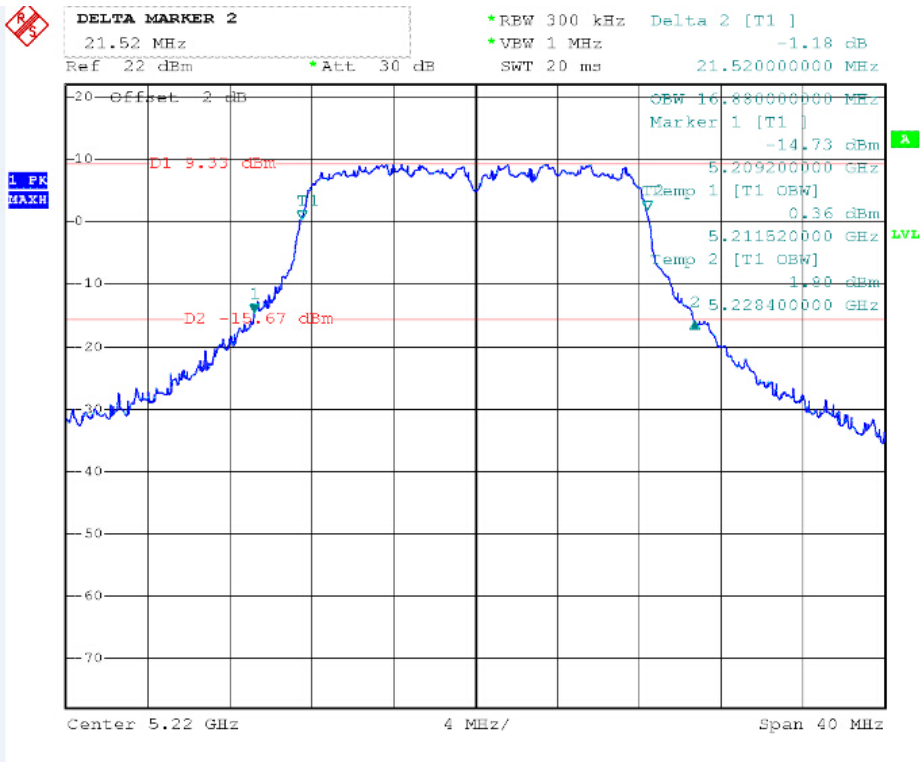
Channel	Frequency (MHz)	Bandwidth (MHz)	99%Bandwidth (MHz)
Low	5745	26.08	18.32
Mid	5785	24.56	18.16
High	5825	24.96	18.32

Test Plot

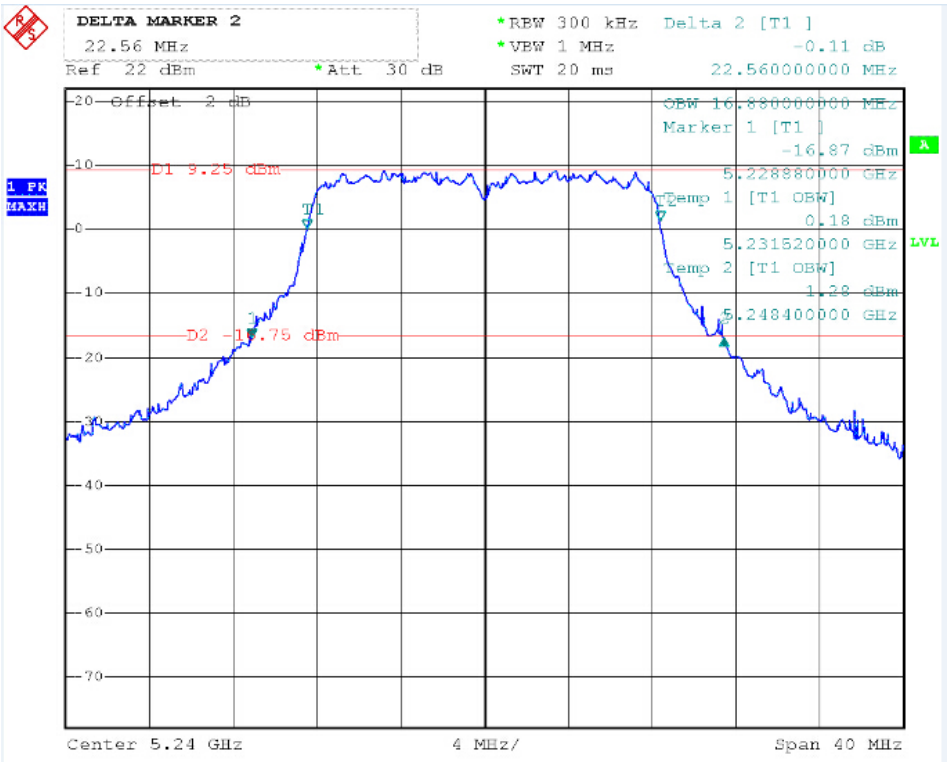
IEEE 802.11a mode for 5180 ~ 5240MHz
CH Low



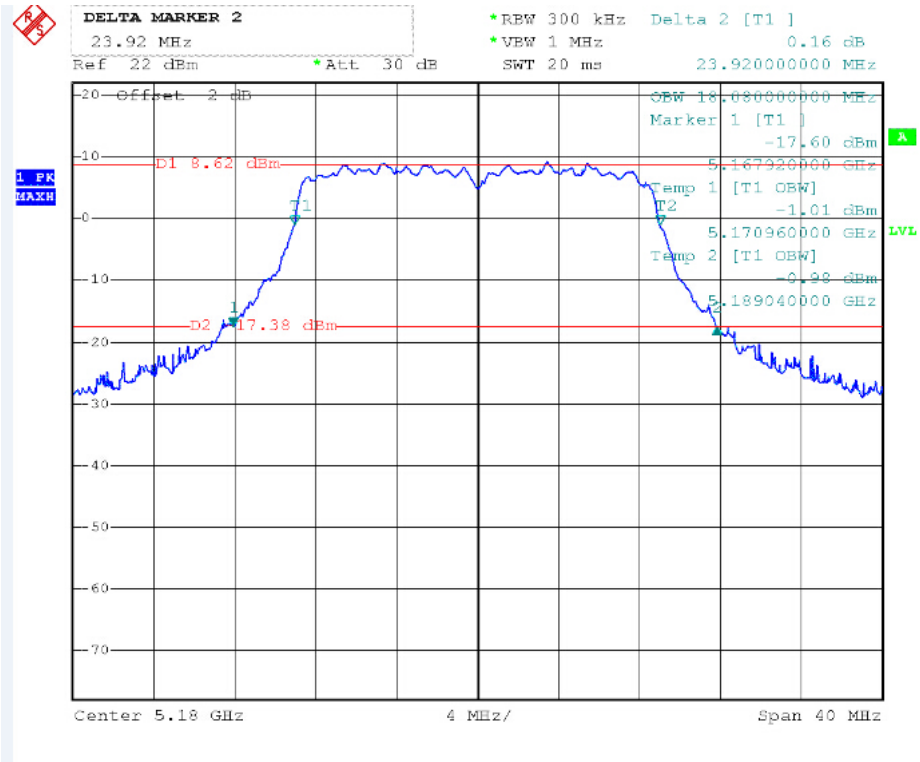
CH Mid



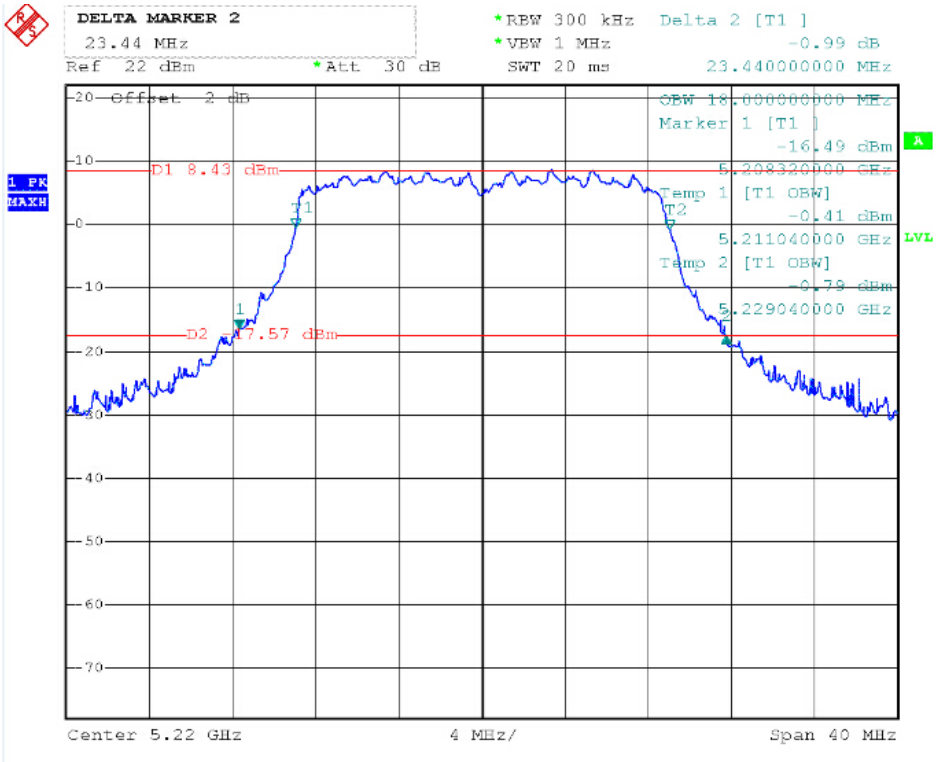
CH High



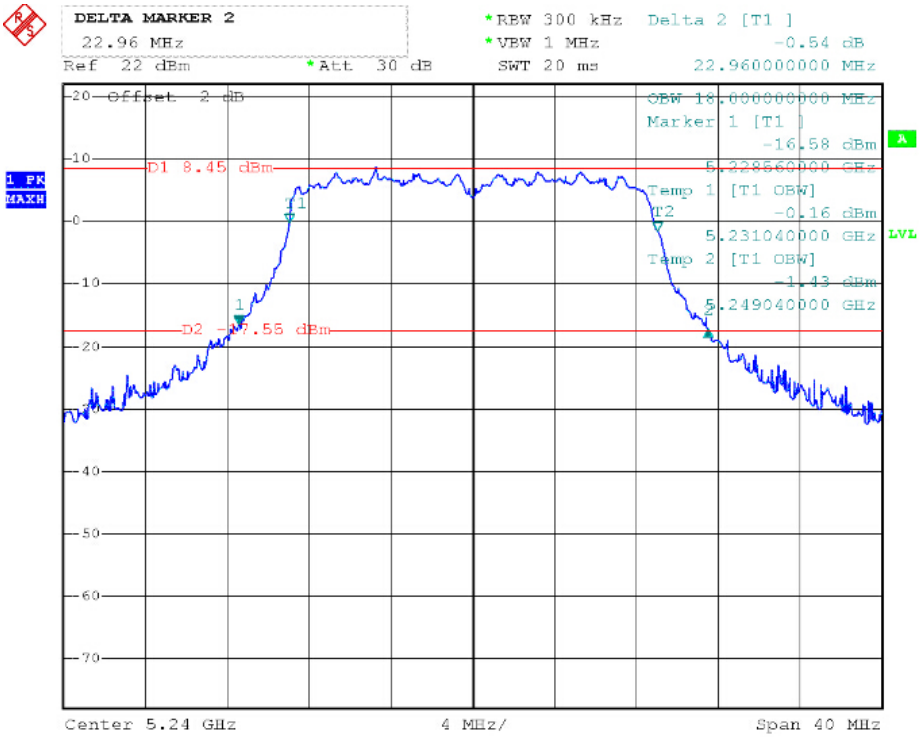
IEEE 802.11n HT20 mode / 5180 ~ 5240MHz
CH Low



CH Mid

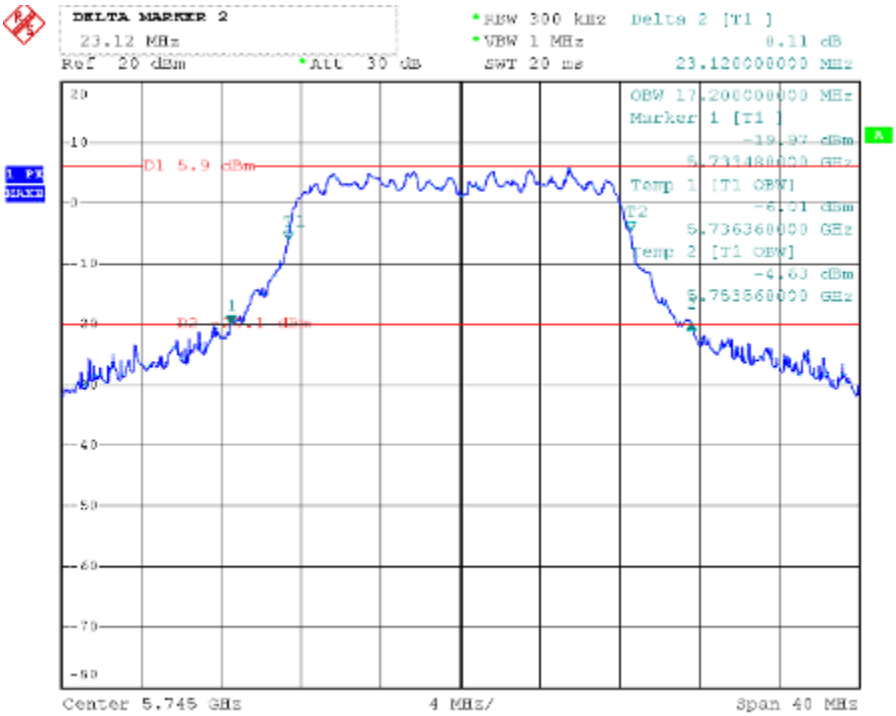


CH High

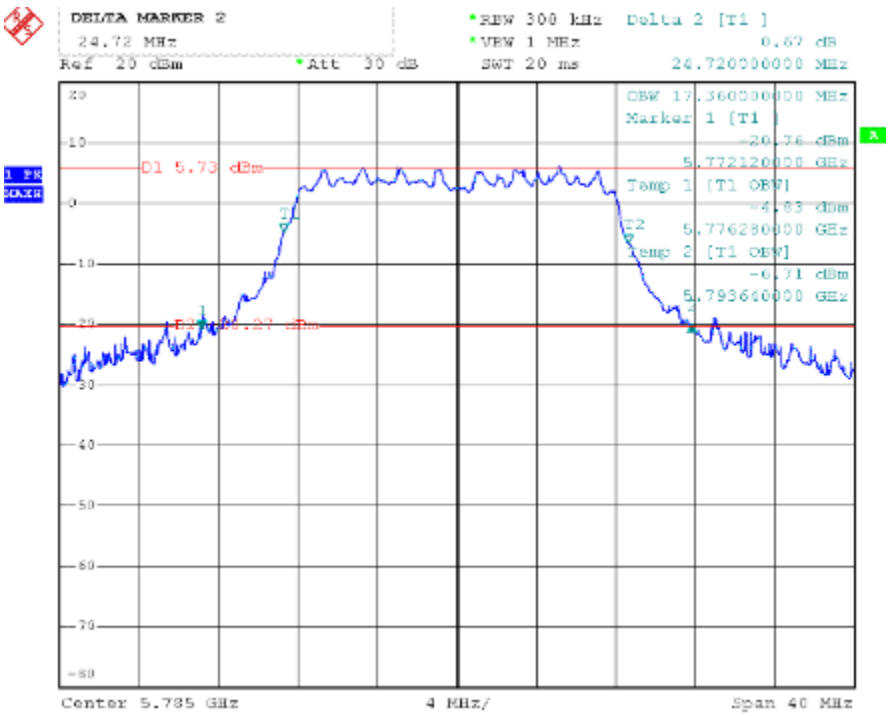


Test Plot

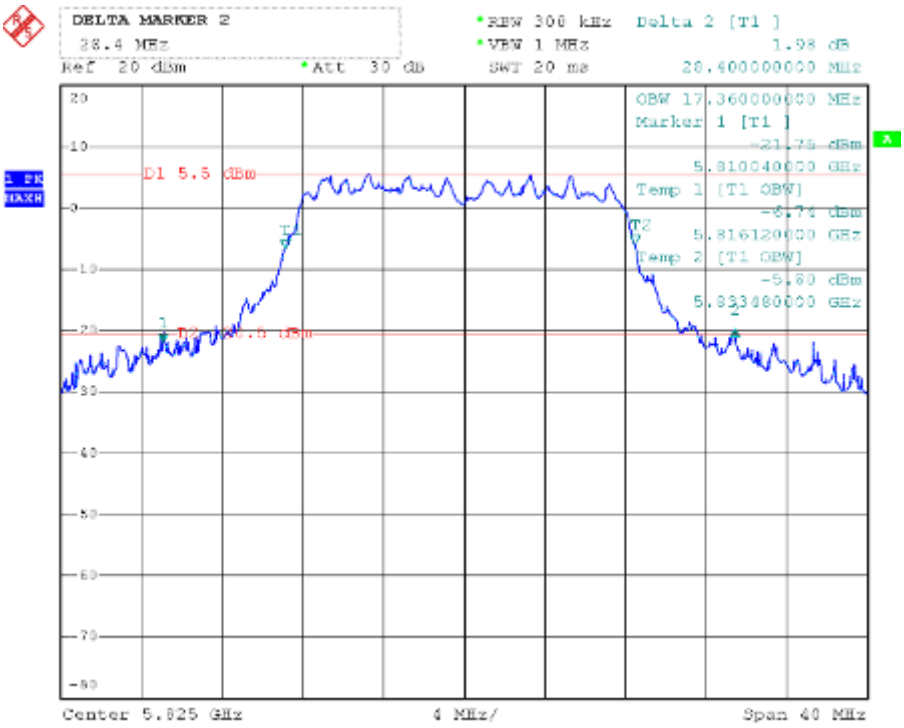
IEEE 802.11a mode for 5745 ~ 5825MHz
CH Low



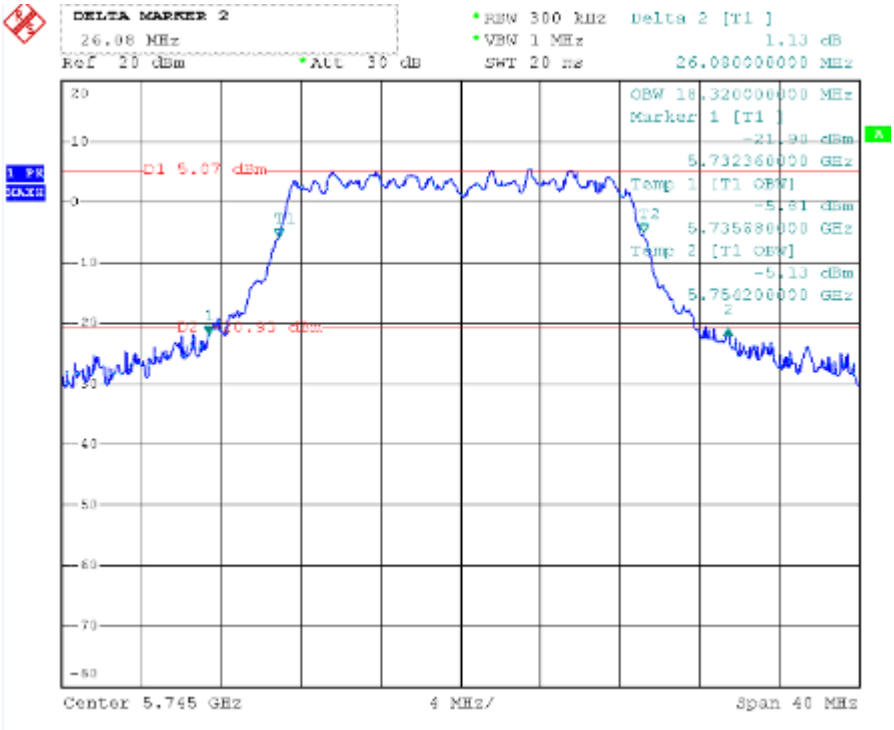
CH Mid



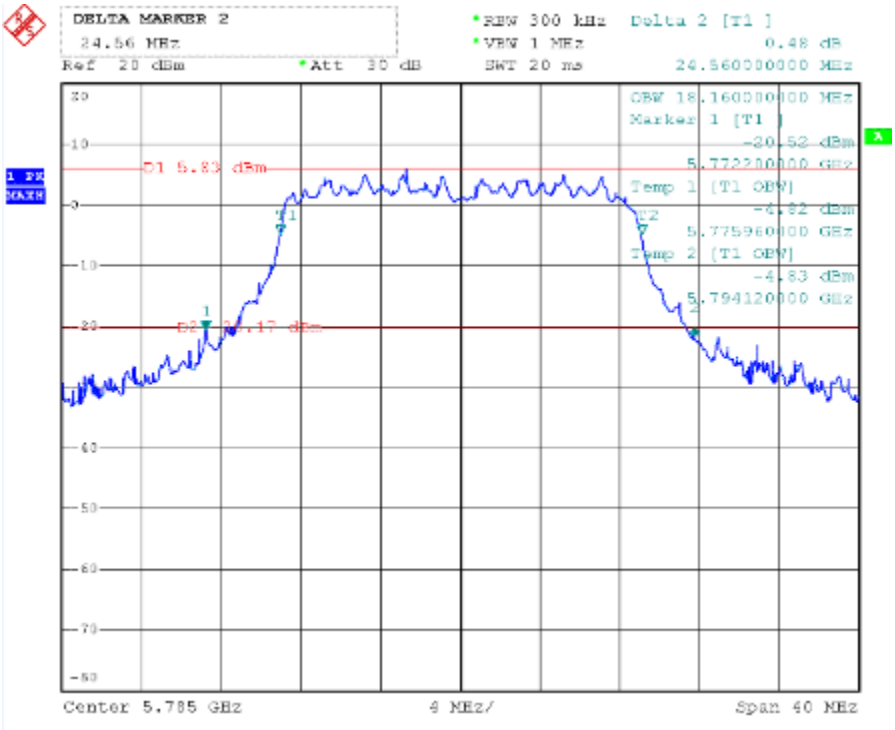
CH High



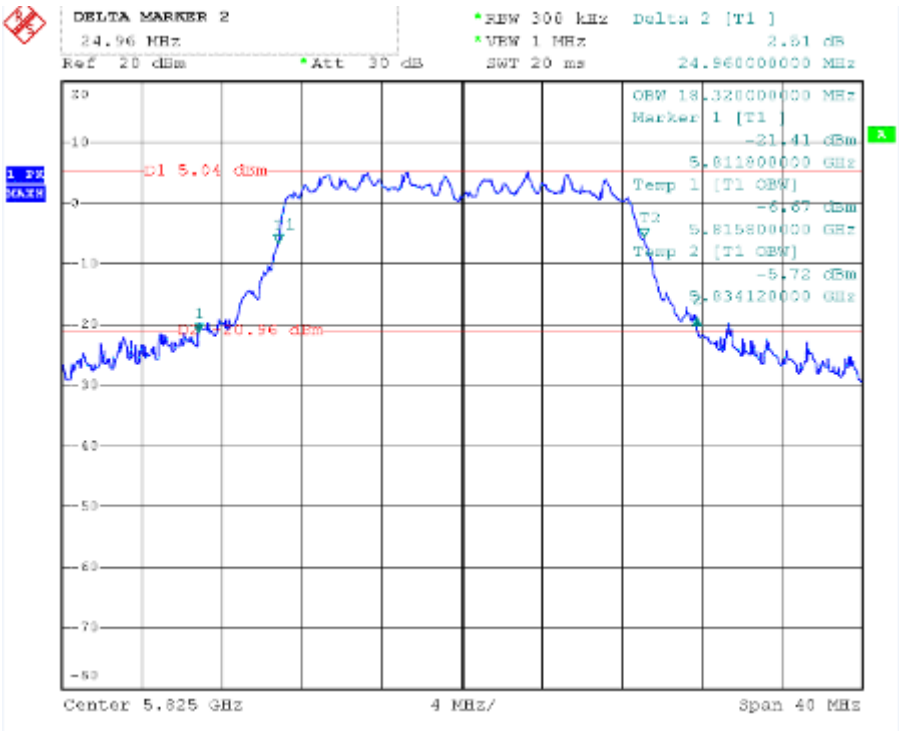
IEEE 802.11n HT20 mode / 5745 ~ 5825MHz
CH Low



CH Mid



CH High



6. THE MAXIMUM E.I.R.P & MAXIMUM CONDUCTED OUTPUT POWER

6.1 Test Limit

According to §15.407(a),

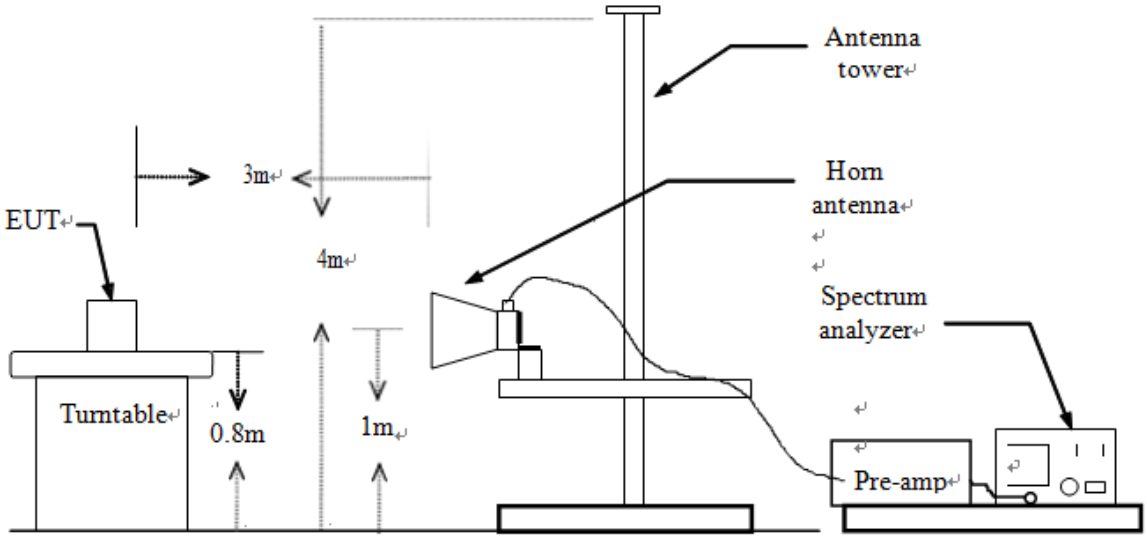
1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1W . The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
2) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.15-5.25GHz: Limit (dBm) = 30dBm.
5.725-5.85GHz: Limit (dBm) = 30dBm.

Test procedure used is KDB 789033 D02v01 - Section E) 3) b) Method PM-G

6.2 Radiation measurement Test Configuration



6.3.Test Procedure

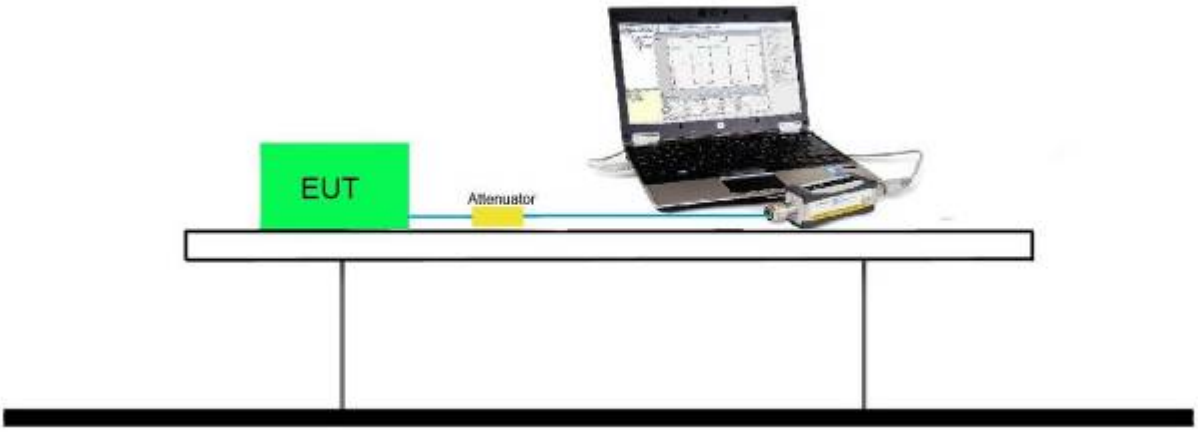
1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
   Below 1GHz:
   RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:
(a) PEAK: RBW=1MHz, VBW=3MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz
duty cycle ≥ 98%, set VBW ≤ RBW/100 but not less than 10 Hz.
duty cycle < 98%, set VBW ≥ 1/T
Sweep=AUTO

7. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.
8. Repeat above procedures until the measurements for all frequencies are complete.

6.4 Conduction measurement Test Configuration

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.



6.5 Test Results

No non-compliance noted

Test Data (E.I.R.P)

5180-5240MHz

Mode	Test CH	Antenna Pol	EIRP (dBm)	Limit (dBm)	Result
802.11a	Low	V	11.78	21.00	Pass
		H	11.69		
	Mid	V	10.22	21.00	Pass
		H	10.69		
	High	V	11.96	21.00	Pass
		H	11.59		
802.11n HT20	Low	V	9.96	21.00	Pass
		H	9.87		
	Mid	V	8.65	21.00	Pass
		H	9.00		
	High	V	9.97	21.00	Pass
		H	9.87		

Test Data (Output Power)

5180-5240MHz

Mode	Test CH	Average power (dBm)	Limit (dBm)	Result
802.11a	Low	12.00	30.00	Pass
	Mid	11.94	30.00	Pass
	High	12.08	30.00	Pass
802.11n HT20	Low	12.56	30.00	Pass
	Mid	11.55	30.00	Pass
	High	10.01	30.00	Pass

5745-5825MHz

Mode	Test CH	Average power (dBm)	Limit (dBm)	Result
802.11a	Low	11.41	30.00	Pass
	Mid	11.66	30.00	Pass
	High	12.55	30.00	Pass
802.11n HT20	Low	10.78	30.00	Pass
	Mid	9.64	30.00	Pass
	High	10.54	30.00	Pass

7. PEAK POWER SPECTRAL DENSITY

7.1 Test Limit

According to §15.407(a)
For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used,
the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

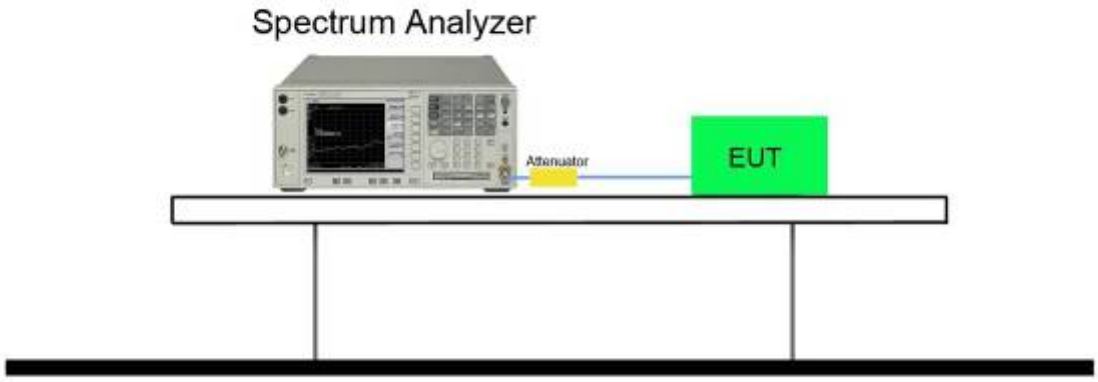
5.15-5.25 GHz: Limit (dBm/MHz) = 17dBm/MHz.
5.725-5.85 GHz Limit (dBm/500kHz) = 30dBm/500kHz.

Test procedure used is KDB 789033 D02v01 - Section F

7.2 Test Procedure

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz, if measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100 kHz
4. VBW = 3MHz
5. Number of sweep points ≥ 2 × (span / RBW)
6. Detector = power averaging (RMS)
7. Sweep time = auto
8. Trigger = free run
9. Use the peak search function on the instrument to find the peak of the spectrum and record its value
10. Add 10*log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10*log(1/0.25) = 6 dB if the duty cycle is 25%.
11. When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant factor 10*log(500kHz/100kHz) = 6.99 dB to the measured result.

7.3 Test Setup



7.4 Test Results

No non-compliance noted

Test Data

5180-5240MHz

Mode	Test CH	PSD (dBm)	Limt (dBm)	Result
802.11a	Lowest	6.10	11	Pass
	Middle	6.65	11	Pass
	Highest	7.59	11	Pass
802.11n HT20	Lowest	5.61	11	Pass
	Middle	5.93	11	Pass
	Highest	5.71	11	Pass

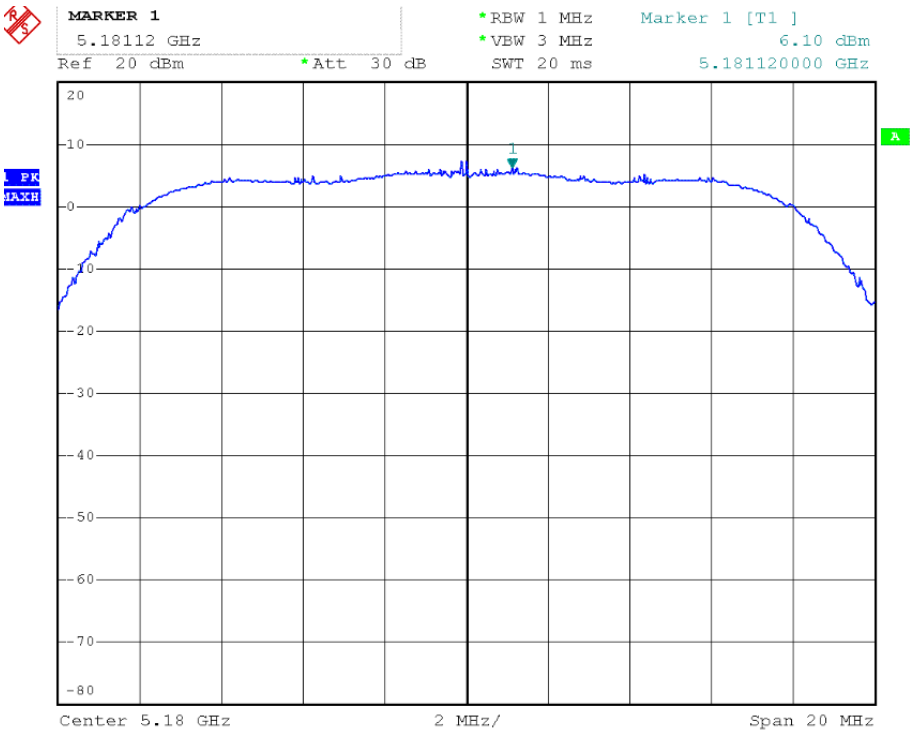
5745MHz-5825MHz

Mode	Test CH	PSD Reading Base on 100kHz (dBm)	Correction factor (dB)	Corrected Data (dBm)	Limt Base on 500kHz (dBm)	Result
802.11a	Lowest	-1.17	6.99	5.82	30	Pass
	Middle	-1.41	6.99	5.58	30	Pass
	Highest	-1.66	6.99	5.33	30	Pass
802.11n HT20	Lowest	-1.94	6.99	5.05	30	Pass
	Middle	-2.30	6.99	4.69	30	Pass
	Highest	-2.56	6.99	4.43	30	Pass

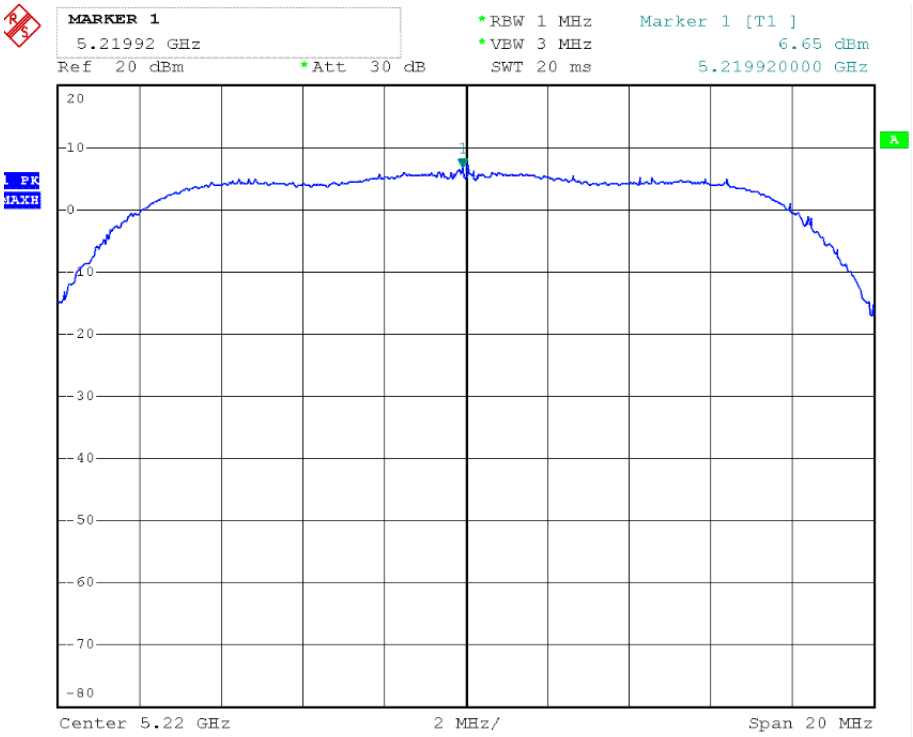
Note: When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant factor 10*log(500kHz/100kHz) = 6.99 dB to the measured result.

IEEE 802.11a mode / 5180 ~ 5240MHz

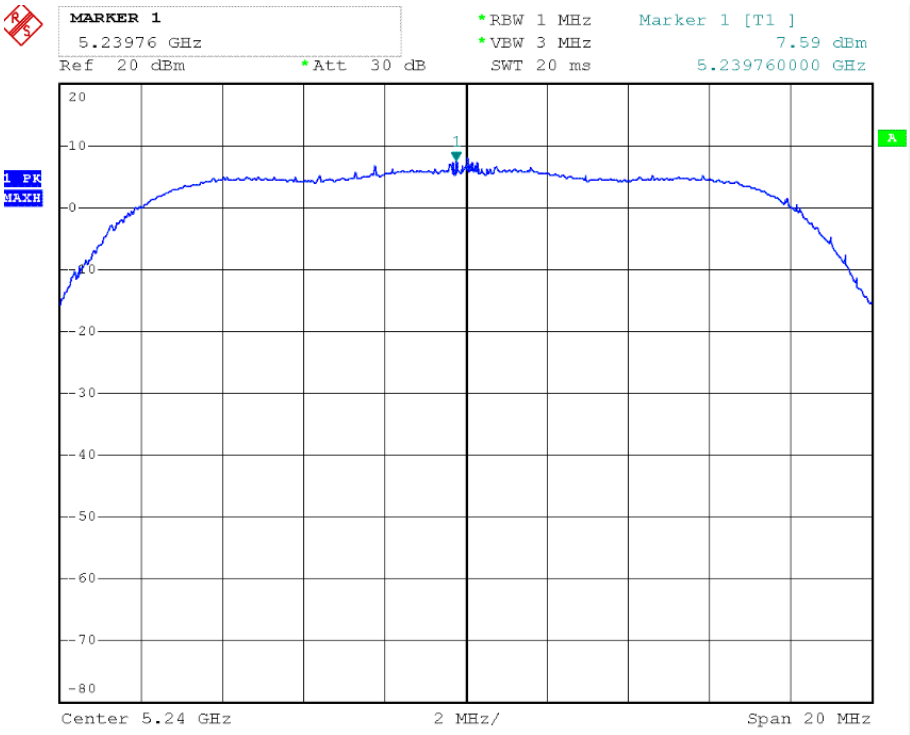
CH Low



CH Mid

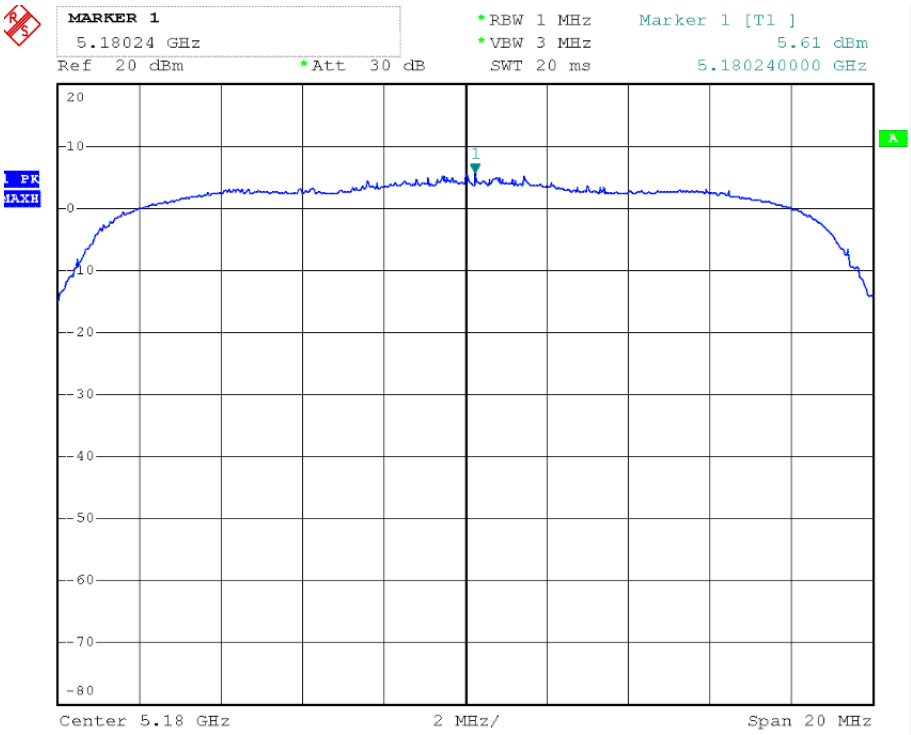


CH High

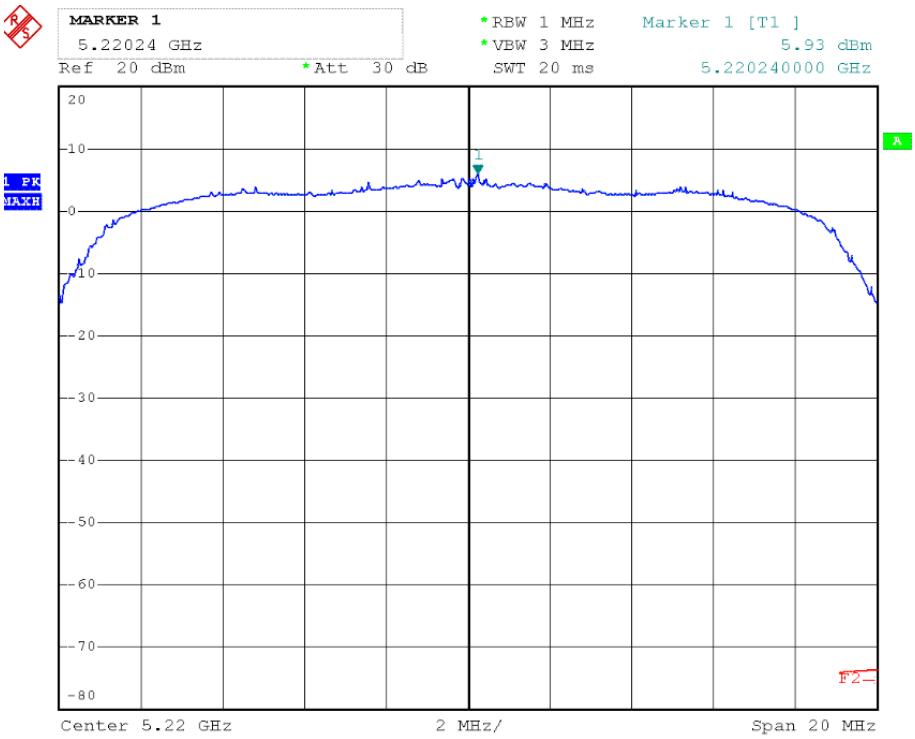


IEEE 802.11n HT 20 MHz Channel mode / 5180 ~ 5240MHz

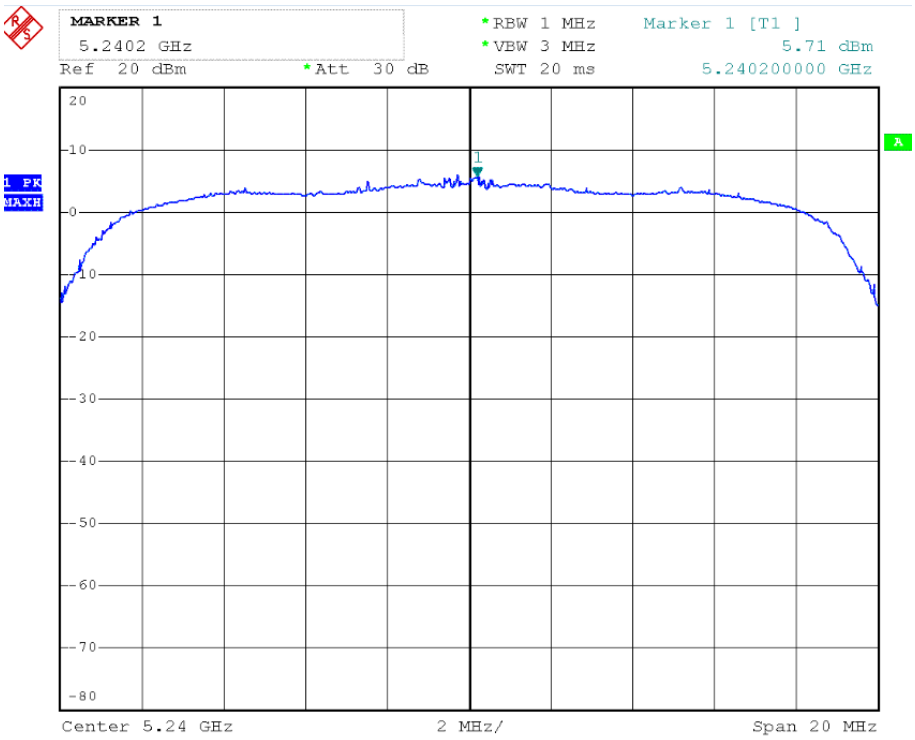
CH Low



CH Mid

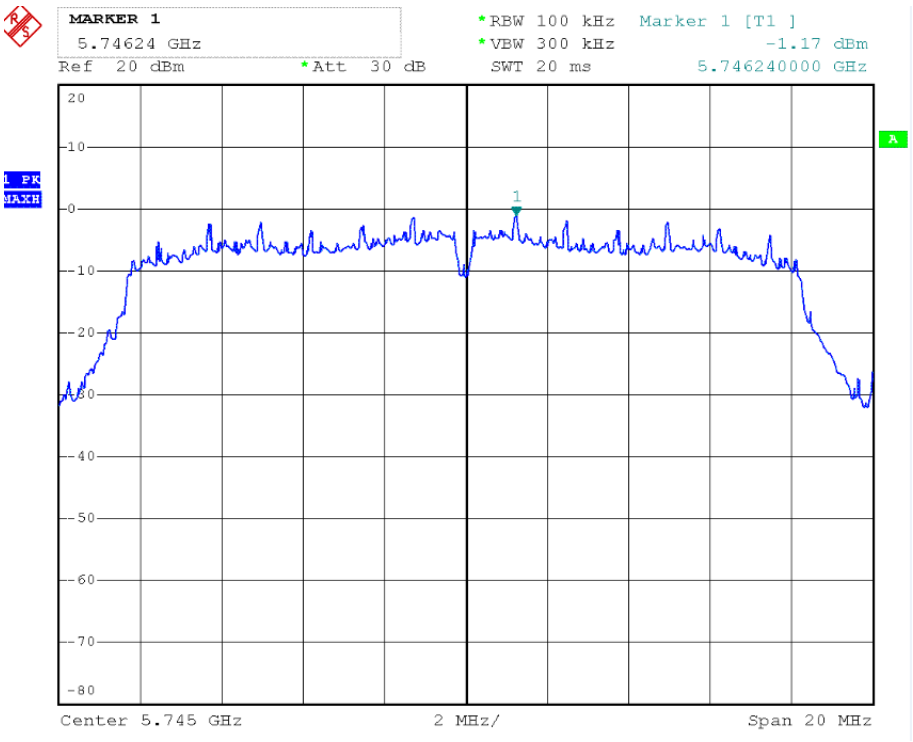


CH High

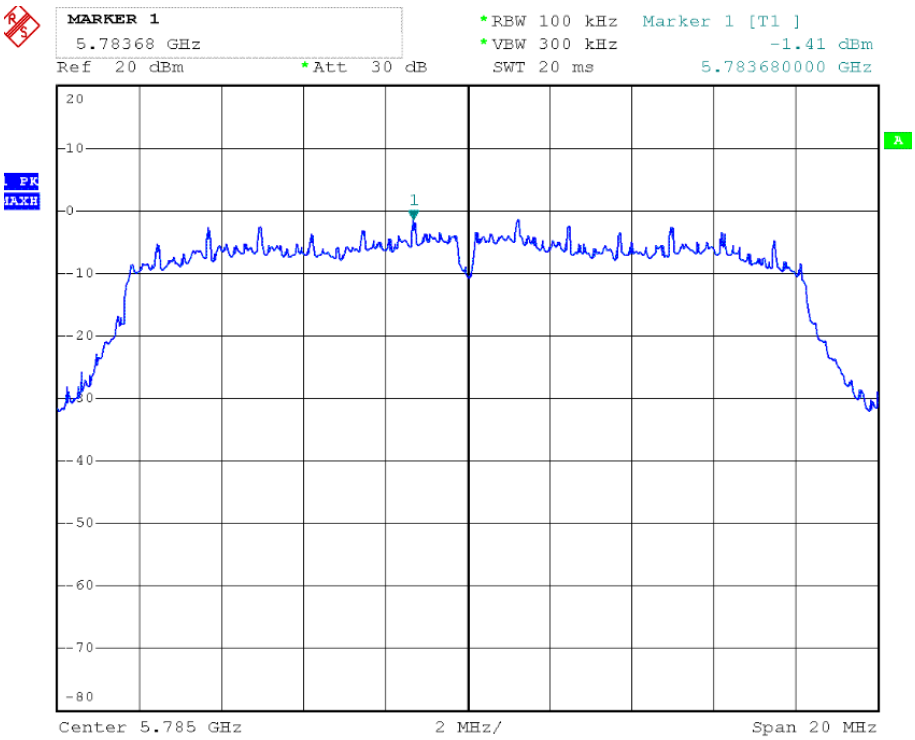


IEEE 802.11a mode / 5745 ~ 5825MHz

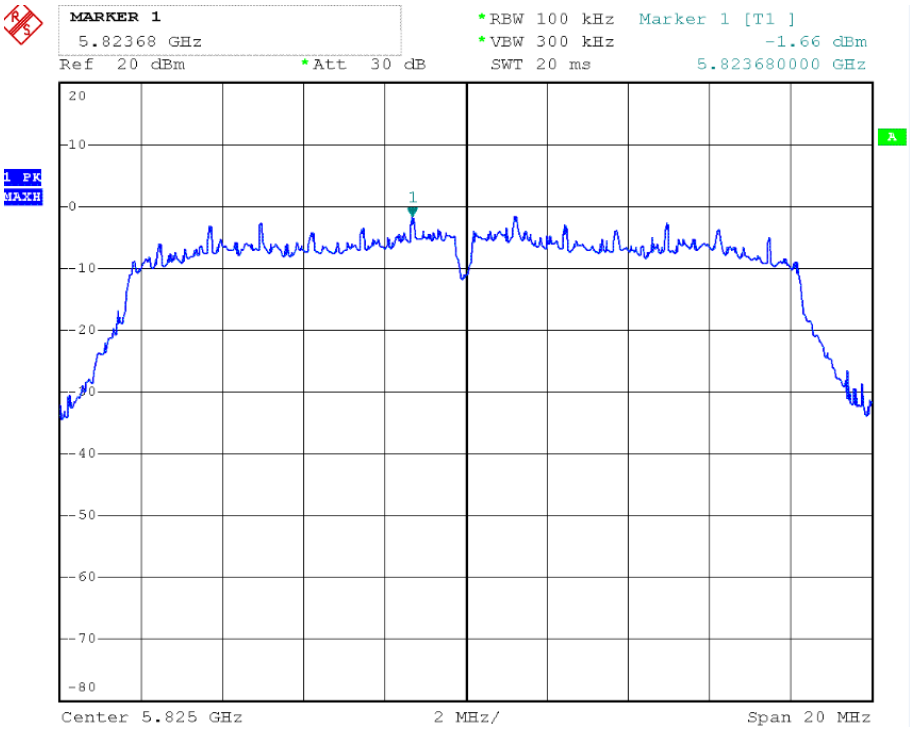
CH Low



CH Mid

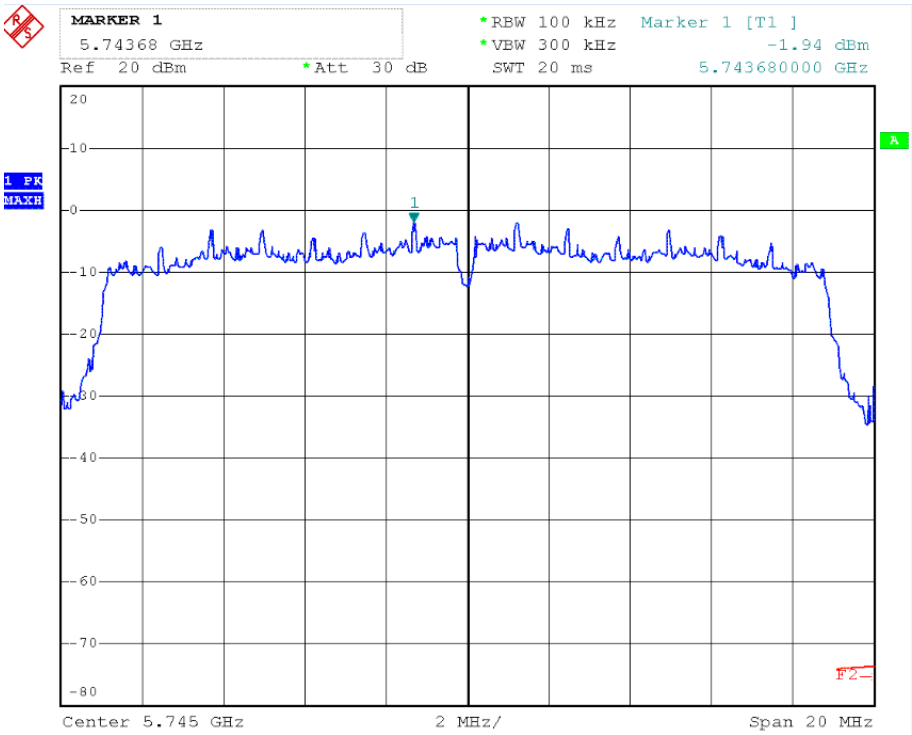


CH High

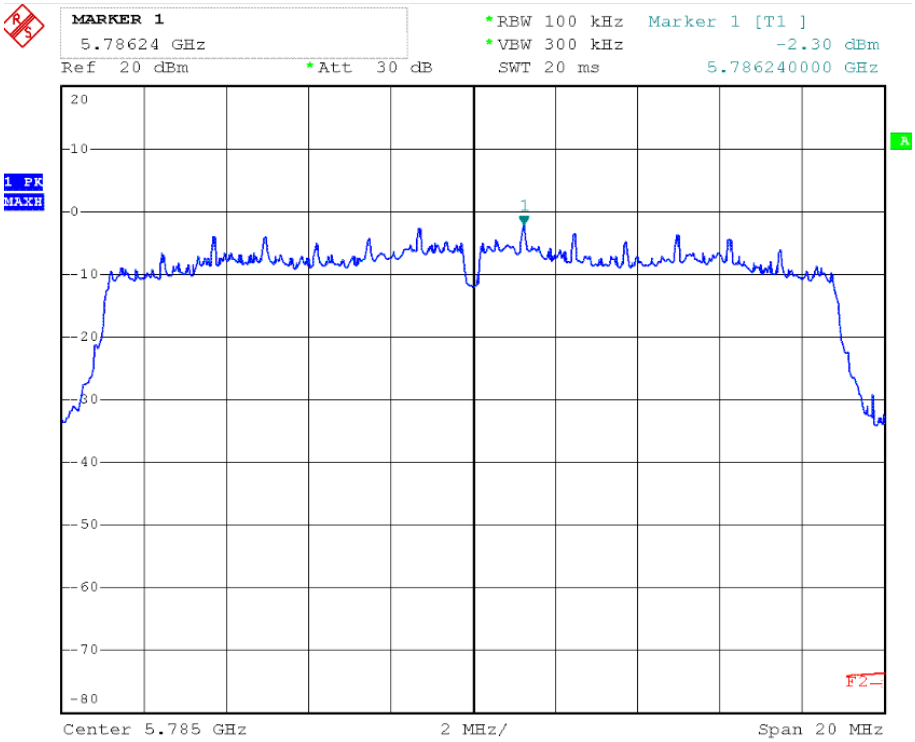


IEEE 802.11n HT 20 MHz Channel mode / 5745 ~ 5825MHz

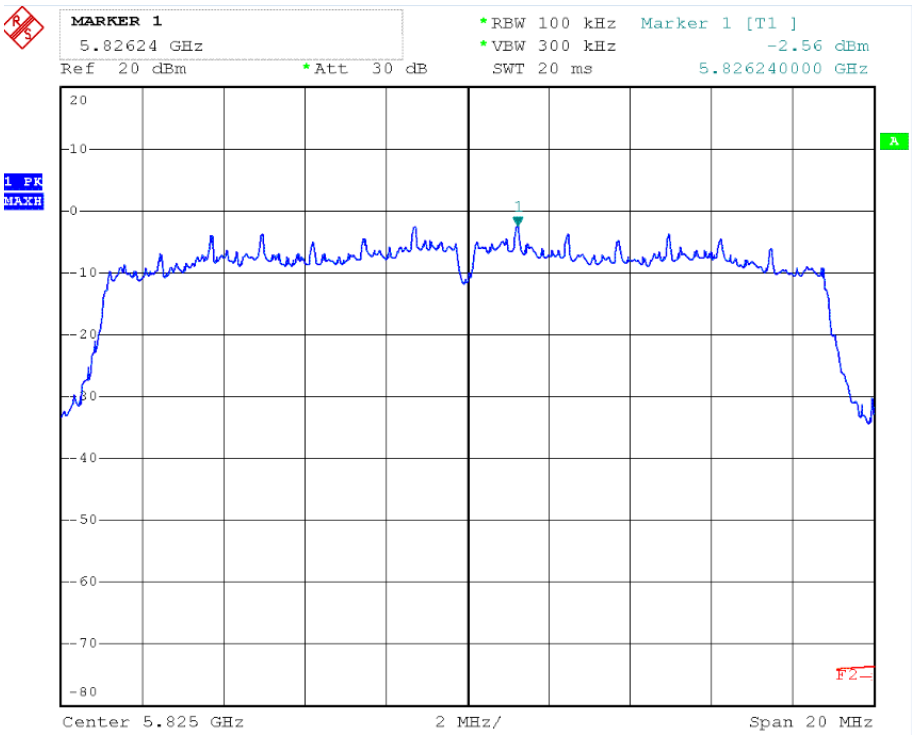
CH Low



CH Mid



CH High



8. 6dB Bandwidth Measurement

8.1 Test Limit

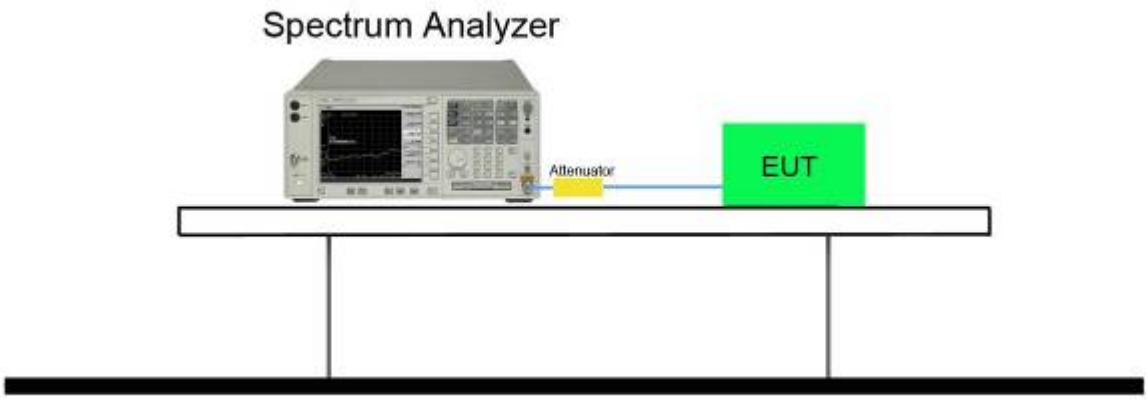
The minimum 6dB bandwidth shall be at least 500 kHz.

Test procedure used is KDB 789033 D02v01 – Section C.2

8.2 Test Procedure

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW ≧ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

8.3 Test Setup



8.4 Test Results

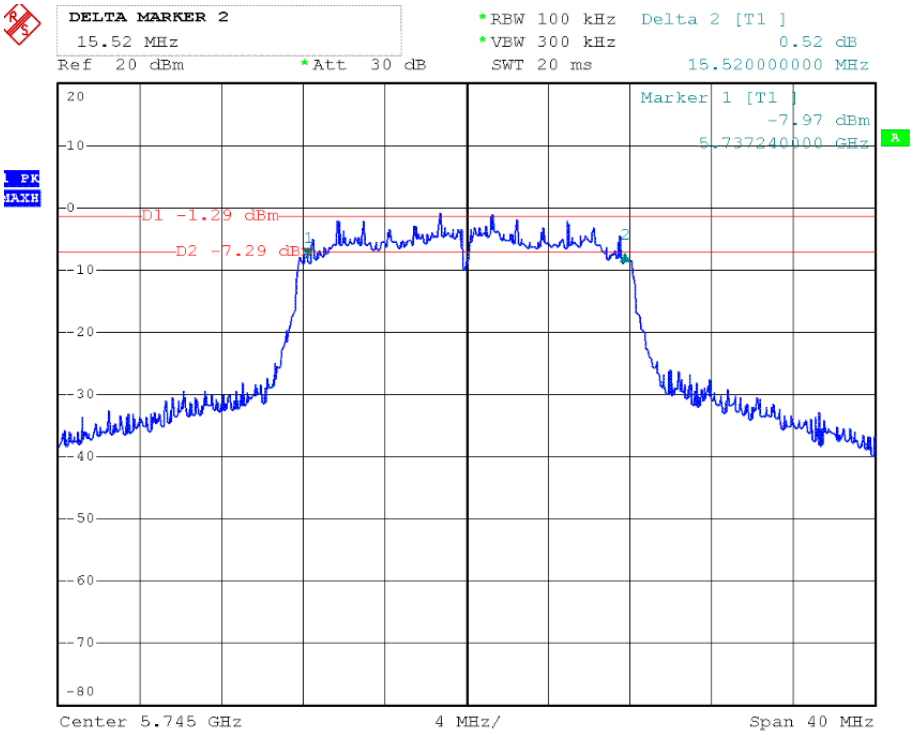
No non-compliance noted.

Test Data

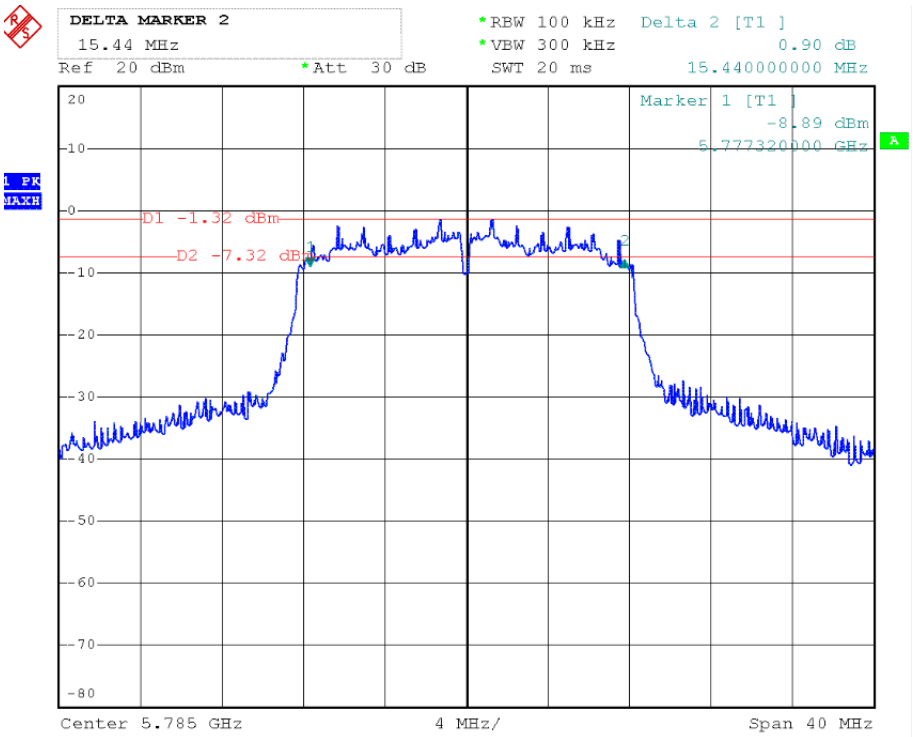
Test CH	6dB Bandwidth (MHz)		Limit(kHz)	Result
	802.11a	802.11n HT20		
Lowest	15.52	16.24	>500	Pass
Middle	15.44	16.08		
Highest	15.28	16.16		

Test Plot

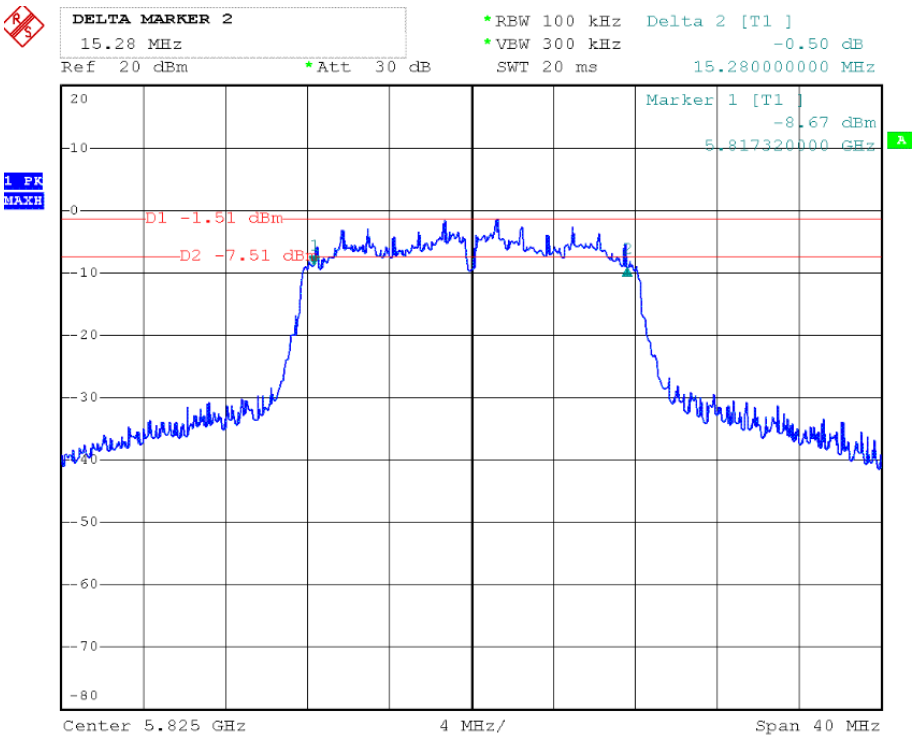
6dB BANDWIDTH (802.11a MODE CH Low 5745MHz)



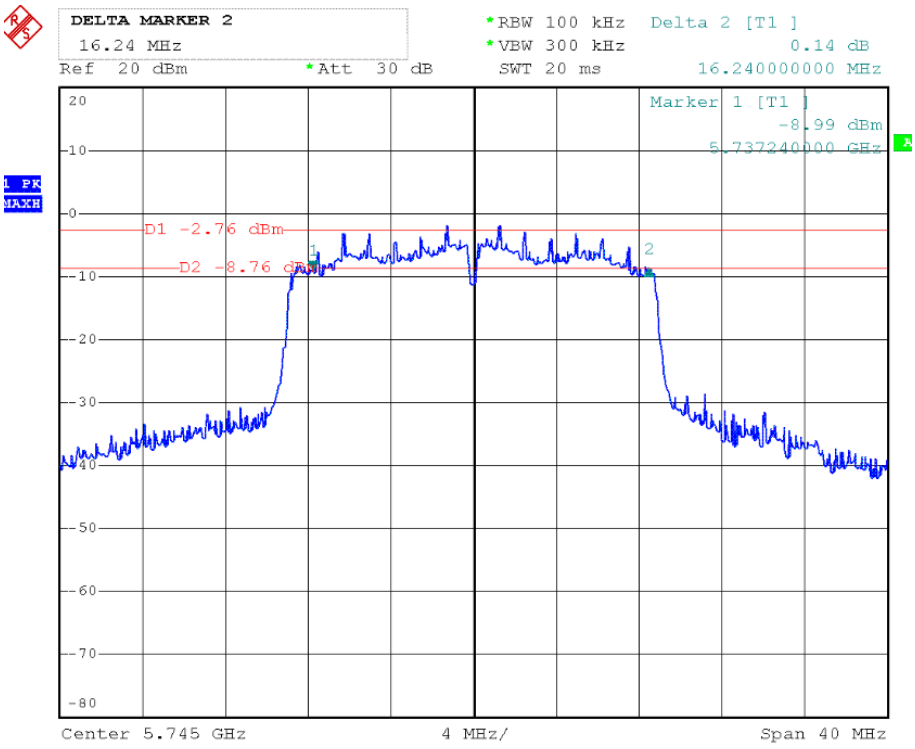
6dB BANDWIDTH (802.11a MODE CH Mid 5785MHz)



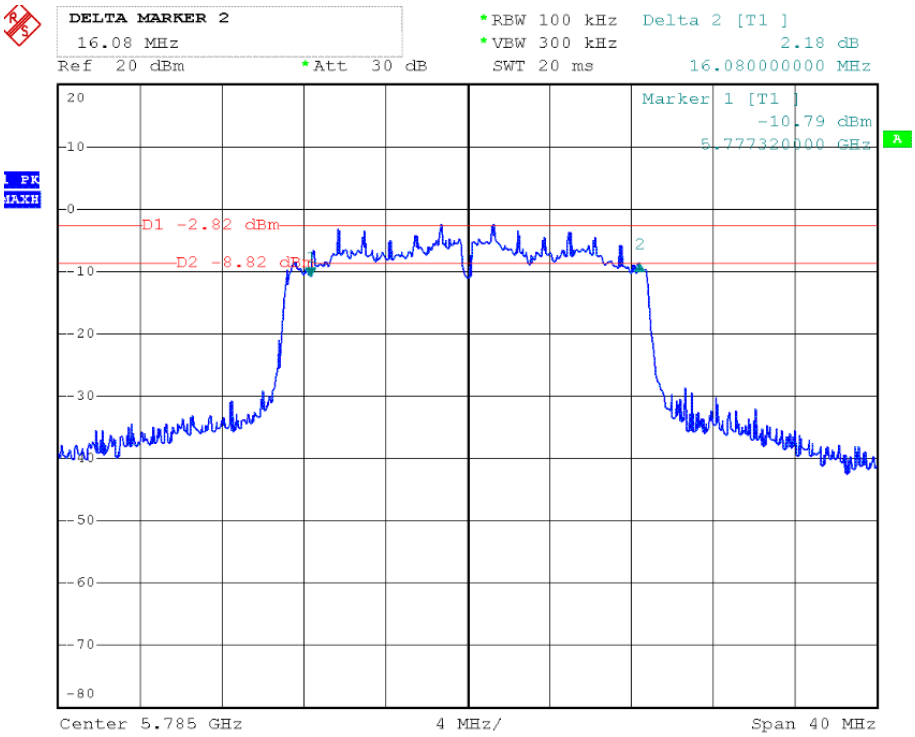
6dB BANDWIDTH (802.11a MODE CH High 5825MHz)



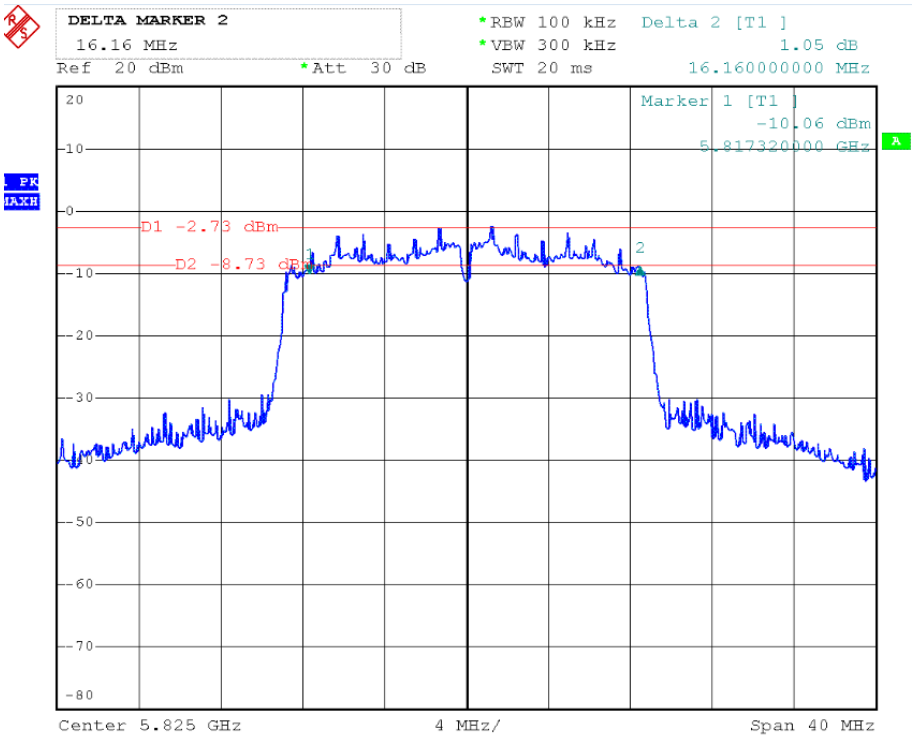
6dB BANDWIDTH (802.11n HT20 MODE CH Low 5745MHz)



6dB BANDWIDTH (802.11n HT20 MODE CH Mid 5785MHz)



6dB BANDWIDTH (802.11n HT20 MODE CH High 5825MHz)



9. TRANSMITTER UNDESIRABLE EMISSION AND BAND EDGE EMISSIONS

9.1 Test Limit

(1) For 15.205 requirement:
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) as below table.

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

(2) For 15.407(b) requirement:
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.

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.

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.

For transmitters operating in the 5.725-5.85 GHz band: 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.

As below table:

Un-restricted band emissions above 1GHz Limit	
Operating Band	**Limit**
5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.725 - 5.850 GHz	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.
Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).	

9.2 Radiated Test Configuration

Test procedure used is KDB 789033 D02v01 – Section G

Quasi-Peak Measurements below 1GHz:

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120 kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Peak Measurements above 1GHz.

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

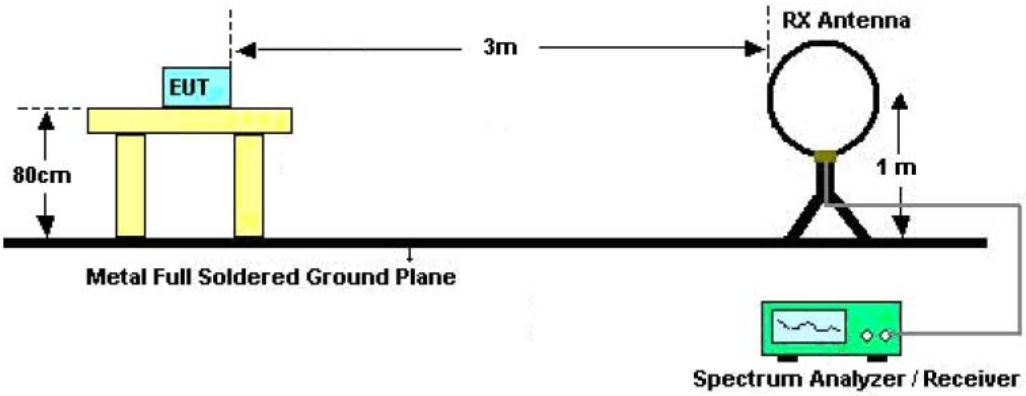
Average Measurements above 1GHz (Method AD):

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz

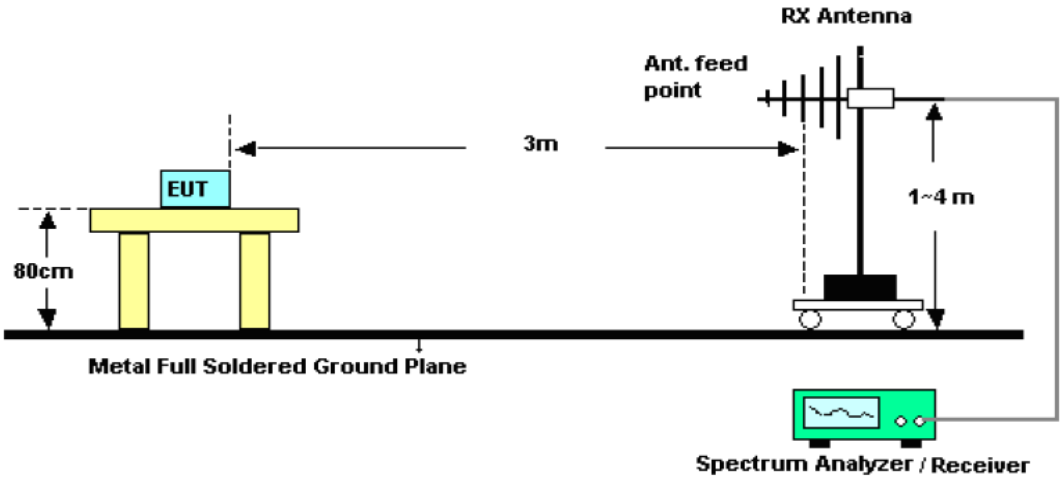
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be > 2 x span/RBW)
6. Sweep time = auto
7. Trace was averaged over at 100 sweeps

9.3 Radiated Test Setup

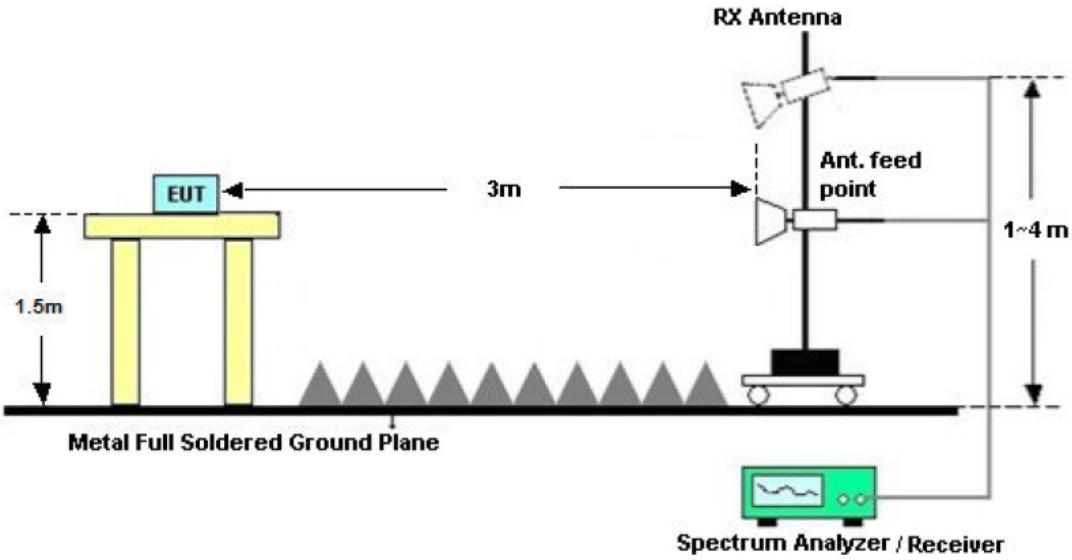
For radiated emission below 30MHz



For radiated emission from 30MHz to1GHz



For radiated emission from above1GHz



9.4 Conducted Test Configuration

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

9.5 Conducted Test Setup

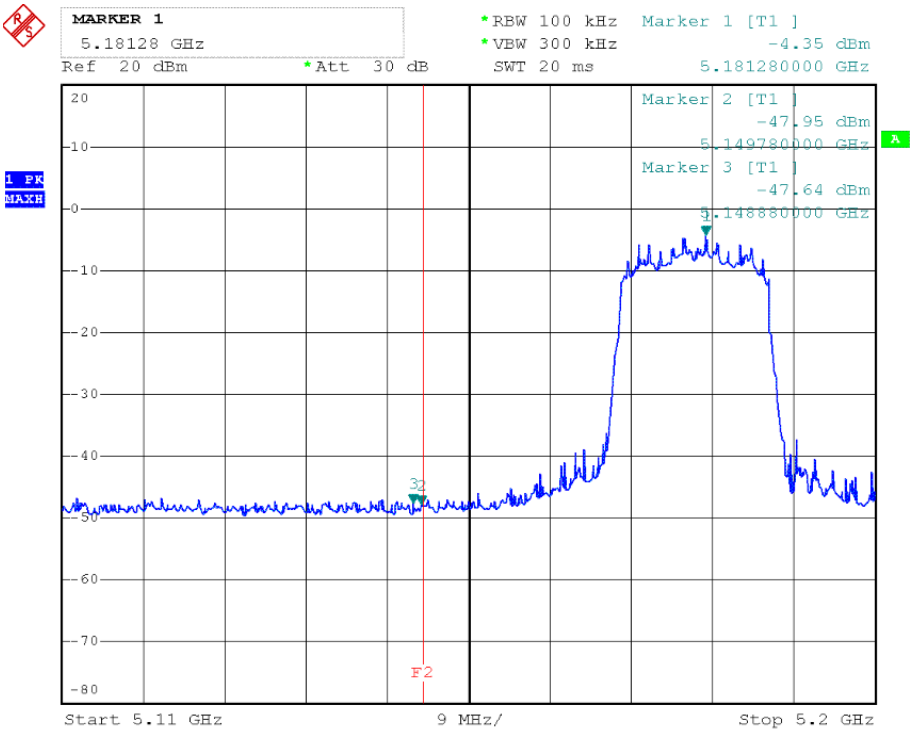
Spectrum Analyzer

9.6 Test Result

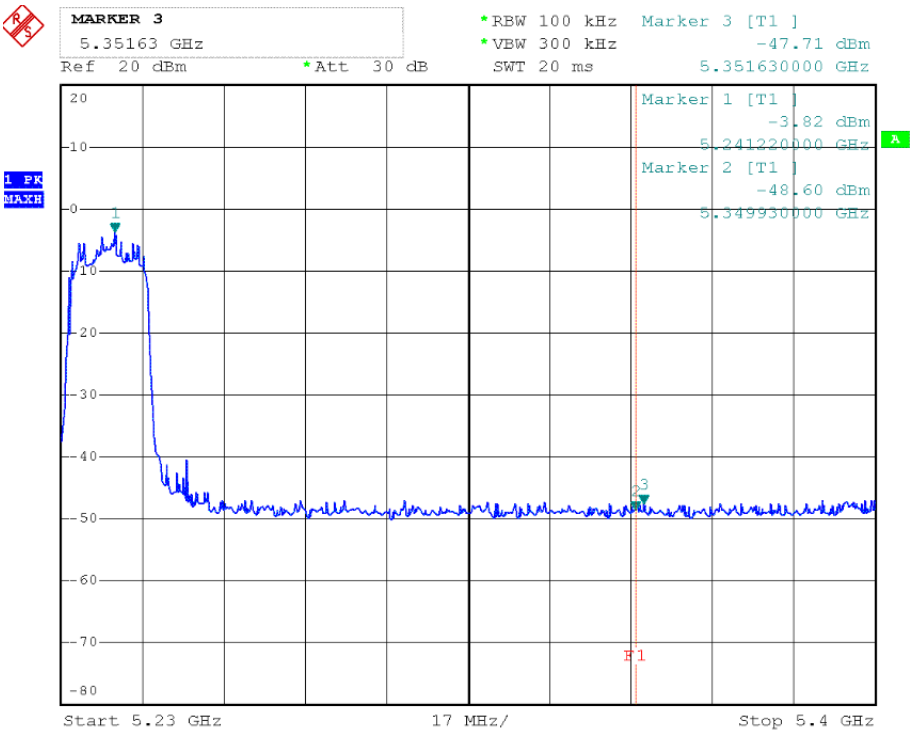
Note:
1. We test all modes, and chose the worst data for the report.
2. Worst-case radiated emission below 30MHz is IEEE 802 11a TX (CH Low:5825MHz) mode;
3. Worst-case radiated emission below 1GHz is IEEE 802.11a TX (CH Low:5180MHz, Middle:5220MHz, High:5240MHz) mode.
4.Worst-case radiated emission above 1GHz is IEEE 802.11n HT20 TX (CH Low:5745MHz, Middle:5785MHz, High:5825MHz) mode.

Conducted Band Edges Test Result

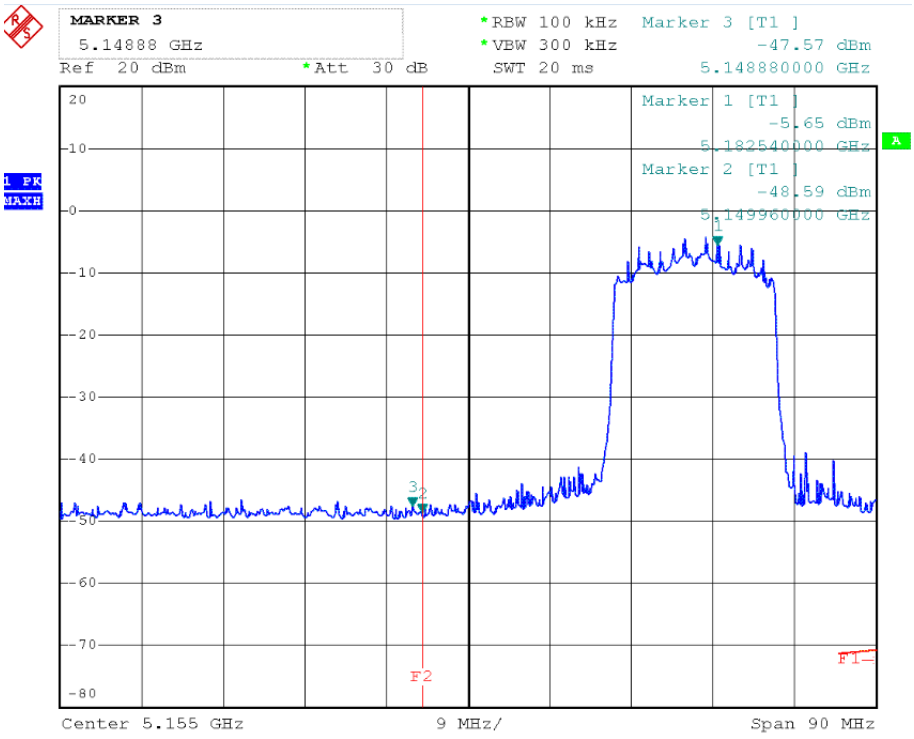
5150-5250MHz:
Band Edges (IEEE 802.11a mode / 5180 MHz)



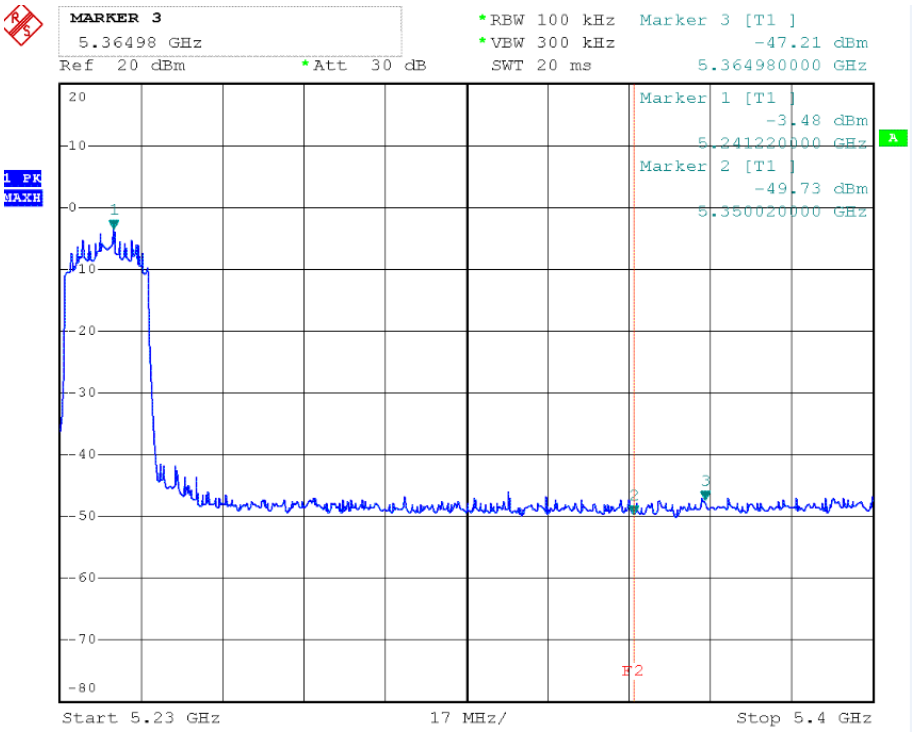
Band Edges (IEEE 802.11a mode / 5240 MHz)



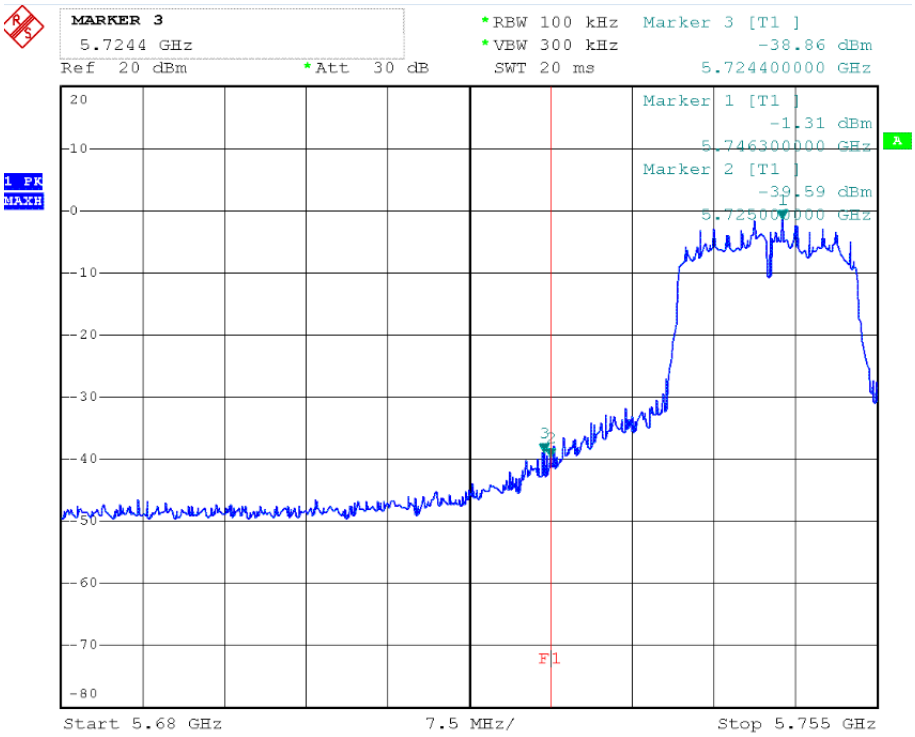
Band Edges (IEEE 802.11n HT 20 MHz Channel mode / 5180 MHz)



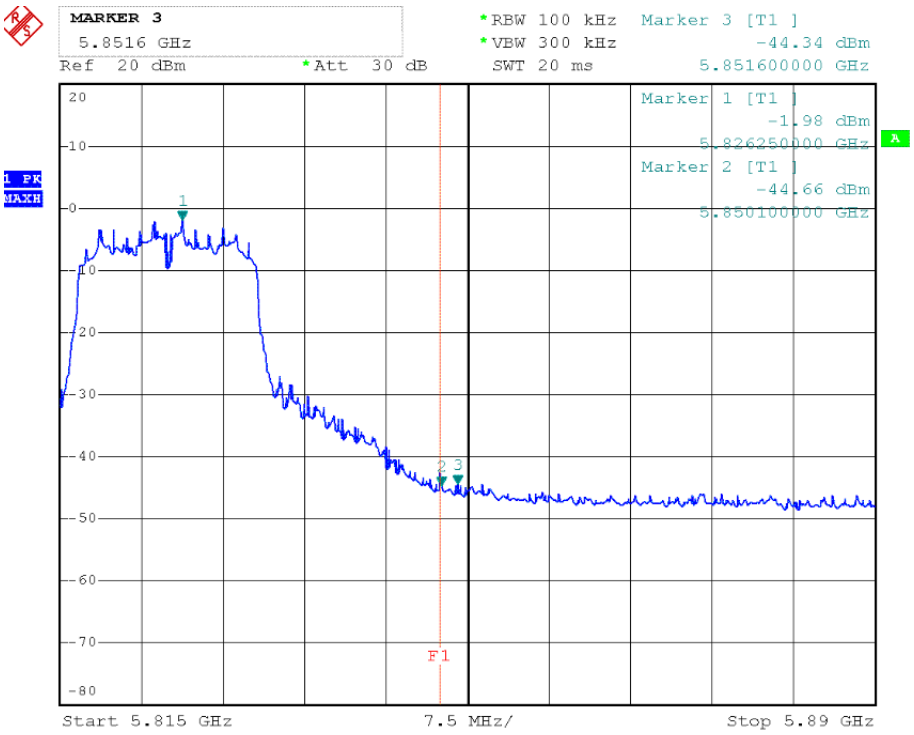
Band Edges (IEEE 802.11n HT 20 MHz Channel mode / 5240 MHz)



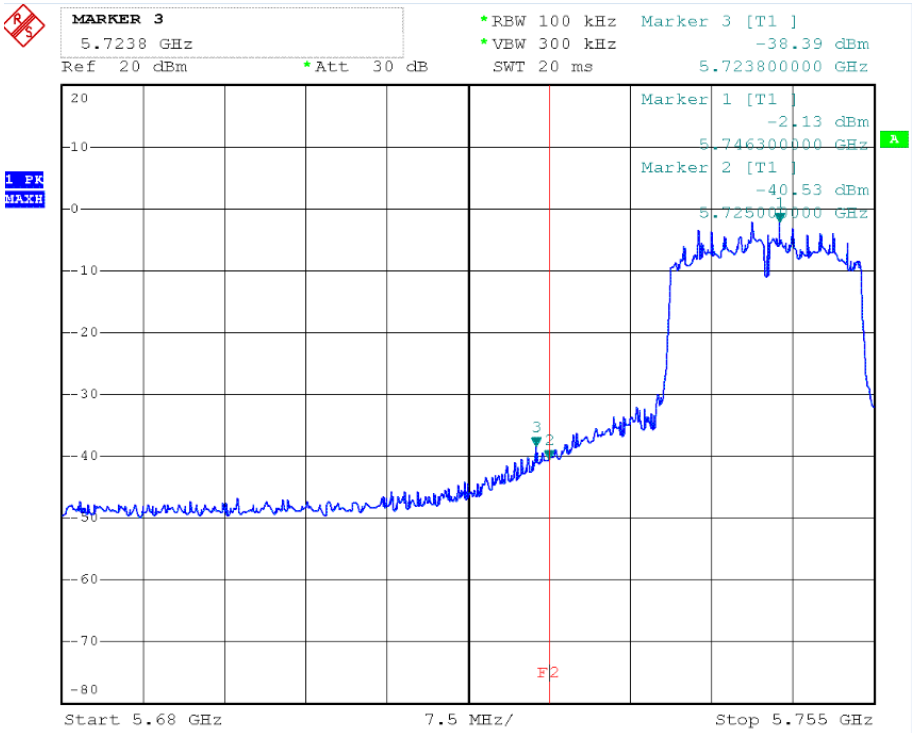
5725-5850MHz:
Band Edges (IEEE 802.11a mode / 5745 MHz)



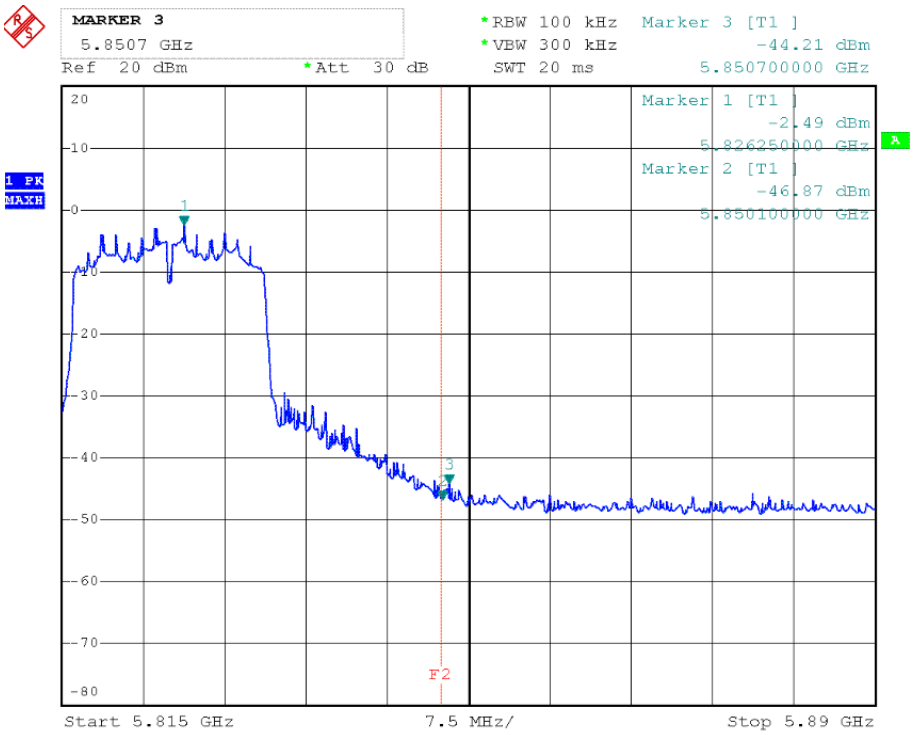
Band Edges (IEEE 802.11a mode / 5825 MHz)



Band Edges (IEEE 802.11n HT20 MHz Channel mode / 5745 MHz)

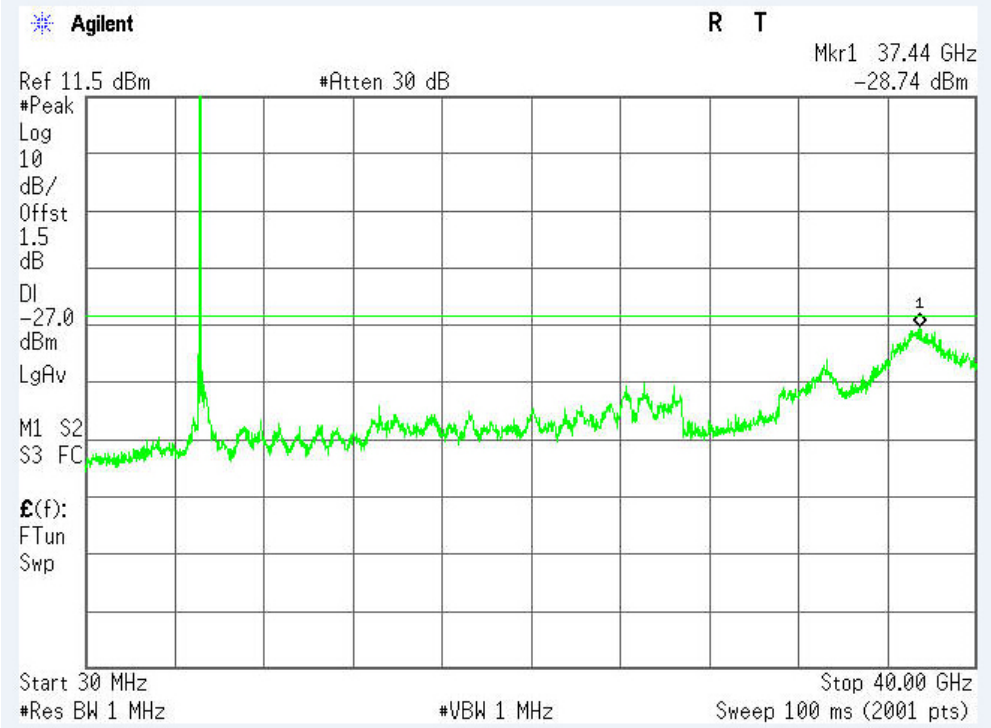


Band Edges (IEEE 802.11n HT20 MHz Channel mode / 5825 MHz)

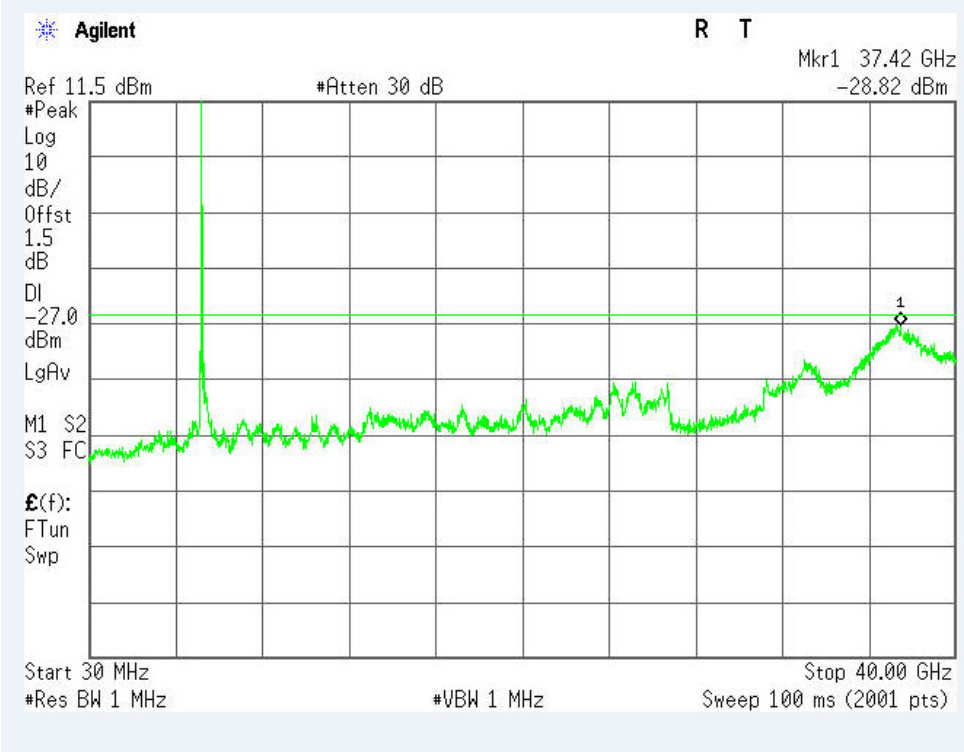


Conducted Undesirable Emission Test Result

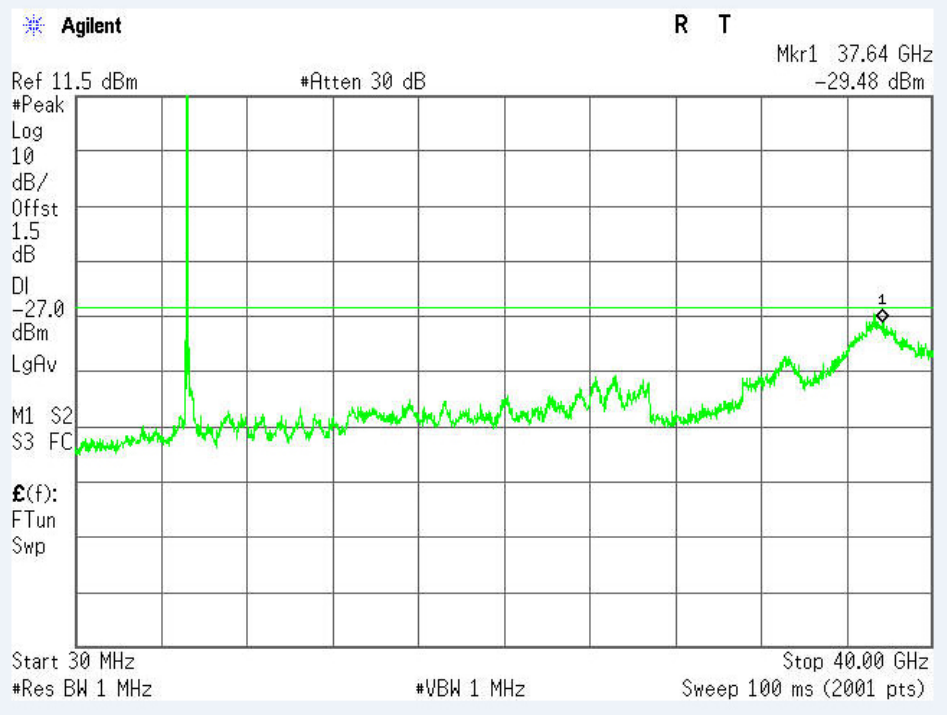
IEEE 802.11a (5180 ~ 5240MHz)
CH Low



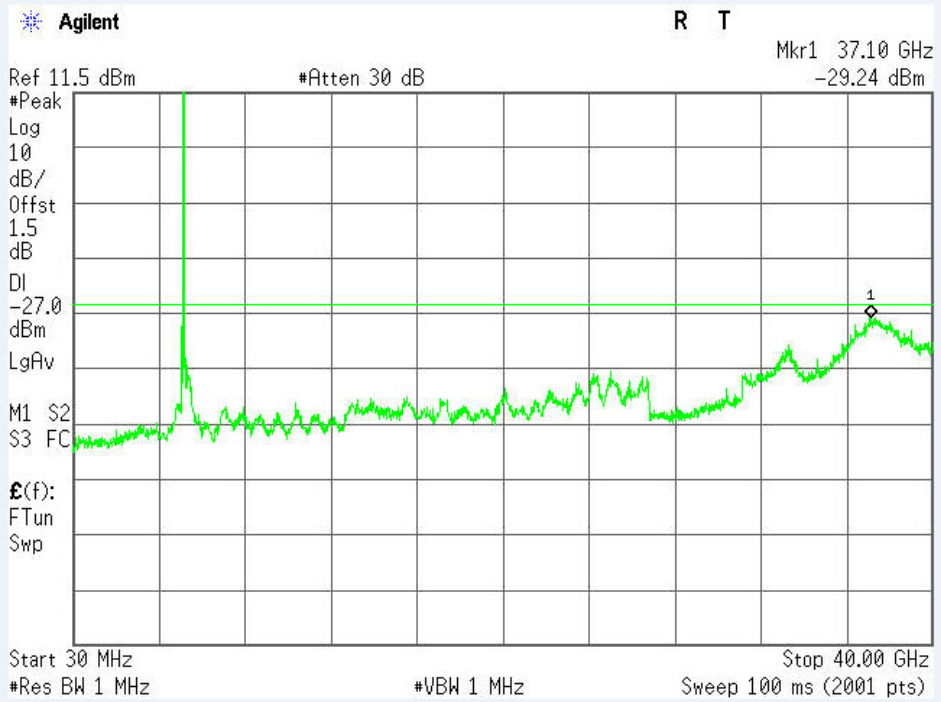
CH Mid



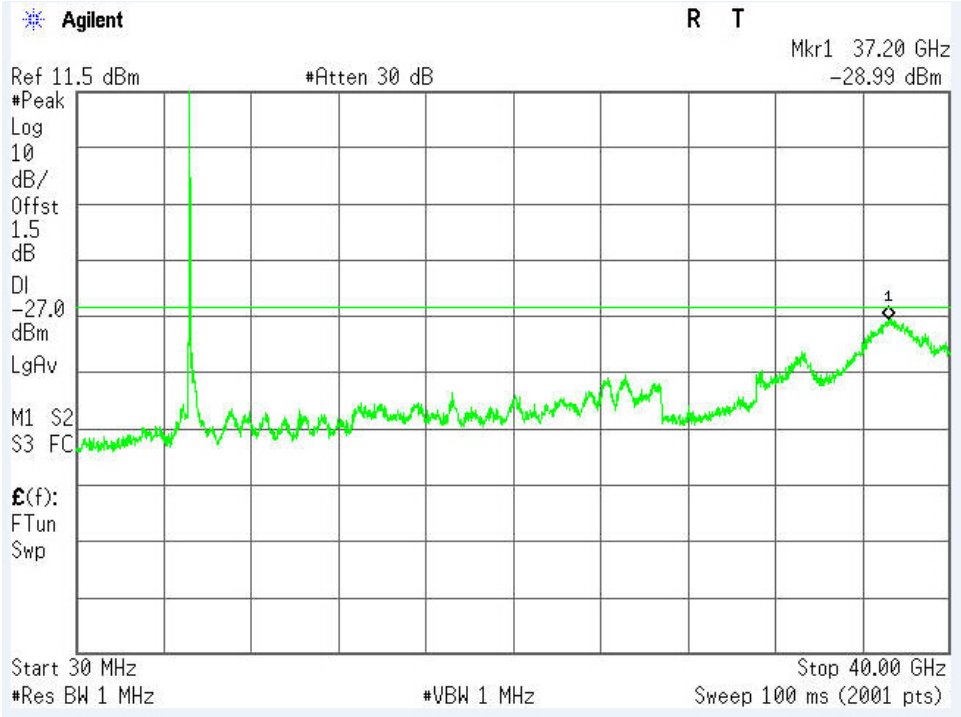
CH High



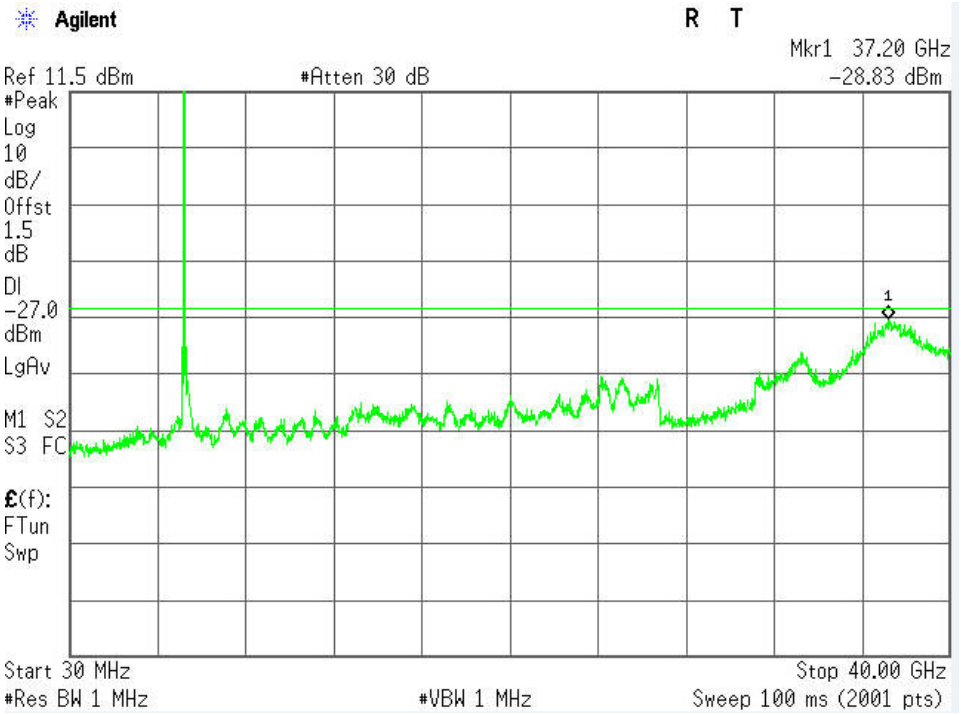
IEEE 802.11n HT 20 MHz (5180 ~ 5240MHz)
CH Low



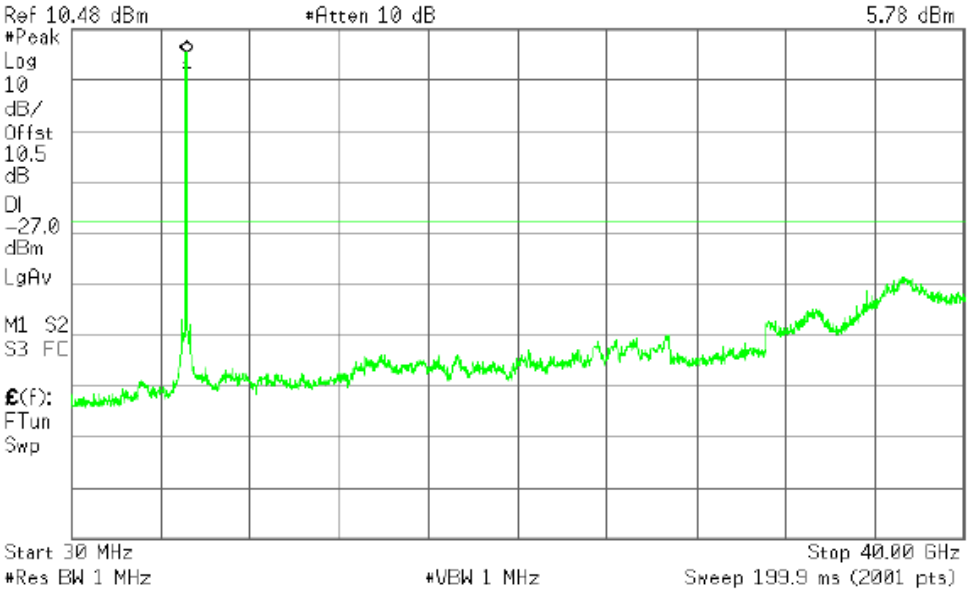
CH Mid



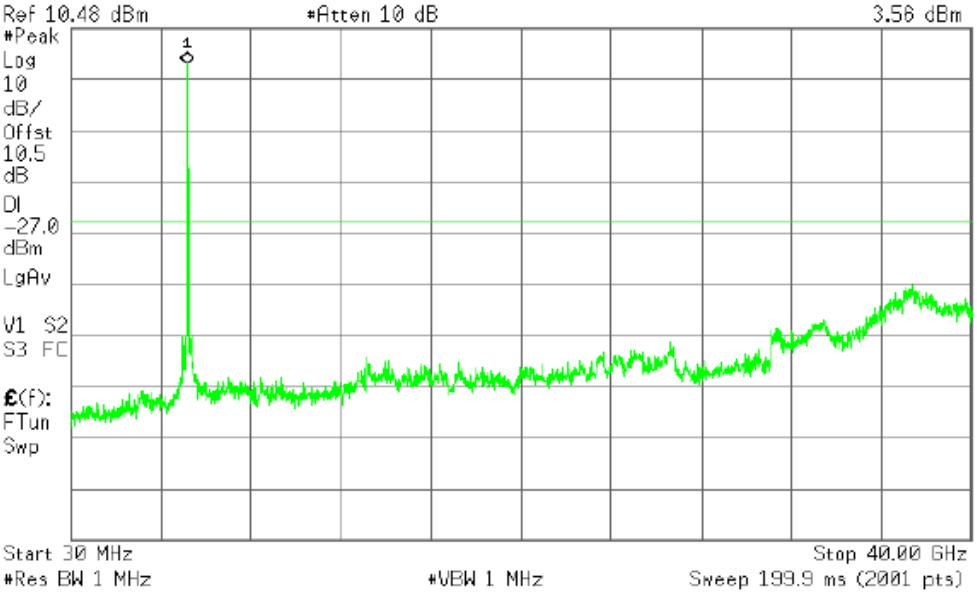
CH High



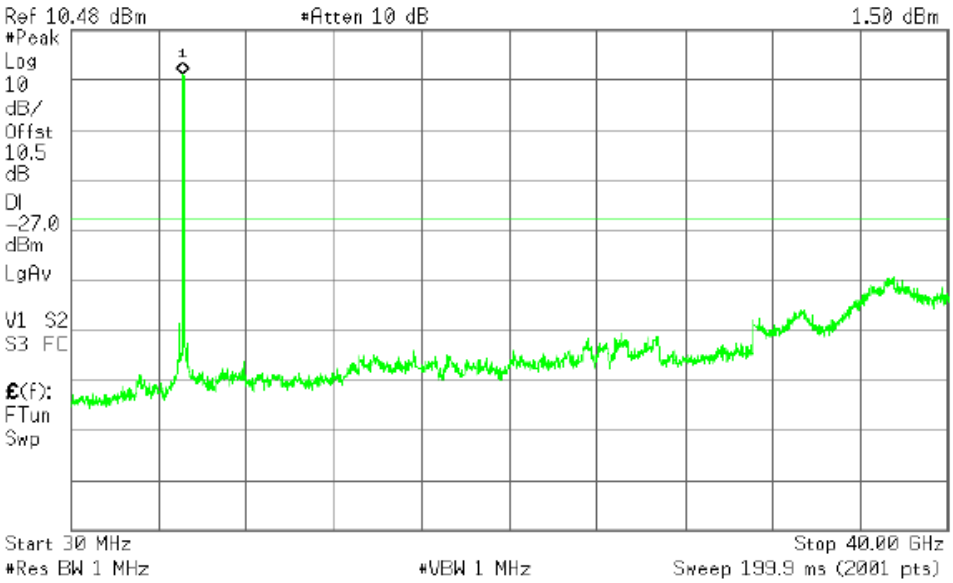
IEEE 802.11a (5745 ~ 5825MHz)
CH Low



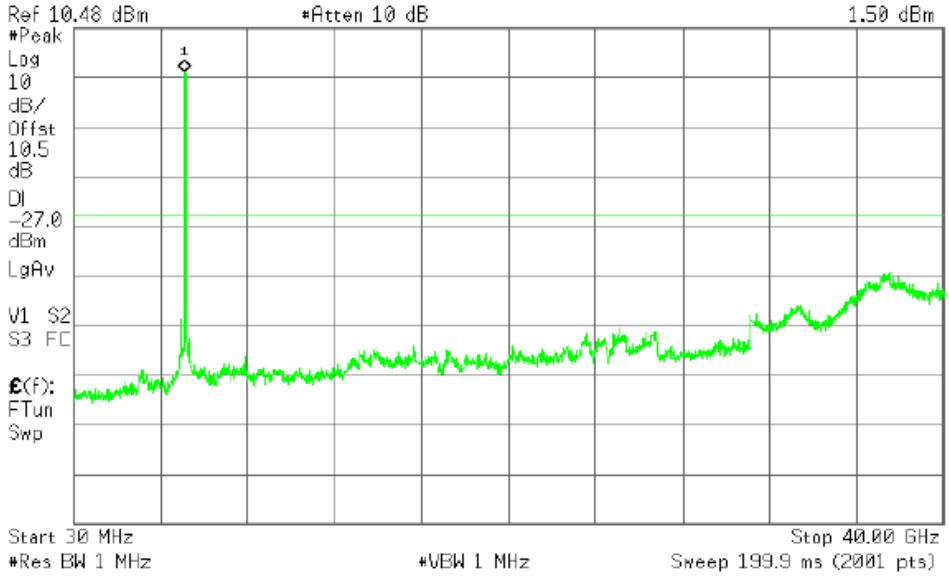
CH Mid



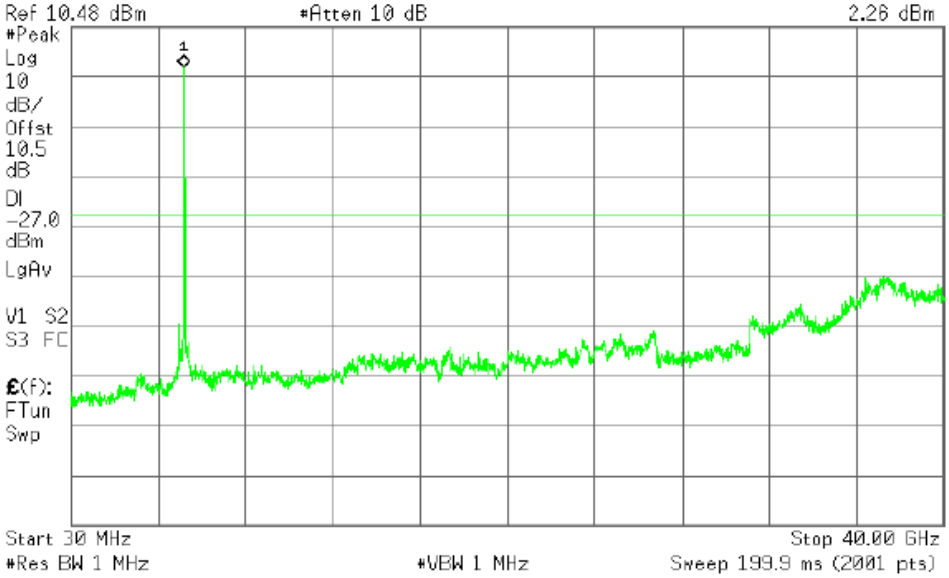
CH High



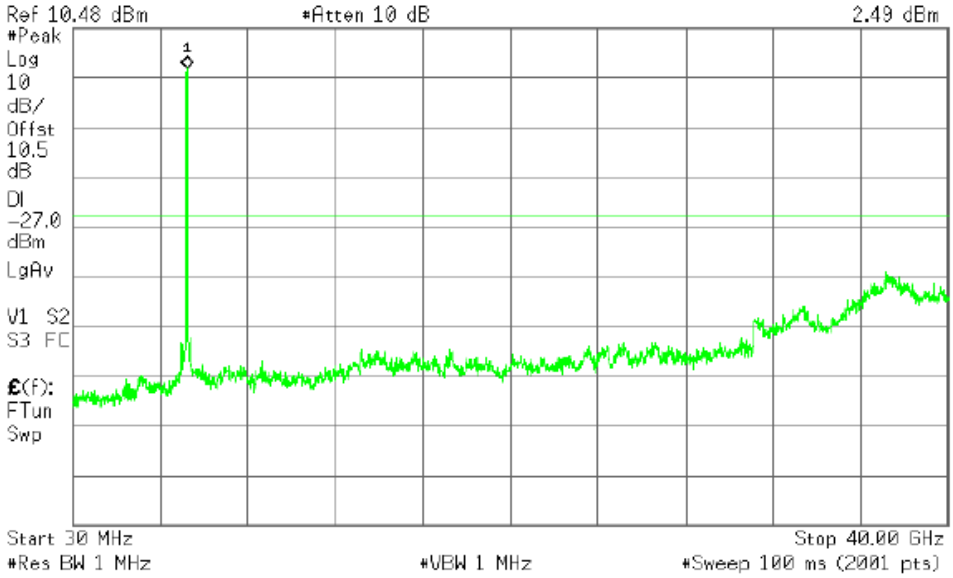
IEEE 802.11n HT 20 MHz (5745 ~ 5825MHz)
CH Low



CH Mid



CH High

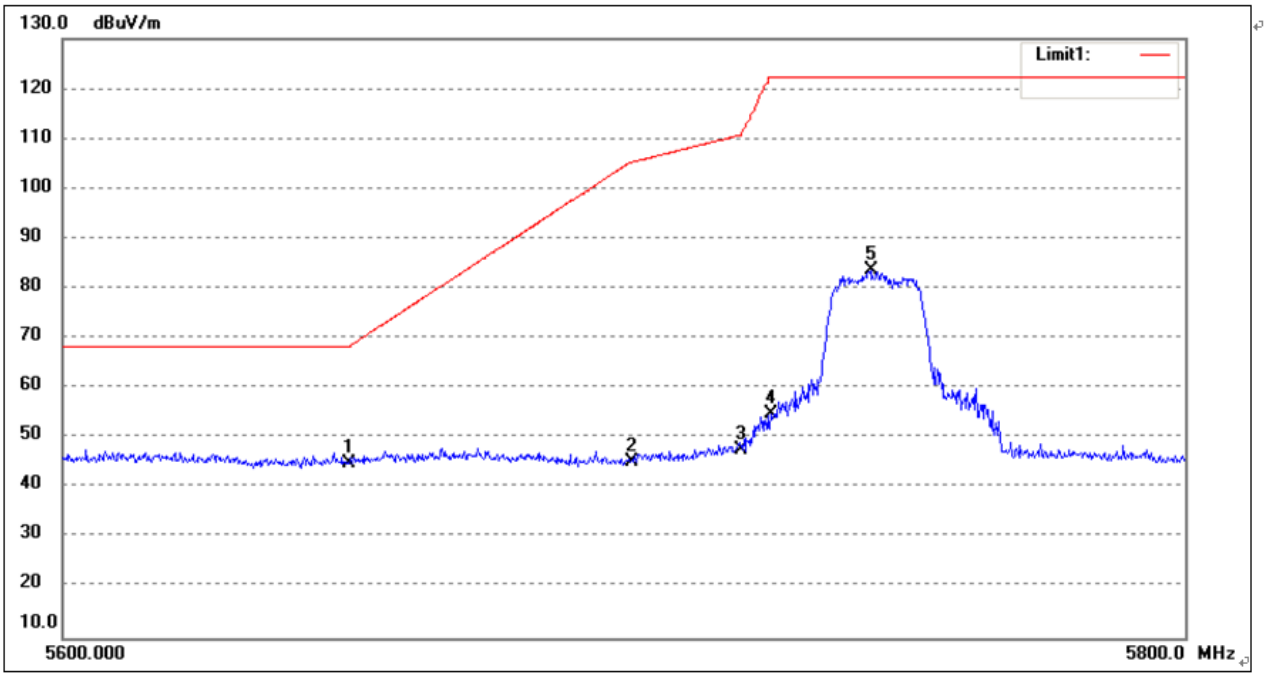


Radiated Band Edges and Undesirable Emission Test Result

IEEE 802.11a CH Low

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Test Frequency (MHz) :5745

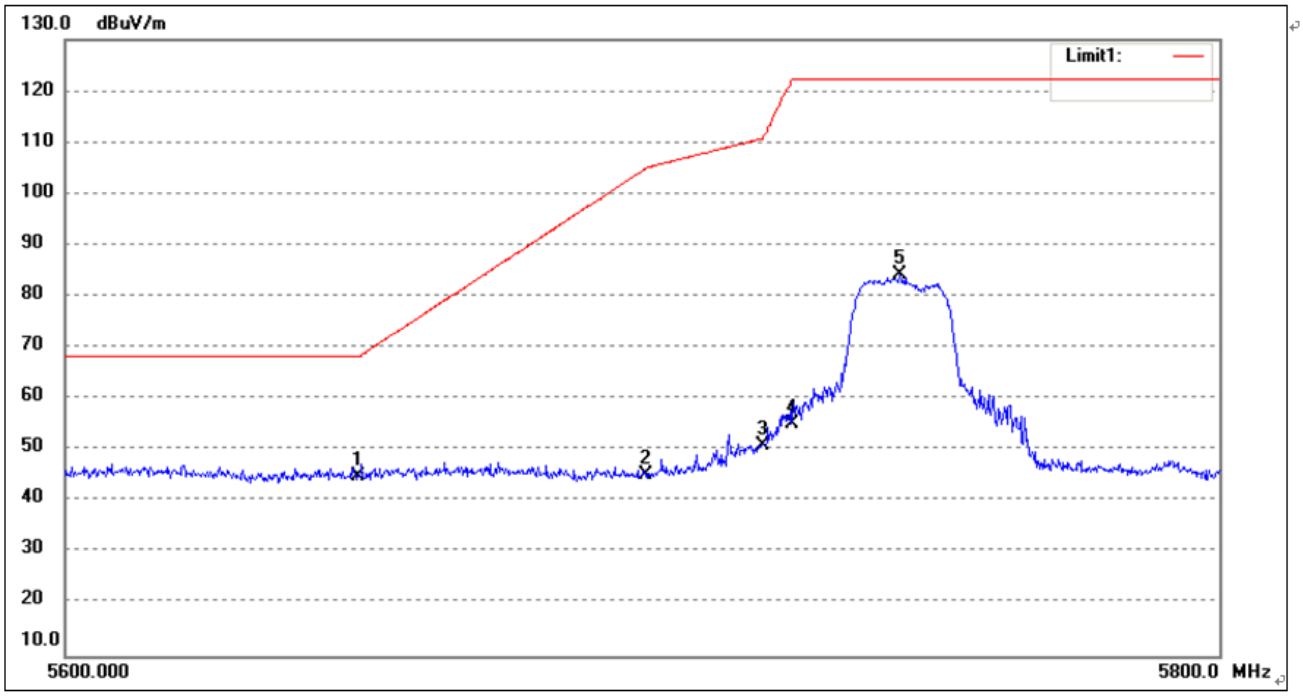
Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5650.137	44.90	0.04	44.94	68.30	-23.36	peak
2	5700.323	45.23	0.13	45.36	105.29	-59.93	peak
3	5720.361	47.33	0.18	47.51	111.62	-64.11	peak
4	5725.382	54.61	0.19	54.80	122.20	-67.40	peak
5	5743.291	83.29	0.24	83.53	122.20	-38.67	peak

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Test Frequency (MHz) :5745

Polarization: Vertical

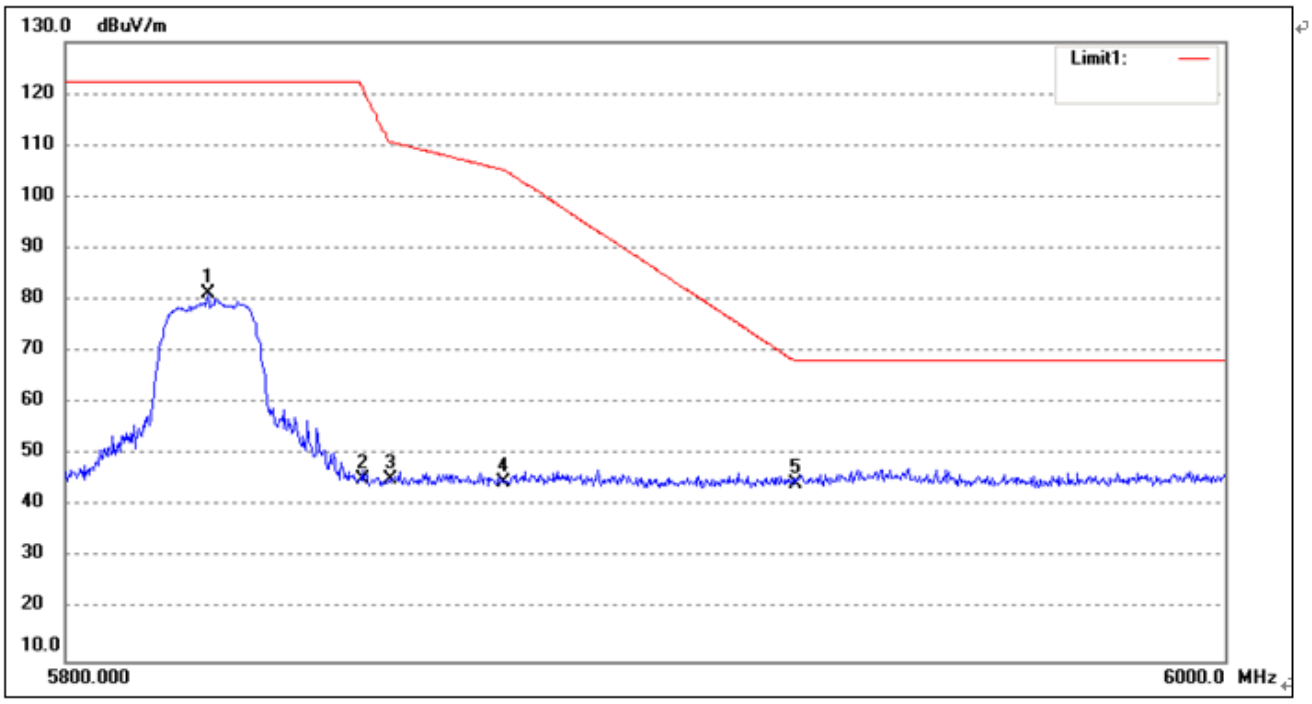


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5650.335	44.93	0.04	44.97	68.45	-23.48	peak
2	5699.723	45.07	0.13	45.20	105.00	-59.80	peak
3	5720.361	50.77	0.18	50.95	111.62	-60.67	peak
4	5724.980	55.02	0.19	55.21	122.15	-66.94	peak
5	5743.895	83.88	0.24	84.12	122.20	-38.08	peak

IEEE 802.11a CH High

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Test Frequency (MHz) :5825

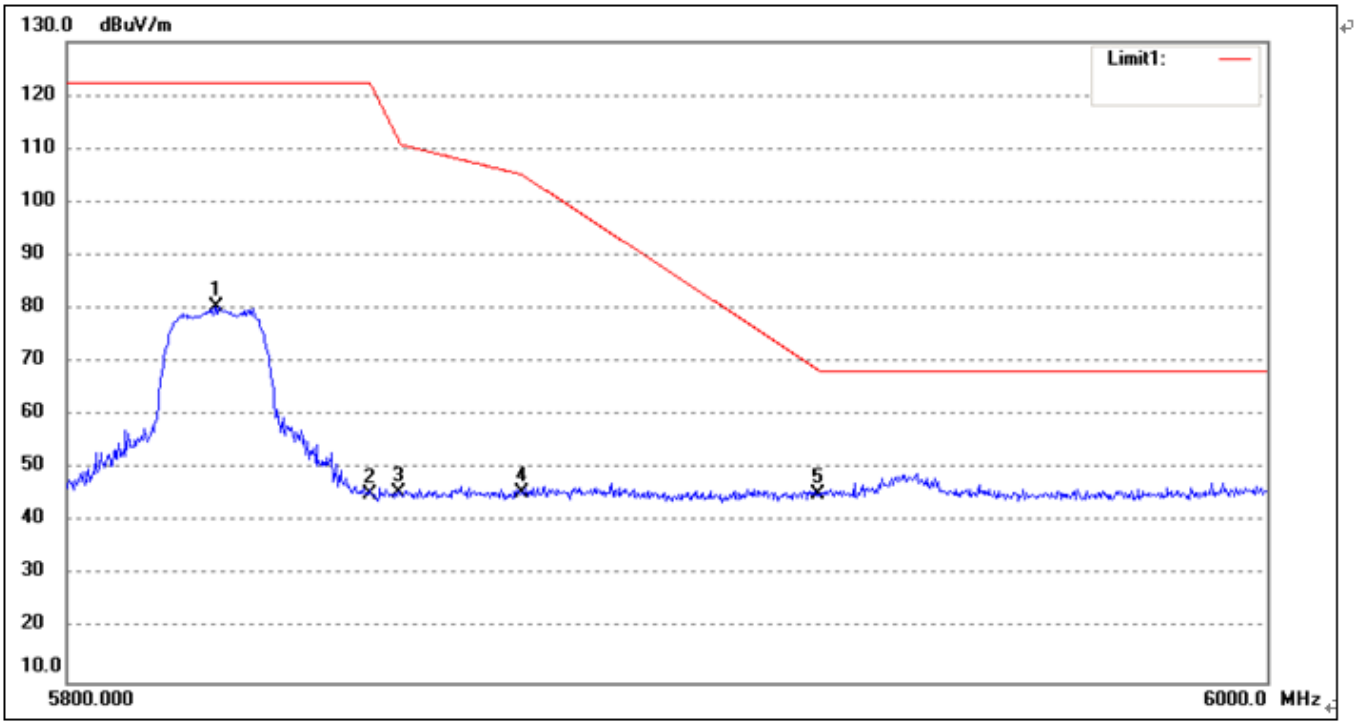
Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5824.236	80.86	0.45	81.31	122.20	-40.89	peak
2	5850.358	44.67	0.51	45.18	121.38	-76.20	peak
3	5855.715	44.63	0.53	45.16	110.60	-65.44	peak
4	5874.804	44.05	0.58	44.63	105.25	-60.62	peak
5	5925.008	43.62	0.70	44.32	68.20	-23.88	peak

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Test Frequency (MHz) :5825

Polarization: Vertical

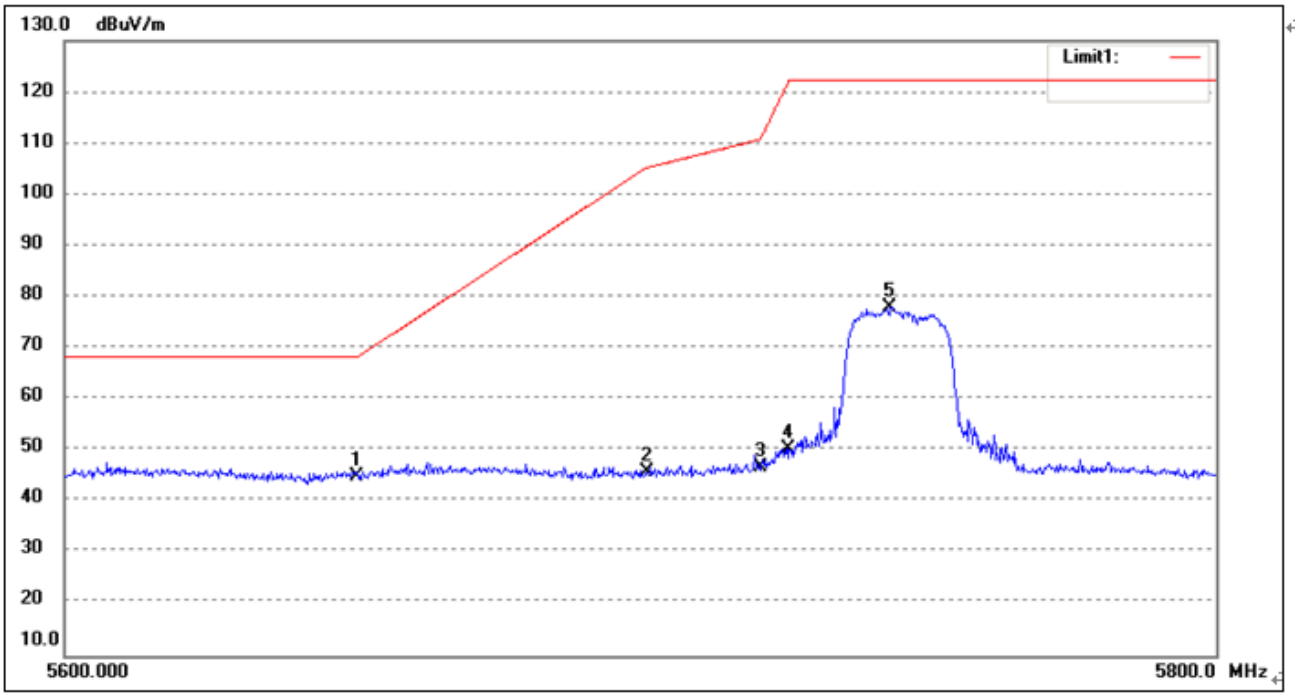


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5824.433	80.04	0.45	80.49	122.20	-41.71	peak
2	5850.159	44.89	0.51	45.40	121.84	-76.44	peak
3	5854.921	44.90	0.53	45.43	110.98	-65.55	peak
4	5875.003	44.87	0.58	45.45	105.20	-59.75	peak
5	5924.405	44.68	0.70	45.38	68.64	-23.26	peak

IEEE 802.11n CH Low

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Test Frequency (MHz) :5745

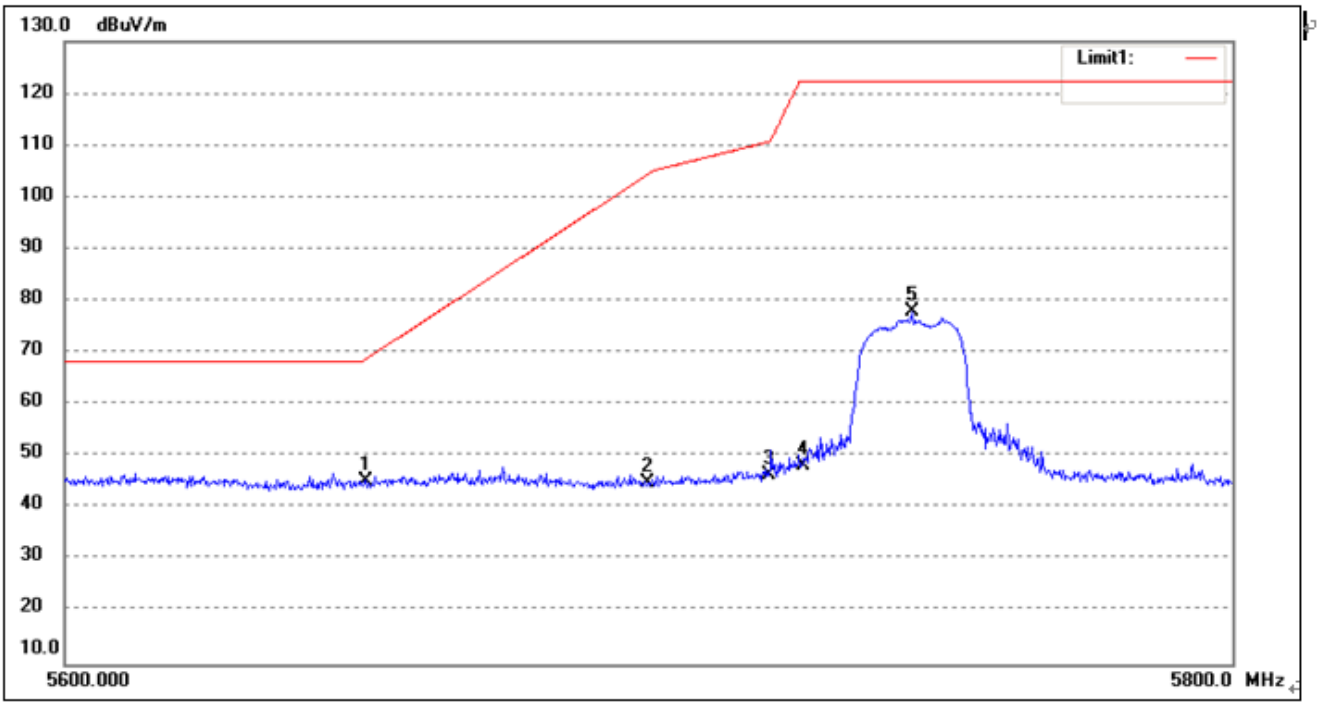
Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5650.335	44.79	0.04	44.83	68.45	-23.62	peak
2	5700.323	45.59	0.13	45.72	105.29	-59.57	peak
3	5720.160	46.48	0.18	46.66	111.16	-64.50	peak
4	5724.980	50.05	0.19	50.24	122.15	-71.91	peak
5	5742.686	77.76	0.24	78.00	122.20	-44.20	peak

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Test Frequency (MHz) :5745

Polarization: Vertical

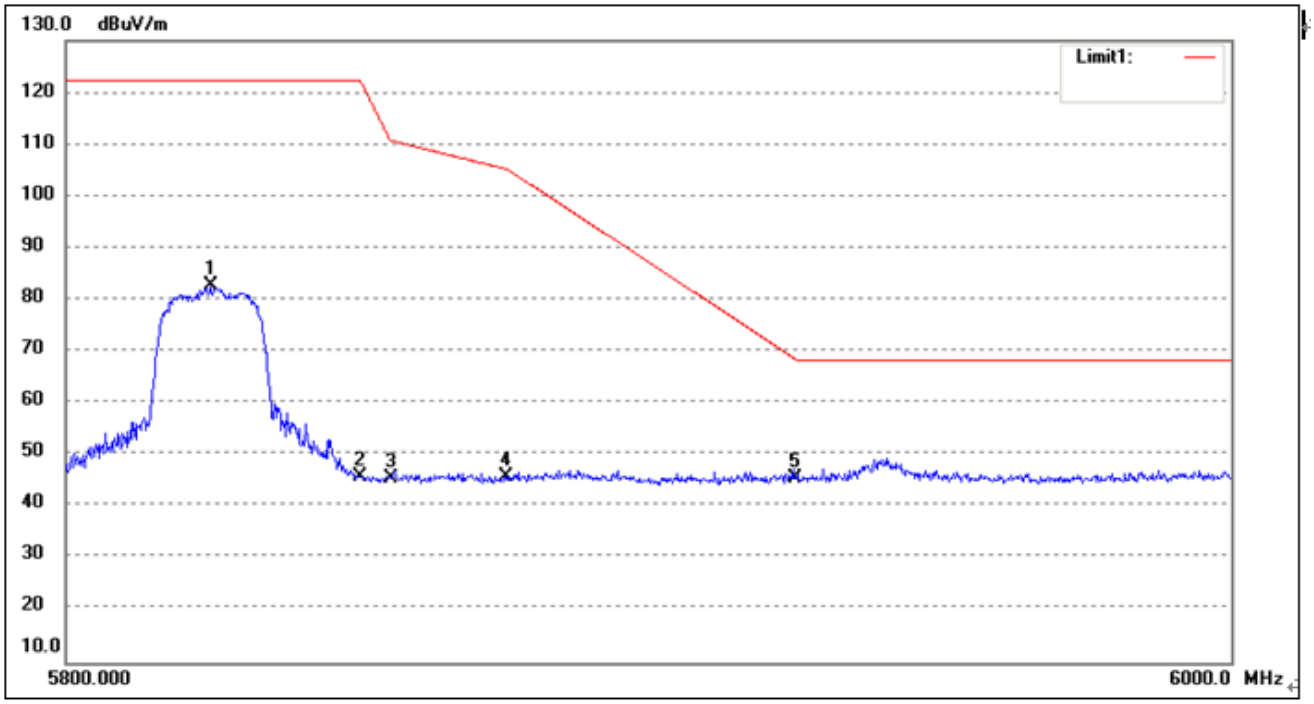


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5650.732	45.36	0.04	45.40	68.74	-23.34	peak
2	5698.923	44.90	0.13	45.03	104.40	-59.37	peak
3	5719.759	46.20	0.18	46.38	110.73	-64.35	peak
4	5725.382	48.07	0.19	48.26	122.20	-73.94	peak
5	5744.500	77.57	0.24	77.81	122.20	-44.39	peak

IEEE 802.11n CH High

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Test Frequency (MHz) :5825

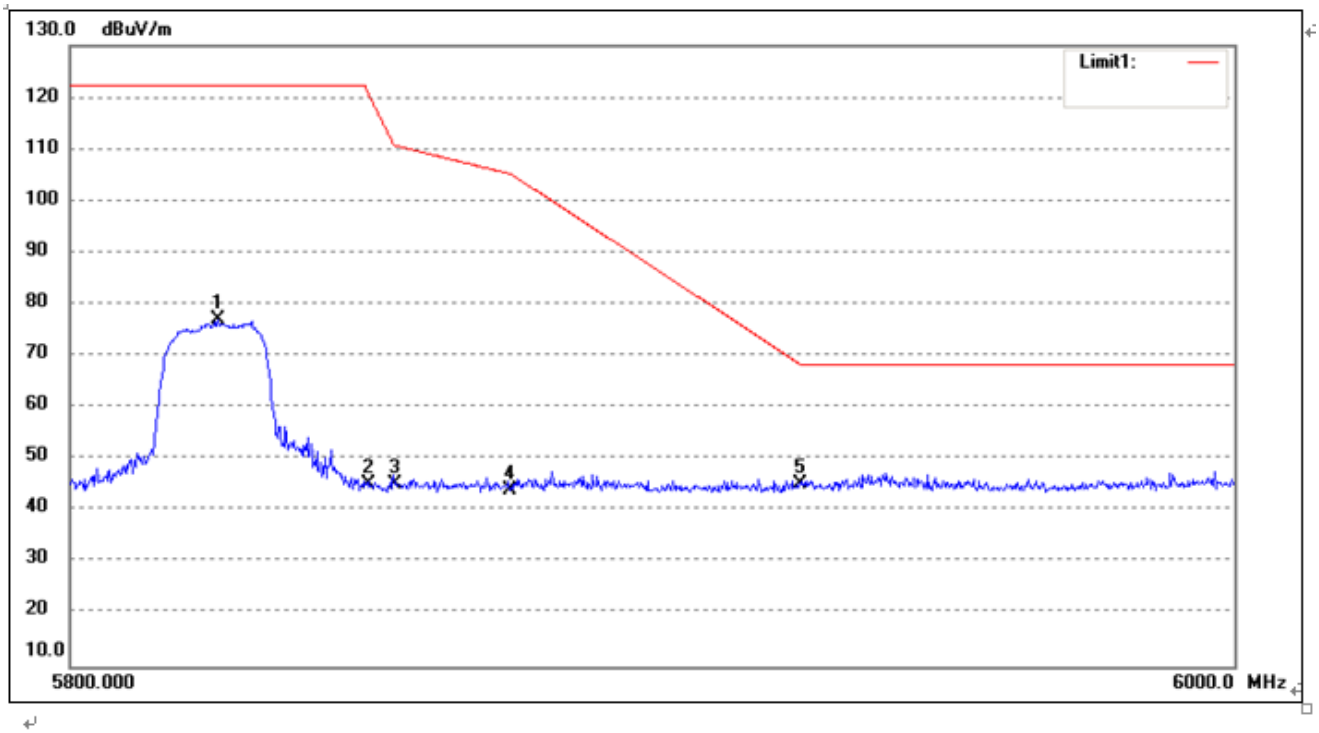
Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5824.433	82.29	0.45	82.74	122.20	-39.46	peak
2	5850.159	45.38	0.51	45.89	121.84	-75.95	peak
3	5855.120	45.15	0.53	45.68	110.77	-65.09	peak
4	5874.804	45.24	0.58	45.82	105.25	-59.43	peak
5	5924.405	44.97	0.70	45.67	68.64	-22.97	peak

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Test Frequency (MHz) :5825

Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5825.026	76.74	0.45	77.19	122.20	-45.01	peak
2	5850.358	44.79	0.51	45.30	121.38	-76.08	peak
3	5855.120	44.86	0.53	45.39	110.77	-65.38	peak
4	5874.804	43.52	0.58	44.10	105.25	-61.15	peak
5	5924.606	44.51	0.70	45.21	68.49	-23.28	peak

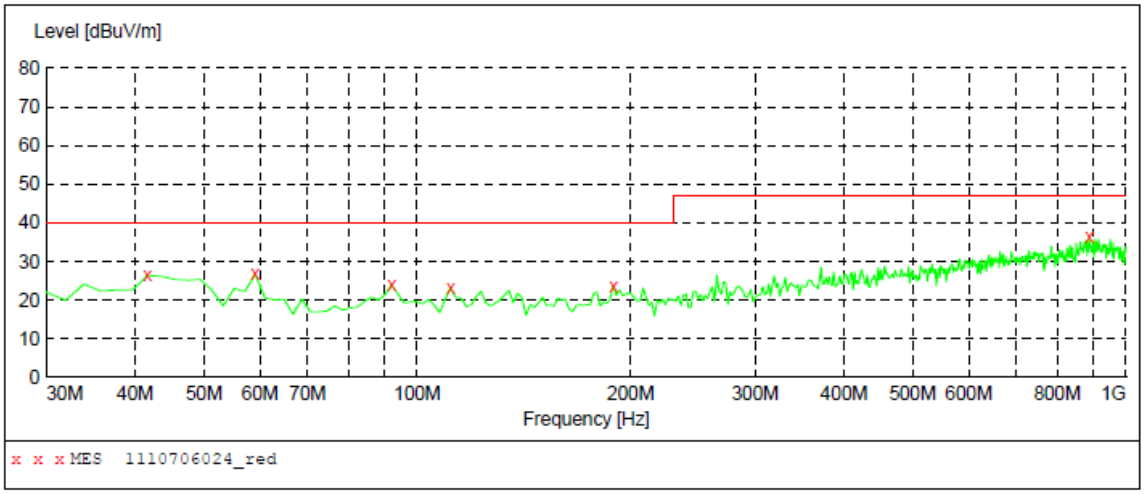
Transmitter Radiated Undesirable Emissions (Below 1GHz)

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuous transmitting
Test Frequency (MHz) :5825	Polarization: Vertical

Note:
1. We test all modes, and chose the worst data for the report.
2. Worst-case radiated emission below 30MHz is IEEE 802 11a TX (CH Low:5825MHz) mode.
3. Worst-case radiated emission below 1GHz is IEEE 802 11a TX (CH Low:5825MHz) mode.

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015



MEASUREMENT RESULT: "1110706024_red"

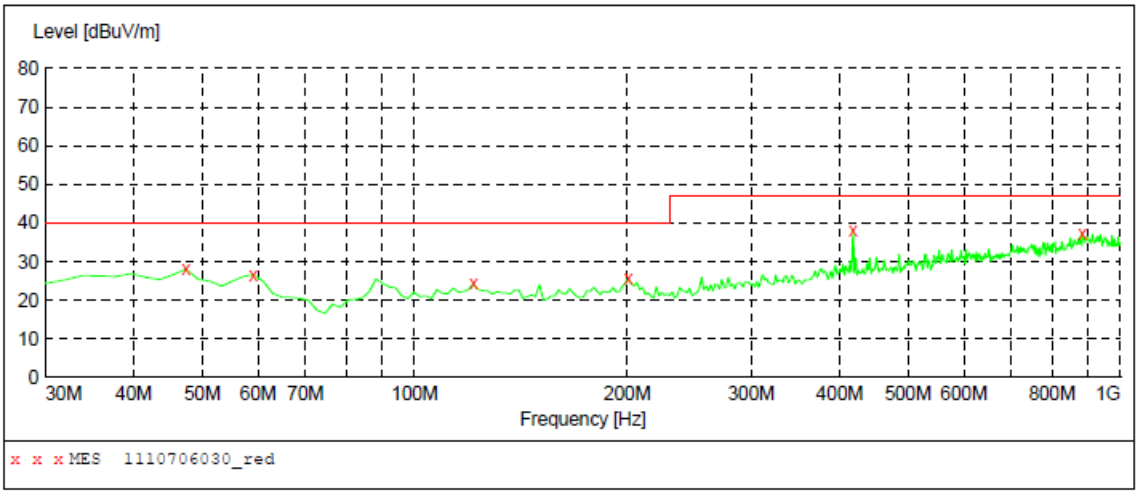
Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
41.640000	26.30	15.4	40.0	13.7	---	100.0	0.00	VERTICAL
59.100000	26.70	15.7	40.0	13.3	---	100.0	0.00	VERTICAL
92.080000	24.00	14.0	40.0	16.0	---	100.0	0.00	VERTICAL
111.480000	23.20	12.5	40.0	16.8	---	100.0	0.00	VERTICAL
189.080000	23.60	13.4	40.0	16.4	---	100.0	0.00	VERTICAL
887.480000	36.50	25.5	47.0	10.5	---	100.0	0.00	VERTICAL

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuous transmitting
Test Frequency (MHz) :5825	Polarization: Horizontal

Note:
1. We test all modes, and chose the worst data for the report.
2. Worst-case radiated emission below 30MHz is IEEE 802 11a TX (CH Low:5825MHz) mode.
3. Worst-case radiated emission below 1GHz is IEEE 802 11a TX (CH Low:5825MHz) mode.

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	9163-2015



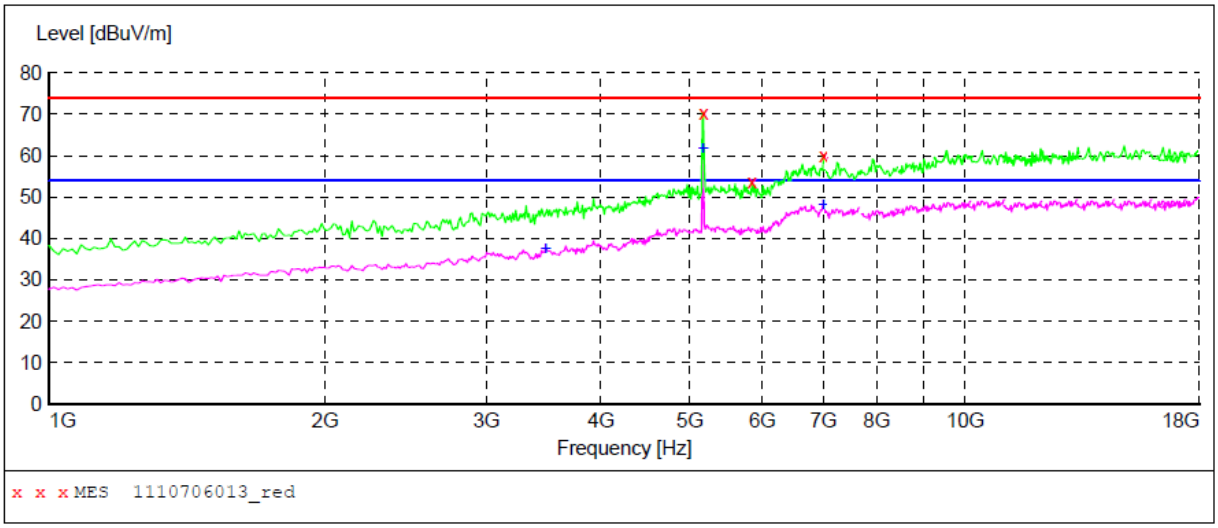
MEASUREMENT RESULT: "1110706030_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	28.10	16.7	40.0	11.9	---	100.0	0.00	HORIZONTAL
59.100000	26.60	15.7	40.0	13.4	---	100.0	0.00	HORIZONTAL
121.180000	24.20	13.2	40.0	15.8	---	100.0	0.00	HORIZONTAL
200.720000	25.60	14.0	40.0	14.4	---	100.0	0.00	HORIZONTAL
418.000000	38.00	18.2	47.0	9.0	---	100.0	0.00	HORIZONTAL
883.600000	37.30	25.4	47.0	9.7	---	100.0	0.00	HORIZONTAL

Transmitter Radiated Undesirable Emissions (Above 1GHz)

Worst-case radiated emission of IEEE 802.11a mode

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuous transmitting
Test Frequency (MHz) :5240	Polarization: Horizontal
Note: 1. We test all modes, and chose the worst data for the report. 2.Worst-case radiated emission above 1GHz for IEEE 802.11a mode (5240MHz).	

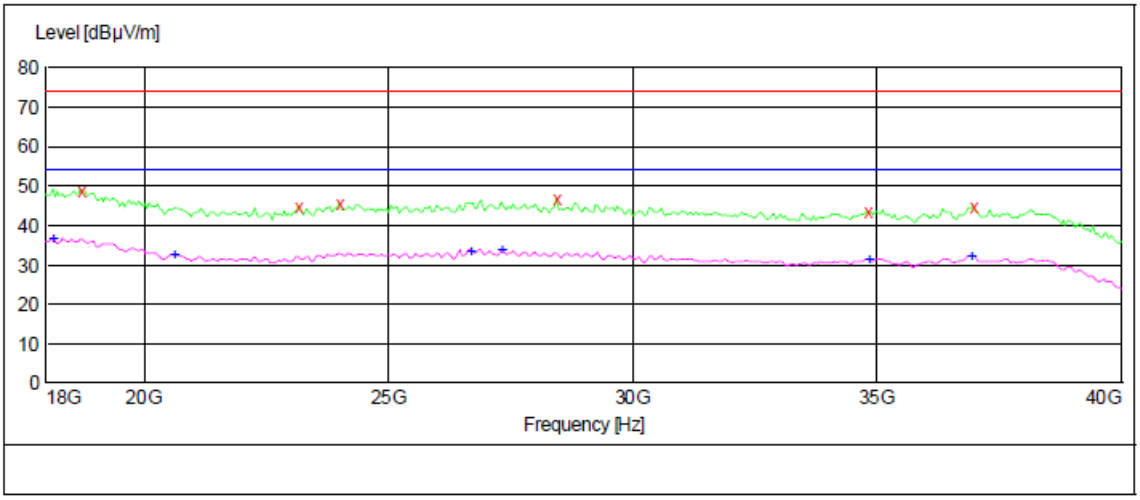


MEASUREMENT RESULT: "1110706013_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
5241.000000	70.30	12.7	74.0	3.7	---	150.0	0.00	HORIZONTAL
5848.000000	53.50	13.0	74.0	20.5	---	150.0	0.00	HORIZONTAL
7000.000000	59.80	20.3	74.0	14.2	---	150.0	0.00	HORIZONTAL

MEASUREMENT RESULT: "1110706013_red2"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
3484.000000	37.50	4.6	53.9	16.4	---	150.0	0.00	HORIZONTAL
5241.000000	61.50	12.7	53.9	-7.6	---	150.0	0.00	HORIZONTAL
7000.000000	48.20	20.3	53.9	5.7	---	150.0	0.00	HORIZONTAL



MEASUREMENT RESULT: "HC170625002_red"

6/25/2017 3:52PM

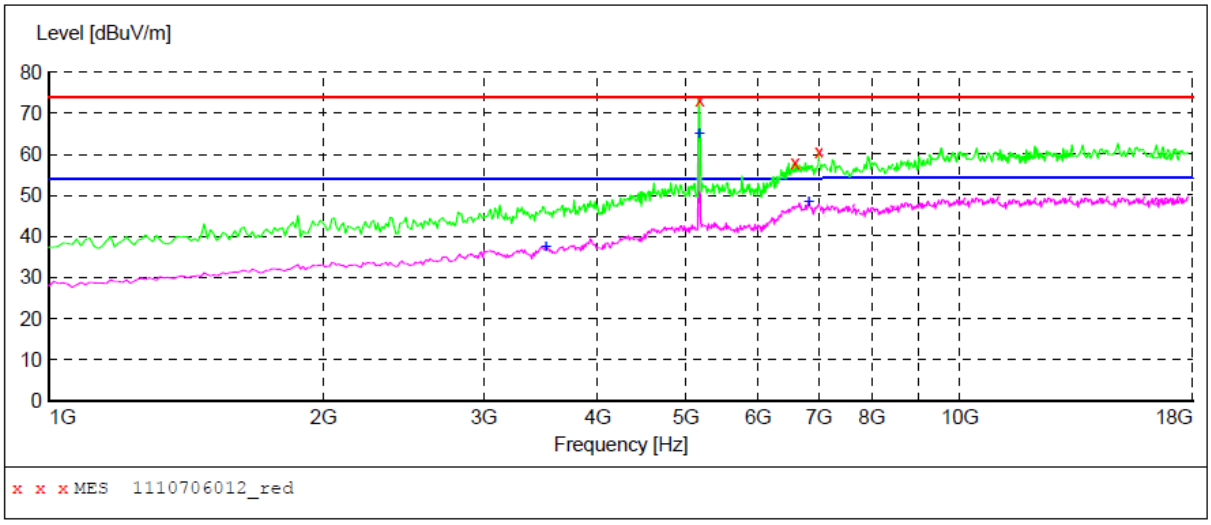
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
18705.410822	49.20	-22.4	74.0	24.8	---	100.0	294.00	HORIZONTAL
23158.316633	44.80	-24.2	74.0	29.2	---	100.0	13.00	HORIZONTAL
23995.991984	45.70	-22.8	74.0	28.3	---	100.0	328.00	HORIZONTAL
28448.897796	46.70	-20.3	74.0	27.3	---	100.0	244.00	HORIZONTAL
34797.595190	43.70	-13.8	74.0	30.3	---	100.0	351.00	HORIZONTAL
36957.915832	44.80	-12.8	74.0	29.2	---	100.0	163.00	HORIZONTAL

MEASUREMENT RESULT: "HC170625002_red2"

6/25/2017 3:52PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
18132.264529	36.80	-19.8	54.0	17.2	---	100.0	121.00	HORIZONTAL
20601.202405	32.50	-26.7	54.0	21.5	---	100.0	96.00	HORIZONTAL
26685.370741	33.70	-21.4	54.0	20.3	---	100.0	129.00	HORIZONTAL
27302.605210	33.80	-21.0	54.0	20.2	---	100.0	0.00	HORIZONTAL
34841.683367	31.50	-13.7	54.0	22.5	---	100.0	187.00	HORIZONTAL
36913.827655	32.30	-12.8	54.0	21.7	---	100.0	104.00	HORIZONTAL

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuous transmitting
Test Frequency (MHz) :5240	Polarization: Vertical
Note: 1. We test all modes, and chose the worst data for the report. 2.Worst-case radiated emission above 1GHz for IEEE 802.11a mode (5240MHz).	

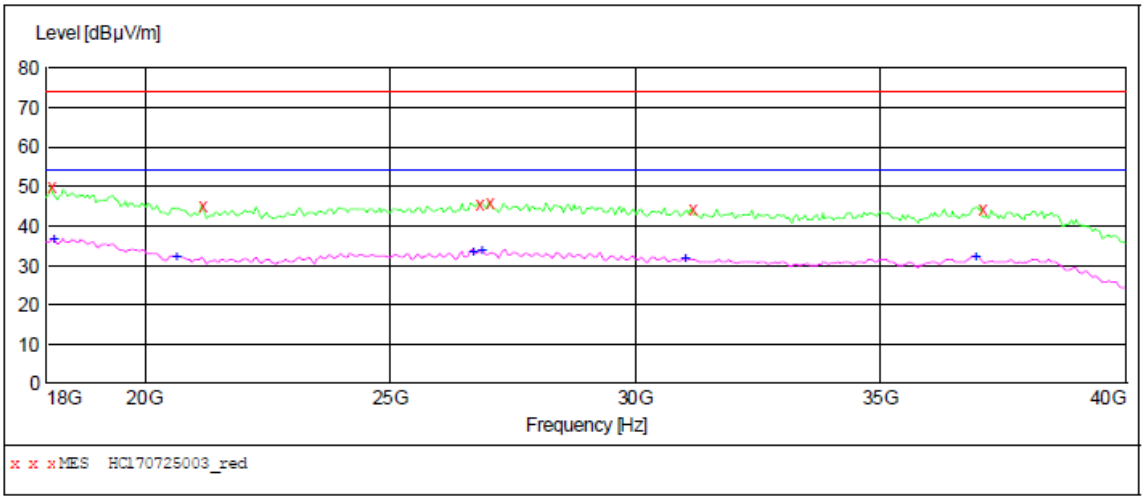


MEASUREMENT RESULT: "1110706012_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
5241.000000	73.20	12.7	74.0	0.8	---	150.0	0.00	VERTICAL
6592.000000	58.00	18.9	74.0	16.0	---	150.0	0.00	VERTICAL
7000.000000	60.50	20.3	74.0	13.5	---	150.0	0.00	VERTICAL

MEASUREMENT RESULT: "1110706012_red2"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
3508.000000	37.40	4.7	53.9	16.5	---	150.0	0.00	VERTICAL
5241.000000	64.80	12.7	53.9	-10.9	---	150.0	0.00	VERTICAL
6820.000000	48.40	19.7	53.9	5.5	---	150.0	0.00	VERTICAL



MEASUREMENT RESULT: "HC170725003_red"

7/25/2017 3:54PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
18088.176353	49.90	-19.6	74.0	24.1	---	100.0	318.00	HORIZONTAL
21174.348697	45.30	-26.7	74.0	28.7	---	100.0	57.00	HORIZONTAL
26817.635271	45.70	-21.3	74.0	28.3	---	100.0	348.00	HORIZONTAL
27038.076152	46.20	-21.0	74.0	27.8	---	100.0	197.00	HORIZONTAL
31138.276553	44.30	-18.1	74.0	29.7	---	100.0	278.00	HORIZONTAL
37046.092184	44.60	-12.7	74.0	29.4	---	100.0	41.00	HORIZONTAL

MEASUREMENT RESULT: "HC170725003_red2"

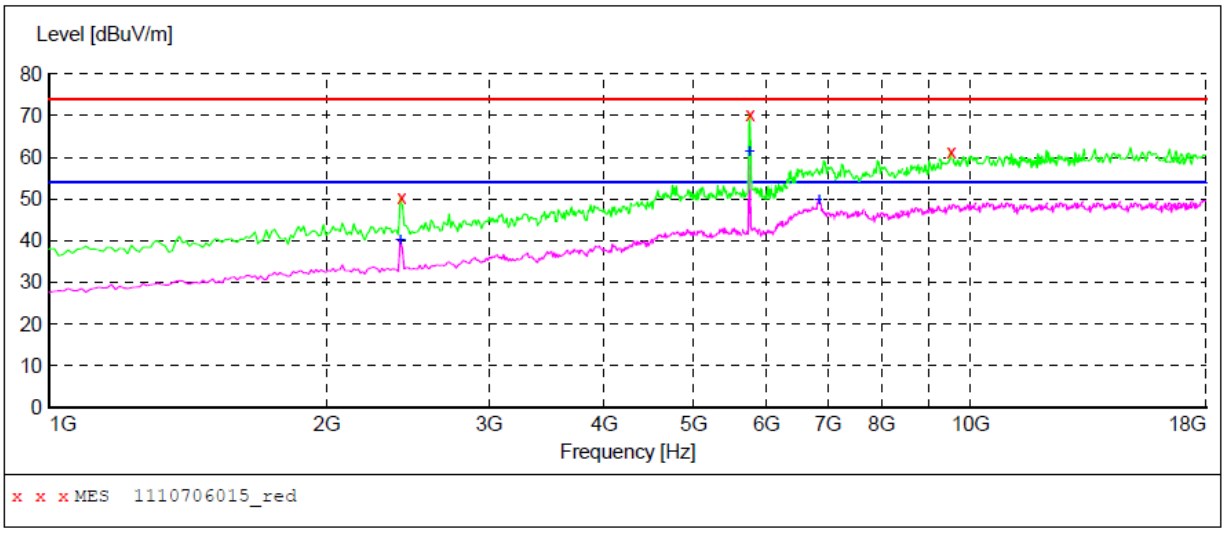
7/25/2017 3:54PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
18132.264529	36.60	-19.8	54.0	17.4	---	100.0	57.00	HORIZONTAL
20645.290581	32.40	-26.7	54.0	21.6	---	100.0	164.00	HORIZONTAL
26685.370741	33.60	-21.4	54.0	20.4	---	100.0	82.00	HORIZONTAL
26861.723447	33.80	-21.2	54.0	20.2	---	100.0	238.00	HORIZONTAL
31006.012024	31.70	-18.2	54.0	22.3	---	100.0	0.00	HORIZONTAL
36913.827655	32.40	-12.8	54.0	21.6	---	100.0	214.00	HORIZONTAL

Transmitter Radiated Undesirable Emissions (Above 1GHz)

Worst-case radiated emission of IEEE 802.11n HT 20 mode

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuous transmitting
Test Frequency (MHz) :5745	Polarization: Horizontal
Note: 1. We test all modes, and chose the worst data for the report. 2.Worst-case radiated emission above 1GHz for IEEE 802.11a mode (5745MHz).	

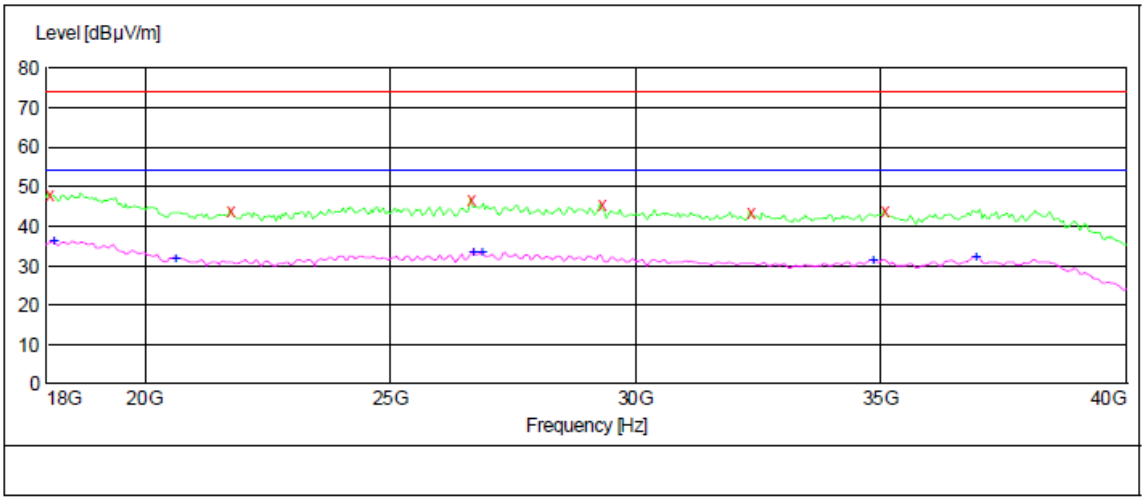


MEASUREMENT RESULT: "1110706015_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
2404.000000	50.30	12.7	74.0	23.7	---	150.0	0.00	HORIZONTAL
5745.000000	70.40	13.0	74.0	3.6	---	150.0	0.00	HORIZONTAL
9628.000000	60.80	24.0	74.0	13.2	---	150.0	0.00	HORIZONTAL

MEASUREMENT RESULT: "1110706015_red2"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
2404.000000	40.20	1.9	53.9	13.7	---	150.0	0.00	HORIZONTAL
5745.000000	61.30	12.7	53.9	-7.4	---	150.0	0.00	HORIZONTAL
6820.000000	49.80	19.7	53.9	5.1	---	150.0	0.00	HORIZONTAL



MEASUREMENT RESULT: "HC170625014_red"

6/25/2017 4:36PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
18044.088176	48.30	-19.4	74.0	25.7	---	100.0	332.00	HORIZONTAL
21747.494990	44.10	-26.0	74.0	29.9	---	100.0	360.00	HORIZONTAL
26641.282565	47.00	-21.5	74.0	27.0	---	100.0	356.00	HORIZONTAL
29286.573146	45.70	-19.5	74.0	28.3	---	100.0	167.00	HORIZONTAL
32328.657315	43.80	-17.1	74.0	30.2	---	100.0	241.00	HORIZONTAL
35062.124248	44.10	-13.4	74.0	29.9	---	100.0	83.00	HORIZONTAL

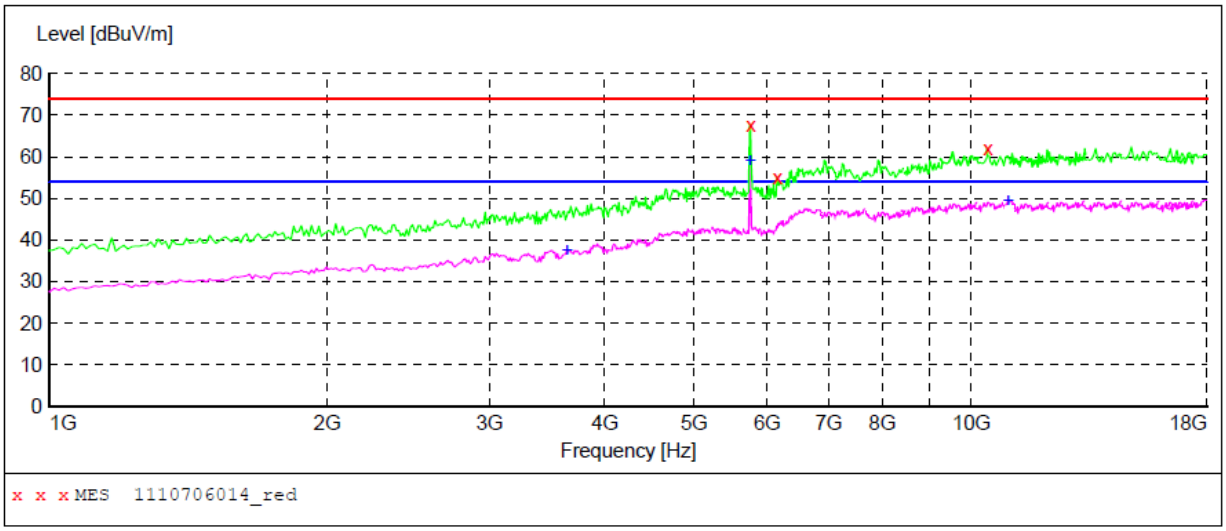
MEASUREMENT RESULT: "HC170625014_red2"

6/25/2017 4:36PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
18132.264529	36.30	-19.8	54.0	17.7	---	100.0	207.00	HORIZONTAL
20601.202405	32.00	-26.7	54.0	22.0	---	100.0	0.00	HORIZONTAL
26685.370741	33.10	-21.4	54.0	20.9	---	100.0	142.00	HORIZONTAL
26861.723447	33.20	-21.2	54.0	20.8	---	100.0	167.00	HORIZONTAL
34841.683367	31.40	-13.7	54.0	22.6	---	100.0	332.00	HORIZONTAL
36913.827655	32.20	-12.8	54.0	21.8	---	100.0	249.00	HORIZONTAL

Worst-case radiated emission of IEEE 802.11n HT 20 mode

Temperature (℃) : 22~23	EUT: Personal Theater
Humidity (%RH): 50~54	M/N: G1
Barometric Pressure (mbar): 950~1000	Operation Condition: Continuous transmitting
Test Frequency (MHz) :5745	Polarization: Vertical
Note: 1. We test all modes, and chose the worst data for the report. 2.Worst-case radiated emission above 1GHz for IEEE 802.11a mode (5745MHz).	

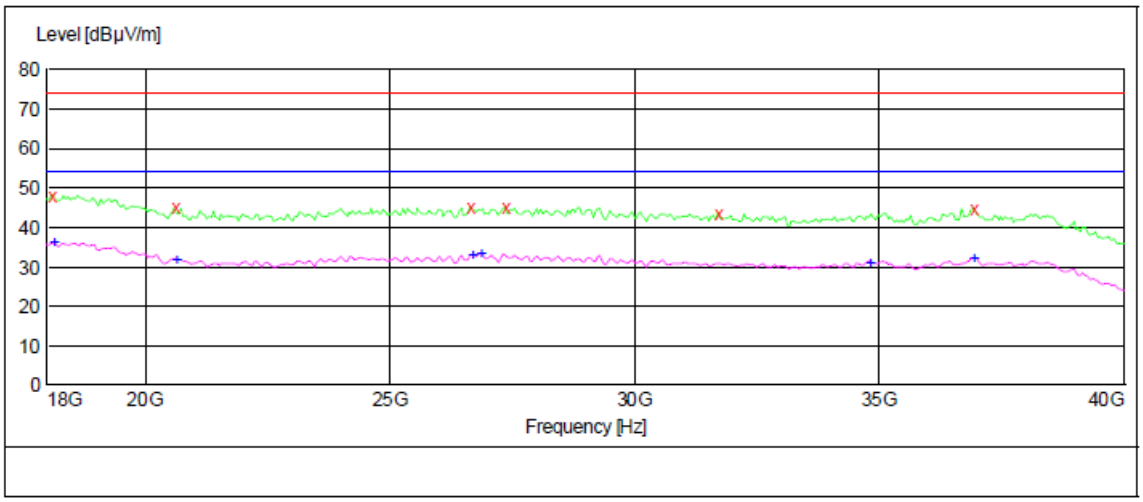


MEASUREMENT RESULT: "1110706014_red"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
5746.000000	67.70	12.7	74.0	6.3	---	150.0	0.00	VERTICAL
6260.000000	55.10	14.8	74.0	18.9	---	150.0	0.00	VERTICAL
10564.000000	61.60	22.1	74.0	12.4	---	150.0	0.00	VERTICAL

MEASUREMENT RESULT: "1110706014_red2"

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
3640.000000	37.50	5.6	53.9	16.4	---	150.0	0.00	VERTICAL
5746.000000	59.10	12.5	53.9	-5.2	---	150.0	0.00	VERTICAL
10920.000000	49.30	19.7	53.9	4.6	---	150.0	0.00	VERTICAL



MEASUREMENT RESULT: "HC170625013_red"

6/25/2017 4:34PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
18088.176353	48.40	-19.6	74.0	25.6	---	100.0	256.00	VERTICAL
20601.202405	45.00	-26.7	74.0	29.0	---	100.0	6.00	VERTICAL
26641.282565	45.00	-21.5	74.0	29.0	---	100.0	65.00	VERTICAL
27346.693387	45.20	-21.0	74.0	28.8	---	100.0	272.00	VERTICAL
31711.422846	43.80	-17.6	74.0	30.2	---	100.0	206.00	VERTICAL
36913.827655	44.90	-12.8	74.0	29.1	---	100.0	6.00	VERTICAL

MEASUREMENT RESULT: "HC170625013_red2"

6/25/2017 4:34PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
18132.264529	36.30	-19.8	54.0	17.7	---	100.0	15.00	VERTICAL
20645.290581	32.00	-26.7	54.0	22.0	---	100.0	297.00	VERTICAL
26685.370741	33.00	-21.4	54.0	21.0	---	100.0	256.00	VERTICAL
26861.723447	33.40	-21.2	54.0	20.6	---	100.0	305.00	VERTICAL
34797.595190	31.20	-13.8	54.0	22.8	---	100.0	6.00	VERTICAL
36913.827655	32.10	-12.8	54.0	21.9	---	100.0	330.00	VERTICAL

10. POWER LINE CONDUCTED EMISSIONS

10.1 Test Limit

FCC Part 15 Subpart C Paragraph 15.207		
Frequency(MHz)	QP (dBμV)	AV (dBμV)
0.15 - 0.50	66 - 56	56 – 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

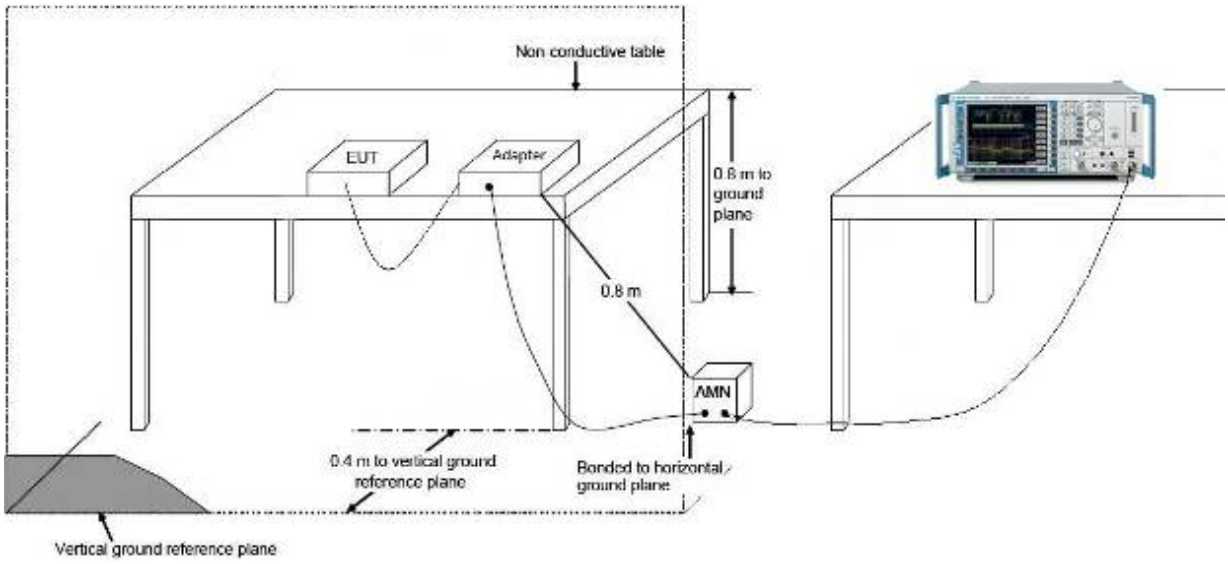
10.2 Test Procedure

The EUT was setup according to ANSI C63.4, 2009 and tested according to KDB 789033 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

10.3 Test Setup



10.4 Test Result

No non-compliance noted.

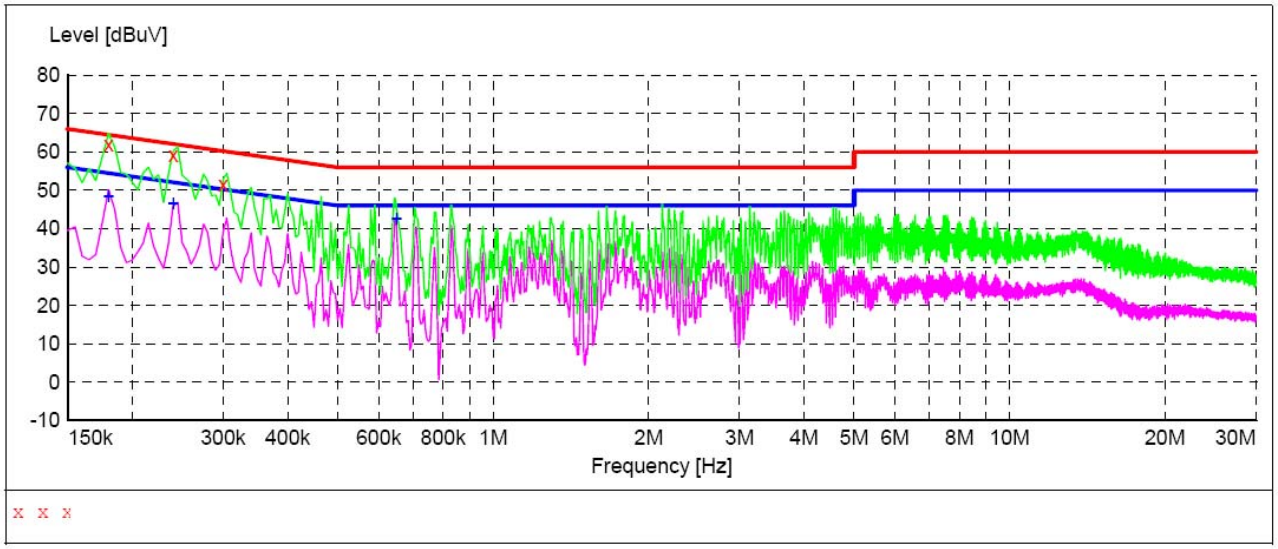
Test Plot

Conducted Emission:

EUT:	Personal Theater
M/N:	G1
Operating Condition:	Tx Mode
Test Site:	Shielded Room
Operator:	Yang
Test Specification:	AC 120V/60Hz for adapter
Comment:	L Line

SCAN TABLE: "Voltage(150K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.180000	61.90	12.0	65	2.6	QP	L1	GND
0.240000	59.00	13.6	62	3.1	QP	L1	GND
0.300000	51.50	11.0	60	8.7	QP	L1	GND

MEASUREMENT RESULT:

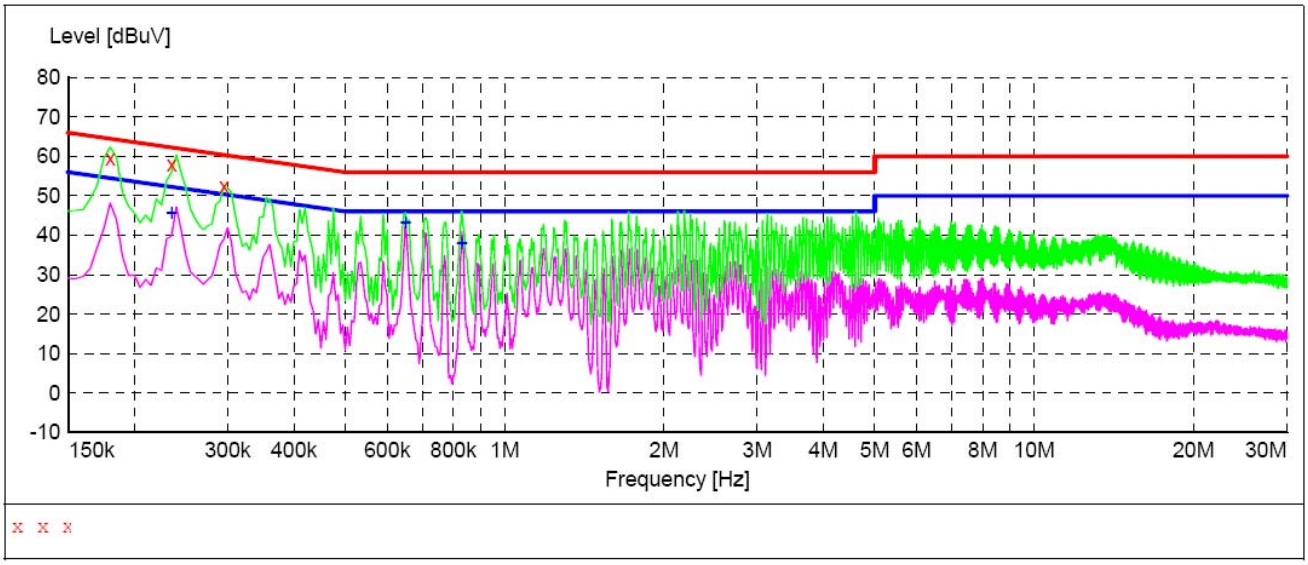
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.180000	48.30	12.0	55	6.2	AV	L1	GND
0.240000	46.60	13.6	52	5.5	AV	L1	GND
0.650000	42.70	10.4	46	3.3	AV	L1	GND

Conducted Emission:

EUT:	Personal Theater
M/N:	G1
Operating Condition:	Tx Mode
Test Site:	Shielded Room
Operator:	Yang
Test Specification:	AC 120V/60Hz for adapter
Comment:	N Line

SCAN TABLE: "Voltage(150K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.180000	59.40	12.0	65	5.1	QP	N	GND
0.235000	58.00	13.4	62	4.3	QP	N	GND
0.295000	52.40	11.2	60	8.0	QP	N	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.235000	45.80	13.4	52	6.5	AV	N	GND
0.650000	43.10	10.4	46	2.9	AV	N	GND
0.830000	38.10	10.3	46	7.9	AV	N	GND

11. FREQUENCY STABILITY

11.1 Test Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

11.2 Test Procedure

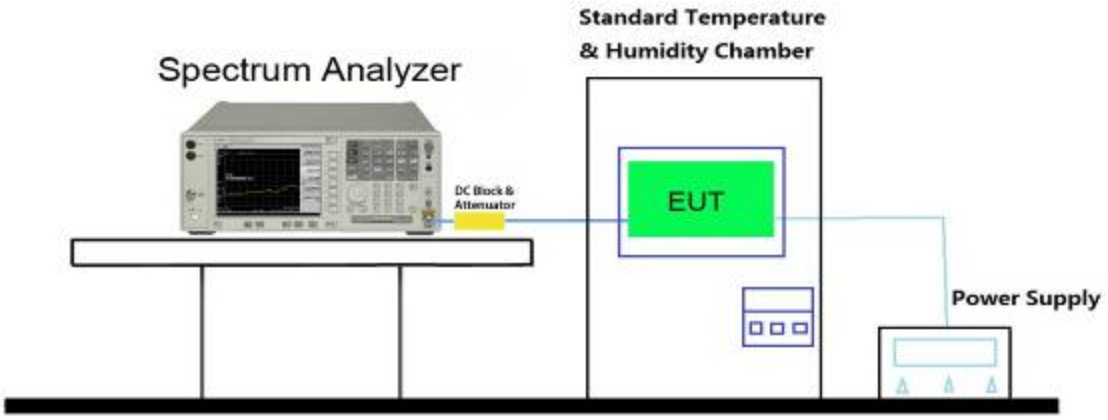
Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

11.3 Test Setup



11.4 Test Result

5150-5250MHz
802.11a mode:

Reference Frequency(Middle Channel): 5240 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	120	121	0.0231
40	120	118	0.0225
30	120	116	0.0221
20	120	124	0.0237
10	120	136	0.0260
0	120	141	0.0269
-10	120	133	0.0254
-20	120	128	0.0244
-30	120	144	0.0275

802.11n HT20 mode:

Reference Frequency(Middle Channel): 5240 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	120	141	0.0269
40	120	128	0.0244
30	120	124	0.0237
20	120	154	0.0294
10	120	114	0.0218
0	120	134	0.0256
-10	120	147	0.0281
-20	120	118	0.0225
-30	120	126	0.0240

5725-5850MHz
802.11a mode:

Reference Frequency(Middle Channel): 5785MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	120	118	0.0338
40	120	124	0.0349
30	120	134	0.0367
20	120	125	0.0351
10	120	116	0.0335
0	120	147	0.0390
-10	120	157	0.0407
-20	120	184	0.0455
-30	120	164	0.0420

802.11n HT20 mode:

Reference Frequency(Middle Channel): 5785MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	120	117	0.0227
40	120	127	0.0244
30	120	145	0.0276
20	120	154	0.0292
10	120	165	0.0312
0	120	185	0.0347
-10	120	154	0.0292
-20	120	181	0.0340
-30	120	157	0.0297

Frequency Stability Versus Input Voltage is:

5150-5250MHz
802.11a mode:

Reference Frequency(Middle Channel): 5240 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	102	139	0.0265
	120	136	0.0260
	138	133	0.0254

802.11n HT20 mode:

Reference Frequency(Middle Channel): 5240 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	102	145	0.0277
	120	148	0.0282
	138	152	0.0290

5725-5850MHz
802.11a mode:

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	102	147	0.0270
	120	154	0.0306
	138	186	0.0367

802.11n HT20 mode:

Reference Frequency(Middle Channel): 5785 MHz			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	102	184	0.0335
	120	149	0.0296
	138	158	0.0313

…End of Report…