SPORTON International Inc.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

FCC RADIO TEST REPORT

Applicant's company	**Misfit, Inc.**
Applicant Address	25 Hampshire Street Apt. 19, Salem, NH 03079 USA
FCC ID	**PT3-BM0**
Manufacturer's company	**Misfit, Inc.**
Manufacturer Address	25 Hampshire Street Apt. 19, Salem, NH 03079 USA

Product Name	Ray
Brand Name	MISFIT
Model Name	BM0
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.249
Test Freq. Range	2400~2483.5MHz
Received Date	Jan. 13, 2016
Final Test Date	Jan. 20, 2016
Submission Type	Original Equipment

Statement

Test result included is only for the Bluetooth LE 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 C63.10-2013** 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
FR611409	Rev. 01	Initial issue of report	Jan. 26, 2016

1. VERIFICATION OF COMPLIANCE

Product Name	:	Ray
Brand Name	:	MISFIT
Model Name	:	BM0
Applicant	:	Misfit, Inc.
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. 13, 2016 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:
Cliff Chang
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**
-	15.207	AC Power Line Conducted Emissions	-	Note
4.1	15.249(a)	Field Strength of Fundamental Emissions	Complies	41.20 dB
4.2	15.215(c)	20dB Spectrum Bandwidth	Complies	-
4.3	15.249(a)/(d)	Radiated Emissions	Complies	11.64 dB
4.4	15.249(d)	Band Edge Emissions	Complies	8.26 dB
4.5	15.203	Antenna Requirements	Complies	-

Note: It was supplied power by battery (4.5Vdc) 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 1.5Vdc battery*3
Modulation	DSSS
Data Rate (Mbps)	GFSK: 1
Frequency Range	2400~2483.5MHz
Operation Frequency Range	2402~2480MHz
Channel Number	40 (37 hopping + 3 advertising channel)
Channel Space	2 MHz Bandwidth
Channel Band Width (99%)	1.12 MHz
Max. Field Strength	52.80 dBuV/m at 3m (Average)
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	LDS Antenna	N/A	-6.41

Note: The EUT has one antenna.

3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	0	2402 MHz	20	2442 MHz
	1	2404 MHz	:	:
	2	2406 MHz	37	2476 MHz
	:	:	38	2478 MHz
	18	2438 MHz	39	2480 MHz
	19	2440 MHz	-	-

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
Field Strength of Fundamental Emissions 20dB Spectrum Bandwidth	CTX	0/20/39	1
Radiated Emissions 30MHz ~ 1GHz	CTX	-	-
Radiated Emissions 1GHz~10th Harmonic	CTX	0/20/39	1
Band Edge Emissions	CTX	0/20/39	1

Note: 1. CTX=continuously transmitting

2. The EUT is designed as stand-along product.

For Radiated Emission below 1GHz test:

Mode 1. EUT in X axis.

Mode 2. EUT in Y axis.

Mode 3. EUT in Z axis.

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

For Radiated Emission above 1GHz test:

The EUT was performed at X axis, Y axis and Z axis position for Radiated emission above 1GHz test, and the worst case was found at X axis. So the measurement will follow this same test configuration.

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	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

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

3.7. Table for Supporting Units

Test Site: 03CH01-CB (below 1GHz)

Support Unit	Brand	Model	FCC ID
iPod	Apple	A1421	BCG-A1421

Test Site: 03CH01-CB (above 1GHz) and TH01-CB

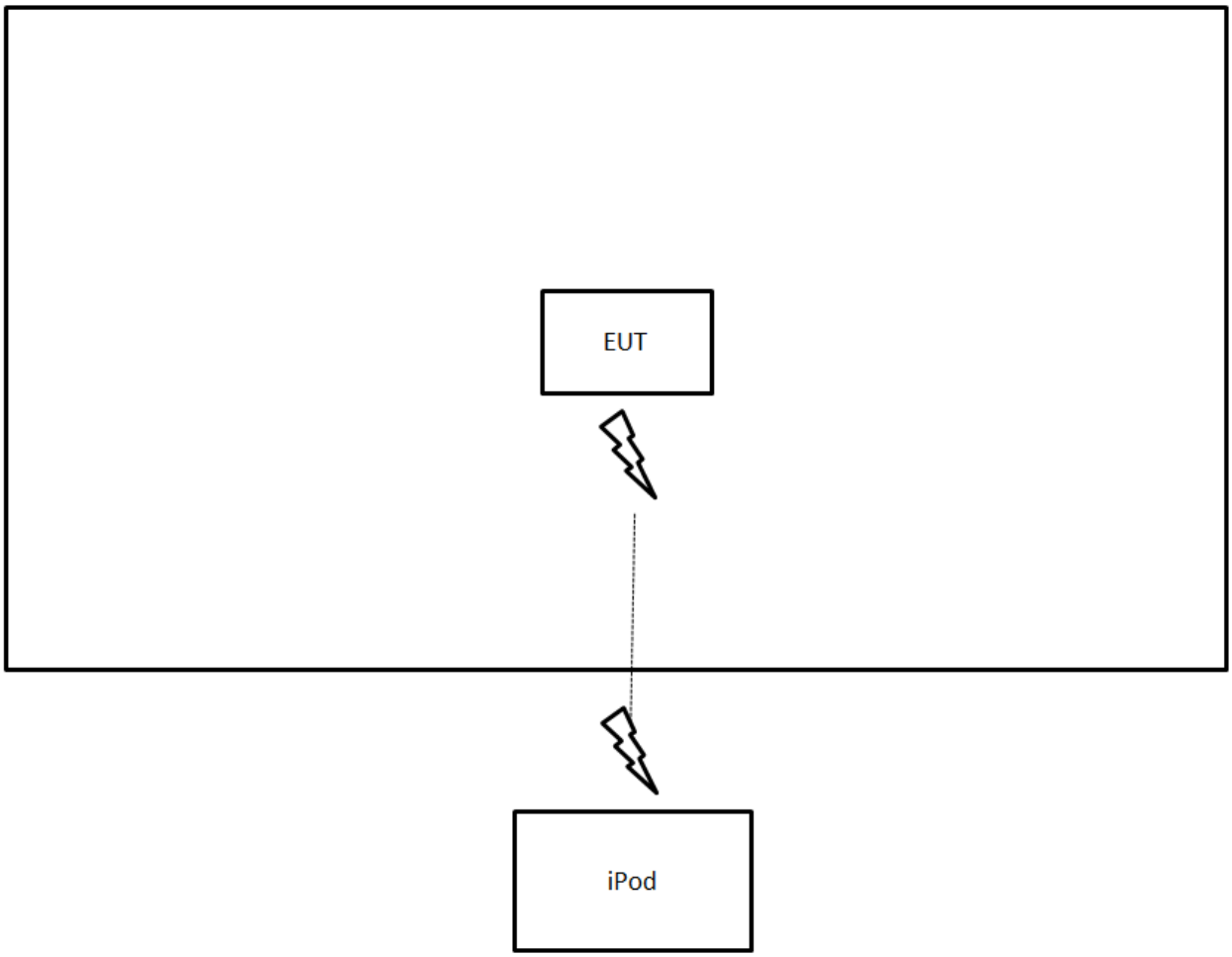
Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC
Power Supply	Advanced	LPS-305	N/A

3.8. Duty Cycle

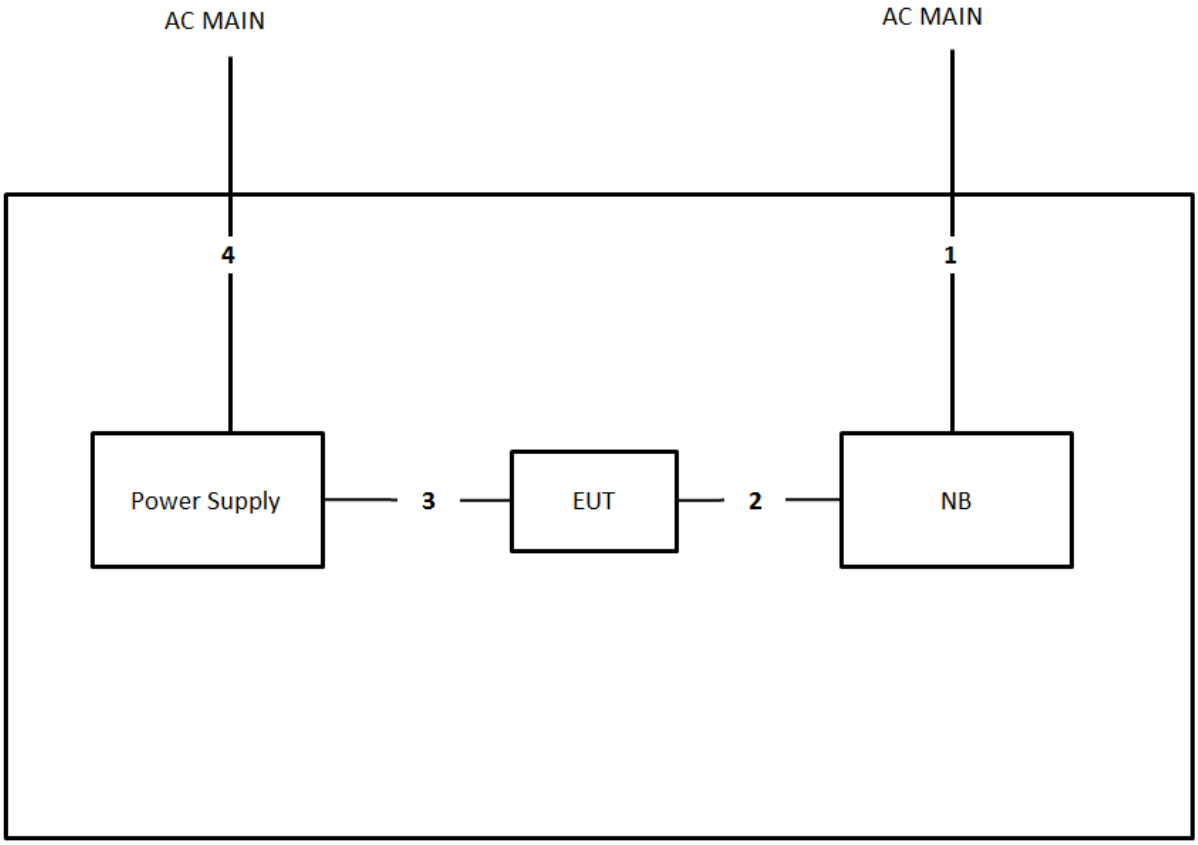
On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
0.392	0.628	62.42	2.05	2.55

3.9. Test Configurations

Test Configuration: 30MHz~1GHz



Test Configuration: above 1GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	No	1.8m
3	Crocodile clip cable*2	No	1m
4	Power cable	No	1.5m

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 (dBuV/m) at 3m
2400~2483.5MHz	94 (Average)
	114 (Peak)

4.1.2. Measuring Instruments and Setting

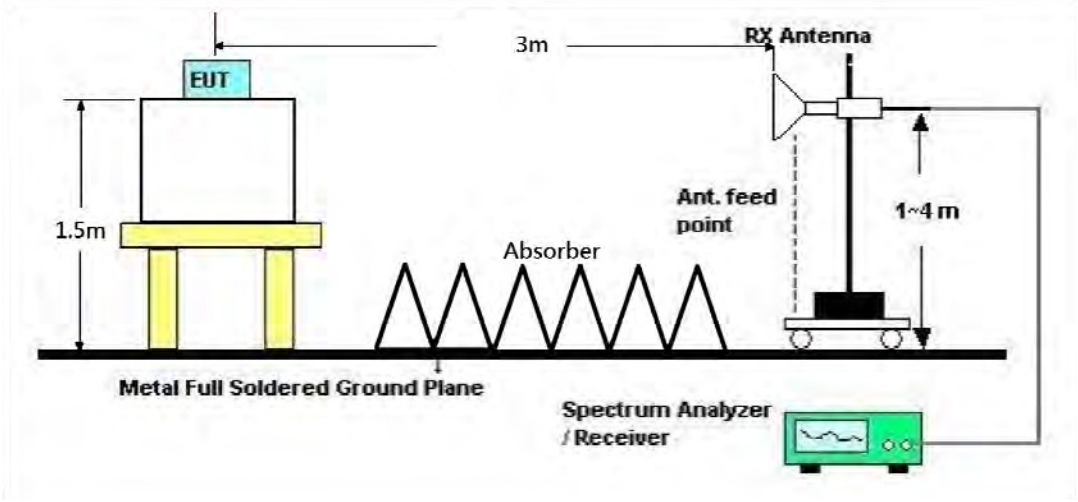
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Power Meter Parameter	Setting
RBW	1 MHz Peak / 3MHz Peak
VBW	1 MHz Peak / 1/T 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 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. 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.

4.1.4. Test Setup Layout



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	22°C	Humidity	59%
Test Engineer	Lucke Hsieh	Configurations	Channel 0, 20, 39
Test Date	Jan. 20, 2016		

Channel 0

	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	2401.73	57.08	114.00	-56.92	58.72	4.98	28.24	34.86	Peak	307	85	HORIZONTAL
2	2401.96	52.80	94.00	-41.20	54.44	4.98	28.24	34.86	Average	307	85	HORIZONTAL

Channel 20

	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	2441.76	55.17	114.00	-58.83	56.71	5.02	28.31	34.87	Peak	307	85	HORIZONTAL
2	2441.96	51.00	94.00	-43.00	52.54	5.02	28.31	34.87	Average	307	85	HORIZONTAL

Channel 39

	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	2479.75	53.70	114.00	-60.30	55.17	5.06	28.36	34.89	Peak	315	77	HORIZONTAL
2	2479.93	49.63	94.00	-44.37	51.10	5.06	28.36	34.89	Average	315	77	HORIZONTAL

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 (2400~2483.5MHz).

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	100 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.2.3. Test Procedures

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

4.2.4. Test Setup Layout

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

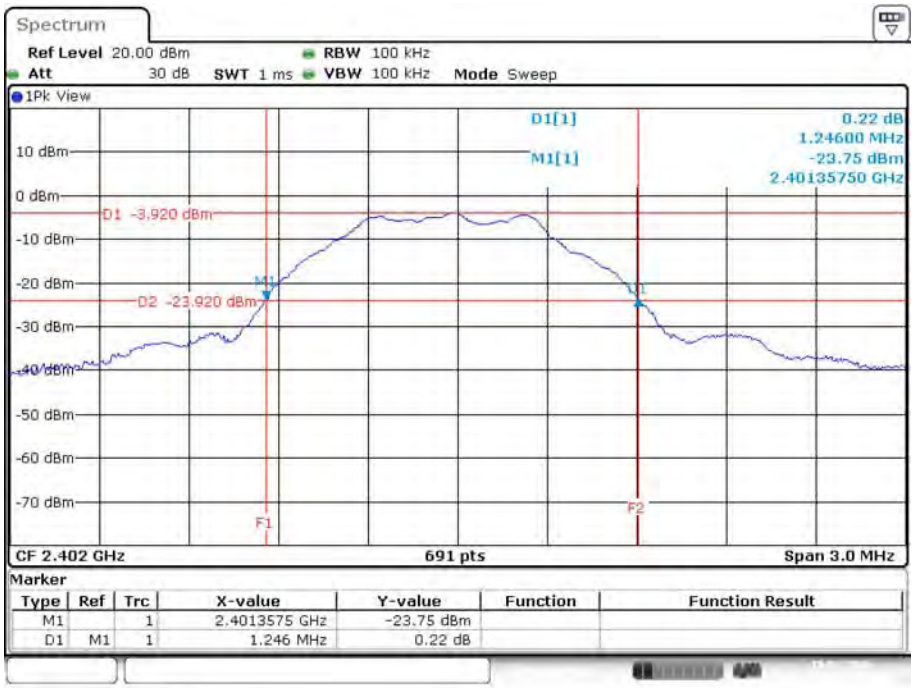
The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of 20dB Spectrum Bandwidth

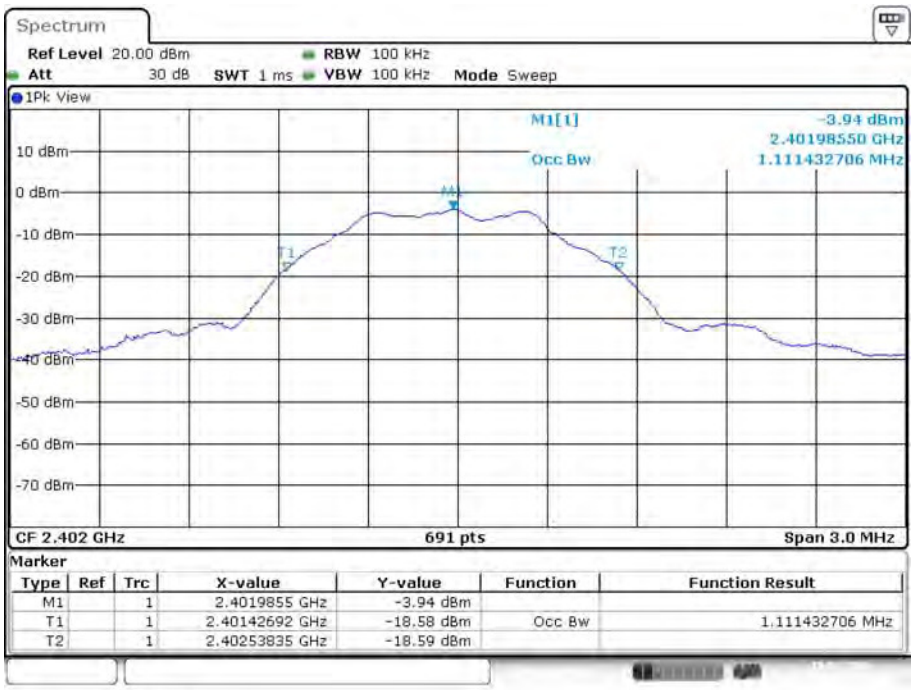
Temperature	24℃	Humidity	60%
Test Engineer	Clemens Fang	Configurations	Channel 0/20/39

Frequency	20dB BW (MHz)	99% OBW (MHz)	Frequency range (MHz) f_L > 2400MHz	Frequency range (MHz) f_H < 2483.5MHz	Test Result
2402 MHz	1.25	1.11	2401.3575	-	Complies
2442 MHz	1.24	1.11	-	-	Complies
2480 MHz	1.28	1.12	-	2480.6078	Complies

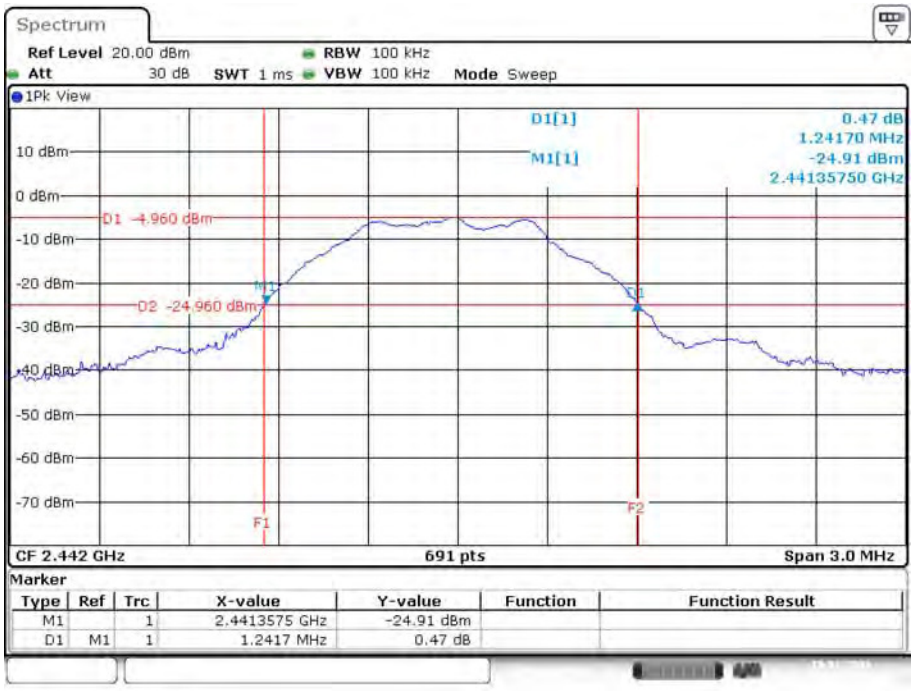
20 dB Bandwidth Plot on 2402 MHz



99% Bandwidth Plot on 2402 MHz



20 dB Bandwidth Plot on 2442 MHz



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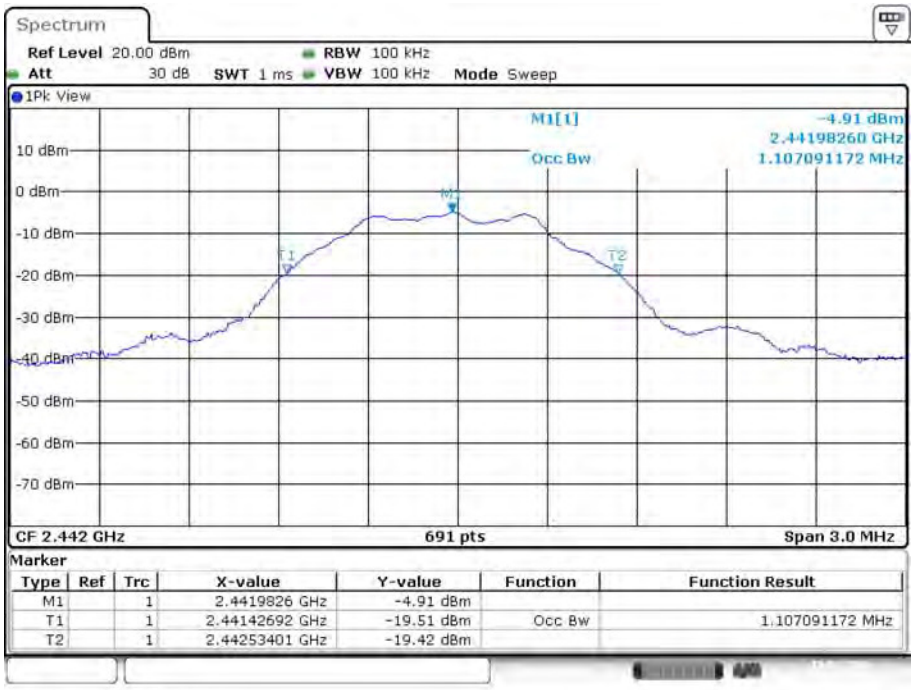
99% Bandwidth Plot on 2442 MHz



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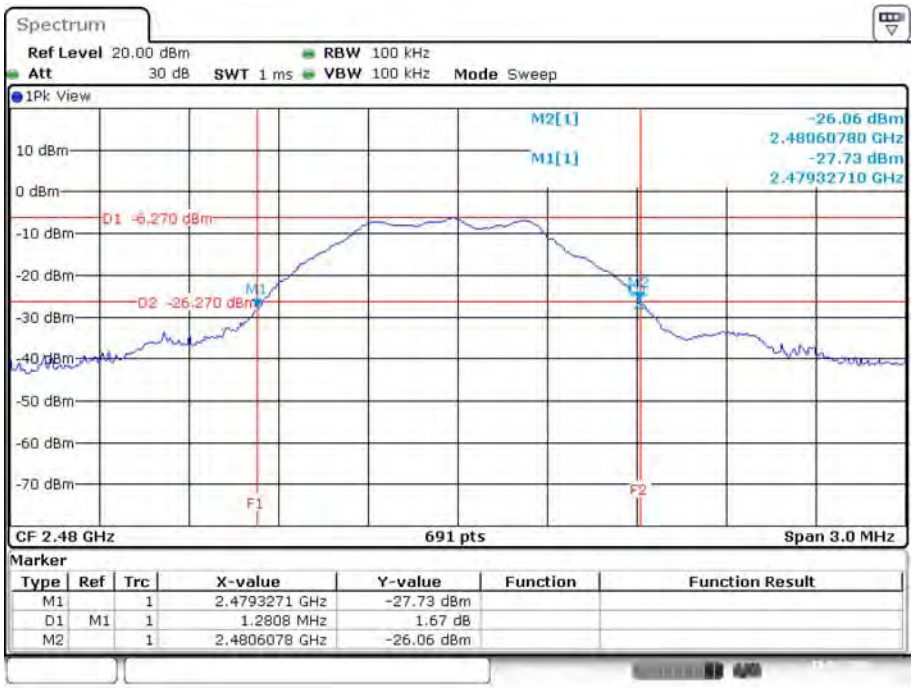
20 dB Bandwidth Plot on 2480 MHz



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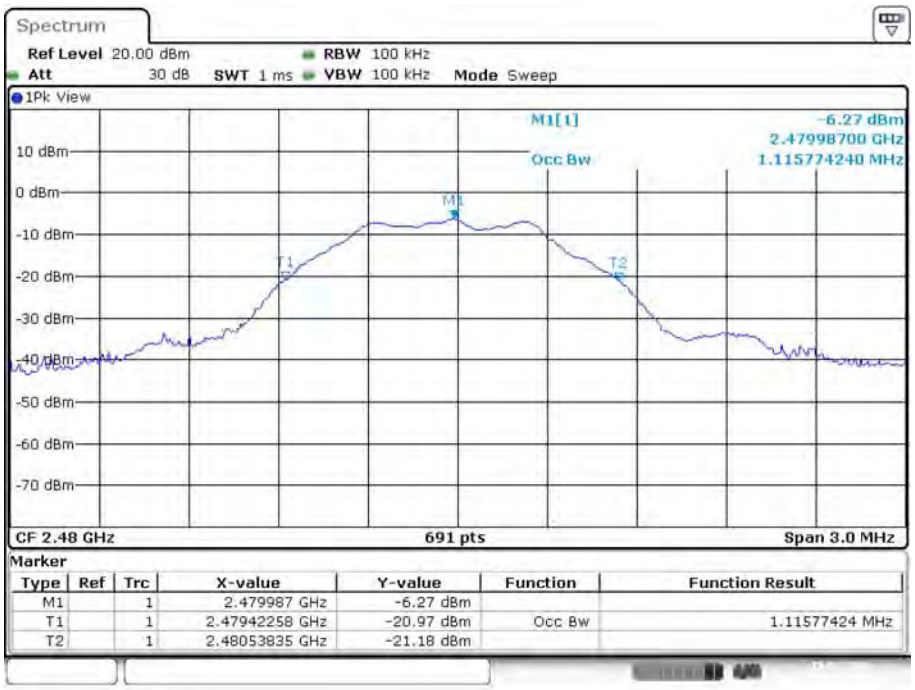
99% Bandwidth Plot on 2480 MHz



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4.3. Radiated Emissions Measurement

4.3.1. Limit

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

4.3.2. 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 (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

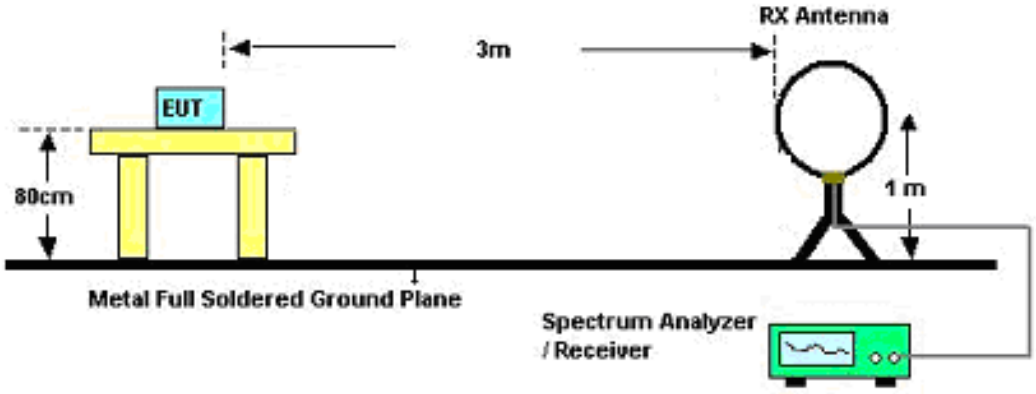
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.3.3. Test Procedures

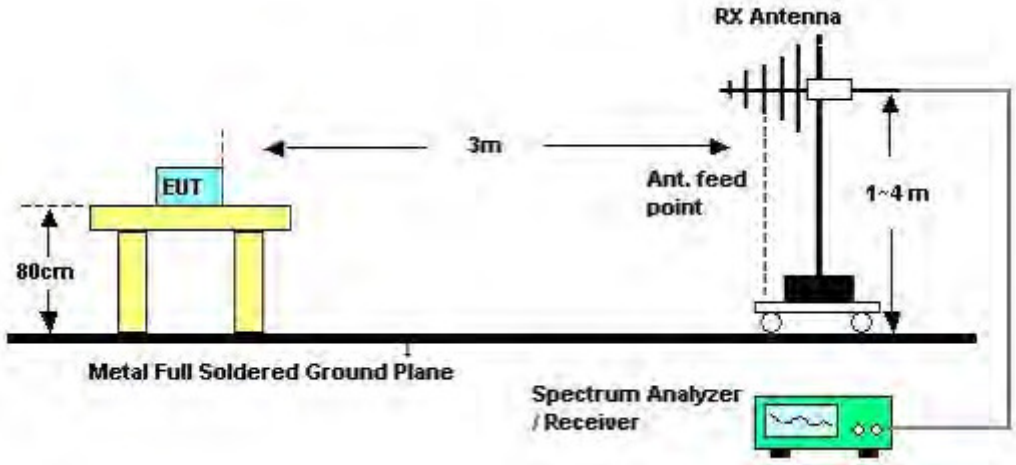
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

4.3.4. Test Setup Layout

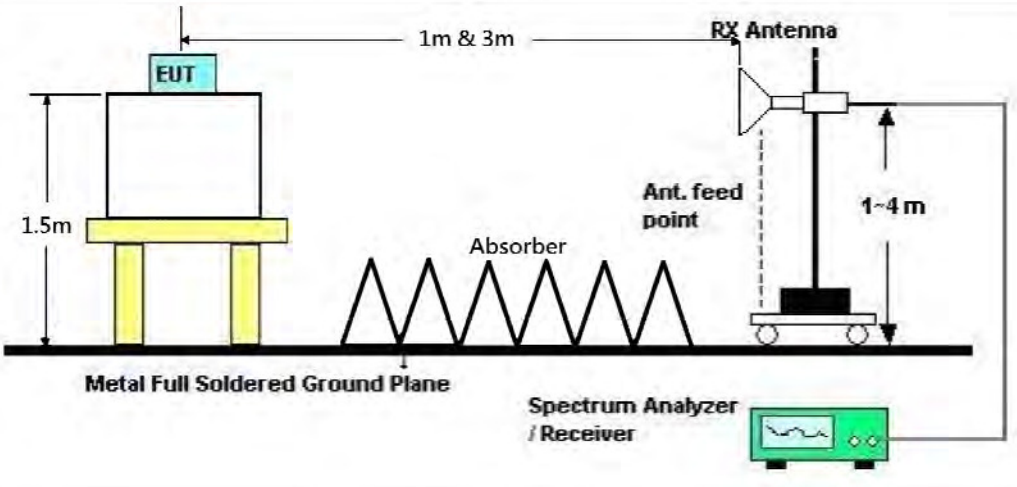
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



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	22°C	Humidity	59%
Test Engineer	Lucke Hsieh	Configurations	CTX
Test Date	Jan. 20, 2016	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.

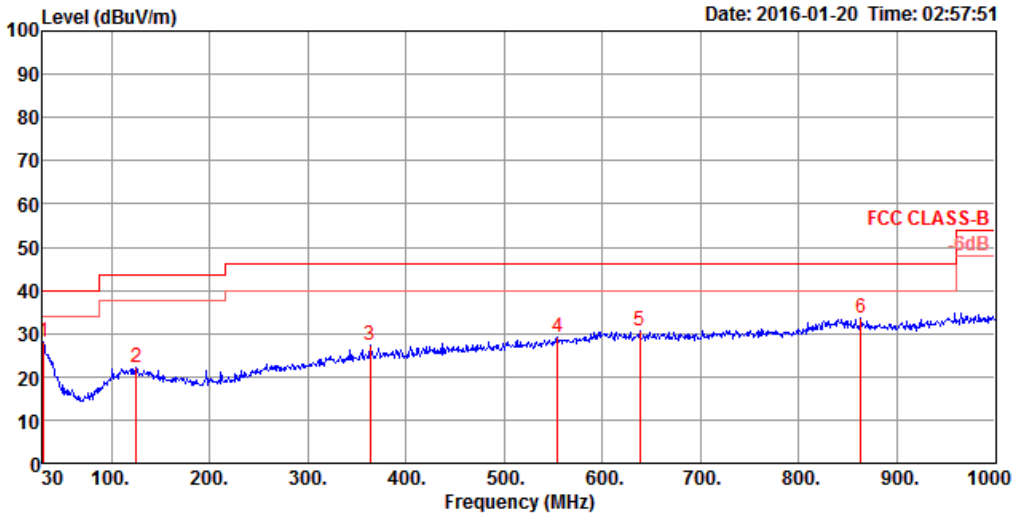
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

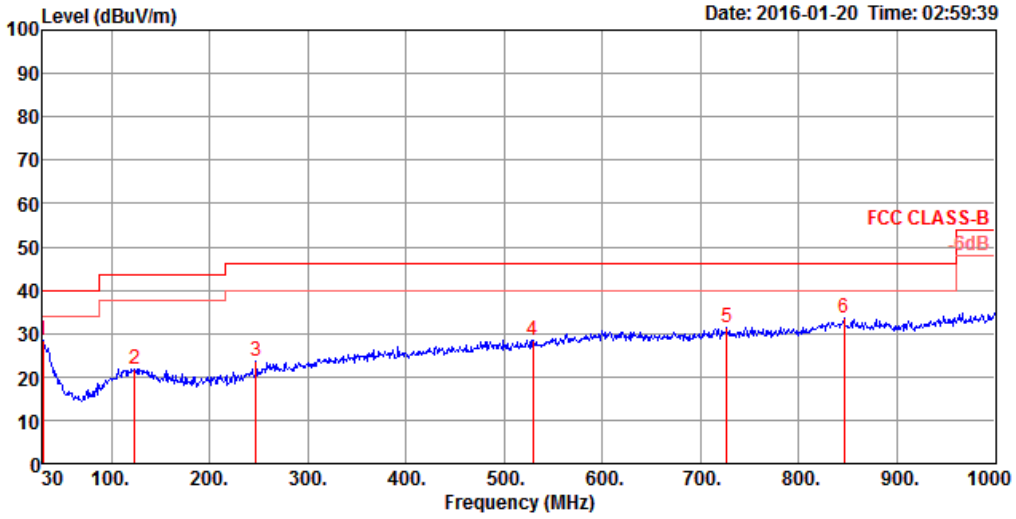
Temperature	22°C	Humidity	59%
Test Engineer	Lucke Hsieh	Configurations	CTX
Test Mode	Mode 1		

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	30.97	28.04	40.00	-11.96	34.81	0.50	25.13	32.40	200	327	Peak	HORIZONTAL
2	125.06	22.27	43.50	-21.23	34.73	0.97	18.94	32.37	150	161	Peak	HORIZONTAL
3	363.68	27.24	46.00	-18.76	36.13	1.64	21.78	32.31	150	193	Peak	HORIZONTAL
4	554.77	29.28	46.00	-16.72	34.77	2.04	24.85	32.38	200	355	Peak	HORIZONTAL
5	638.19	30.61	46.00	-15.39	34.87	2.18	25.95	32.39	150	149	Peak	HORIZONTAL
6	863.23	33.65	46.00	-12.35	35.56	2.53	27.48	31.92	200	276	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	30.00	28.36	40.00	-11.64	34.67	0.49	25.60	32.40	100	330	Peak	VERTICAL
2	124.09	21.95	43.50	-21.55	34.39	0.96	18.97	32.37	200	40	Peak	VERTICAL
3	247.28	23.73	46.00	-22.27	35.78	1.33	18.92	32.30	100	82	Peak	VERTICAL
4	529.55	28.58	46.00	-17.42	34.47	1.99	24.49	32.37	100	128	Peak	VERTICAL
5	726.46	31.40	46.00	-14.60	35.24	2.32	26.17	32.33	150	333	Peak	VERTICAL
6	845.77	33.60	46.00	-12.40	35.76	2.51	27.33	32.00	150	303	Peak	VERTICAL

Note:

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

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

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

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

Temperature	22°C	Humidity	59%
Test Engineer	Lucke Hsieh	Configurations	Channel 0
Test Date	Jan. 18, 2016		

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	4802.54	35.64	54.00	-18.36	32.43	7.19	32.56	36.54	171	164	HORIZONTAL	Average
2	4804.64	47.73	74.00	-26.27	44.52	7.19	32.56	36.54	171	164	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	4804.20	46.01	74.00	-27.99	42.80	7.19	32.56	36.54	168	201	VERTICAL	Peak
2	4804.41	34.40	54.00	-19.60	31.19	7.19	32.56	36.54	168	201	VERTICAL	Average

Temperature	22°C	Humidity	59%
Test Engineer	Lucke Hsieh	Configurations	Channel 20
Test Date	Jan. 18, 2016		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4883.70	46.83	74.00	-27.17	40.99	7.61	33.00	31.23	HORIZONTAL	357	148	Peak
2	4883.71	34.06	54.00	-19.94	28.22	7.61	33.00	31.23	HORIZONTAL	357	148	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4883.54	33.79	54.00	-20.21	27.95	7.61	33.00	31.23	VERTICAL	253	145	Average
2	4883.78	46.58	74.00	-27.42	40.74	7.61	33.00	31.23	VERTICAL	253	145	Peak

Temperature	22°C	Humidity	59%
Test Engineer	Lucke Hsieh	Configurations	Channel 39
Test Date	Jan. 18, 2016		

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	4959.43	37.02	54.00	-16.98	33.68	7.03	32.83	36.52	105	62	HORIZONTAL	Average
2	4960.31	47.21	74.00	-26.79	43.87	7.03	32.83	36.52	105	62	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	4959.97	34.78	54.00	-19.22	31.44	7.03	32.83	36.52	252	192	VERTICAL	Average
2	4960.56	46.42	74.00	-27.58	43.08	7.03	32.83	36.52	252	192	VERTICAL	Peak

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. 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 (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

4.4.3. Test Procedures

The test procedure is the same as section 4.3.3.

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	22°C	Humidity	59%
Test Engineer	Lucke Hsieh	Configurations	Channel 0, 20, 39
Test Date	Jan. 15, 2016 / Jan. 18, 2016		

Channel 0

	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	2388.00	56.38	74.00	-17.62	23.96	4.52	27.90	0.00	188	206	HORIZONTAL	Peak
2	2389.40	45.71	54.00	-8.29	13.29	4.52	27.90	0.00	188	206	HORIZONTAL	Average
3	2402.00	91.03			58.60	4.54	27.89	0.00	188	206	HORIZONTAL	Average
4	2402.40	92.46			60.03	4.54	27.89	0.00	188	206	HORIZONTAL	Peak

Item 3, 4 are the fundamental frequency at 2402 MHz.

Channel 20

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2371.20	54.56	74.00	-19.44	22.32	5.22	0.00	27.02	HORIZONTAL	49	184	Peak
2	2390.00	44.70	54.00	-9.30	12.42	5.23	0.00	27.05	HORIZONTAL	49	184	Average
3	2441.60	88.45			55.98	5.29	0.00	27.18	HORIZONTAL	49	184	Peak
4	2442.00	86.95			54.48	5.29	0.00	27.18	HORIZONTAL	49	184	Average
5	2483.50	45.18	54.00	-8.82	12.58	5.33	0.00	27.27	HORIZONTAL	49	184	Average
6	2483.50	57.15	74.00	-16.85	24.55	5.33	0.00	27.27	HORIZONTAL	49	184	Peak

Item 3, 4 are the fundamental frequency at 2442 MHz.

Channel 39

	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	2480.00	84.77			52.35	4.60	27.82	0.00	296	181	VERTICAL	Average
2	2480.20	86.20			53.78	4.60	27.82	0.00	296	181	VERTICAL	Peak
3	2483.80	59.00	74.00	-15.00	26.58	4.61	27.81	0.00	296	181	VERTICAL	Peak
4	2484.00	45.74	54.00	-8.26	13.32	4.61	27.81	0.00	296	181	VERTICAL	Average

Item 1, 2 are the fundamental frequency at 2480 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. Further, this requirement does not apply to intentional radiators that must be professionally installed.

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	37880	20MHz ~ 2GHz	Sep. 03, 2015	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 18, 2016	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Feb.10, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 09, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 02, 2015	Conducted (TH01-CB)

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

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

6. MEASUREMENT UNCERTAINTY

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