FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Smart Projector

ISSUED TO
Guizhou CVIM Technology Co., Ltd.

4th Floor, 5th R&D Building, Zunyi Software Park, Xiazi Town, Xinpu New District, Zunyi, Guizhou

Prepared by:
Cao Shaodong
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Date Mar. 28, 2017

Approved by:
Wei Yanquan
(Chief Engineer)
Date Mar. 28, 2017

Report No.:	BL-SZ1710090-604
EUT Name:	Smart Projector
Model Name:	A5/A1/A3/A8/V1/V3/V6/V8/Q1/Q3/Q6/Q8
Brand Name:	WOWOTO
Test Standard:	47 CFR Part 15 Subpart E
FCC ID:	2AKWS-ASERIES
Test conclusion:	Pass
Test Date:	Jan. 15, 2017 ~ Mar. 08, 2017
Date of Issue:	Mar. 28, 2017

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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Mar. 28, 2017	Initial Issue

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20 to 25℃
Ambient Relative Humidity	45% - 55%
Ambient Pressure	100 kPa - 102 kPa

1.4 Announce

(1) The test report reference to the report template version v3.8.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant

Applicant	Guizhou CVIM Technology Co., Ltd.
Address	4th Floor, 5th R&D Building, Zunyi Software Park, Xiazi Town, Xinpu New District, Zunyi, Guizhou

2.2 Manufacturer

Manufacturer	Guizhou CVIM Technology Co., Ltd.
Address	4th Floor, 5th R&D Building, Zunyi Software Park, Xiazi Town, Xinpu New District, Zunyi, Guizhou

2.3 Factory

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Type	Smart Projector
Model Name Under Test	A5
Series Model Name	A5, A1, A3, A8, V1, V3, V6, V8, Q1, Q3, Q6, Q8
Description of Model name differentiation	All models share the same hardware circuit design, including LAYOUT, system architecture, software, etc. These different models have different color, and for different Sales channels. The sales channels are as follows: Distributor, Amazon and so on.
Hardware Version	TDB
Software Version	TDB
Dimensions (Approx.)	131x82x24 mm
Weight (Approx.)	250 g
Network and Wireless connectivity	Bluetooth 3.0, Bluetooth 4.0 Low Energy (BLE), WIFI 802.11a,802.11b, 802.11g and 802.11n (HT20)

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No.	654659-2S1P
	Serial No.	N/A
	Capacitance	2100 mAh
	Rated Voltage	7.4 V
	Limit Charge Voltage	8.4 V
Ancillary Equipment 2	Charger	
	Brand Name	N/A

	Model Name	AW018WR-1200150UH
	Rated Input	100-240 V ~, 50/60 Hz, 0.5 A
	Rated Output	12 V ⎓, 1.5 A
Ancillary Equipment 3	Remote Control	

2.6 Technical Information

Frequency Range	Band I: 5150 MHz to 5250 MHz, Band IV: 5725 MHz to 5850 MHz
Modulation technology	OFDM
Modulation Type	256QAM, 64QAM, 16QAM, BPSK, QPSK
Product Type	Mobile and portable for FCC standard
Transfer Rate (Mbps) (Single RF path)	802.11a: 54/ 48/ 36 / 24 / 18 / 9/ 6 Mbps
Channel Bandwidth	802.11a: 20 MHz
Maximum Output Power	Band I: 19.21 dBm Band IV: 17.98 dBm
Antenna Type	FPC Antenna
Antenna Gain	Band I: 5150 MHz to 5250 MHz: 0 dBi Band IV: 5725 MHz to 5850 MHz: 0 dBi
About the Product	The equipment is Smart Projector, intended for used with information technology equipment.

2.7 Additional Instructions

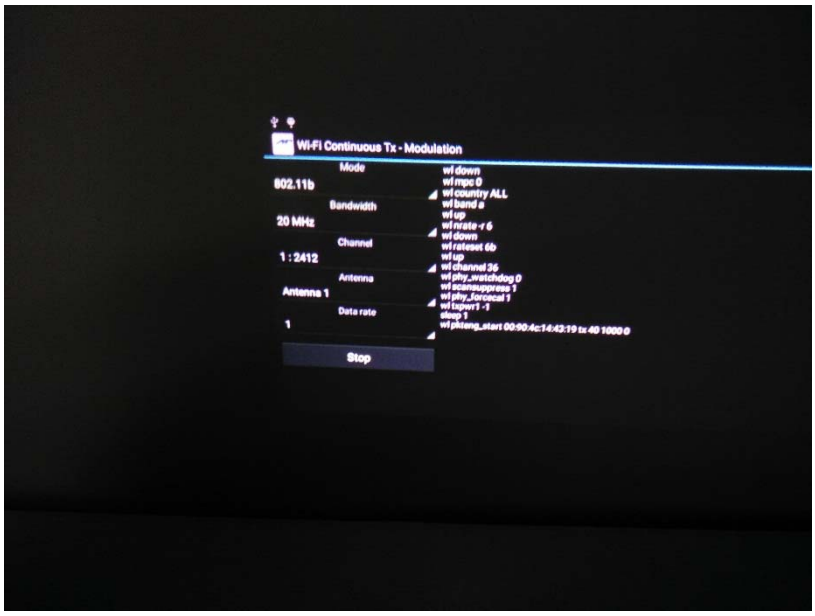
Mode	☒ Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

Test Software Version	Ampak RFTest Tool Ver.5.4		
Support Units (Software installation media)	Description	Manufacturer	Model
	Notebook	Dell	X220

Band I (5150 - 5250 MHz) Power level setup in software			
Mode	Channel	Frequency (MHz)	Soft Set
11a	CH36	5180	TX LEVEL is built-in set parameters and cannot be changed and selected.
11a	CH44	5220	
11a	CH48	5240	

Band IV (5725 - 5850 MHz) Power level setup in software			
Mode	Channel	Frequency (MHz)	Soft Set
11a	CH149	5745	TX LEVEL is built-in set parameters and cannot be changed and selected.
11a	CH157	5785	
11a	CH165	5825	

Run Software



2.8 Channel List

20 MHz		40 MHz		80 MHz	
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
36	**5180**				
40	5200				
44	**5220**				
48	**5240**				
149	**5745**				
153	5765				
157	**5785**				
161	5805				
165	**5825**				

The Lowest frequency, the middle frequency and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11a/n(HT20)

Band I (5150 - 5250 MHz)			Band IV (5725 - 5850 MHz)		
Channel Number	Channel	Frequency (MHz)	Channel Number	Channel	Frequency (MHz)
36	Low	5180	149	Low	5745
44	Mid	5220	157	Mid	5785
48	High	5240	165	High	5825

Note: Preliminary tests were performed in different data rate in above table to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Modulation Type	Band I	Band IV
				Channel	Channel
RF Output Power	11a	6	BPSK	48/44/36	165/157/149
Emission Bandwidth & 99% Occupied Bandwidth	11a	6	BPSK	48/44/36	165/157/149
6 dB bandwidth	11a	6	BPSK	N/A	165/157/149
Power Spectral Density	11a	6	BPSK	48/44/36	165/157/149
Conducted Spurious Emission and Band Edge (Authorized-band)	11a	6	BPSK	48/44/36	165/157/149
Radiated Spurious Emissions	11a	6	BPSK	48/44/36	165/157/149
Band Edge (Restricted-band)	11a	6	BPSK	48/36	165/149
Frequency Stability	Unmodulated	N/A	N/A	N/A	N/A

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15 Subpart E (10-1-15 Edition)	Unlicensed National Information Infrastructure Devices
2	KDB Publication 789033 D02v01r03	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Part No.	Test Result	Verdict
1	Antenna Requirement	15.203	--	Pass[Note1]
2	RF Output Power	15.407(a)	ANNEX A.1	Pass
3	Emission Bandwidth & 99% Occupied Bandwidth	15.407(a)	ANNEX A.2	Pass
4	6 dB bandwidth	15.407(e)	ANNEX A.3	Pass
5	Power Spectral Density	15.407(a)	ANNEX A.4	Pass
6	Conducted Emission	15.207	ANNEX A.5	Pass
7	Conducted Spurious Emission and Band Edge (Authorized-band)	15.407(b) 15.209	ANNEX A.6	Pass
8	Radiated Spurious Emissions and Band Edge (Restricted-band)	15.407(b)	ANNEX A.7	Pass
9	Frequency Stability	15.407(g)	ANNEX A.8	Pass
10	Receiver Spurious Emissions	--	--	N/A[Note2]

Note [1]: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.

Note [2]: Only radio communication receivers operating in stand-alone mode within the band 30-960 MHz, as well as scanner receivers, are subject to Industry Canada requirements, so this test is not applicable

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% - 55%	
Atmospheric Pressure	100 kPa - 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
	LT (Low Temperature)	0℃
	HT (High Temperature)	+35℃
Working Voltage of the EUT	NV (Normal Voltage)	7.4 V
	LV (Low Voltage)	6.2 V
	HV (High Voltage)	8.4 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2016.07.13	2017.07.12
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	177746	2016.07.13	2017.07.12
Signal Generator	ROHDE&SCHWARZ	SMB100A	260592	2016.07.13	2017.07.12
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2016.07.13	2017.07.12
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04
LISN	SCHWARZBECK	NSLK 8127	8127-687	2016.07.05	2017.07.04
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2016.07.13	2017.07.12
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2016.07.13	2017.07.12
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2016.07.13	2017.07.12
Test Antenna-Rod(9 kHz-30 MHz)	SCHWARZBECK	VAMP 9243	9243-556	2015.07.22	2017.07.21
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2015.07.22	2017.07.21
Test Antenna-Rod	SCHWARZBECK	VAMP 9243	9243-556	2015.07.22	2017.07.21
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2019.02.20
Anechoic Chamber	EMC TECHNOLOGY LTD	21.1m*11.6m*7.35m	N/A	2016.08.09	2018.08.08
Shielded Enclosure	ChangNing	CN-130701	130703	--	--

4.3 Measurement Uncertainty

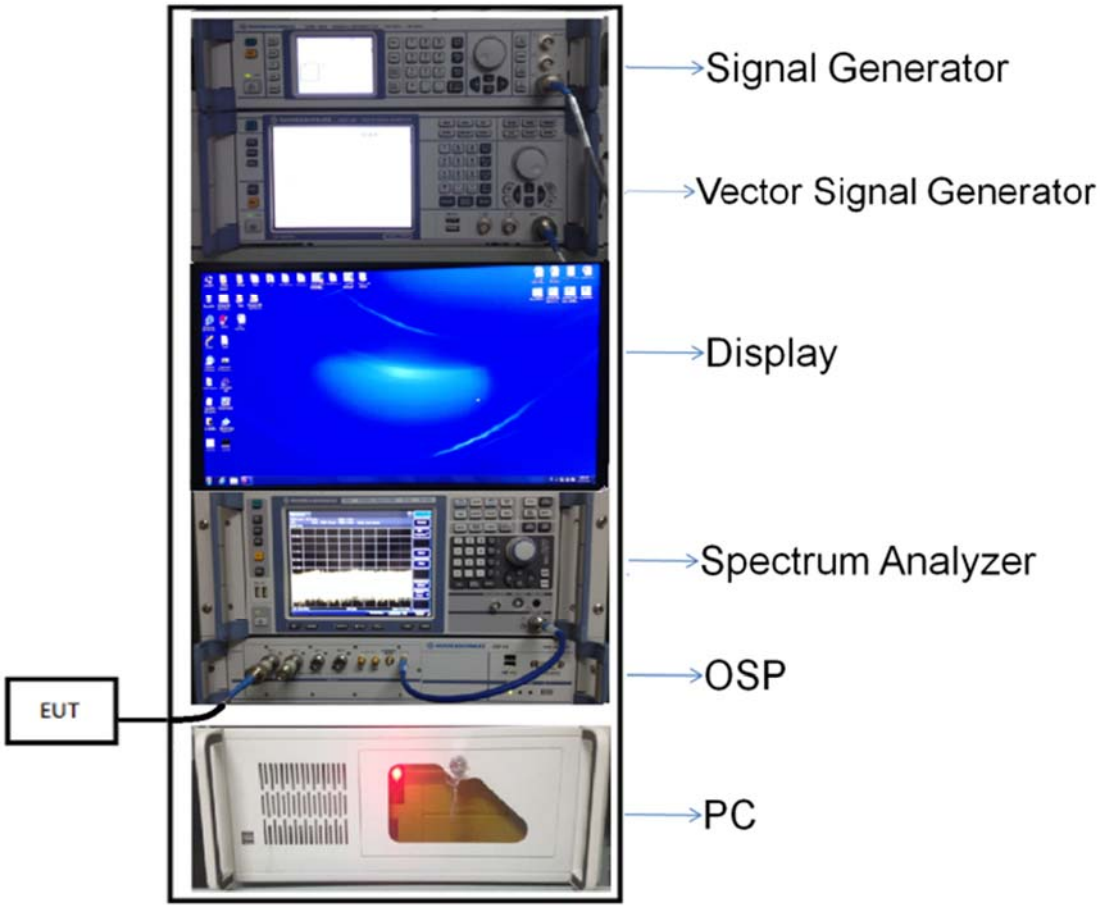
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

Measurement	Value
Occupied Channel Bandwidth	±4%
RF output power, conducted	±1.4 dB
Power Spectral Density, conducted	±2.5 dB
Unwanted Emissions, conducted	±2.8 dB
All emissions, radiated	±5.4 dB
Temperature	±1°C
Humidity	±4%

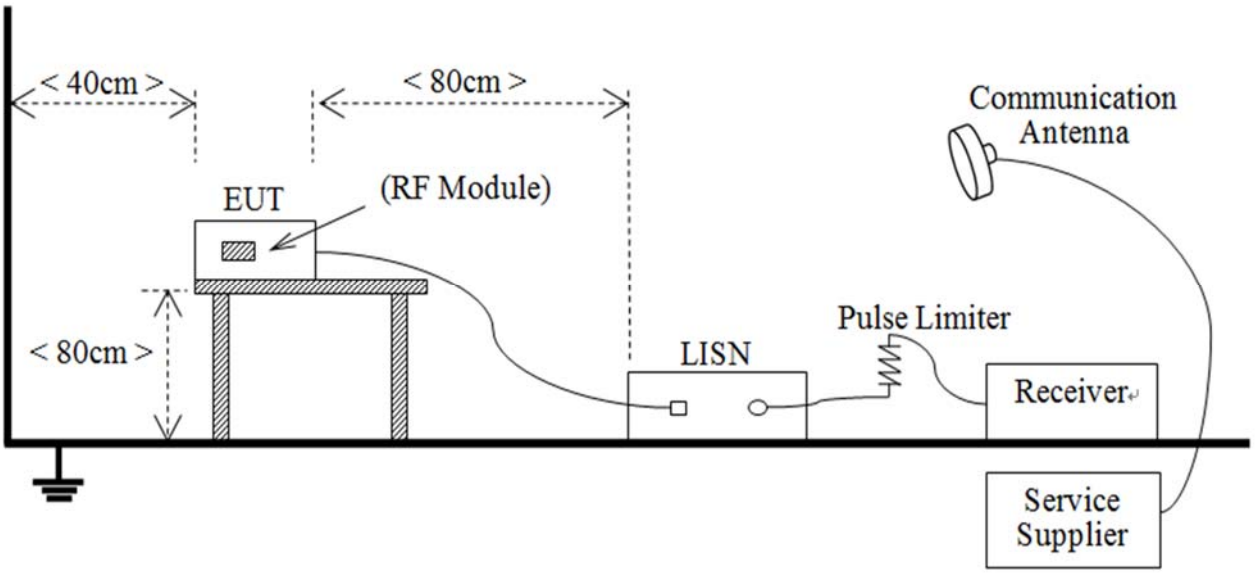
4.4 Description of Test Setup

4.4.1 For Antenna Port Test



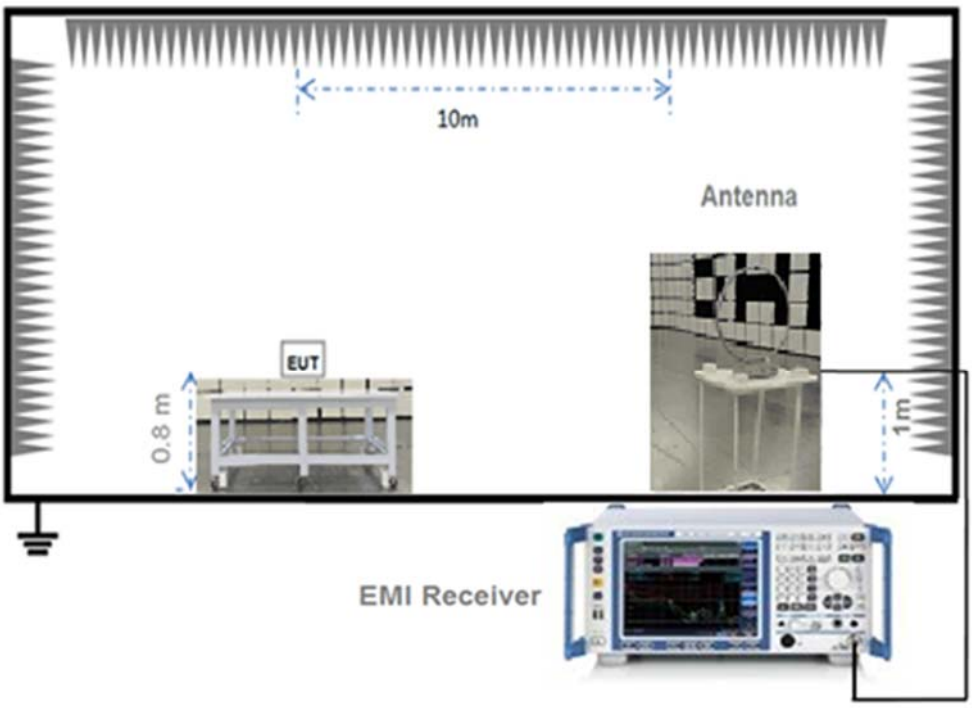
(Diagram 1)

4.4.2 For AC Power Supply Port Test



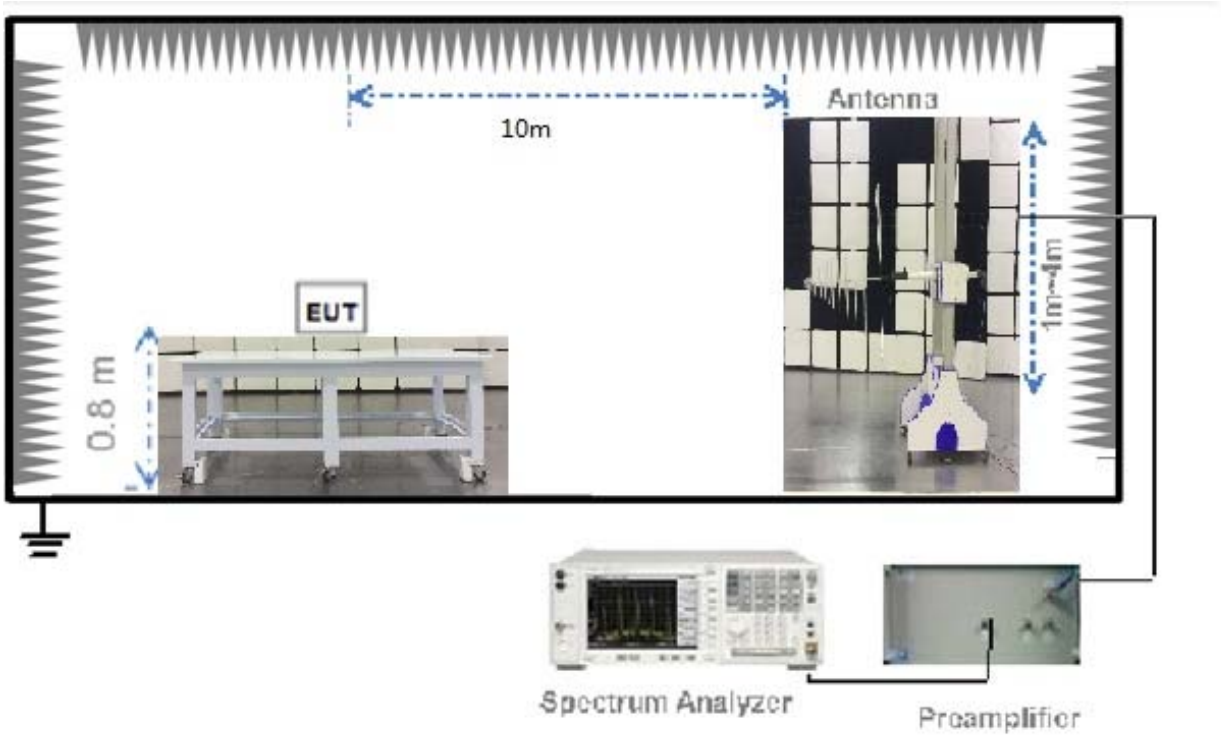
(Diagram 2)

4.4.3 For Radiated Test (Below 30 MHz)



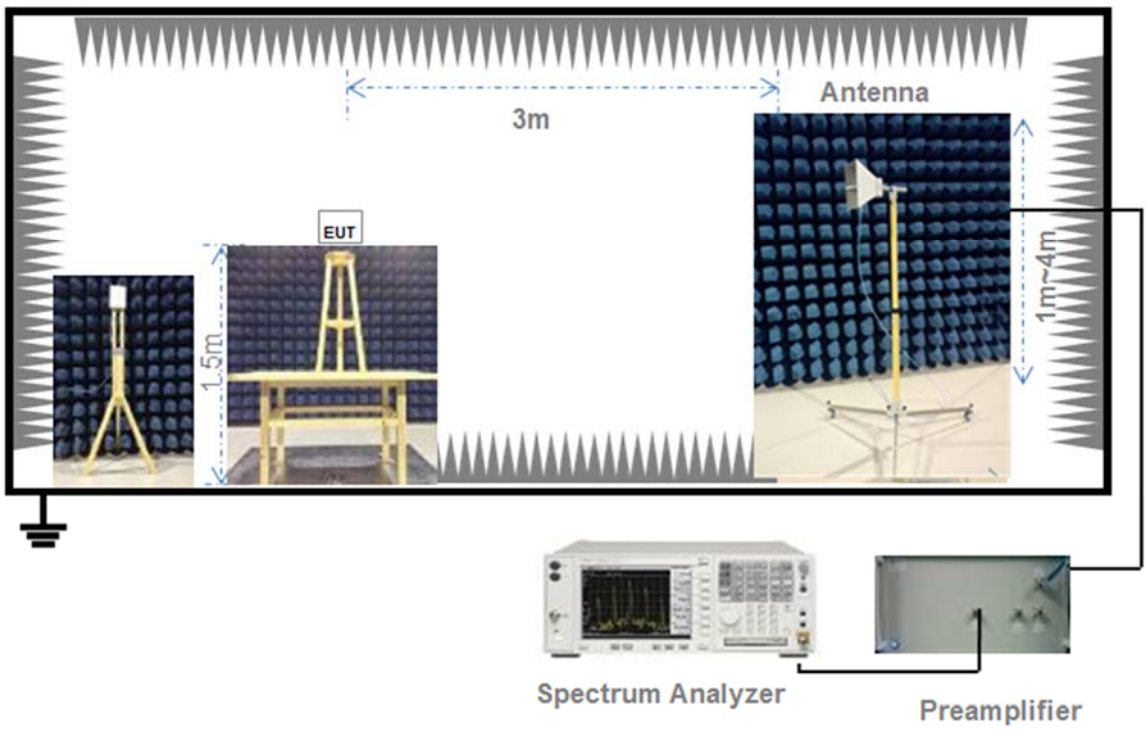
(Diagram 3)

4.4.4 For Radiated Test (30 MHz-1 GHz)



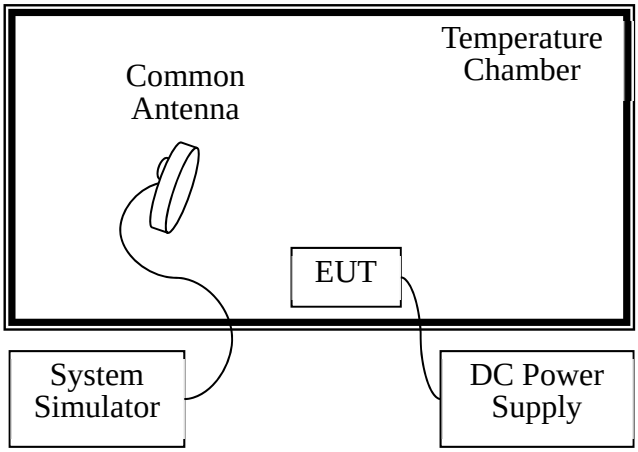
(Diagram 4)

4.4.5 For Radiated Test (Above 1 GHz)



(Diagram 5)

4.4.6 For Frequency Stability Test



(Diagram 6)

5 TEST ITEMS

5.1 RF Output Power

5.1.1 Test Limit

FCC §15.407(a)

The maximum conducted output power should not exceed:

Frequency Band (MHz)	Limit
5150-5250	250 mW
5250-5350	250 mW or 11 dBm + 10log B, whichever is less.
5470-5725	250 mW or 11 dBm + 10log B, whichever is less.
5725-5850	1 W
Note: Where “B” is the 26 dB emissions bandwidth in MHz.	

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The maximum conducted output power shall not exceed:

Frequency Band (MHz)	Limit
5150-5250	N/A
5250-5350	250 mW or 11 dBm + 10log B, whichever is less.
5470-5725	250 mW or 11 dBm + 10log B, whichever is less.
5725-5850	1 W
Note: Where “B” is the 99% emissions bandwidth in MHz.	

The maximum e.i.r.p. shall not exceed:

Frequency Band (MHz)	Limit
5150-5250	200 mW or 10 dBm + 10log B, whichever is less.
5250-5350	1W or 17 dBm + 10log B, whichever is less.
5470-5725	1W or 17 dBm + 10log B, whichever is less.
5725-5850	N/A
Note: Where “B” is the 99% emissions bandwidth in MHz.	

5.1.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.3 Test Procedure

The maximum peak conducted output power may be measured using a broadband Average RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the emission bandwidth and utilize a fast-responding diode detector.

The E.I.R.P used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.

5.1.4 Test Result

Please refer to ANNEX A.1.

5.2 Emission Bandwidth and 6 dB Bandwidth

5.2.1 Limit

FCC §15.407(a), RSS-247, 6.2

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.2.2 Test Setup

The test setup photo please refer to 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

Emission bandwidth

1. Set RBW = approximately 1% of the emission bandwidth.

2. Set VBW ≥ 3*RBW,

3. Detector = Peak.

4. Trace mode = Max hold.

5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission.

Occupied Bandwidth

1. Set Span = 1.5 times to 5.0 times the OBW

2. Set RBW = 1% to 5% of the OBW.

3. Set VBW ≥ 3*RBW, Detector = Peak.

4. Trace mode = Max hold.

5. Use the 99% power bandwidth function of the instrument.

6 dB bandwidth

1. Set RBW = 100 kHz, VBW = 300 kHz.

2. Detector = Peak.Trace mode = Max hold.

3. Allow the trace to stabilize.

4. 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.

5.2.4 Test Result

Please refer to ANNEX A.2 and ANNEX A.3.

5.3 Power Spectral density (PSD)

5.3.1 Limit

FCC §15.407(a)

The maximum power spectral density should not exceed:

Frequency Band (MHz)	Limit
5150-5250	11 dBm/MHz
5250-5350	11 dBm/MHz
5470-5725	11 dBm/MHz
5725-5850	30 dBm/500kHz

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The maximum power spectral density should not exceed:

Frequency Band (MHz)	Limit
5150-5250	N/A
5250-5350	11 dBm/MHz
5470-5725	11 dBm/MHz
5725-5850	30 dBm/500kHz

The e.i.r.p. spectral density should not exceed:

Frequency Band (MHz)	Limit
5150-5250	10 dBm/MHz
5250-5350	N/A
5470-5725	N/A
5725-5850	N/A

5.3.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth.

1. Set RBW = 510 kHz/1 MHz, VBW ≥ 3*RBW, Sweep time = Auto, Detector = RMS.
2. Allow the sweeps to continue until the trace stabilizes.
3. Use the peak marker function to determine the maximum amplitude level.
4. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.

5.3.4 Test Result

Please refer to ANNEX A.4.

5.4 Conducted Emission

5.4.1 Limit

FCC §15.207, RSS-GEN, 8.8

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 within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.4.2 Test Setup

The section 4.4.2 (Diagram 2) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

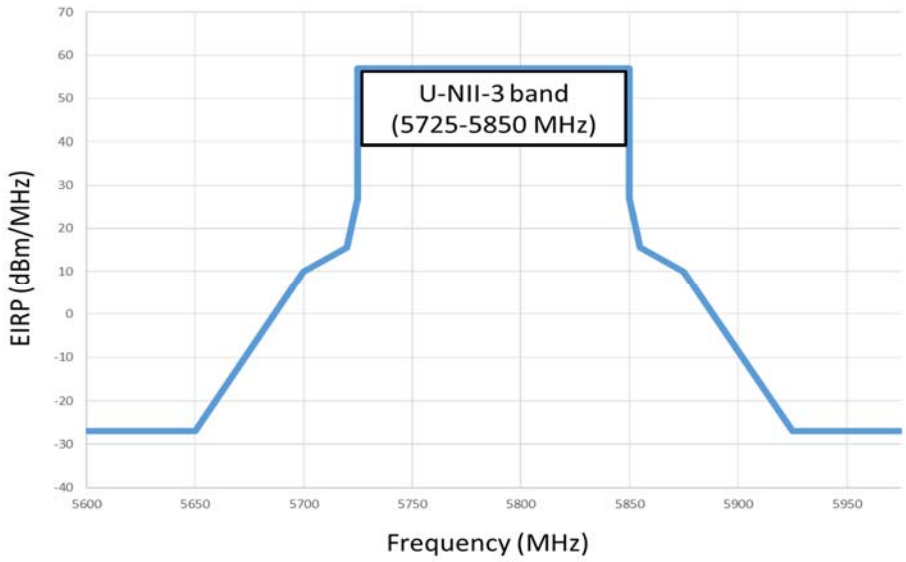
5.4.4 Test Result

Please refer to ANNEX A.5.

5.5 Conducted Spurious Emission and Band Edge (Authorized-band)

5.5.1 Limit

FCC §15.407(b)

Un-restricted band emissions	
Frequency Band (MHz)	Limit
5150 - 5250	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5250 - 5350	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5470 - 5725	Outside of the 5.47-5.725 GHz band: e.i.r.p. -27 dBm
5725 - 5850	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. 

RSS-247, 6.2

Un-restricted band emissions	
Frequency Band (MHz)	Limit
5150 - 5250	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm, However, any unwanted emissions that fall into the band 5250-5350 MHz must be 26 dBc, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth, above 5.25 GHz.
5250 - 5350	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm. And any emissions within the band 5150-5250 MHz shall meet the power spectral density limits of 10 dBm/MHz, The device shall be labelled “for indoor use only.”
5470 - 5725	Outside of the 5.47-5.725 GHz band: e.i.r.p. -27 dBm
5725 - 5850	5715 -5725 MHz: e.i.r.p. -17 dBm 5850 -5860 MHz: e.i.r.p. -17 dBm Other un-restricted band: e.i.r.p .-27 dBm

5.5.2 Test Setup

See section 4.4.2 (Diagram 2) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize

5.5.4 Test Result

Please refer to ANNEX A.6.

5.6 Radiated Spurious Emissions and Band Edge (Restricted-band)

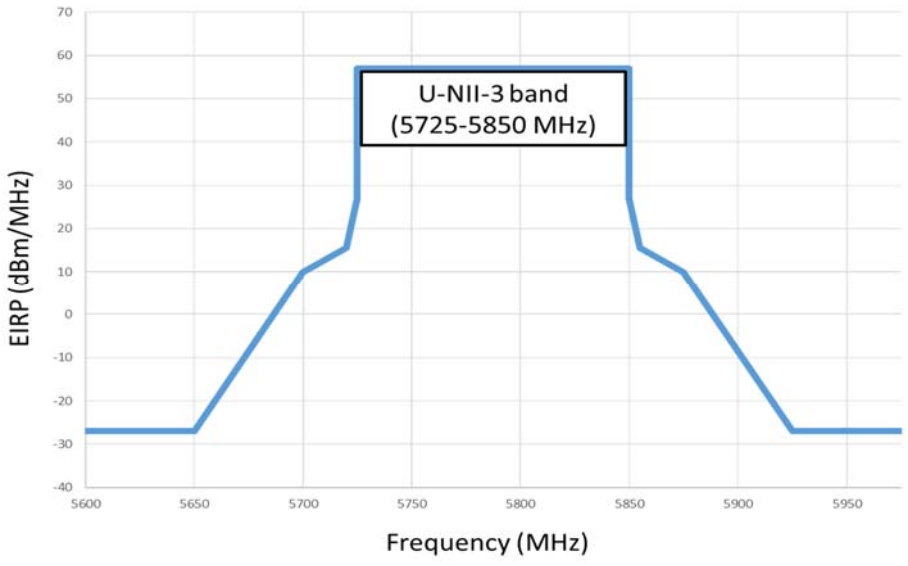
5.6.1 Limit

FCC §15.209 & 15.407(b), RSS-247, 6.2

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note [1]: The Limit for radiated test was performed according to FCC Part 15C

Note [2]: The tighter limit applies at the band edge.

Un-restricted band emissions	
Out Operating Band (MHz）	Limit
5150 - 5250	e.i.r.p. -27 dBm (68.2 dBuV/m@3m)
5250 - 5350	e.i.r.p. -27 dBm (68.2 dBuV/m@3m)
5470 - 5725	e.i.r.p. -27 dBm (68.2 dBuV/m@3m)
5725 - 5850	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: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength.

5.6.2 Test Setup

The section 4.4.3-4.4.5 (Diagram 3 - Diagram 5) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

Since the emission limits are specified in terms of radiated field strength levels, measurements performed to demonstrate compliance have traditionally relied on a radiated test configuration. Radiated measurements remain the principal method for demonstrating compliance to the specified limits; however antenna-port conducted measurements are also now acceptable to demonstrate compliance (see below for details). When radiated measurements are utilized, test site requirements and procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 shall be followed.

Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

General Procedure for conducted measurements in restricted bands

a) Measure the conducted output power (in dBm) using the detector specified (see guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).

b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see guidance on determining the applicable antenna gain)

c) Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).

d) For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).

e) Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

E = EIRP – 20log D + 104.8

where:

E = electric field strength in dBμV/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

f) Compare the resultant electric field strength level to the applicable limit.

g) Perform radiated spurious emission test.

Quasi-Peak measurement procedure

The specifications for measurements using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Frequency Interference (CISPR) of the International Electrotechnical Commission.

As an alternative to CISPR quasi-peak measurement, compliance can be demonstrated to the applicable emission limits using a peak detector.

Peak power measurement procedure

Peak emission levels are measured by setting the instrument as follows:

a) RBW = as specified in Table 1.

b) VBW ≥ 3 x RBW.

c) Detector = Peak.

d) Sweep time = auto.

e) Trace mode = max hold.

f) Allow sweeps to continue until the trace stabilizes. (Note that the required measurement time may be longer for low duty cycle applications).

Table 1—RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

Trace averaging across on and off times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT (i.e., duty cycle ≥ 98 percent) cannot be achieved and the duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent), then the following procedure shall be used:

a) The EUT shall be configured to operate at the maximum achievable duty cycle.

b) Measure the duty cycle, x, of the transmitter output signal as described in section 6.0.

c) RBW = 1 MHz (unless otherwise specified).

d) VBW ≥ 3 x RBW.

e) Detector = RMS, if span/(# of points in sweep) ≤ (RBW/2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.

f) Averaging type = power (i.e., RMS).

1) As an alternative, the detector and averaging type may be set for linear voltage averaging.

2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

g) Sweep time = auto.

h) Perform a trace average of at least 100 traces.

i) A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

1) If power averaging (RMS) mode was used in step f), then the applicable correction factor is 10 log(1/x), where x is the duty cycle.

2) If linear voltage averaging mode was used in step f), then the applicable correction factor is 20 log(1/x), where x is the duty cycle.

3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

NOTE: Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.

Determining the applicable transmit antenna gain

A conducted power measurement will determine the maximum output power associated with a restricted band emission; however, in order to determine the associated EIRP level, the gain of the transmitting antenna (in dBi) must be added to the measured output power (in dBm).

Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.

See KDB 662911 for guidance on calculating the additional array gain term when determining the effective antenna gain for a EUT with multiple outputs occupying the same or overlapping frequency ranges in the same band.

Radiated spurious emission test

An additional consideration when performing conducted measurements of restricted band emissions is that unwanted emissions radiating from the EUT cabinet, control circuits, power leads, or intermediate circuit elements will likely go undetected in a conducted measurement configuration. To address this concern, a radiated test shall be performed to ensure that emissions emanating from the EUT cabinet (rather than the antenna port) also comply with the applicable limits.

For these cabinet radiated spurious emission measurements the EUT transmit antenna may be replaced with a termination matching the nominal impedance of the antenna. Procedures for performing radiated measurements are specified in ANSI C63.10. All detected emissions shall comply with the applicable limits.

The measurement frequency range is from 30 MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

5.6.4 Test Result

Please refer to ANNEX A.7 and Please refer to ANNEX A.9

5.7 Frequency Stability

5.7.1 Limit

FCC §15.407(g)

Manufacturers 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.

5.7.2 Test Setup

The section 4.4.6 (Diagram 6) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.7.3 Test Procedure

The EUT is installed in an environment test chamber with external power source.
Set the chamber to operate at 50 centigrade and external power source to output at nominal voltage of EUT.
A sufficient stabilization period at each temperatures is used prior to each frequency measurement.
When temperature is stabled, measure the frequency stability.
The test shall be performed under -30 to 50 centigrade and 85 to 115 percent of the nominal voltage.
Change setting of chamber and external power source to complete all conditions.

5.7.4 Test Result

Please refer to ANNEX A.8.

ANNEX A TEST RESULT

A.1 RF Output Power

Note [1]: For FCC standard, if transmitting antennas of directional gain greater than 6 dBi are used, all band maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Data

Conducted Power

Band I (5150 - 5250 MHz)						
Note [3]: Transmitting antennas of directional gain in Band I(5150 MHz to 5250 MHz) is 0 dBi						
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	FCC Limit (mW)	Verdict
11a	CH36	5180	19.05	80.35	250	Pass
11a	CH44	5220	19.12	81.66	250	Pass
11a	CH48	5240	19.21	83.37	250	Pass

Band IV (5725 - 5850 MHz)						
Note [10]: Transmitting antennas of directional gain in Band IV (5725 MHz to 5850 MHz) is 0 dBi Formulas: Directional gain = GANT + Array Gain, *Array Gain* = 0.						
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	FCC/IC Limit (W)	Verdict
11a	CH149	5745	17.98	62.81	1.00	Pass
11a	CH157	5785	17.97	62.66	1.00	Pass
11a	CH165	5825	17.04	50.58	1.00	Pass

A.2 Emission Bandwidth & 99% Bandwidth

Test Data

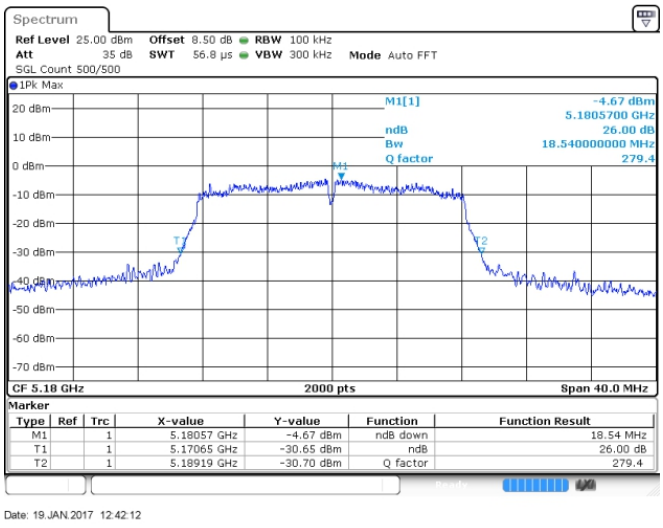
Band I (5150 - 5250 MHz)				
Mode	Channel	Frequency	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
11a	CH36	5180	18.54	16.34
11a	CH44	5220	18.20	16.32
11a	CH48	5240	18.26	16.36

Band IV (5725 - 5850 MHz)				
Mode	Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
11a	CH149	5745	18.24	16.40
11a	CH157	5785	18.46	16.38
11a	CH165	5825	18.24	16.38

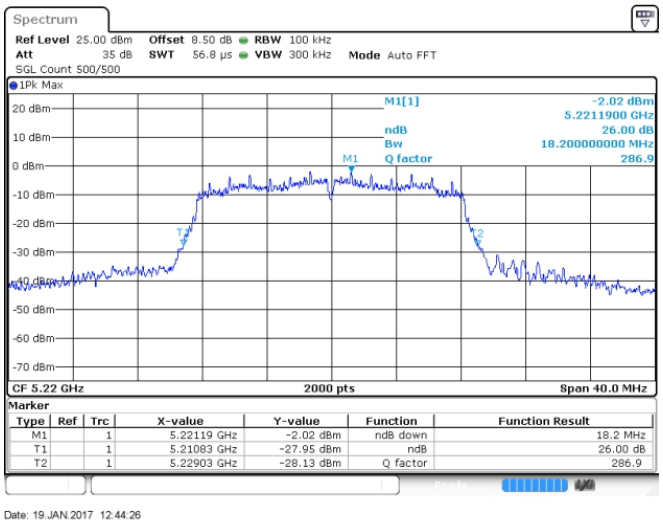
Test Plots

26 dB Bandwidth

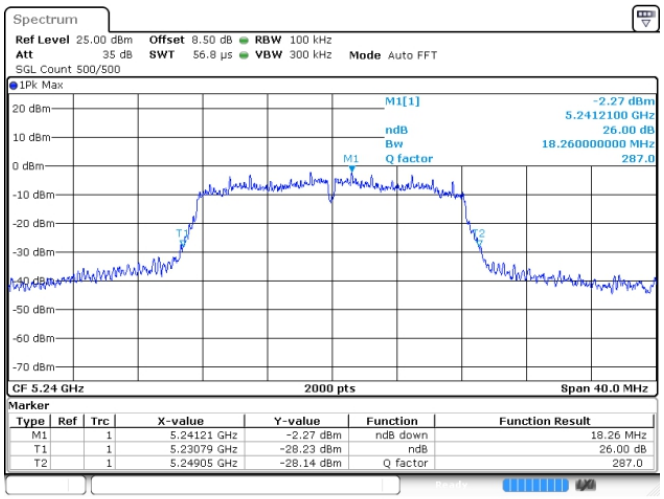
802.11a Band I LOW CHANNEL



802.11a Band I MIDDLE CHANNEL



802.11a Band I HIGH CHANNEL



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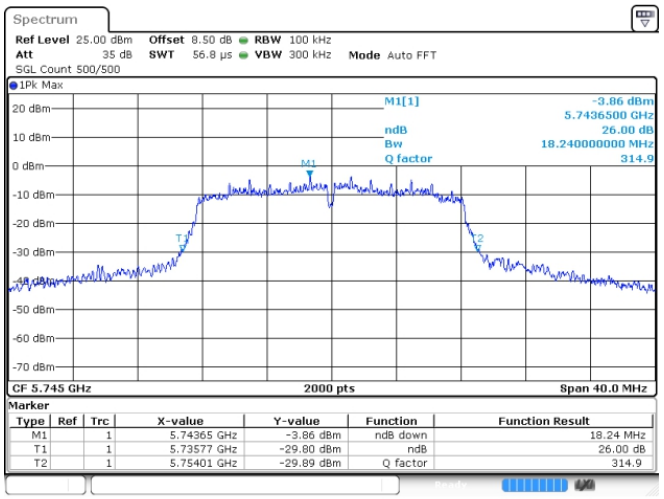
802.11a Band IV LOW CHANNEL



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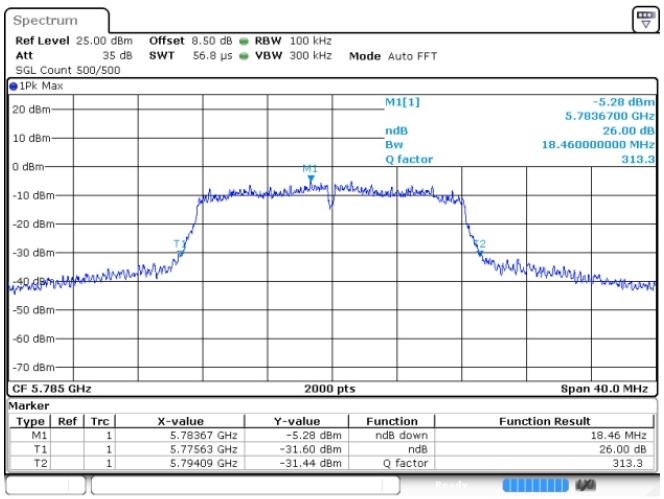

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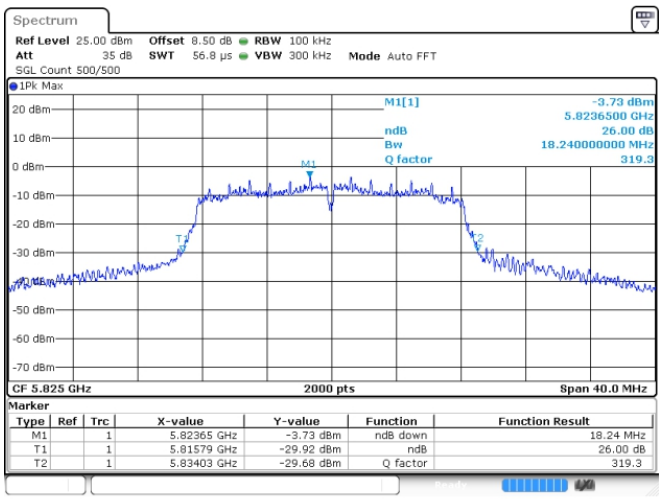
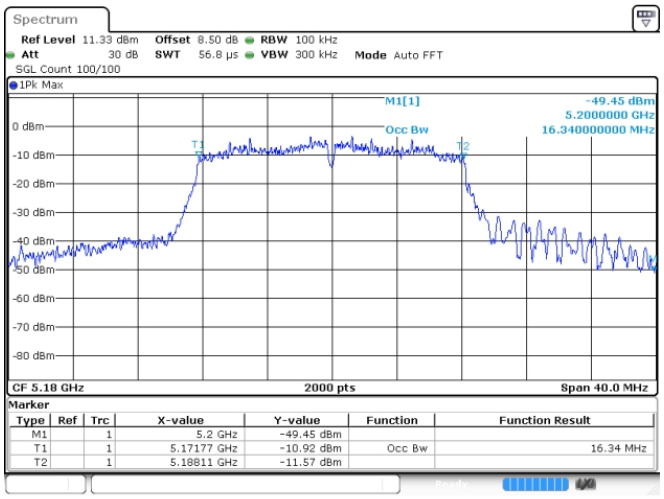
802.11a Band IV HIGH CHANNEL



Date: 19.JAN.2017 12:53:46

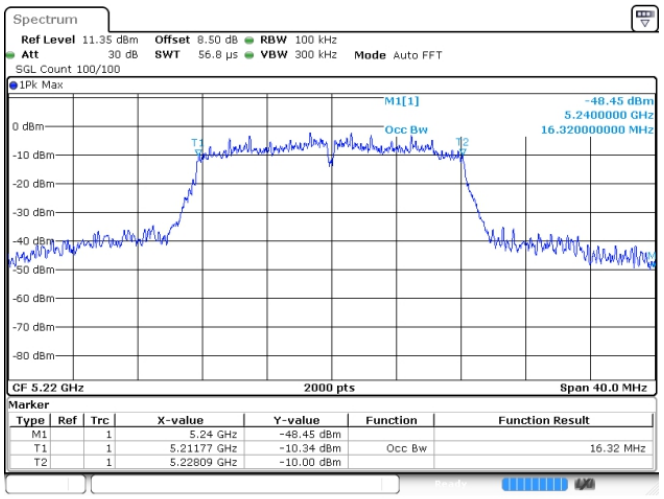
99% Bandwidth

802.11a Band I LOW CHANNEL



Date: 19.JAN.2017 12:42:21

802.11a Band I MIDDLE CHANNEL



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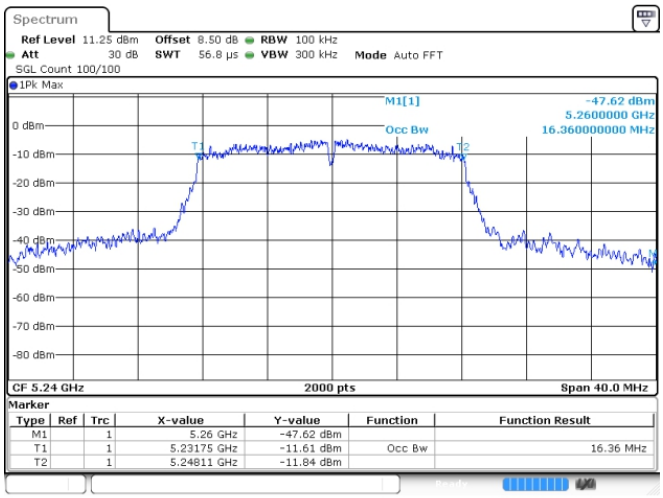
802.11a Band I HIGH CHANNEL



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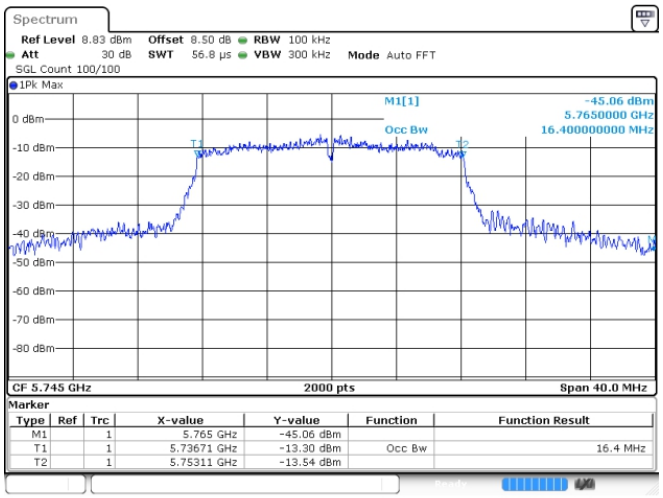
802.11a Band IV LOW CHANNEL



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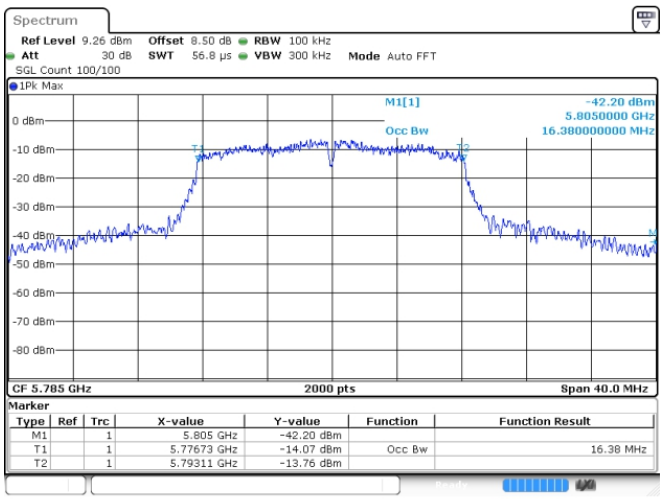
802.11a Band IV MIDDLE CHANNEL



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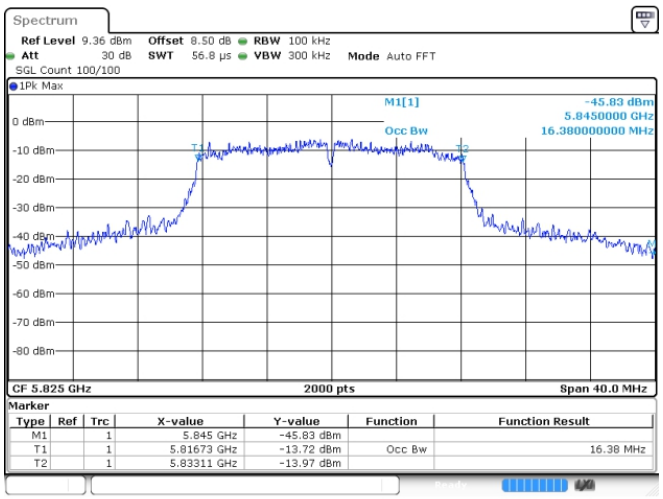
802.11a Band IV HIGH CHANNEL



Date: 19.JAN.2017 12:53:56

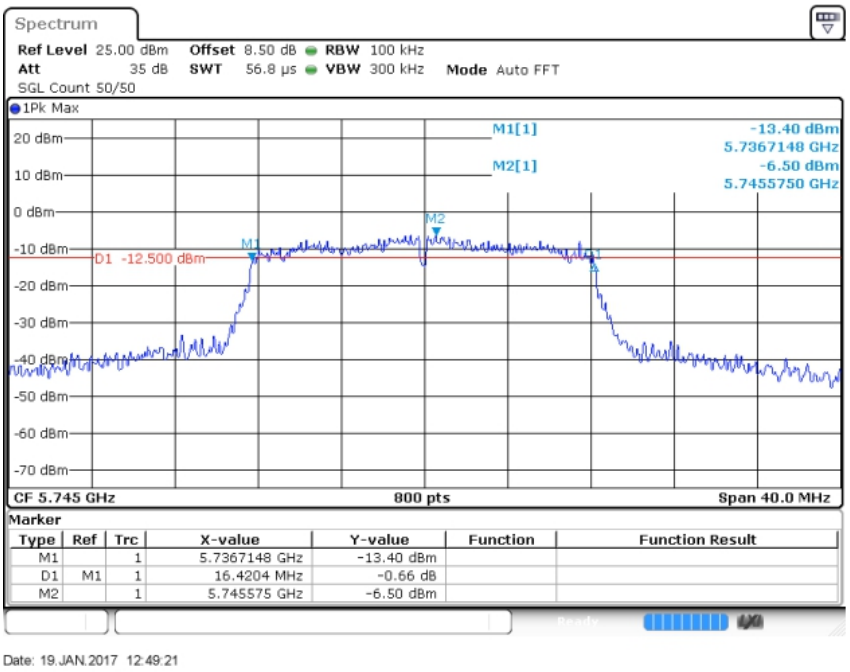
A.3 6 dB Bandwidth

Test Data

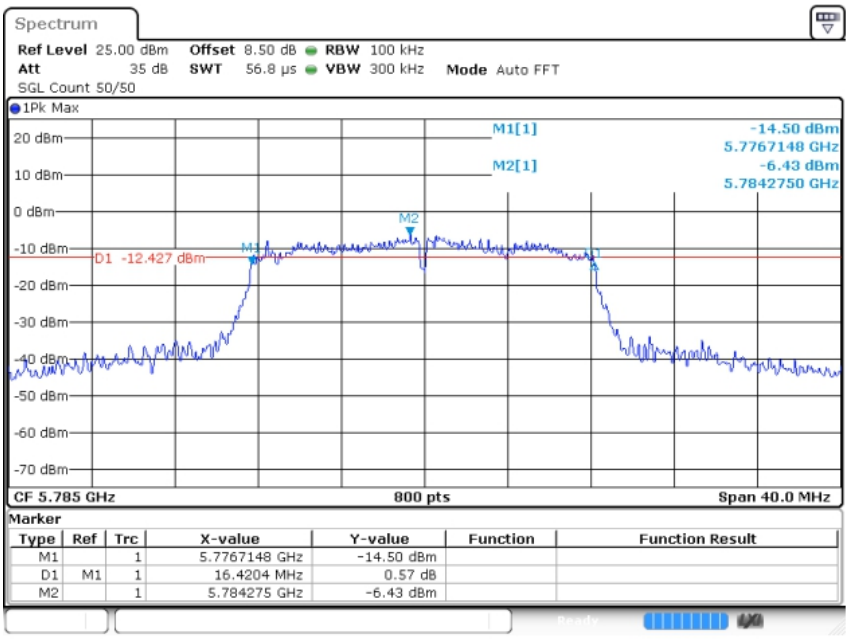
Band IV (5725 - 5850 MHz)					
Mode	Channel	Frequency(MHz)	6 dB Bandwidth (MHz)	Limit (kHz)	Verdict
11a	CH149	5745	16.42	500	Pass
11a	CH157	5785	16.42	500	Pass
11a	CH165	5825	16.42	500	Pass

Test Plots

802.11a LOW CHANNEL

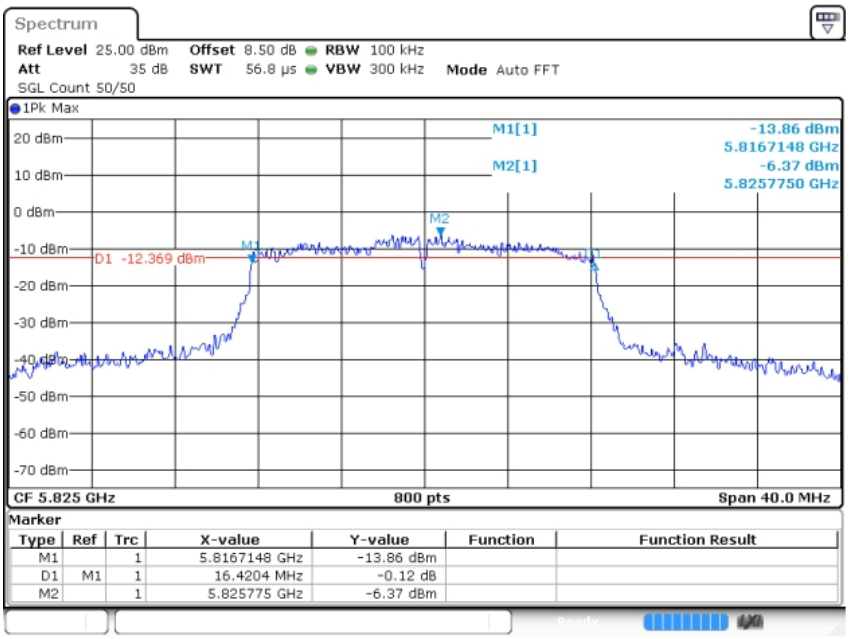


802.11a MIDDLE CHANNEL



Date: 19.JAN.2017 12:51:48

802.11a HIGH CHANNEL



Date: 19.JAN.2017 12:53:51

A.4 Power Spectral Density

Test Data

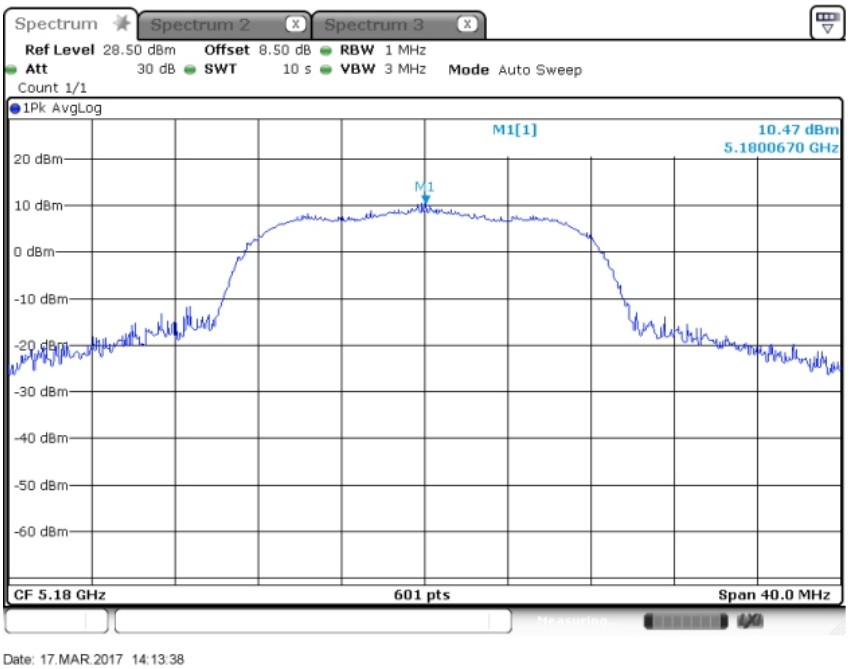
Note [1]: The RBW used in Band IV is 1 MHz, and the PSD factor is: 10*log (500 kHz/RBW) =-3 dBm.

Band I (5150 - 5250 MHz)					
Mode	Channel	Frequency (MHz)	PSD (dBm/MHz)	FCC Limit(dBm/MHz)	Verdict
11a	CH36	5180	10.47	11	Pass
11a	CH44	5220	9.65	11	Pass
11a	CH48	5240	10.40	11	Pass

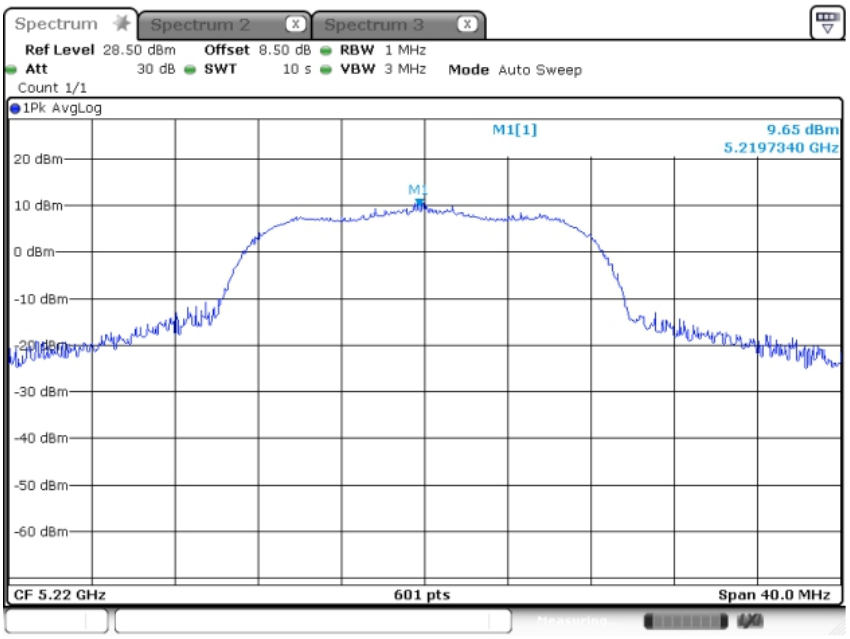
Band IV (5725 - 5850 MHz)					
Mode	Channel	Frequency (MHz)	PSD (dBm/MHz)	FCC Limit(dBm/ 500 kHz)	Verdict
11a	CH149	5745	5.88	30	Pass
11a	CH157	5785	5.62	30	Pass
11a	CH165	5825	4.52	30	Pass

Test Plots

802.11a BAND I LOW CHANNEL



802.11a BAND I MIDDLE CHANNEL



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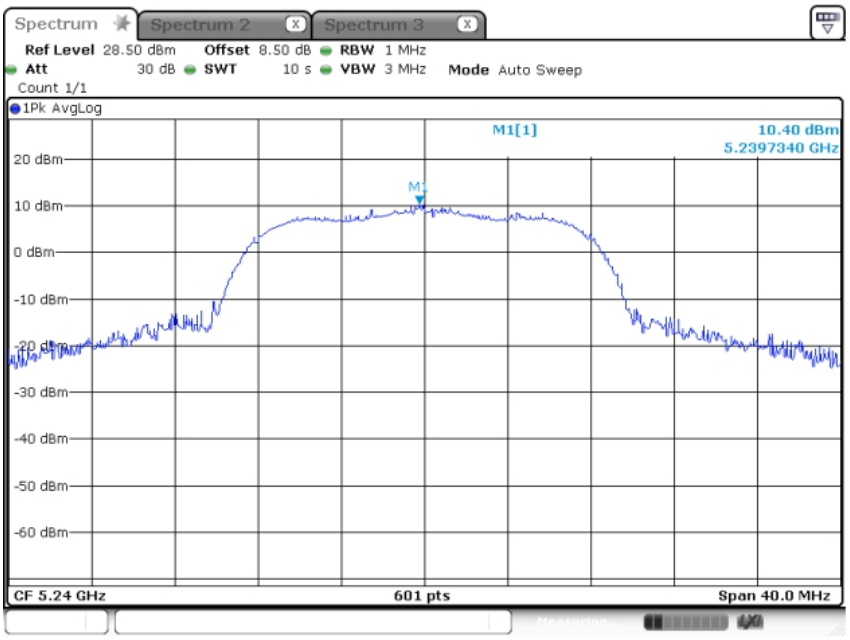
802.11a BAND I HIGH CHANNEL



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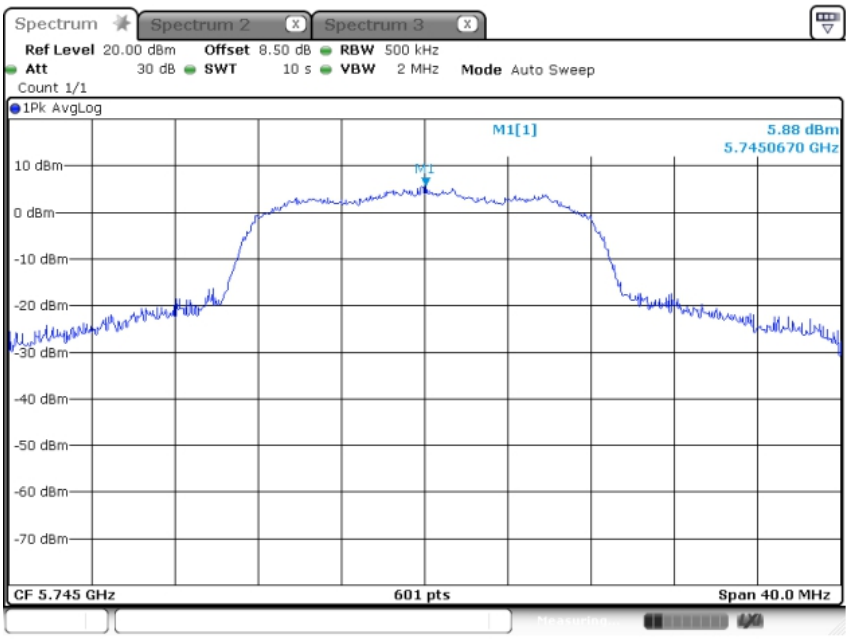
802.11a BAND IV LOW CHANNEL



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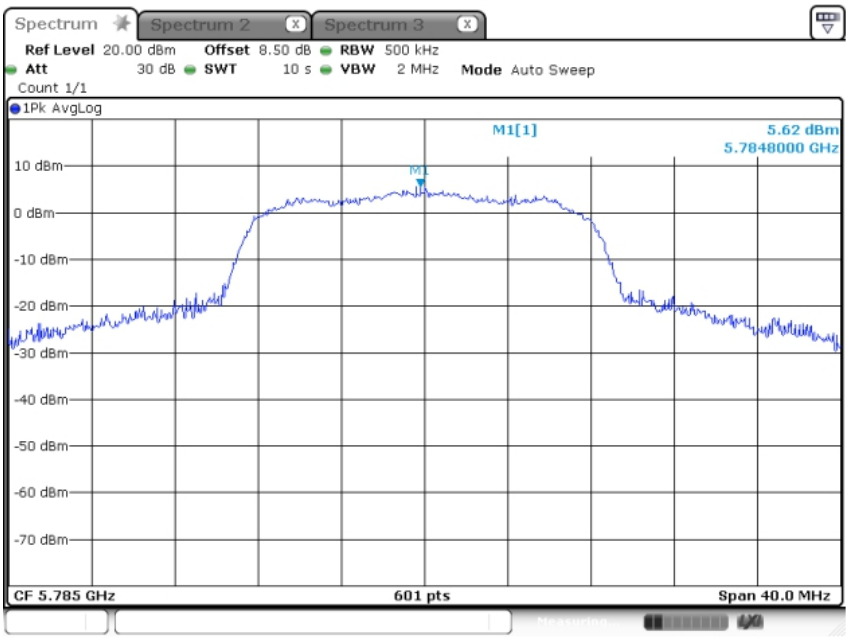
802.11a BAND IV MIDDLE CHANNEL



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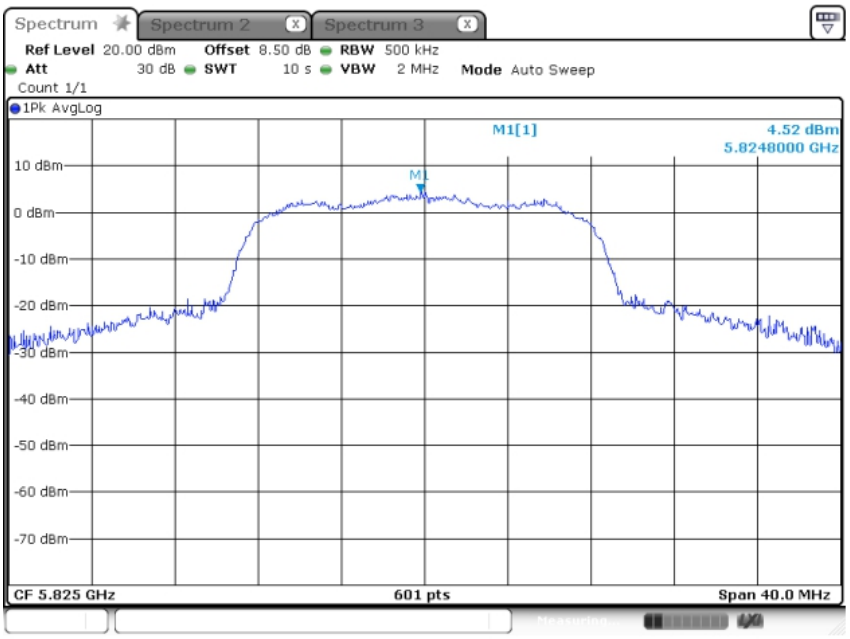
802.11a BAND IV HIGH CHANNEL



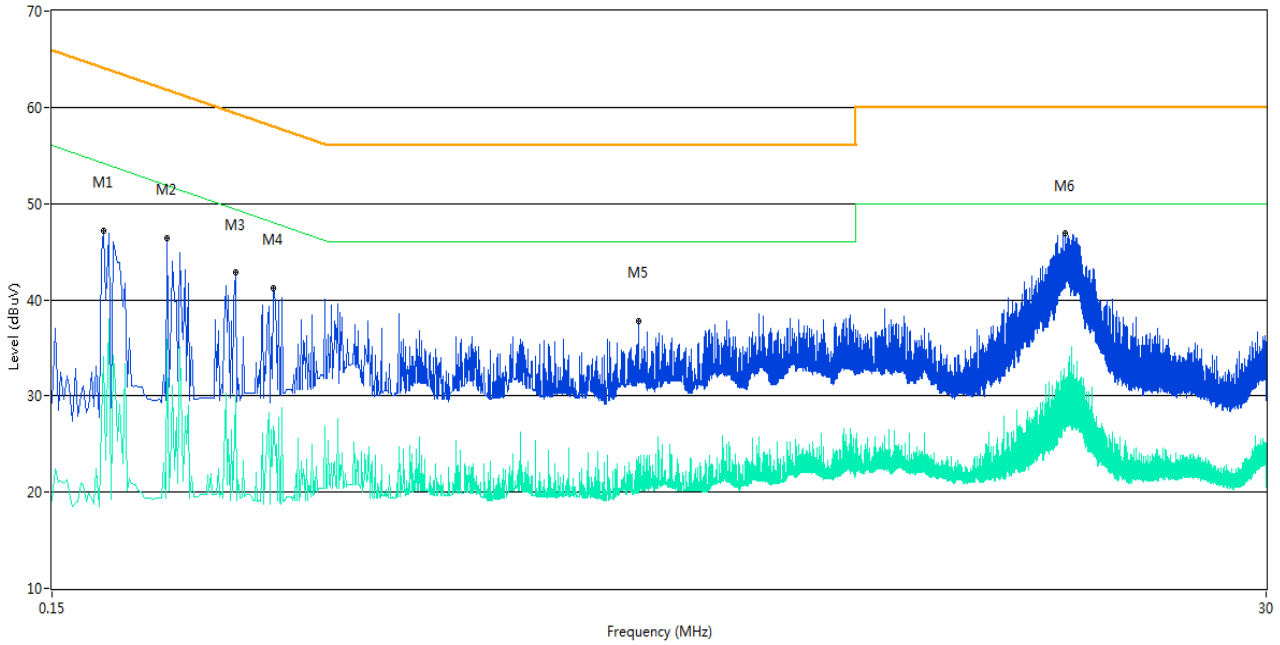
A.5 Conducted Emissions

Note [1]: The EUT is working in the Normal link mode.

Note [2]: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

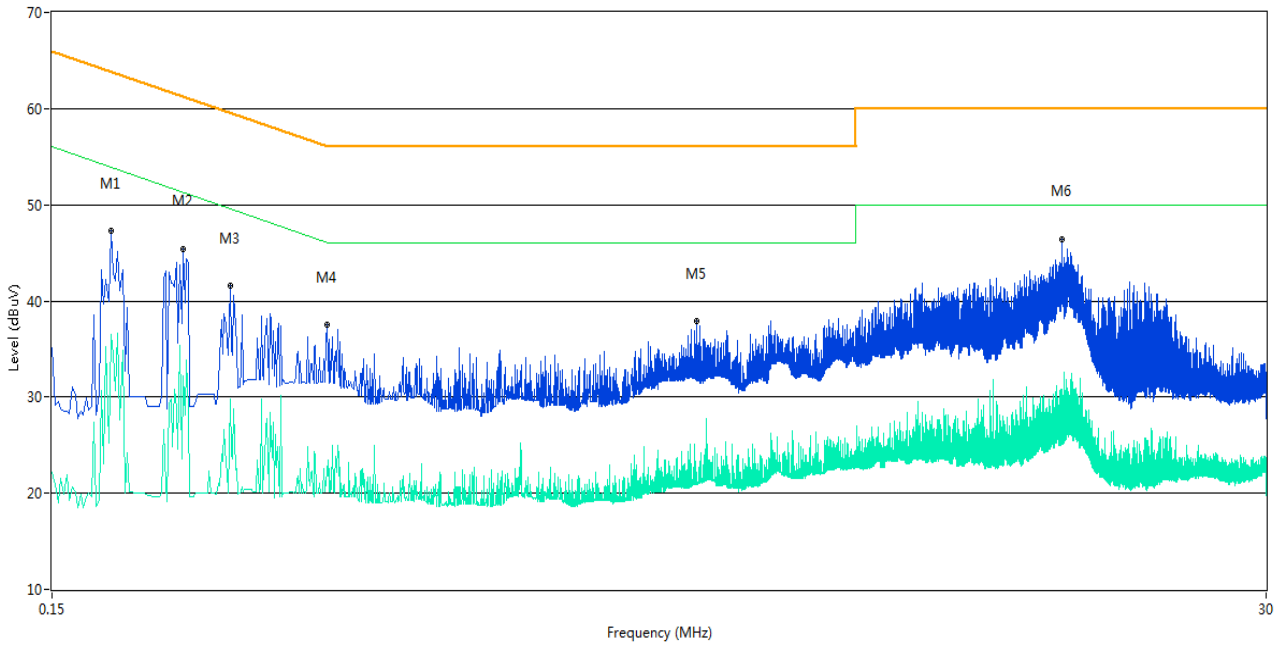
Test Data and Plots

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.188	47.2	11.00	64.1	16.90	Peak	L Line	Pass
1**	0.188	34.1	11.00	54.1	20.00	AV	L Line	Pass
2	0.248	46.5	11.00	61.8	15.30	Peak	L Line	Pass
2**	0.248	35.9	11.00	51.8	15.90	AV	L Line	Pass
3	0.334	42.8	11.00	59.4	16.60	Peak	L Line	Pass
3**	0.334	30.1	11.00	49.4	19.30	AV	L Line	Pass
4	0.394	41.2	11.00	58.0	16.80	Peak	L Line	Pass
4**	0.394	26.9	11.00	48.0	21.10	AV	L Line	Pass
5	1.942	37.8	11.00	56.0	18.20	Peak	L Line	Pass
5**	1.942	23.6	11.00	46.0	22.40	AV	L Line	Pass
6	12.498	46.9	11.00	60.0	13.10	Peak	L Line	Pass
6**	12.498	27.3	11.00	50.0	22.70	AV	L Line	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.194	47.3	11.00	63.9	16.60	Peak	N Line	Pass
1**	0.194	36.6	11.00	53.9	17.30	AV	N Line	Pass
2	0.266	45.4	11.00	61.2	15.80	Peak	N Line	Pass
2**	0.266	32.3	11.00	51.2	18.90	AV	N Line	Pass
3	0.326	41.5	11.00	59.6	18.10	Peak	N Line	Pass
3**	0.326	29.8	11.00	49.6	19.80	AV	N Line	Pass
4	0.498	37.5	11.00	56.0	18.50	Peak	N Line	Pass
4**	0.498	22.3	11.00	46.0	23.70	AV	N Line	Pass
5	2.496	37.9	11.00	56.0	18.10	Peak	N Line	Pass
5**	2.496	22.2	11.00	46.0	23.80	AV	N Line	Pass
6	12.304	46.5	11.00	60.0	13.50	Peak	N Line	Pass
6**	12.304	30.9	11.00	50.0	19.10	AV	N Line	Pass

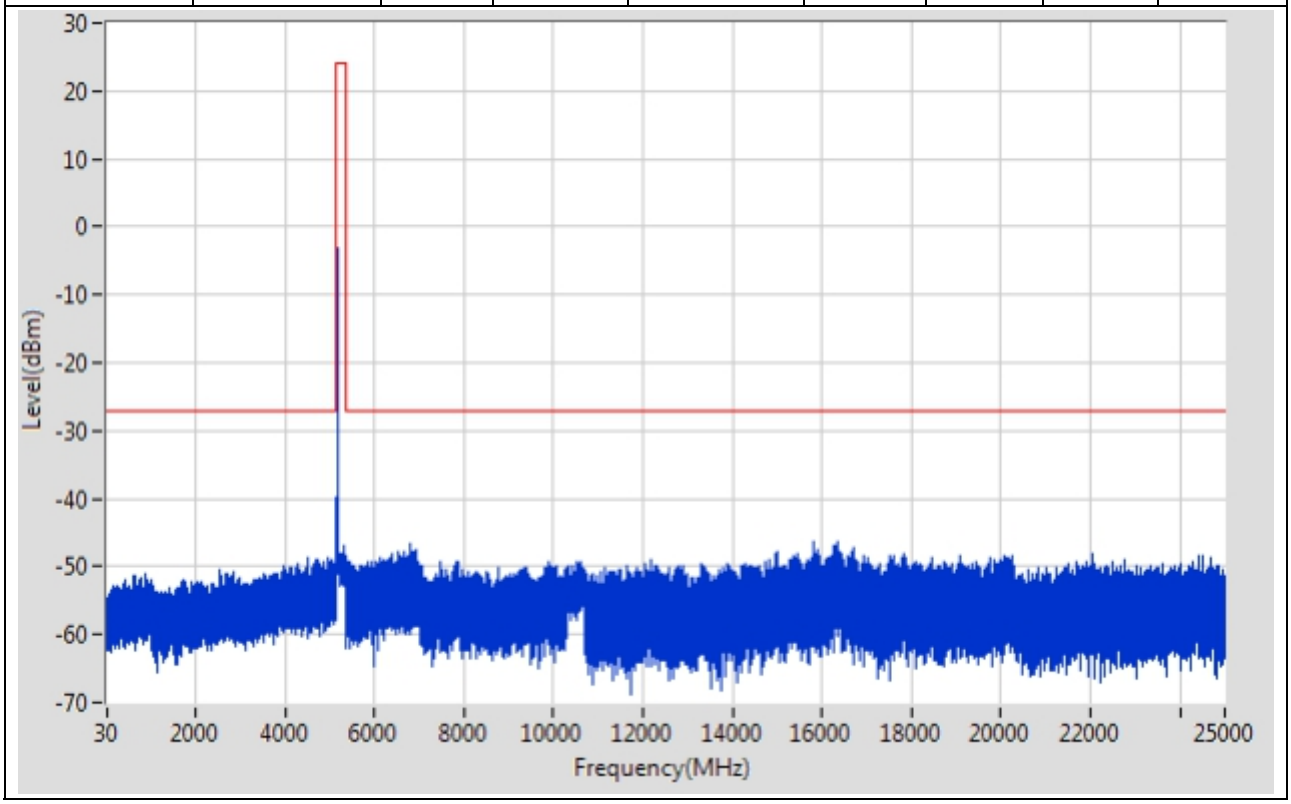
A.6 Conducted Spurious Emission and Band Edge (Authorized-band)

Test Band	Mode	Channel	Verdict
Band I	802.11a	Low	Pass
		Middle	Pass
		High	Pass
Band IV	802.11a	Low	Pass
		Middle	Pass
		High	Pass

Test Plots

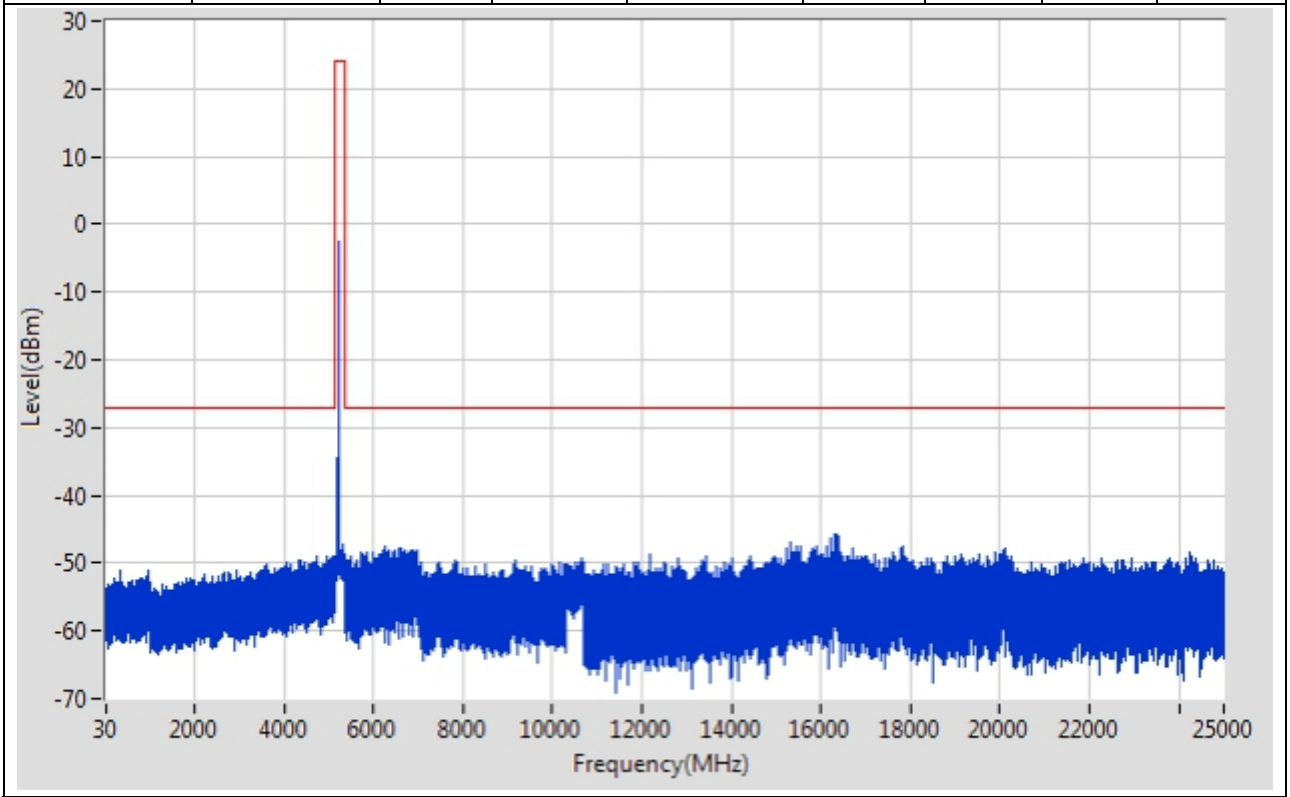
802.11a Band I LOW CHANNEL

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	888.789	-51.01	-27	Pass	9700
1000	5150	0.1	Peak	4530.87	-48.55	-27	Pass	41499
5150	5350	0.1	Peak	5181.116	-3.04	24	Pass	2000
5350	10300	0.1	Peak	6792.545	-46.49	-27	Pass	49499
10300	10700	0.1	Peak	10614.879	-49.31	-27	Pass	4000
10700	25000	0.1	Peak	16351.977	-46.37	-27	Pass	142999



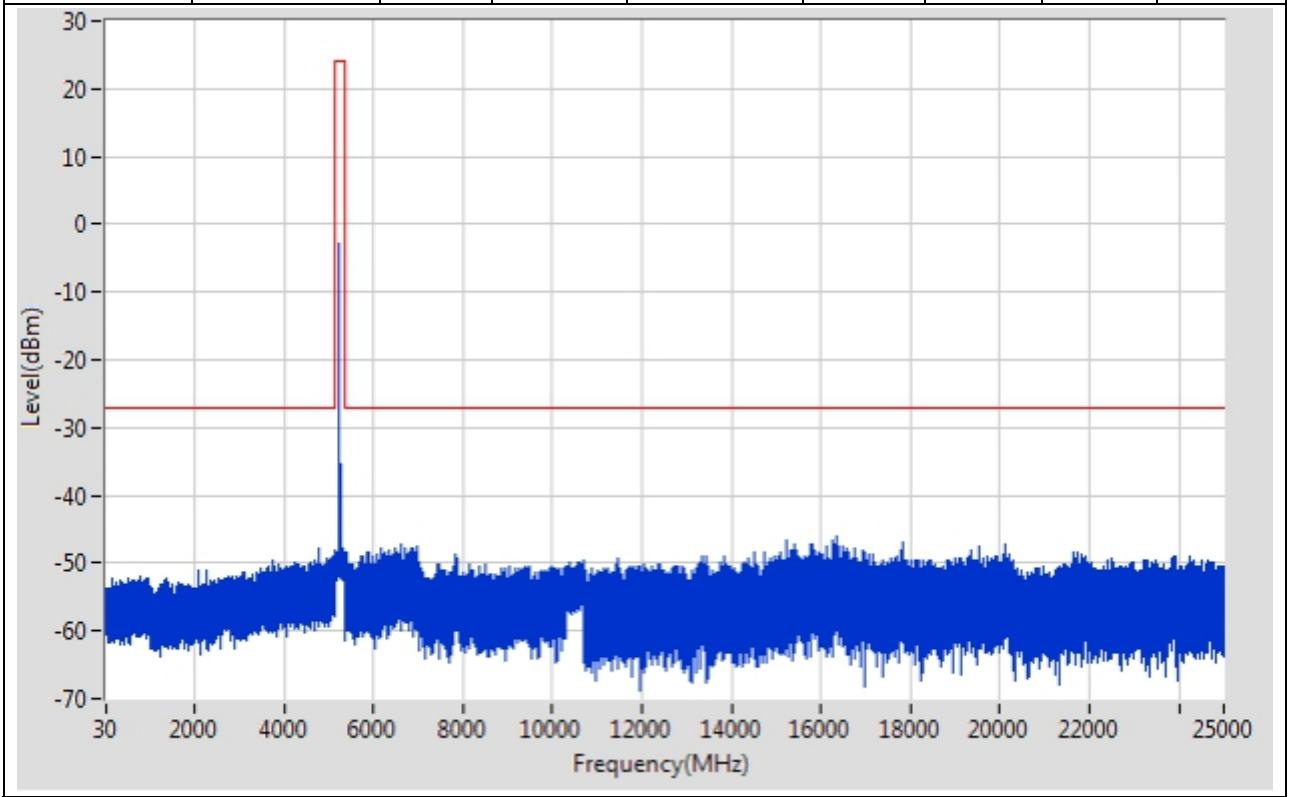
802.11a Band I MIDDLE CHANNEL

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	973.097	-51.16	-27	Pass	9700
1000	5150	0.1	Peak	5103.59	-48.92	-27	Pass	41499
5150	5350	0.1	Peak	5221.136	-2.55	24	Pass	2000
5350	10300	0.1	Peak	6240.628	-47.44	-27	Pass	49499
10300	10700	0.1	Peak	10644.886	-49.34	-27	Pass	4000
10700	25000	0.1	Peak	16359.577	-45.83	-27	Pass	142999



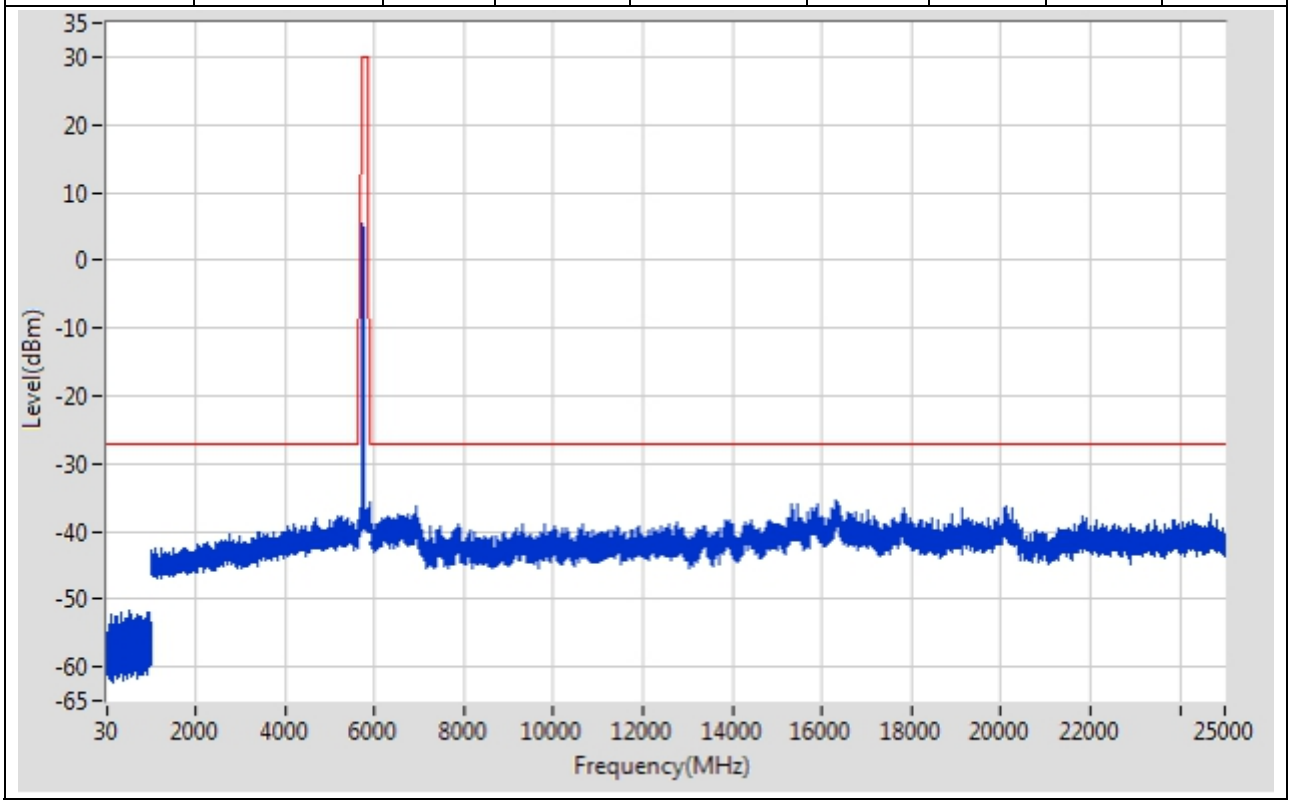
802.11a Band I HIGH CHANNEL

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	799.379	-51.88	-27	Pass	9700
1000	5150	0.1	Peak	4764.719	-47.74	-27	Pass	41499
5150	5350	0.1	Peak	5241.246	-2.75	24	Pass	2000
5350	10300	0.1	Peak	6599.739	-47.35	-27	Pass	49499
10300	10700	0.1	Peak	10695.599	-49.7	-27	Pass	4000
10700	25000	0.1	Peak	16362.177	-46.17	-27	Pass	142999



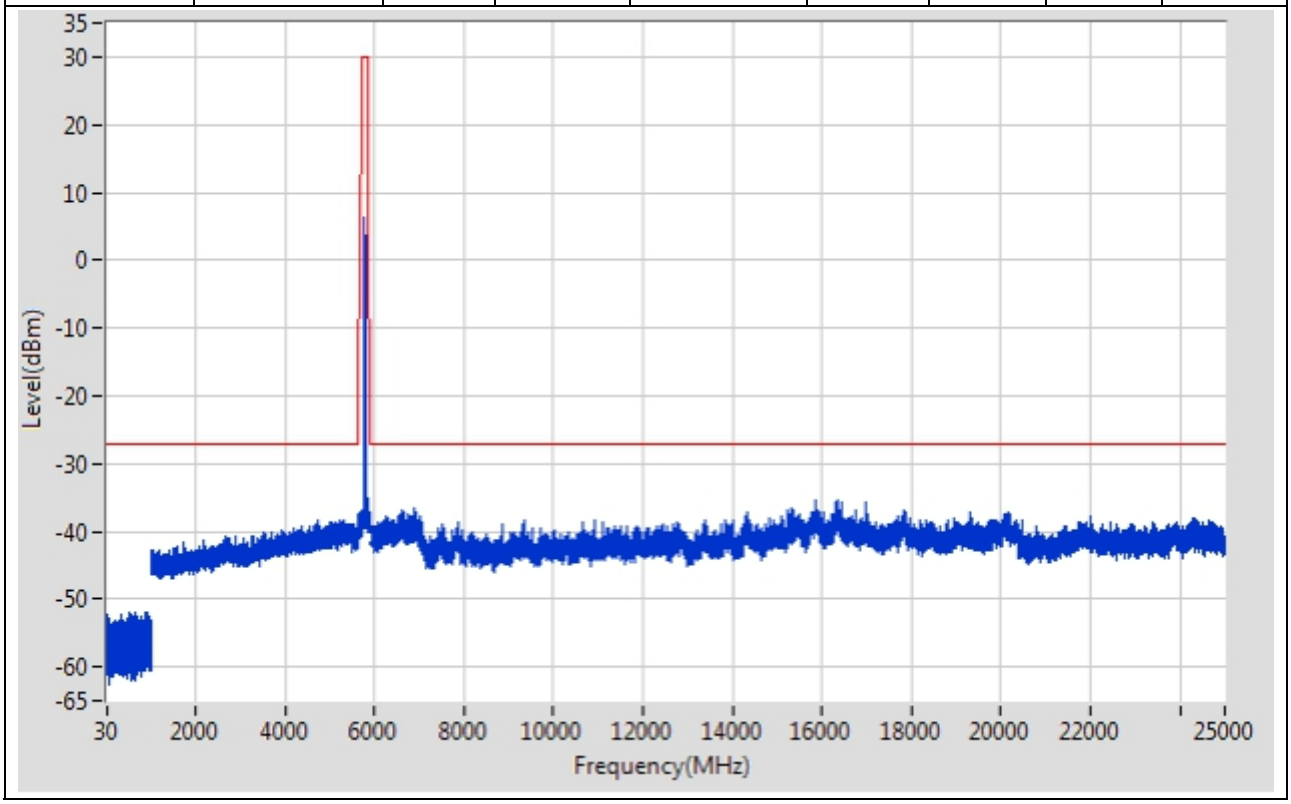
802.11a Band IV LOW CHANNEL

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	542.653	-51.56	-27	Pass	9700
1000	5650	1	Peak	5188.901	-37.8	-27	Pass	4650
5650	5700	1	Peak	5650.145	-39.34	-26.89	Pass	691
5700	5720	1	Peak	5701.188	-37.35	10.33	Pass	691
5720	5725	1	Peak	5720.232	-32.07	16.13	Pass	691
5725	5850	1	Peak	5745.471	5.4	30	Pass	691
5850	5855	1	Peak	5854.696	-37.18	16.29	Pass	691
5855	5875	1	Peak	5874.826	-37.5	10.05	Pass	691
5875	5925	1	Peak	5924.928	-38.22	-26.95	Pass	691
5925	25000	1	Peak	16324.545	-35.5	-27	Pass	19075



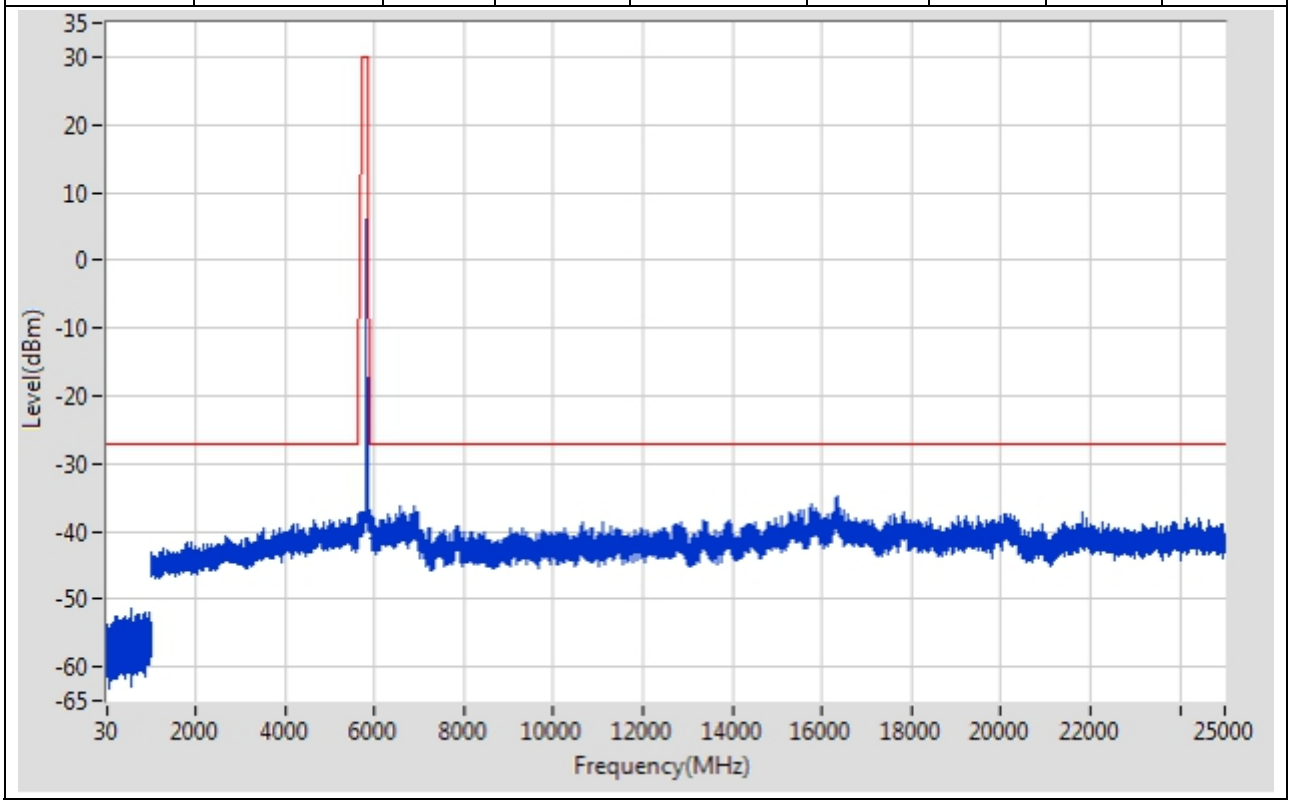
802.11a Band IV MIDDLE CHANNEL

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	942.394	-51.92	-27	Pass	9700
1000	5650	1	Peak	5216.907	-38.29	-27	Pass	4650
5650	5700	1	Peak	5650.145	-38.75	-26.89	Pass	691
5700	5720	1	Peak	5700.174	-37.95	10.05	Pass	691
5720	5725	1	Peak	5720.007	-37.91	15.62	Pass	691
5725	5850	1	Peak	5784.964	6.39	30	Pass	691
5850	5855	1	Peak	5854.928	-37.49	15.77	Pass	691
5855	5875	1	Peak	5871.29	-35.09	11.04	Pass	691
5875	5925	1	Peak	5924.855	-37.57	-26.89	Pass	691
5925	25000	1	Peak	16340.546	-35.34	-27	Pass	19075



802.11a Band IV HIGH CHANNEL

Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	586.457	-51.32	-27	Pass	9700
1000	5650	1	Peak	5436.954	-38	-27	Pass	4650
5650	5700	1	Peak	5650	-38.32	-27	Pass	691
5700	5720	1	Peak	5700.493	-38	10.14	Pass	691
5720	5725	1	Peak	5720.058	-37.9	15.73	Pass	691
5725	5850	1	Peak	5825.181	5.96	30	Pass	691
5850	5855	1	Peak	5854.906	-36.46	15.81	Pass	691
5855	5875	1	Peak	5874.681	-37.53	10.09	Pass	691
5875	5925	1	Peak	5924.783	-37.61	-26.84	Pass	691
5925	25000	1	Peak	16345.546	-34.7	-27	Pass	19075



A.7 Radiated Spurious Emissions and Band Edge (Restricted-band)

A.7.1 Radiated Spurious Emissions

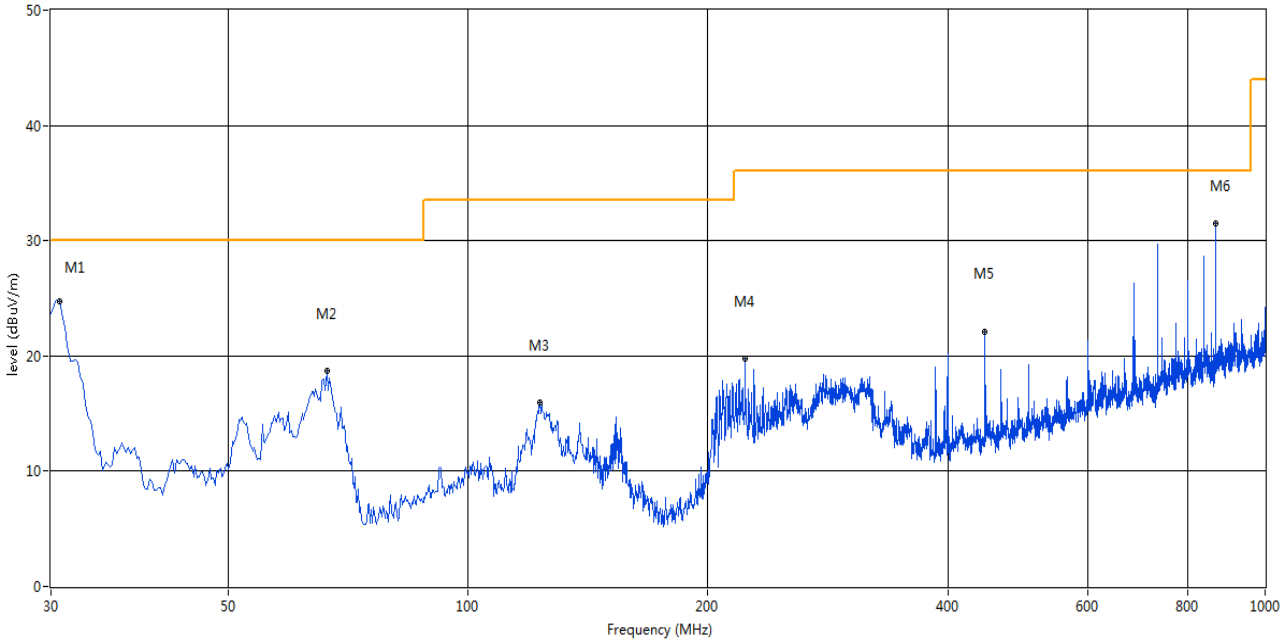
Note [1]: The symbol of "--" in the table which means not application.

Note [2]: For the test data above 1 GHz，According the ANSI C63.4, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note [3]: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

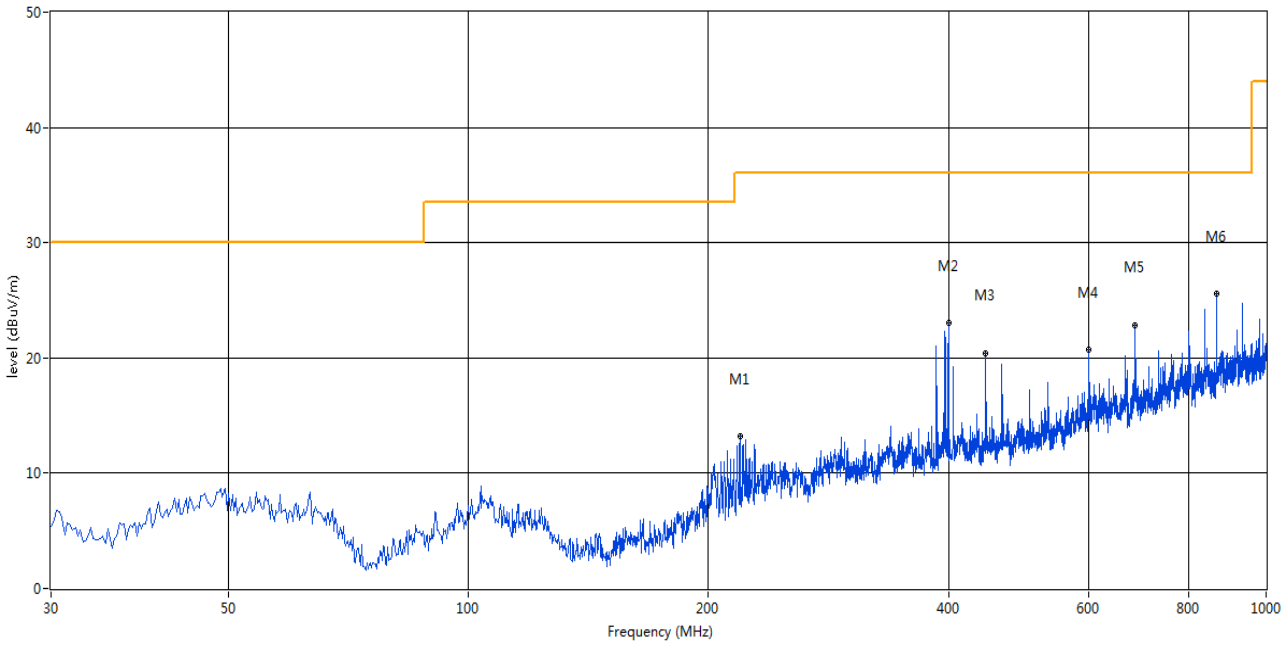
Note [4]: The EUT is working in the Normal link mode below 1 GHz.

30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	30.727	24.71	-16.90	30.0	5.29	Peak	13.00	100	Vertical	Pass
2	66.608	18.71	-16.83	30.0	11.29	Peak	314.00	100	Vertical	Pass
3	123.097	15.91	-18.62	33.5	17.59	Peak	143.00	100	Vertical	Pass
4	222.739	19.75	-15.64	36.0	16.25	Peak	0.00	200	Vertical	Pass
5	445.541	22.14	-10.25	36.0	13.86	Peak	171.00	100	Vertical	Pass
6	866.658	31.45	-2.99	36.0	4.55	Peak	0.00	300	Vertical	Pass

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	219.103	13.18	-15.79	36.0	22.82	Peak	141.00	100	Horizontal	Pass
2	399.963	23.09	-10.87	36.0	12.91	Peak	90.00	100	Horizontal	Pass
3	445.541	20.45	-10.25	36.0	15.55	Peak	131.00	100	Horizontal	Pass
4	599.975	20.69	-6.86	36.0	15.31	Peak	172.00	100	Horizontal	Pass
5	685.556	22.88	-6.01	36.0	13.12	Peak	141.00	100	Horizontal	Pass
6	866.658	25.58	-2.99	36.0	10.42	Peak	258.00	100	Horizontal	Pass

Note 1: Only noise floor was seen of the test frequency (25 GHz ~ 40 GHz).

1 GHz to 40 GHz, ANT V Band I 11a Low channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	47.94	-0.22	68.2	20.26	Peak	250.00	100	Vertical	Pass
2	3564.00	46.90	7.61	68.2	21.30	Peak	90.40	100	Vertical	Pass
3	5181.00	101.67	11.15	68.2	-33.47	Peak	75.60	100	Vertical	N/A
4	6923.00	47.03	13.44	68.2	21.17	Peak	206.00	100	Vertical	Pass
5	11023.25	48.84	18.41	68.2	19.36	Peak	203.50	100	Vertical	Pass
6	16504.00	56.03	23.30	68.2	12.17	Peak	272.50	100	Vertical	Pass

1 GHz to 40 GHz, ANT H Band I 11a Low channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	54.36	-0.22	68.2	13.84	Peak	261.80	100	Horizontal	Pass
2	3168.00	46.44	7.01	68.2	21.76	Peak	296.30	100	Horizontal	Pass
3	5179.00	93.58	11.38	68.2	-25.38	Peak	119.80	100	Horizontal	N/A
4	9092.75	47.87	17.84	68.2	20.33	Peak	0.00	100	Horizontal	Pass
5	11548.50	49.42	18.06	68.2	18.78	Peak	292.20	100	Horizontal	Pass
6	16784.50	56.35	23.06	68.2	11.85	Peak	142.30	100	Horizontal	Pass

1 GHz to 40 GHz, ANT V Band I 11a Middle channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	47.45	-0.22	68.2	20.75	Peak	292.10	100	Vertical	Pass
2	3564.00	47.39	7.61	68.2	20.81	Peak	135.00	100	Vertical	Pass
3	5219.00	104.28	11.11	68.2	-36.08	Peak	76.10	100	Vertical	N/A
4	6892.00	47.37	13.32	68.2	20.83	Peak	179.20	100	Vertical	Pass
5	10789.50	48.54	18.92	68.2	19.66	Peak	360.00	100	Vertical	Pass
6	16212.50	56.26	24.39	68.2	11.94	Peak	289.70	100	Vertical	Pass

1 GHz to 40 GHz, ANT H Band I 11a Middle channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	51.64	-0.22	68.2	16.56	Peak	292.00	100	Horizontal	Pass
2	3168.00	47.81	7.01	68.2	20.39	Peak	283.40	100	Horizontal	Pass
3	5221.00	93.84	11.28	68.2	-25.64	Peak	108.00	100	Horizontal	N/A
4	9101.00	47.44	18.02	68.2	20.76	Peak	333.30	100	Horizontal	Pass
5	12610.00	49.39	19.26	68.2	18.81	Peak	16.40	100	Horizontal	Pass
6	16275.75	55.61	24.32	68.2	12.59	Peak	143.20	100	Horizontal	Pass

1 GHz to 40 GHz, ANT V Band I 11a High channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	46.66	-0.22	68.2	21.54	Peak	263.40	100	Vertical	Pass
2	3564.00	47.36	7.61	68.2	20.84	Peak	90.90	100	Vertical	Pass
3	5239.00	103.63	11.06	68.2	-35.43	Peak	62.10	100	Vertical	N/A
4	6993.00	47.59	13.44	68.2	20.61	Peak	307.30	100	Vertical	Pass
5	11347.75	48.11	18.02	68.2	20.09	Peak	359.30	100	Vertical	Pass
6	16460.00	56.13	23.45	68.2	12.07	Peak	222.90	100	Vertical	Pass

1 GHz to 40 GHz, ANT H Band I 11a High channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	53.00	-0.22	68.2	15.20	Peak	276.50	100	Horizontal	Pass
2	3168.00	48.49	7.01	68.2	19.71	Peak	296.60	100	Horizontal	Pass
3	5241.00	94.00	11.12	68.2	-25.80	Peak	107.50	100	Horizontal	N/A
4	6953.00	47.90	13.60	68.2	20.30	Peak	296.60	100	Horizontal	Pass
5	9106.50	46.99	18.14	68.2	21.21	Peak	31.70	100	Horizontal	Pass
6	14686.25	53.66	22.79	68.2	14.54	Peak	359.00	100	Horizontal	Pass

1 GHz to 40 GHz, ANT V Band IV 11a Low channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	46.11	-0.22	68.2	22.09	Peak	273.60	100	Vertical	Pass
2	3168.00	47.78	7.01	68.2	20.42	Peak	256.60	100	Vertical	Pass
3	5149.00	47.89	11.20	68.2	20.31	Peak	0.20	100	Vertical	Pass
4	5745.00	102.44	11.87	125.0	22.56	Peak	68.00	100	Vertical	Pass
5	9092.75	46.95	17.84	68.2	21.25	Peak	231.10	100	Vertical	Pass
6	14683.50	54.00	22.84	68.2	14.20	Peak	352.00	100	Vertical	Pass

1 GHz to 40 GHz, ANT H Band IV 11a Low channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	52.48	-0.22	68.2	15.72	Peak	273.90	100	Horizontal	Pass
2	3168.00	44.97	7.01	68.2	23.23	Peak	282.40	100	Horizontal	Pass
3	4741.00	46.34	10.88	68.2	21.86	Peak	1.90	100	Horizontal	Pass
4	5744.00	94.98	11.71	125.0	30.02	Peak	267.90	100	Horizontal	Pass
5	9076.25	46.93	17.47	68.2	21.27	Peak	305.20	100	Horizontal	Pass
6	12104.00	48.66	18.47	68.2	19.54	Peak	18.10	100	Horizontal	Pass

1 GHz to 40 GHz, ANT V Band IV 11a Middle channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1989.50	46.48	-0.69	68.2	21.72	Peak	185.30	100	Vertical	Pass
2	3564.00	47.27	7.61	68.2	20.93	Peak	196.00	100	Vertical	Pass
3	4966.00	46.11	10.96	68.2	22.09	Peak	36.40	100	Vertical	Pass
4	5784.00	102.29	11.85	125.0	22.71	Peak	65.40	100	Vertical	Pass
5	9142.25	47.56	17.68	68.2	20.64	Peak	238.50	100	Vertical	Pass
6	12722.75	49.48	19.30	68.2	18.72	Peak	18.50	100	Vertical	Pass

1 GHz to 40 GHz, ANT H Band IV 11a Middle channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	50.99	-0.22	68.2	17.21	Peak	272.90	100	Horizontal	Pass
2	3168.00	47.42	7.01	68.2	20.78	Peak	284.30	100	Horizontal	Pass
3	5065.00	46.16	11.32	68.2	22.04	Peak	284.30	100	Horizontal	Pass
4	5787.00	95.57	12.28	125.0	29.43	Peak	269.50	100	Horizontal	Pass
5	9268.75	46.58	15.80	68.2	21.62	Peak	311.90	100	Horizontal	Pass
6	13160.00	49.58	19.12	68.2	18.62	Peak	216.80	100	Horizontal	Pass

1 GHz to 40 GHz, ANT V Band IV 11a High channel

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	50.68	-0.22	68.2	17.52	Peak	280.30	100	Horizontal	Pass
2	3168.00	44.33	7.01	68.2	23.87	Peak	296.60	100	Horizontal	Pass
3	4997.00	45.78	11.05	68.2	22.42	Peak	122.60	100	Horizontal	Pass
4	5824.00	94.67	11.86	125.0	30.33	Peak	268.00	100	Horizontal	Pass
5	9161.50	47.09	17.28	68.2	21.11	Peak	0.30	100	Horizontal	Pass
6	13256.25	50.34	20.51	68.2	17.86	Peak	1.70	100	Horizontal	Pass

1 GHz to 40 GHz, ANT H Band IV 11a High channel

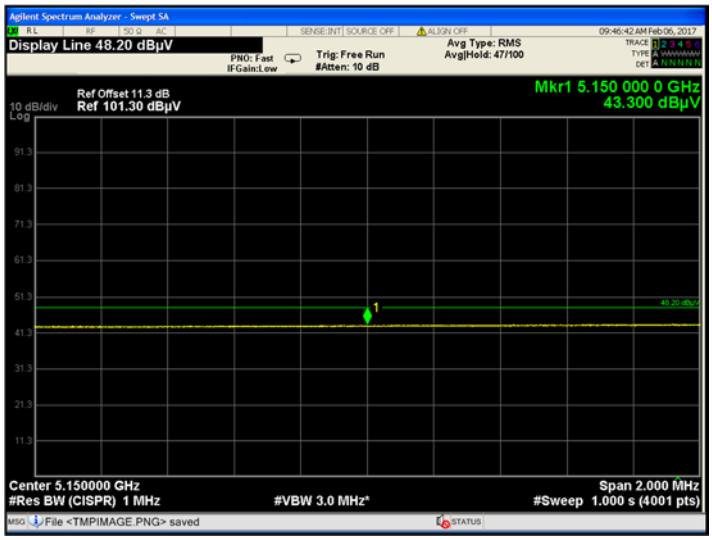
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1980.00	46.89	-0.22	68.2	21.31	Peak	302.00	100	Vertical	Pass
2	3564.00	47.75	7.61	68.2	20.45	Peak	92.60	100	Vertical	Pass
3	5148.00	46.02	11.34	68.2	22.18	Peak	20.30	100	Vertical	Pass
4	5826.00	101.45	11.57	125.0	23.55	Peak	78.50	100	Vertical	Pass
5	9101.00	47.09	18.02	68.2	21.11	Peak	80.50	100	Vertical	Pass
6	13272.75	49.88	20.25	68.2	18.32	Peak	1.10	100	Vertical	Pass

A.7.2 Band Edge (Restricted-band)

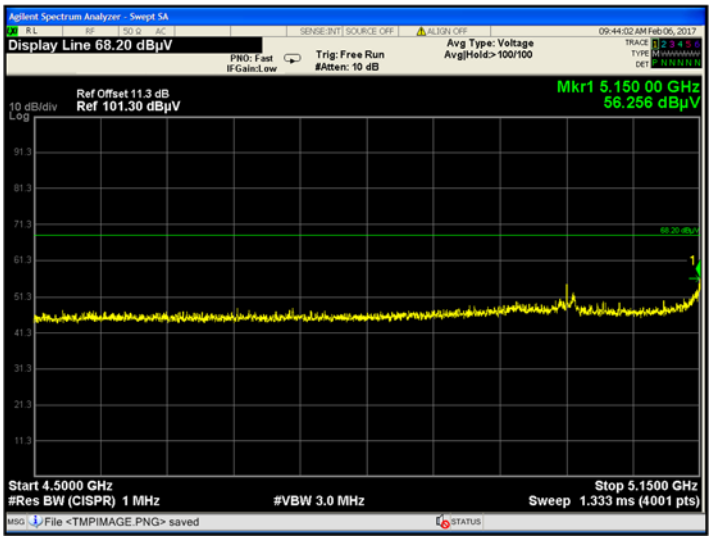
Test Band	Mode	Channel	Verdict
Band I	802.11a	Low	Pass
		High	Pass
Band IV	802.11a	Low	Pass
		High	Pass

Test Plots

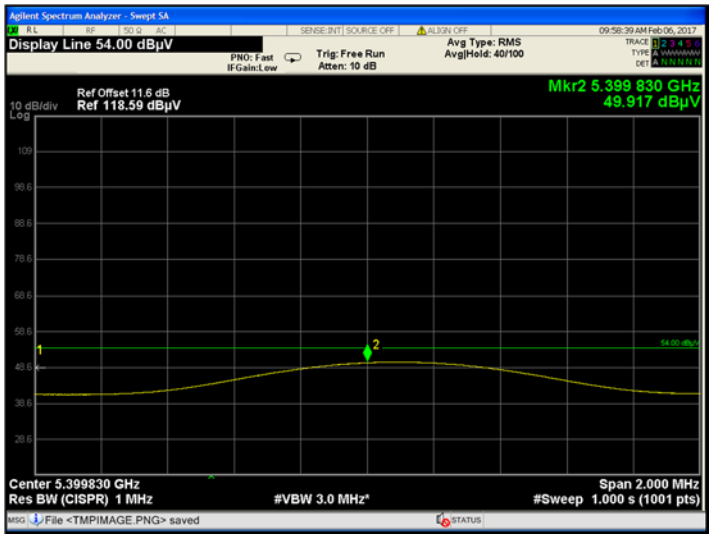
802.11a BAND I LOW CHANNEL, PEAK



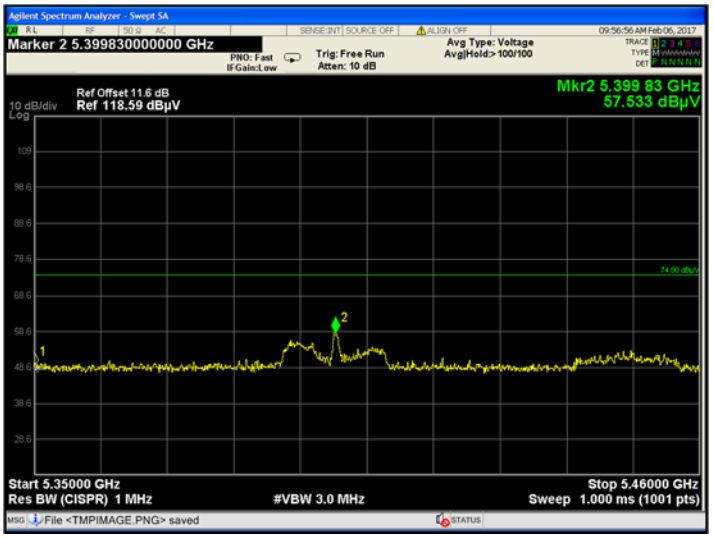
802.11a BAND I LOW CHANNEL, AV



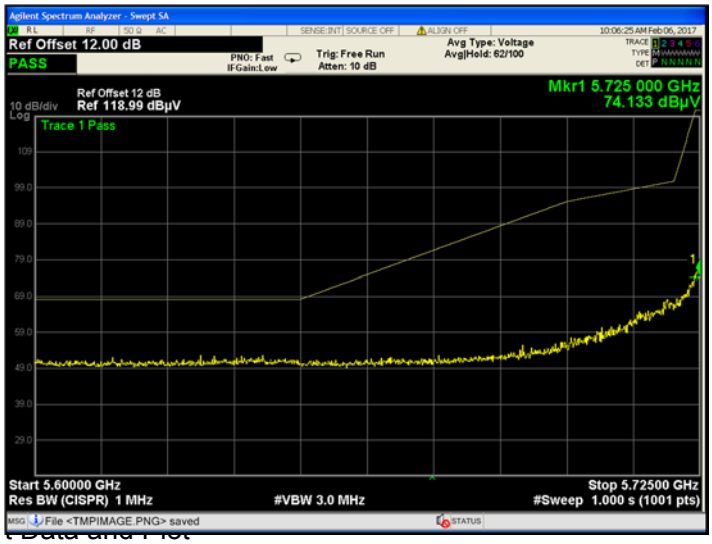
802.11a BAND I HIGH CHANNEL, PEAK



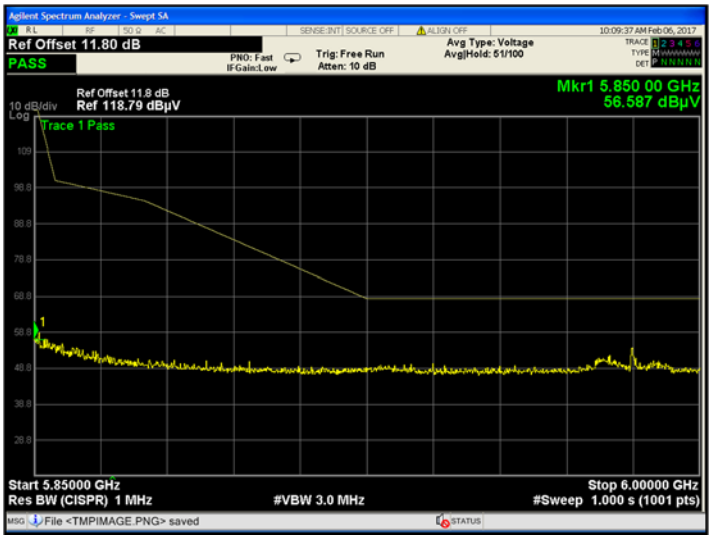
802.11a BAND I HIGH CHANNEL, AV



802.11a BAND IV LOW CHANNEL, PEAK



802.11a BAND IV HIGH CHANNEL, PEAK



A.8 Frequency Stability

Measurement Data (the worst channel)

Voltage vs. Frequency Stability (5240 MHz)

Test Conditions		Test Frequency (MHz)	0 Minute		2 Minute		5 Minute		10Minute	
TEMP. (°C)	Voltage (VDC)		Measurement Frequency (MHz)	Max. Deviation (ppm)	Measurement Frequency (MHz)	Max. Deviation (ppm)	Measurement Frequency (MHz)	Max. Deviation (ppm)	Measurement Frequency (MHz)	Max. Deviation (ppm)
20	6.2	5240	5239.953198	-8.93	5240.049405	9.43	5239.965326	-6.62	5240.037585	7.17
	7.4	5240	5240.048049	9.17	5239.973101	-5.13	5240.008664	1.65	5239.988194	-2.25
	8.4	5240	5240.038784	7.40	5240.005888	1.12	5240.013519	2.58	5240.014184	2.71

Temperature vs. Frequency Stability (5240 MHz)

Test Conditions		Test Frequency (MHz)	0 Minute		2 Minute		5 Minute		10Minute	
Voltage (VDC)	TEMP. (°C)		Measurement Frequency (MHz)	Max. Deviation (ppm)	Measurement Frequency (MHz)	Max. Deviation (ppm)	Measurement Frequency (MHz)	Max. Deviation (ppm)	Measurement Frequency (MHz)	Max. Deviation (ppm)
7.4	0	5240	5239.971996	-5.34	5239.951503	-9.26	5239.951864	-9.19	5239.986037	-2.66
	5	5240	5240.047404	9.05	5240.022111	4.22	5240.033 33	6.36	5240.042693	8.15
	10	5240	5240.021183	4.04	5240.044069	8.41	5240.034602	6.60	5240.004271	0.82
	15	5240	5240.003596	0.69	5240.000504	0.10	5240.014048	2.68	5240.012515	2.39
	20	5240	5239.999154	-0.16	5239.967282	-6.24	5239.953185	-8.93	5239.985079	-2.85
	25	5240	5240.026823	5.12	5240.004061	0.77	5240.020329	3.88	5240.004308	0.82
	30	5240	5240.021692	4.14	5240.048269	9.21	5240.037 49	7.15	5240.021241	4.05
	35	5240	5239.973314	-5.09	5240.022018	4.20	5240.031972	6.10	5240.006901	1.32

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ1710090-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL- SZ1710090-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL- SZ1710090-AI.PDF”.

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