NCC RADIO TEST REPORT

Equipment	:	**VUSION 1.6 BWY**
Brand Name	:	**SES-imagotag**
Model Name	:	**Y16S01**
Applicant	:	龍亭新技股份有限公司 **74144** 南部科學工業園區台南市新市區創業路 **28** 號 **4** 樓
Manufacturer	:	**SES-imagotag** **55 Place Nelson Mandela, 92024 Nanterre, France.**
Standard	:	**NCC LP0002 Section 3.10.2**

The product was received on Jan. 02, 2018, and testing was started from Feb. 07, 2018 and completed on Mar. 10, 2018. We, SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013, NCC LP0002 (Jan. 10, 2018) and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

History of this test report 3

Summary of Test Result 4

1. General Information 5

1.1. Product Details 5
1.2. Accessories 5
1.3. Antenna Information 5
1.4. Table for Carrier Frequencies 5
1.5. Table for Test Modes 6
1.6. Table for Testing Locations 7
1.7. Table for Supporting Units 7
1.8. Duty Cycle 7
1.9. Test Configurations 8

2. Test Result 10

2.1. Field Strength of Fundamental Emissions Measurement 10
2.2. 20dB Spectrum Bandwidth Measurement 14
2.3. Radiated Emissions Measurement 18
2.4. Band Edge Emissions Measurement 32
2.5. Antenna Requirements 36

3. List of Measuring Equipments 37

4. Measurement Uncertainty 38

Appendix A. Test Photos

Photographs of EUT v01

History of this test report

Report No.	Version	Description	Issued Date
TR6D1412-15	01	Initial issue of report	Jun. 04, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	2.3	AC Power Line Conducted Emissions	-	Note
2.1	3.10.2.2	Field Strength of Fundamental Emissions	PASS	-
2.2	-	20dB Spectrum Bandwidth	PASS	-
2.3	3.10.2.2	Radiated Emissions	PASS	-
2.4	3.10.2.2	Band Edge Emissions	PASS	-
2.5	2.2	Antenna Requirements	PASS	-
Note: It was supplied power by Internal Lithium Battery (3Vdc) for EUT; it's not necessary to apply to AC Power Line Conducted Emissions test.				

Reviewed by: Sam Chen

Report Producer: Cindy Peng

1. General Information

1.1. Product Details

Items	Description
Power Type	From Internal Lithium Battery (3Vdc)
Modulation	MSK
Frequency Range	2400 ~ 2483.5MHz
Operation Frequency Range	2404 ~ 2479.25MHz
Channel Number	11
Channel Bandwidth (99%)	1.120 MHz
Max. Field Strength	60.31 dBuV/m (Average)
Carrier Frequencies	Please refer to section 1.4

1.2. Accessories

Equipment Name	Brand Name	Model Name
Internal Lithium Battery	Henli Max	CR2450

1.3. Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	SES-imagotag	R26N02	Printed on PCB Antenna	N/A	-9.17

1.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency
2400 ~ 2483.5MHz	0	2404 MHz
	1	2409.95 MHz
	2	2421.85 MHz
	3	2424.65 MHz
	4	2441.8 MHz
	5	2449.15 MHz
	6	2461.75 MHz
	7	2469.45 MHz
	8	2474.35 MHz
	9	2476.8 MHz
	10	2479.25 MHz

1.5. Table for Test Modes

The following table is a list of the test modes shown in this test report.

Test Items	Mode	Channel	Antenna
Field Strength of Fundamental Emissions 20dB Spectrum Bandwidth	CTX	0/4/10	1
Radiated Emissions 30MHz ~ 1GHz	Intentional – CTX	-	1
	Unintentional – CRX	-	1
Radiated Emissions 1GHz~5th Harmonic	Unintentional – CRX	-	1
Radiated Emissions 1GHz~10th Harmonic	Intentional – CTX	0/4/10	1
Band Edge Emissions	Intentional – CTX	0/4/10	1

The following test modes were performed for all tests:

For Radiated Emission test below 1GHz:

Intentional – CTX

Test Mode 1 - CTX in X axis

Test Mode 2 - CTX in Y axis

Test Mode 3 - CTX in Z axis

Mode 3 is the worst case, so it was selected to record in this test report.

Unintentional – CRX

Test Mode 1 - CRX in X axis

Test Mode 2 - CRX in Y axis

Test Mode 3 - CRX in Z axis

Mode 3 is the worst case, so it was selected to record in this test report.

For Radiated Emission test above 1GHz:

Unintentional 1GHz~5th Harmonic

The EUT was performed at X axis, Y axis and Z axis position for Radiated emission test.

Z axis generated the worst test result for Radiated emission unintentional below 1GHz test, thus the measurement for Radiated emission unintentional 1GHz~5th Harmonic test will follow this same test configuration.

Test Mode 1 - CRX in Z axis

Intentional 1GHz~10th Harmonic

The EUT was performed at X axis, Y axis and Z axis position for Radiated emission test, and the worst case was found at X axis. So the measurement will follow this same test configuration.

Test Mode 1 - CTX in X axis

1.6. 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 Designation No.**	**IC File No.**	**VCCI Reg. No**
03CH01-CB	SAC	Hsin Chu	TW0006	IC 4086D	-

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

1.7. Table for Supporting Units

N/A

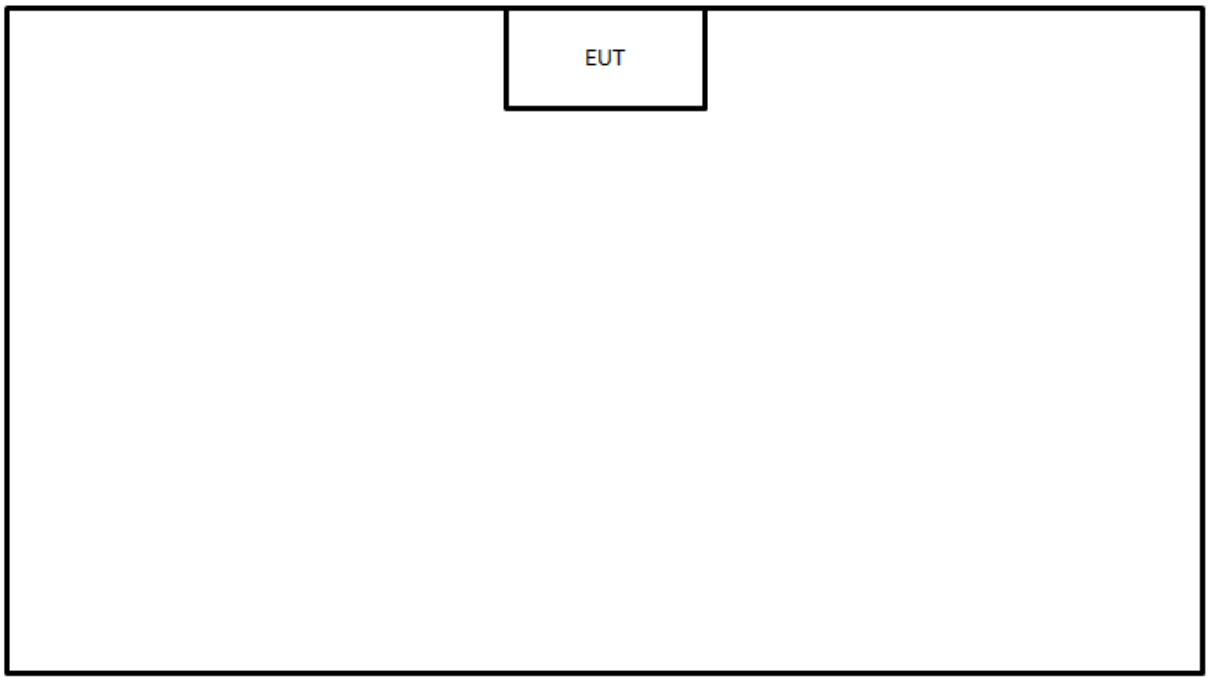
1.8. Duty Cycle

Duty Cycle (%)	Correction Duty Factor (dB)
1.03	-39.74

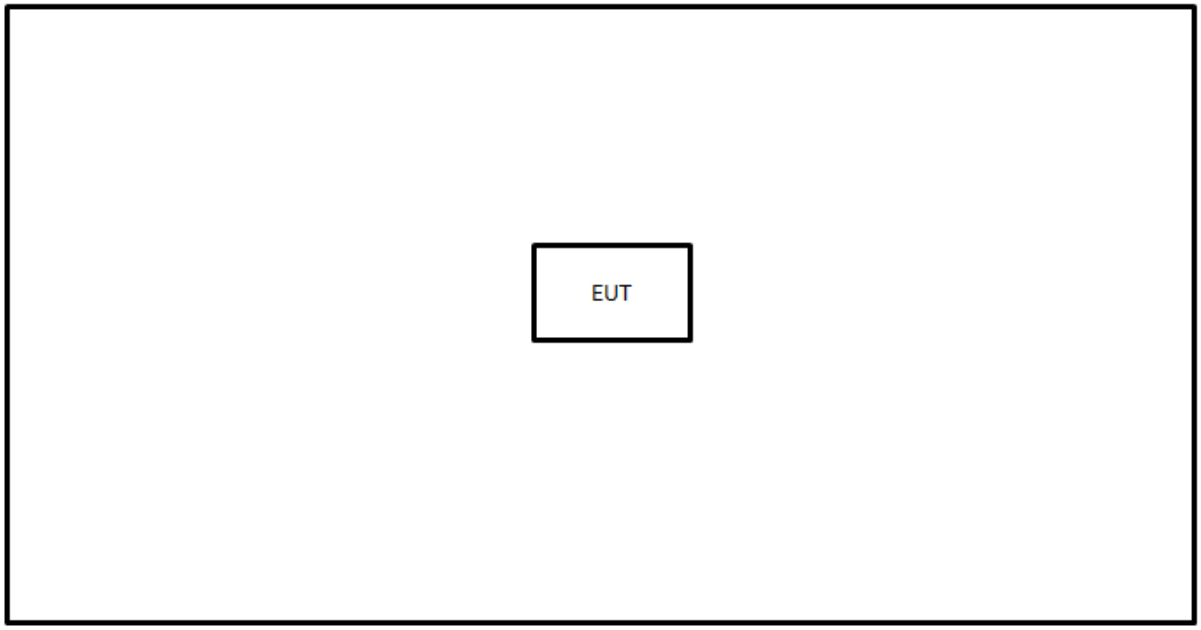
1.9. Test Configurations

1.9.1. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz and Unintentional 1GHz~5th Harmonic



Test Configuration: Intentional 1GHz~10th Harmonic



2. Test Result

2.1. Field Strength of Fundamental Emissions Measurement

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

2.1.2. Measuring Instruments and Setting

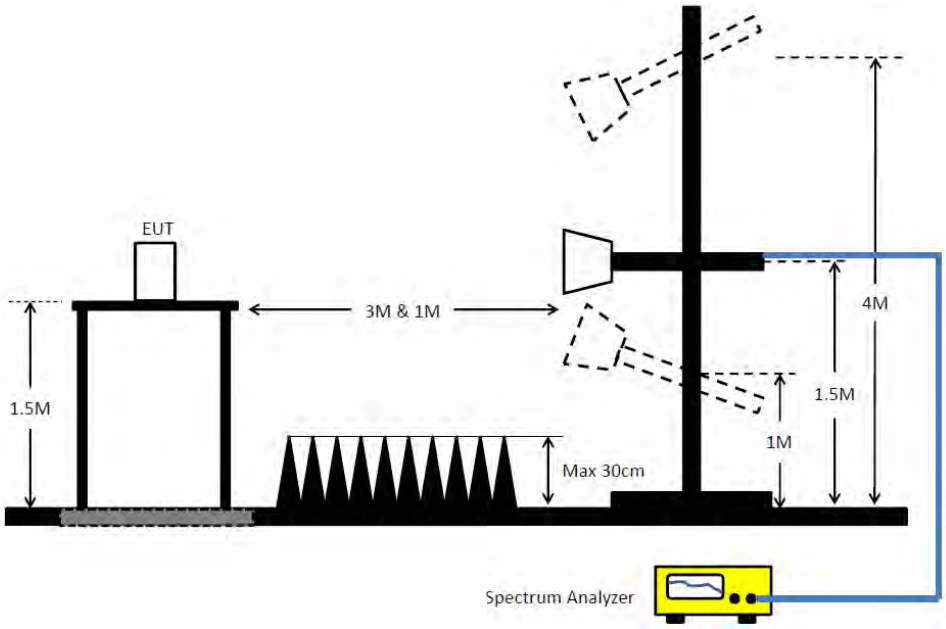
Refer a test equipment and calibration data table in this test report. The following table is the setting of the spectrum analyzer.

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

2.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.8 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 1/T 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.

2.1.4. Test Setup Layout



2.1.5. Test Deviation

There is no deviation with the original standard.

2.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

2.1.7. Test Result of Field Strength of Fundamental Emissions

Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Channel 0, 4, 10
Test Date	Mar. 05, 2018 ~ Mar. 10, 2018		

Channel 0

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2404.12	60.31	94.00	-33.69	27.14	5.12	28.05	0.00	112	222	Average	VERTICAL
2	2404.12	100.05	114.00	-13.95	66.88	5.12	28.05	0.00	112	222	Peak	VERTICAL

Channel 4

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2441.88	58.79	94.00	-35.21	25.62	5.19	27.98	0.00	150	173	Average	VERTICAL
2	2441.88	98.53	114.00	-15.47	65.36	5.19	27.98	0.00	150	173	Peak	VERTICAL

Channel 10

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2479.33	58.38	94.00	-35.62	25.20	5.25	27.93	0.00	107	194	Average	VERTICAL
2	2479.33	98.12	114.00	-15.88	64.94	5.25	27.93	0.00	107	194	Peak	VERTICAL

Note:

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

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

2.2. 20dB Spectrum Bandwidth Measurement

2.2.1. Limit

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

2.2.2. Measuring Instruments and Setting

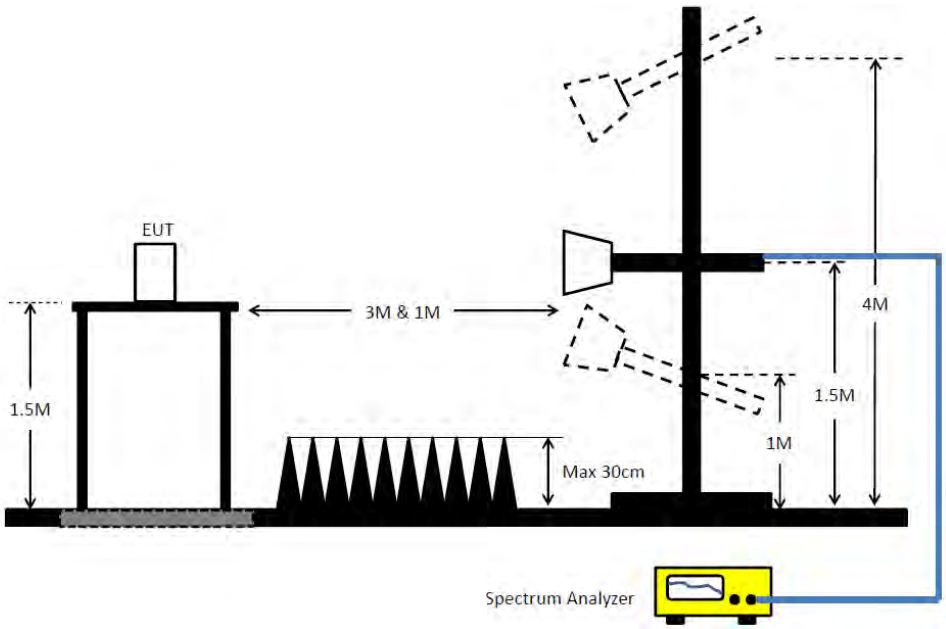
Refer a test equipment and calibration data table in this test report. The following table is the setting of the spectrum analyzer.

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

2.2.3. Test Procedures

1. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
2. Measured the spectrum width with power higher than 6dB below carrier.

2.2.4. Test Setup Layout



2.2.5. Test Deviation

There is no deviation with the original standard.

2.2.6. EUT Operation during Test

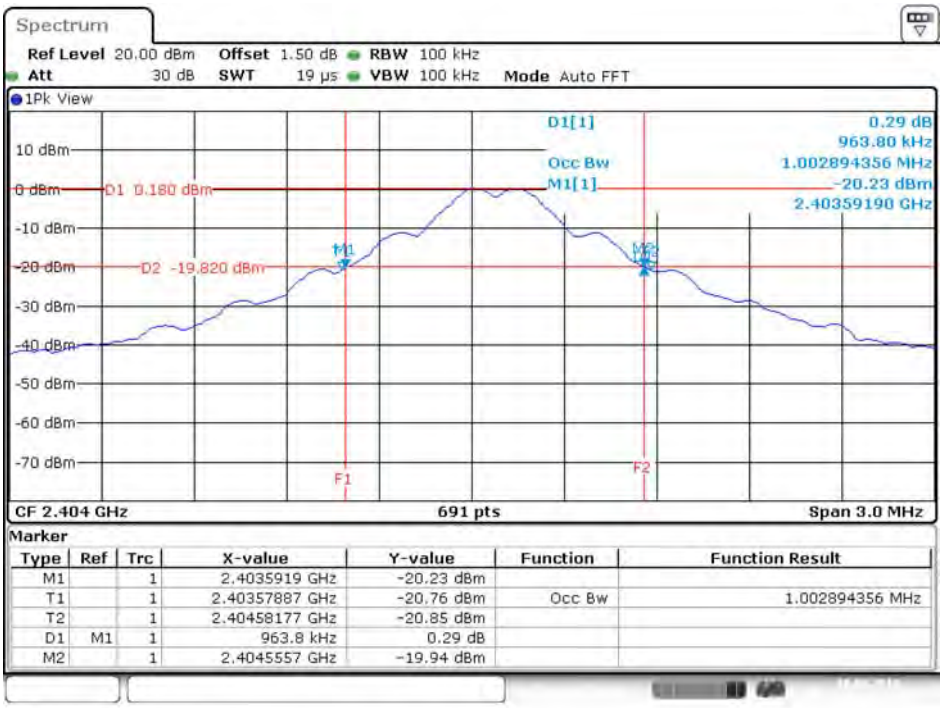
The EUT was programmed to be in continuously transmitting mode.

2.2.7. Test Result of 20dB Spectrum Bandwidth

Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Channel 0/4/10

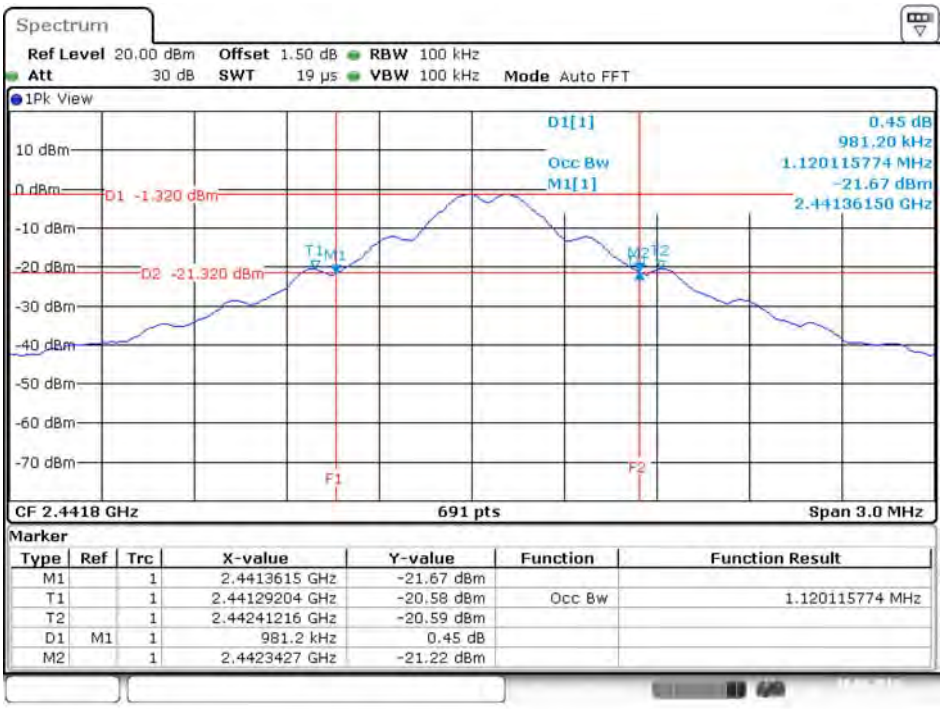
Frequency	20dB BW (MHz)	99% OBW (MHz)	Frequency range (MHz) f_L > 2400MHz	Frequency range (MHz) f_H < 2483.5MHz	Test Result
2404 MHz	0.96	1.003	2403.5919	-	PASS
2441.8 MHz	0.98	1.120	-	-	PASS
2479.25 MHz	0.96	1.090	-	2479.7797	PASS

20 dB Bandwidth Plot on 2404 MHz



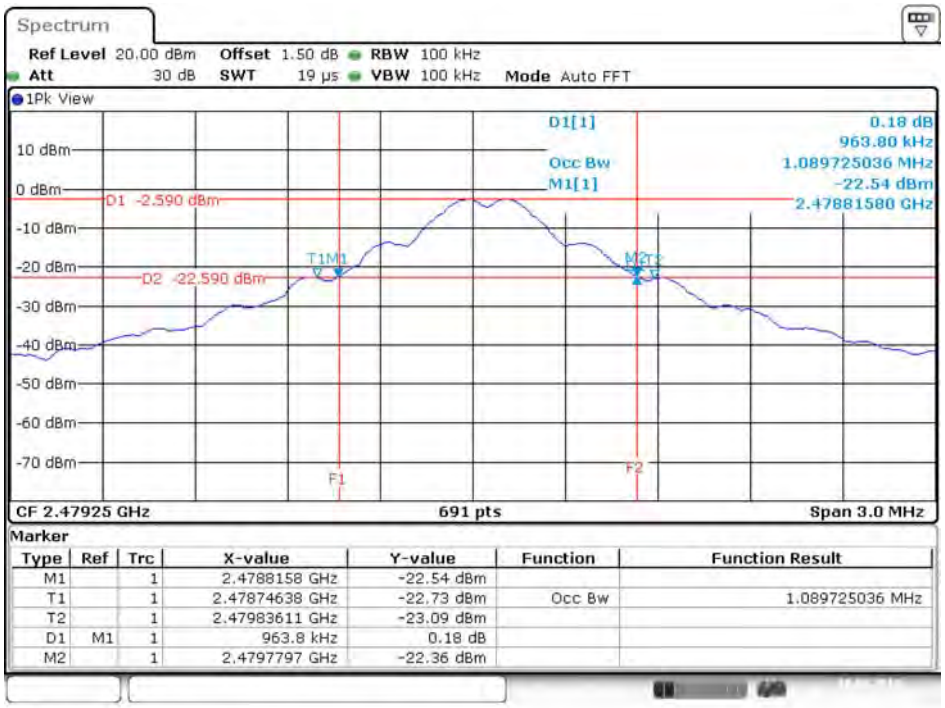
Date: 10.MAR.2018 13:01:55

20 dB Bandwidth Plot on 2441.8 MHz



Date: 10.MAR.2018 13:29:08

20 dB Bandwidth Plot on 2479.25 MHz



2.3. Radiated Emissions Measurement

2.3.1. 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

2.3.2. Measuring Instruments and Setting

Refer a test equipment and calibration data table in this test 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 / 1/T 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

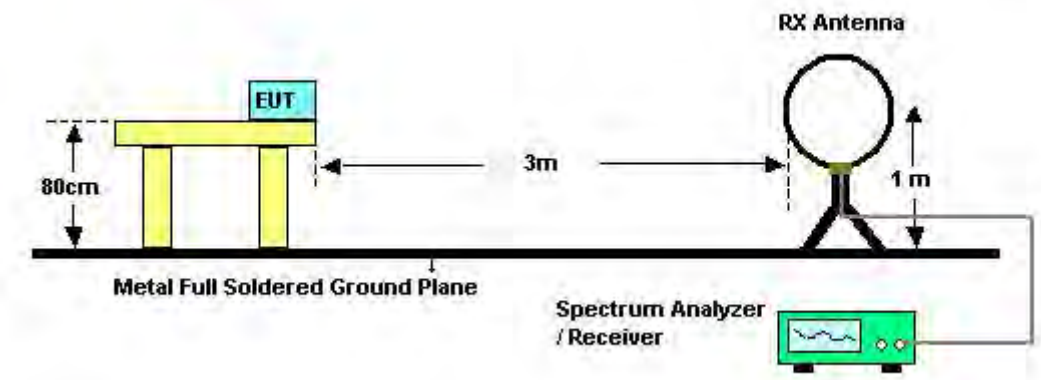
2.3.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 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 1/T 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.

2.3.4. Test Setup Layout

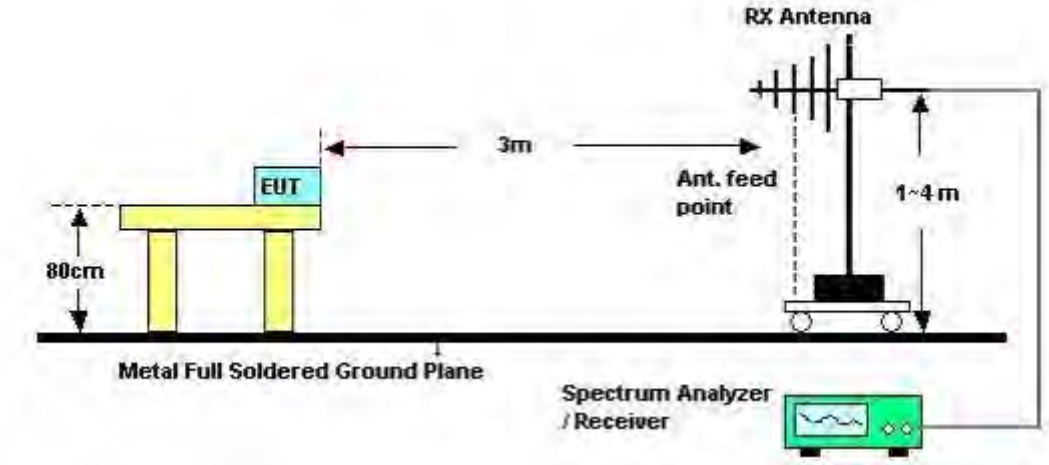
For Radiated Emissions: 9kHz ~30MHz

Intentional – CTX and Unintentional – CRX



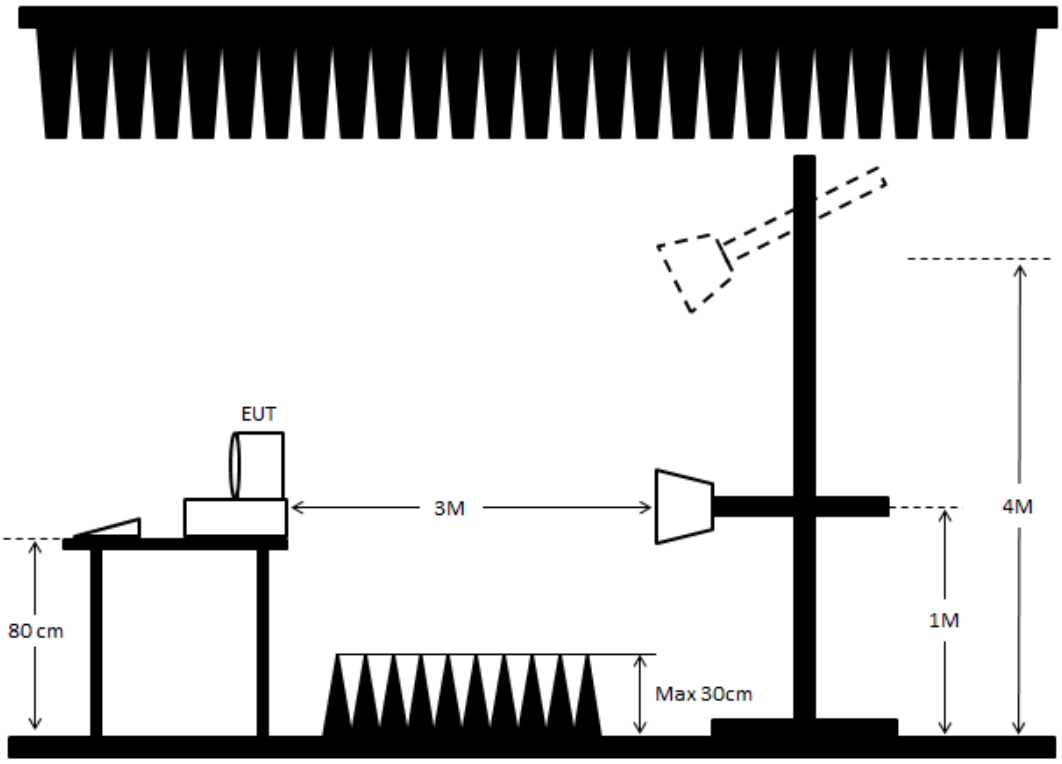
For Radiated Emissions: 30MHz~1GHz

Intentional – CTX and Unintentional – CRX

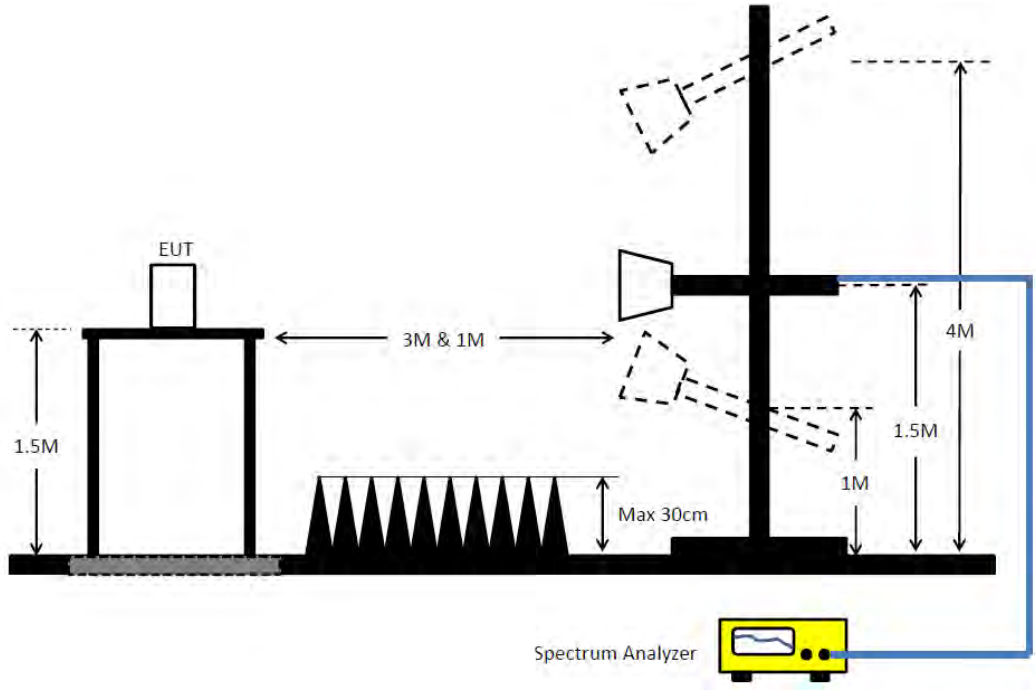


For Radiated Emissions: Above 1GHz

Unintentional 1GHz~5th Harmonic-CRX



Intentional 1GHz~10th Harmonic-CTX



2.3.5. Test Deviation

There is no deviation with the original standard.

2.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Intentional – CTX
Test Date	Mar. 05, 2018 ~ Mar. 10, 2018	Test Mode	Mode 3

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.

Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Unintentional – CRX
Test Date	Mar. 05, 2018 ~ Mar. 10, 2018	Test Mode	Mode 3

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.

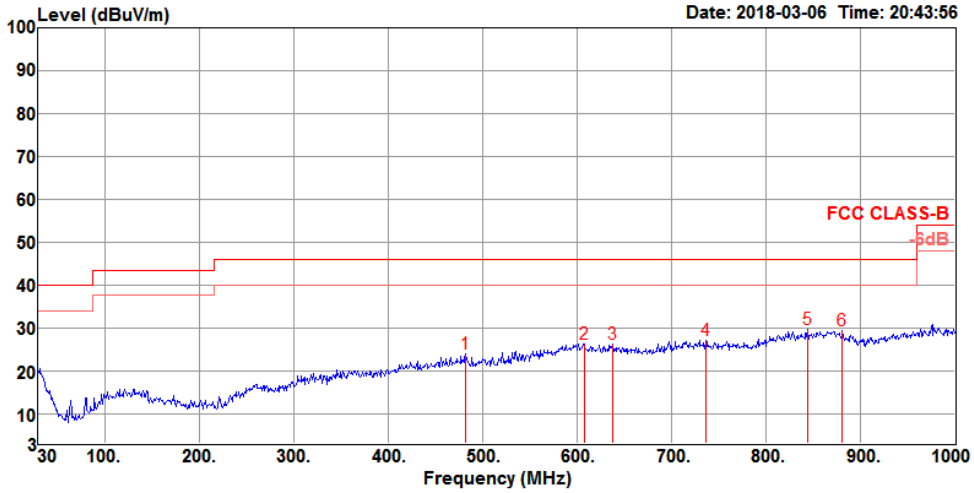
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

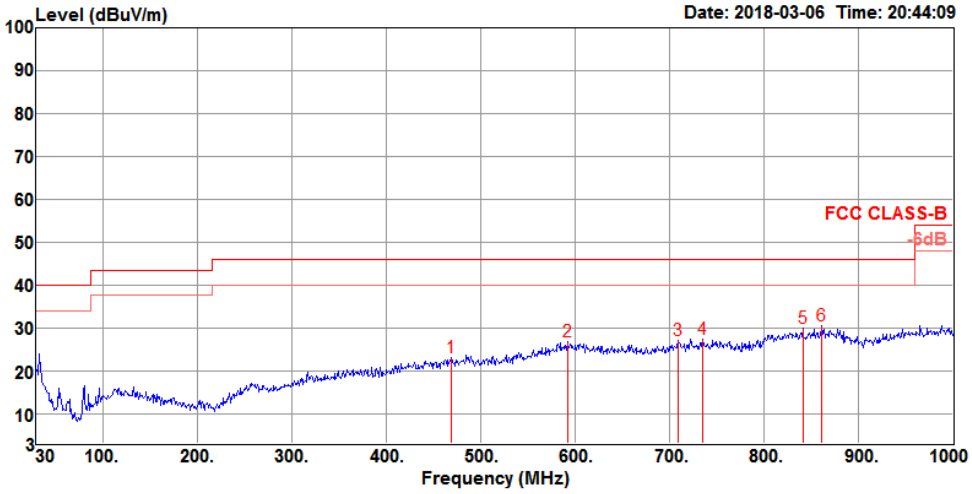
Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Intentional – CTX
Test Mode	Mode 3		

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	482.02	23.83	46.00	-22.17	29.04	3.98	23.29	32.48	100	8	Peak	HORIZONTAL
2	607.15	26.19	46.00	-19.81	29.45	4.73	24.57	32.56	100	132	Peak	HORIZONTAL
3	638.19	26.21	46.00	-19.79	28.95	4.93	24.88	32.55	100	1	Peak	HORIZONTAL
4	736.16	26.95	46.00	-19.05	28.63	5.31	25.44	32.43	100	205	Peak	HORIZONTAL
5	843.83	29.49	46.00	-16.51	29.59	5.84	26.18	32.12	100	1	Peak	HORIZONTAL
6	880.69	29.34	46.00	-16.66	28.71	6.05	26.50	31.92	100	360	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	469.41	22.95	46.00	-23.05	28.44	3.88	23.11	32.48	100	357	Peak	VERTICAL
2	591.63	26.69	46.00	-19.31	30.20	4.61	24.44	32.56	100	272	Peak	VERTICAL
3	709.00	27.17	46.00	-18.83	29.32	5.29	25.05	32.49	100	223	Peak	VERTICAL
4	735.19	27.33	46.00	-18.67	29.06	5.31	25.40	32.44	100	223	Peak	VERTICAL
5	840.92	29.89	46.00	-16.11	30.03	5.83	26.15	32.12	100	353	Peak	VERTICAL
6	861.29	30.39	46.00	-15.61	30.17	5.92	26.33	32.03	100	360	Peak	VERTICAL

Note:

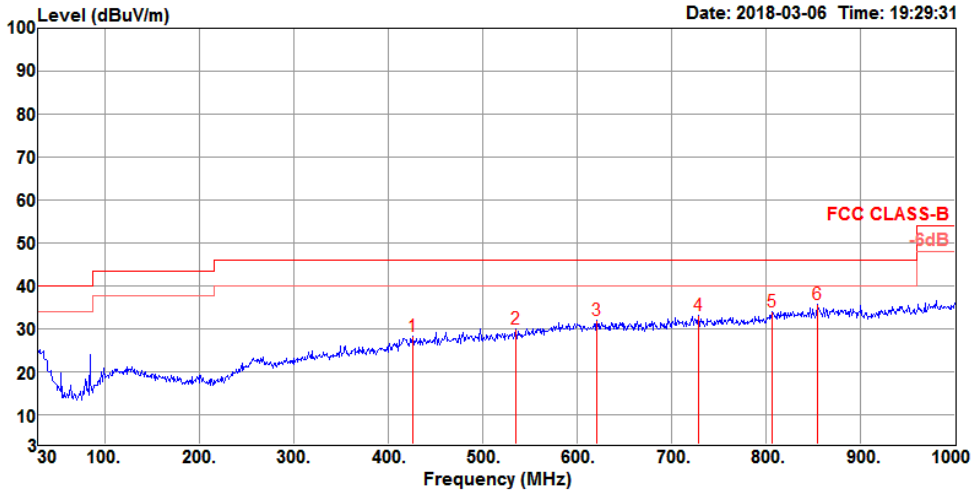
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

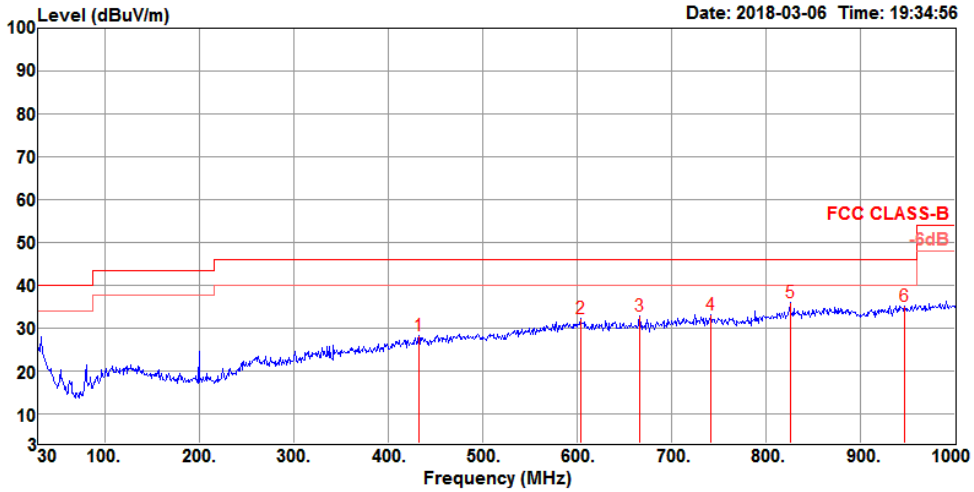
Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Unintentional – CRX
Test Mode	Mode 3		

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	425.76	28.08	46.00	-17.92	34.30	3.64	22.60	32.46	100	40	Peak	HORIZONTAL
2	535.37	30.02	46.00	-15.98	34.46	4.26	23.82	32.52	100	286	Peak	HORIZONTAL
3	620.73	31.90	46.00	-14.10	34.96	4.81	24.69	32.56	100	158	Peak	HORIZONTAL
4	728.40	33.03	46.00	-12.97	34.86	5.30	25.32	32.45	100	68	Peak	HORIZONTAL
5	806.00	33.97	46.00	-12.03	34.75	5.66	25.85	32.29	100	320	Peak	HORIZONTAL
6	854.50	35.51	46.00	-10.49	35.41	5.89	26.27	32.06	100	158	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	432.55	28.10	46.00	-17.90	34.25	3.67	22.64	32.46	150	352	Peak	VERTICAL
2	603.27	32.30	46.00	-13.70	35.65	4.70	24.52	32.57	100	360	Peak	VERTICAL
3	666.32	32.81	46.00	-13.19	35.33	5.09	24.92	32.53	300	188	Peak	VERTICAL
4	741.98	33.11	46.00	-12.89	34.72	5.31	25.50	32.42	100	49	Peak	VERTICAL
5	825.40	35.78	46.00	-10.22	36.29	5.75	25.94	32.20	125	343	Peak	VERTICAL
6	946.65	35.11	46.00	-10.89	33.52	6.29	26.71	31.41	100	170	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.

2.3.9. Results of Radiated Emissions (Unintentional 1GHz~5th Harmonic)

Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Unintentional – CRX
Test Date	Mar. 05, 2018 ~ Mar. 10, 2018	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1832.30	39.54	74.00	-34.46	42.83	3.58	27.77	34.64	154	301	Peak	HORIZONTAL
2	1833.00	32.00	54.00	-22.00	35.29	3.58	27.77	34.64	154	301	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	1872.00	42.01	74.00	-31.99	45.04	3.60	27.99	34.62	123	33	Peak	VERTICAL
2	1872.90	33.10	54.00	-20.90	36.13	3.60	27.99	34.62	123	33	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.

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

Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Channel 0
Test Date	Mar. 05, 2018 ~ Mar. 10, 2018	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4808.18	14.60	54.00	-39.40	-25.34	7.42	32.52	0.00	101	204	Average	HORIZONTAL
2	4808.18	54.34	74.00	-19.66	14.40	7.42	32.52	0.00	101	204	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4807.91	12.70	54.00	-41.30	-27.24	7.42	32.52	0.00	101	132	Average	VERTICAL
2	4807.91	52.44	74.00	-21.56	46.52	7.42	32.52	34.02	101	132	Peak	VERTICAL

Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Channel 4
Test Date	Mar. 05, 2018 ~ Mar. 10, 2018	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4883.60	15.79	54.00	-38.21	-24.33	7.44	32.68	0.00	103	204	Average	HORIZONTAL
2	4883.60	55.53	74.00	-18.47	49.42	7.44	32.68	34.01	103	204	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4883.81	12.90	54.00	-41.10	-27.22	7.44	32.68	0.00	229	325	Average	VERTICAL
2	4883.81	52.64	74.00	-21.36	46.53	7.44	32.68	34.01	229	325	Peak	VERTICAL

Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Channel 10
Test Date	Mar. 05, 2018 ~ Mar. 10, 2018	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4958.66	15.29	54.00	-38.71	-24.98	7.45	32.82	0.00	100	190	Average	HORIZONTAL
2	4958.66	55.03	74.00	-18.97	48.77	7.45	32.82	34.01	100	190	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4958.68	12.45	54.00	-41.55	-27.82	7.45	32.82	0.00	102	131	Average	VERTICAL
2	4958.68	52.19	74.00	-21.81	45.93	7.45	32.82	34.01	102	131	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.

2.4. Band Edge Emissions Measurement

2.4.1. 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

2.4.2. Measuring Instruments and Setting

Refer a test equipment and calibration data table in this test 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 / 1/T for Average
RBW / VBW (Emission in non-restricted band)	100kHz/300kHz for Peak

2.4.3. Test Procedures

The test procedure is the same as section 2.3.3.

2.4.4. Test Setup Layout

This test setup layout is the same as that shown in section 2.3.4.

2.4.5. Test Deviation

There is no deviation with the original standard.

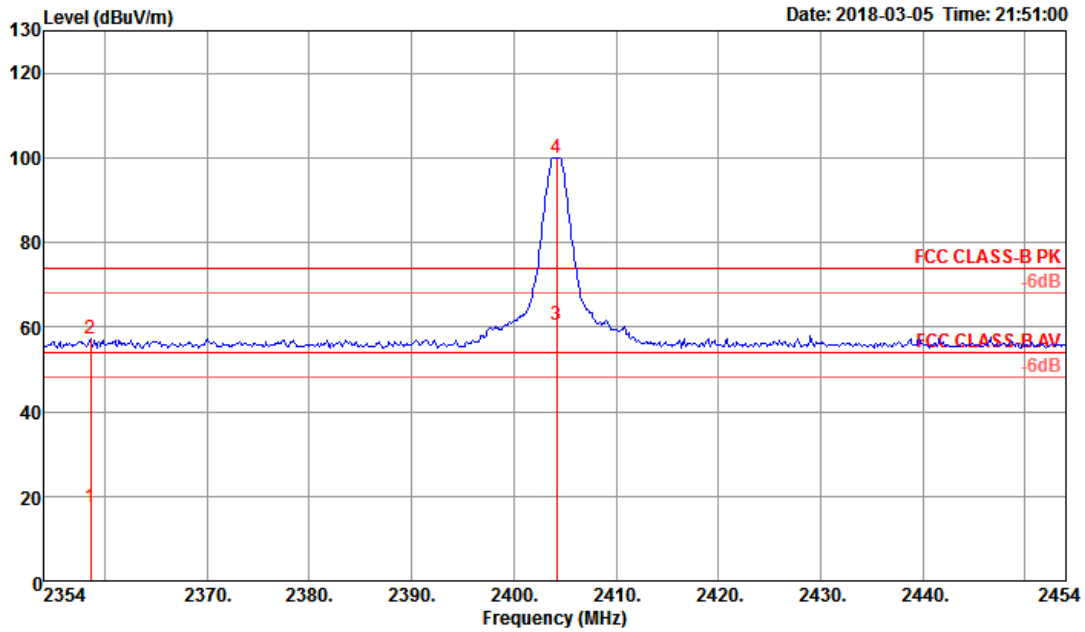
2.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

2.4.7. Test Result of Band Edge and Fundamental Emissions

Temperature	23℃	Humidity	56%
Test Engineer	Joy Tseng & Cola Fan	Configurations	Channel 0, 4, 10
Test Date	Mar. 05, 2018 ~ Mar. 10, 2018	Test Mode	Mode 1

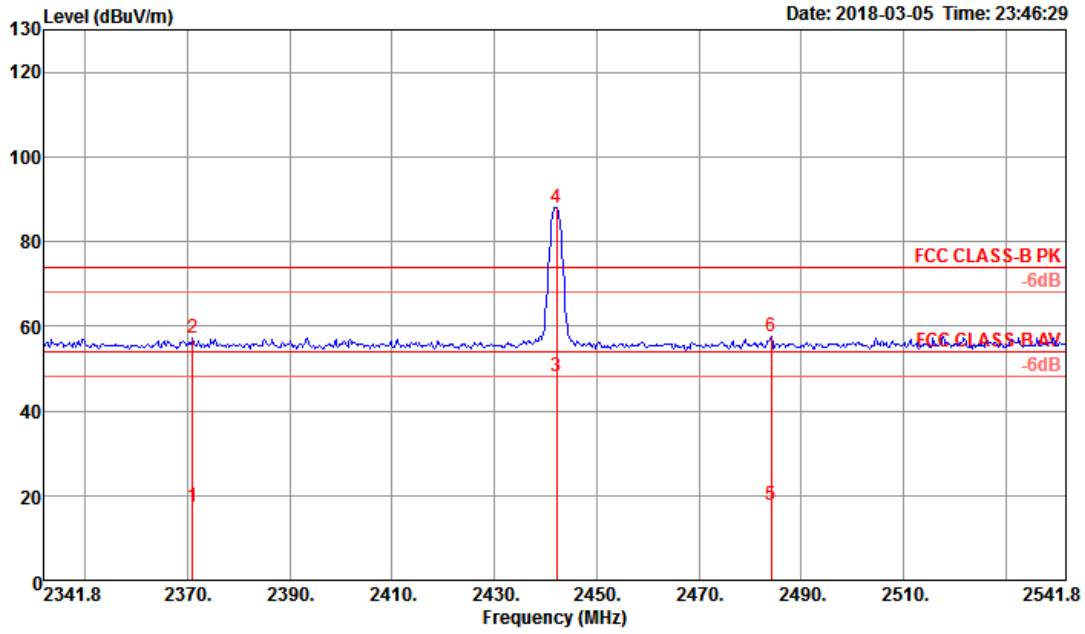
Channel 0



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2358.60	17.56	54.00	-36.44	-15.59	5.04	28.11	0.00	112	222	Average	VERTICAL
2	2358.60	57.30	74.00	-16.70	24.15	5.04	28.11	0.00	112	222	Peak	VERTICAL
3 •	2404.20	60.31	54.00			5.12	28.05	0.00	112	222	Average	VERTICAL
4 •	2404.20	100.05	74.00			5.12	28.05	0.00	112	222	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 2404 MHz.

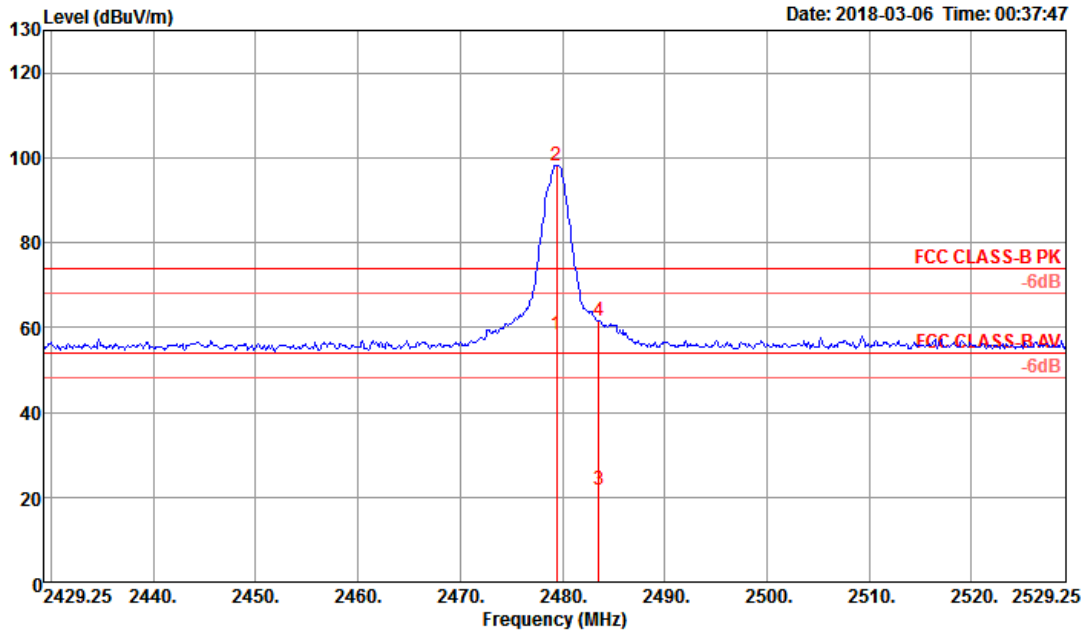
Channel 4



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2371.00	17.48	54.00	-36.52	-15.67	5.06	28.09	0.00	258	172	Average	HORIZONTAL
2	2371.00	57.22	74.00	-16.78	24.07	5.06	28.09	0.00	258	172	Peak	HORIZONTAL
3	2442.20	48.19	54.00			5.19	27.98	0.00	258	172	Average	HORIZONTAL
4 •	2442.20	87.93	74.00			5.19	27.98	0.00	258	172	Peak	HORIZONTAL
5	2484.20	17.70	54.00	-36.30	-15.49	5.27	27.92	0.00	258	172	Average	HORIZONTAL
6	2484.20	57.44	74.00	-16.56	24.25	5.27	27.92	0.00	258	172	Peak	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2441.8 MHz.

Channel 10



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1 ●	2479.45	58.38	54.00			5.25	27.93	0.00	107	194	Average	VERTICAL
2 ●	2479.45	98.12	74.00			5.25	27.93	0.00	107	194	Peak	VERTICAL
3	2483.55	21.88	54.00	-32.12	-11.31	5.27	27.92	0.00	107	194	Average	VERTICAL
4	2483.55	61.62	74.00	-12.38	28.43	5.27	27.92	0.00	107	194	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 2479.25 MHz.

Note:

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

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

2.5. Antenna Requirements

2.5.1. 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.

2.5.2. Antenna Connector Construction

The antenna connector complied with the requirements.

3. List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 30, 2017	Aug. 29, 2018	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2016*	Mar. 15, 2018*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 20, 2017	Nov. 19, 2018	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 05, 2017	Jul. 04, 2018	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2017	May 01, 2018	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 09, 2018	Jan. 08, 2019	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 10, 2017	Jul. 09, 2018	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 23, 2017	Nov. 22, 2018	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	May 06, 2017	May 05, 2018	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)

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

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

4. 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%
Conducted Emission	1.7 dB	Confidence levels of 95%