FCC Test Report

Product Name	Wireless IP gateway
Model No.	TSC06-X(X=0-9 A-Z)
FCC ID.	FU5TSC06

Applicant	EVERSPRING INDUSTRY CO., LTD
Address	3F, No.50, Sec.1, Zhonghua Rd., Tucheng Dist., New Taipei City 23666,Taiwan

Date of Receipt	Jul. 29, 2016
Issued Date	Aug. 10, 2016
Report No.	1680060R-RFUSP15V00-A
Report Version	V1.0

Testing Laboratory
3023

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

Test Report

Issued Date: Aug. 10, 2016

Report No. : 1680060R-RFUSP15V00-A

Product Name	Wireless IP gateway
Applicant	EVERSPRING INDUSTRY CO., LTD
Address	3F, No.50, Sec.1, Zhonghua Rd., Tucheng Dist., New Taipei City 23666,Taiwan
Manufacturer	Dong-Guan Li Yuan Electronics Co.,Ltd
Model No.	TSC06-X(X=0-9 A-Z)
FCC ID.	FU5TSC06
EUT Rated Voltage	AC 100-240V~50/60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	EVERSPRING
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2015 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By : Leven Huang

(Senior Adm. Specialist / Leven Huang)

Tested By : Paul Jiang

(Engineer / Paul Jiang)

Approved By :

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless IP gateway
Trade Name	EVERSPRING
FCC ID.	FU5TSC06
Model No.	TSC06-X(X=0-9 A-Z)
Frequency Range	916MHz
Type of Modulation	FSK
Number of Channels	1
Channel Control	Auto
Antenna Type	Monopole Antenna
Power Adapter	MFR: Ktec, M/N: KSASB0240900200VU Input: AC 100-240V~50/60Hz, 0.6A Output: DC 9V, 2A Cable Out: Non-Shielded, 1.8m, with one ferrite core bonded.

Center Frequency of Each Channel:

Channel	Frequency
Channel 1:	916MHz

Note:

1. The EUT is an Wireless IP gateway with a built-in 916MHz Z-Wave transceiver.
2. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit

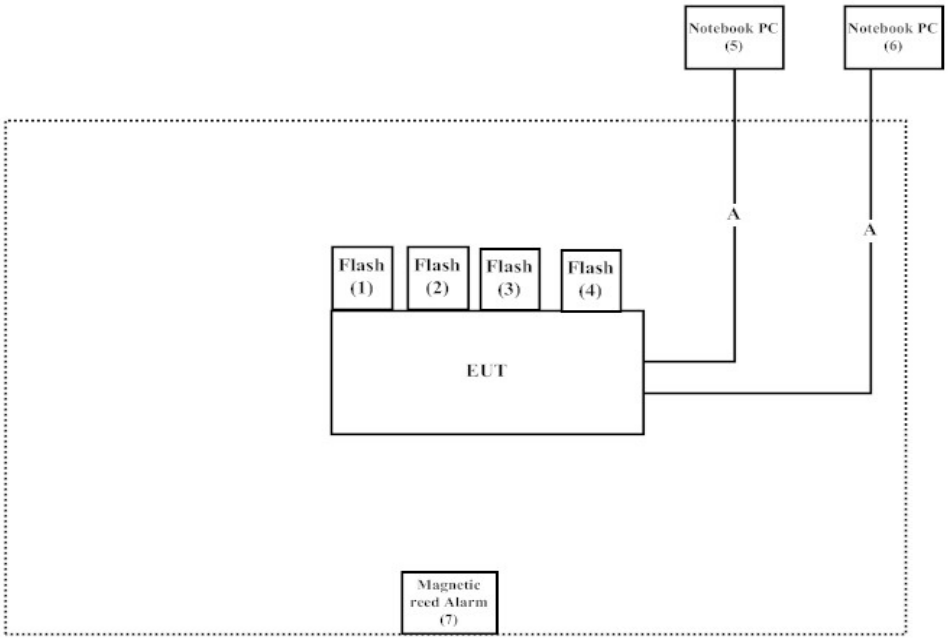
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Flash	Transcend	TS8GJF370	N/A	N/A
2	Flash	Transcend	TS8GJF370	N/A	N/A
3	Flash	Transcend	TS8GJF370	N/A	N/A
4	Flash	Transcend	TS8GJF370	N/A	N/A
5	Notebook PC	DELL	Latitude E5440	FS9TK32	Non-Shielded, 1.8m
6	Notebook PC	DELL	Latitude E5440	74BTK32	Non-Shielded, 1.8m
7	Magnetic reed Alarm	SFR	HSM01-1	N/A	N/A

Signal Cable Type		Signal cable Description
A	LAN Cable	Non-Shielded, 5m, two PCS.

1.4. Configuration of Test System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in section 1.4.
(2) Provide the Power Source.
(3) Starts the continuous transmit.
(4) Verify that the EUT works correctly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site: http://www.quietek.com/chinese/about/certificates.aspx?bval=5
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site: http://www.quietek.com/

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng,
Linkou Dist. New Taipei City 24451,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

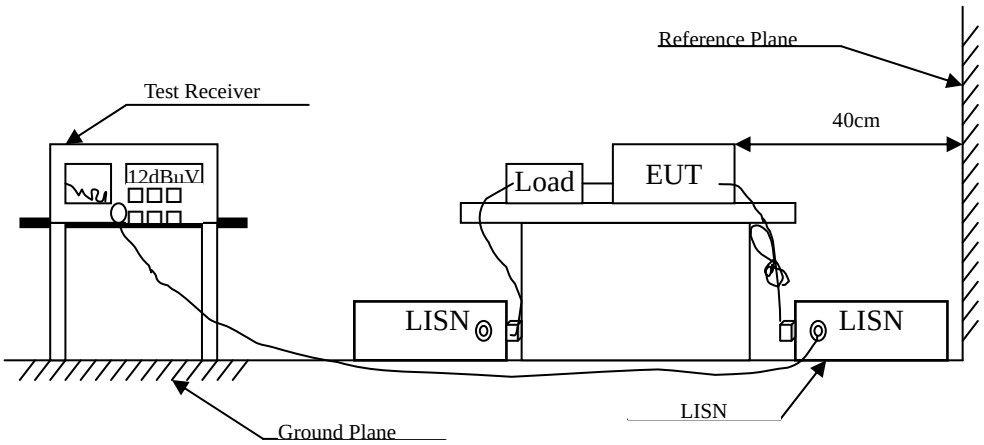
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Due Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2015	Sep., 2016	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2016	Feb., 2017	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2016	Feb., 2017	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2016	Mar, 2017	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2016	Feb., 2017	
	No.8 Shielded Room					

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

2.2. Test Setup



2.3. Limits

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

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Wireless IP gateway
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.173	9.680	34.810	44.490	-20.853	65.343
0.233	9.677	30.050	39.727	-23.902	63.629
0.380	9.672	22.250	31.922	-27.507	59.429
0.541	9.677	13.400	23.077	-32.923	56.000
1.408	9.715	5.490	15.205	-40.795	56.000
15.939	9.967	9.930	19.897	-40.103	60.000
Average					
0.173	9.680	14.140	23.820	-31.523	55.343
0.233	9.677	12.870	22.547	-31.082	53.629
0.380	9.672	10.050	19.722	-29.707	49.429
0.541	9.677	0.230	9.907	-36.093	46.000
1.408	9.715	0.120	9.835	-36.165	46.000
15.939	9.967	1.790	11.757	-38.243	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Wireless IP gateway
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.166	9.735	35.580	45.315	-20.228	65.543
0.232	9.737	30.570	40.307	-23.350	63.657
0.306	9.739	25.140	34.879	-26.664	61.543
0.408	9.743	23.260	33.003	-25.626	58.629
0.548	9.747	14.030	23.777	-32.223	56.000
16.611	10.126	5.780	15.906	-44.094	60.000
Average					
0.166	9.735	13.960	23.695	-31.848	55.543
0.232	9.737	11.250	20.987	-32.670	53.657
0.306	9.739	6.110	15.849	-35.694	51.543
0.408	9.743	14.770	24.513	-24.116	48.629
0.548	9.747	5.070	14.817	-31.183	46.000
16.611	10.126	0.270	10.396	-39.604	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Radiated Emission

3.1. Test Equipment

The following test equipments are used during the radiated emission test:

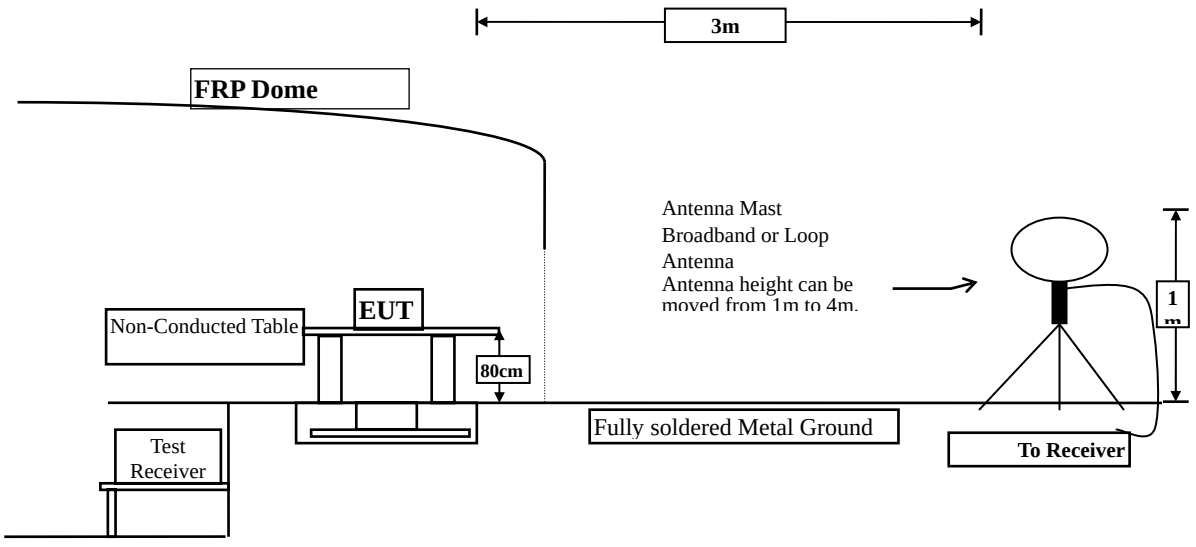
Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
☒Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2015	Sep, 2016
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun, 2016	Jun, 2017
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun, 2016	Jun, 2017
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun, 2016	Jun, 2017
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun, 2016	Jun, 2017

Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
☒CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2015	Oct, 2016
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2016	Mar, 2017
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2016	Jan, 2017
	X	Horn Antenna	TRC	AH-0801/95051	Aug, 2016	Aug, 2017
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2016	Jan, 2017
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2016	Jul, 2017
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2016	Jul, 2017

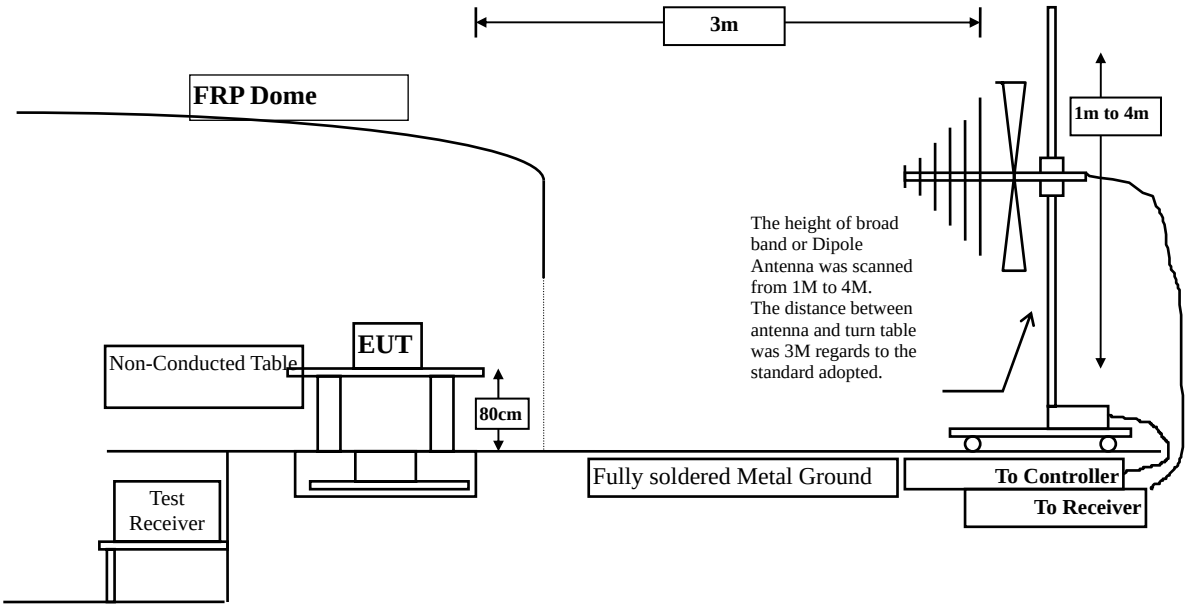
Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

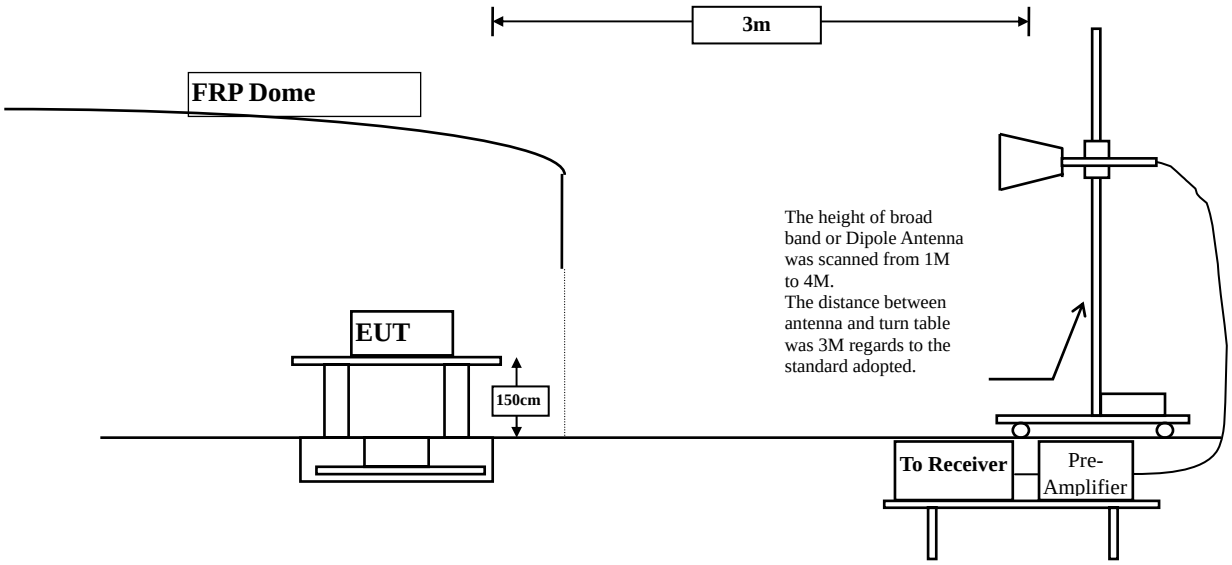
Under 30MHz Test Setup



Below 1GHz



Above 1GHz



3.3. Limits

➢ **Fundamental and Harmonics Emission Limits**

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m @3m)	(dBuV/m @3m)	(uV/m @3m)	(dBuV/m @3m)
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➢ **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
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

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.4. Test Procedure

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

3.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

3.6. Test Result of Radiated Emission

Product : Wireless IP gateway
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Quasi-Peak:					
916.000	-5.877	98.900	93.023	-0.977	94.000
Vertical					
Quasi-Peak:					
916.000	-4.821	98.300	93.479	-0.521	94.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

Product : Wireless IP gateway
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
1832.000	3.172	48.510	51.682	-22.318	74.000
2748.000	6.971	35.760	42.731	-31.269	74.000
3664.000	7.263	33.930	41.192	-32.808	74.000
4580.000	8.856	30.720	39.576	-34.424	74.000
5496.000	12.141	32.580	44.721	-29.279	74.000
6412.000	14.480	33.490	47.970	-26.030	74.000
7328.000	17.215	32.460	49.675	-24.325	74.000
8244.000	21.104	31.980	53.084	-20.916	74.000
9160.000	18.785	32.310	51.095	-22.905	74.000

Average Detector:

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Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless IP gateway
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
1832.000	4.694	48.130	52.824	-21.176	74.000
2748.000	6.803	37.560	44.363	-29.637	74.000
3664.000	8.234	34.370	42.603	-31.397	74.000
4580.000	12.578	32.810	45.387	-28.613	74.000
5496.000	13.617	32.290	45.907	-28.093	74.000
6412.000	15.897	33.920	49.817	-24.183	74.000
7328.000	18.116	32.380	50.496	-23.504	74.000
7328.000	18.116	32.510	50.626	-23.374	74.000
8244.000	21.074	32.410	53.483	-20.517	74.000
9160.000	18.692	32.170	50.862	-23.138	74.000

Average Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless IP gateway
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
42.107	-4.048	18.626	14.579	-25.421	40.000
173.524	-9.959	25.926	15.967	-27.533	43.500
356.816	-2.341	19.057	16.715	-29.285	46.000
571.849	2.236	17.489	19.725	-26.275	46.000
726.271	3.471	17.111	20.582	-25.418	46.000
891.693	5.799	16.692	22.491	-23.509	46.000
Vertical					
30.000	1.020	31.152	32.172	-7.828	40.000
173.529	-8.449	27.075	18.627	-24.873	43.500
297.193	-7.231	25.828	18.597	-27.403	46.000
618.637	-2.513	22.754	20.241	-25.759	46.000
841.918	3.028	18.899	21.928	-24.072	46.000
942.362	6.584	20.933	27.517	-18.483	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

4. Band Edge

4.1. Test Equipment

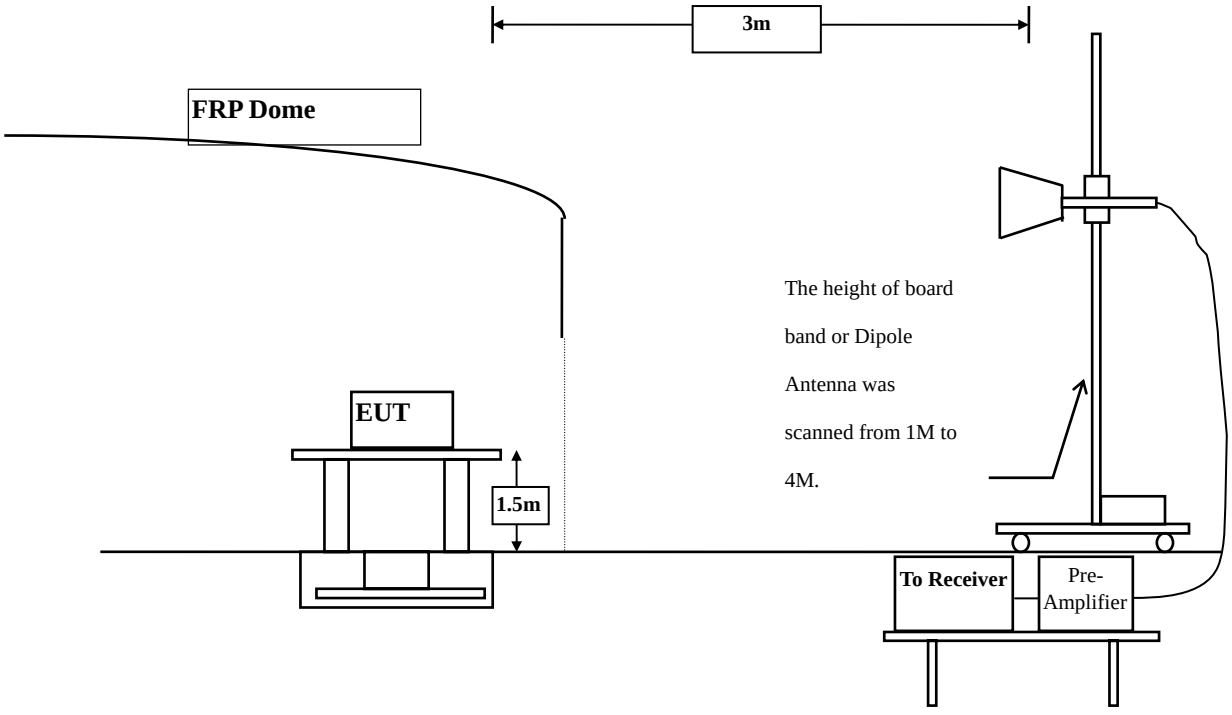
The following test equipments are used during the band edge tests:

Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.	Due Cal.
☒CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2015	Oct, 2016
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2016	Mar, 2017
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2016	Jan, 2017
	X	Horn Antenna	TRC	AH-0801/95051	Aug, 2016	Aug, 2017
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2016	Jan, 2017
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2016	Jul, 2017
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2016	Jul, 2017

Note: 1. All equipments are calibrated every one year.

2. The test equipments marked by "X" are used to measure the final test results.

4.2. Test Setup



4.3. Limit

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)).

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.
The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30)is 120 kHz, above 1GHz are 1 MHz.

4.5. Uncertainty

Radiated is ± 3.9 dB.

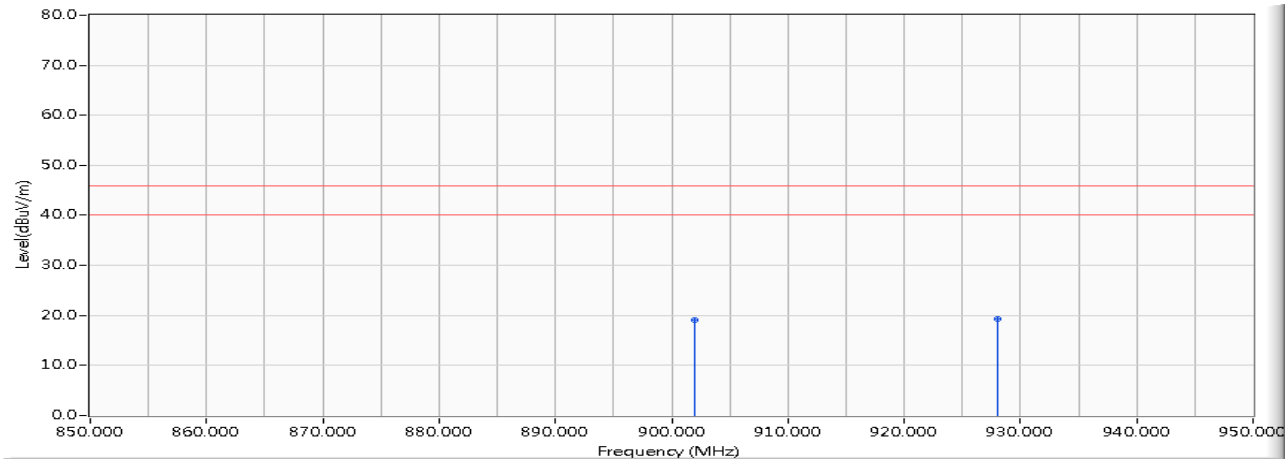
4.6. Test Result of Band Edge

Product : Wireless IP gateway
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

RF Radiated Measurement (Horizontal):

No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	-5.979	25.100	19.121	46.000	Pass
02(Quasi-Peak)	928.000	-5.791	25.200	19.409	46.000	Pass

Figure Channel 01: Horizontal (Quasi-Peak)



Note:

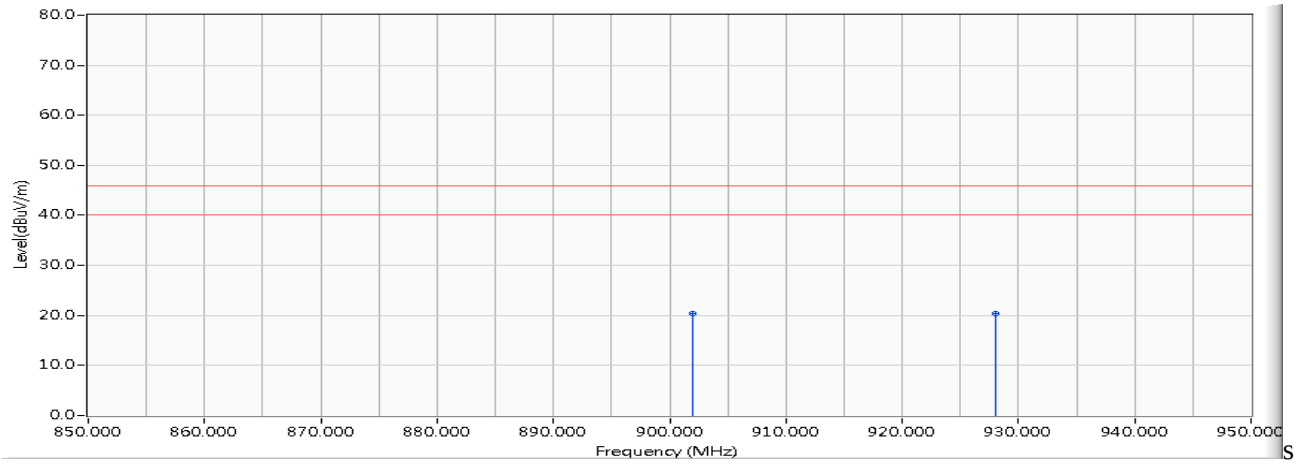
1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : Wireless IP gateway
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

RF Radiated Measurement (Vertical):

No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	-4.829	25.100	20.271	46.000	Pass
02(Quasi-Peak)	928.000	-4.811	25.200	20.389	46.000	Pass

Figure Channel 01: Vertical (Quasi-Peak)



Note:

1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

5. EMI Reduction Method During Compliance Testing

No modification was made during testing.