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FCC RADIO TEST REPORT

Applicant's company	**BRIGADE ELECTRONICS PLC**
Applicant Address	Brigade House, The Mills, Station Road, South Darenth, Kent, DA4 9BD United Kingdom
FCC ID	R5XBACKSENSE
Manufacturer's company	**Wistron Neweb Corporation**
Manufacturer Address	20 Park Avenus II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.

Product Name	Brigade Backsense Radar
Brand Name	BRIGADE
Model Name	BS-7030, BS-7045, BS-7060, BS-8000, BS-XXXX, BS-XXXX-X
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.249
Test Freq. Range	24000 ~ 24250MHz
Received Date	Nov. 14, 2013
Final Test Date	Nov. 21, 2013
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

Table of Contents

History of This Test Report

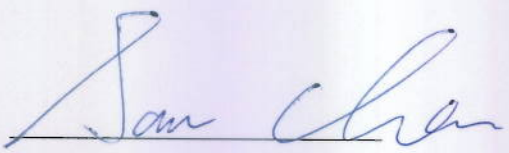
REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3N1469	Rev. 01	Initial issue of report	Dec. 12, 2013
FR3N1469	Rev. 02	1. Changing the brand name 2. Adding a model name "BS-XXXX-X"	Dec. 13, 2013
FR3N1469	Rev. 03	Revise test setup layout in section 4.3.4.	Dec. 18, 2013

Certificate No.: CB10211160

1 CERTIFICATE OF COMPLIANCE

Product Name	:	**Brigade Backsense Radar**
Brand Name	:	**BRIGADE**
Model Name	:	**BS-7030, BS-7045, BS-7060, BS-8000, BS-XXXX, BS-XXXX-X**
Applicant	:	**BRIGADE ELECTRONICS PLC**
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 Nov. 14, 2013 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**
-	15.207	AC Power Line Conducted Emissions	-	Note 1
4.1	15.249(a)	Field Strength of Fundamental Emissions	Complies	1.33 dB
4.2	15.215(c)	20dB Spectrum Bandwidth	Complies	-
4.3	15.249(a)/(d)	Radiated Emissions	Complies	3.01 dB
4.4	15.249(d)	Band Edge Emissions	Complies	6.29 dB
4.5	15.203	Antenna Requirements	Complies	-

Note 1:

It was supplied power by DC-Powered for EUT; it's not necessary to apply to AC Power Port Conducted emission test.

3 GENERAL INFORMATION

3.1 Product Details

Items	Description
Power Type	From DC 9V ~ 32V
Modulation	FMCW
Frequency Range	24000 ~ 24250MHz
Operation Frequency Range	24068 ~ 24218MHz
Channel Number	1536
Channel Band Width (99%)	4.160 MHz
Max. Field Strength	116.21 dBuV/m at 1m (Average)
Carrier Frequencies	Please refer to section 3.2
Antenna	Antenna Type: Patch array Antenna (Without any antenna connector) Antenna Gain: 18 dBi

3.2 Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency
24000 ~ 24250MHz	1	24068 MHz
	:	:
	768	24143 MHz
	:	:
	1536	24218 MHz

3.3 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 Link	-
Radiated Emissions 1GHz~40GHz	CTX	1/768/1536
Radiated Emissions 40GHz~100GHz	CTX	1/768/1536
Band Edge Emissions	CTX	1/768/1536

Note: CTX=continuously transmitting

The following test modes were performed for all tests:

For Radiated Emission test

There are two modes of EUT, one is power DC 12V of EUT, and the other is power DC 24 of EUT.

Power DC 12V has been evaluated to be the worst case.

Consequently, measurement for Radiated Emission test will follow this same test mode.

For Radiated Emission test below 1GHz:

Mode 1. Normal Link - Stand of EUT with DC 12V

For Radiated Emission test above 1GHz:

Mode 1. CTX - Stand of EUT with DC 12V

3.4 Table for Testing Locations

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).

Please refer section 6 for Test Site Address.

3.5 Table for Multiple Listing

The model names in the following table are all refer to the identical product except for the following table:

Model Name	Description
BS-7030	3 meter detection range for LED status
BS-7045	4.5 meter detection range for LED status
BS-7060	6 meter detection range for LED status
BS-8000	Configurable system with Detection Length variable from 3m to 30m
BS-XXXX	Were the "X" can represent any character for any associated variant, bespoke system which can have software changes or customised settings. i.e. This software change only change the detection range for LED status.

The model name BS-8000 was selected as representative model for the test and its data was recorded in this report.

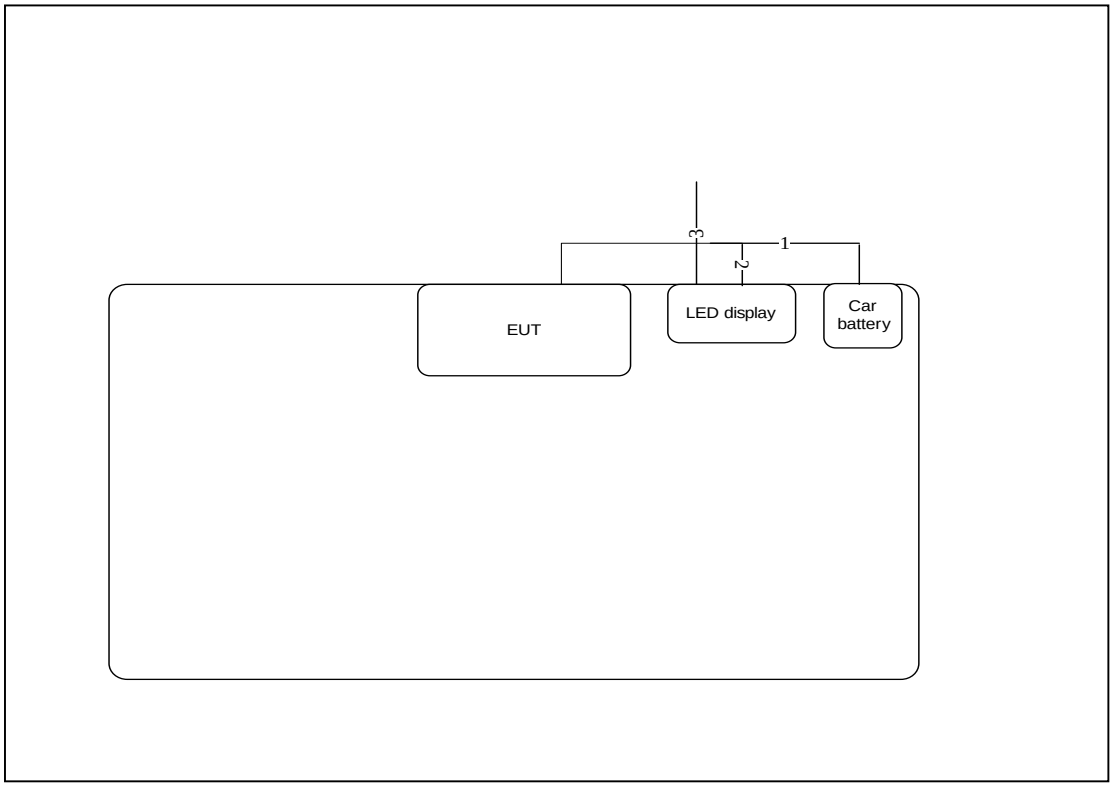
3.6 Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Battery	YUASA	ST-CLN139	N/A

3.7 Test Configurations

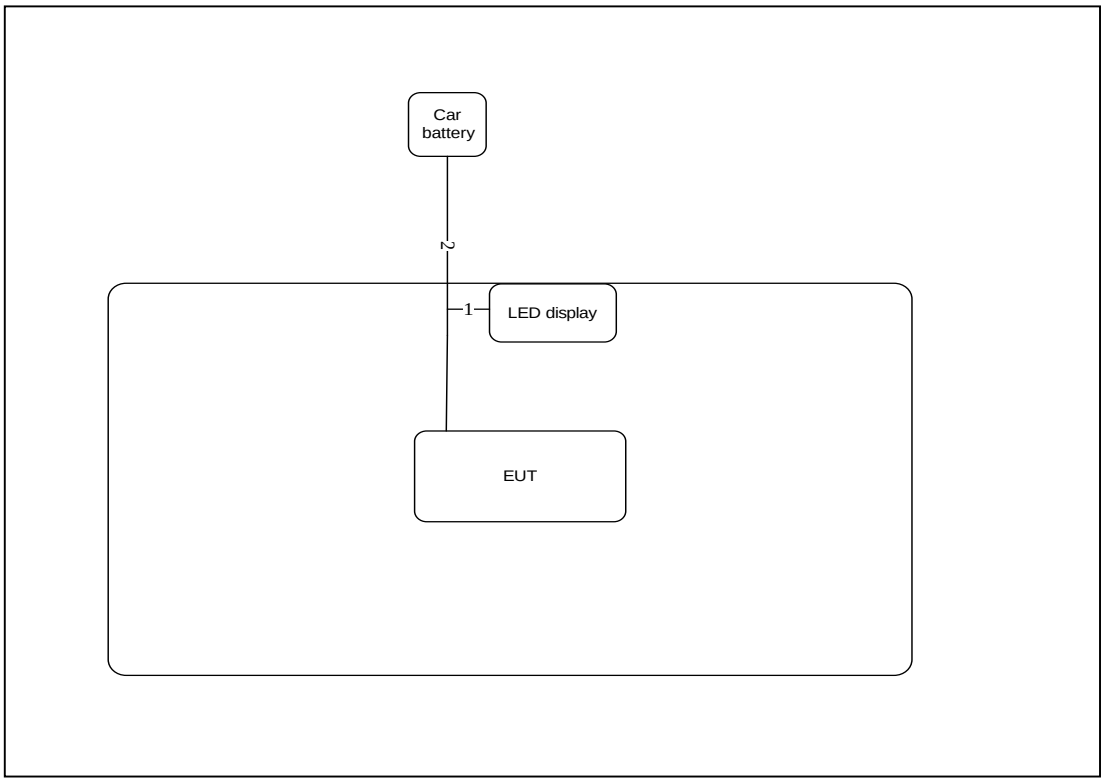
3.7.1 Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz



Item	Connection	Shielded	Length(m)	Remark
1	Bridage cable	No	2.5m	-
2	Power cable	No	2.5m	-
3	USB cable	No	0.85m	Load

Test Configuration: Above 1GHz



Item	Connection	Shielded	Length(m)
1	Bridage cable	No	2.5m
2	Power cable	No	2.5m

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.

Frequency Band (MHz)	Fundamental Emissions Limit Average/Peak (dBuV/m) at 3m
24000-24250	108/128

4.1.2 Measuring Instruments and Setting

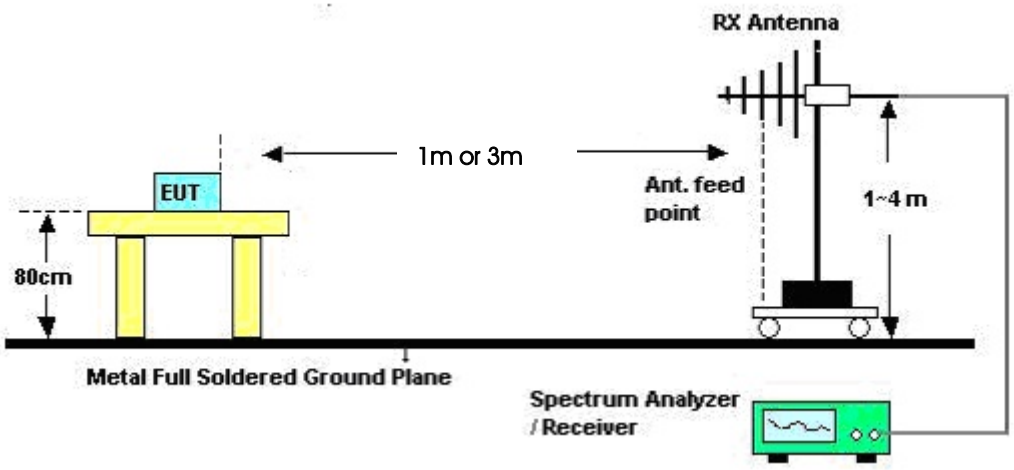
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Power Meter Parameter	Setting
RBW	1 MHz Peak / 3MHz 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 3MHz 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 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 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	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1
Test Date	Nov. 21, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	24068.30	96.95	137.54	-40.59	72.82	20.37	38.92	35.16	Peak	100	335	HORIZONTAL
2	24068.36	96.70	117.54	-20.84	72.57	20.37	38.92	35.16	Average	100	335	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	24068.38	116.30	137.54	-21.24	92.17	20.37	38.92	35.16	Peak	100	347	VERTICAL
2	24068.46	116.21	117.54	-1.33	92.08	20.37	38.92	35.16	Average	100	347	VERTICAL

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 768
Test Date	Nov. 21, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	24143.20	93.08	117.54	-24.46	69.01	20.36	38.93	35.22	Average	100	14	HORIZONTAL
2	24143.20	93.66	137.54	-43.88	69.59	20.36	38.93	35.22	Peak	100	14	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	24143.20	116.07	117.54	-1.47	92.00	20.36	38.93	35.22	Average	100	360	VERTICAL
2	24143.20	116.27	137.54	-21.27	92.20	20.36	38.93	35.22	Peak	100	360	VERTICAL

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1536
Test Date	Nov. 21, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	24217.72	96.23	117.54	-21.31	72.22	20.35	38.94	35.28	Average	100	348	HORIZONTAL
2	24218.00	96.55	137.54	-40.99	72.54	20.35	38.94	35.28	Peak	100	348	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	24217.56	115.74	137.54	-21.80	91.73	20.35	38.94	35.28	Peak	100	20	VERTICAL
2	24217.96	115.25	117.54	-2.29	91.24	20.35	38.94	35.28	Average	100	20	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 (24000 ~ 24250MHz).

4.2.2 Measuring Instruments and Setting

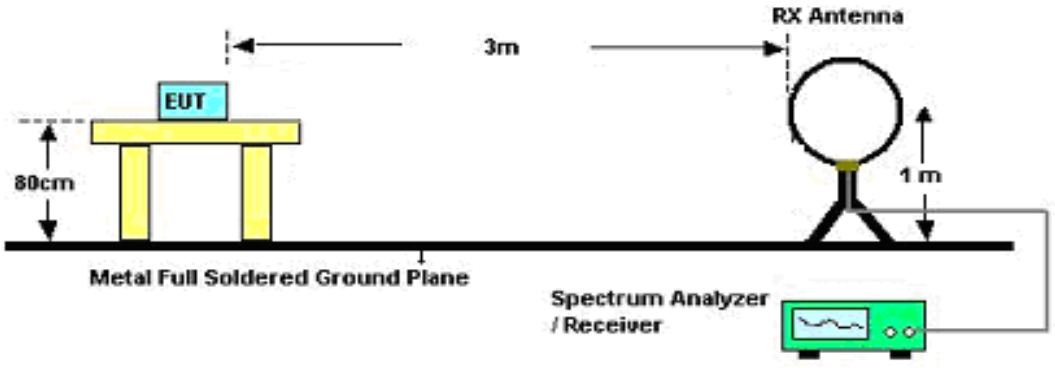
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 test procedure is the same as section 4.3.3.
2. The resolution bandwidth of 1000 kHz and the video bandwidth of 3000 kHz were used.
3. Measured the spectrum width with power higher than 20dB 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

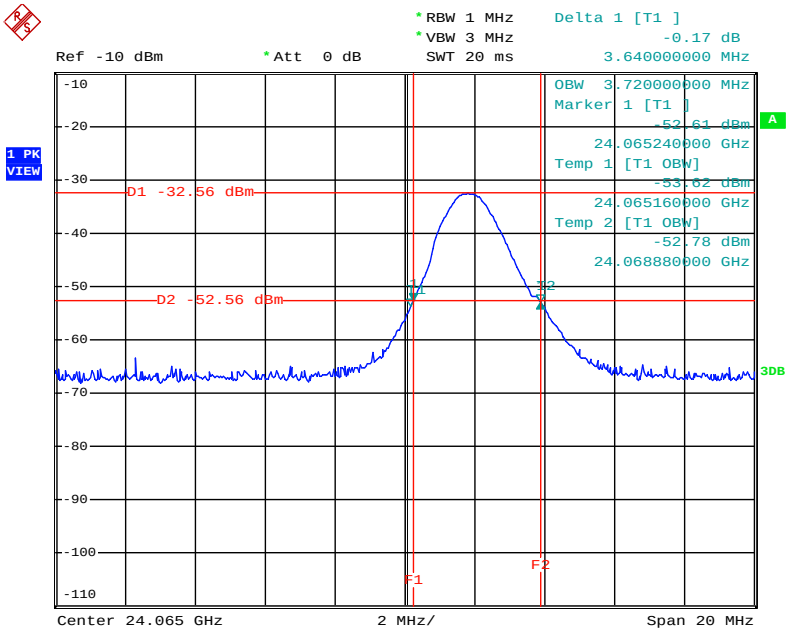
The EUT was programmed to be in continuously transmitting mode.

4.2.7 Test Result of 20dB Spectrum Bandwidth

Temperature	20°C	Humidity	63%
Test Engineer	Benson 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	3.640	3.720	24065.2400	-	Complies
24143 MHz	3.680	3.920	-	-	Complies
24218 MHz	3.640	4.160	-	24220.2000	Complies

20 dB / 99% Bandwidth Plot on 24068 MHz



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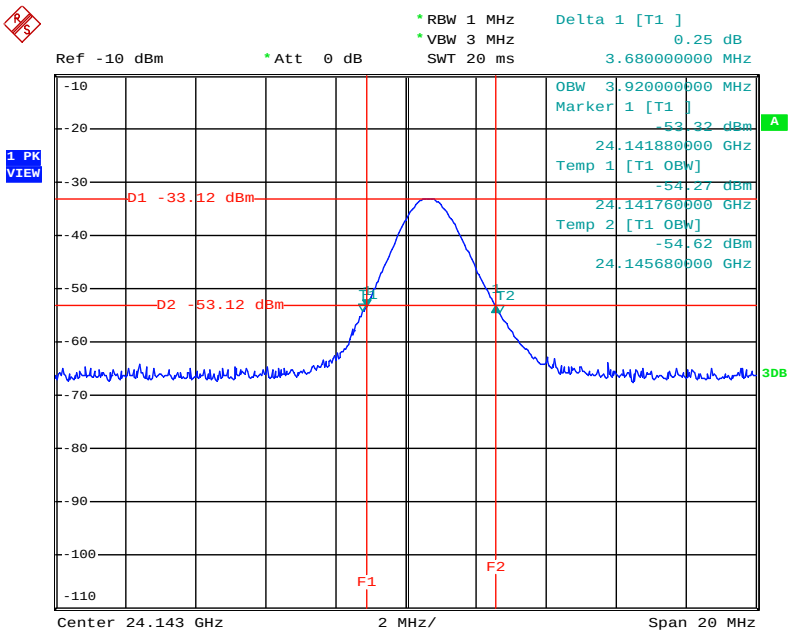
20 dB / 99% Bandwidth Plot on 24143 MHz



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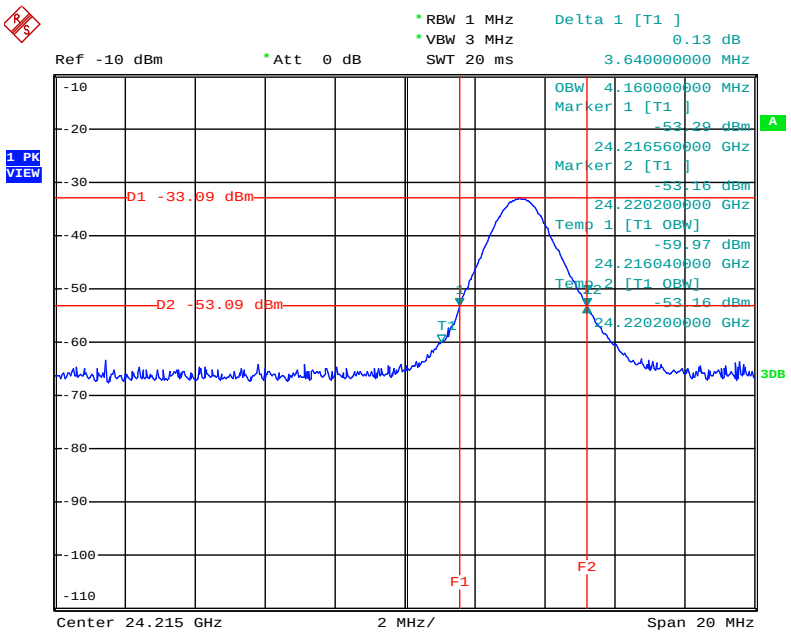
20 dB / 99% Bandwidth Plot on 24218 MHz



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4.3 Radiated Emissions Measurement

4.3.1 Limit

For 9kHz~40GHz

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 15.209(a) 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

For 40GHz~100GHz

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)

4.3.2 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

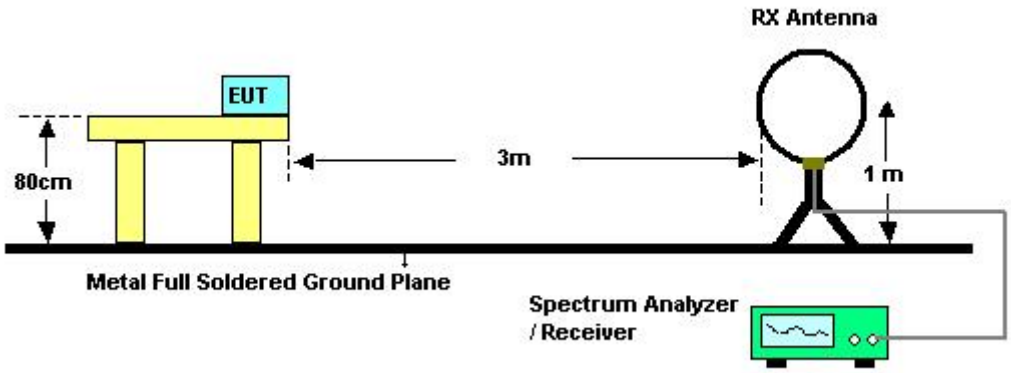
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.3.3 Test Procedures

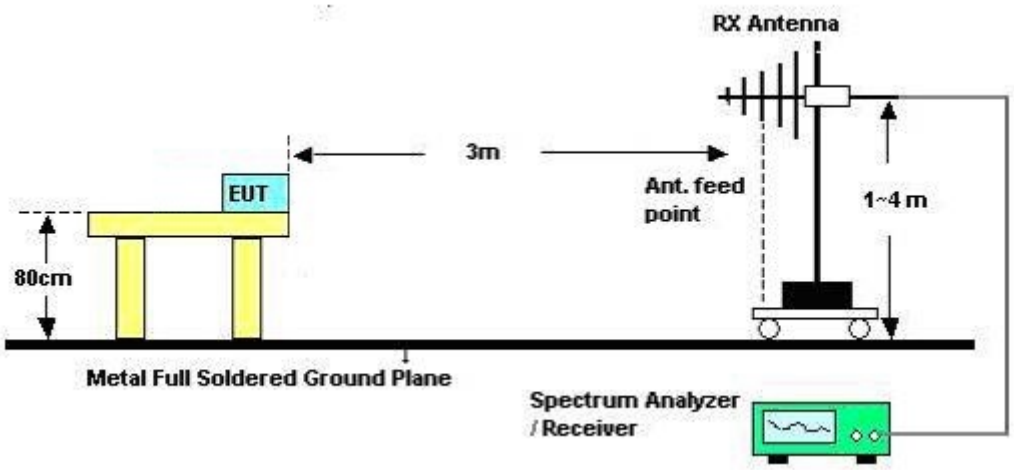
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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

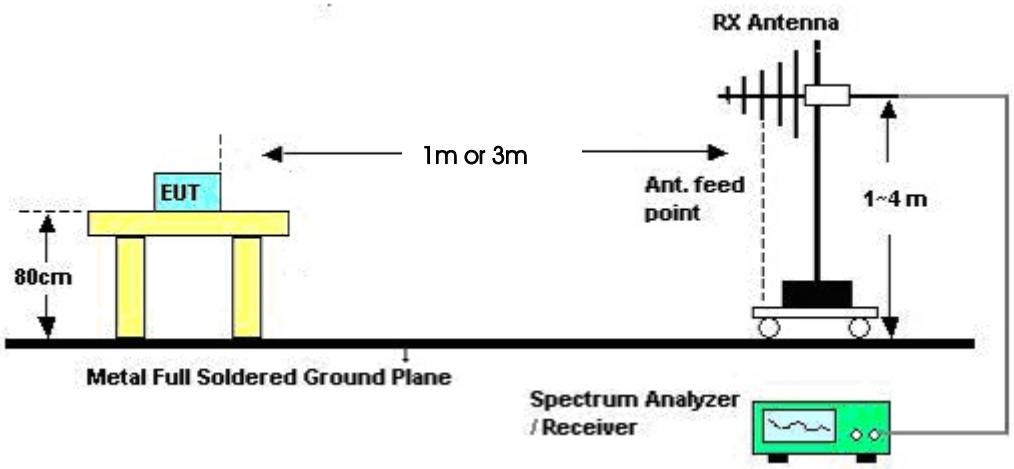
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For radiated emissions: 1GHz~40GHz

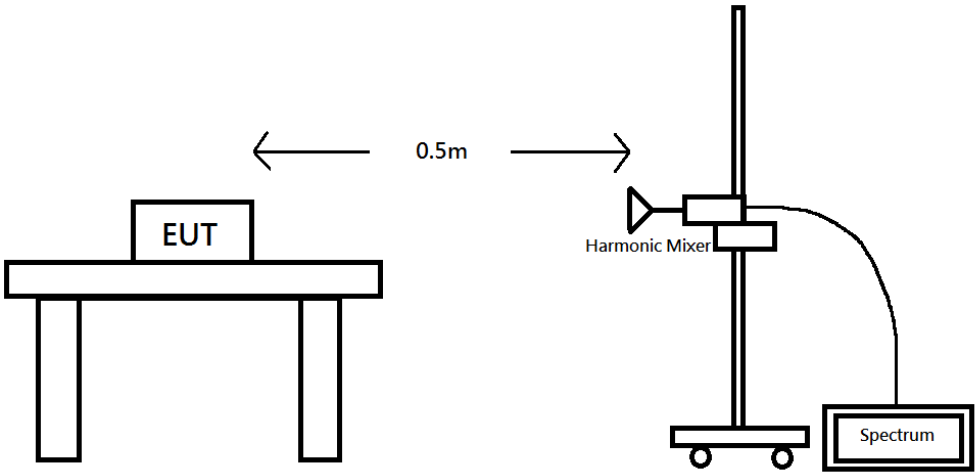


Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

For radiated emissions: 40GHz~100GHz



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 (9kHz~30MHz)

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Normal Link / Mode 1
Test Date	Nov. 14, 2013		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

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

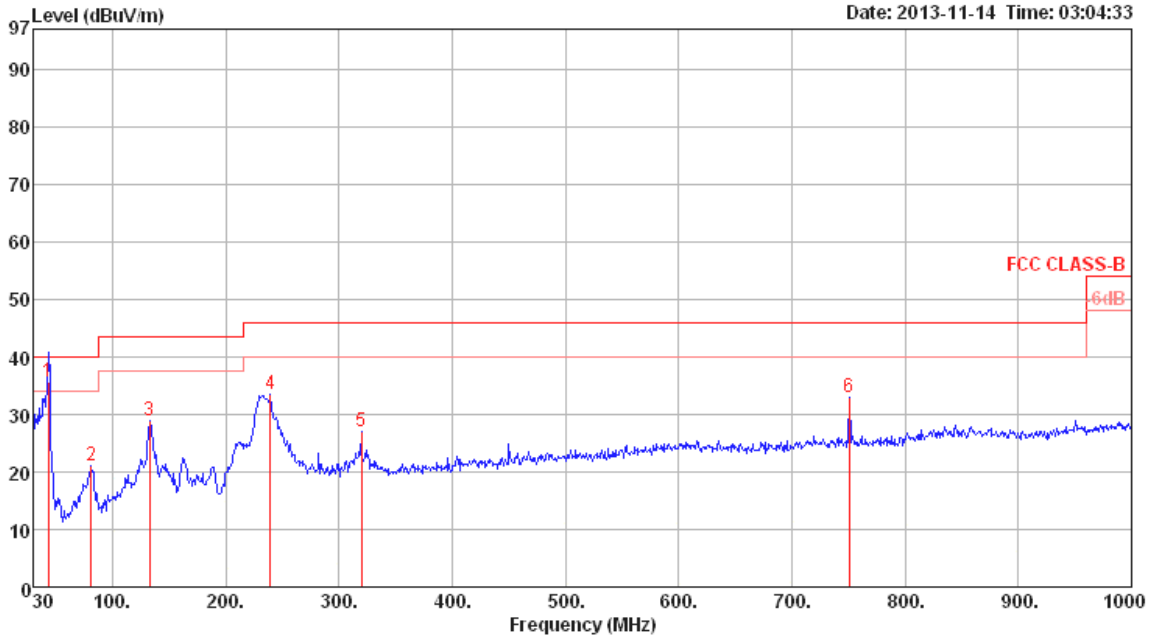
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

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

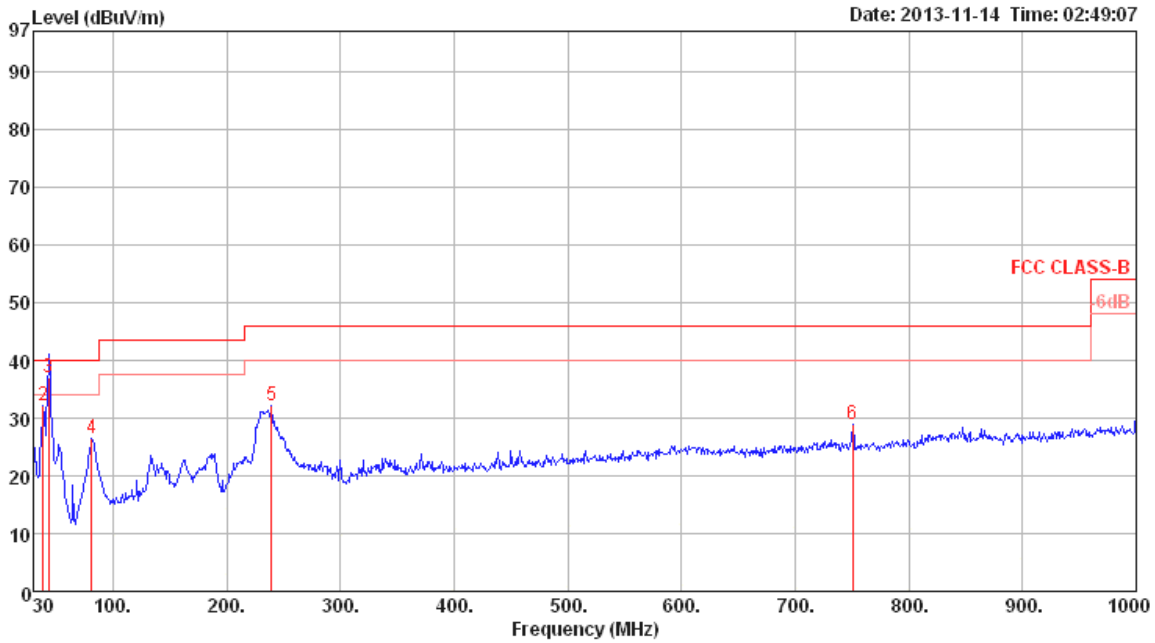
Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Normal Link / Mode 1

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	43.58	35.67	40.00	-4.33	51.87	0.72	10.88	27.80	QP	206	264	HORIZONTAL
2	81.41	21.17	40.00	-18.83	40.50	1.00	7.35	27.68	Peak	400	0	HORIZONTAL
3	132.82	28.90	43.50	-14.60	42.67	1.38	12.28	27.43	Peak	400	0	HORIZONTAL
4	239.52	33.56	46.00	-12.44	46.85	1.75	11.98	27.02	Peak	400	0	HORIZONTAL
5	320.03	26.96	46.00	-19.04	38.02	2.06	13.91	27.03	Peak	400	0	HORIZONTAL
6	750.71	32.93	46.00	-13.07	38.10	3.20	19.43	27.80	Peak	400	0	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	30.00	26.31	40.00	-13.69	34.74	0.61	18.76	27.80	Peak	400	0	VERTICAL
2	38.73	32.15	40.00	-7.85	45.58	0.67	13.70	27.80	Peak	400	0	VERTICAL
3	43.58	36.99	40.00	-3.01	53.19	0.72	10.88	27.80	QP	166	282	VERTICAL
4	81.41	26.43	40.00	-13.57	45.76	1.00	7.35	27.68	Peak	400	0	VERTICAL
5	239.52	32.12	46.00	-13.88	45.41	1.75	11.98	27.02	Peak	400	0	VERTICAL
6	750.71	28.91	46.00	-17.09	34.08	3.20	19.43	27.80	Peak	400	0	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 (1GHz~40GHz)

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1 / 1~18G
Test Date	Nov. 18, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1949.91	45.31	74.00	-28.69	50.27	3.39	27.53	35.88	196	62	HORIZONTAL	Peak
2	1950.02	40.36	54.00	-13.64	45.32	3.39	27.53	35.88	196	62	HORIZONTAL	Average
3	6014.63	51.53	74.00	-22.47	44.89	6.53	35.21	35.10	117	69	HORIZONTAL	Peak
4	6017.22	44.27	54.00	-9.73	37.63	6.53	35.21	35.10	117	69	HORIZONTAL	Average
5	12034.16	45.98	54.00	-8.02	32.87	9.15	38.76	34.80	112	280	HORIZONTAL	Average
6	12034.90	56.50	74.00	-17.50	43.39	9.15	38.76	34.80	112	280	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1949.49	43.11	74.00	-30.89	48.08	3.39	27.53	35.89	101	47	VERTICAL	Peak
2	1950.00	36.89	54.00	-17.11	41.85	3.39	27.53	35.88	101	47	VERTICAL	Average
3	6017.11	43.27	54.00	-10.73	36.63	6.53	35.21	35.10	107	41	VERTICAL	Average
4	6017.30	51.16	74.00	-22.84	44.52	6.53	35.21	35.10	107	41	VERTICAL	Peak
5	12033.80	55.84	74.00	-18.16	42.73	9.15	38.76	34.80	104	28	VERTICAL	Peak
6	12034.15	45.80	54.00	-8.20	32.69	9.15	38.76	34.80	104	28	VERTICAL	Average

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1 / 18~26G
Test Date	Nov. 21, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	21920.44	53.21	63.54	-10.33	31.74	19.48	37.79	35.80	Average	100	60	HORIZONTAL
2	21920.45	65.66	83.54	-17.88	44.19	19.48	37.79	35.80	Peak	100	60	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	21920.48	53.30	63.54	-10.24	31.83	19.48	37.79	35.80	Average	100	12	VERTICAL
2	21920.52	66.15	83.54	-17.39	44.68	19.48	37.79	35.80	Peak	100	12	VERTICAL

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1 / 26~40G
Test Date	Nov. 21, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	31522.00	68.01	83.54	-15.53	48.67	20.73	40.01	41.40	Peak	100	60	HORIZONTAL
2	31526.80	57.00	63.54	-6.54	37.58	20.73	40.01	41.32	Average	100	60	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	31520.80	67.48	83.54	-16.06	48.14	20.73	40.01	41.40	Peak	100	182	VERTICAL
2	31527.60	57.30	63.54	-6.24	37.88	20.73	40.01	41.32	Average	100	182	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.

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 768 / 1~18G
Test Date	Nov. 18, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1949.84	43.11	74.00	-30.89	48.07	3.39	27.53	35.88	129	297	HORIZONTAL	Peak
2	1950.00	36.84	54.00	-17.16	41.80	3.39	27.53	35.88	129	297	HORIZONTAL	Average
3	6035.85	45.93	54.00	-8.07	39.28	6.54	35.21	35.10	120	65	HORIZONTAL	Average
4	6035.94	52.40	74.00	-21.60	45.75	6.54	35.21	35.10	120	65	HORIZONTAL	Peak
5	12070.21	56.86	74.00	-17.14	43.75	9.16	38.71	34.76	128	87	HORIZONTAL	Peak
6	12071.50	46.51	54.00	-7.49	33.40	9.16	38.71	34.76	128	87	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1949.81	43.42	74.00	-30.58	48.38	3.39	27.53	35.88	101	61	VERTICAL	Peak
2	1950.01	37.98	54.00	-16.02	42.94	3.39	27.53	35.88	101	61	VERTICAL	Average
3	6035.87	44.36	54.00	-9.64	37.71	6.54	35.21	35.10	100	41	VERTICAL	Average
4	6036.02	51.72	74.00	-22.28	45.07	6.54	35.21	35.10	100	41	VERTICAL	Peak
5	12070.54	45.62	54.00	-8.38	32.51	9.16	38.71	34.76	101	154	VERTICAL	Average
6	12071.93	56.40	74.00	-17.60	43.29	9.16	38.71	34.76	101	154	VERTICAL	Peak

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 768 / 18~26G
Test Date	Nov. 21, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	22077.20	66.80	83.54	-16.74	45.33	19.54	37.73	35.80	Peak	100	225	HORIZONTAL
2	22088.64	53.17	63.54	-10.37	31.68	19.55	37.74	35.80	Average	100	225	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	22071.60	53.16	63.54	-10.38	31.69	19.54	37.73	35.80	Average	100	128	VERTICAL
2	22080.48	65.69	83.54	-17.85	44.21	19.55	37.73	35.80	Peak	100	128	VERTICAL

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 768 / 26~40G
Test Date	Nov. 21, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	31525.20	57.80	63.54	-5.74	38.38	20.73	40.01	41.32	Average	100	10	HORIZONTAL
2	31528.20	68.92	83.54	-14.62	49.50	20.73	40.01	41.32	Peak	100	10	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	31528.00	57.92	63.54	-5.62	38.50	20.73	40.01	41.32	Average	100	0	VERTICAL
2	31528.00	65.49	83.54	-18.05	46.07	20.73	40.01	41.32	Peak	100	0	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.

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1536 / 1~18G
Test Date	Nov. 18, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1649.86	42.14	74.00	-31.86	50.21	3.04	25.64	36.75	100	90	HORIZONTAL	Peak
2	1649.95	36.78	54.00	-17.22	44.85	3.04	25.64	36.75	100	90	HORIZONTAL	Average
3	6054.32	45.36	54.00	-8.64	38.71	6.54	35.22	35.11	120	72	HORIZONTAL	Average
4	6054.35	51.74	74.00	-22.26	45.09	6.54	35.22	35.11	120	72	HORIZONTAL	Peak
5	12108.86	59.14	74.00	-14.86	46.02	9.17	38.67	34.72	100	71	HORIZONTAL	Peak
6	12109.04	49.81	54.00	-4.19	36.69	9.17	38.67	34.72	100	71	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1649.93	38.90	74.00	-35.10	46.97	3.04	25.64	36.75	101	294	VERTICAL	Peak
2	1650.01	31.38	54.00	-22.62	39.45	3.04	25.64	36.75	101	294	VERTICAL	Average
3	6054.37	51.69	74.00	-22.31	45.04	6.54	35.22	35.11	107	28	VERTICAL	Peak
4	6054.51	46.57	54.00	-7.43	39.92	6.54	35.22	35.11	107	28	VERTICAL	Average
5	12108.96	48.70	54.00	-5.30	35.58	9.17	38.67	34.72	100	305	VERTICAL	Average
6	12109.07	58.67	74.00	-15.33	45.55	9.17	38.67	34.72	100	305	VERTICAL	Peak

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1536 / 18~26G
Test Date	Nov. 21, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	22750.00	53.06	63.54	-10.48	30.70	19.71	38.30	35.65	Average	100	10	HORIZONTAL
2	22750.00	65.15	83.54	-18.39	42.79	19.71	38.30	35.65	Peak	100	10	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	22750.03	66.50	83.54	-17.04	44.14	19.71	38.30	35.65	Peak	100	138	VERTICAL
2	22752.00	52.74	63.54	-10.80	30.38	19.71	38.30	35.65	Average	100	138	VERTICAL

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1536 / 26~40G
Test Date	Nov. 21, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	31526.00	58.28	63.54	-5.26	38.86	20.73	40.01	41.32	Average	100	305	HORIZONTAL
2	31531.20	69.04	83.54	-14.50	49.62	20.73	40.01	41.32	Peak	100	305	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	31514.20	57.73	63.54	-5.81	38.42	20.70	40.01	41.40	Average	100	43	VERTICAL
2	31531.20	67.89	83.54	-15.65	48.47	20.73	40.01	41.32	Peak	100	43	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.

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

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1
Test Date	Nov. 19, 2013		

Frequency (GHz)	Measurement Distance (m)	Measurement Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
72.2	0.5	83.602	103.56	-19.958
Frequency (GHz)	**Measurement Distance (m)**	**Measurement Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
72.2	0.5	76.482	83.56	-7.078

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 768
Test Date	Nov. 19, 2013		

Frequency (GHz)	Measurement Distance (m)	Measurement Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
72.43	0.5	84.190	103.56	-19.370
Frequency (GHz)	**Measurement Distance (m)**	**Measurement Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
72.43	0.5	78.070	83.56	-5.490

Temperature	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1536
Test Date	Nov. 19, 2013		

Frequency (GHz)	Measurement Distance (m)	Measurement Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
72.65	0.5	85.206	103.56	-18.354
Frequency (GHz)	**Measurement Distance (m)**	**Measurement Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
72.65	0.5	79.056	83.56	-4.504

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

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

EIRP = PT * GT = (PR / GR) * (4 * Pi * D / λ)^2

EIRP = Meas. Level - RX Antenna Gain + 20*log(4*Pi(3.14159)*D/(300/(Frequency*1000)))

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 15.209(a) 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

The test procedure is the same as section 4.3.3, only the frequency range investigated is limited to 2MHz around bandedges.

4.4.4 Test Setup Layout

This test setup layout is the same as that shown in section 4.3.4

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	24°C	Humidity	52%
Test Engineer	James Chou	Configurations	Channel 1, 768, 1536
Test Date	Nov. 21, 2013	Test Mode	Mode 1

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	24000.00	54.81	63.54	-8.73	30.64	20.37	38.90	35.10	Average	100	335	HORIZONTAL
2	24000.00	65.06	83.54	-18.48	40.89	20.37	38.90	35.10	Peak	100	335	HORIZONTAL
3	24068.40	96.31			72.18	20.37	38.92	35.16	Average	100	335	HORIZONTAL
4	24068.40	96.86			72.73	20.37	38.92	35.16	Peak	100	335	HORIZONTAL

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	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	23992.00	56.09	63.54	-7.45	31.92	20.37	38.90	35.10	Average	100	14	VERTICAL
2	23992.00	77.15	83.54	-6.39	52.98	20.37	38.90	35.10	Peak	100	14	VERTICAL
3	24142.74	116.33			92.26	20.36	38.93	35.22	Average	100	14	VERTICAL
4	24143.54	116.83			92.76	20.36	38.93	35.22	Peak	100	14	VERTICAL
5	24255.40	77.25	83.54	-6.29	53.25	20.35	38.95	35.30	Peak	100	14	VERTICAL
6	24256.60	57.04	63.54	-6.50	33.04	20.35	38.95	35.30	Average	100	14	VERTICAL

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

Channel 1536

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	24218.00	117.01			93.00	20.35	38.94	35.28	Peak	100	7	VERTICAL
2	24218.40	116.61			92.60	20.35	38.94	35.28	Average	100	7	VERTICAL
3	24250.00	56.01	63.54	-7.53	32.01	20.35	38.95	35.30	Average	100	7	VERTICAL
4	24254.80	68.10	83.54	-15.44	44.10	20.35	38.95	35.30	Peak	100	7	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.

4.5 Antenna Requirements

4.5.1 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.

4.5.2 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	Apr. 16, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 01, 2013	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. 12, 2013	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	Oct. 23, 2013	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9kHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Nov. 27, 2012	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Nov. 26, 2012	Radiation (03CH01-CB)
Turn Table	INN CO	CO2000	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. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
Mixer	OML	M19HW/A	U91113-1	40 ~ 60 GHz	Mar. 23, 2011***	Radiation (03CH01-CB)
Mixer	OML	M15HW/A	V91113-1	50 ~ 75 GHz	Mar. 23, 2011***	Radiation (03CH01-CB)
Mixer	OML	M12HW/A	E91113-1	60 ~ 90 GHz	Mar. 23, 2011***	Radiation (03CH01-CB)
Mixer	OML	M08HW/A	F91113-1	90 ~ 140 GHz	Mar. 23, 2011***	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO19R	U91113-A	40 ~ 60 GHz	N.C.R	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO15R	V91113-A	50 ~ 75 GHz	N.C.R	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO12R	E91113-A	60 ~ 90 GHz	N.C.R	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO08R	F91113-A	90 ~ 140 GHz	N.C.R	Radiation (03CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Signal analyzer	Agilent	N9010A	MY52220519	10Hz~44GHz	Nov. 20, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)

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

"*" Calibration Interval of instruments listed above is two year.

"***" Calibration Interval of instruments listed above is three year.

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

6 TEST LOCATION

SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	886-2-2696-2468
	FAX	:	886-2-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	886-3-327-3456
	FAX	:	886-3-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	886-2-2601-1640
	FAX	:	886-2-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	886-2-2631-4739
	FAX	:	886-2-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	886-2-8227-2020
	FAX	:	886-2-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	886-2-2794-8886
	FAX	:	886-2-2794-9777
JHUBEI	ADD	:	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

7 MEASUREMENT UNCERTAINTY

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	0.026	dB	normal(k=2)	0.013
Cable loss	0.002	dB	normal(k=2)	0.001
AMN/LISN specification	1.200	dB	normal(k=2)	0.600
Mismatch Receiver VSWR 1= AMN/LISN VSWR 2=	-0.080	dB	U-shaped	0.060
Combined standard uncertainty Uc(y)				1.2
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				2.4

Uncertainty of Radiated Emission Measurement (30MHz ~ 1,000MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.173	dB	K=1	0.086
Cable loss	±0.174	dB	K=2	0.087
Antenna gain	±0.169	dB	K=2	0.084
Site imperfection	±0.433	dB	Triangular	0.214
Pre-amplifier gain	±0.366	dB	K=2	0.183
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.778
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.555

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.191	dB	K=1	0.095
Cable loss	±0.169	dB	K=2	0.084
Antenna gain	±0.191	dB	K=2	0.096
Site imperfection	±0.582	dB	Triangular	0.291
Pre-amplifier gain	±0.304	dB	K=2	0.152
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.839
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.678

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.186	dB	K=1	0.093
Cable loss	±0.167	dB	K=2	0.083
Antenna gain	±0.190	dB	K=2	0.095
Site imperfection	±0.488	dB	Triangular	0.244
Pre-amplifier gain	±0.269	dB	K=2	0.134
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.771
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.541

Uncertainty of Radiated Emission Measurement (40GHz ~ 220GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.156	dB	K=1	0.078
Cable loss	±0.124	dB	K=2	0.062
Antenna gain	±0.167	dB	K=2	0.084
Site imperfection	±0.345	dB	Triangular	0.173
Pre-amplifier gain	±0.296	dB	K=2	0.148
Transmitter antenna	±0.982	dB	Rectangular	0.491
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Mixer	±1.700	dB	K=2	0.85
Combined standard uncertainty Uc(y)				2.328
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				4.655

Uncertainty of Conducted Emission Measurement

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Cable loss	±0.038	dB	K=2	0.019
Attenuator	±0.047	dB	K=2	0.024
Power Meter specification	±0.300	dB	Triangular	0.150
Power Sensor specification	±0.300	dB	Rectangular	0.150
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				0.863
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				1.726