HCT CO.,LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 **FAX: +82-31-645-6401**

FCC/ISED UNII REPORT

Certification

Applicant Name:
WISOL CO., LTD

Address:
531-7, Gajang-ro, Osan-si Gyeonggi-do, 18103, Korea

Date of Issue:
September 14, 2017
Test Site/Location:
HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majang-myeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
Report No.: HCT-R-1708-F009-1
ISED Registration Number: 5944A-5

FCC ID :	**2ABA2ATM200**
ISED ID :	**11534A-ATM200**
APPLICANT :	**WISOL CO., LTD**

Model: ATM200

EUT Type: AUDIO TRANSCEIVER

Modulation type OFDM

FCC Classification: Unlicensed National Information Infrastructure(UNII)

FCC Rule Part(s): Part 15.407

ISED Rule Part(s): RSS-247 Issue 2(February 2017) , RSS-Gen Issue 4(November 2014)

Band	Frequency Range (MHz)	Ant.0 Power (dBm)	Ant.1 Power (dBm)
UNII3	5730.35 – 5820.35	10.37	10.77

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC/IC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by : Kyung Soo Kang
Engineer of Telecommunication testing center

Approved by : Jong Seok Lee
Manager of Telecommunication testing center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1708-F009	August 24, 2017	- First Approval Report
HCT-R-1708-F009-1	September 14, 2017	- Removed the '20 MHz BW' in Section 2. - Revised the test configuration and test procedure on Section 9.4.

Table of Contents

1. GENERAL INFORMATION

Applicant:	WISOL CO., LTD
Address:	531-7, Gajang-ro, Osan-si Gyeonggi-do, 18103, Korea
FCC ID:	2ABA2ATM200
ISED ID:	11534A-ATM200
EUT Type:	AUDIO TRANSCEIVER
Model:	ATM200
Date(s) of Tests:	July 25, 2017 ~ August 17, 2017
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

2. EUT DESCRIPTION

Model	ATM200	
EUT Type	AUDIO TRANSCEIVER	
Power Supply	DC 5 V	
Frequency Range	TX:	5730.35 – 5820.35 MHz (UNII 3)
	RX:	5730.35 – 5820.35 MHz (UNII 3)
Modulation Type	OFDM	
Antenna Specification	Manufacturer: Wisol Antenna type: PCB Printed Peak Gain : 2.2 dBi (UNII 3)	

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04 dated May 2, 2017 entitled “Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E” and ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’ were used in the measurement.

3.1 EUT CONFIGURATION

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

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E / RSS-Gen issue 4, RSS-247 issue 2.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3.75 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 8 of ANSI C63.10. (Version: 2013)

Conducted Antenna Terminal

See Section from 8.1 to 8.4.(KDB 789033 D02 v01r04)

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

4. 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 equipments, which is traceable to recognized national standards
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, 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.”

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203, §15.407 / RSS-Gen(Issue 4) Section 8.3

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

* The antennas of this E.U.T are permanently attached.
* The E.U.T Complies with the requirement of §15.203, §15.407 / RSS-Gen

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70

8. SUMMARY OF TEST RESULTS

8.1 FCC Part

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§15.407 (for Power Measurement)	N/A	CONDUCTED	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§15.407(a)(1)	< 250 mW (5150-5250 MHz) < 250 mW or 11+10 log log $_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10 log log $_{10}$ (BW) dBm (5470-5725 MHz) <1 W (5725-5850 MHz)		PASS
Peak Power Spectral Density	§15.407(a)(1),(5)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
Frequency Stability	§15.407(g)	NA		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207	<FCC 15.207 limits		PASS
Undesirable Emissions	§15.407(b)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) <-27 dBm/MHz EIRP(Worst) (UNII 3)	RADIATED	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

8.2 IC Part

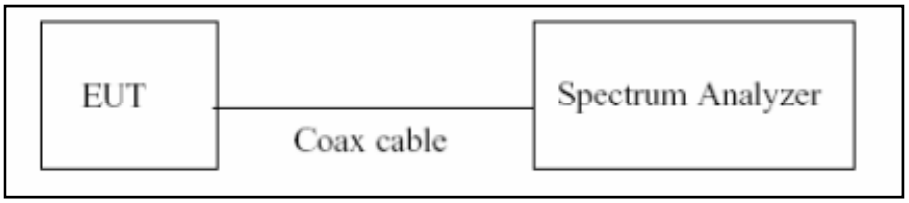
Test Description	IC Part Section(s)	Test Limit	Test Condition	Test Result
99% Bandwidth(IC)	RSS-Gen, 6.6	N/A	CONDUCTED	PASS
6 dB Bandwidth	RSS-247, 6.2.4.1	> 500 kHz (5725~5850 MHz)		PASS
Maximum Conducted Output Power,	RSS-247, 6.2	< 250 mW or 11+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10 log $_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less		PASS
	RSS-247, 6.2.4 1	<1 W (5725-5850 MHz)		
Maximum e.i.r.p	RSS-247, 6.2	< 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5150-5250, 5250-5350 MHz, for devices installed in vehicles) < 1 W or 17+10 log $_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less		
Power Spectral Density	RSS-247 6.2	<10 dBm/ MHz(e.i.r.p.) (5150-5250 MHz) <11 dBm/MHz(Conducted) (5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz)		PASS
	RSS-247, 6.2.4 1	<30 dBm/500 kHz(Conducted) (5725-5850 MHz)		
AC Conducted Emissions 150 kHz-30 MHz	RSS-Gen, 8.8	RSS-Gen section 8.8 table 3		NA
Undesirable Emissions	RSS-247, 6.2.1 2	26 dBc at 5250~5350 MHz (5150~5350 MHz)		PASS
	RSS-247, 6.2	<-27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5725 MHz)	RADIATED	PASS
	RSS-247, 6.2.4 2	<-17 dBm/MHz EIRP within 5715-5725 MHz and 5850-5860 MHz, <-27 dBm/MHz EIRP outside 5715-5860 MHz (5725~5850 MHz)		
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	RSS-Gen, 8.9 RSS-Gen, 8.10	RSS-Gen section 8.9 table 4, 5 section 8.10 table 6		PASS
Receiver Spurious Emissions	RSS-Gen, 5 RSS-Gen, 7.1.2	RSS-Gen section 7.1.2 table 2		PASS

9. TEST RESULT

9.1 DUTY CYCLE

The zero-span mode on a spectrum analyzer or EMI receiver ,if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/*T*, where *T* is defined in section B)1)a), and the number of sweep points across duration *T* exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if *T* ≤ 16.7 microseconds.)

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, (B.2 in KDB 789033 D02 v01r04)
The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if T ≤ 6.25 microseconds. (50/6.25 = 8)
The zero-span method was used becaure all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/*T*.

1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10*log(1/Duty Cycle)

▣ Duty Cycle Factor

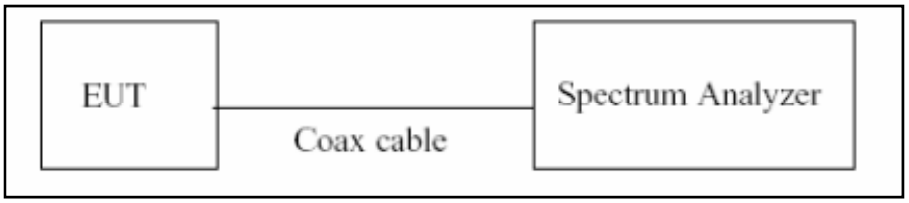
Frequency	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
5730.35~5820.35MHz	-	-	100	-

9.2 EMISSION BANDWIDTH AND MINIMUM EMISSION BANDWIDTH MEASUREMENT

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033 D02 v01r04, at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

The 26 dB bandwidth is used to determine the conducted power limits.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE (26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.
The Spectrum Analyzer is set to(C.1 in KDB 789033 D02 v01r04)

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Note : We tested 26 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 26 dB.

In order to simplify the report, attached plots were only the most wide channel.

▣ TEST PROCEDURE (for the band 5.725-5.85 GHz, 6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(C.2 in KDB 789033 D02 v01r04)

1. RBW = 100 kHz
2. VBW ≥ 3*RBW
3. Detector = Peak
4. Trace mode = max hold
5. Allow the trace to stabilize
6. 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 lever measured in the fundamental emission.

Note : We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

▣ TEST RESULTS

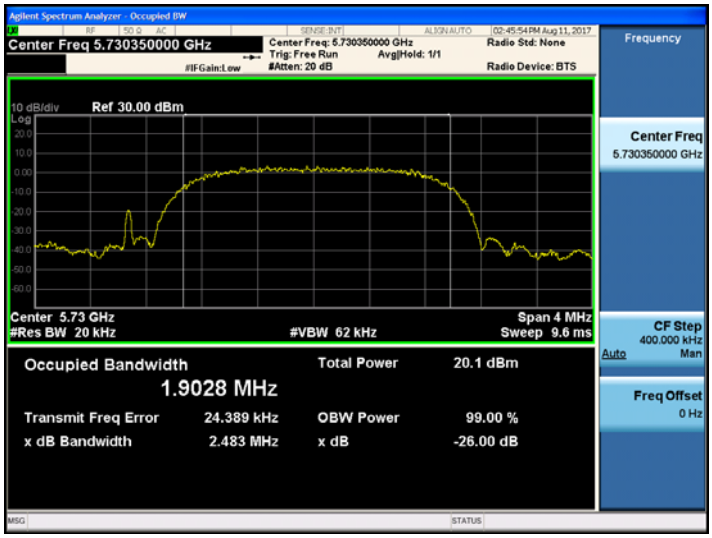
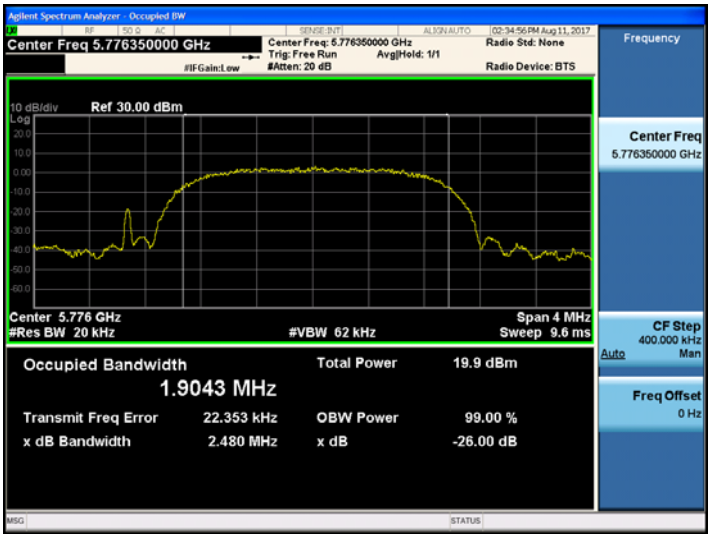
Conducted 26 dB Bandwidth Measurements for Ant.0

Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
5730.35	Low	2.48	N/A	Pass
5776.35	Mid	2.48	N/A	Pass
5820.35	High	2.48	N/A	Pass

Conducted 26 dB Bandwidth Measurements for Ant.1

Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
5730.35	Low	2.47	N/A	Pass
5776.35	Mid	2.48	N/A	Pass
5820.35	High	2.47	N/A	Pass

▣ TEST Plot

26dB Bandwidth for Ant.0 (CH. Low)	26dB Bandwidth for Ant.1 (CH. Mid)
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS

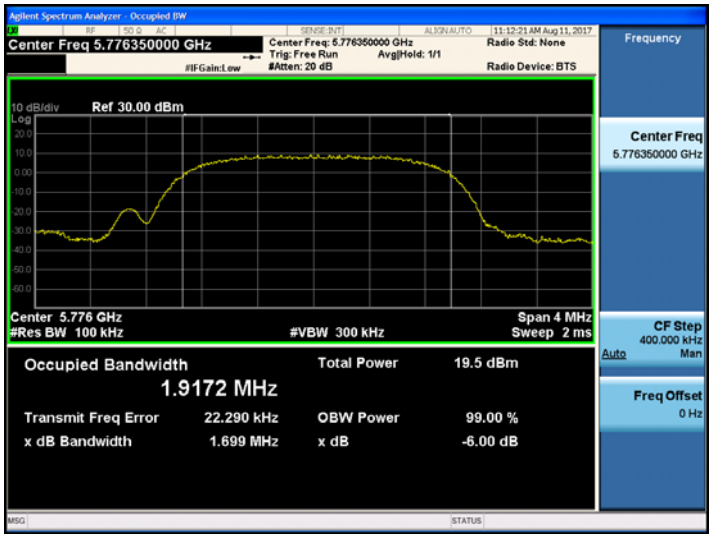
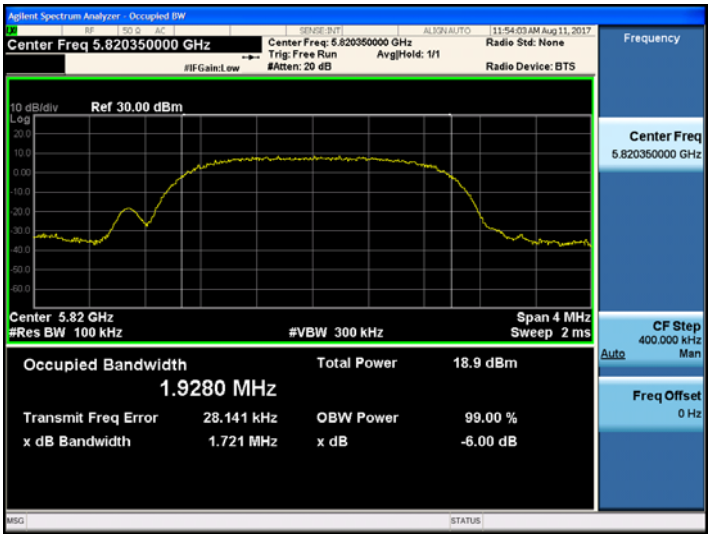
Conducted 6 dB Bandwidth Measurements for Ant.0

Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
5730.35	Low	1.69	0.5	Pass
5776.35	Mid	1.70	0.5	Pass
5820.35	High	1.69	0.5	Pass

Conducted 6 dB Bandwidth Measurements for Ant.1

Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
5730.35	Low	1.70	0.5	Pass
5776.35	Mid	1.66	0.5	Pass
5820.35	High	1.72	0.5	Pass

▣ TEST Plot

BAND 6dB Bandwidth for Ant.0 (CH.Mid)	6dB Bandwidth for Ant.1 (CH.High)
	

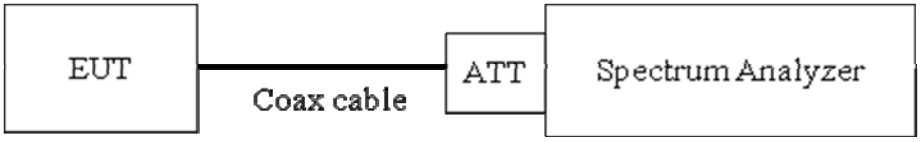
Note : In order to simplify the report, attached plots were only the most wide channel.

9.3 99% BANDWIDTH MEASUREMENT

None; for IC reporting purposes only

The 99 % bandwidth is used to determine the conducted power limits(for IC).

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to as close to 1% of the selected span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RBW = 1% of the total span
VBW ≥ 3 x RBW
Detector = Peak
Trace mode = max hold
Sweep = auto couple
Allow the trace to stabilize

▣ TEST RESULTS

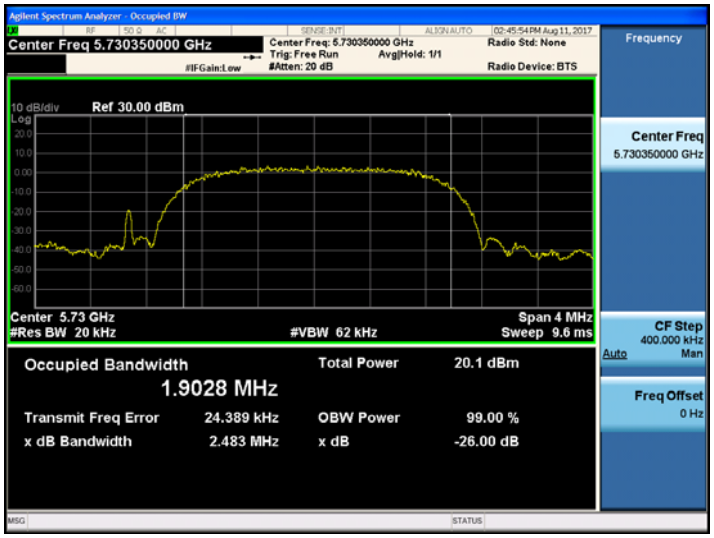
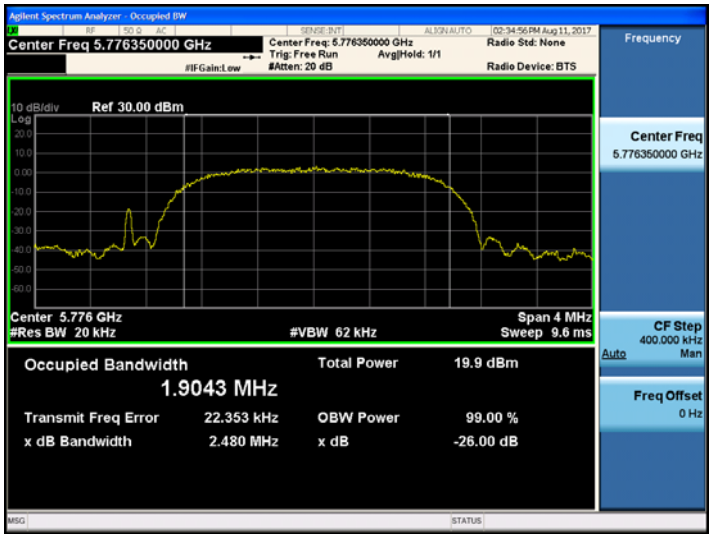
99% Bandwidth Measurements for Ant.0

Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]
5730.35	Low	1.903
5776.35	Mid	1.891
5820.35	High	1.898

99% Bandwidth Measurements for Ant.1

Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]
5730.35	Low	1.893
5776.35	Mid	1.904
5820.35	High	1.903

▣ TEST Plot

99% Bandwidth for Ant.0 (CH. Low)	99% Bandwidth for Ant.1 (CH. Mid)
	

Note : In order to simplify the report, attached plots were only the most wide channel.

9.4 OUTPUT POWER MEASUREMENT

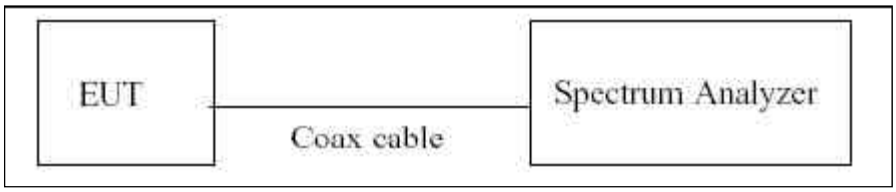
Test Requirements and limit, §15.407(a)(1) / RSS-247 6.2

A transmitter antenna terminal of EUT is connected to the input of a Power meter or Spectrum Analyzer .Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

▣ LIMIT

Band	Limit (dBm)
UNII 3	30.00

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

▪ Average Power

The transmitter output is connected to the Spectrum Analyzer. We use the spectrum analyzer's integrated band power measurement function. We tested according to Method SA-2 in KDB 789033 D02 v01r04.

The Spectrum Analyzer is set to

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.
3. RBW = 1 MHz.
4. VBW ≥ 3 MHz.
5. Number of points in sweep ≥ 2*span/RBW.
6. Sweep time = auto.
7. Detector = RMS.
8. Do not use sweep triggering. Allow the sweep to "free run".
9. Trace average at least 100 traces in power averaging(RMS) mode
10. Integrated bandwidth = OBW
11. Add 10log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

▣ SAMPLE CALCULATION (Conducted)

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

Note:

1. Spectrum reading values are not plot data. The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 3	12.1

(Actual value of loss for the attenuator and cable combination)

▣ TEST RESULTS

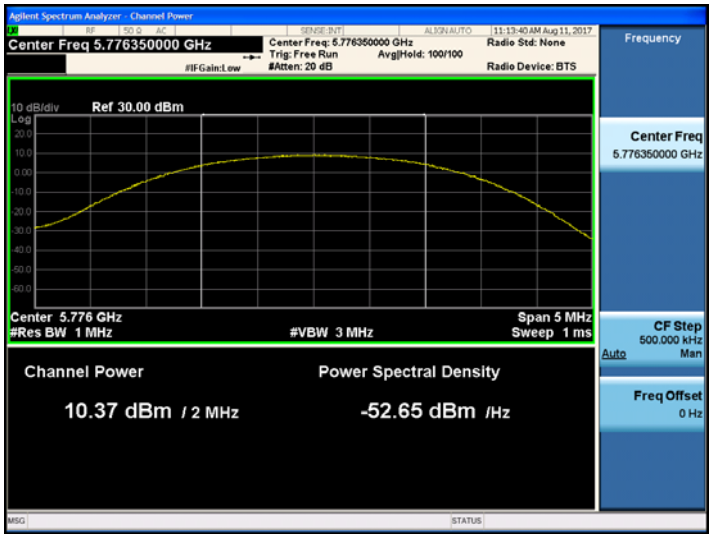
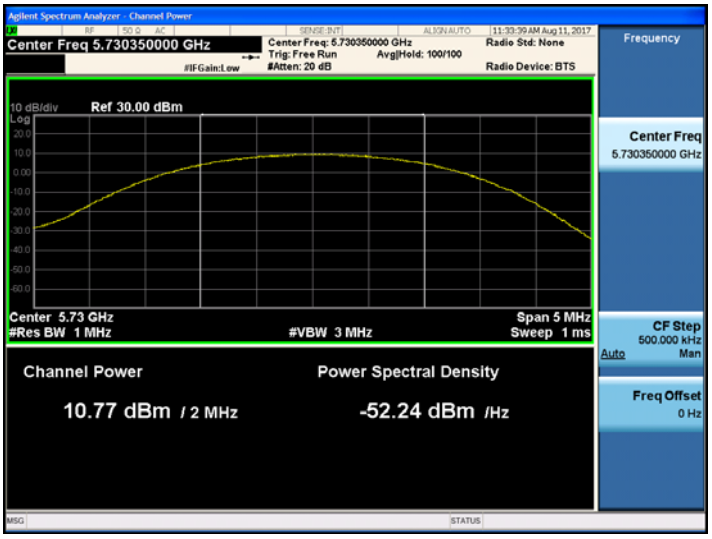
Conducted Output Power Measurements for Ant.0

Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
5730.35	Low	10.32	0.00	10.32	30
5776.35	Mid	10.37	0.00	10.37	30
5820.35	High	10.30	0.00	10.30	30

Conducted Output Power Measurements for Ant.1

Frequency [MHz]	Channel No.	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
5730.35	Low	10.77	0.00	10.77	30
5776.35	Mid	10.47	0.00	10.47	30
5820.35	High	10.16	0.00	10.16	30

▣ TEST Plot

Average Power for Ant.0 (CH. Mid)	Average Power for Ant.1 (CH. Low)
	

9.5 POWER SPECTRAL DENSITY

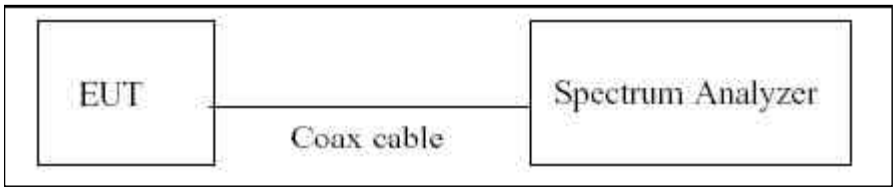
The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The maximum permissible peak power spectral density is 11 dBm/ MHz for UNII 1 and 30 dBm/500 kHz for UNII 3.

▣ LIMIT

Power Spectral Density

Band	Limit
UNII 3	30 dBm/500 kHz

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Method in KDB 789033 D02 v01r04.

The spectrum analyzer is set to :

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
3. VBW ≥ 3 MHz
4. Number of points in sweep ≥ 2*span/RBW.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.

▣ SAMPLE CALCULATION

PSD = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

Output Power = 5 dBm + 10 dB + 0.8 dB + 0.21 dB = 16.01 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 5.2 GHz, 5.3 GHz and 5.6 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 3	12.1

(Actual value of loss for the attenuator and cable combination)

▣ TEST RESULTS

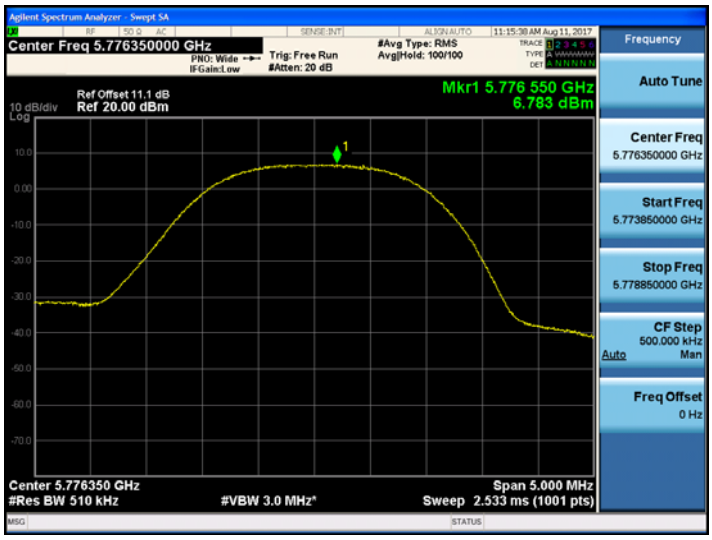
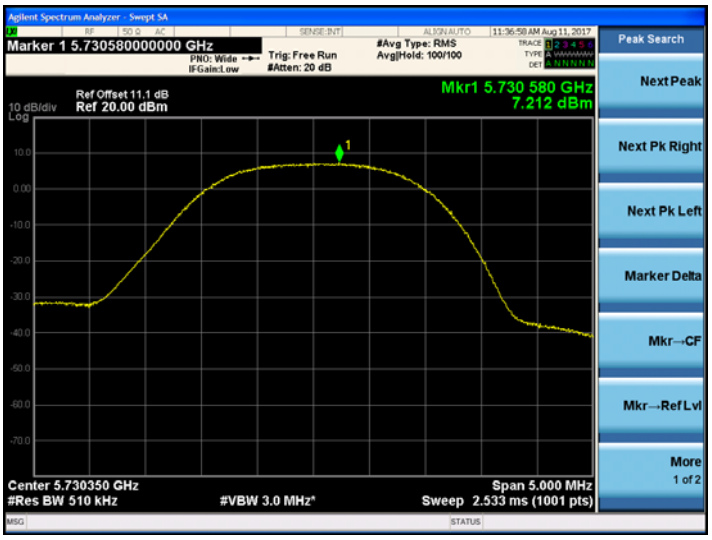
Conducted Power Density Measurements for Ant.0

Frequency (MHz)	Channel No.	Test Result				
		Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5730.35	Low	6.712	0.000	6.712	30	Pass
5776.35	Mid	6.783	0.000	6.783		Pass
5820.35	High	6.763	0.000	6.763		Pass

Conducted Power Density Measurements for Ant.1

Frequency (MHz)	Channel No.	Test Result				
		Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5730.35	Low	7.212	0.000	7.212	30	Pass
5776.35	Mid	7.004	0.000	7.004		Pass
5820.35	High	6.587	0.000	6.587		Pass

▣ TEST Plot

PSD for Ant.0 (CH. Mid)	PSD for Ant.1 (CH. Low)
	

9.6 FREQUENCY STABILITY

The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 ℃ and 50 ℃. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

Ant.0

OPERATING BAND: UNII Band 3

OPERATING FREQUENCY: 5.776.350,000 Hz

REFERENCE VOLTAGE: 5 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	5.00	+20(Ref)	5776377.20	27.20
100%		-30	5776298.10	-51.90
100%		-20	5776304.70	-45.30
100%		-10	5776311.10	-38.90
100%		0	5776318.20	-31.80
100%		+10	5776325.00	-25.00
100%		+30	5776338.10	-11.90
100%		+40	5776345.00	-5.00
100%		+50	5776351.00	1.00
MAX	5.50	+20	5776323.40	-26.60
MIN	4.50	+20	5776318.70	-31.30

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Ant.1

OPERATING BAND: UNII Band 3

OPERATING FREQUENCY: 5.776.350,000 Hz

REFERENCE VOLTAGE: 5 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	5.00	+20(Ref)	5776377.27	27.27
100%		-30	5776300.10	-49.90
100%		-20	5776305.40	-44.60
100%		-10	5776309.60	-40.40
100%		0	5776317.20	-32.80
100%		+10	5776322.50	-27.50
100%		+30	5776335.10	-14.90
100%		+40	5776340.50	-9.50
100%		+50	5776345.30	-4.70
MAX	5.50	+20	5776322.90	-27.10
MIN	4.50	+20	5776314.20	-35.80

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

9.7 RADIATED MEASUREMENT

9.7.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209, §15.407 / RSS-247 6.2

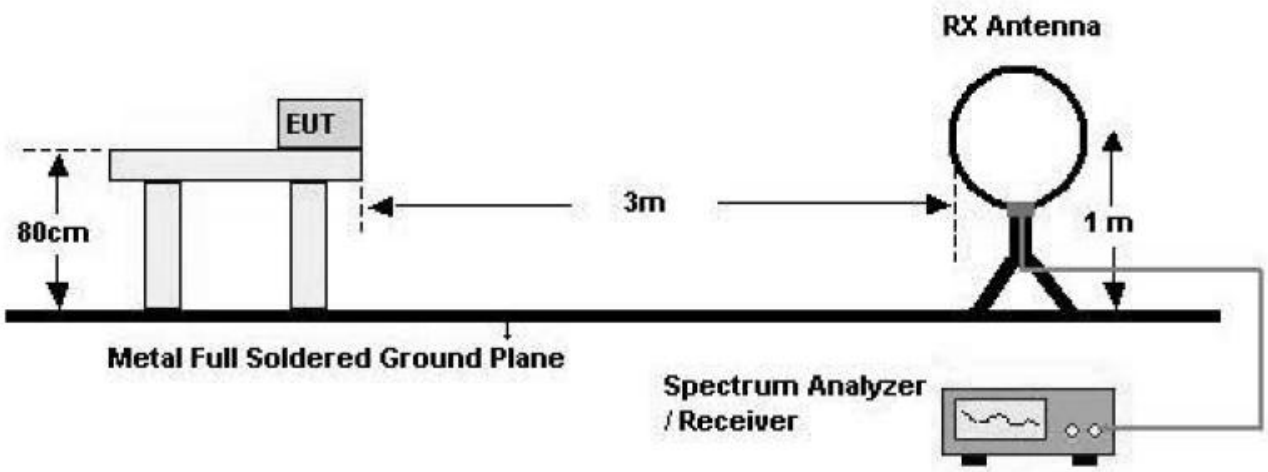
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

▣ §15.407, KDB 789033 D02

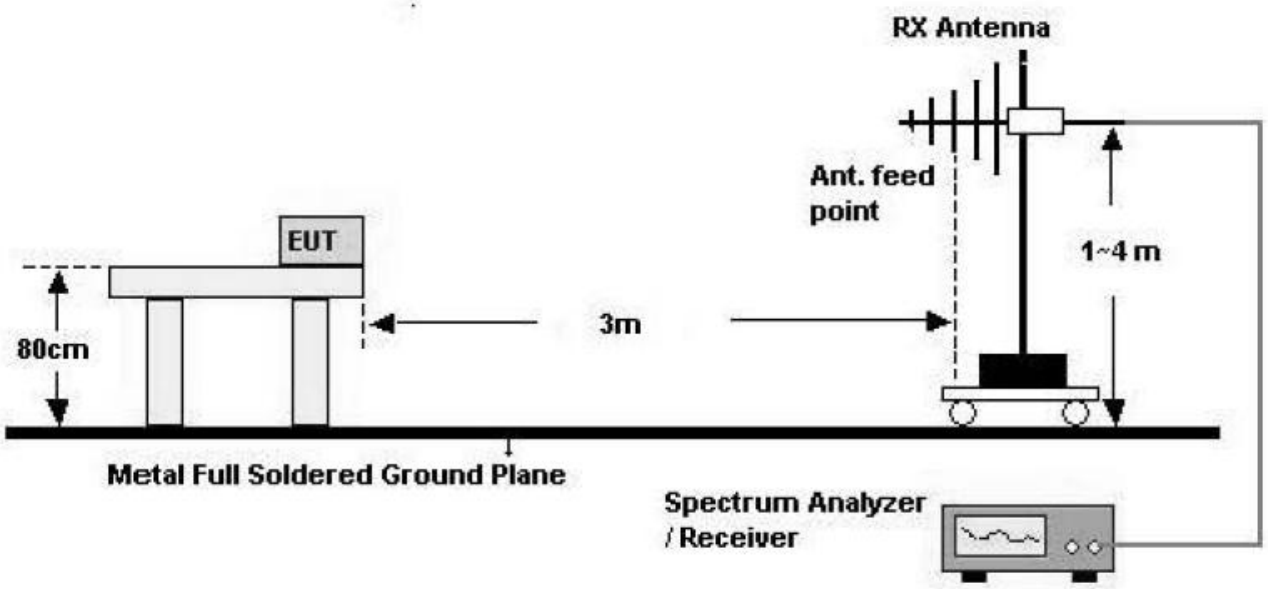
All harmonics that do not lie in a restricted band are subject to a peak limit of -27 dBm/MHz. At a distance of 3 meters the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2 dB to the EIRP limit of -27 dBm/MHz to obtain the limit for out of band spurious emissions of 68.2 dBμV/m. Espectally, for transmitter operating in the 5725 Mhz – 5850 MHz : all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequency 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

TEST CONFIGURATION

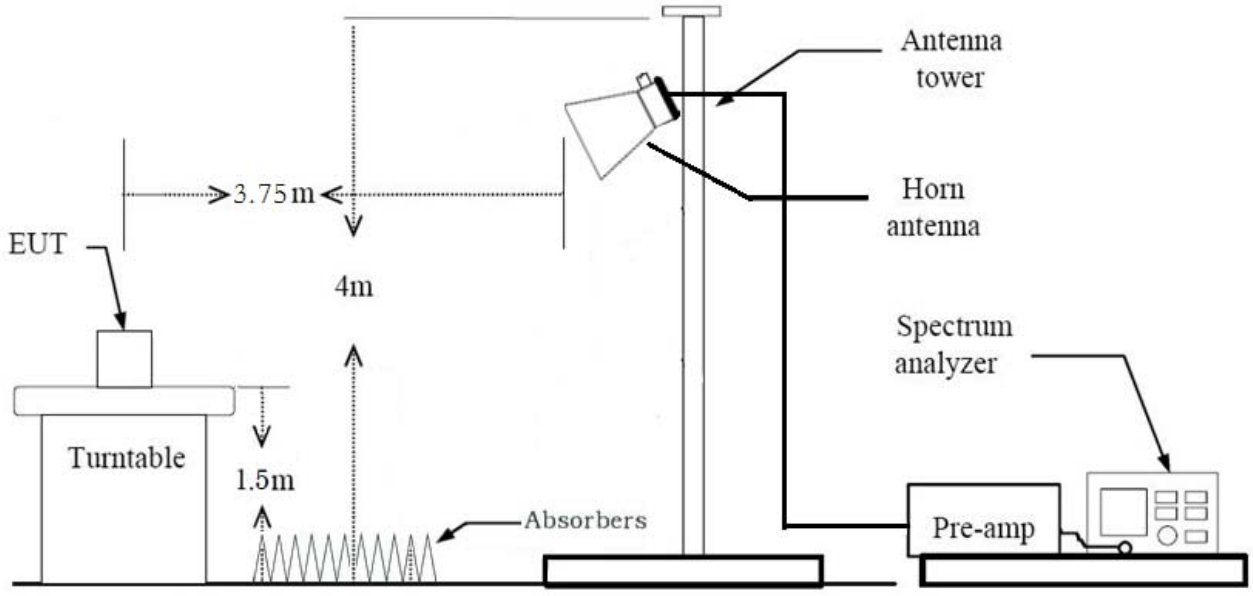
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

ANSI C63.10:2013

Method G)5) in KDB 789033 D02 v01r04 (Peak)

Method G)6)d) in KDB 789033 D02 v01r04 (Average)

. Spectrum setting:

- Peak.

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = Peak
4. Sweep Time = auto
5. Trace mode = max hold
6. Allow sweeps to continue until the trace stabilizes.
7. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

- Average (Method VB :Averaging using reduced video bandwidth)

1. RBW = 1 MHz
2. VBW
   2.1. If the EUT is configured to transmit with duty cycle ≥ 98 percent, set VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
   2.2. If the EUT duty cycle is < 98 percent, set VBW ≥ 1/T, where T is the minimum transmission

duration.

3. The analyzer is set to linear detector mode.
4. Detector = Peak.
5. Sweep time = auto.
6. Trace mode = max hold.
7. Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

Note :

1. We used the Method VB to perform the average filed strength measurements.
2. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Frequency	T_{on} (ms)	T_{total} (ms)	Duty Cycle (%)	The actual setting value of VBW (Hz)
5730.35~5820.35 MHz	**-**	**-**	**100**	**1000**

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dB㎶	dB /m	dB	(H/V)	dB㎶/m	dB㎶/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dBuV) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. The test results for below 30 MHz is correlated to an open site.
   The result on OATS is about 2 dB higher than semi-anechoic chamber (10 m chamber)

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dB㎶	dB /m	dB	(H/V)	dB㎶/m	dB㎶/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

[Ant.0]

Band :	UNII 3
Operating Frequency	5730.35MHz
Channel No.	Low Channel

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11460.7	57.60	-2.34	V	55.26	73.98	18.72	PK
11460.7	49.89	-2.34	V	47.55	53.98	6.43	AV
17235	55.32	1.78	V	57.10	68.20	11.10	PK
11460.7	58.94	-2.34	H	56.60	73.98	17.38	PK
11460.7	51.69	-2.34	H	49.35	53.98	4.63	AV
17235	55.50	1.78	H	57.28	68.20	10.92	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operating Frequency	5776.35 MHz
Channel No.	Middle Channel

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11552.7	56.14	-2.49	V	53.65	73.98	20.33	PK
11552.7	47.29	-2.49	V	44.80	53.98	9.18	AV
17355	55.41	1.66	V	57.07	68.20	11.13	PK
11552.7	57.19	-2.49	H	54.70	73.98	19.28	PK
11552.7	50.41	-2.49	H	47.92	53.98	6.06	AV
17355	55.47	1.66	H	57.13	68.20	11.07	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operating Frequency	5820.32 MHz
Channel No.	High Channel

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11640.7	56.49	-2.23	V	54.26	73.98	19.72	PK
11640.7	47.50	-2.23	V	45.27	53.98	8.71	AV
17475	55.28	4.01	V	59.29	68.20	8.91	PK
11640.7	57.62	-2.23	H	55.39	73.98	18.59	PK
11640.7	50.60	-2.23	H	48.37	53.98	5.61	AV
17475	55.41	4.01	H	59.42	68.20	8.78	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

[Ant.1]

Band :	UNII 3
Operating Frequency	5730.35 MHz
Channel No.	Low Channel

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11460.7	57.04	-2.34	V	54.70	73.98	19.28	PK
11460.7	50.01	-2.34	V	47.67	53.98	6.31	AV
17235	55.41	1.78	V	57.19	68.20	11.01	PK
11460.7	58.15	-2.34	H	55.81	73.98	18.17	PK
11460.7	51.48	-2.34	H	49.14	53.98	4.84	AV
17235	55.59	1.78	H	57.37	68.20	10.83	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operating Frequency	5776.35 MHz
Channel No.	Middle Channel

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11552.7	57.16	-2.49	V	54.67	73.98	19.31	PK
11552.7	49.70	-2.49	V	47.21	53.98	6.77	AV
17355	55.40	1.66	V	57.06	68.20	11.14	PK
11552.7	57.31	-2.49	H	54.82	73.98	19.16	PK
11552.7	50.05	-2.49	H	47.56	53.98	6.42	AV
17355	55.47	1.66	H	57.13	68.20	11.07	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operating Frequency	5820.32 MHz
Channel No.	High Channel

Frequency [MHz]	Reading [dBuV]	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11640.7	56.92	-2.23	V	54.69	73.98	19.29	PK
11640.7	48.80	-2.23	V	46.57	53.98	7.41	AV
17475	55.41	4.01	V	59.42	68.20	8.78	PK
11640.7	57.27	-2.23	H	55.04	73.98	18.94	PK
11640.7	49.91	-2.23	H	47.68	53.98	6.30	AV
17475	55.44	4.01	H	59.45	68.20	8.75	PK

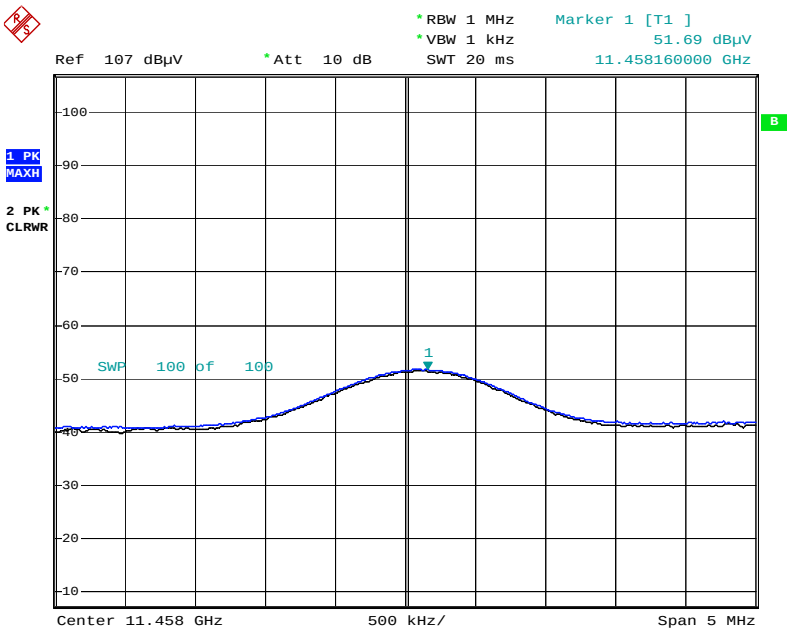
*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

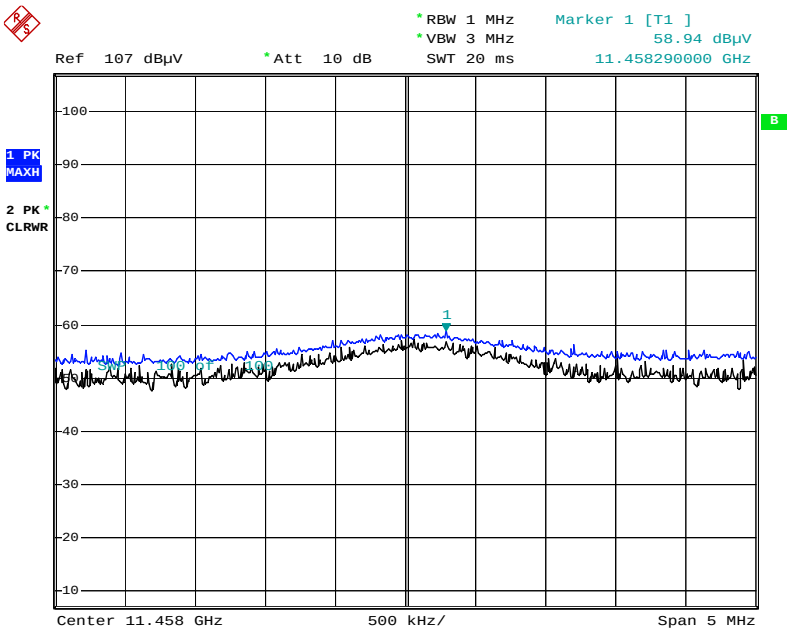
▣ RESULT PLOTS for Ant.0 (Worst case : Z-H)

Radiated Spurious Emissions plot – Average Reading (Ch.Low 2nd Harmonic)



Date: 9.AUG.2017 03:34:53

Radiated Spurious Emissions plot – Peak Reading (Ch.Low 2nd Harmonic)

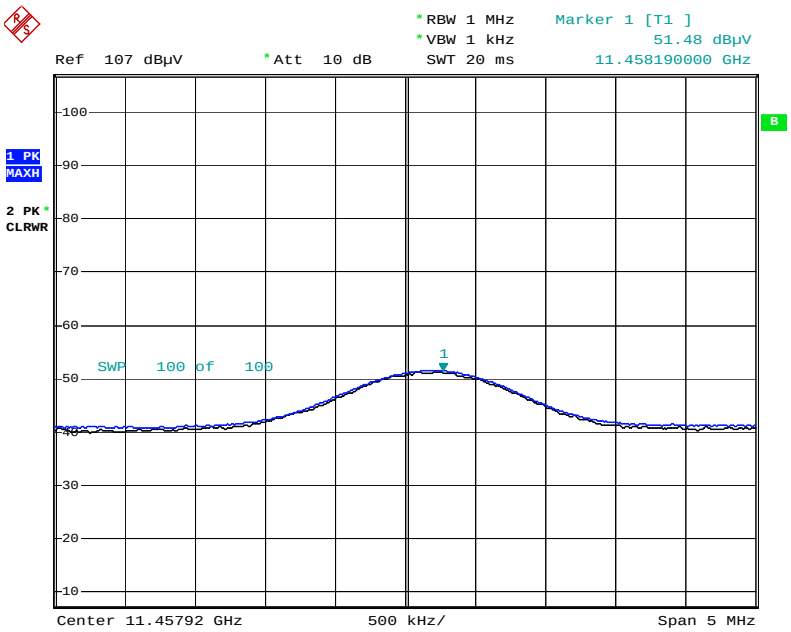


Date: 9.AUG.2017 03:35:25

Note : Only the worst case plots for Radiated Spurious Emissions.

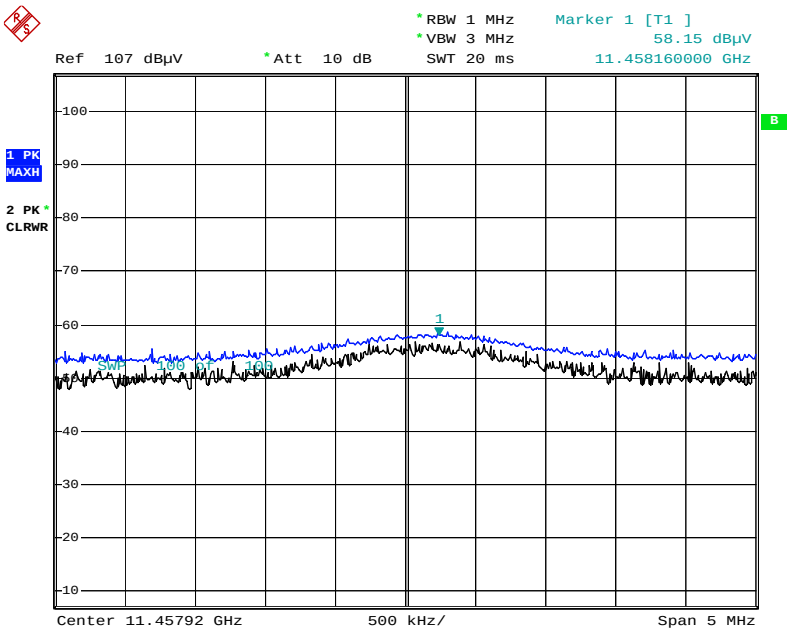
▣ RESULT PLOTS for Ant.1 (Worst case : Z-H)

Radiated Spurious Emissions plot – Average Reading (Ch.Low 2nd Harmonic)



Date: 9.AUG.2017 01:43:47

Radiated Spurious Emissions plot – Peak Reading (Ch.Low 2nd Harmonic)



Date: 9.AUG.2017 01:42:52

Note : Only the worst case plots for Radiated Spurious Emissions.

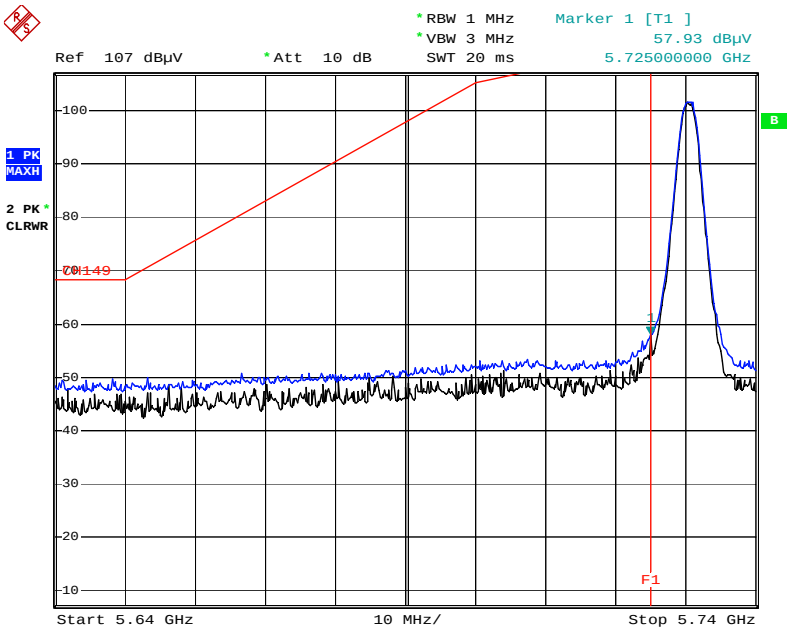
9.7.2 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.247(d) §15.205, §15.209

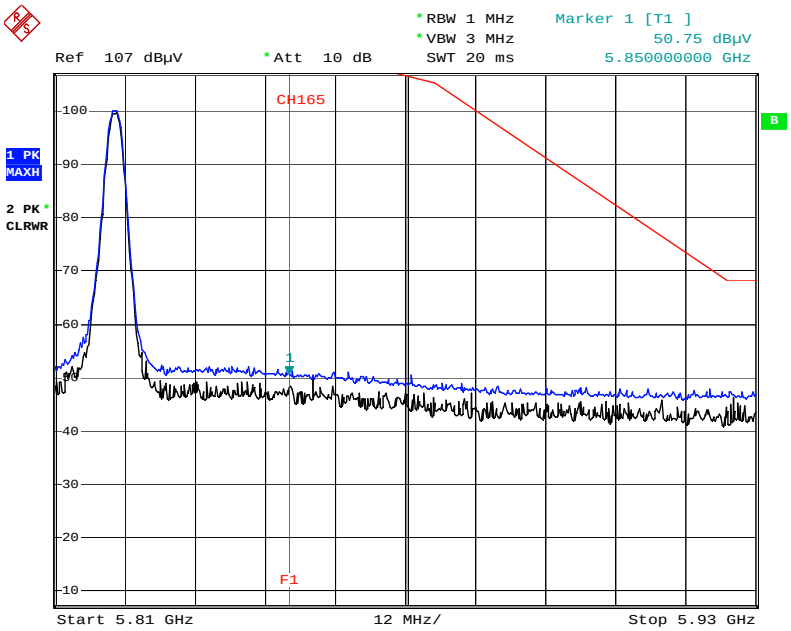
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

▣ RESULT PLOTS (UNII 3)

Radiated Restricted Band Edges plot – Peak Reading for Ant.0

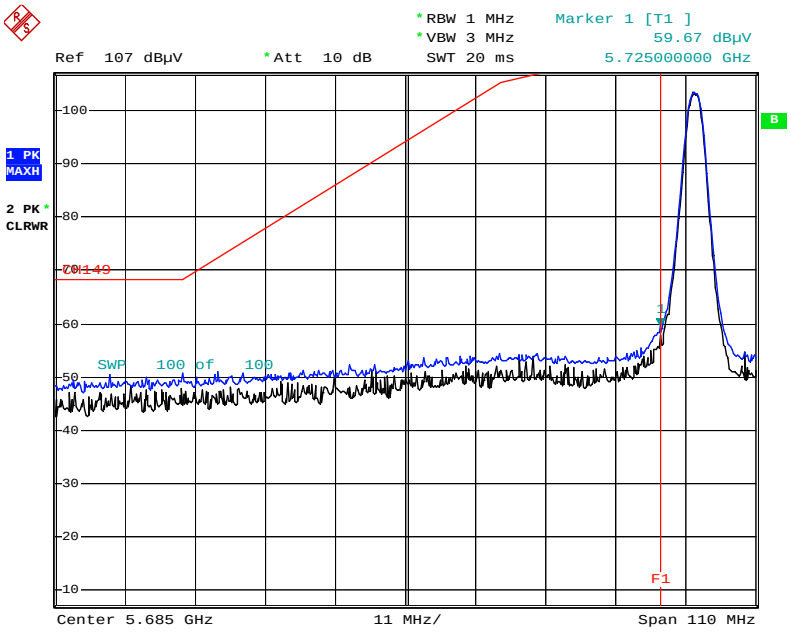


Date: 8.AUG.2017 23:11:40

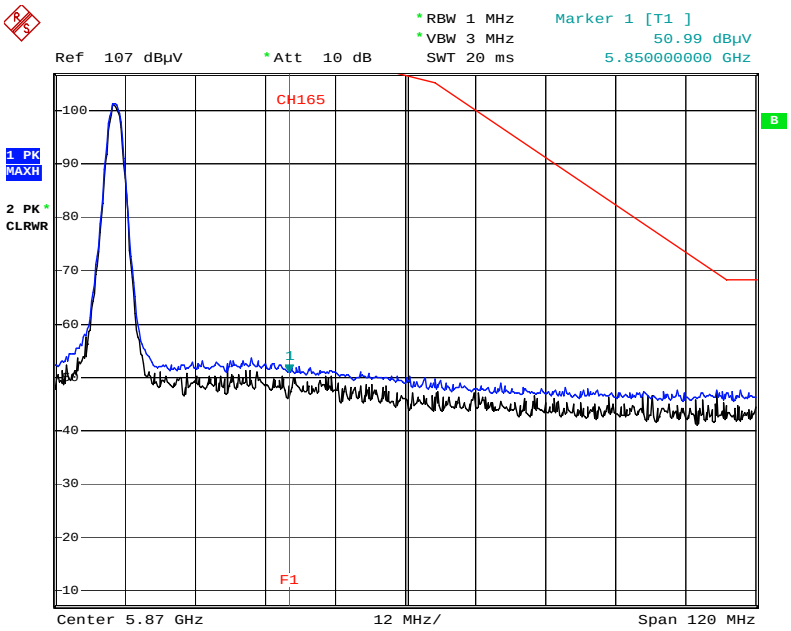


Date: 9.AUG.2017 00:21:37

Radiated Restricted Band Edges plot – Peak Reading for Ant.1



Date: 9.AUG.2017 01:14:42



Date: 9.AUG.2017 00:32:33

9.7.3 RECEIVER SPURIOUS EMISSIONS

ISED Rule(s):	**RSS-Gen**
Test Requirements:	**Blow the table**
Operating conditions:	**Under normal test conditions**
Method of testing:	**Radiated**
S/A. Settings:	**F < 1 GHz: RBW: 120 kHz, VBW: 300 kHz (Quasi Peak)** **F > 1 GHz: RBW: 1 MHz, VBW: 1 MHz (Peak)**
Mode of operation:	**Receive**

Frequency (MHz)	Field Strength (microvolts/m at 3 meters)
30 – 88	100
88 - 216	150
216 – 960	200
Above 960	500

Operation Mode: Receive:

30 MHz ~ 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBμN	dB /m	dB	(H/V)	dBμN/m	dBμN/m	dB
No critical peaks found							

Above 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBμN	dB /m	dB	(H/V)	dBμN/m	dBμN/m	dB
No critical peaks found							

9.8 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which 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 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

TEST CONFIGURATION

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

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

SAMPLE CALCULATION

Quasi-peak(Final Result) = Reading Value + Correction Factor

▣ RESULT PLOTS

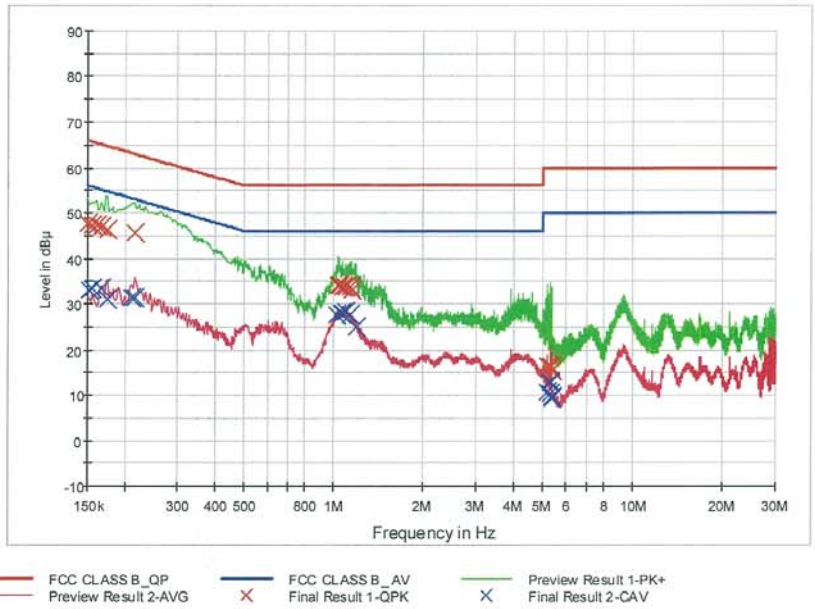
Conducted Emissions (Line 1)

EMI Auto Test(14) 1 / 2

HCT TEST Report

Common Information

EUT:	ATM200
Manufacturer:	WISOL
Test Site:	SHIELD ROOM
Operating Conditions:	WLAN 5GHz MODE



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	47.6	9.000	Off	L1	9.6	18.4	66.0
0.156000	47.3	9.000	Off	L1	9.6	18.4	65.7
0.160000	47.2	9.000	Off	L1	9.6	18.3	65.5
0.166000	46.8	9.000	Off	L1	9.6	18.3	65.2
0.174000	46.3	9.000	Off	L1	9.6	18.4	64.8
0.216000	45.6	9.000	Off	L1	9.6	17.4	63.0
1.032000	34.1	9.000	Off	L1	9.7	21.9	56.0
1.042000	34.0	9.000	Off	L1	9.7	22.0	56.0
1.070000	33.8	9.000	Off	L1	9.7	22.2	56.0
1.092000	33.8	9.000	Off	L1	9.7	22.2	56.0
1.138000	33.9	9.000	Off	L1	9.7	22.1	56.0
1.144000	33.1	9.000	Off	L1	9.7	22.9	56.0
5.184000	16.3	9.000	Off	L1	9.9	43.7	60.0
5.188000	16.5	9.000	Off	L1	9.9	43.5	60.0
5.202000	16.3	9.000	Off	L1	9.9	43.7	60.0
5.316000	16.2	9.000	Off	L1	9.9	43.8	60.0
5.322000	16.5	9.000	Off	L1	9.9	43.5	60.0
5.346000	15.5	9.000	Off	L1	9.9	44.5	60.0

Final Result 2

2017-08-11 오전 9:08:29

EMI Auto Test(14) 2 / 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.152000	33.1	9.000	Off	L1	9.6	22.8	55.9
0.156000	33.6	9.000	Off	L1	9.6	22.1	55.7
0.166000	33.4	9.000	Off	L1	9.6	21.7	55.2
0.174000	30.9	9.000	Off	L1	9.6	23.8	54.8
0.210000	31.4	9.000	Off	L1	9.6	21.8	53.2
0.216000	31.3	9.000	Off	L1	9.6	21.7	53.0
1.026000	27.6	9.000	Off	L1	9.7	18.4	46.0
1.054000	27.8	9.000	Off	L1	9.7	18.2	46.0
1.070000	27.8	9.000	Off	L1	9.7	18.2	46.0
1.092000	28.2	9.000	Off	L1	9.7	17.8	46.0
1.138000	27.8	9.000	Off	L1	9.7	18.2	46.0
1.188000	25.0	9.000	Off	L1	9.7	21.0	46.0
5.202000	10.6	9.000	Off	L1	9.9	39.4	50.0
5.312000	10.2	9.000	Off	L1	9.9	39.8	50.0
5.316000	12.7	9.000	Off	L1	9.9	37.3	50.0
5.324000	13.2	9.000	Off	L1	9.9	36.8	50.0
5.346000	9.7	9.000	Off	L1	9.9	40.4	50.0
5.366000	9.4	9.000	Off	L1	9.9	40.6	50.0

2017-08-11 오전 9:08:29

Conducted Emissions (Line 2)

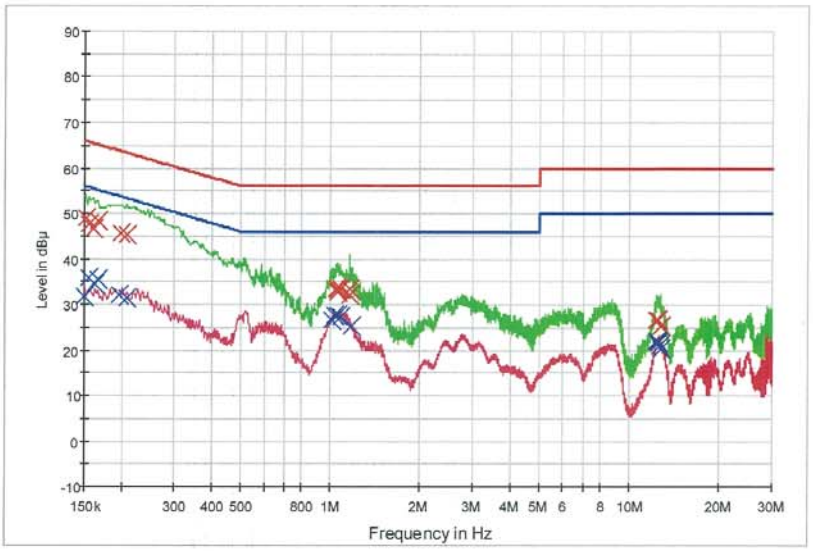
EMI Auto Test(14) 1 / 2

HCT TEST Report

Common Information

EUT:	ATM200
Manufacturer:	WISOL
Test Site:	SHIELD ROOM
Operating Conditions:	WLAN 5GHz MODE

FCC CLASS B



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.152000	49.0	9.000	Off	N	9.6	16.9	65.9
0.156000	47.8	9.000	Off	N	9.6	17.9	65.7
0.160000	46.7	9.000	Off	N	9.6	18.8	65.5
0.166000	48.2	9.000	Off	N	9.6	16.9	65.2
0.198000	45.5	9.000	Off	N	9.6	18.2	63.7
0.208000	45.1	9.000	Off	N	9.6	18.2	63.3
1.044000	33.5	9.000	Off	N	9.7	22.5	56.0
1.052000	33.2	9.000	Off	N	9.7	22.8	56.0
1.062000	32.9	9.000	Off	N	9.7	23.1	56.0
1.080000	33.4	9.000	Off	N	9.7	22.6	56.0
1.160000	33.3	9.000	Off	N	9.7	22.7	56.0
1.164000	32.1	9.000	Off	N	9.7	23.9	56.0
12.344000	26.6	9.000	Off	N	10.2	33.4	60.0
12.492000	26.6	9.000	Off	N	10.2	33.4	60.0
12.498000	26.7	9.000	Off	N	10.2	33.3	60.0
12.538000	26.5	9.000	Off	N	10.2	33.5	60.0
12.702000	25.4	9.000	Off	N	10.2	34.6	60.0
12.730000	25.3	9.000	Off	N	10.2	34.7	60.0

Final Result 2

2017-08-11 오전 9:18:08

EMI Auto Test(14) 2 / 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	31.7	9.000	Off	N	9.6	24.3	56.0
0.156000	35.7	9.000	Off	N	9.6	20.0	55.7
0.162000	34.2	9.000	Off	N	9.6	21.1	55.4
0.166000	35.4	9.000	Off	N	9.6	19.8	55.2
0.196000	32.1	9.000	Off	N	9.6	21.7	53.8
0.208000	31.2	9.000	Off	N	9.6	22.1	53.3
1.006000	26.6	9.000	Off	N	9.7	19.4	46.0
1.030000	27.6	9.000	Off	N	9.7	18.4	46.0
1.052000	27.6	9.000	Off	N	9.7	18.4	46.0
1.056000	27.6	9.000	Off	N	9.7	18.4	46.0
1.082000	27.3	9.000	Off	N	9.7	18.7	46.0
1.176000	25.4	9.000	Off	N	9.7	20.6	46.0
12.344000	21.7	9.000	Off	N	10.2	28.3	50.0
12.408000	22.0	9.000	Off	N	10.2	28.0	50.0
12.530000	21.6	9.000	Off	N	10.2	28.4	50.0
12.538000	21.5	9.000	Off	N	10.2	28.5	50.0
12.652000	20.8	9.000	Off	N	10.2	29.2	50.0
12.702000	20.2	9.000	Off	N	10.2	29.8	50.0

2017-08-11 오전 9:18:08

10. LIST OF TEST EQUIPMENT

10.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/23/2016	Annual	100073
Rohde & Schwarz	ESCI / Test Receiver	12/23/2016	Annual	100584
Agilent	N9020A / Signal Analyzer	06/13/2017	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/30/2016	Annual	MY49431210
Agilent	N1911A / Power Meter	04/17/2017	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/17/2017	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/23/2016	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/12/2017	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/30/2017	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/10/2017	Annual	07560
Rohde & Schwarz	EMC32 / Software	-	-	-

10.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Audix	AM4000 / Antenna Position Tower	N/A	N/A	N/A
Audix	Turn Table	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Rohde & Schwarz	Loop Antenna	04/19/2017	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	08/25/2016	Biennial	9120D-1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	09/04/2015	Biennial	BBHA9170541
Rohde & Schwarz	FSP / Spectrum Analyzer	09/10/2016	Annual	100688
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/23/2016	Annual	101068-SZ
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	06/12/2017	Annual	8
Wainwright Instruments	WHFX7.0/18G-8SS / High Pass Filter	05/15/2017	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	06/30/2017	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/24/2017	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/12/2017	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	07/19/2017	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	07/11/2017	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/11/2017	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	01/23/2017	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/30/2017	Annual	25956