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FCC RADIO TEST REPORT

Applicant's company	**PEGATRON CORPORATION**
Applicant Address	5F No. 76, Ligong St.,Beitou District, Taipei City 112, Taiwan
FCC ID	**VUI-ITV790X**
Manufacturer's company	**PEGATRON CORPORATION**
Manufacturer Address	5F No. 76, Ligong St.,Beitou District, Taipei City 112, Taiwan

Product Name	STB Product
Brand Name	CISCO
Model No.	ITV790X(The "X" in model name can be 0 to 9, A to Z or blank, for marketing purpose.)
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.249
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Jan. 23, 2014
Final Test Date	May 18, 2014
Submission Type	Original Equipment

Statement

Test result included is only for the IEEE 802.15.4 ZigBee RF4CE of the product.

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
FR432003AC	Rev. 01	Initial issue of report	Jun. 11, 2014

Certificate No.: CB10305121

1. CERTIFICATE OF COMPLIANCE

Product Name	:	STB Product
Brand Name	:	CISCO
Model Name	:	ITV790X(The "X" in model name can be 0 to 9, A to Z or blank, for marketing purpose.)
Applicant	:	PEGATRON 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 Jan. 23, 2014 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
SPORTON INTERNATIONAL INC.

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	15.207	AC Power Line Conducted Emissions	Complies	14.12 dB
4.2	15.249(a)	Field Strength of Fundamental Emissions	Complies	0.02 dB
4.3	15.215(c)	20dB Spectrum Bandwidth	Complies	-
4.4	15.249(a)/(d)	Radiated Emissions	Complies	1.07 dB
4.5	15.249(d)	Band Edge Emissions	Complies	8.15 dB
4.6	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Power Type	From Power Adapter
Modulation	O-QPSK
Data Rate	250kbps
Frequency Range	2400 ~ 2483.5MHz
Operation Frequency Range	2425 ~ 2475MHz
Channel Number	11
Channel Band Width (99%)	2.64 MHz
Max. Field Strength	93.98 dBuV/m at 3m (Average)
Carrier Frequencies	Please refer to section 3.3
Antenna	Please refer to section 3.4

3.2. Accessories

Power	Brand	Model	Rating
Adapter 1	ENG	3A-183WU12	Input:100-120V~50-60Hz, 0.5A Output:12V, 1.5A
Adapter 2	APD	WB-18B12FU	Input:100-120V~ , 60Hz, 0.4A Max. Output:12V, 1.5A

3.3. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency
2400 ~ 2483.5MHz	1	2425 MHz
	2	2430 MHz
	:	:
	5	2445 MHz
	6	2450 MHz
	7	2455 MHz
	:	:
	10	2470 MHz
	11	2475 MHz

3.4. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Airgain	N5x20B	Embedded Antenna	U.FL	1.70
2	Airgain	N5x20B	Embedded Antenna	U.FL	1.70
3	Airgain	N5x20B	Embedded Antenna	U.FL	1.70
4	Hong Lin	N/A	Printed Antenna	N/A	3.39

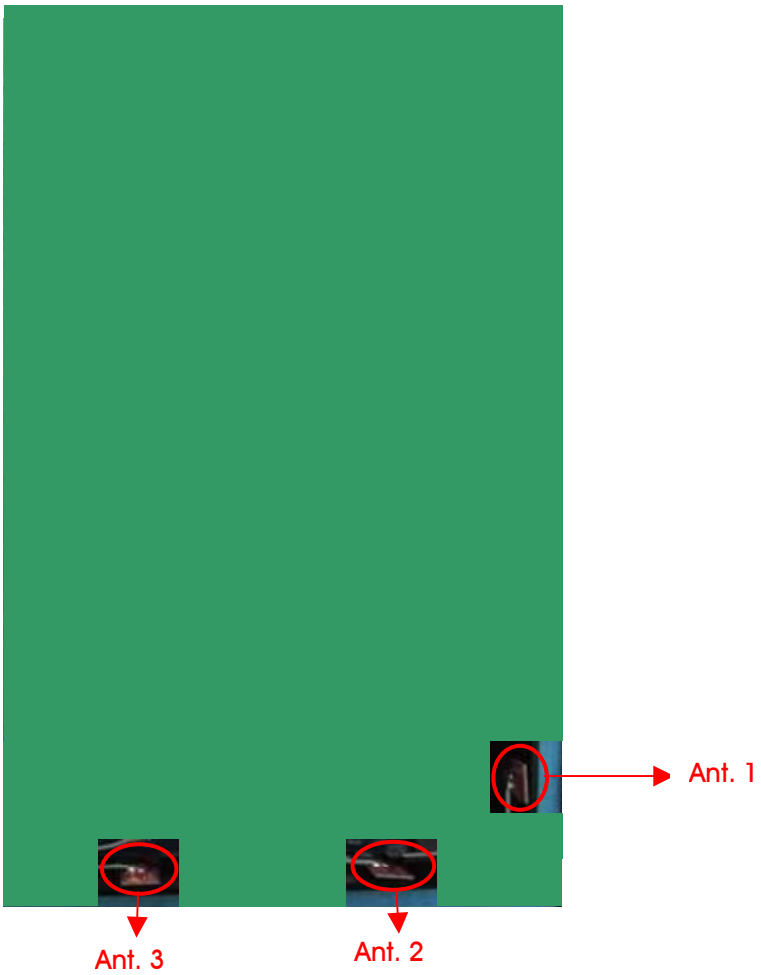
Note: The EUT has four antennas.

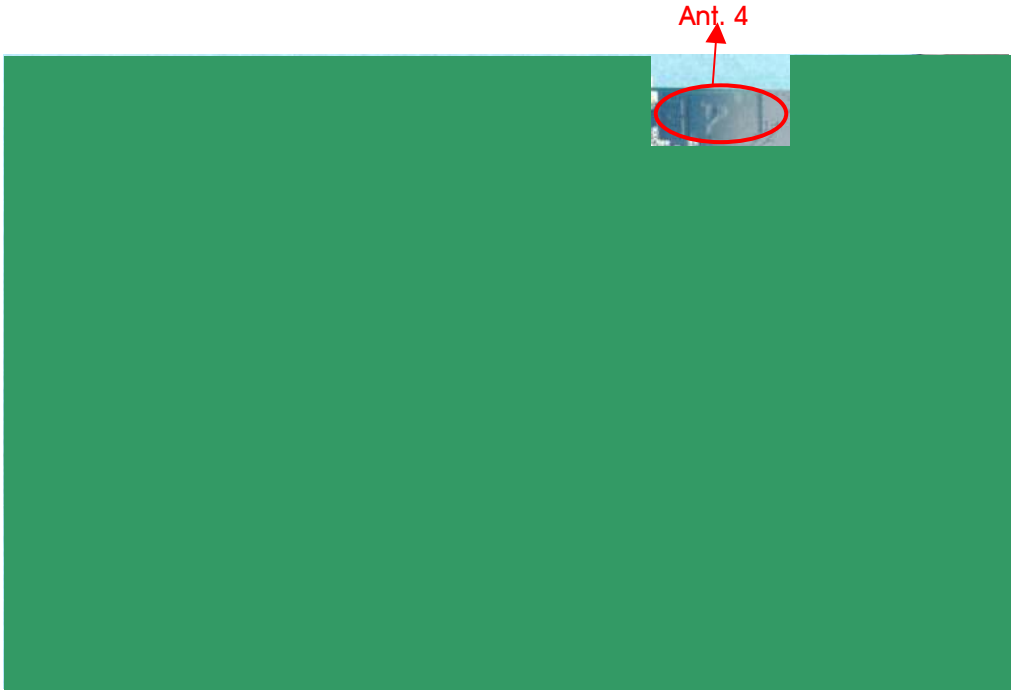
For IEEE 802.11a/n/ac mode (3TX/3RX)

Ant. 1, Ant. 2 and Ant. 3 could transmit/receive simultaneously.

For IEEE 802.15.4 ZigBee RF4CE mode: (1TX/1RX)

Ant. 4 can be use as transmit and receive antenna.





3.5. 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	Antenna
AC Power Line Conducted Emissions	CTX	-	-
Field Strength of Fundamental Emissions 20dB Spectrum Bandwidth	CTX	1/6/11	4
Radiated Emissions 30MHz ~ 1GHz	CTX	-	-
Radiated Emissions 1GHz~10th Harmonic	CTX	1/6/11	4
Band Edge Emissions	CTX	1/6/11	4

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. Laying of EUT + Adapter 1

Mode 2. Laying of EUT + Adapter 2

Mode 1 is the worst case, so it was selected to record in this test report.

For Radiated Emission test:

After evaluating, Adapter 2 generated the worst case. Thus, it was tested and recorded in this report.

Mode 1. Laying of EUT + Adapter 2

Mode 1 is the worst case, so it was selected to record in this test report.

3.6. Table for Testing Locations

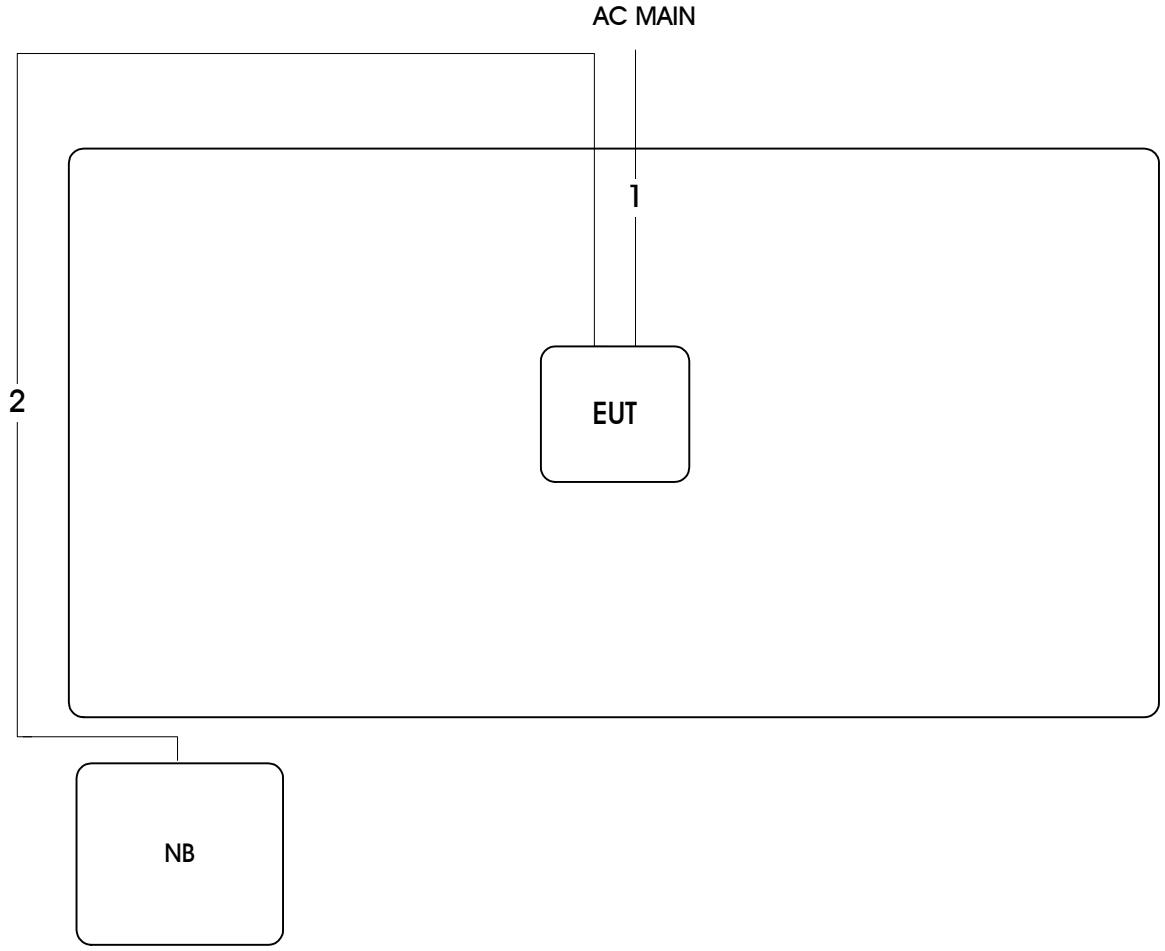
Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	**Site Category**	**Location**	**FCC Reg. No.**	**IC File No.**	**VCCI Reg. No**
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D	-
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

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

3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC

3.8. Test Configurations



Item	Connection	Shielded	Length(m)
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

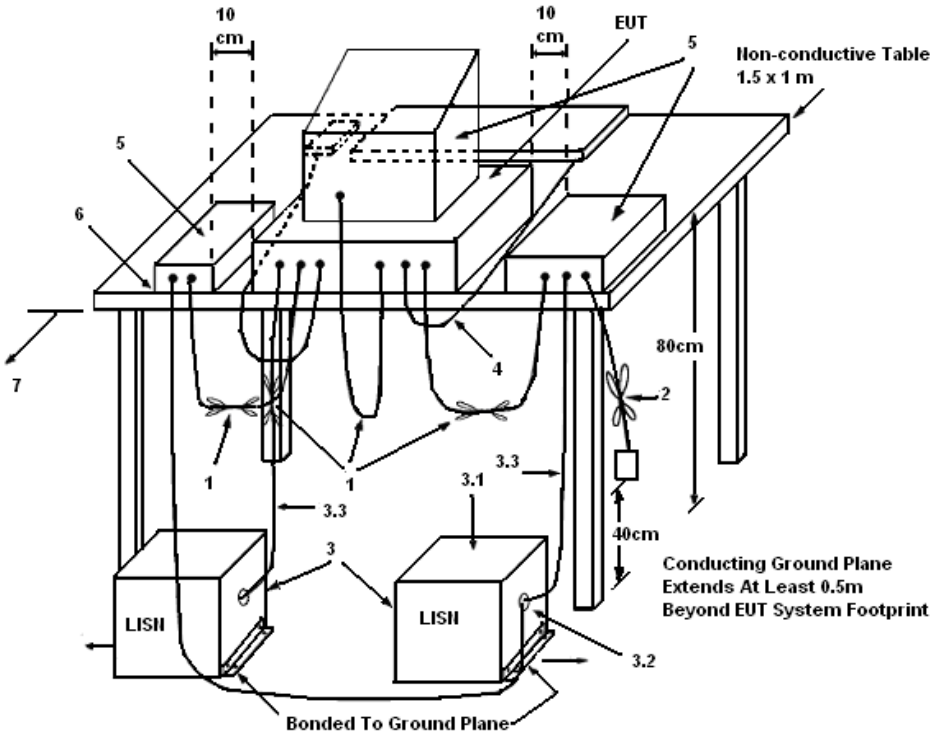
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

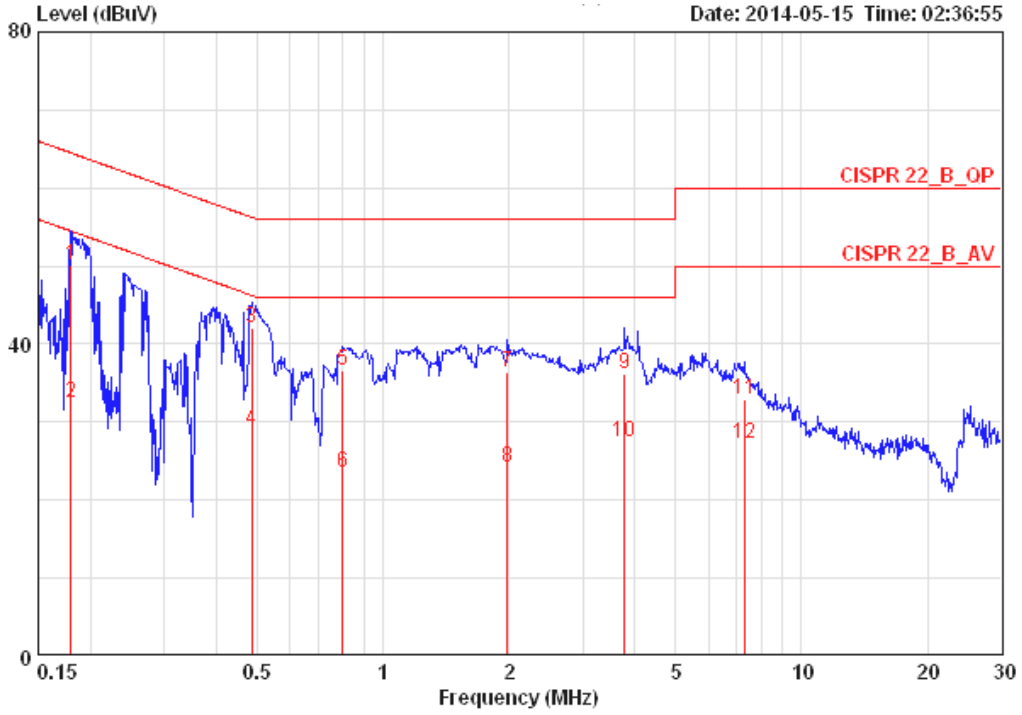
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

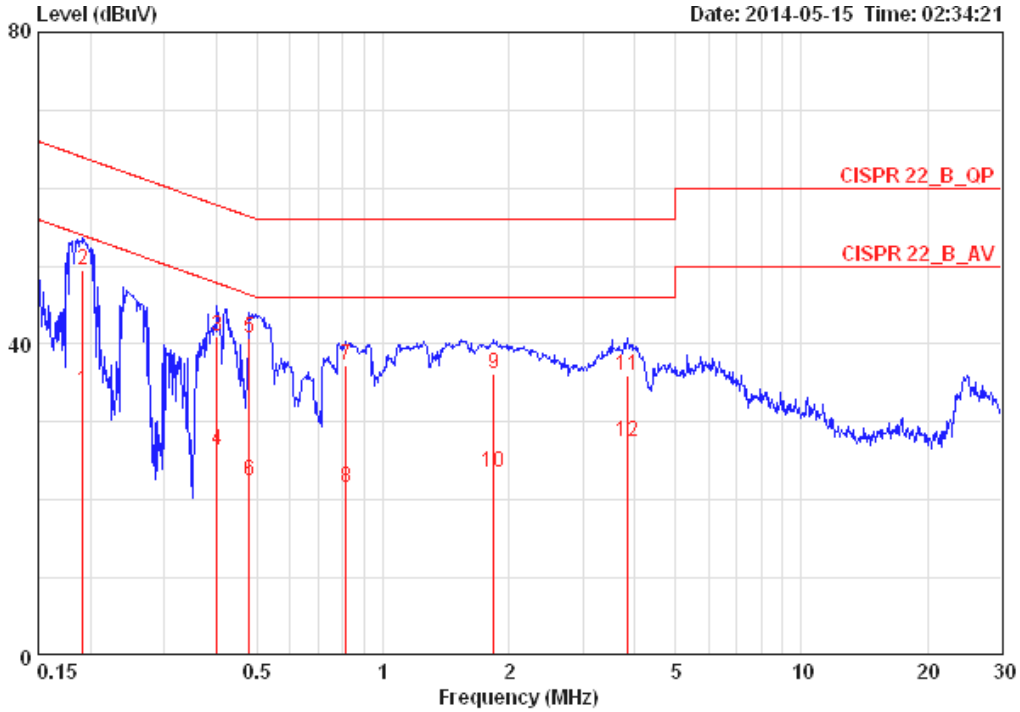
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	52%
Test Engineer	Justin Chiu	Phase	Line
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.17961	50.24	-14.26	64.50	0.15	49.93	0.16	LINE	QP
2	0.17961	32.56	-21.94	54.50	0.15	32.25	0.16	LINE	AVERAGE
3 @	0.48632	42.11	-14.12	56.23	0.15	41.77	0.18	LINE	QP
4	0.48632	28.95	-17.28	46.23	0.15	28.61	0.18	LINE	AVERAGE
5	0.80023	36.72	-19.28	56.00	0.16	36.37	0.20	LINE	QP
6	0.80023	23.48	-22.52	46.00	0.16	23.13	0.20	LINE	AVERAGE
7	1.980	36.40	-19.60	56.00	0.19	35.96	0.25	LINE	QP
8	1.980	24.13	-21.87	46.00	0.19	23.69	0.25	LINE	AVERAGE
9	3.779	36.21	-19.79	56.00	0.27	35.64	0.30	LINE	QP
10	3.779	27.45	-18.55	46.00	0.27	26.88	0.30	LINE	AVERAGE
11	7.290	32.97	-27.03	60.00	0.33	32.29	0.35	LINE	QP
12	7.290	27.27	-22.73	50.00	0.33	26.59	0.35	LINE	AVERAGE

Temperature	24℃	Humidity	52%
Test Engineer	Justin Chiu	Phase	Neutral
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.19140	33.95	-20.02	53.98	0.07	33.72	0.16	NEUTRAL	AVERAGE
2	0.19140	49.58	-14.39	63.98	0.07	49.35	0.16	NEUTRAL	QP
3	0.40187	41.02	-16.79	57.81	0.07	40.77	0.18	NEUTRAL	QP
4	0.40187	26.44	-21.37	47.81	0.07	26.19	0.18	NEUTRAL	AVERAGE
5	0.47865	40.73	-15.64	56.36	0.07	40.47	0.18	NEUTRAL	QP
6	0.47865	22.55	-23.82	46.36	0.07	22.29	0.18	NEUTRAL	AVERAGE
7	0.81737	37.26	-18.74	56.00	0.08	36.99	0.20	NEUTRAL	QP
8	0.81737	21.47	-24.53	46.00	0.08	21.20	0.20	NEUTRAL	AVERAGE
9	1.839	36.20	-19.80	56.00	0.11	35.85	0.24	NEUTRAL	QP
10	1.839	23.54	-22.46	46.00	0.11	23.19	0.24	NEUTRAL	AVERAGE
11	3.840	35.99	-20.01	56.00	0.13	35.56	0.30	NEUTRAL	QP
12	3.840	27.49	-18.51	46.00	0.13	27.06	0.30	NEUTRAL	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss

4.2. Field Strength of Fundamental Emissions Measurement

4.2.1. 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 (dBuV/m) at 3m
2400-2483.5	94 (Average)
	114 (Peak)

4.2.2. Measuring Instruments and Setting

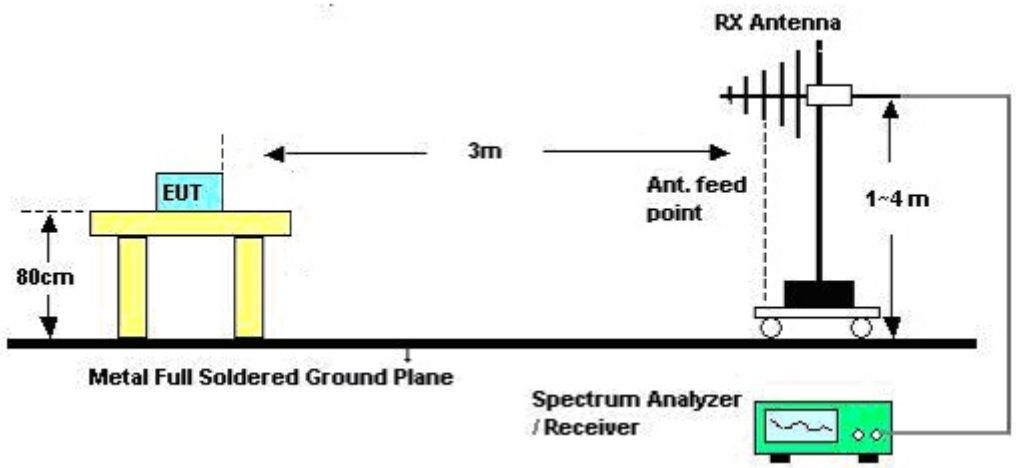
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Power Meter Parameter	Setting
RBW	1 MHz Peak / 3MHz Peak
VBW	1 MHz Peak / 10Hz Average
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.2.3. 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.

4.2.4. 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 Field Strength of Fundamental Emissions

Temperature	24°C	Humidity	53%
Test Engineer	Kenneth Huang	Configurations	Channel 1, 6, 11
Test Date	May 18, 2014		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2425.00	93.84	94.00	-0.16	63.03	2.93	27.88	0.00	Average	356	100	HORIZONTAL
2	2425.50	98.46	114.00	-15.54	67.65	2.93	27.88	0.00	Peak	356	100	HORIZONTAL

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2450.02	93.98	94.00	-0.02	63.18	2.94	27.86	0.00	Average	351	100	HORIZONTAL
2	2450.50	98.56	114.00	-15.44	67.76	2.94	27.86	0.00	Peak	351	100	HORIZONTAL

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2475.00	93.63	94.00	-0.37	62.85	2.96	27.82	0.00	Average	353	100	HORIZONTAL
2	2475.50	98.13	114.00	-15.87	67.35	2.96	27.82	0.00	Peak	353	100	HORIZONTAL

Note:

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

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

4.3. 20dB Spectrum Bandwidth Measurement

4.3.1. Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (2400 ~ 2483.5MHz).

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.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 20dB Bandwidth
RBW	100 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.3.3. 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.

4.3.4. Test Setup Layout

4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

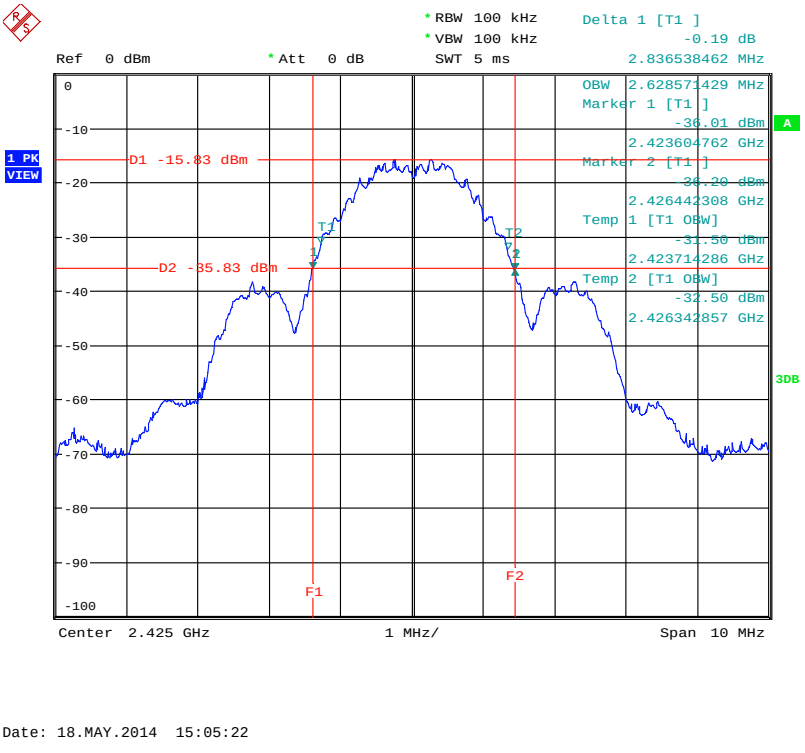
The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of 20dB Spectrum Bandwidth

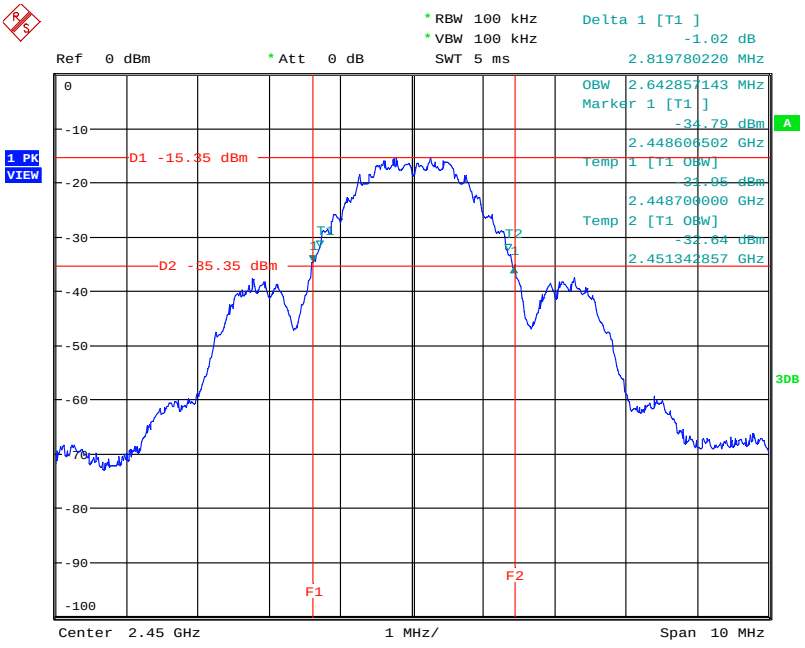
Temperature	24℃	Humidity	53%
Test Engineer	Kenneth Huang	Configurations	Channel 1/6/11

Frequency	20dB BW (MHz)	99% OBW (MHz)	Frequency range (MHz) f_L > 2400MHz	Frequency range (MHz) f_H < 2483.5MHz	Test Result
2425 MHz	2.84	2.63	2423.6048	-	Complies
2450 MHz	2.82	2.64	-	-	Complies
2475 MHz	2.82	2.61	-	2476.4253	Complies

20 dB/99% Bandwidth Plot on 2425 MHz



20 dB/99% Bandwidth Plot on 2450 MHz



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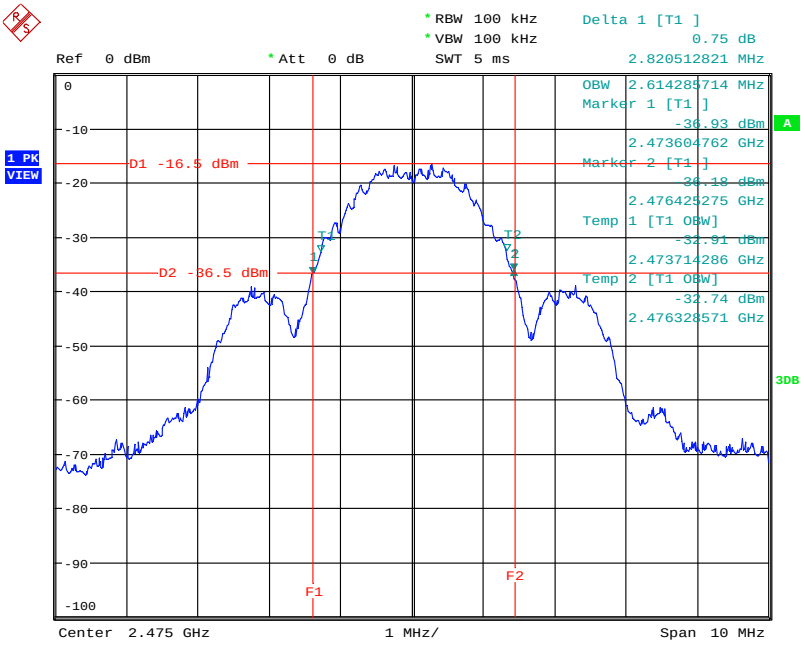
20 dB/99% Bandwidth Plot on 2475 MHz



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4.4. Radiated Emissions Measurement

4.4.1. 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 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 and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100kHz/300kHz for Peak

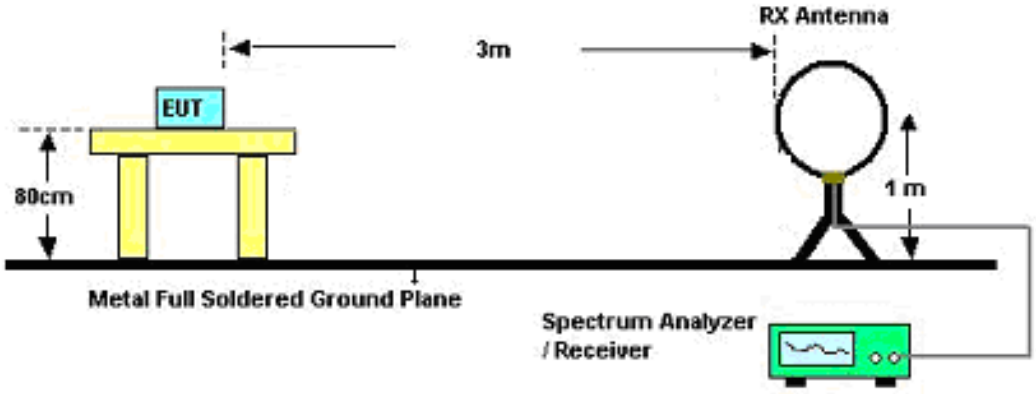
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.4.3. Test Procedures

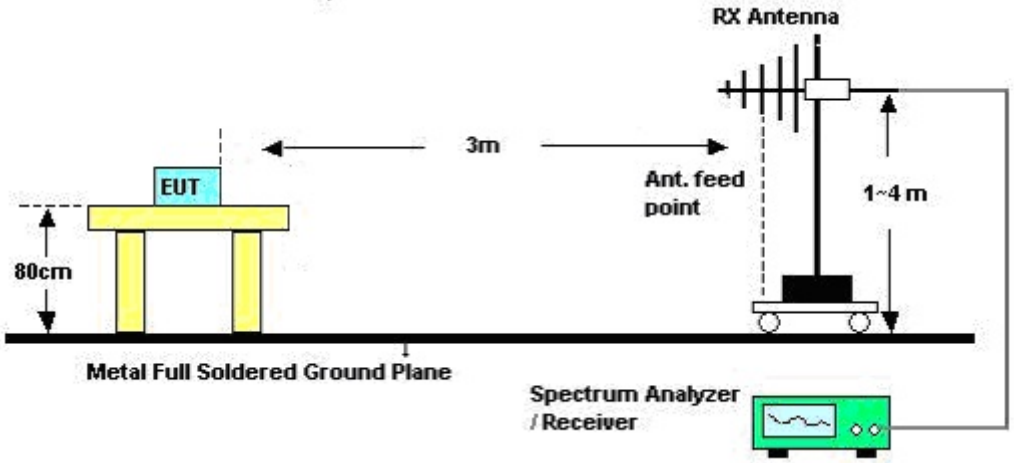
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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. 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 3MHz 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.

4.4.4. Test Setup Layout

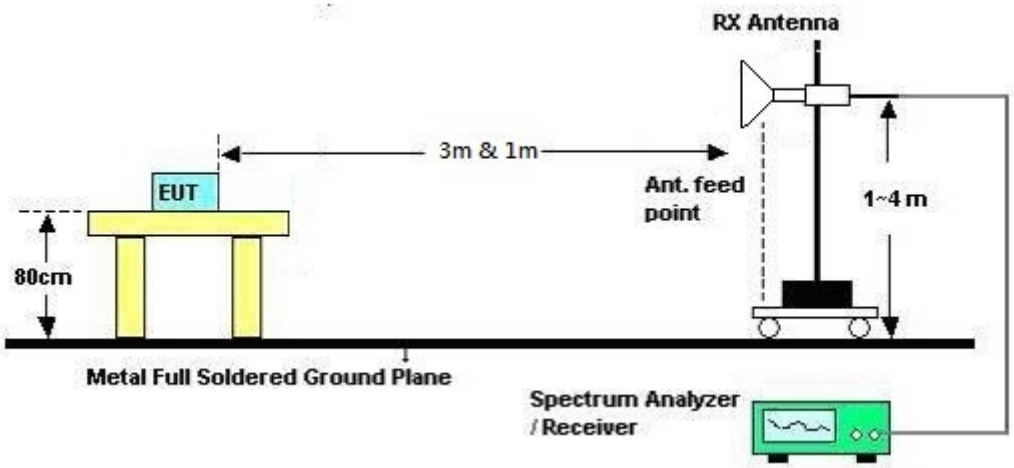
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



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. Results of Radiated Emissions (9kHz~30MHz)

Temperature	24°C	Humidity	53%
Test Engineer	Kenneth Huang	Configurations	CTX
Test Date	May 18, 2014	Test Mode	Mode 1

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 20dB below the permissible value has no need to be reported.

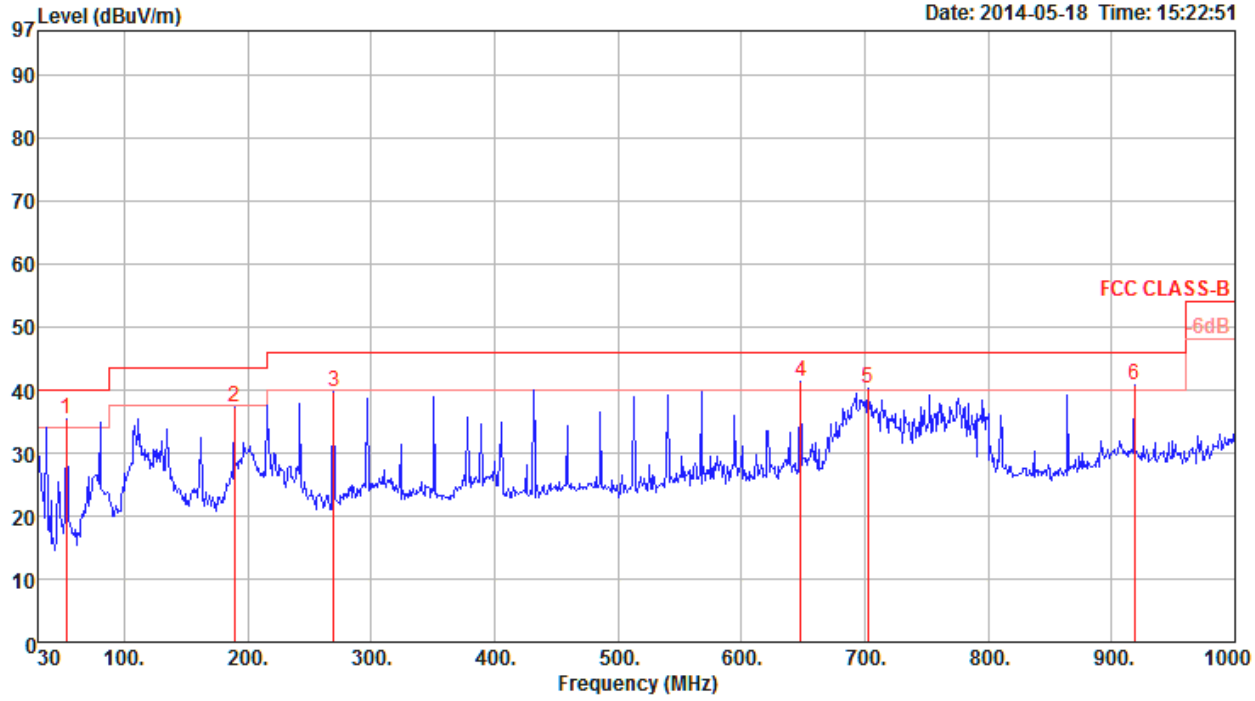
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

4.4.8. Results of Radiated Emissions (30MHz~1GHz)

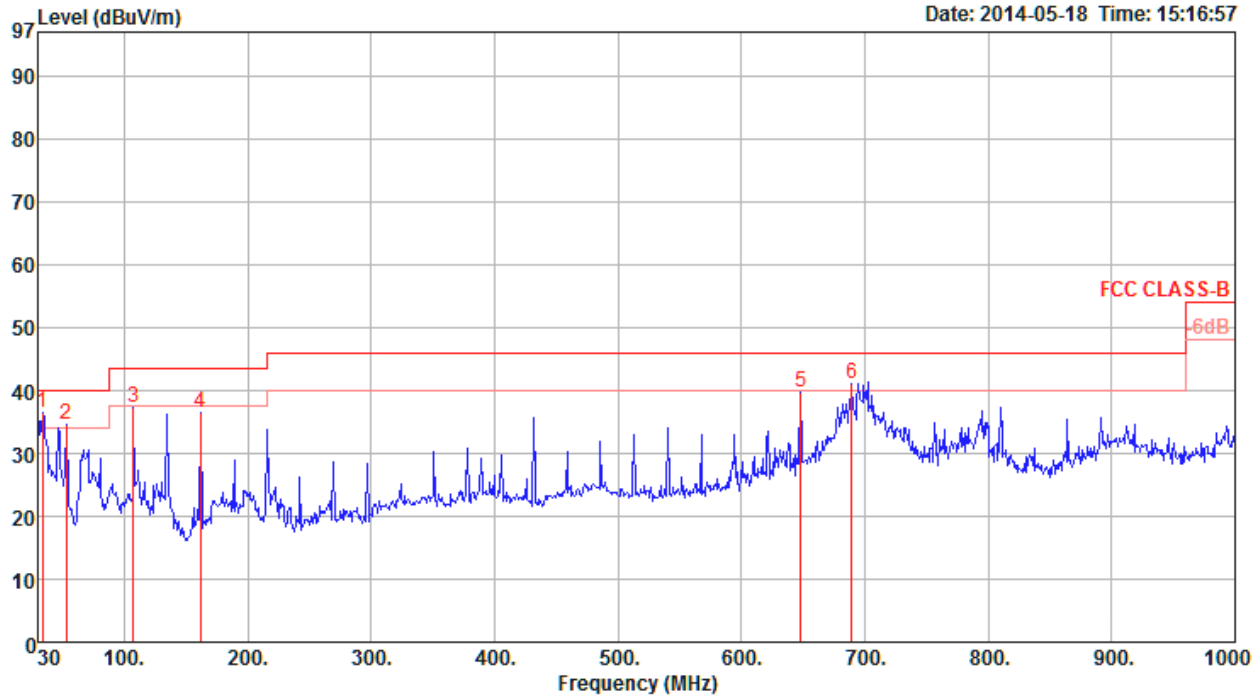
Temperature	24°C	Humidity	53%
Test Engineer	Kenneth Huanf	Configurations	CTX
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	53.28	35.52	40.00	-4.48	54.17	1.10	8.16	27.91	Peak	0	100	HORIZONTAL
2	189.08	37.35	43.50	-6.15	52.81	2.05	9.81	27.32	Peak	0	100	HORIZONTAL
3	269.59	39.75	46.00	-6.25	50.77	2.48	13.40	26.90	Peak	0	100	HORIZONTAL
4	647.89	41.31	46.00	-4.69	45.39	3.89	19.59	27.56	Peak	0	100	HORIZONTAL
5	702.21	40.15	46.00	-5.85	43.06	4.16	20.01	27.08	Peak	0	100	HORIZONTAL
6	918.52	40.72	46.00	-5.28	41.09	4.69	21.65	26.71	Peak	0	100	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	33.88	36.53	40.00	-3.47	46.12	0.90	17.50	27.99	Peak	0	400	VERTICAL
2	53.28	34.60	40.00	-5.40	53.25	1.10	8.16	27.91	Peak	0	400	VERTICAL
3	107.60	37.20	43.50	-6.30	51.04	1.55	12.36	27.75	Peak	0	400	VERTICAL
4	161.92	36.59	43.50	-6.91	51.57	1.89	10.54	27.41	Peak	0	400	VERTICAL
5	647.89	39.70	46.00	-6.30	43.78	3.89	19.59	27.56	Peak	0	400	VERTICAL
6	689.60	41.19	46.00	-4.81	44.34	4.11	19.92	27.18	Peak	0	400	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.

4.4.9. Results for Radiated Emissions (1GHz~10th Harmonic)

Temperature	24°C	Humidity	53%
Test Engineer	Kenneth Huang	Configurations	Channel 1
Test Date	May 18. 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4850.93	57.29	74.00	-16.71	55.14	4.21	32.62	34.68	Peak	275	170	HORIZONTAL
2	4851.02	49.87	54.00	-4.13	47.72	4.21	32.62	34.68	Average	275	170	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4850.91	59.65	74.00	-14.35	57.50	4.21	32.62	34.68	Peak	254	102	VERTICAL
2	4851.01	52.39	54.00	-1.61	50.24	4.21	32.62	34.68	Average	254	102	VERTICAL

Temperature	24°C	Humidity	53%
Test Engineer	Kenneth Huang	Configurations	Channel 6
Test Date	May 18. 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4898.99	57.92	74.00	-16.08	55.67	4.22	32.69	34.66	Peak	253	139	HORIZONTAL
2	4901.05	50.32	54.00	-3.68	48.07	4.22	32.69	34.66	Average	253	139	HORIZONTAL
3	7348.53	48.09	54.00	-5.91	40.58	5.35	37.11	34.95	Average	337	168	HORIZONTAL
4	7348.55	58.70	74.00	-15.30	51.19	5.35	37.11	34.95	Peak	337	168	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4900.92	59.20	74.00	-14.80	56.95	4.22	32.69	34.66	Peak	255	100	VERTICAL
2	4901.00	51.80	54.00	-2.20	49.55	4.22	32.69	34.66	Average	255	100	VERTICAL
3	7348.46	56.13	74.00	-17.87	48.62	5.35	37.11	34.95	Peak	153	181	VERTICAL
4	7348.61	45.08	54.00	-8.92	37.57	5.35	37.11	34.95	Average	153	181	VERTICAL

Temperature	24°C	Humidity	53%
Test Engineer	Kenneth Huang	Configurations	Channel 11
Test Date	May 18. 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4950.98	54.96	74.00	-19.04	52.57	4.23	32.80	34.64	Peak	321	100	HORIZONTAL
2	4951.03	46.84	54.00	-7.16	44.45	4.23	32.80	34.64	Average	321	100	HORIZONTAL
3	7423.61	58.81	74.00	-15.19	51.19	5.37	37.22	34.97	Peak	336	180	HORIZONTAL
4	7423.65	48.13	54.00	-5.87	40.51	5.37	37.22	34.97	Average	336	180	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4949.02	60.25	74.00	-13.75	57.86	4.23	32.80	34.64	Peak	274	112	VERTICAL
2	4951.02	52.93	54.00	-1.07	50.54	4.23	32.80	34.64	Average	274	112	VERTICAL
3	7426.27	46.75	54.00	-7.25	39.13	5.37	37.22	34.97	Average	163	110	VERTICAL
4	7426.38	57.79	74.00	-16.21	50.17	5.37	37.22	34.97	Peak	163	110	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.

4.5. Band Edge Emissions Measurement

4.5.1. 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

4.5.2. 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 (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100kHz/300kHz for Peak

4.5.3. Test Procedures

1. The test procedure is the same as section 4.4.3, 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.

4.5.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.4.4.

4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Test Result of Band Edge and Fundamental Emissions

Temperature	24°C	Humidity	53%
Test Engineer	Kenneth Huang	Configurations	Channel 1, 6, 11
Test Date	May 18, 2014		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2390.00	56.04	74.00	-17.96	25.21	2.91	27.92	0.00	Peak	275	100	VERTICAL
2	2390.00	45.53	54.00	-8.47	14.70	2.91	27.92	0.00	Average	275	100	VERTICAL
3	2425.00	90.18			59.37	2.93	27.88	0.00	Average	275	100	VERTICAL
4	2425.64	94.64			63.83	2.93	27.88	0.00	Peak	275	100	VERTICAL

Item 3, 4 are the fundamental frequency at 2425 MHz.

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2390.00	57.04	74.00	-16.96	26.21	2.91	27.92	0.00	Peak	262	100	VERTICAL
2	2390.00	45.50	54.00	-8.50	14.67	2.91	27.92	0.00	Average	262	100	VERTICAL
3	2449.68	95.02			64.22	2.94	27.86	0.00	Peak	262	100	VERTICAL
4	2450.00	90.55			59.75	2.94	27.86	0.00	Average	262	100	VERTICAL
5	2483.50	55.80	74.00	-18.20	25.02	2.96	27.82	0.00	Peak	262	100	VERTICAL
6	2483.50	45.85	54.00	-8.15	15.07	2.96	27.82	0.00	Average	262	100	VERTICAL

Item 3, 4 are the fundamental frequency at 2450 MHz.

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2475.00	93.49			62.71	2.96	27.82	0.00	Average	353	100	HORIZONTAL
2	2475.48	98.08			67.30	2.96	27.82	0.00	Peak	353	100	HORIZONTAL
3	2483.50	55.91	74.00	-18.09	25.13	2.96	27.82	0.00	Peak	353	100	HORIZONTAL
4	2483.50	45.69	54.00	-8.31	14.91	2.96	27.82	0.00	Average	353	100	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2475 MHz.

Note:

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

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

4.6. Antenna Requirements

4.6.1. 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. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.6.2. Antenna Connector Construction

Please refer to section 3.4 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
EMI Test Receiver	R&S	ESCS 30	100355	9 kHz ~ 2.75 GHz	Apr. 23, 2014	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov. 23, 2013	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Nov. 23, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 04, 2013	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R	Conduction (CO01-CB)
Bilog Antenna	SCHAFFNER	CBL61112B	2894	30MHz - 1GHz	Nov. 14, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz – 30MHz	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	Dec. 17, 2013	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	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Oct. 23, 2013	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100019	9kHz~40GHz	Dec. 02, 2013	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Dec. 12, 2013	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	30MHz - 1GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1GHz - 40GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1GHz – 40GHz	Nov. 17, 2013	Radiation (03CH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	0120A02056002D	2GHz ~ 18GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Power Divider	Woken	3 Way	MDC2366	2GHz ~ 18GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Power Divider	Woken	4 Way	0120A04056002D	2GHz ~ 18GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1GHz – 26.5GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1GHz – 26.5GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1GHz – 26.5GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1GHz – 26.5GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1GHz – 26.5GHz	Nov. 17, 2013	Conducted (TH01-CB)

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

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

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

6. 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 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