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FCC RADIO TEST REPORT

Applicant's company	**Wistron NeWeb Corporation**
Applicant Address	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan
FCC ID	NKRUMDRT1
Manufacturer's company	**Wistron NeWeb Corporation**
Manufacturer Address	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan

Product Name	24GHz Blind Spot Detection Radar
Brand Name	WNC
Model Name	UMD-RT01
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.249
Test Freq. Range	24068MHz ~24218MHz
Received Date	Dec. 21, 2012
Final Test Date	Dec. 29, 2012
Submission Type	Original Equipment

Statement

The test result in this report refers exclusively to the presented test model / sample.
Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2009** and **47 CFR FCC Part 15 Subpart C**.
The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR2D2102-03	Rev. 01	Initial issue of report	Aug. 27, 2014

Certificate No.: CB10308121

1 CERTIFICATE OF COMPLIANCE

Product Name	:	24GHz Blind Spot Detection Radar
Brand Name	:	WNC
Model Name	:	UMD-RT01
Applicant	:	Wistron NeWeb Corporation
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart C § 15.249

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Dec. 21, 2012 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Reviewed By:
Sam Chen

2 SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.249(a)	Field Strength of Fundamental Emissions	Complies	9.02 dB
4.2	15.215(c)	20dB Spectrum Bandwidth	Complies	-
4.3	15.249(a)/(d)	Radiated Emissions	Complies	0.515 dB
4.4	15.249(d)	Band Edge Emissions	Complies	11.33 dB
4.5	15.203	Antenna Requirements	Complies	-

3 GENERAL INFORMATION

3.1 Product Details

Items	Description
Power Type	From DC Battery 13.5V
Modulation	FMCW
Frequency Range	24068MHz ~24218MHz
Channel Number	1536
Channel Band Width (99%)	2.34 MHz
Max. Field Strength	104.98 dBuV/m at 1.5m (Average)
Carrier Frequencies	Please refer to section 3.3
Antenna	TX: PATCH array Antenna, Antenna Gain: 14dBi (Without any antenna connector) RX: PATCH array Antenna, Antenna Gain: 13dBi (Without any antenna connector)

3.2 Accessories

N/A

3.3 Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency
24068MHz ~24218MHz	1	24068 MHz
	:	:
	768	24143 MHz
	:	:
	1536	24218 MHz

3.4 Table for Test Modes

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	Channel
Field Strength of Fundamental Emissions 20dB Spectrum Bandwidth	CTX	1/768/1536
Radiated Emissions 30MHz~1GHz	Normal	-
Radiated Emissions 1GHz~40GHz	Normal	-
Radiated Emissions 40GHz~100GHz	CTX	1/768/1536
Band Edge Emissions	CTX	1/768/1536

Note: CTX=continuously transmitting

3.5 Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	**Site Category**	**Location**	**FCC Reg. No.**	**IC File No.**	**VCCI Reg. No**
03CH01-CB	SAC	Hsin Chu	187376	IC 4086D	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

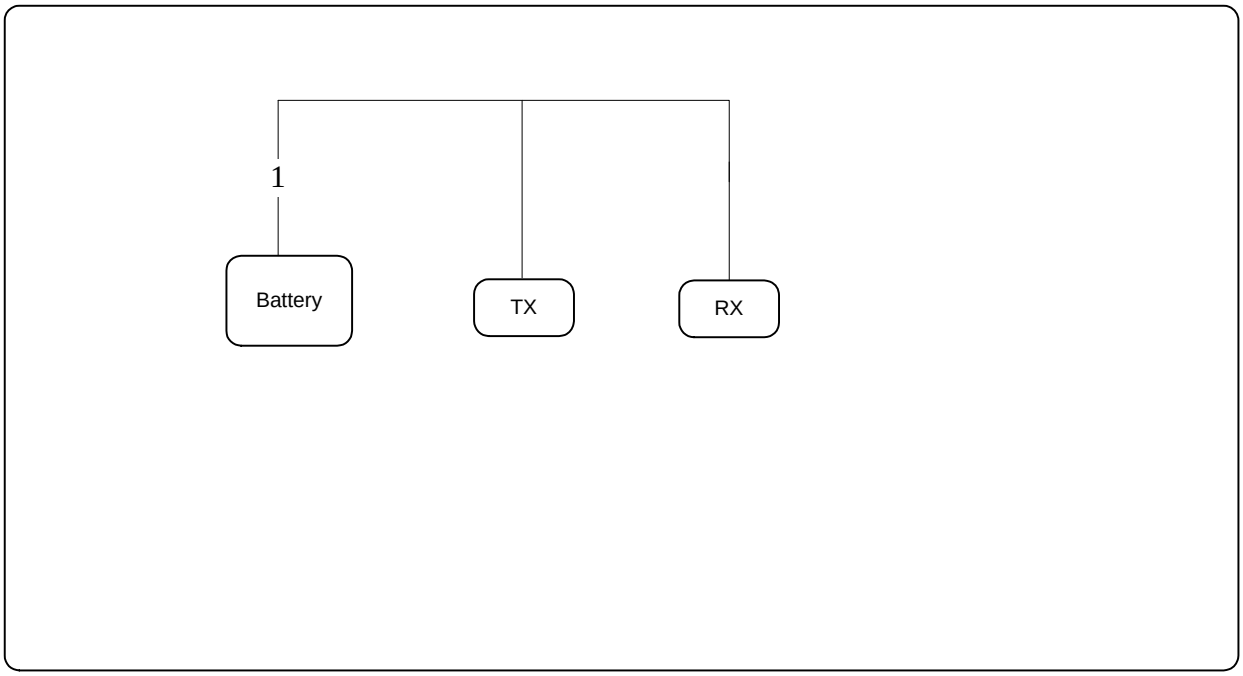
Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

3.6 Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Battery	YUASA	36B20R(S)	DoC
24GHz Blind Spot Detection Radar	WNC	UMDRT01(S)	N/A

3.7 Test Configurations

3.7.1 Radiation Emissions Test Configuration



Item	Connection	Shield	Length
1	Power Cable	No	8.2m

4 TEST RESULT

4.1 Field Strength of Fundamental Emissions Measurement

4.1.1 Limit

The field strength of fundamental emissions within these bands specified at a distance of 3 meters (measurement instrumentation employing an average detector) shall comply with the following table.

4.1.2 Measuring Instruments and Setting

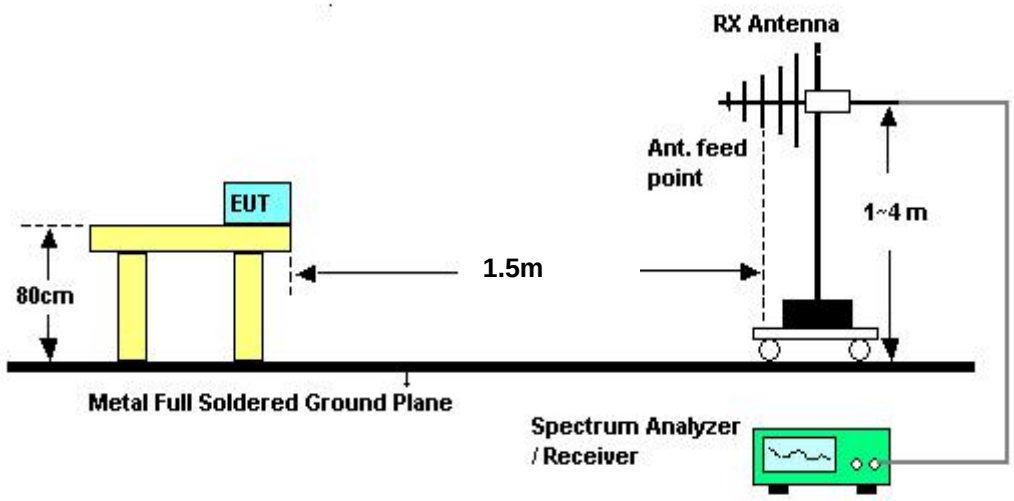
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Power Meter Parameter	Setting
RBW	1 MHz Peak / 1MHz Average
VBW	1 MHz Peak / 10Hz Average
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.1.3 Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. For Fundamental emissions, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

4.1.4 Test Setup Layout



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6.02 dB].

4.1.5 Test Deviation

There is no deviation with the original standard.

4.1.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.1.7 Test Result of Field Strength of Fundamental Emissions

Temperature	26°C	Humidity	60%
Test Engineer	Satsohi Yang	Configurations	Channel 1
Test Date	Dec. 28, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	24068.34	104.62	114.00	-9.38	93.88	6.17	38.70	34.13	Average	HORIZONTAL
2	24068.37	104.99	134.00	-29.01	94.25	6.17	38.70	34.13	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	24068.33	79.44	134.00	-54.56	68.70	6.17	38.70	34.13	Peak	VERTICAL
2	24068.37	78.66	114.00	-35.34	67.92	6.17	38.70	34.13	Average	VERTICAL

Temperature	26°C	Humidity	60%
Test Engineer	Satsohi Yang	Configurations	Channel 768
Test Date	Dec. 28, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	24143.31	104.09	114.00	-9.91	93.27	6.18	38.79	34.15	Average	HORIZONTAL
2	24143.36	104.51	134.00	-29.49	93.69	6.18	38.79	34.15	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	24142.47	79.32	136.00	-56.68	68.50	6.18	38.79	34.15	Peak	VERTICAL
2	24142.75	78.34	116.00	-37.66	67.52	6.18	38.79	34.15	Average	VERTICAL

Temperature	26°C	Humidity	60%
Test Engineer	Satsohi Yang	Configurations	Channel 1536
Test Date	Dec. 28, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	24217.67	104.98	114.00	-9.02	94.03	6.19	38.92	34.16	Average	HORIZONTAL
2	24218.19	104.80	134.00	-29.20	93.86	6.19	38.92	34.17	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	24218.09	78.02	114.00	-35.98	67.08	6.19	38.92	34.17	Average	VERTICAL
2	24218.59	78.74	134.00	-55.26	67.80	6.19	38.92	34.17	Peak	VERTICAL

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.2 20dB Spectrum Bandwidth Measurement

4.2.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (24068MHz ~24218MHz).

4.2.2 Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 20dB Bandwidth
RBW	1000 kHz
VBW	3000 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.2.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

4.2.4 Test Setup Layout

4.2.5 Test Deviation

There is no deviation with the original standard.

4.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

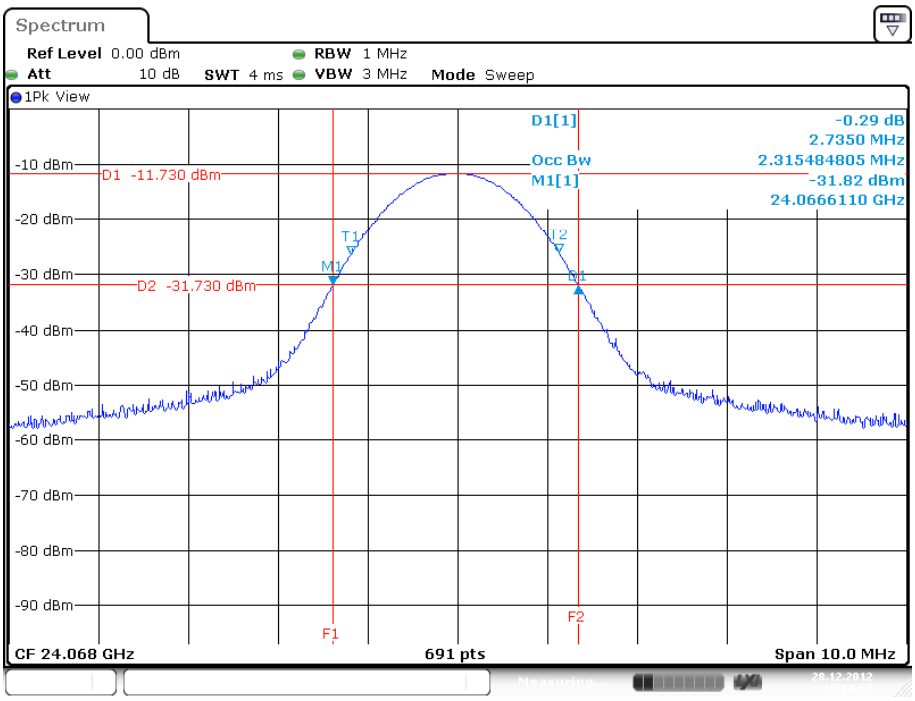
4.2.7 Test Result of 20dB Spectrum Bandwidth

Temperature	26°C	Humidity	60%
Test Engineer	Robert Peng	Configurations	Channel 1/768/1536

Frequency	20dB BW (MHz)	99% OBW (MHz)	Frequency range (MHz) f_L > 24000MHz	Frequency range (MHz) f_H < 24250MHz	Test Result
24068 MHz	2.74	2.32	24066.6110	-	Complies
24143 MHz	2.74	2.30	-	-	Complies
24218 MHz	2.78	2.34	-	24219.6000	Complies

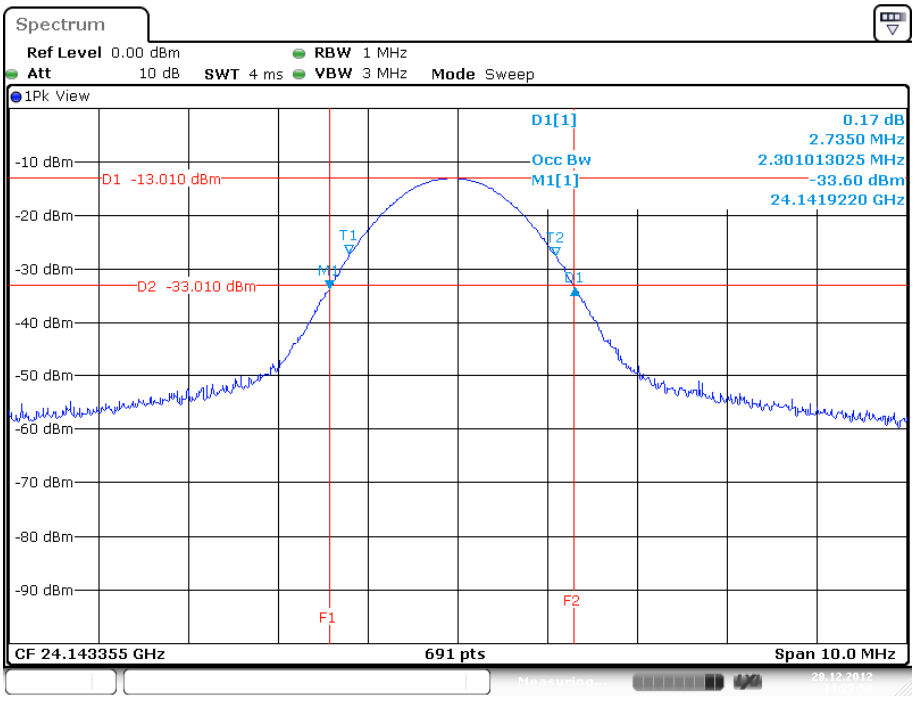
Note: f_H = 24216.821MHz (M1) + 2.779MHz = 24219.6MHz

20 dB / 99% Bandwidth Plot on 24068 MHz



Date: 28.DEC.2012 14:10:52

20 dB / 99% Bandwidth Plot on 24143 MHz



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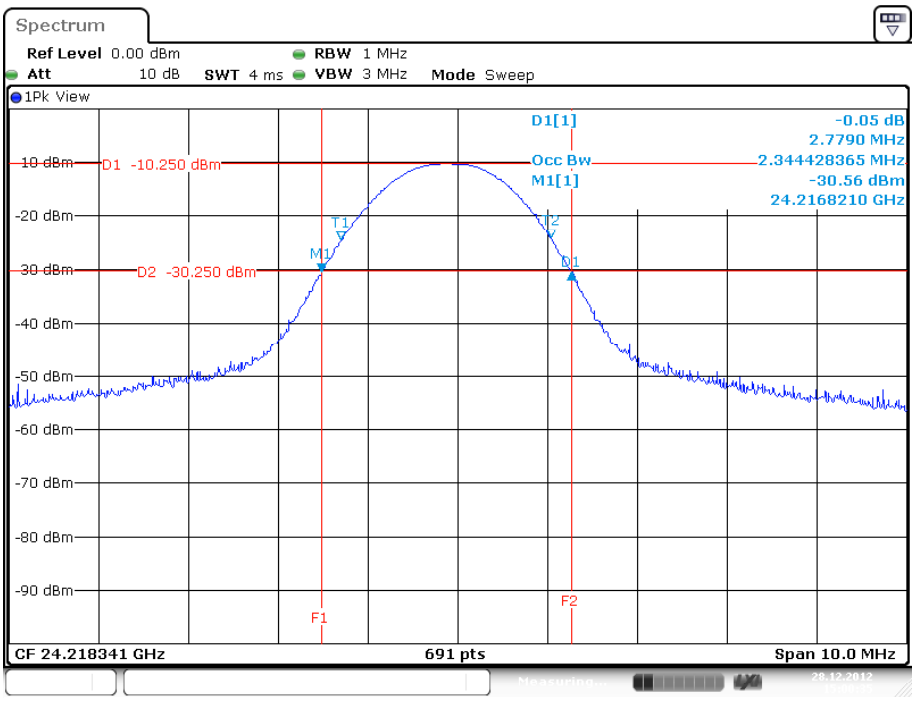
20 dB / 99% Bandwidth Plot on 24218 MHz



Date: 28.DEC.2012 15:00:35

4.3 Radiated Emissions Measurement

4.3.1 Limit

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 2.8 limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
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

4.3.2 Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

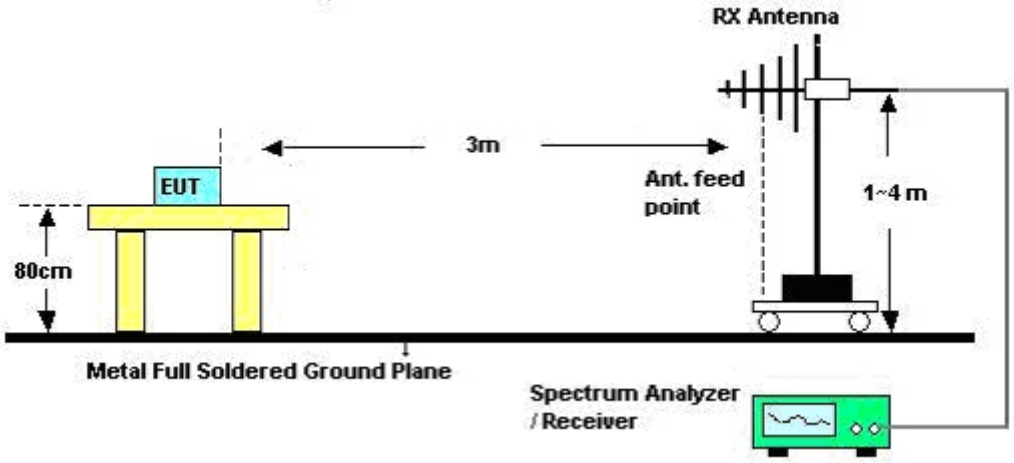
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.3.3 Test Procedures

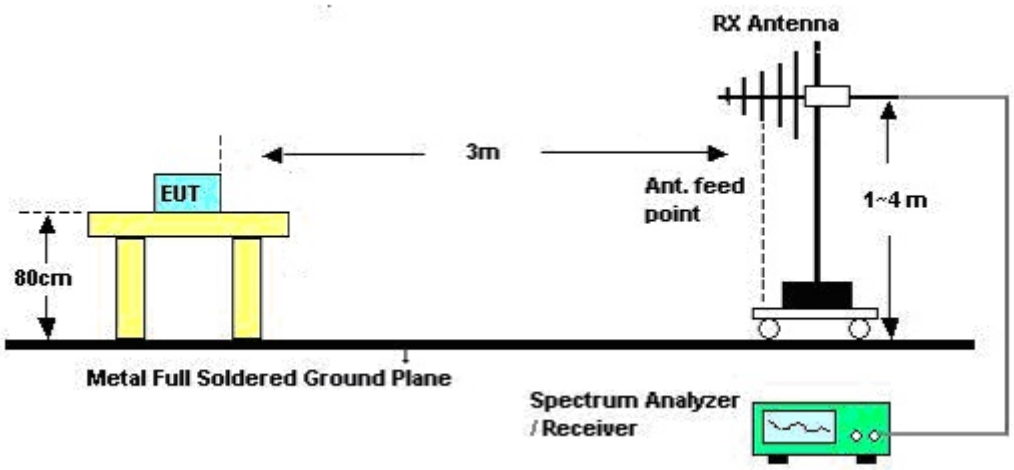
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.3.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1.5m or 3m to 0.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6.02 dB].

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [0.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [15.56 dB].

4.3.5 Test Deviation

There is no deviation with the original standard.

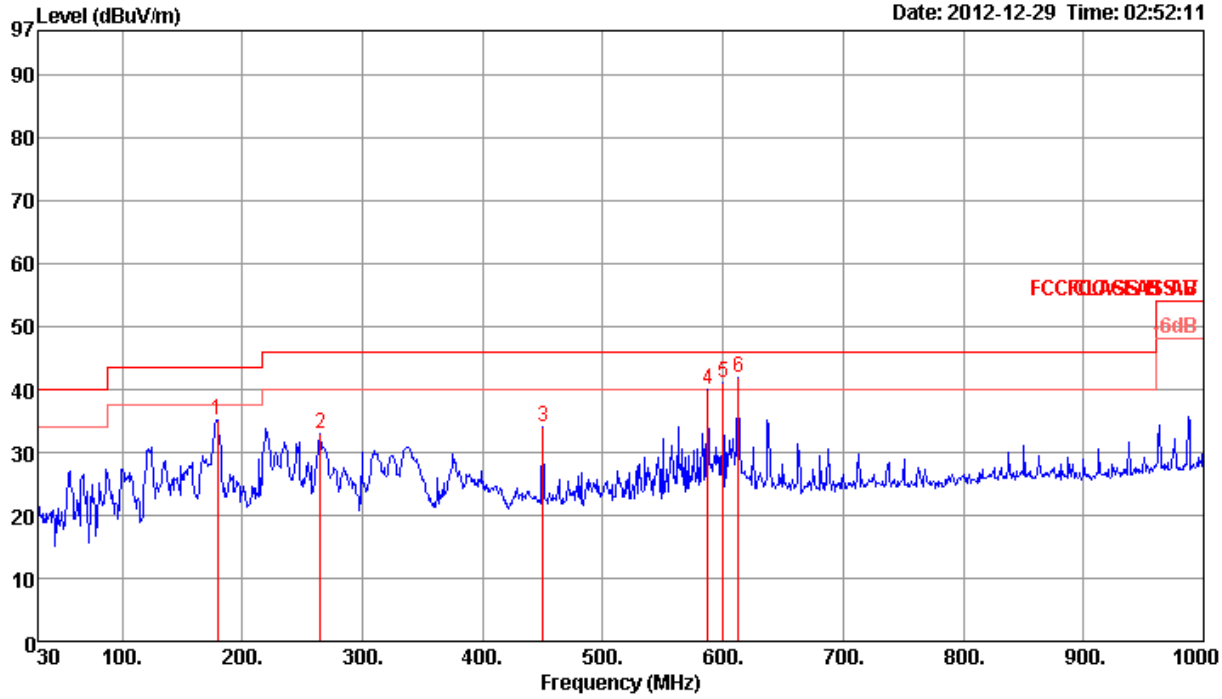
4.3.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7 Results of Radiated Emissions (30MHz~1GHz)

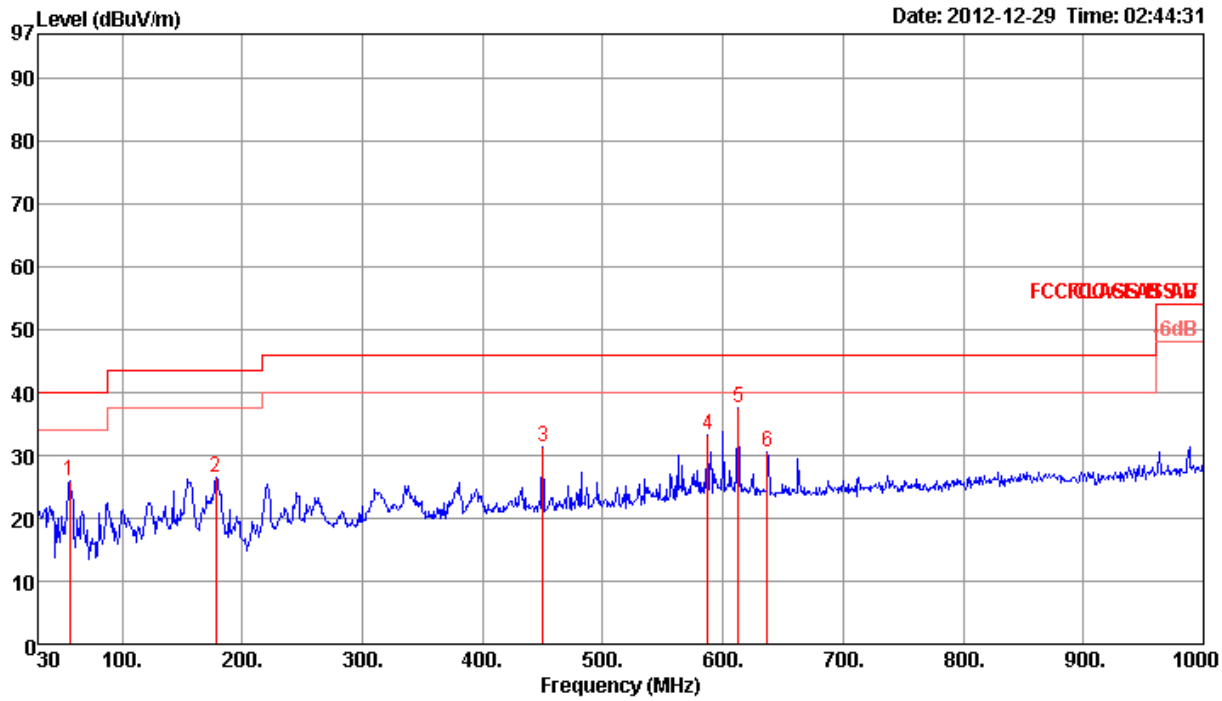
Temperature	24.5°C	Humidity	57%
Test Engineer	Satsohi Yang	Configurations	Normal

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	179.38	35.12	43.50	-8.38	47.58	1.60	27.20	13.14	360	100	Peak	HORIZONTAL
2	264.74	33.07	46.00	-12.93	45.14	1.96	26.97	12.94	360	100	Peak	HORIZONTAL
3	450.01	34.02	46.00	-11.98	42.43	2.60	27.85	16.84	360	100	Peak	HORIZONTAL
4	587.75	39.90	46.00	-6.10	46.49	2.88	28.10	18.63	360	100	Peak	HORIZONTAL
5 !	600.36	40.96	46.00	-5.04	47.39	2.90	28.10	18.77	360	100	Peak	HORIZONTAL
6 p	612.97	41.83	46.00	-4.17	48.13	2.98	28.09	18.81	360	100	Peak	HORIZONTAL

Vertical



		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1		56.19	25.84	40.00	-14.16	45.35	0.80	27.78	7.47	0	400	Peak	VERTICAL
2		178.41	26.42	43.50	-17.08	38.91	1.59	27.21	13.13	0	400	Peak	VERTICAL
3		450.01	31.26	46.00	-14.74	39.67	2.60	27.85	16.84	0	400	Peak	VERTICAL
4		587.75	33.32	46.00	-12.68	39.91	2.88	28.10	18.63	0	400	Peak	VERTICAL
5	p	612.97	37.45	46.00	-8.55	43.75	2.98	28.09	18.81	0	400	Peak	VERTICAL
6		637.22	30.45	46.00	-15.55	36.50	3.12	28.06	18.89	0	400	Peak	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.3.8 Results for Radiated Emissions (1GHz~40GHz)

Temperature	24.5°C	Humidity	57%
Test Engineer	Satsohi Yang	Configurations	Normal / 1~18G
Test Date	Dec. 29, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	1551.71	39.62	74.00	-34.38	45.23	3.53	34.90	25.76	236	100	Peak	HORIZONTAL
2	1551.80	32.61	54.00	-21.39	38.22	3.53	34.90	25.76	236	100	Average	HORIZONTAL
3	10599.90	39.45	54.00	-14.55	25.64	9.05	35.14	39.90	53	100	Average	HORIZONTAL
4	10600.24	53.65	74.00	-20.35	39.84	9.05	35.14	39.90	53	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	1552.07	31.07	54.00	-22.93	36.68	3.53	34.90	25.76	88	100	Average	VERTICAL
2	1552.12	38.34	74.00	-35.66	43.95	3.53	34.90	25.76	88	100	Peak	VERTICAL
3	0592.68	53.37	74.00	-20.63	39.55	9.05	35.14	39.91	233	100	Peak	VERTICAL
4	0601.92	40.35	54.00	-13.65	26.52	9.05	35.12	39.90	233	100	Average	VERTICAL

Temperature	24.5℃	Humidity	57%
Test Engineer	Satsohi Yang	Configurations	Normal / 18~26G
Test Date	Dec. 29, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	25879.18	44.40	60.00	-15.60	35.74	4.22	39.15	34.71	Average	HORIZONTAL
2	25882.44	54.06	80.00	-25.94	45.40	4.22	39.15	34.71	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	25878.54	41.14	60.00	-18.86	32.48	4.22	39.15	34.71	Average	VERTICAL
2	25884.28	52.97	80.00	-27.03	44.31	4.22	39.15	34.71	Peak	VERTICAL

Temperature	24.5℃	Humidity	57%
Test Engineer	Satsohi Yang	Configurations	Normal / 26~40G
Test Date	Dec. 29, 2012		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	27597.62	63.36	80.00	-16.64	49.77	6.23	39.23	31.87	Peak	HORIZONTAL
2	27601.42	53.49	60.00	-6.51	39.90	6.23	39.23	31.87	Average	HORIZONTAL
3	30462.36	56.64	80.00	-23.36	47.42	5.45	40.17	36.40	Peak	HORIZONTAL
4	30463.60	43.32	60.00	-16.68	34.08	5.45	40.19	36.40	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	27603.66	47.92	60.00	-12.08	34.35	6.23	39.24	31.90	Average	VERTICAL
2	27605.66	61.75	80.00	-18.25	48.18	6.23	39.24	31.90	Peak	VERTICAL
3	30463.22	57.86	80.00	-22.14	48.62	5.45	40.19	36.40	Peak	VERTICAL
4	30465.98	44.42	60.00	-15.58	35.23	5.40	40.19	36.40	Average	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.3.9 Results for Radiated Emissions (40GHz~100GHz)

4.3.10 Limit

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 47 CFR Part 15.249, whichever is the lesser attenuation.

Operating Frequencies (MHz)	Harmonics Strength (micorvolts/meter)	Harmonics Strength (dBuV/m) at 3m
24.0~24.25 GHz	2500 at 3m	68 (Average)
24.0~24.25 GHz	2500 at 3m	88 (Peak)

4.3.11 Test Result

Temperature	26°C	Humidity	60%
Test Engineer	Satsohi Yang	Configurations	Channel 1
Test Date	Dec. 28, 2012		

Frequency (GHz)	Measurement Distance (m)	Measurement Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
48.1366	0.5	87.931	103.56	-15.629
Frequency (GHz)	**Measurement Distance (m)**	**Measurement Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
48.1372	0.5	81.151	83.56	-2.409

Temperature	26°C	Humidity	60%
Test Engineer	Satsohi Yang	Configurations	Channel 768
Test Date	Dec. 28, 2012		

Frequency (GHz)	Measurement Distance (m)	Measurement Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
48.2846	0.5	87.697	103.56	-15.863
Frequency (GHz)	**Measurement Distance (m)**	**Measurement Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
48.2846	0.5	81.617	83.56	-1.943

Temperature	26°C	Humidity	60%
Test Engineer	Satsohi Yang	Configurations	Channel 1536
Test Date	Dec. 28, 2012		

Frequency (GHz)	Measurement Distance (m)	Measurement Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
48.4368	0.5	87.715	103.56	-15.845
Frequency (GHz)	Measurement Distance (m)	Measurement Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
48.4372	0.5	83.045	83.56	-0.515

4.4 Band Edge Emissions Measurement

4.4.1 Limit

Band edge emissions radiated outside of the specified frequency bands shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 2.8 limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
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

4.4.2 Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

4.4.3 Test Procedures

1. The test procedure is the same as section 4.2.3, only the frequency range investigated is limited to 2MHz around bandedges.
2. In case the emission is fail due to the used RBW/VBW is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

4.4.4 Test Setup Layout

This test setup layout is the same as that shown in section 4.2.4.

4.4.5 Test Deviation

There is no deviation with the original standard.

4.4.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7 Test Result of Band Edge and Fundamental Emissions

Temperature	26°C	Humidity	60%
Test Engineer	Satsohi Yang	Configurations	Channel 1, 768, 1536
Test Date	Dec. 28, 2012		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	24000.00	47.23	60.00	-12.77	36.58	6.17	38.60	34.12	Average	VERTICAL
2	24000.00	57.55	80.00	-22.45	46.90	6.17	38.60	34.12	Peak	VERTICAL
3	24068.40	77.82			67.08	6.17	38.70	34.13	Average	VERTICAL
4	24068.40	79.09			68.35	6.17	38.70	34.13	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 24068 MHz.

Channel 768

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	24000.00	47.23	60.00	-12.77	36.58	6.17	38.60	34.12	Average	VERTICAL
2	24000.00	58.68	80.00	-21.32	48.03	6.17	38.60	34.12	Peak	VERTICAL
3	24142.39	77.39			66.57	6.18	38.79	34.15	Average	VERTICAL
4	24143.39	78.46			67.64	6.18	38.79	34.15	Peak	VERTICAL
5	24250.00	48.67	60.00	-11.33	37.69	6.20	38.95	34.17	Average	VERTICAL
6	24250.00	60.14	80.00	-19.86	49.16	6.20	38.95	34.17	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 24143 MHz.

Channel 1566

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		
1	24218.19	77.62			66.68	6.19	38.92	34.17	Average	VERTICAL
2	24218.39	79.00			68.06	6.19	38.92	34.17	Peak	VERTICAL
3	24250.00	48.52	60.00	-11.48	37.54	6.20	38.95	34.17	Average	VERTICAL
4	24250.00	60.59	80.00	-19.41	49.61	6.20	38.95	34.17	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 24218 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.4.8 Antenna Requirements

4.4.9 Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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 manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

4.4.10 Antenna Connector Construction

Please refer to section 3.1 in this test report, antenna connector complied with the requirements.

5 LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2012	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9KHz~40GHz	Nov. 16, 2012	Radiation (05CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 20, 2012	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R.	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2012	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9KHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 20, 2012	Radiation (03CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R.	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9KHz~40GHz	Oct. 08, 2012	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 05, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	0120A02056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	3 Way	MDC2366	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	4 Way	0120A04056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Nov. 28, 2012	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Nov. 27, 2012	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required.

6 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Radiated Emission (40GHz ~ 220GHz)	4.7 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%