



FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

Notebook Computer

Model:

Satellite S5*****-C*****, Satellite E5*****-C*****,
Satellite L5*****-C*****, Satellite P5*****-C*****,

Satellite Radius L5*****-C*****,

Satellite Radius P5*****-C*****,

Satellite Fusion L5*****-C*****,

(* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose)

Trade Name: TOSHIBA

Issued to

Pegatron Corporation

5F, NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112, TAIWAN (R.O.C.)

Issued by

Compliance Certification Services Inc.

No.11, Wugong 6th Rd., Wugu Dist.,

New Taipei City 24891, Taiwan. (R.O.C.)

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Issued Date: February 25, 2015



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	February 25, 2015	Initial Issue	ALL	Kelly Cheng



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1. TEST RESULT CERTIFICATION

Applicant: Pegatron Corporation
5F, NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112,
TAIWAN (R.O.C.)

Equipment Under Test: Notebook Computer

Trade Name: TOSHIBA

Model: Satellite S5*****-C*****, Satellite E5*****-C*****,
Satellite L5*****-C*****, Satellite P5*****-C*****,
Satellite Radius L5*****-C*****,
Satellite Radius P5*****-C*****,
Satellite Fusion L5*****-C*****,
(* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing
purpose)

Date of Test: February 11 ~ 14, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart E	No non-compliance noted

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Reviewed by:

Miller Lee
Section Manager
Compliance Certification Services Inc.

Angel Cheng
Section Manager
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Notebook Computer				
Trade Name	TOSHIBA				
Model Number	Satellite S5*****-C*****, Satellite E5*****-C*****, Satellite L5*****-C*****, Satellite P5*****-C*****, Satellite Radius L5*****-C*****, Satellite Radius P5*****-C*****, Satellite Fusion L5*****-C*****, (* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose)				
Model Discrepancy	All the above models are identical except for the designation of model numbers. The suffix of “*” (*means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose) on model number is just for marketing purpose only.				
Received Date	January 23, 2015				
Power Supply	1. VDC from Power Adapter Liteon / Model: PA5178U-1ACA I/P: 100-240V, 50-60Hz, 1.7A O/P: 19V, 3.42A 2. Power from Battery TOSHIBA / PA5208U-1BRS Rating 10.8Vdc, 45Wh, 3860mAh				
Operating Frequency Range & Number of Channels	UNII Band IV	Mode	Frequency Range (MHz)	Number of Channels	
		IEEE 802.11a	5745 ~ 5825	5 Channels	
		IEEE 802.11n HT 20 mode	5745 ~ 5825	5 Channels	
		IEEE 802.11n HT 40 mode	5755 ~ 5795	2 Channels	
		IEEE 802.11ac80 mode	5775	1 Channels	
Transmit Power	IEEE 802.11a mode / 5745 ~ 5825MHz: 13.46dBm IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz: 13.45dBm IEEE 802.11n HT 40 mode / 5670 ~ 5795MHz: 13.40dBm IEEE 802.11ac80 mode / 5775MHz: 13.45dBm				
Modulation Technique	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)				
Transmit Data Rate	IEEE 802.11a mode: 54, 48, 36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT 20 mode: OFDM (6.50, 13.00, 19.50, 26.00, 39.00, 52.00, 58.50, 65.00, 78.00, 104.0, 117.0, 130.0, 156.0, 175.5, 195.0Mbps) IEEE 802.11n HT 40 mode: OFDM (13.50, 27.00, 40.50, 54.00, 81.00, 108.0, 121.5, 135.0, 162.0, 216.0, 243.0, 270.0, 324.0, 364.5, 405.0Mbps) IEEE 802.11ac80 mode: OFDM (29.3, 58.5, 87.8, 117, 175.5, 234, 263.3, 292.5, 351, 390, 468, 526.5, 585, 702, 780 Mbps)				



Antenna Designation	1. PIFA Antenna / Yageo(Metal) ANTA0TP09551WLAN4 (TX1) / 0.32dBi (Worse) ANTA0TP09551WLAN3 (TX2) / 2.23dBi (Worse) 2. PIFA Antenna / Yageo(IMR) ANTA0TP09551WLAN2 (TX1) / -2.81dBi ANTA0TP09551WLAN1 (TX2) / 0.19dBi 3. PIFA Antenna / ACON(Metal) APP6Y-700301 (TX1) /-5.75dBi APP6Y-700302 (TX2) / -4.31dBi 4. PIFA Antenna / ACON(IMR) APP6Y-700249 (TX1) /-3.42dBi APP6Y-700250 (TX2) / -1.50dBi
----------------------------	--

Remark:

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID: **VUI-THOR7265** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.*



3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4. Radiated testing was performed at an antenna to EUT distance 3 meters.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 0.8 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. 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 C63.4.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



3.5 DESCRIPTION OF TEST MODES

The EUT (model: Satellite S50-C) comes with eight types of antenna (model: ANTA0TP09551WLAN4 (TX1) / ANTA0TP09551WLAN3 (TX2) / ANTA0TP09551WLAN2 (TX1) / ANTA0TP09551WLAN1 (TX2) / APP6Y-700301 (TX1) / APP6Y-700302 (TX2) / APP6Y-700249 (TX1) / APP6Y-700250 (TX2)) for sale. After the preliminary test, the antenna ANTA0TP09551WLAN4 (TX1) / ANTA0TP09551WLAN3 (TX2) were found to emit the worst emissions and therefore had been tested under operating condition.

The EUT is a IEEE802.11b/g is 1x1 SISO only, IEEE802.11n HT20/HT40 is 2x2 MIMO, 2x2 configuration spatial MIMO (2Tx & 2Rx) without beam forming function that operate in double TX chains and double RX chains. The 2x2 configuration is implemented with two outside TX & RX chains (Chain 0 and 1).

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

UNII Band VI:

IEEE 802.11a mode:

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 mode:

Channel Low(5745MHz), Channel Mid(5785MHz) and Channel High(5825MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 mode:

Channel Low(5755MHz) and Channel High(5795MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11ac80 mode:

Channel Low(5775MHz) with 29.3Mbps data rate were chosen for full testing.

The field strength of spurious emission was measured in the following position: The EUT has Notebook mode, Flat mode, and Tent mode, Stand mode, Tablet X, Y and Z axis modes. The worst emission was found in Notebook mode and the worst case was recorded.



4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	11/23/2015
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/07/2015
AC Power Source	EXTECH	6205	1140845	N.C.R
DC Power Supply	ABM	8301HD	D011531	N.C.R
Power Meter	Anritsu	ML2495A	1012009	06/03/2015
Power Sensor	Anritsu	MA2411A	0917072	06/03/2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40	101073	07/09/2015

Wugu 966 Chamber A				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510268	09/18/2015
EMI Test Receiver	R&S	ESCI	100064	05/30/2015
Bilog Antenna	Sunol Sciences	JB3	A030105	08/19/2015
Horn Antenna	EMCO	3117	00055165	01/26/2016
Horn Antenna	EMCO	3116	26370	12/25/2015
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R
Pre-Amplifier	MITEQ	1652-3000	1490939	08/09/2016
Pre-Amplifier	EMC	EMC 01265	4035	08/09/2016
Pre-Amplifier	MITEQ	AMF-6F-260400-4 0-8P	985646	12/25/2015
Coaxial Cable	Huber+Suhner	102	29212/2	12/25/2015
Coaxial Cable	Huber+Suhner	102	29406/2	12/25/2015
Test S/W	EZ-EMC (CCS-3A1RE)			

Conducted Emission room # B				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	101073	09/18/2015
LISN	R&S	ENV216	101054	05/18/2015
LISN	SCHWARZBECK	NSLK 8127	8127-541	11/25/2015
Capacitive Voltage Probe	FCC	F-CVP-1	100185	03/09/2015
Test S/W	CCS-3A1-CE			



4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 1.2575
3M Semi Anechoic Chamber / <200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☒ No.139, Wugong Rd., Wugu Dist., New Taipei City 24891, Taiwan (R.O.C.)

Tel: 886-2-2298-4086 / Fax: 886-2-2298-1470

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☐ No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

**5.3 TABLE OF ACCREDITATIONS AND LISTINGS**

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
	N/A						

Remark:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*



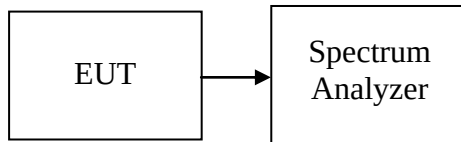
7. FCC PART 15 REQUIREMENTS

7.1 6DB BANDWIDTH

LIMIT

According to §15.407, systems using digital modulation techniques may operate in the 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = VBW = 100kHz, Span = 50MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted



TEST RESULTS

No non-compliance noted

Test Data

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

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5745	16.179	16.9156
Mid	5785	15.979	16.8504
High	5825	16.200	16.8191

Test mode: IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 0

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5745	17.247	17.8656
Mid	5785	17.359	17.9032
High	5825	17.126	17.7817

Test mode: IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 1

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5745	17.358	17.8467
Mid	5785	17.499	18.0590
High	5825	17.143	17.9798

Test mode: IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 0

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5755	35.962	36.1713
High	5795	36.046	36.1651

Test mode: IEEE 802.11n HT 40 mode/ 5755 ~ 5795MHz / Chain 1

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5755	36.055	36.1821
High	5795	35.955	36.2653

Test mode: IEEE 802.11ac80 mode / 5775MHz / Chain 0

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)
Mid	5290	75.549	76.5384

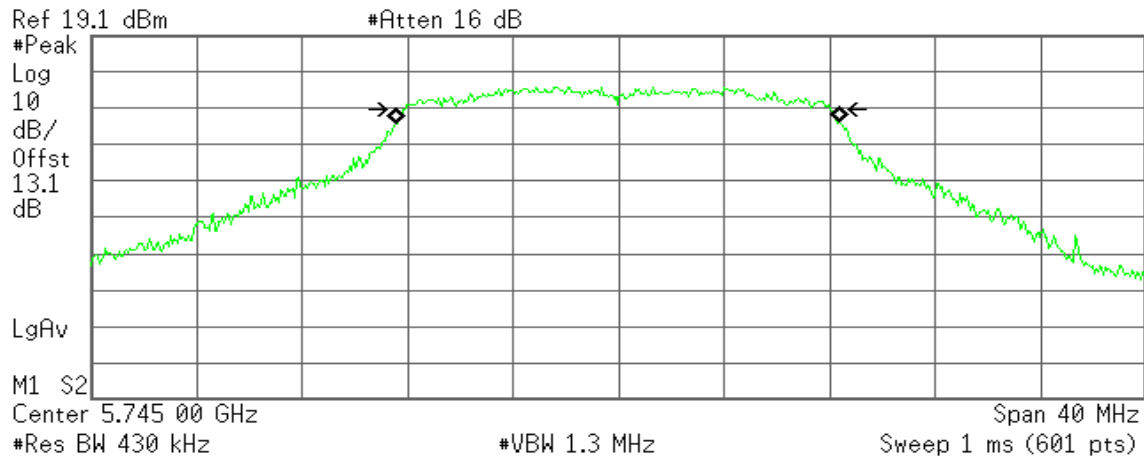
Test mode: IEEE 802.11ac80 mode/ 5775MHz / Chain 1

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)
Mid	5290	75.566	75.9495

**IEEE 802.11a mode / 5745 ~ 5825MHz****CH Low**

* Agilent

R T



Occupied Bandwidth
16.9156 MHz

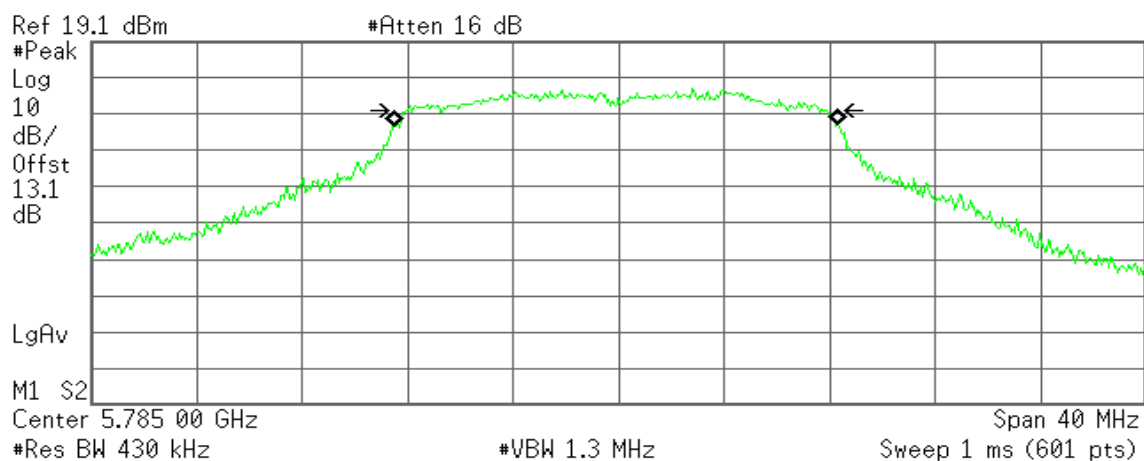
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -27.078 kHz
x dB Bandwidth 16.179 MHz

CH Mid

* Agilent

R T



Occupied Bandwidth
16.8504 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

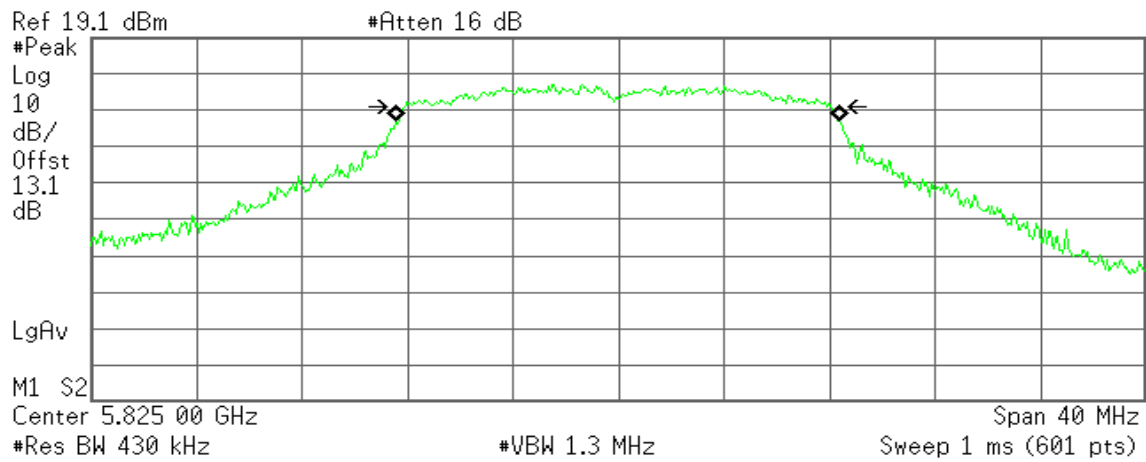
Transmit Freq Error -84.526 kHz
x dB Bandwidth 15.979 MHz



CH High

Agilent

R T



Occupied Bandwidth
16.8191 MHz

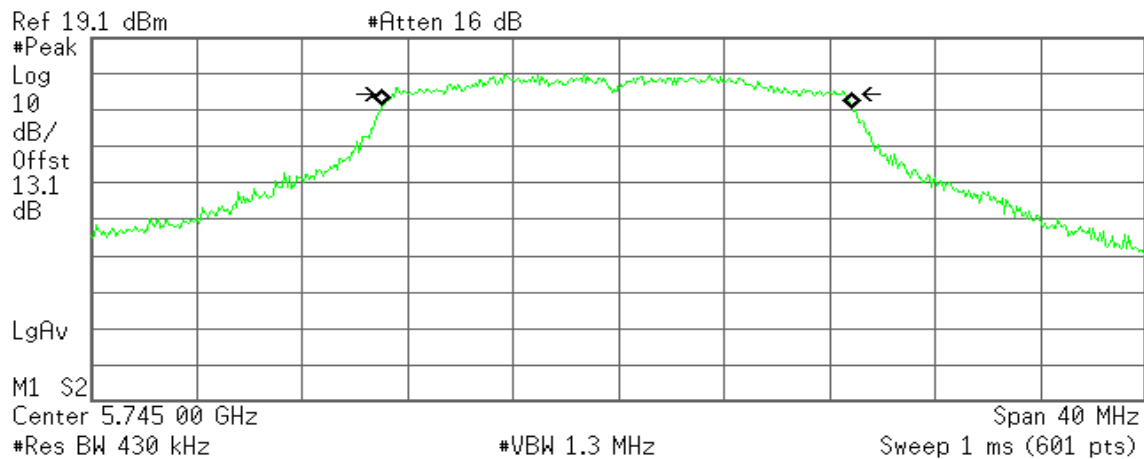
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -40.158 kHz
x dB Bandwidth 16.200 MHz

**IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 0****CH Low**

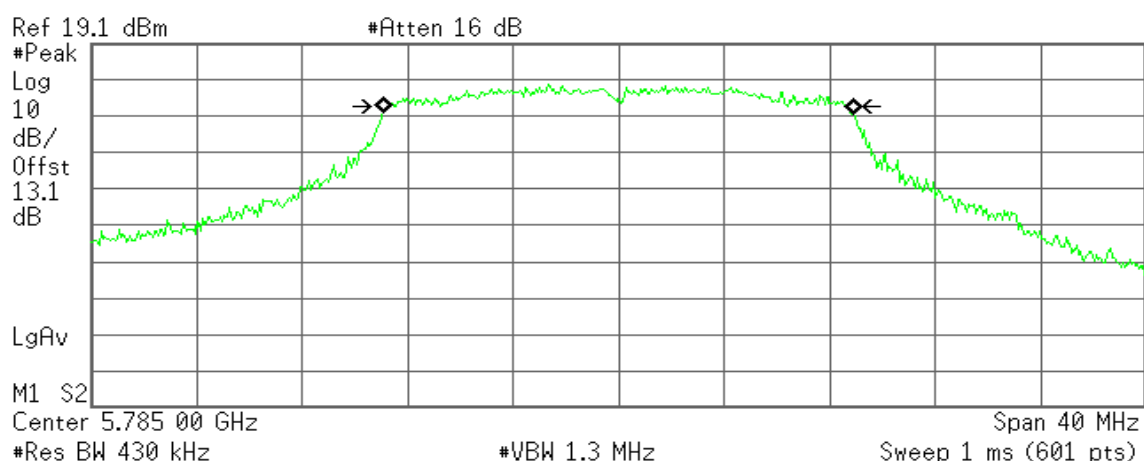
* Agilent

R T

**Occupied Bandwidth**
17.8656 MHz**Occ BW % Pwr** 99.00 %
x dB -6.00 dB**Transmit Freq Error** -40.103 kHz
x dB Bandwidth 17.247 MHz**CH Mid**

* Agilent

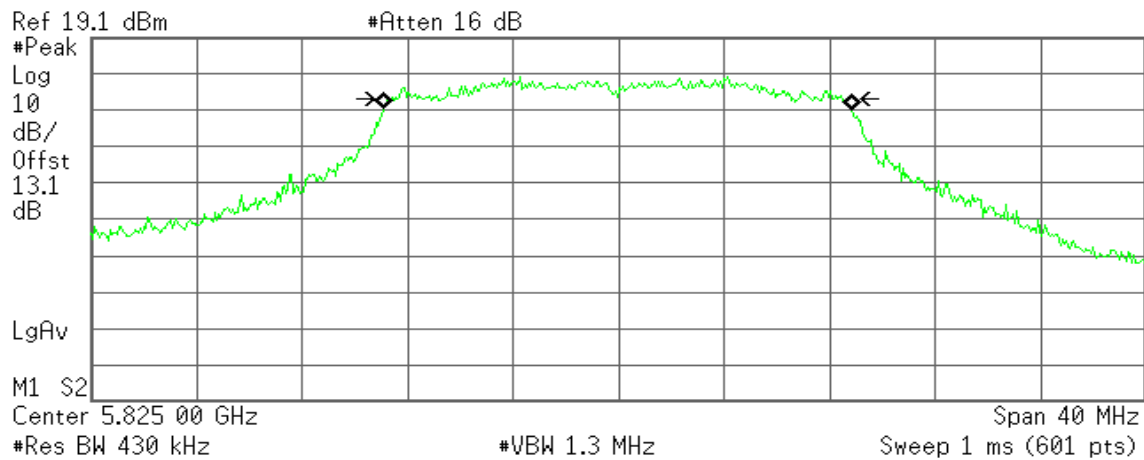
R T

**Occupied Bandwidth**
17.9032 MHz**Occ BW % Pwr** 99.00 %
x dB -6.00 dB**Transmit Freq Error** -7.896 kHz
x dB Bandwidth 17.359 MHz

**CH High**

* Agilent

R T



Occupied Bandwidth
17.7817 MHz

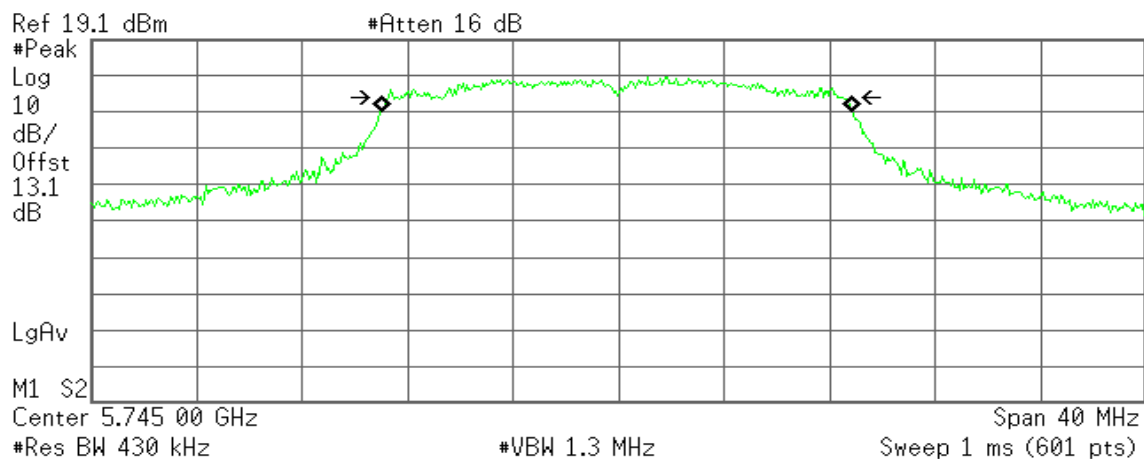
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -23.687 kHz
x dB Bandwidth 17.126 MHz

IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 1**CH Low**

* Agilent

R T



Occupied Bandwidth
17.8467 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

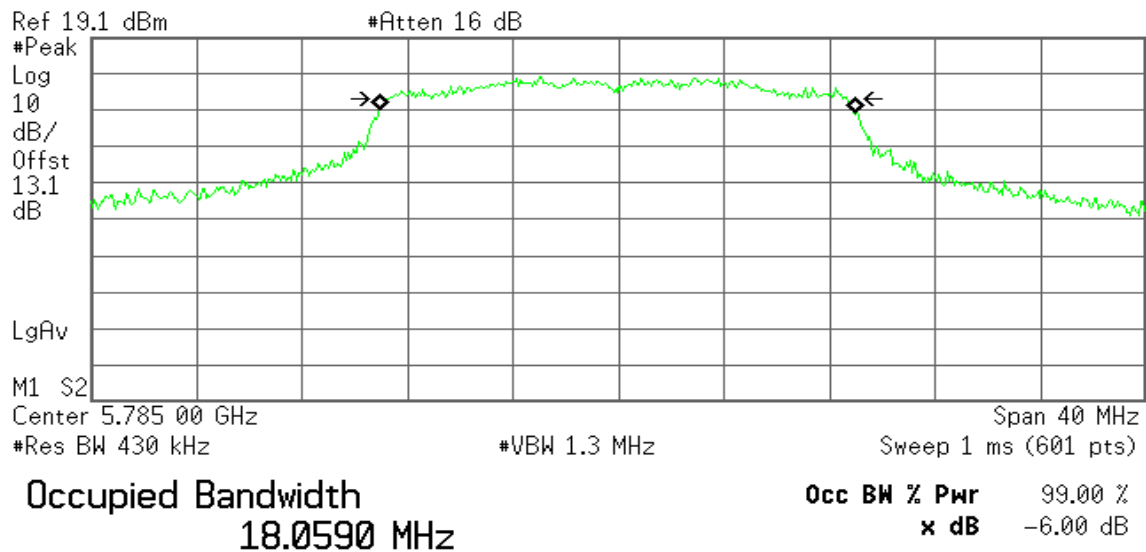
Transmit Freq Error -53.566 kHz
x dB Bandwidth 17.358 MHz



CH Mid

Agilent

R T

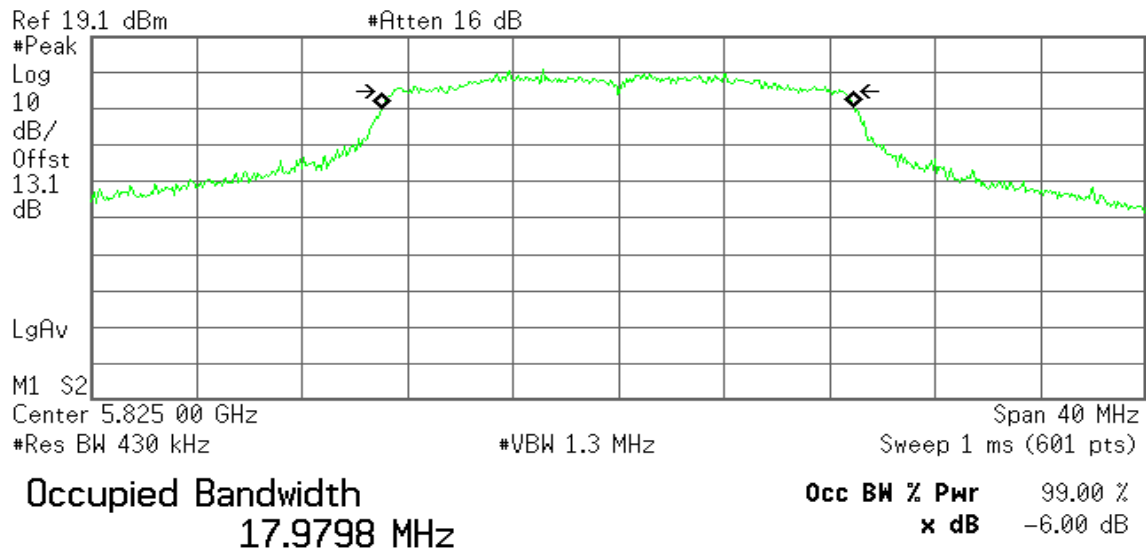


Transmit Freq Error -58.266 kHz
x dB Bandwidth 17.499 MHz

CH High

Agilent

R T

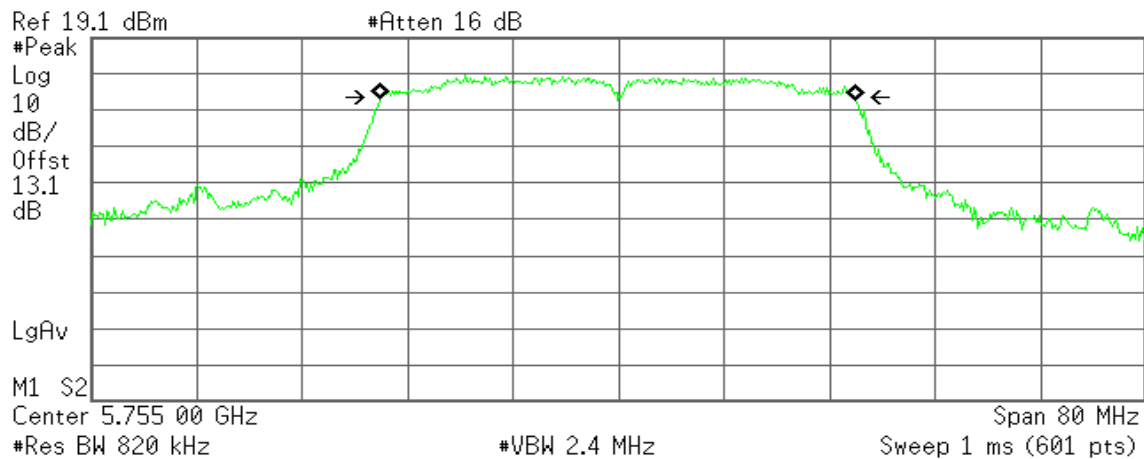


Transmit Freq Error -28.177 kHz
x dB Bandwidth 17.143 MHz

**IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 0****CH Low**

* Agilent

R T



Occupied Bandwidth
36.1713 MHz

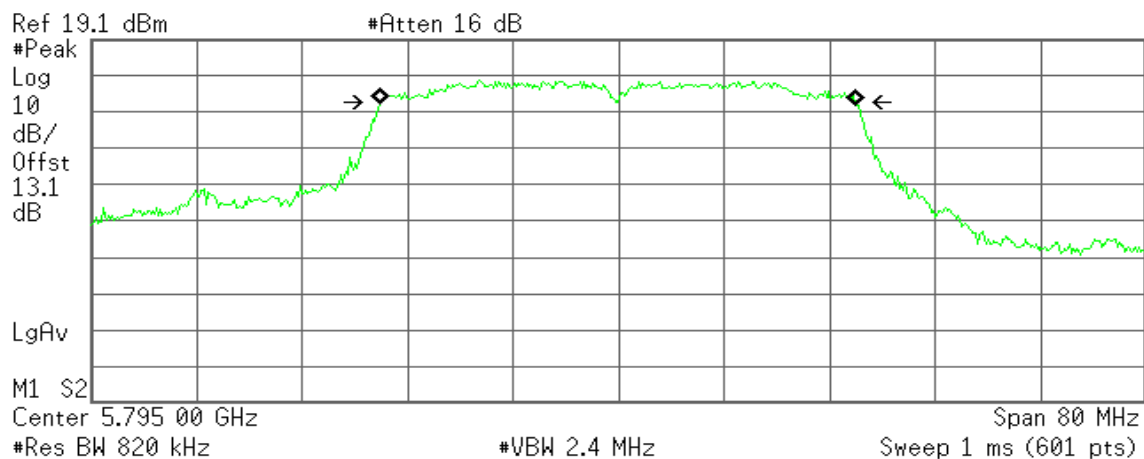
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -41.577 kHz
x dB Bandwidth 35.962 MHz

CH High

* Agilent

R T



Occupied Bandwidth
36.1651 MHz

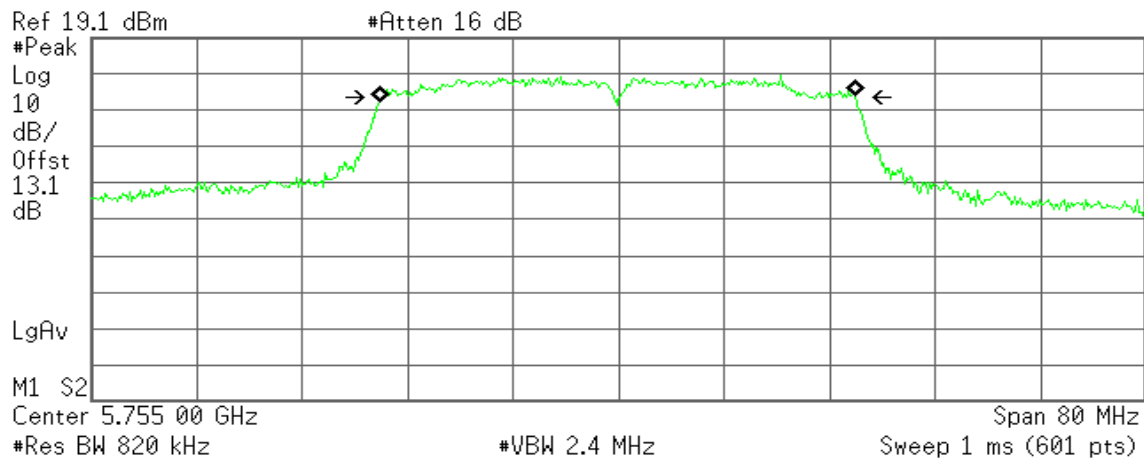
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -35.501 kHz
x dB Bandwidth 36.046 MHz

**IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 1****CH Low**

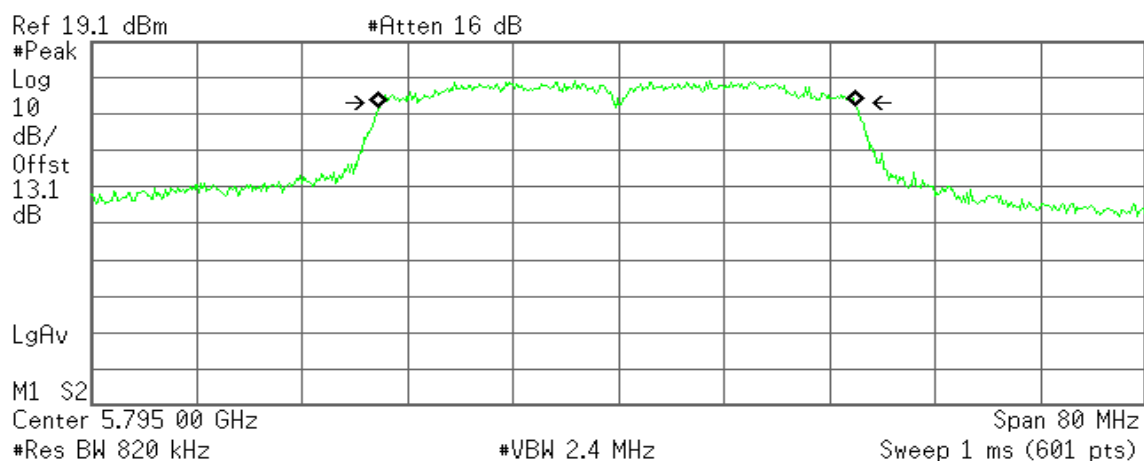
* Agilent

R T

**Occupied Bandwidth****36.1821 MHz****Occ BW % Pwr** 99.00 %
x dB -6.00 dB**Transmit Freq Error** -71.296 kHz
x dB Bandwidth 36.055 MHz**CH High**

* Agilent

R T

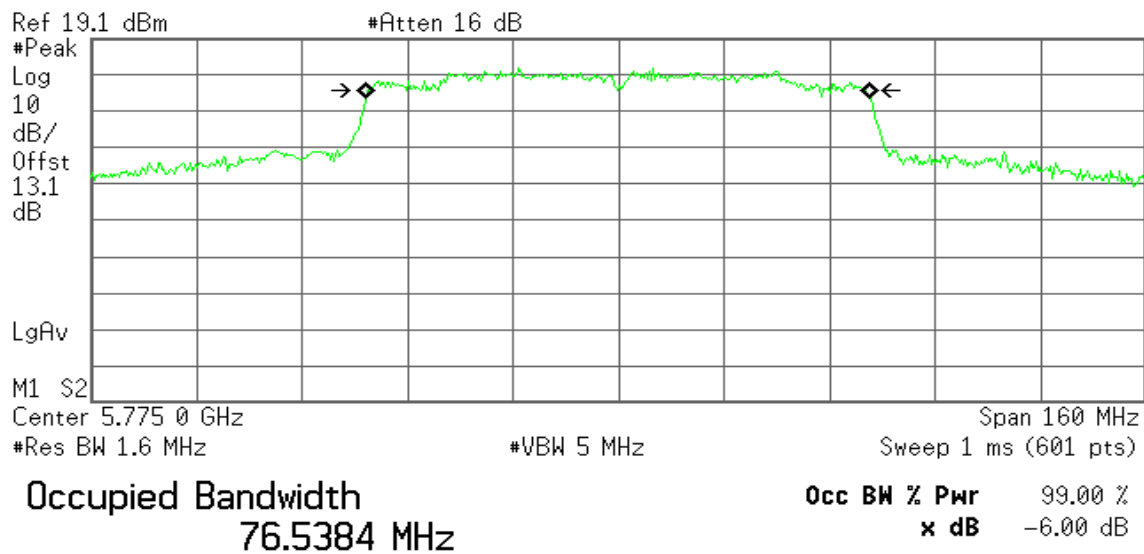
**Occupied Bandwidth****36.2653 MHz****Occ BW % Pwr** 99.00 %
x dB -6.00 dB**Transmit Freq Error** -89.493 kHz
x dB Bandwidth 35.955 MHz



IEEE 802.11ac80 mode / 5775MHz / Chain 0

Agilent

R T

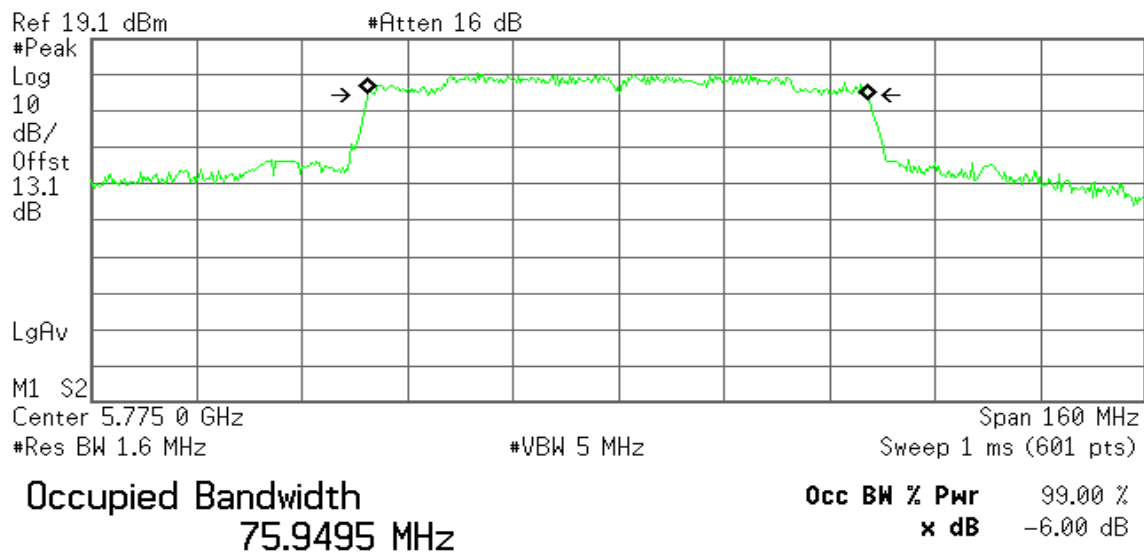


Transmit Freq Error -105.287 kHz
x dB Bandwidth 75.549 MHz

IEEE 802.11ac80 mode / 5775MHz / Chain 1

Agilent

R T



Transmit Freq Error -77.721 kHz
x dB Bandwidth 75.566 MHz



7.2 MAXIMUM OUTPUT POWER

LIMIT

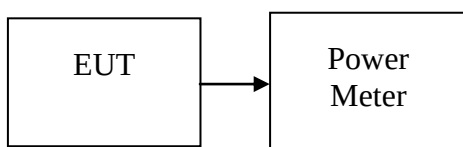
According to §15.407(a)

- (1) For the band 5.725-5.850 GHz bands, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 30 dBm, where B is the 6 dB emission bandwidth in MHz.

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.

Test Configuration

The EUT was connected to a Power Meter through a 50Ω RF cable



TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the avg power detection. The EUT is configured to transmit continuously.

TEST RESULTS

No non-compliance noted

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

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5745	13.42	30.00
Mid	5785	13.45	
High	5825	13.46	

Test mode: IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5745	10.46	10.42	13.45	30.00
Mid	5785	10.41	10.38	13.41	
High	5825	10.32	10.26	13.30	

Test mode: IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5755	10.42	10.36	13.40	30.00
High	5795	10.32	10.38	13.36	

Test mode: IEEE 802.11n HT 80 MHz mode / 5775MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Mid	5775	10.42	10.46	13.45	30.00

Remark: 1. Total PPSD (dBm) = $10 \cdot \log(10^{\text{Chain 0 PPSD} / 10} + 10^{\text{Chain 1 PPSD} / 10})$



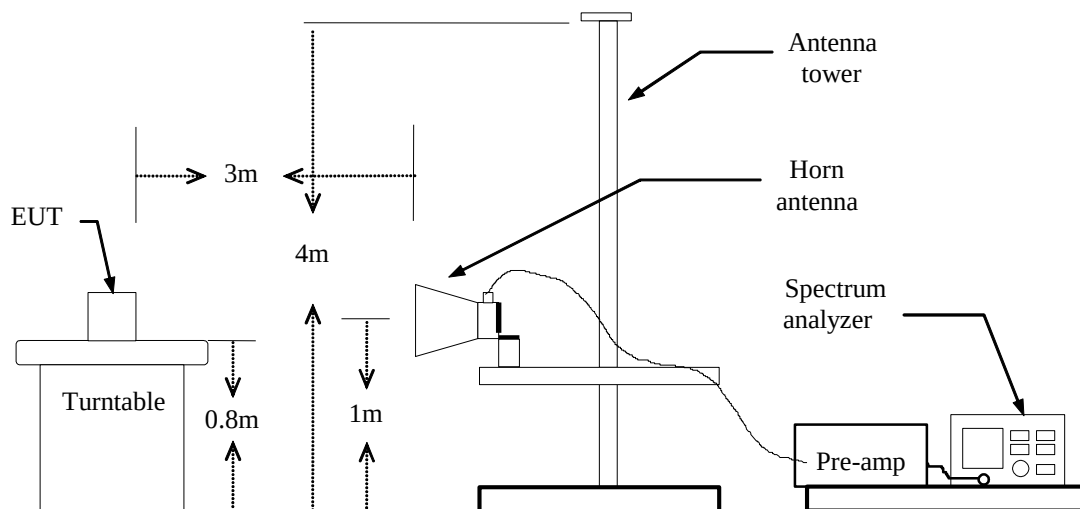
7.3 BAND EDGES MEASUREMENT

LIMIT

According to §15.407(b),

- (1) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the 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 emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz,
if duty cycle $\geq 98\%$, VBW=10Hz.
if duty cycle $< 98\%$ VBW=1/T.
IEEE 802.11b mode: $\geq 98\%$, VBW=10Hz
IEEE 802.11g mode: $\geq 98\%$, VBW=10Hz
IEEE 802.11n HT 20 MHz mode: $\geq 98\%$, VBW=10Hz
IEEE 802.11n HT 40 MHz mode: 96%=VBW 2kHz
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

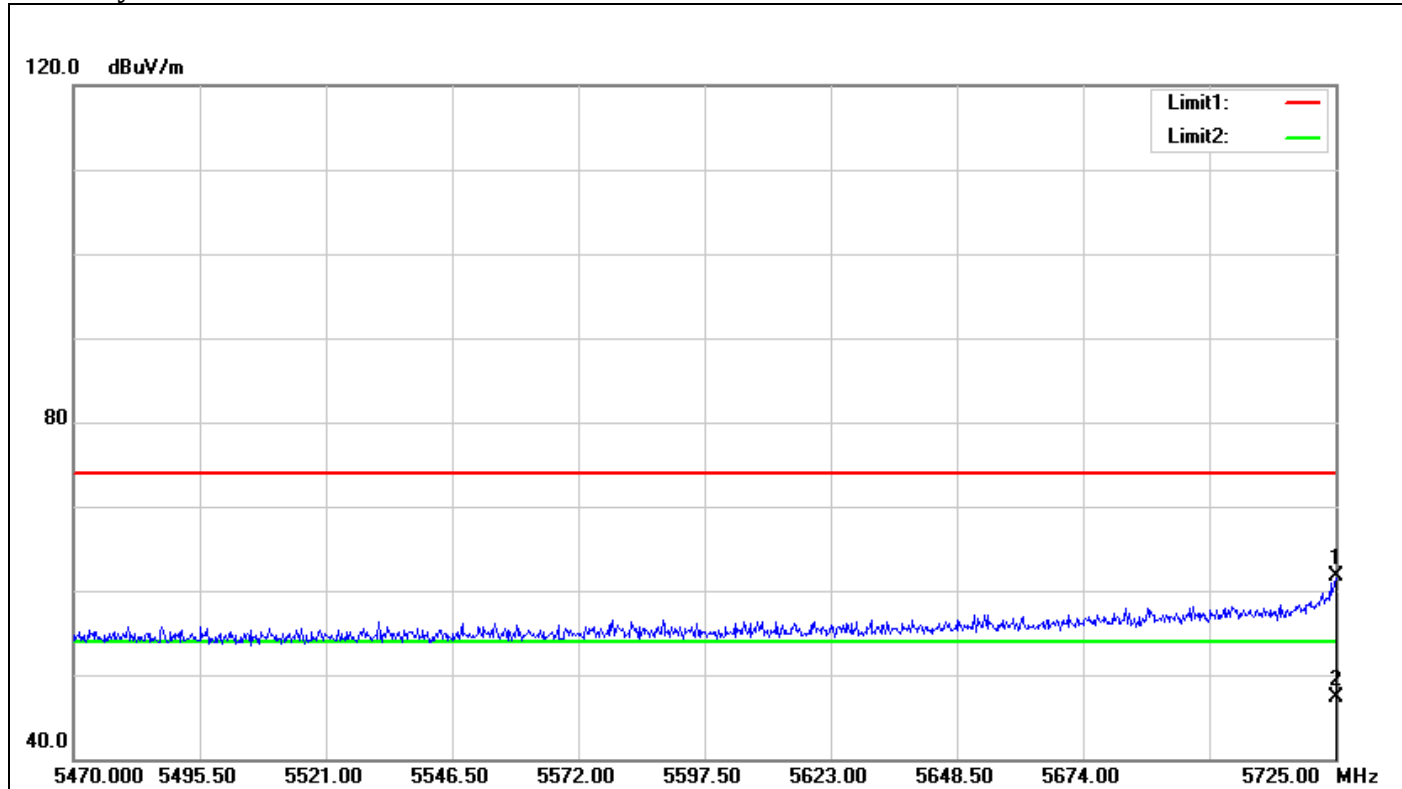


TEST RESULTS

Refer to attach spectrum analyzer data chart.

Band Edges (IEEE 802.11a mode / CH 5745 MHz)

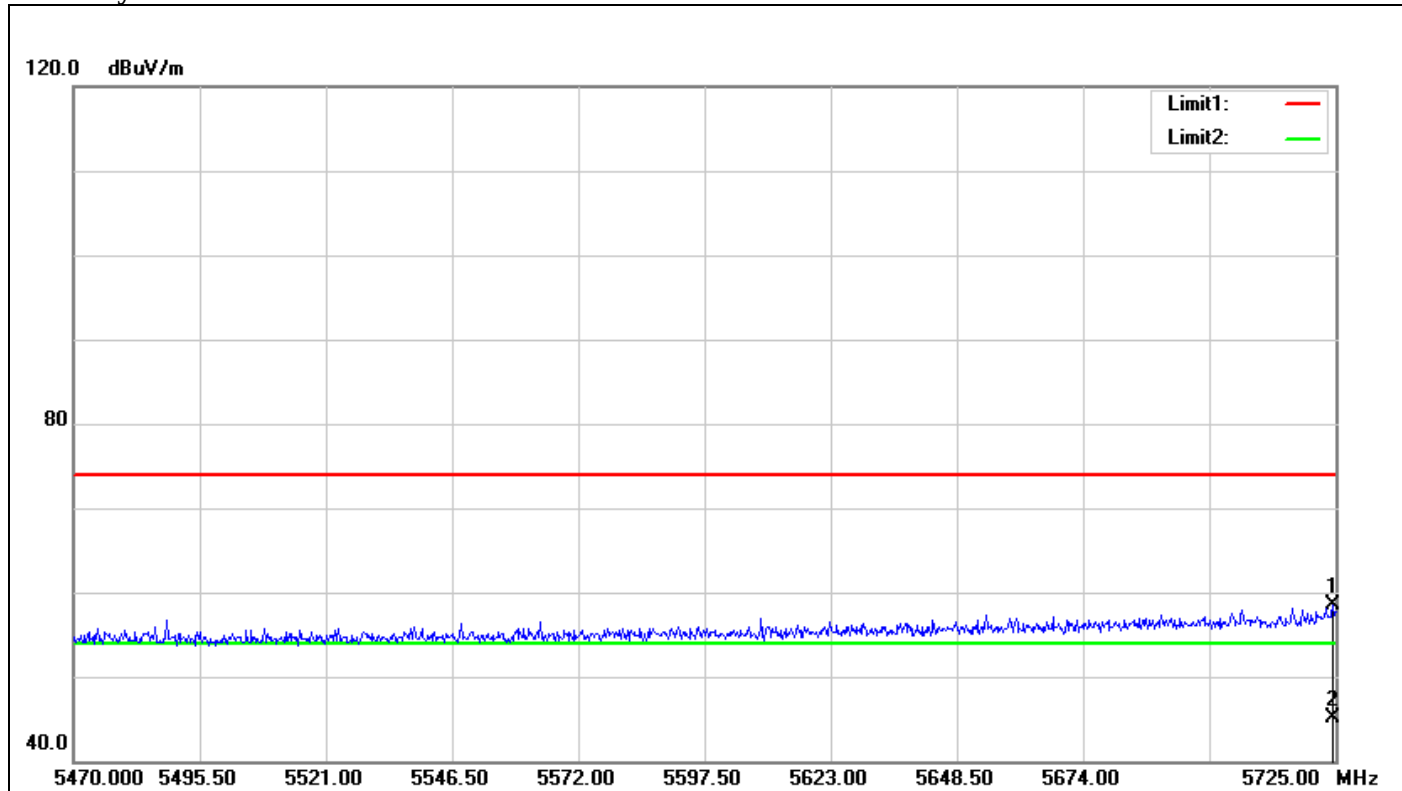
Polarity: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5725.000	55.47	6.21	61.68	74.00	-12.32	100	248	peak
2	5725.000	41.12	6.21	47.33	54.00	-6.67	100	248	AVG



Polarity: Horizontal

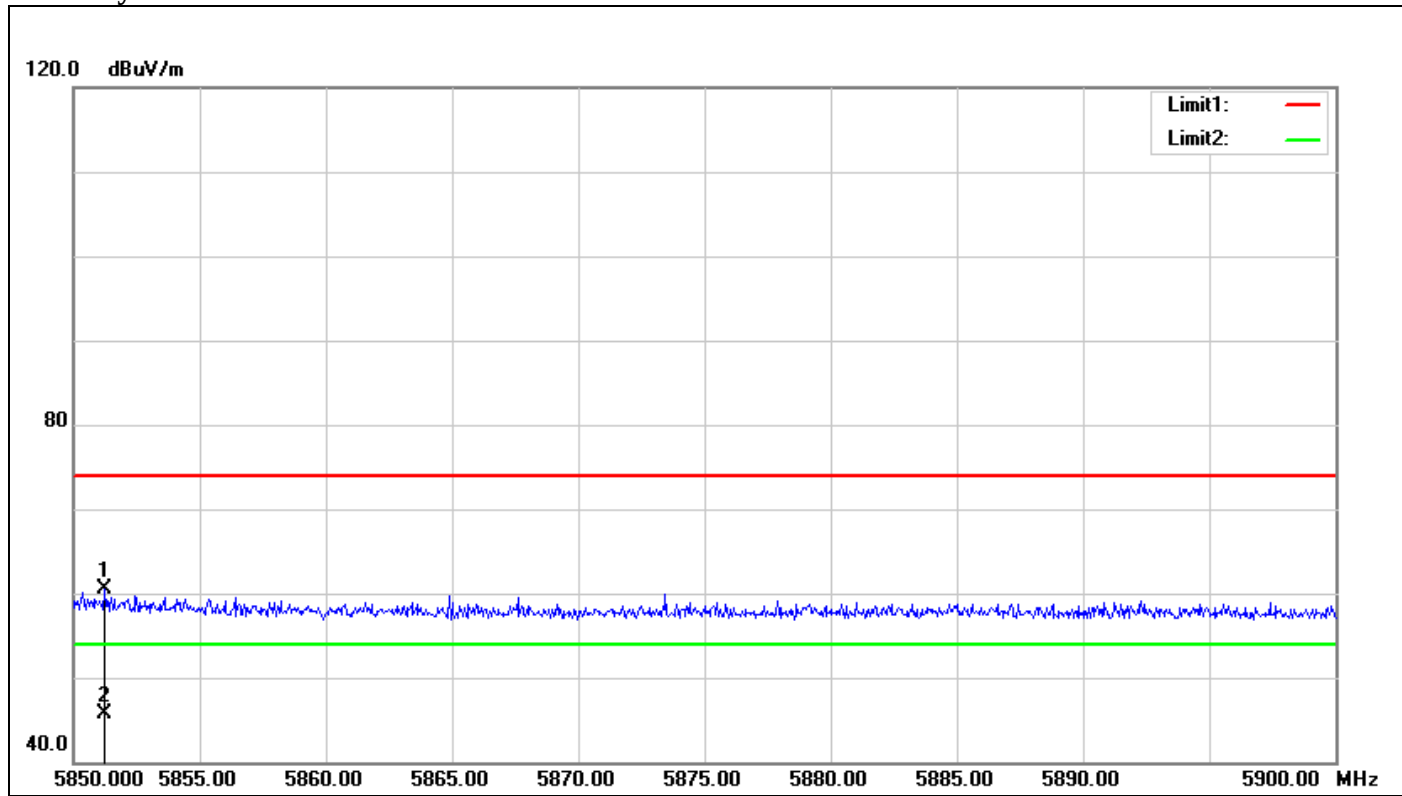


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5724.490	52.38	6.21	58.59	74.00	-15.41	100	86	peak
2	5724.490	38.81	6.21	45.02	54.00	-8.98	100	86	AVG



Band Edges (IEEE 802.11a mode / CH 5825 MHz)

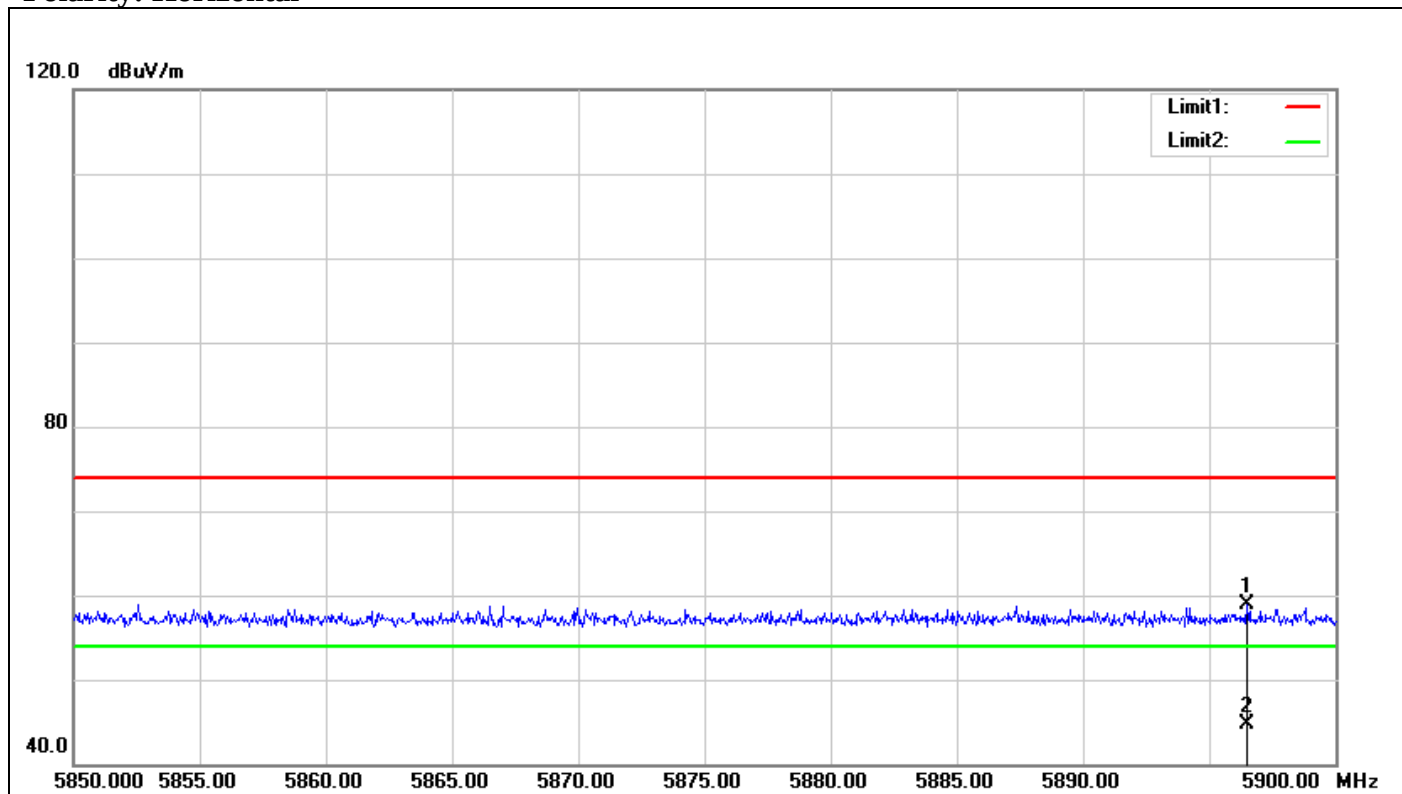
Polarity: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5851.250	53.66	6.75	60.41	74.00	-13.59	100	184	peak
2	5851.250	38.95	6.75	45.70	54.00	-8.30	100	184	AVG



Polarity: Horizontal

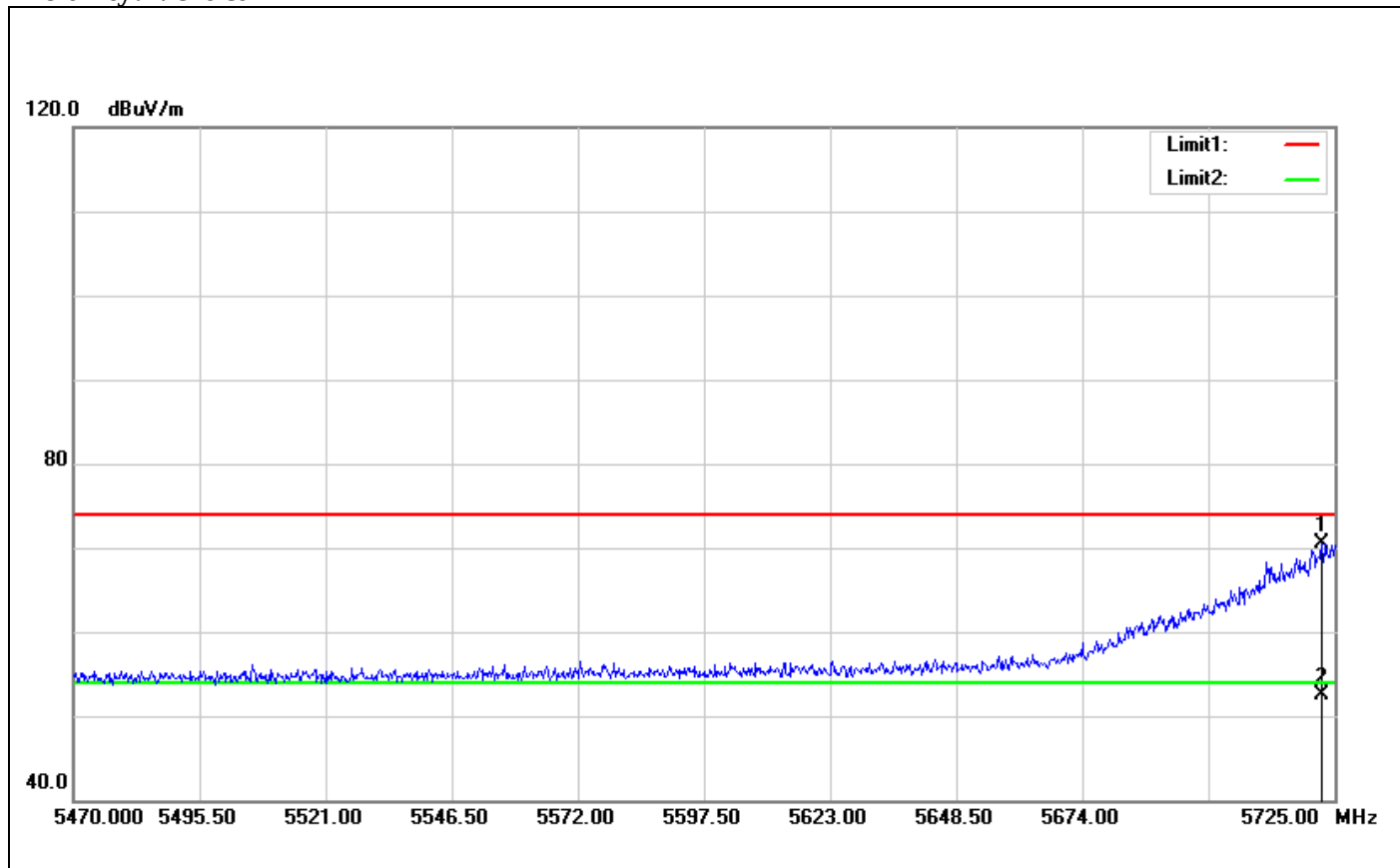


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5896.500	51.93	6.94	58.87	74.00	-15.13	100	310	peak
2	5896.500	37.80	6.94	44.74	54.00	-9.26	100	310	AVG



Band Edges (IEEE 802.11n HT 20 MHz mode / CH 5745 MHz)

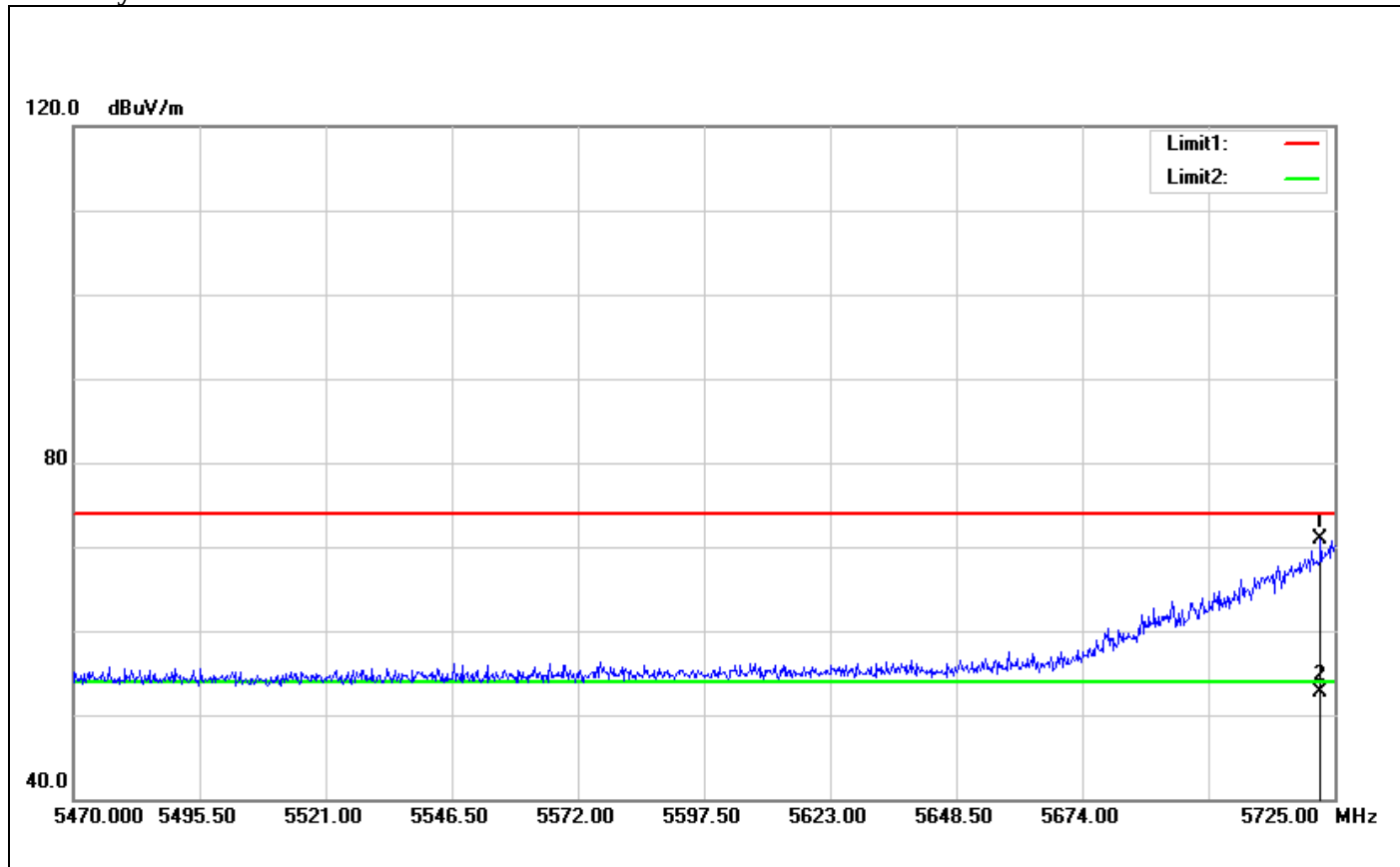
Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5722.450	64.36	6.20	70.56	74.00	-3.44	100	163	peak
2	5722.450	46.27	6.20	52.47	54.00	-1.53	100	163	AVG



Polarity: Horizontal

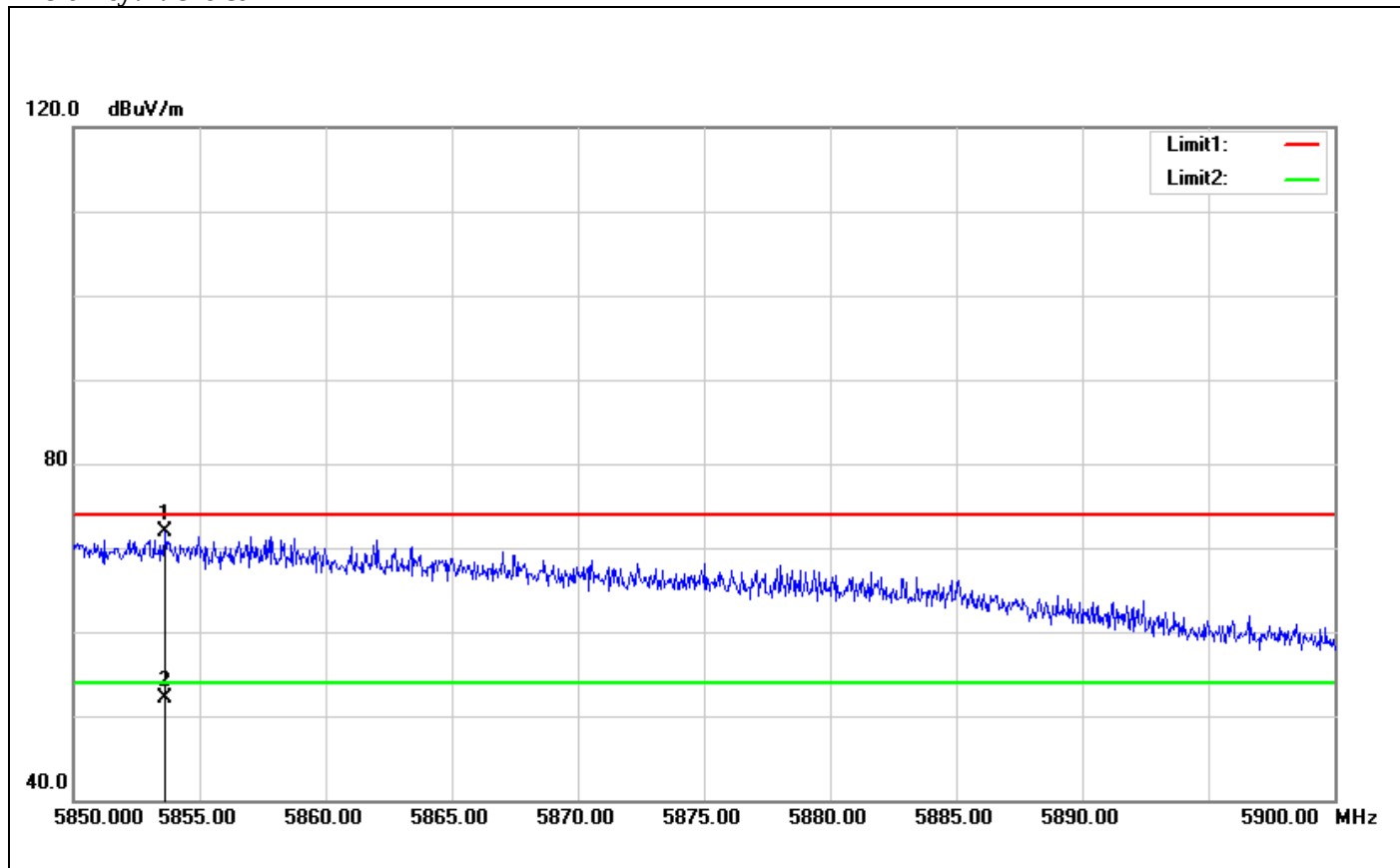


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5722.195	64.77	6.20	70.97	74.00	-3.03	100	156	peak
2	5722.195	46.47	6.20	52.67	54.00	-1.33	100	156	AVG



Band Edges (IEEE 802.11n HT 20 MHz mode / CH 5825 MHz)

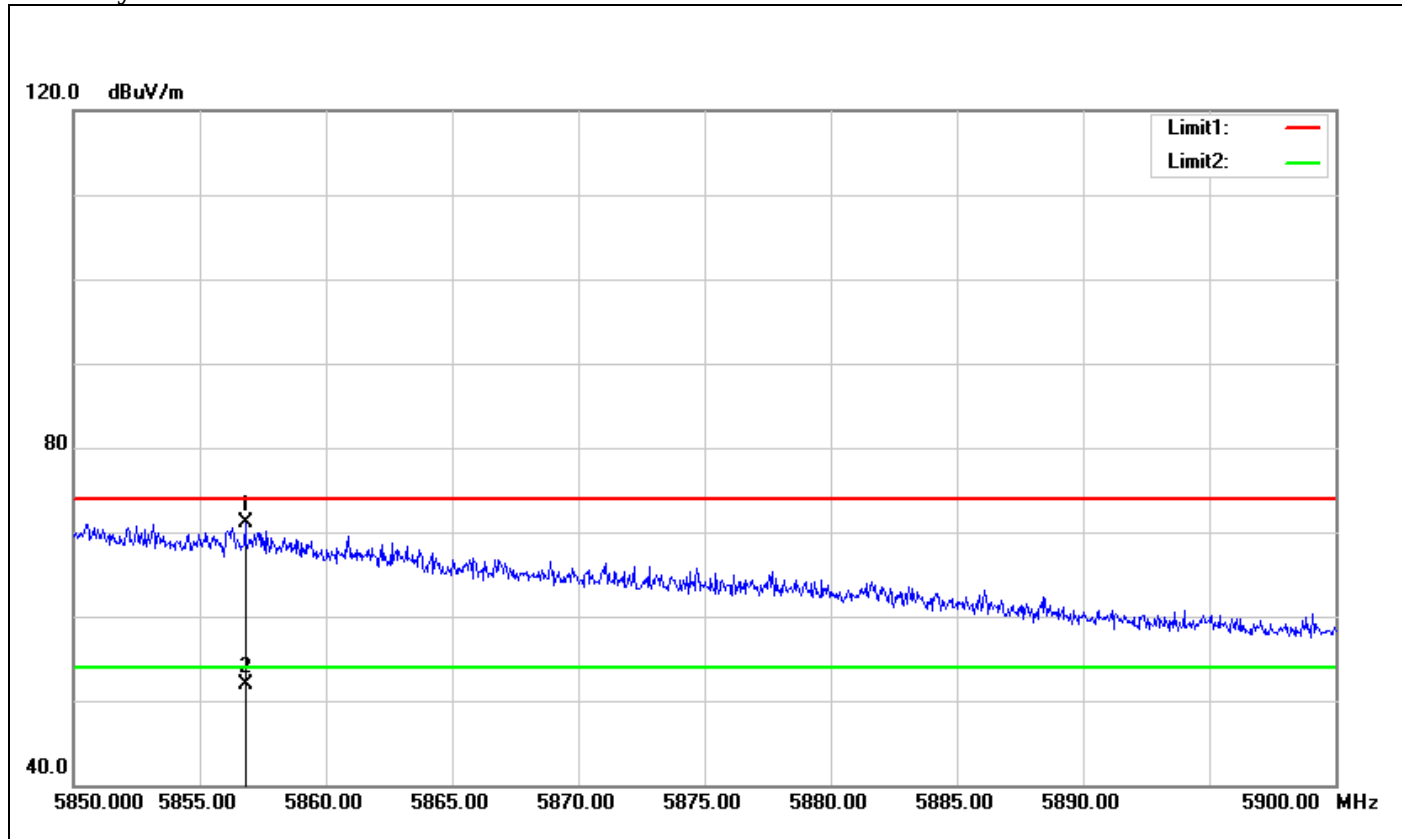
Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5853.650	65.22	6.76	71.98	74.00	-2.02	100	10	peak
2	5853.650	45.40	6.76	52.16	54.00	-1.84	100	10	AVG



Polarity: Horizontal

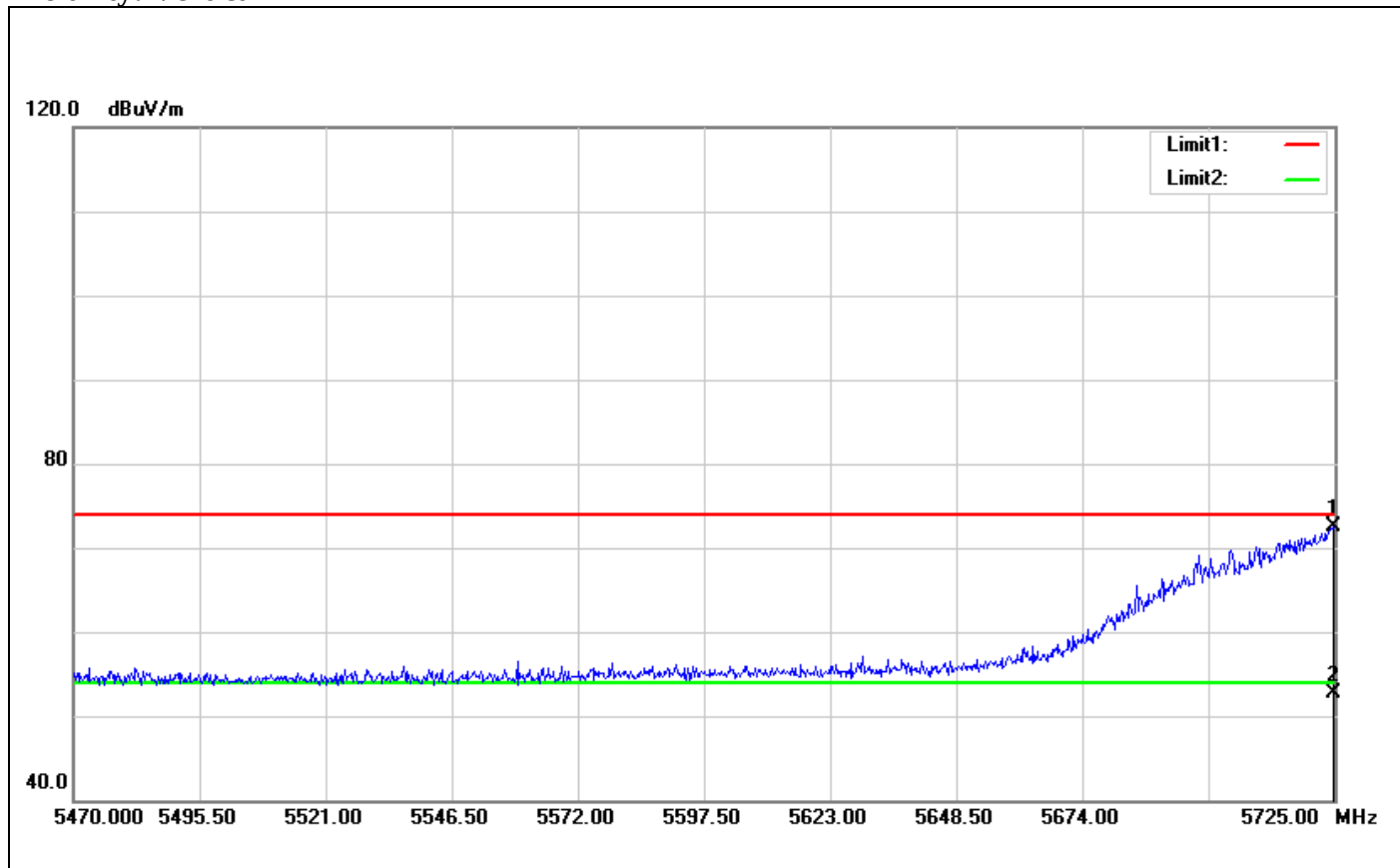


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5856.800	64.35	6.77	71.12	74.00	-2.88	100	241	peak
2	5856.800	45.08	6.77	51.85	54.00	-2.15	100	241	AVG



Band Edges (IEEE 802.11n HT 40 MHz mode / CH 5755 MHz)

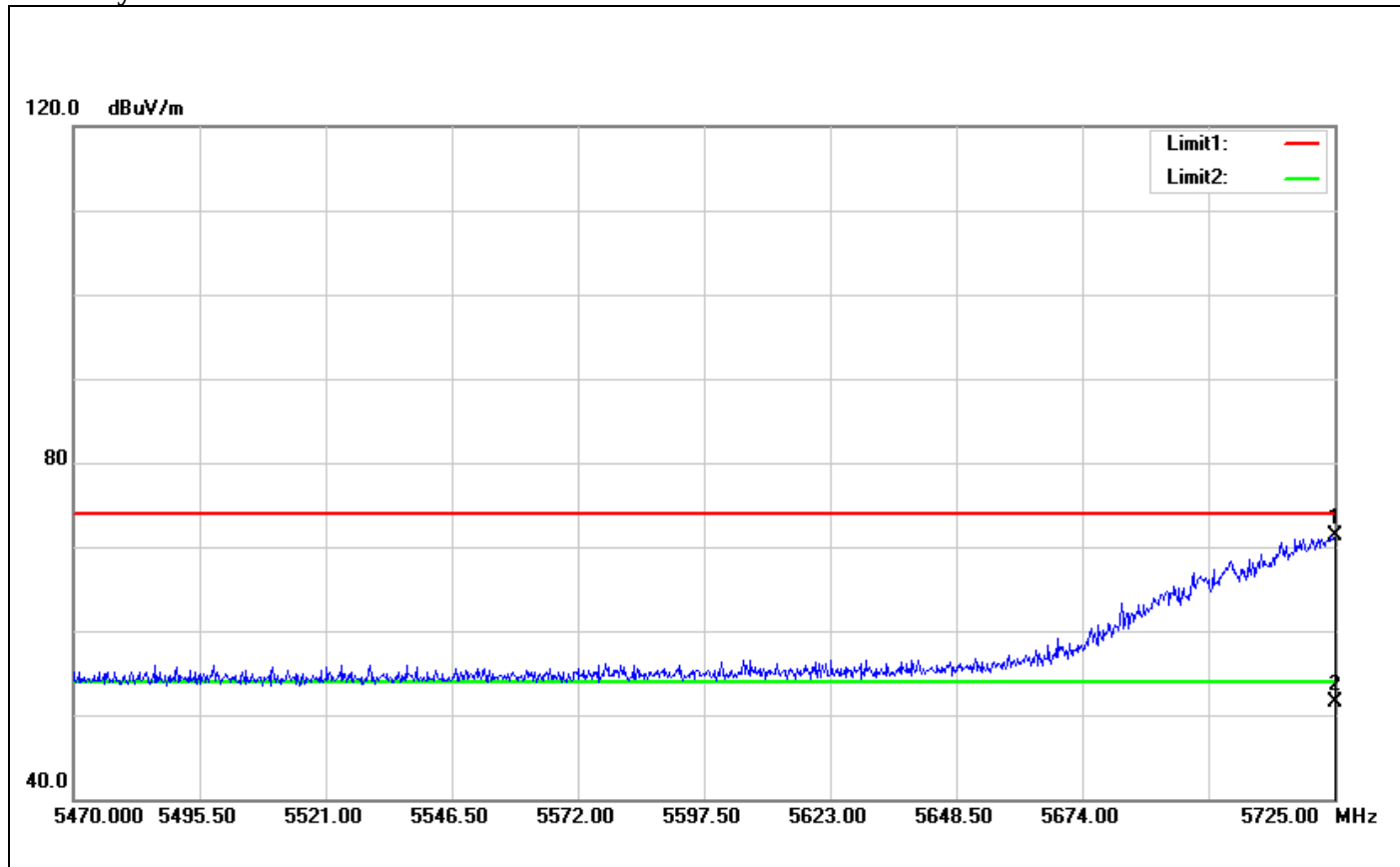
Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5724.745	66.37	6.21	72.58	74.00	-1.42	100	159	peak
2	5724.745	46.40	6.21	52.61	54.00	-1.39	100	159	AVG



Polarity: Horizontal

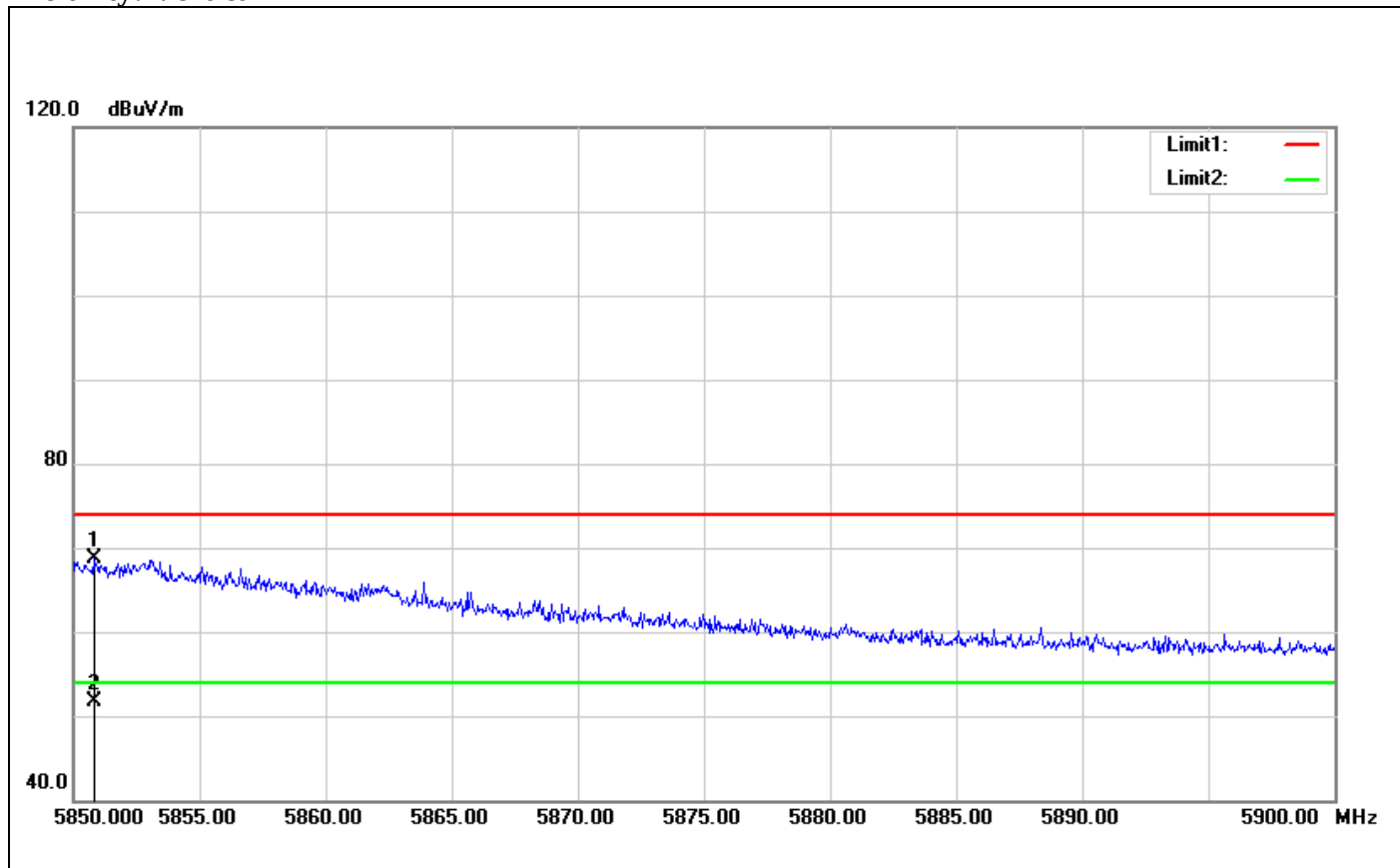


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5725.000	65.17	6.21	71.38	74.00	-2.62	100	266	peak
2	5725.000	45.28	6.21	51.49	54.00	-2.51	100	266	AVG



Band Edges (IEEE 802.11n HT 40 MHz mode / CH 5795 MHz)

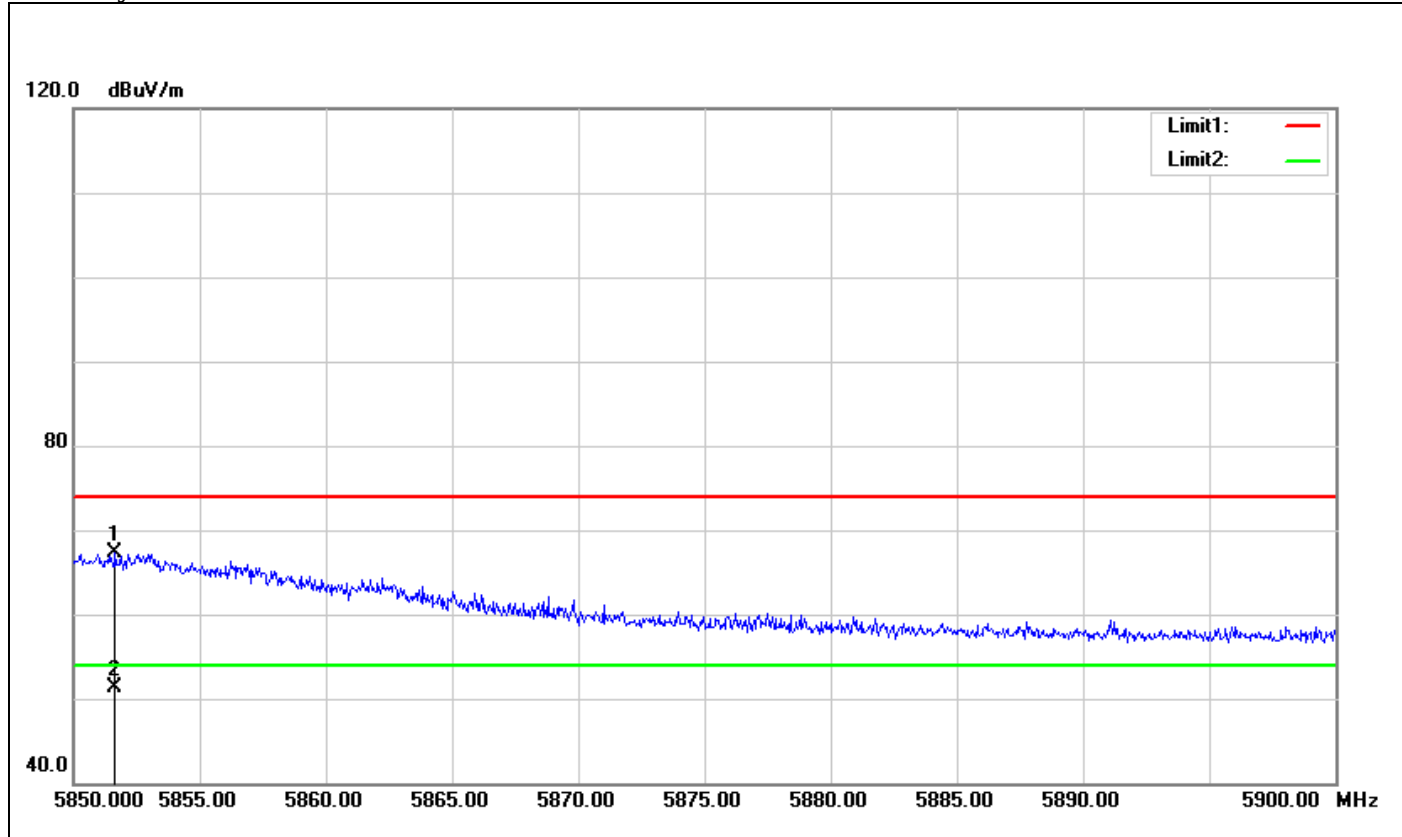
Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5850.800	61.94	6.74	68.68	74.00	-5.32	100	129	peak
2	5850.800	45.03	6.74	51.77	54.00	-2.23	100	129	AVG



Polarity: Horizontal

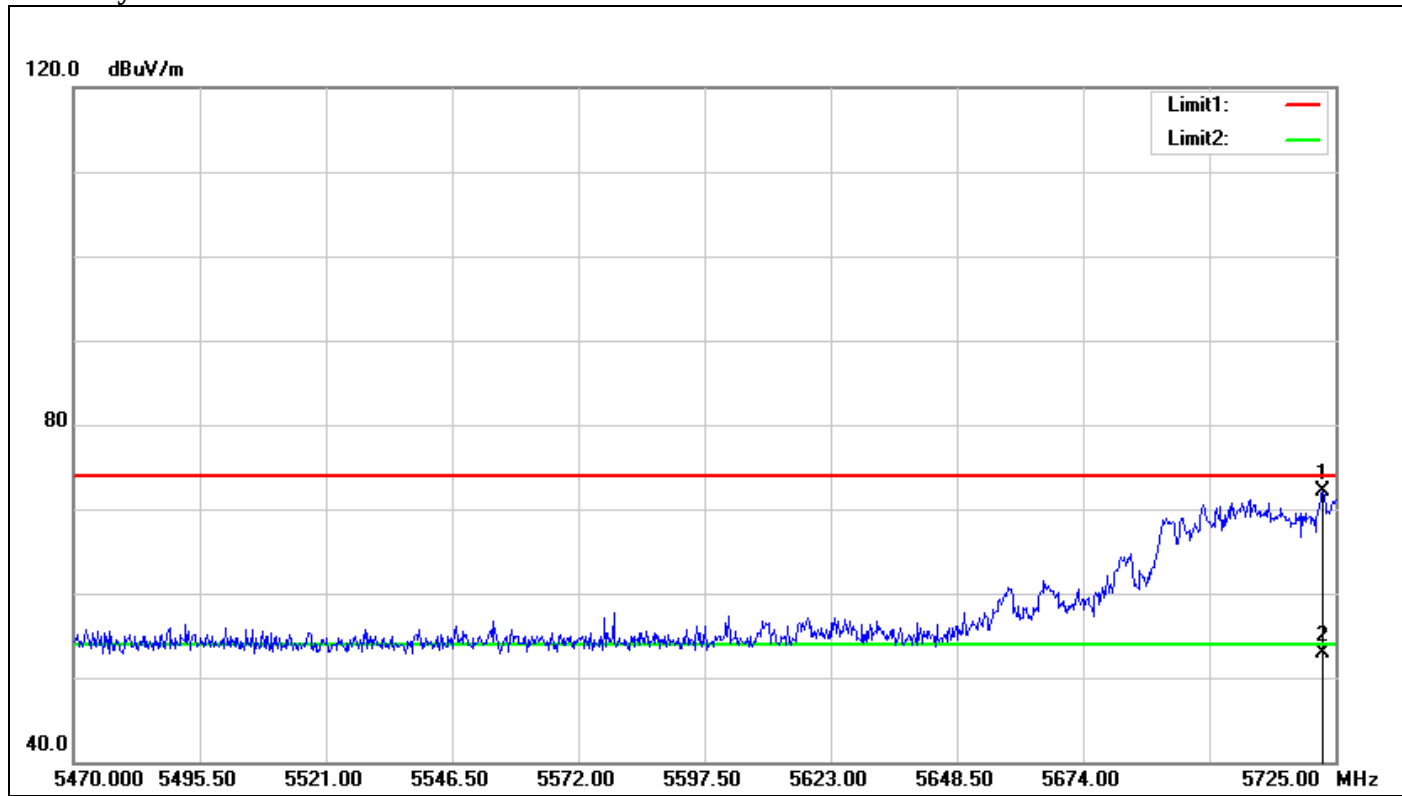


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5851.650	60.46	6.75	67.21	74.00	-6.79	100	248	peak
2	5851.650	44.64	6.75	51.39	54.00	-2.61	100	248	AVG



Band Edges (IEEE 802.11n HT 80 MHz mode / CH 5775 MHz)

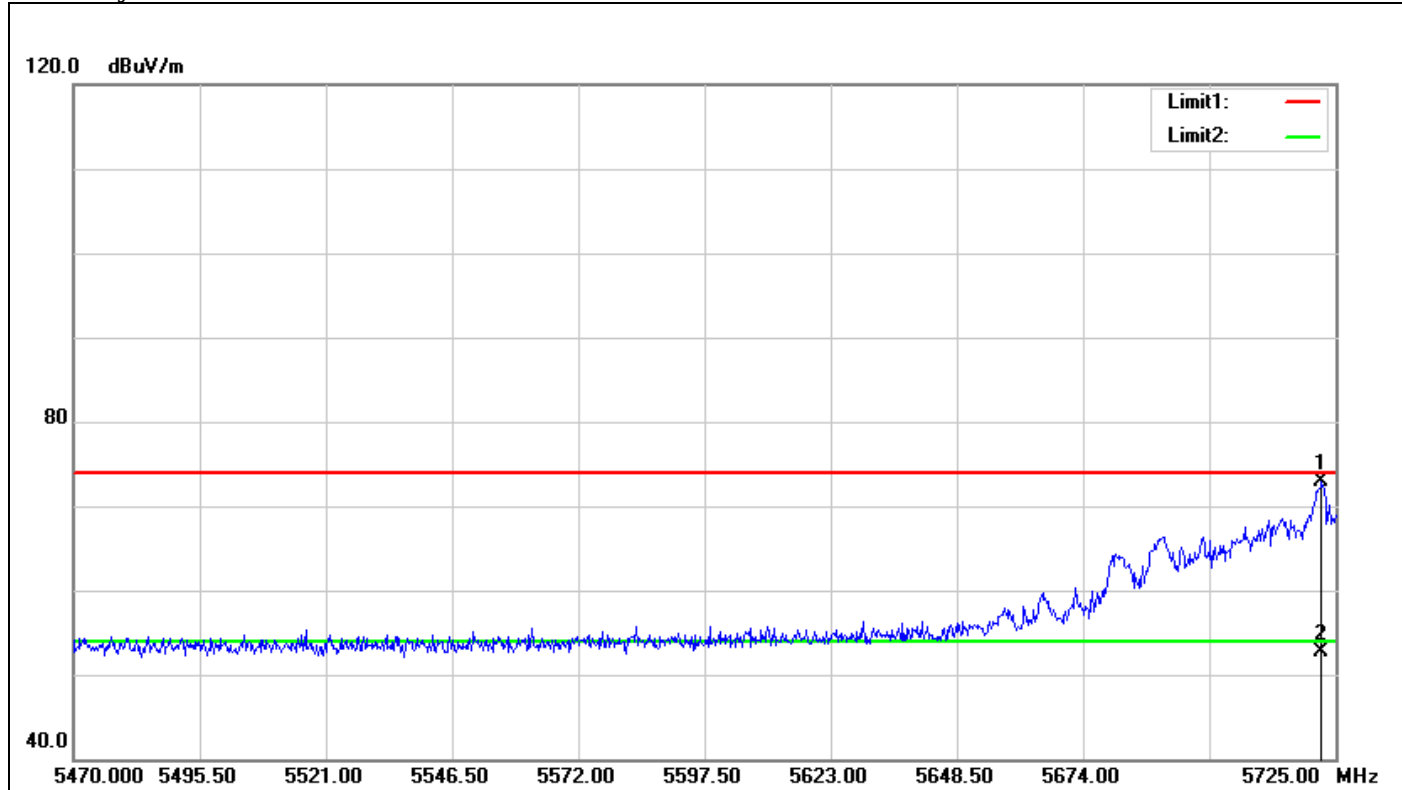
Polarity: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5722.450	65.98	6.20	72.18	74.00	-1.82	100	111	peak
2	5722.450	46.64	6.20	52.84	54.00	-1.16	100	111	AVG



Polarity: Horizontal

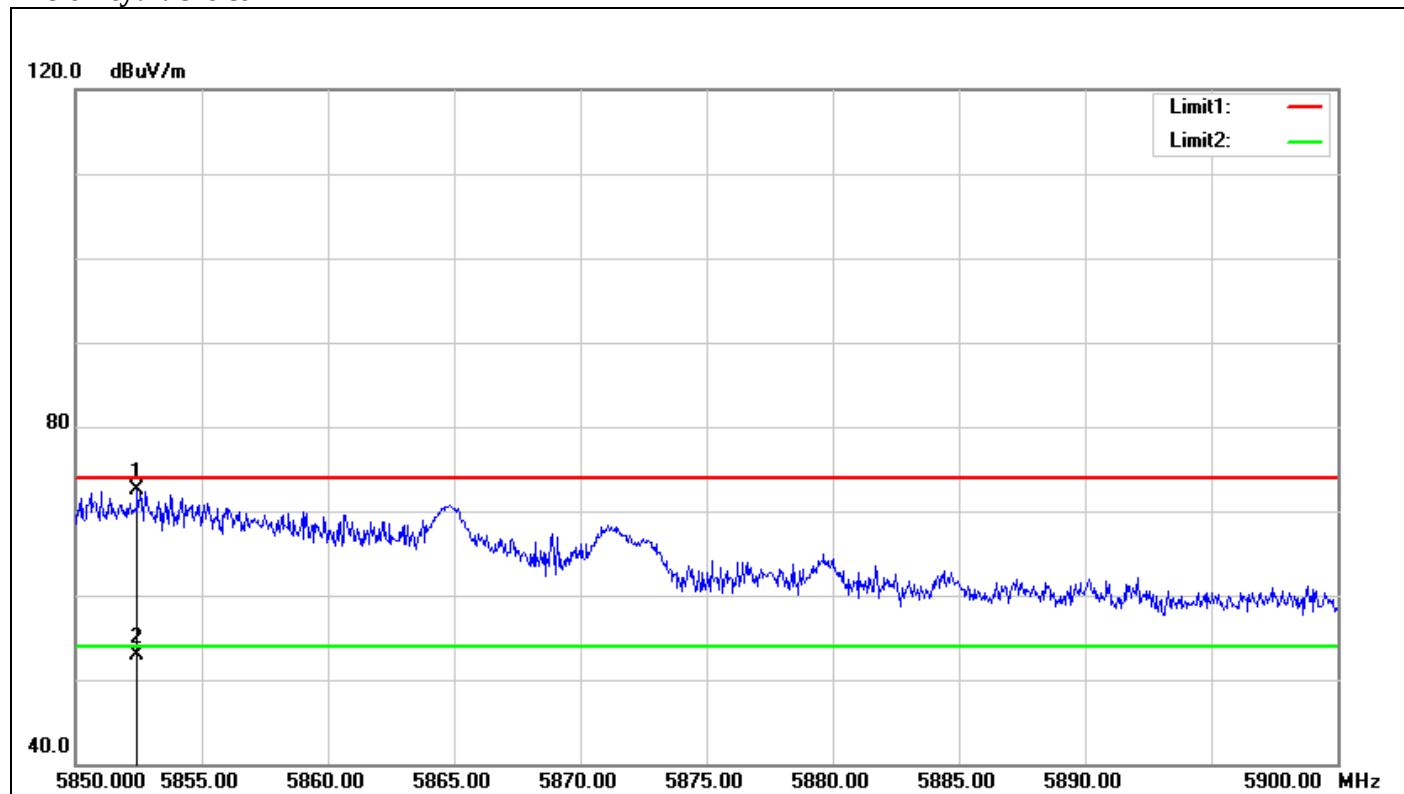


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5722.195	66.64	6.20	72.84	74.00	-1.16	100	328	peak
2	5722.195	46.51	6.20	52.71	54.00	-1.29	100	328	AVG



Band Edges (IEEE 802.11n HT 80 MHz mode / CH 5775 MHz)

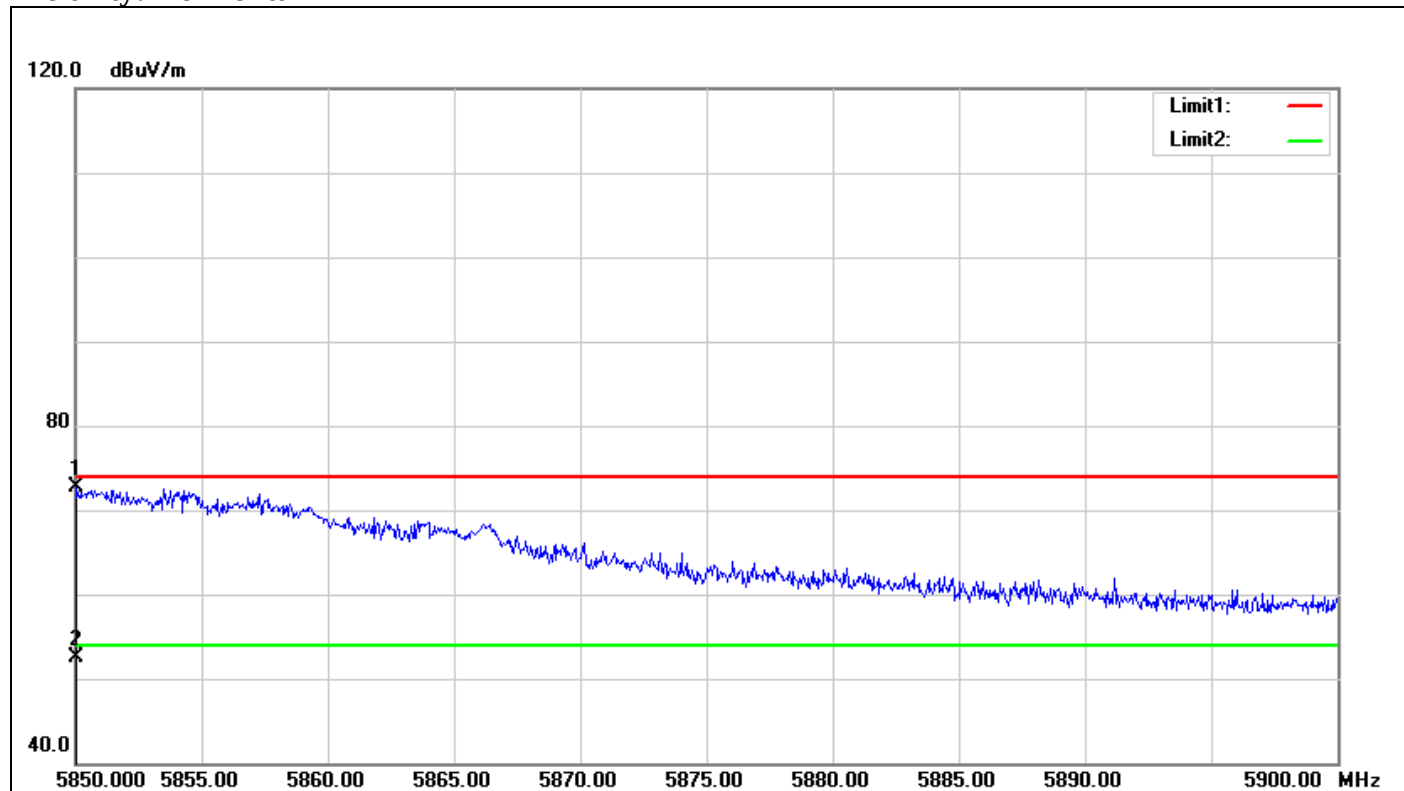
Polarity: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5852.450	65.71	6.75	72.46	74.00	-1.54	100	71	peak
2	5852.450	46.15	6.75	52.90	54.00	-1.10	100	71	AVG



Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	5850.050	66.03	6.74	72.77	74.00	-1.23	100	200	peak
2	5850.050	45.78	6.74	52.52	54.00	-1.48	100	200	AVG



7.4 PEAK POWER SPECTRAL DENSITY

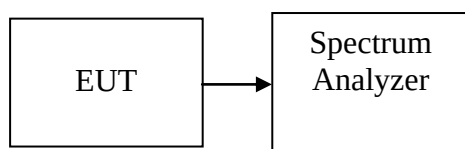
LIMIT

According to §15.407(a),

- (1) For the band 5.725-5.850 GHz, the peak power spectral density shall not exceed 30dBm in any 1MHz band.

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.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 500kHz, VBW = 3*RBW, Span = Sweep= AUTO
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed

TEST RESULTS

No non-compliance noted

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

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	5745	-0.07	30.00	PASS
Mid	5785	-0.12		PASS
High	5825	1.11		PASS

Test mode: IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Chain 0 PSD (dBm)	Chain 1 PSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	5745	0.57	1.09	3.85	30.00	PASS
Mid	5785	0.30	0.87	3.60		PASS
High	5825	1.25	1.81	4.55		PASS

Test mode: IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	Chain 0 PSD (dBm)	Chain 1 PSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	5755	-2.31	-2.24	0.74	30.00	PASS
High	5795	-2.96	-2.48	0.30		PASS

Test mode: IEEE 802.11n HT 80 MHz mode / 5775MHz

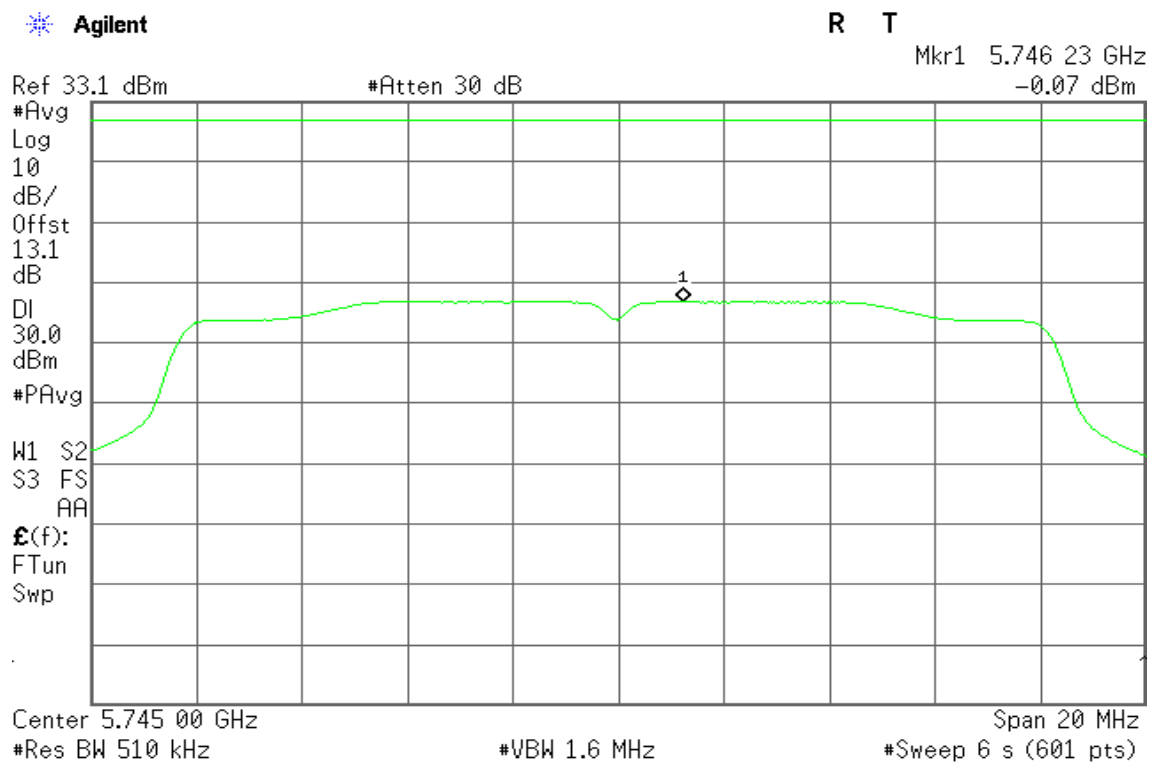
Channel	Frequency (MHz)	Chain 0 PSD (dBm)	Chain 1 PSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Mid	5775	-5.07	-4.40	-1.71	30.00	PASS

Remark: 1. Total PSD (dBm) = $10 \cdot \log(10^{\text{Chain 0 PSD} / 10} + 10^{\text{Chain 1 PSD} / 10})$

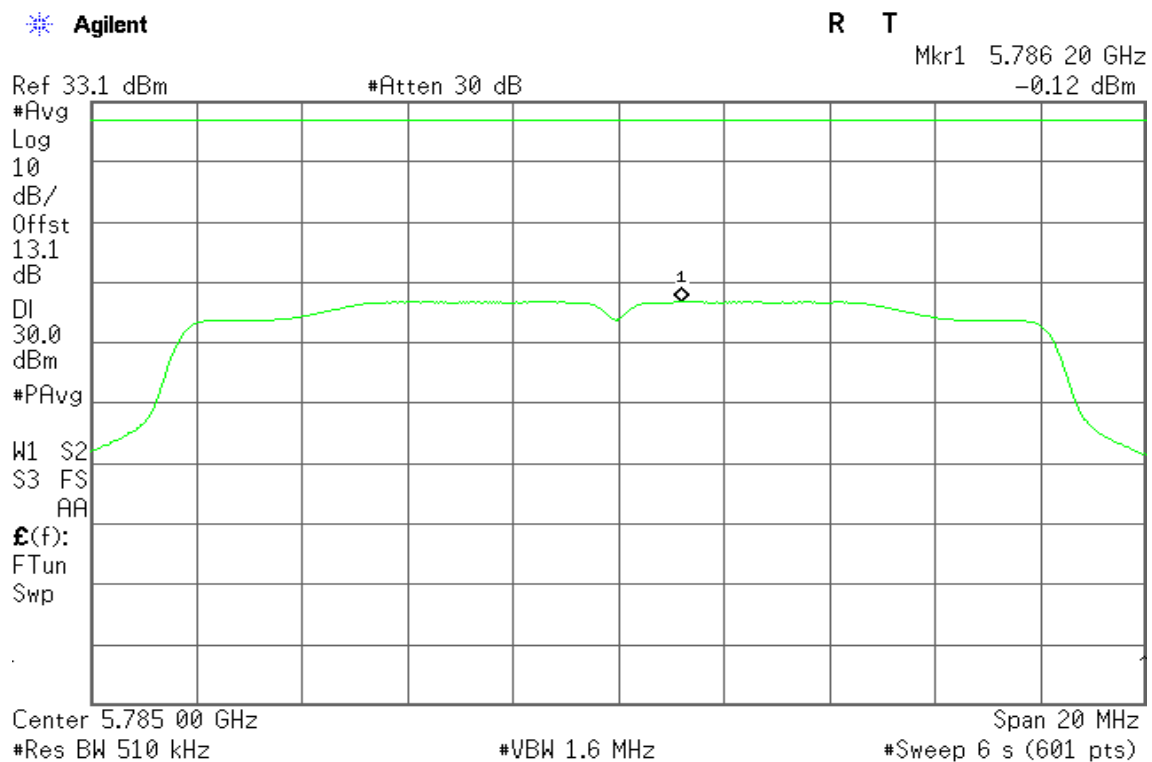


IEEE 802.11a mode / 5745 ~ 5825MHz

CH Low



CH Mid





CH High



R T

Mkr1 5.826 37 GHz

1.11 dBm

Ref 33.1 dBm

#Atten 30 dB

#Avg

Log

10

dB/

Offst

13.1

dB

DI

30.0

dBm

#PAvg

W1 S2

S3 FS

AA

£(f):

FTun

Swp

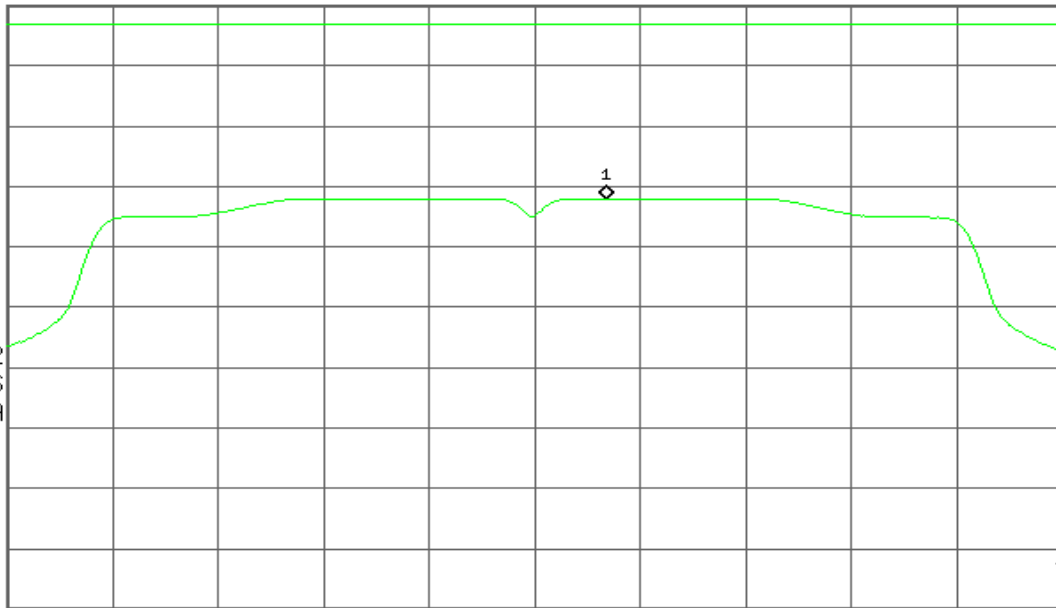
Center 5.825 00 GHz

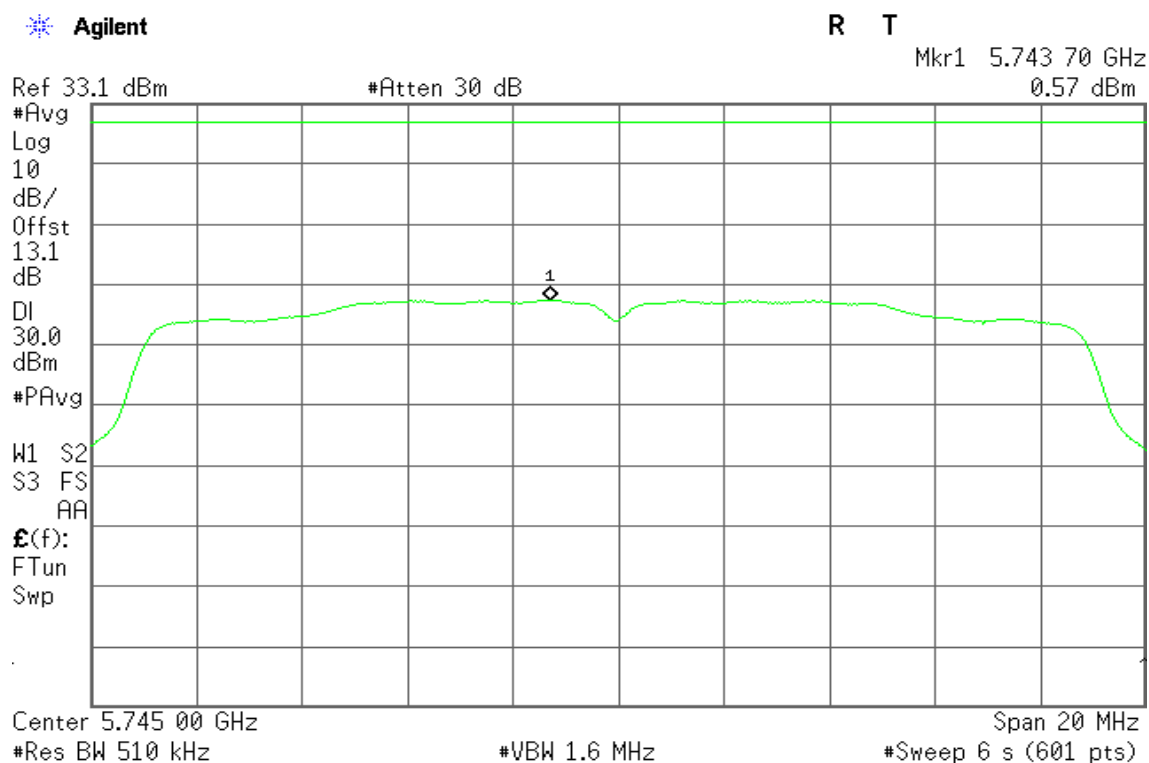
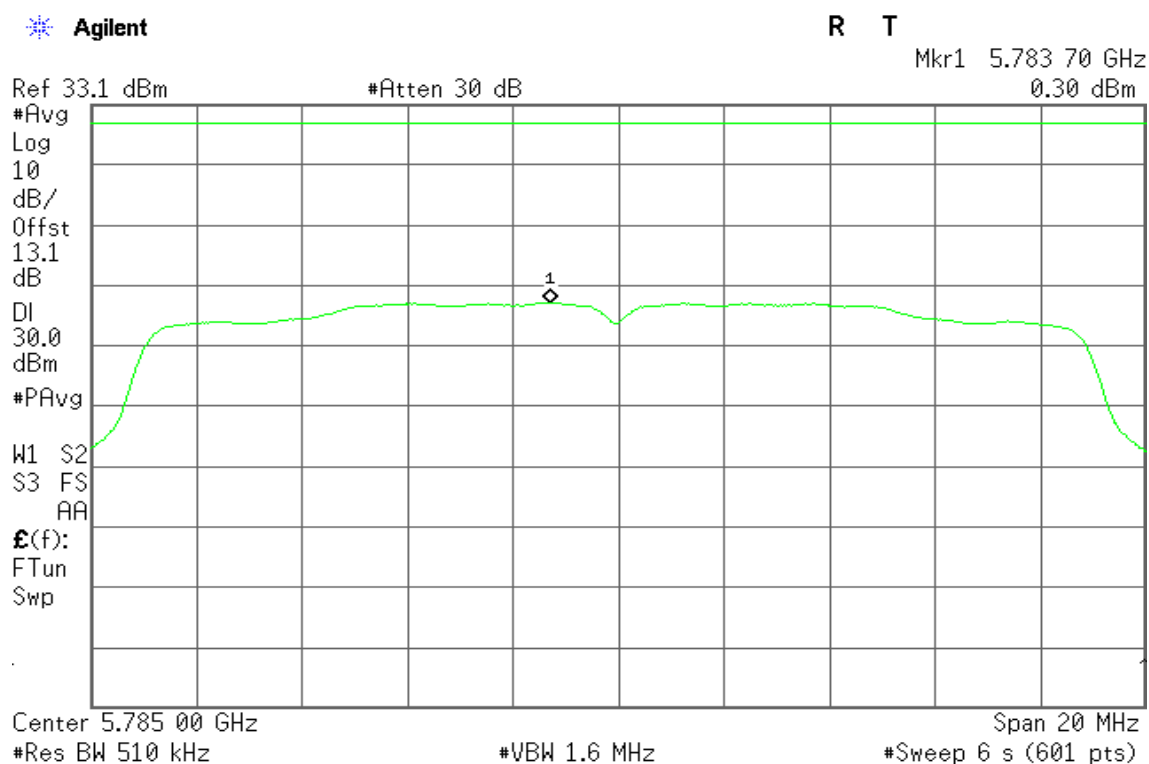
#Res BW 510 kHz

#VBW 1.6 MHz

Span 20 MHz

#Sweep 6 s (601 pts)



**IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 0****CH Low****CH Mid**



CH High

Agilent

R T

Mkr1 5.823 63 GHz
1.25 dBm

Ref 33.1 dBm

#Atten 30 dB

#Avg

Log

10

dB/

Offst

13.1

dB

DI

30.0

dBm

#PAvg

W1 S2

S3 FS

AA

E(f):

FTun

Swp

Center 5.825 00 GHz

#Res BW 510 kHz

#VBW 1.6 MHz

Span 20 MHz

#Sweep 6 s (601 pts)

IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 1

CH Low

Agilent

R T

Mkr1 5.743 60 GHz
1.09 dBm

Ref 33.1 dBm

#Atten 30 dB

#Avg

Log

10

dB/

Offst

13.1

dB

DI

30.0

dBm

#PAvg

W1 S2

S3 FS

AA

E(f):

FTun

Swp

Center 5.745 00 GHz

#Res BW 510 kHz

#VBW 1.6 MHz

Span 20 MHz

#Sweep 6 s (601 pts)



CH Mid

Agilent

R T

Mkr1 5.783 67 GHz
0.87 dBm

Ref 33.1 dBm

#Atten 30 dB

#Avg

Log

10

dB/

Offst

13.1

dB

DI

30.0

dBm

#PAvg

W1 S2

S3 FS

AA

£(f):

FTun

Swp

Center 5.785 00 GHz

#Res BW 510 kHz

#VBW 1.6 MHz

Span 20 MHz

#Sweep 6 s (601 pts)

CH High

Agilent

R T

Mkr1 5.823 67 GHz
1.81 dBm

Ref 33.1 dBm

#Atten 30 dB

#Avg

Log

10

dB/

Offst

13.1

dB

DI

30.0

dBm

#PAvg

W1 S2

S3 FS

AA

£(f):

FTun

Swp

Center 5.825 00 GHz

#Res BW 510 kHz

#VBW 1.6 MHz

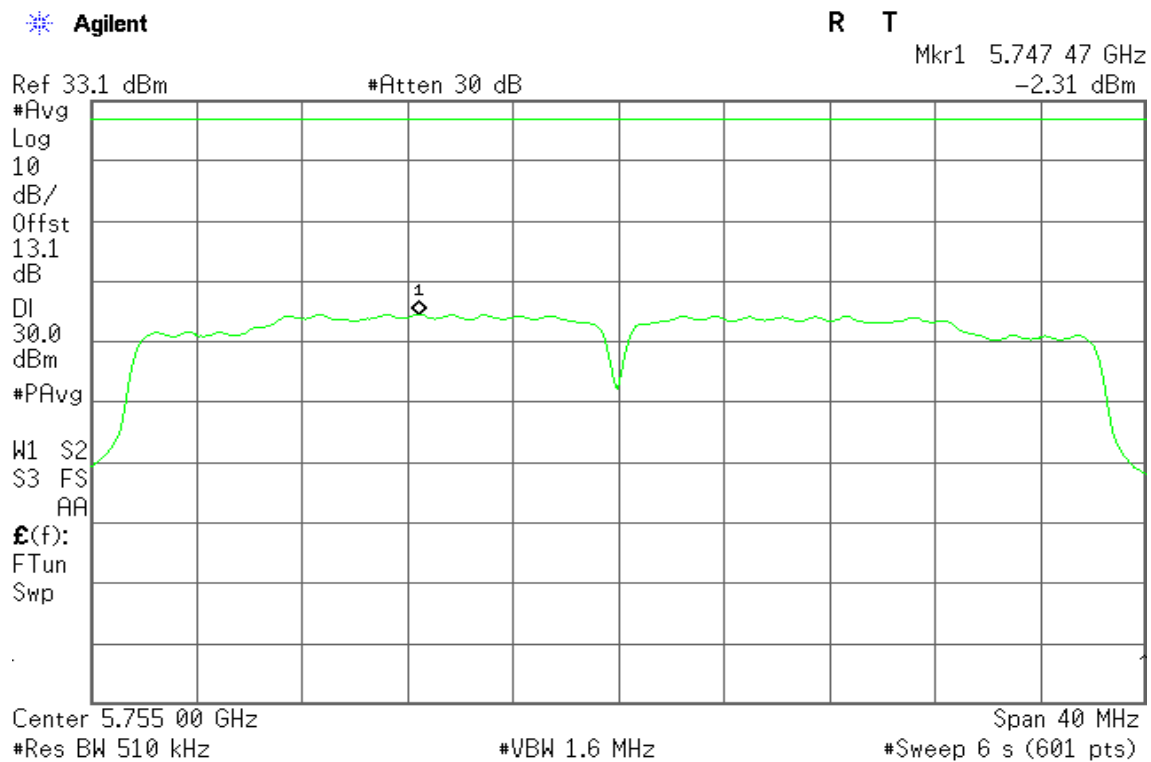
Span 20 MHz

#Sweep 6 s (601 pts)

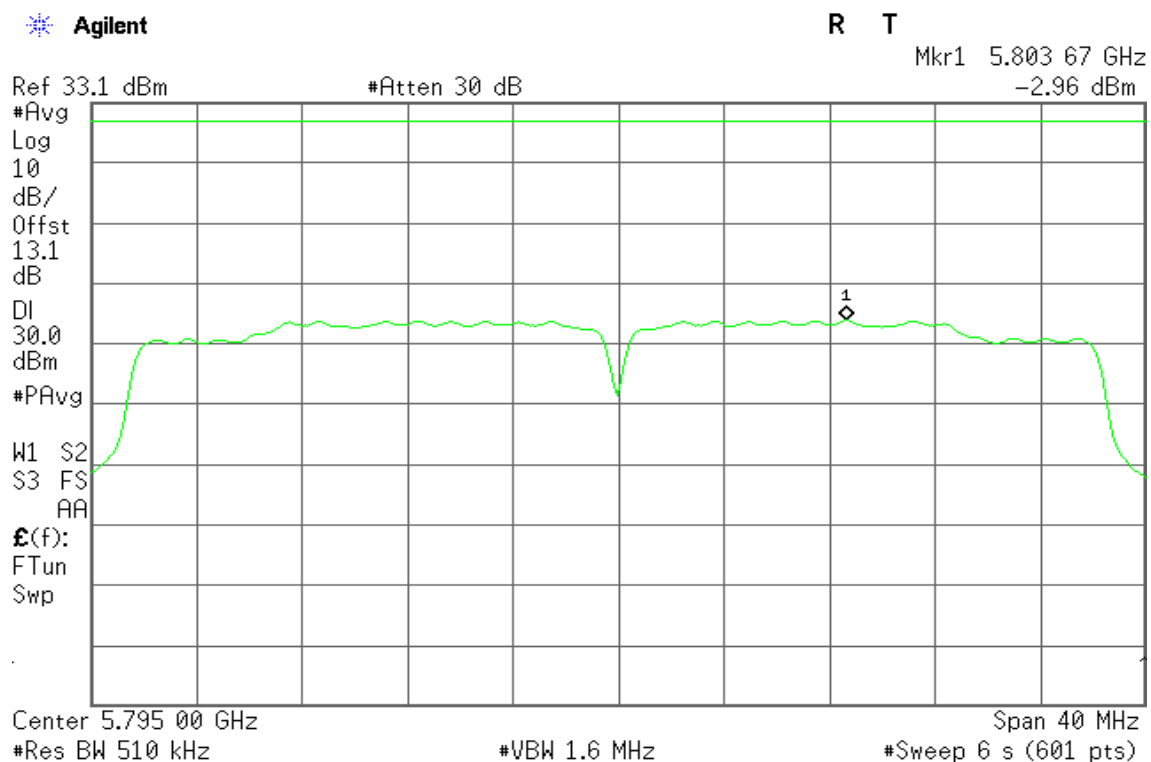


IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 0

CH Low



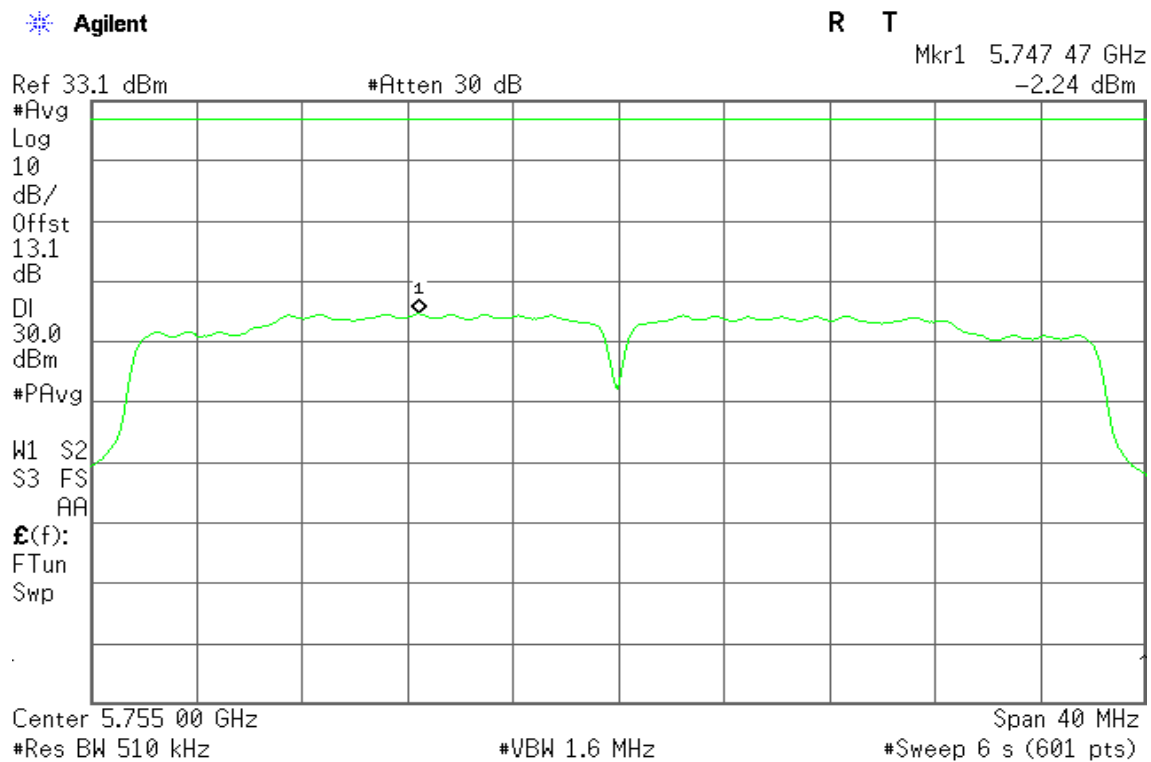
CH High



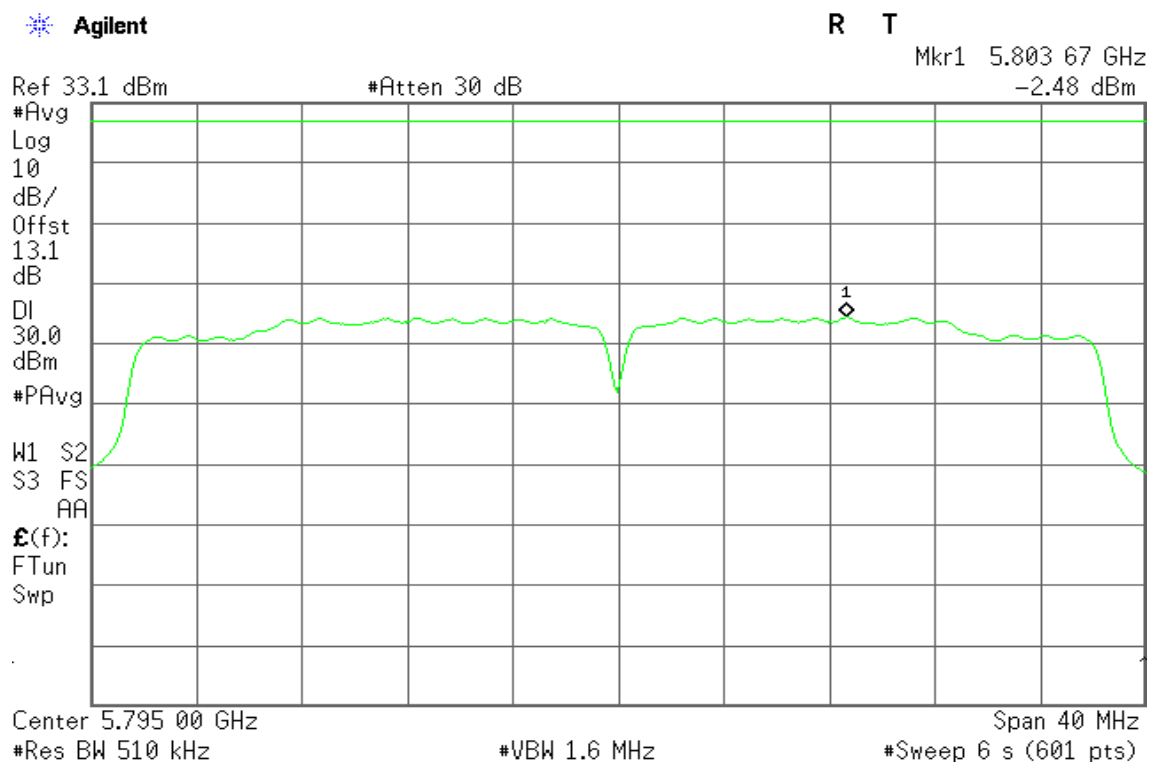


IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 1

CH Low



CH High





IEEE 802.11n HT 80 MHz mode / 5775MHz / Chain 0

CH Mid

Agilent

R T

Mkr1 5.751 13 GHz
-5.07 dBm

Ref 33.1 dBm

#Atten 30 dB

#Avg

Log

10

dB/

Offst

13.1

dB

DI

30.0

dBm

#PAvg

W1 S2

S3 FS

AA

£(f):

FTun

Swp

Center 5.775 00 GHz

#Res BW 510 kHz

#VBW 1.6 MHz

Span 80 MHz

#Sweep 6 s (601 pts)

IEEE 802.11n HT 80 MHz mode / 5775MHz / Chain 1

CH Mid

Agilent

R T

Mkr1 5.752 33 GHz
-4.40 dBm

Ref 33.1 dBm

#Atten 30 dB

#Avg

Log

10

dB/

Offst

13.1

dB

DI

30.0

dBm

#PAvg

W1 S2

S3 FS

AA

£(f):

FTun

Swp

Center 5.775 00 GHz

#Res BW 510 kHz

#VBW 1.6 MHz

Span 80 MHz

#Sweep 6 s (601 pts)



7.5 RADIATED UNDESIRABLE EMISSION

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	30
1.705 – 30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: 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., Sections 15.231 and 15.241.

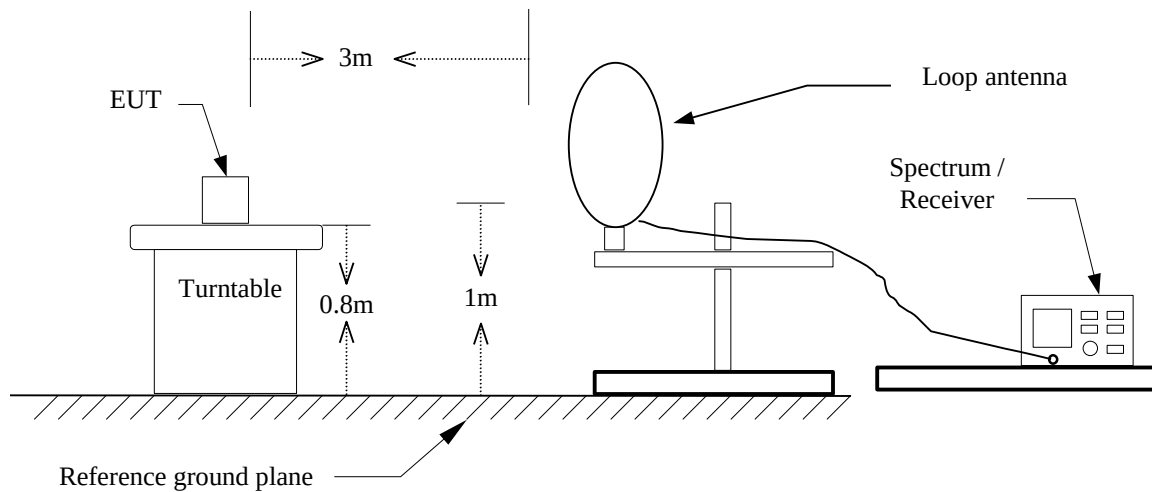
2. In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
0.009 - 0.490	$2400/F(\text{kHz}) + 80$	$20\text{LOG}((2400/F(\text{kHz}))+80)$
0.490 - 1.705	$24000/F(\text{kHz}) + 40$	$20\text{LOG}((24000/F(\text{kHz}))+40)$
1.705 – 30.0	30	69.54
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

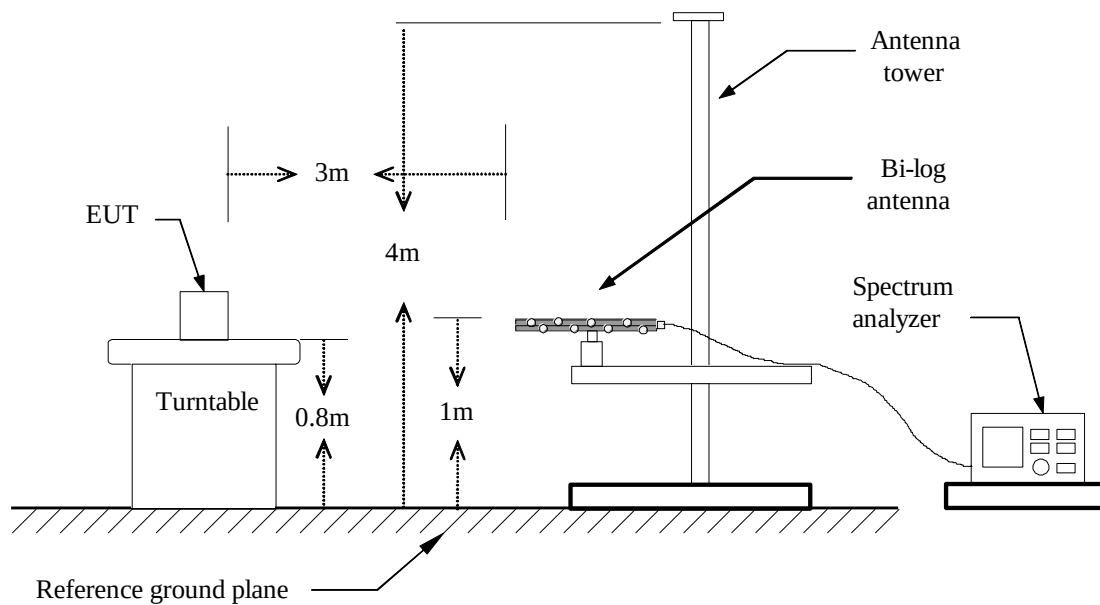


Test Configuration

9kHz ~ 30MHz

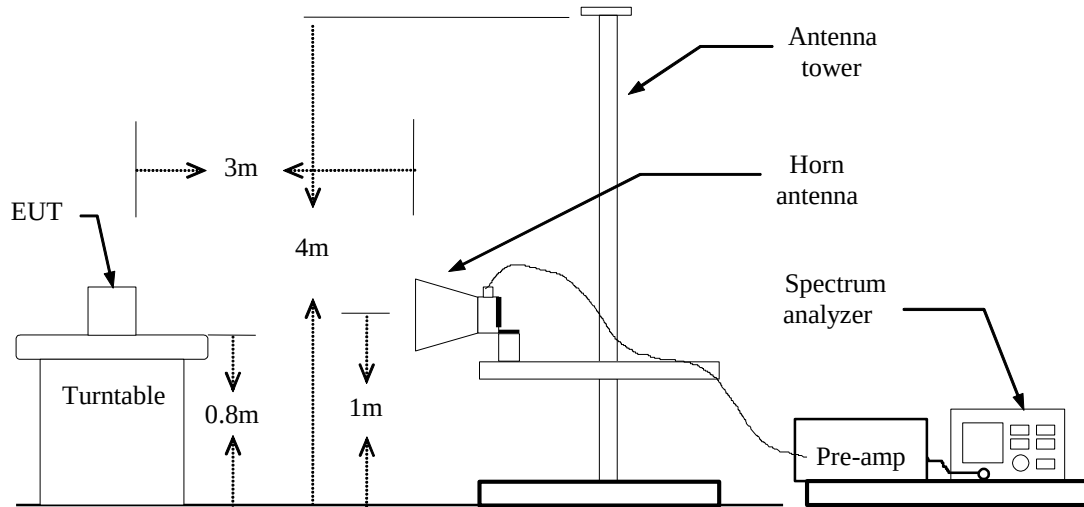


30MHz ~ 1GHz





Above 1 GHz





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=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz,
if duty cycle $\geq 98\%$, VBW=10Hz.

if duty cycle $< 98\%$ VBW=1/T.

IEEE 802.11b mode: $\geq 98\%$, VBW=10Hz

IEEE 802.11g mode: $\geq 98\%$, VBW=10Hz

IEEE 802.11n HT 20 MHz mode: $\geq 98\%$, VBW=10Hz

IEEE 802.11n HT 40 MHz mode: 96%=VBW 2kHz

7. Repeat above procedures until the measurements for all frequencies are complete.

**Below 1 GHz****Operation Mode:** Normal Link**Test Date:** February 13, 2015**Temperature:** 24°C**Tested by:** Dennis Li**Humidity:** 50% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
36.7900	47.36	-14.85	32.51	40.00	-7.49	Peak	V
76.5600	52.10	-22.90	29.20	40.00	-10.80	Peak	V
259.8900	33.28	-17.68	15.60	46.00	-30.40	Peak	V
449.0400	35.30	-12.69	22.61	46.00	-23.39	Peak	V
668.2600	30.21	-9.12	21.09	46.00	-24.91	Peak	V
852.5600	28.68	-6.75	21.93	46.00	-24.07	Peak	V
36.7900	45.81	-14.85	30.96	40.00	-9.04	Peak	H
76.5600	48.48	-22.90	25.58	40.00	-14.42	Peak	H
320.0300	42.28	-15.92	26.36	46.00	-19.64	Peak	H
533.4300	33.23	-11.28	21.95	46.00	-24.05	Peak	H
749.7400	29.90	-7.88	22.02	46.00	-23.98	Peak	H
893.3000	29.30	-6.24	23.06	46.00	-22.94	Peak	H

Remark:

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

**Above 1 GHz**

Operation Mode: Tx / IEEE 802.11a mode / 5745 ~ 5825MHz / CH Low
Test Date: February 11, 2015
Temperature: 27°C
Tested by: Dennis Li
Humidity: 53% RH
Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1595.000	57.36	-7.03	50.33	74.00	-23.67	peak	V
N/A							
1602.000	57.81	-6.99	50.82	74.00	-23.18	peak	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / IEEE 802.11a mode / 5745 ~ 5825MHz /CH Mid **Test Date:** February 11, 2015
Temperature: 27°C **Tested by:** Dennis Li
Humidity: 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.09	-7.97	49.12	74.00	-24.88	peak	V
N/A							
1399.000	57.93	-7.97	49.96	74.00	-24.04	peak	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / IEEE 802.11a mode / 5745 ~ 5825MHz
/CH High

Test Date: February 11, 2015

Temperature: 27°C

Tested by: Dennis Li

Humidity: 53% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.18	-7.97	49.21	74.00	-24.79	peak	V
N/A							
1399.000	58.67	-7.97	50.70	74.00	-23.30	peak	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Tx / IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / CH Low**Test Date:** February 11, 2015**Temperature:** 27°C**Tested by:** Dennis Li**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1392.000	58.59	-8.01	50.58	74.00	-23.42	peak	V
N/A							
1994.000	51.19	-4.91	46.28	74.00	-27.72	peak	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / CH Mid

Test Date: February 11, 2015

Temperature: 27°C

Tested by: Dennis Li

Humidity: 53% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1196.000	57.91	-8.87	49.04	74.00	-24.96	peak	V
N/A							
1399.000	56.62	-7.97	48.65	74.00	-25.35	peak	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: Tx / IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / CH High

Test Date: February 11, 2015

Temperature: 27°C

Tested by: Dennis Li

Humidity: 53% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.54	-7.97	49.57	74.00	-24.43	peak	V
N/A							
1399.000	58.03	-7.97	50.06	74.00	-23.94	peak	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Tx / IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / CH Low**Test Date:** February 11, 2015**Temperature:** 27°C**Tested by:** Dennis Li**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.36	-7.97	49.39	74.00	-24.61	peak	V
N/A							
1399.000	56.96	-7.97	48.99	74.00	-25.01	peak	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Tx / IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / CH High**Test Date:** February 11, 2015**Temperature:** 27°C**Tested by:** Dennis Li**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1595.000	54.23	-7.03	47.20	74.00	-26.80	peak	V
N/A							
1399.000	57.88	-7.97	49.91	74.00	-24.09	peak	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Tx / IEEE 802.11ac80 mode / 5775MHz**Test Date:** February 11, 2015**Temperature:** 27°C**Tested by:** Dennis Li**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.15	-7.97	49.18	74.00	-24.82	peak	V
N/A							
1392.000	57.17	-8.01	49.16	74.00	-24.84	peak	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



7.6 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Operation Mode: Normal Link **Test Date:** February 14, 2015
Temperature: 24°C **Tested by:** Ken Tsai
Humidity: 50% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.2678	33.00	31.98	9.58	42.58	41.56	61.18	51.19	-18.60	-9.63	L1
0.4876	22.71	16.02	9.58	32.29	25.60	56.21	46.21	-23.92	-20.61	L1
0.5197	36.26	27.46	9.58	45.84	37.04	56.00	46.00	-10.16	-8.96	L1
0.7229	28.38	17.64	9.59	37.97	27.23	56.00	46.00	-18.03	-18.77	L1
0.8562	28.61	17.66	9.59	38.20	27.25	56.00	46.00	-17.80	-18.75	L1
2.5752	26.91	16.17	9.60	36.51	25.77	56.00	46.00	-19.49	-20.23	L1
0.2679	32.58	31.73	9.63	42.21	41.36	61.18	51.18	-18.97	-9.82	L2
0.5039	28.72	19.06	9.63	38.35	28.69	56.00	46.00	-17.65	-17.31	L2
0.5917	26.90	17.19	9.63	36.53	26.82	56.00	46.00	-19.47	-19.18	L2
0.7316	22.93	13.73	9.64	32.57	23.37	56.00	46.00	-23.43	-22.63	L2
1.4299	18.52	11.75	9.64	28.16	21.39	56.00	46.00	-27.84	-24.61	L2
2.5111	20.16	12.60	9.65	29.81	22.25	56.00	46.00	-26.19	-23.75	L2

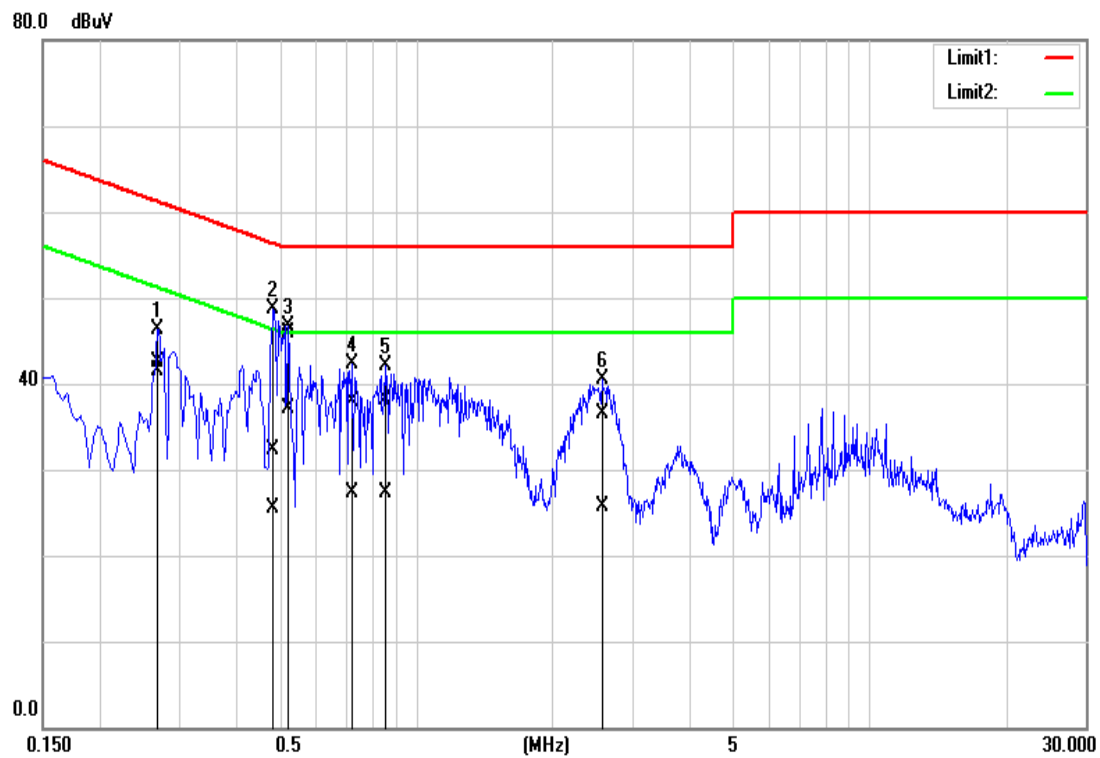
Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)



Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)

