

FCC RF Test Report

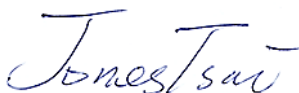
APPLICANT : FUJITSU LIMITED
EQUIPMENT : FUJITSU STYLISTIC Q series
BRAND NAME : FUJITSU
MODEL NAME : Q507
FCC ID : EJE-WB0103
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Mar. 28, 2017 and testing was completed on Jun. 02, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : EJE-WB0103

Page Number : 1 of 20

Report Issued Date : Jun. 05, 2017

Report Version : Rev. 02

Report Template No.: BU5-FR15CBT4.0 Version 2.0



TABLE OF CONTENTS

SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION.....	5
1.1 Applicant.....	5
1.2 Manufacturer.....	5
1.3 Product Feature of Equipment Under Test.....	5
1.4 Modification of EUT	5
1.5 Testing Location	6
1.6 Applicable Standards.....	6
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST.....	7
2.1 Carrier Frequency Channel	7
2.2 Test Mode.....	8
2.3 Connection Diagram of Test System.....	9
2.4 Support Unit used in test configuration and system	9
2.5 EUT Operation Test Setup	9
3 TEST RESULT	10
3.1 Peak Output Power Measurement	10
3.2 Radiated Band Edges and Spurious Emission Measurement	12
3.3 AC Conducted Emission Measurement.....	16
3.4 Antenna Requirements	18
4 LIST OF MEASURING EQUIPMENT.....	19
5 UNCERTAINTY OF EVALUATION.....	20
APPENDIX A. AC CONDUCTED EMISSION TEST RESULT	
APPENDIX B. RADIATED SPURIOUS EMISSION	
APPENDIX C. RADIATED SPURIOUS EMISSION PLOTS	
APPENDIX D. DUTY CYCLE PLOTS	
APPENDIX E. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR732858B	Rev. 01	Initial issue of report	Jun. 01, 2017
FR732858B	Rev. 02	Adding AC Conducted Emission test data	Jun. 05, 2017



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(b)(3)	Peak Output Power	$\leq 30\text{dBm}$	Pass	-
3.2	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 6.00 dB at 34.850 MHz
3.3	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 14.30 dB at 0.150 MHz
3.4	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

FUJITSU LIMITED

1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki, 211-8588 Japan

1.2 Manufacturer

FUJITSU LIMITED

1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki, 211-8588 Japan

1.3 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac

Product Specification subjective to this standard	
Antenna Type	WLAN: PIFA Antenna Bluetooth: PIFA Antenna

1.4 Modification of EUT

No modifications are made to the EUT during all test items.

1.5 Testing Location

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.	
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958	
Test Site No.	Sporton Site No.	FCC Registration No.
	03CH03-KS	306251

Note: The test site complies with ANSI C63.4 2014 requirement.

1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.



2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
	20	2442	-	-

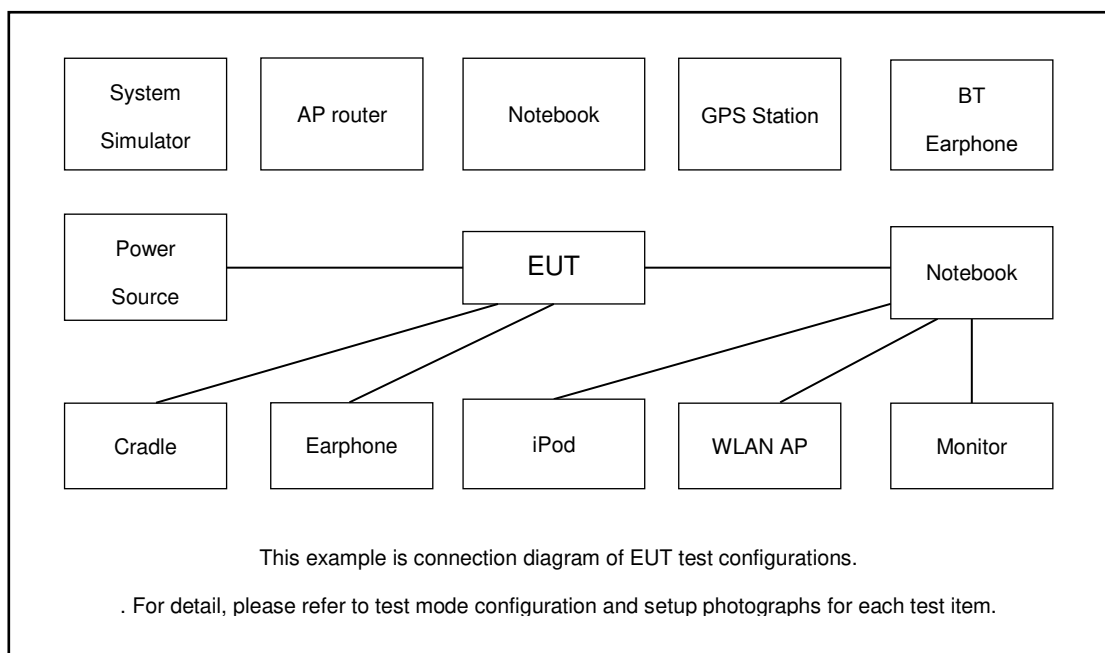
2.2 Test Mode

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth – LE / GFSK
Conducted TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1: WLAN (2.4GHz) Link + Bluetooth Link + TC + TF
Remark: - TC stands for Test Configuration, and consists of Adapter, USB (USB device), SD Card, earphone, and HDMI Cable. - TF stands for Test Function, and consists of H-Pattern, MPEG4 and Camera.	

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-865L	KA2IR865LA1	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	P20G	FCC DoC/ Contains FCC ID: QDS-BRCM1051	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	LCD Monitor	DELL	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	USB HD	Lenovo	F310S	FCC DoC	Shielded, 0.5 m	N/A
6.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
7.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

2.5 EUT Operation Test Setup

The RF test items, programmed RF utility, "DRTU" installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

3 Test Result

3.1 Peak Output Power Measurement

3.1.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

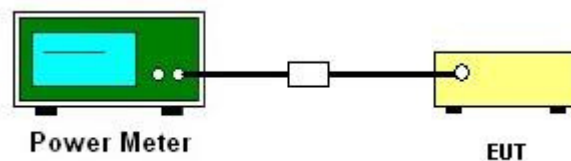
3.1.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.1.3 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.1.4 Test Setup



**3.1.5 Test Result of Peak Output Power**

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)
BLE	1Mbps	1	0	2402	4.56
BLE	1Mbps	1	19	2440	5.28
BLE	1Mbps	1	39	2480	5.93

3.1.6 Test Result of Average Output Power (Reporting Only)

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	4.26
BLE	1Mbps	1	19	2440	5.04
BLE	1Mbps	1	39	2480	5.71

3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/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

3.2.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.



3.2.3 Test Procedures

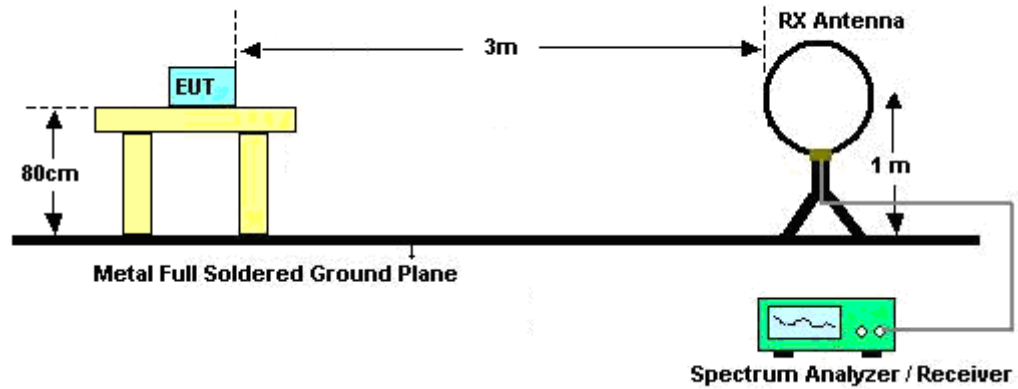
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

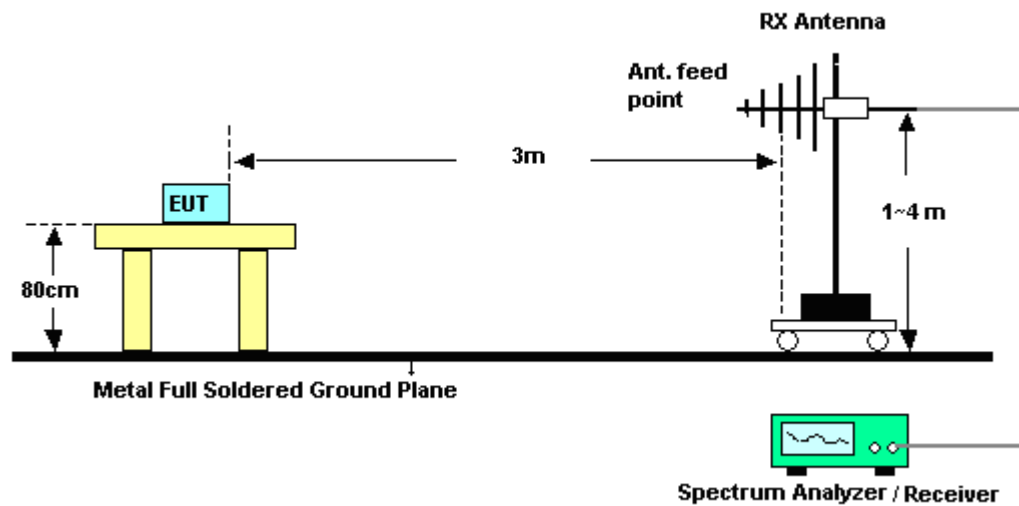
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.2.4 Test Setup

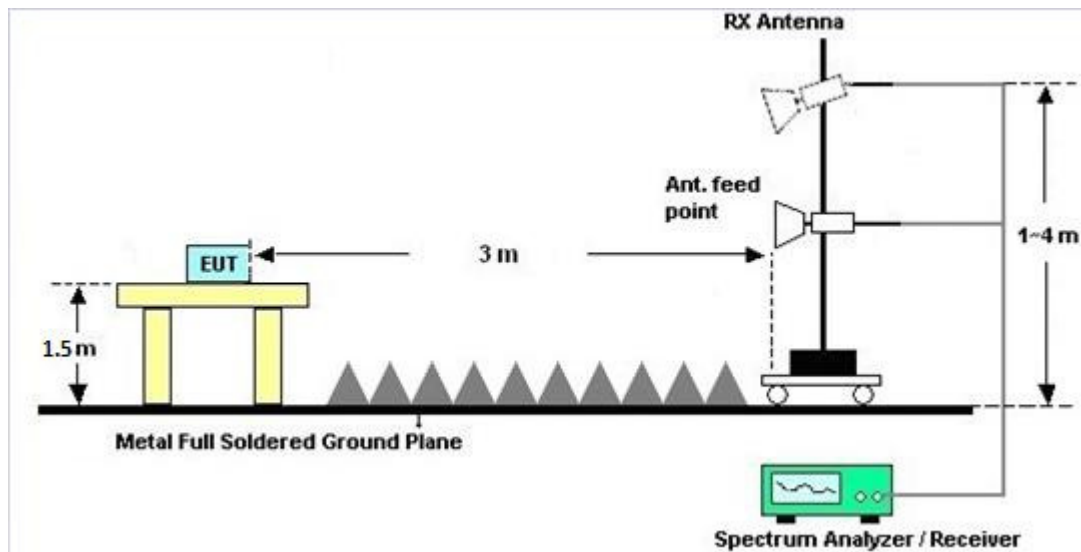
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.2.7 Duty Cycle

Please refer to Appendix D.

3.2.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.

3.3 AC Conducted Emission Measurement

3.3.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (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 the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

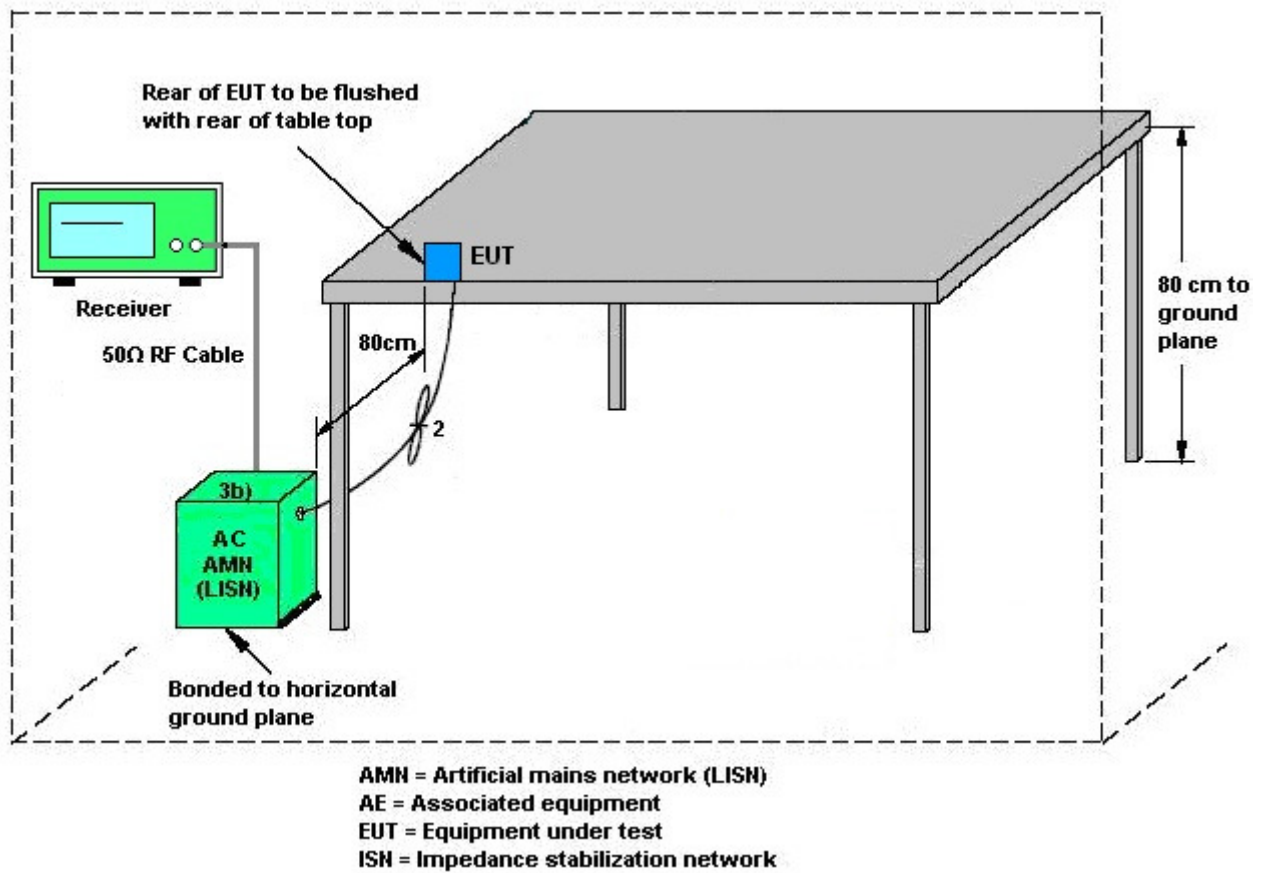
3.3.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

3.3.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.3.4 Test Setup



3.3.5 Test Result of AC Conducted Emission

Please refer to Appendix A.



3.4 Antenna Requirements

3.4.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 rule.

3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.4.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Dec. 26, 2016	Apr. 29, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Dec. 26, 2016	Apr. 29, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jul. 17, 2016	Apr. 29, 2017	Jul. 16, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jun. 02, 2017	N/A	Conduction (CO05-HY)
DC- LISN	Rohde & Schwarz	ESH3-Z6	100485	0.1MHz-200MHz	Jun. 04, 2016	Jun. 02, 2017	Jun. 03, 2017	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Jun. 02, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Jun. 02, 2017	Nov. 28, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 06, 2016	Jun. 02, 2017	Dec. 05, 2017	Conduction (CO05-HY)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct..22.2016	May 27, 2017 ~ May 29, 2017	Oct..21.2017	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	Apr. 18, 2017	May 27, 2017 ~ May 29, 2017	Apr.17, 2018	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 23, 2016	May 27, 2017 ~ May 29, 2017	Nov.22, 2017	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz-2GHz	Apr. 22, 2017	May 27, 2017 ~ May 29, 2017	Apr 21, 2018	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 22, 2017	May 27, 2017 ~ May 29, 2017	Apr 21, 2018	Radiation (03CH03-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz ~40GHz	Oct. 19, 2016	May 27, 2017 ~ May 29, 2017	Oct. 18, 2017	Radiation (03CH03-KS)
Amplifier	com-power	PA-103A	161069	1MHz ~1000MHz / 32 dB	Apr 18, 2017	May 27, 2017 ~ May 29, 2017	Apr 17, 2018	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Oct. 13, 2016	May 27, 2017 ~ May 29, 2017	Oct. 12, 2017	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 13, 2016	May 27, 2017 ~ May 29, 2017	Oct. 12, 2017	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	N/A	May 27, 2017 ~ May 29, 2017	N/A	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	N/A	May 27, 2017 ~ May 29, 2017	N/A	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	N/A	May 27, 2017 ~ May 29, 2017	N/A	Radiation (03CH03-KS)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.70
---	------

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.6
---	-----

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.5
---	-----

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.5
---	-----



Appendix A. AC Conducted Emission Test Results

Test Engineer :	Marlowe Ho	Temperature :	24~25°C
		Relative Humidity :	58~60%

EUT Information

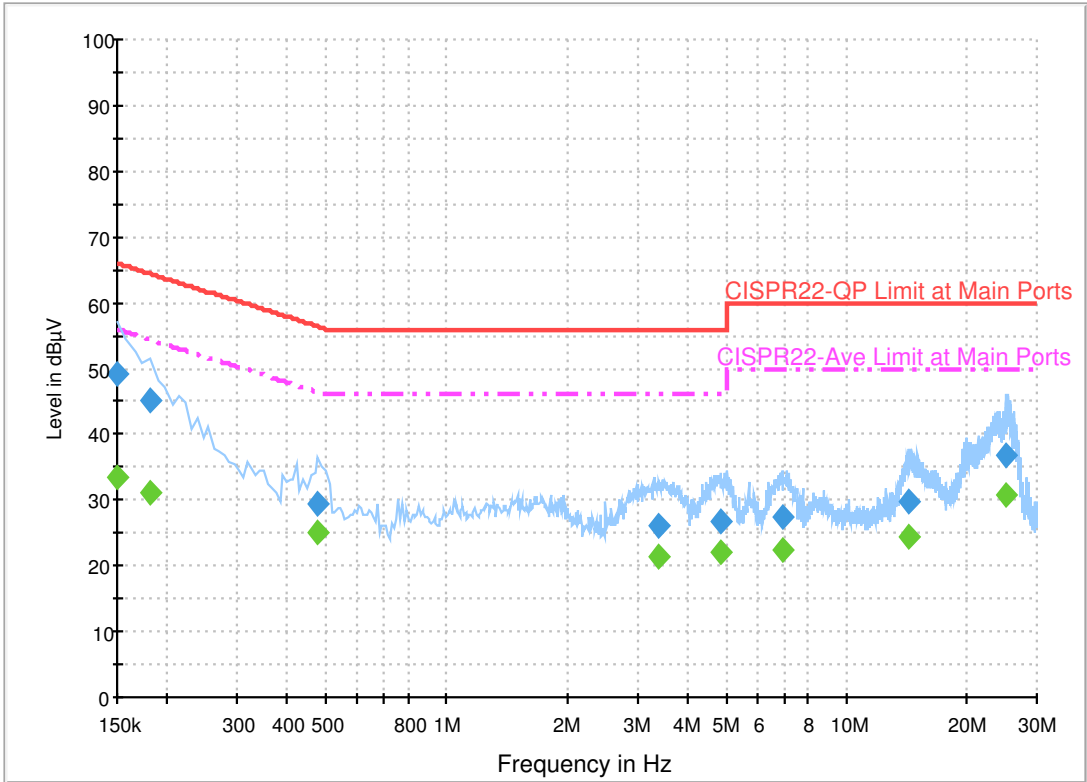
Report NO :732858

Test Mode :Mode 1

Test Voltage :120Vac/60Hz

Phase :Line

ENV216 Auto Test FCC Power Bar - L



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	49.2	Off	L1	19.6	16.8	66.0
0.182000	45.1	Off	L1	19.6	19.3	64.4
0.478000	29.6	Off	L1	19.6	26.8	56.4
3.382000	26.1	Off	L1	19.6	29.9	56.0
4.846000	26.8	Off	L1	19.8	29.2	56.0
6.934000	27.4	Off	L1	19.9	32.6	60.0
14.350000	29.8	Off	L1	20.3	30.2	60.0
25.198000	36.8	Off	L1	20.8	23.2	60.0

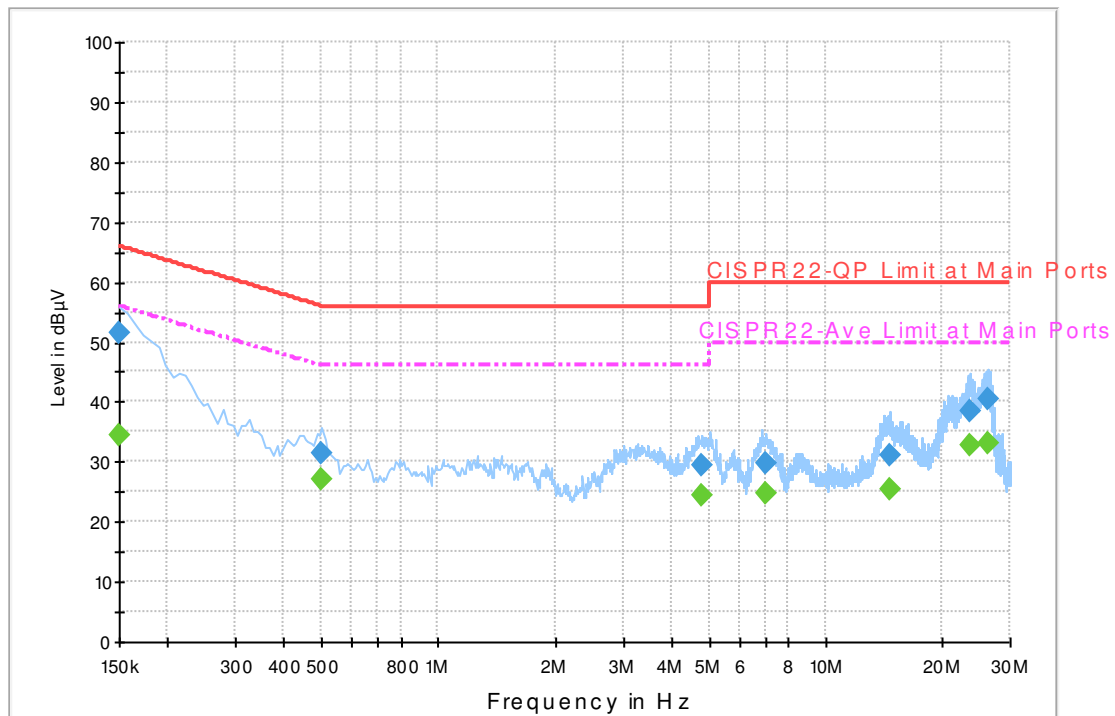
Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	33.5	Off	L1	19.6	22.5	56.0
0.182000	31.2	Off	L1	19.6	23.2	54.4
0.478000	25.0	Off	L1	19.6	21.4	46.4
3.382000	21.3	Off	L1	19.6	24.7	46.0
4.846000	21.9	Off	L1	19.8	24.1	46.0
6.934000	22.5	Off	L1	19.9	27.5	50.0
14.350000	24.5	Off	L1	20.3	25.5	50.0
25.198000	30.6	Off	L1	20.8	19.4	50.0

EUT Information

Report NO : 732858
Test Mode : Mode 1
Test Voltage : 120Vac/60Hz
Phase : Neutral

ENV216 Auto Test FCC Power Bar - N



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	51.7	Off	N	19.5	14.3	66.0
0.502000	31.5	Off	N	19.5	24.5	56.0
4.806000	29.3	Off	N	19.7	26.7	56.0
7.014000	29.9	Off	N	19.9	30.1	60.0
14.758000	31.2	Off	N	20.4	28.8	60.0
23.534000	38.5	Off	N	20.9	21.5	60.0
26.374000	40.4	Off	N	21.0	19.6	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	34.3	Off	N	19.5	21.7	56.0
0.502000	27.0	Off	N	19.5	19.0	46.0
4.806000	24.6	Off	N	19.7	21.4	46.0
7.014000	24.8	Off	N	19.9	25.2	50.0
14.758000	25.4	Off	N	20.4	24.6	50.0
23.534000	32.8	Off	N	20.9	17.2	50.0
26.374000	33.2	Off	N	21.0	16.8	50.0



Appendix B. Radiated Spurious Emission

Test Engineer :	Rich Sun	Temperature :	21~23°C
		Relative Humidity :	41~43%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		2374.48	49.67	-24.33	74	55.01	25.67	5.45	36.46	373	56	P	H
		2389.17	39.9	-14.1	54	45.05	25.8	5.47	36.42	373	56	A	H
	*	2402	86.52	-	-	91.67	25.8	5.47	36.42	373	56	P	H
	*	2402	86.05	-	-	91.2	25.8	5.47	36.42	373	56	A	H
													H
													H
		2385.66	49.8	-24.2	74	54.95	25.8	5.47	36.42	328	203	P	V
		2382.02	40.17	-13.83	54	45.51	25.67	5.45	36.46	328	203	A	V
	*	2402	86.9	-	-	92.05	25.8	5.47	36.42	328	203	P	V
	*	2402	86.46	-	-	91.61	25.8	5.47	36.42	328	203	A	V
													V
													V
BLE CH 19 2440MHz		2388	50.02	-23.98	74	55.17	25.8	5.47	36.42	100	125	P	H
		2388.91	39.78	-14.22	54	44.93	25.8	5.47	36.42	100	125	A	H
	*	2440	86.45	-	-	91.52	25.89	5.49	36.45	100	125	P	H
	*	2440	85.96	-	-	91.03	25.89	5.49	36.45	100	125	A	H
		2498.5	49.39	-24.61	74	54.38	25.97	5.52	36.48	100	125	P	H
		2493.1	39.95	-14.05	54	44.94	25.97	5.52	36.48	100	125	A	H
		2385.53	49.71	-24.29	74	54.86	25.8	5.47	36.42	321	214	P	V
		2360.31	39.86	-14.14	54	45.39	25.55	5.43	36.51	321	214	A	V
	*	2440	90.99	-	-	96.06	25.89	5.49	36.45	321	214	P	V
	*	2440	90.56	-	-	95.63	25.89	5.49	36.45	321	214	A	V
		2486.08	51.4	-22.6	74	56.42	25.94	5.51	36.47	321	214	P	V
		2498.56	40.43	-13.57	54	45.42	25.97	5.52	36.48	321	214	A	V



BLE CH 39 2480MHz	*	2480	90.09	-	-	95.11	25.94	5.51	36.47	377	50	P	H
	*	2480	89.63	-	-	94.65	25.94	5.51	36.47	377	50	A	H
		2485.06	51.75	-22.25	74	56.77	25.94	5.51	36.47	377	50	P	H
		2484.82	44.11	-9.89	54	49.13	25.94	5.51	36.47	377	50	A	H
													H
													H
	*	2480	89.22	-	-	94.24	25.94	5.51	36.47	350	213	P	V
	*	2480	88.74	-	-	93.76	25.94	5.51	36.47	350	213	A	V
		2484.76	52.41	-21.59	74	57.43	25.94	5.51	36.47	350	213	P	V
		2484.7	43.57	-10.43	54	48.59	25.94	5.51	36.47	350	213	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		34.85	27.91	-12.09	40	32.85	25.7	0.71	31.35	100	263	P	H
		199.75	27.33	-16.17	43.5	40.09	17	1.73	31.49			P	H
		331.67	31.4	-14.6	46	39.47	20.96	2.24	31.27			P	H
		444.19	28	-18	46	31.54	25.08	2.62	31.24			P	H
		600.36	32.75	-13.25	46	37.21	24.2	3.07	31.73			P	H
		800.18	33.34	-12.66	46	32.73	28	3.59	30.98			P	H
													H
													H
													H
													H
													H
													H
	!	34.85	34	-6	40	38.94	25.7	0.71	31.35	100	23	P	V
		46.49	28.56	-11.44	40	40.94	18.2	0.84	31.42			P	V
		199.75	31.16	-12.34	43.5	43.92	17	1.73	31.49			P	V
		228.85	31.49	-14.51	46	44.11	17.12	1.73	31.47			P	V
		310.33	35.98	-10.02	46	45.15	19.99	2.17	31.33			P	V
		600.36	36.16	-9.84	46	40.62	24.2	3.07	31.73			P	V
													V
													V
													V
													V
													V
												V	
												V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	Peak or Average
H/V	Horizontal or Vertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix C. Radiated Spurious Emission

Test Engineer :	Rich Sun	Temperature :	21~23°C
		Relative Humidity :	41~43%

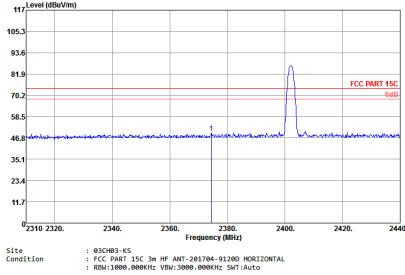
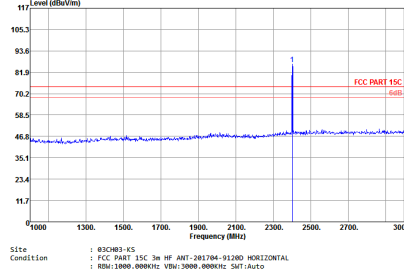
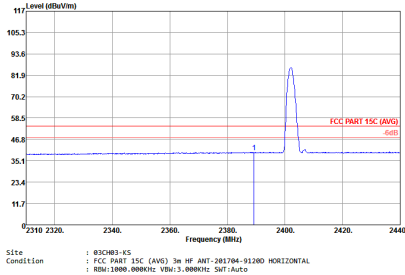
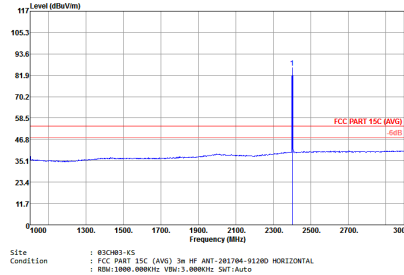
Note symbol

-L	Low channel location
-R	High channel location



2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Fundamental
Peak		
Avg.		



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Vertical	Fundamental
Peak	Site : 83CH03-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto	Site : 83CH03-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto
Avg	Site : 83CH03-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto	Site : 83CH03-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Horizontal	Fundamental
Peak	Site : 83CH03-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SMT:Auto	Site : 83CH03-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SMT:Auto
Avg.	Site : 83CH03-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SMT:Auto	Site : 83CH03-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SMT:Auto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Horizontal	Fundamental
Peak	Site : BSCWB3-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto	Left blank
Avg.	Site : BSCWB3-KS Condition : FCC PART 15C (Ave) 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Vertical	Fundamental
Peak	Site : 83CH03-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3000.000kHz SWT:Auto	Site : 83CH03-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3000.000kHz SWT:Auto
Avg.	Site : 83CH03-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto	Site : 83CH03-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Fundamental
Peak	Site : 83CH83-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SMT:Auto	Site : 83CH83-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SMT:Auto
Avg.	Site : 83CH83-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SMT:Auto	Site : 83CH83-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SMT:Auto

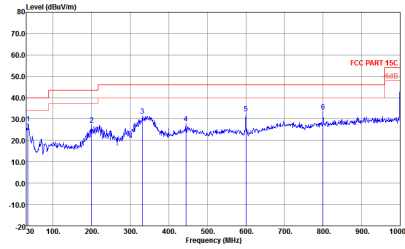
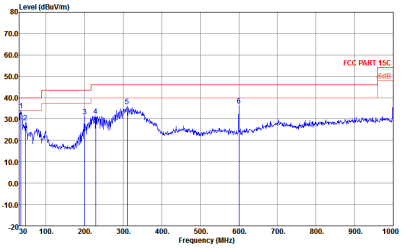


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Vertical	Fundamental
Peak	Site : 83CH03-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto	Site : 83CH03-KS Condition : FCC PART 15C 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto
Avg.	Site : 83CH03-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto	Site : 83CH03-KS Condition : FCC PART 15C (AVG) 3m HF ANT-201704-91200 VERTICAL : RSW:1000.000kHz VSW:3.000kHz SWT:Auto



Emission below 1GHz

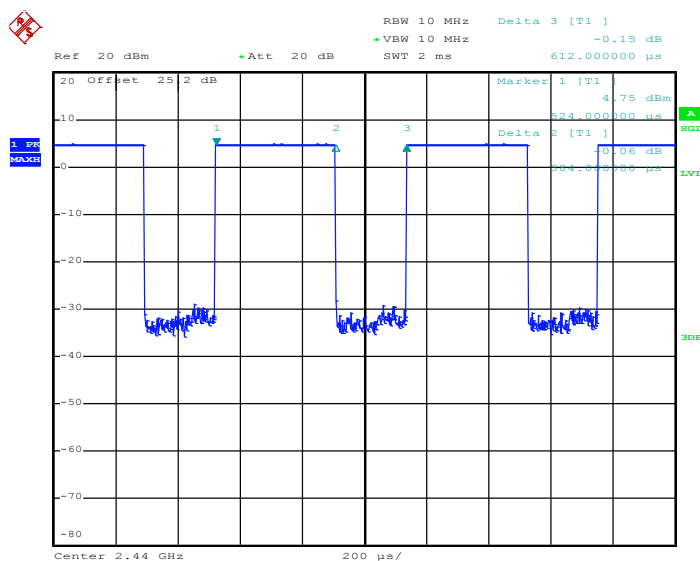
2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
ANT	BLE LF	
1	Horizontal	Vertical
QP / Peak	 Site : 83CH03-KS Condition : FCC PART 15C 3m LF ANT 608 281704 HORIZONTAL : RES:100.000000Hz VSW:300.000000 SMT:Auto	 Site : 83CH03-KS Condition : FCC PART 15C 3m LF ANT 608 281704 VERTICAL : RES:100.000000Hz VSW:300.000000 SMT:Auto

Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth -LE	62.7451	0.384	2.60	3KHz

Bluetooth - LE



Date: 29.APR.2017 10:32:55