



FCC RF Test Report

APPLICANT : Fluke Corporation
EQUIPMENT : CableAnalyzer
BRAND NAME : Fluke
MODEL NAME : Versiv 2,DSX-602
FCC ID : T68-VERSIV2
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

This is a partial report. The product was received on Jun. 21, 2017 and testing was completed on Aug. 06, 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 : T68-VERSIV2

Page Number : 1 of 19

Report Issued Date : Sep. 06, 2017

Report Version : Rev. 01

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

 2.6 Peak Output Power Measurement 10

 2.7 Radiated Band Edges and Spurious Emission Measurement 11

 2.8 AC Conducted Emission Measurement..... 15

 2.9 Antenna Requirements 17

3 LIST OF MEASURING EQUIPMENT 18

4 UNCERTAINTY OF EVALUATION..... 19

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



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
2.6	15.247(b)(3)	Peak Output Power	≤ 30dBm	Pass	-
2.7	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.43 dB at 33.510 MHz
2.8	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 13.0 dB at 0.158 MHz
2.9	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Fluke Corporation
6920 Seaway Blvd, Everett, WA, 98203

1.2 Manufacturer

Fluke Corporation
6920 Seaway Blvd, Everett, WA, 98203

1.3 Product Feature of Equipment Under Test

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

Product Specification subjective to this standard	
Antenna Type	Bluetooth: Chip Antenna WLAN: Ant. 1: Chip Antenna Ant. 2: Chip Antenna

1.4 Modification of EUT

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



1.5 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

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 INC.	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH15-HY	

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	-	-	



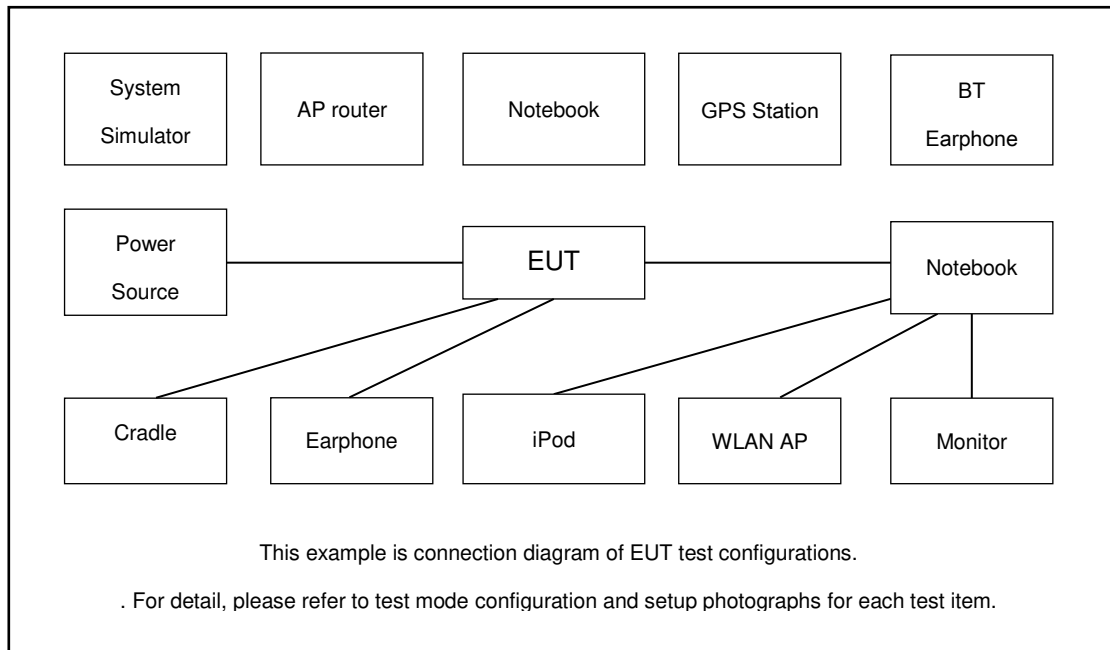
2.2 Test Mode

- 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 (X 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
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 LE Tx + LAN (Load) + USB cable connect to Notebook + USB port connect to USB storage devices + Earphone + Adapter

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	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8m
2.	iPod	Apple	A1285	DoC	Shielded, 1.0m	N/A
3.	iPod Earphone	Apple	A1285	DoC	UnShielded, 1.2m	N/A
4.	NOTE BOOK	Dell	P20G	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	NOTE BOOK	Dell	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	USB Dongle	Transcend	TS8GJF300	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

For Bluetooth function, programmed RF utility, “Tera Term” installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

2.6 Peak Output Power Measurement

2.6.1 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.

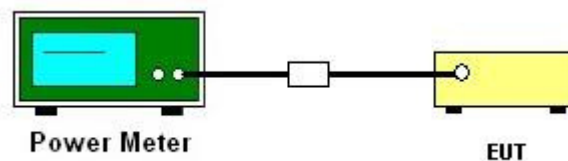
2.6.2 Measuring Instruments

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

2.6.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.1.2 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.

2.6.4 Test Setup





2.7 Radiated Band Edges and Spurious Emission Measurement

2.7.1 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

2.7.2 Measuring Instruments

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

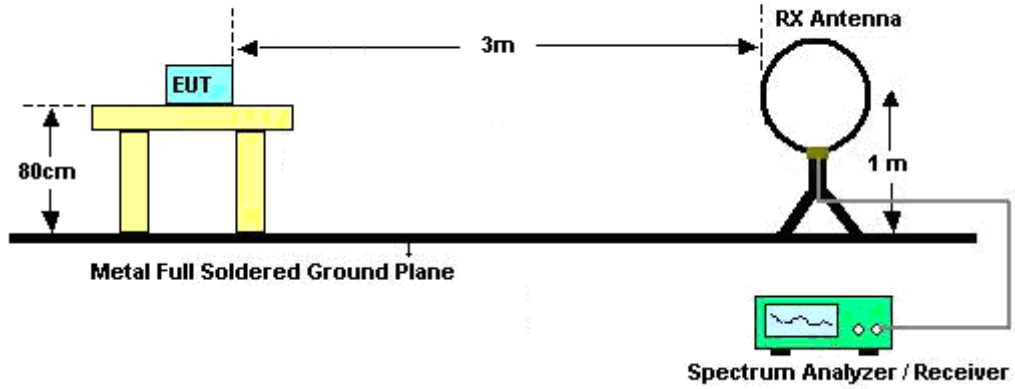


2.7.3 Test Procedures

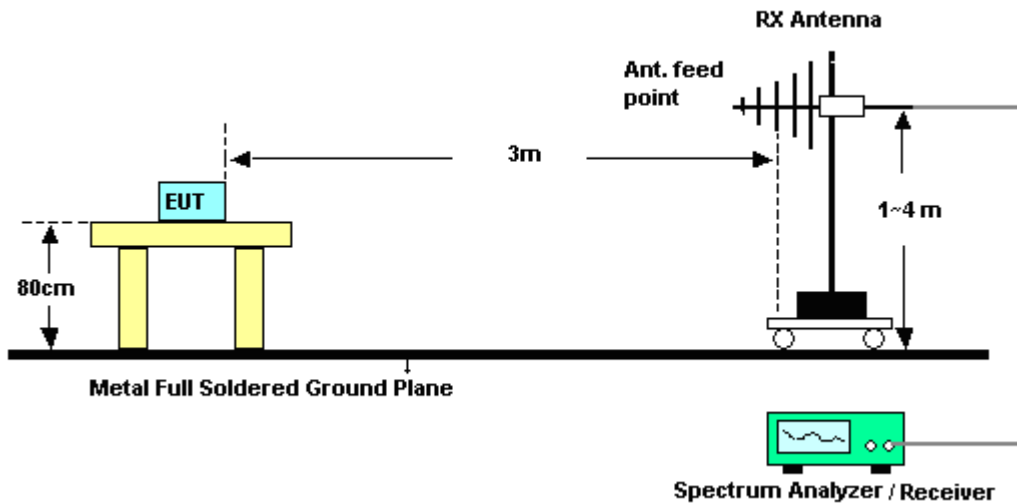
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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.

2.7.4 Test Setup

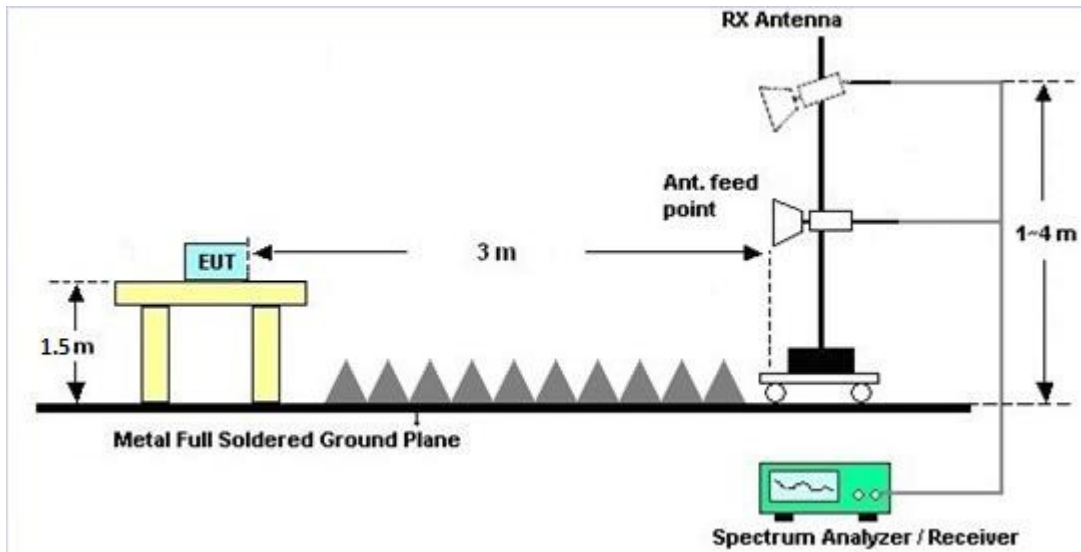
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



2.7.5 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.

2.7.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

2.7.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix B and C.



2.8 AC Conducted Emission Measurement

2.8.1 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.

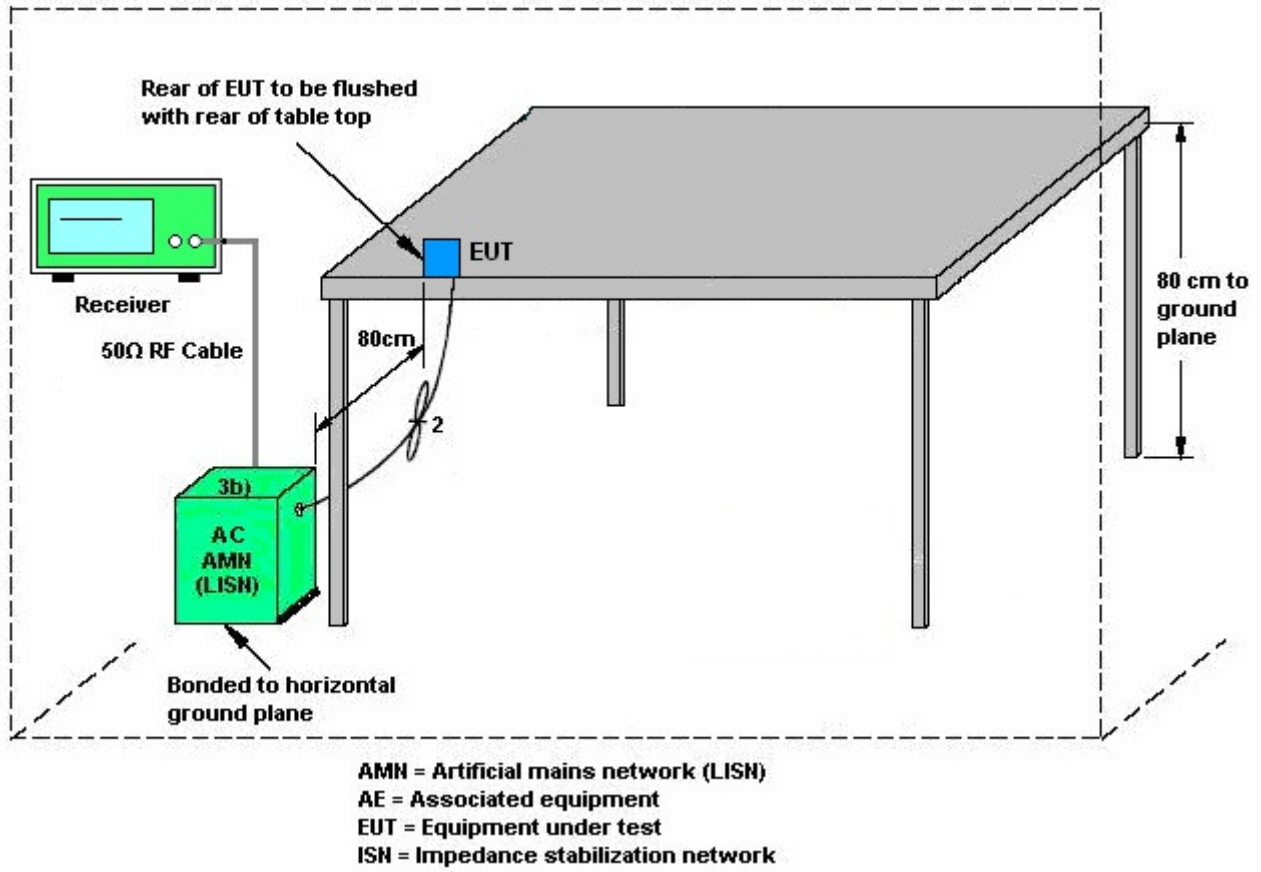
2.8.2 Measuring Instruments

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

2.8.3 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.

2.8.4 Test Setup



2.8.5 Test Result of AC Conducted Emission

Please refer to Appendix A.



2.9 Antenna Requirements

2.9.1 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.

2.9.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

2.9.3 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.



3 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Agilent	E4416A	GB412923 44	NA	Dec. 26, 2016	Jul. 03, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US404415 48	50MHz~18GHz	Dec. 26, 2016	Jul. 03, 2017	Dec. 25, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Aug. 06, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Aug. 06, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Aug. 06, 2017	Nov. 28, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 06, 2016	Aug. 06, 2017	Dec. 05, 2017	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	May 15, 2017	Jul. 18, 2017~ Jul. 26, 2017	May 14, 2019	Radiation (03CH15-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800	2025787	1GHZ~18GHZ	Feb. 13, 2017	Jul. 18, 2017 ~ Jul. 26, 2017	Feb. 12, 2018	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 576	18GHz ~ 40GHz	Apr. 27, 2017	Jul. 18, 2017 ~ Jul. 26, 2017	Apr. 26, 2018	Radiation (03CH15-HY)
Preamplifier	MITEQ	TTA 1840-35-HG	1887435	18GHz ~ 40GHz	Oct. 13, 2016	Jul. 18, 2017 ~ Jul. 26, 2017	Oct. 12, 2017	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Nov. 09, 2016	Jul. 18, 2017 ~ Jul. 26, 2017	Nov. 08, 2017	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&0 0800N1D01N- 06	41912&05	30MHz to 1GHz	Jan. 07, 2017	Jul. 18, 2017 ~ Jul. 26, 2017	Jan. 06, 2018	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120D	9120D-162 0	1G~18GHz	Sep. 30, 2016	Jul. 18, 2017 ~ Jul. 26, 2017	Sep. 29, 2017	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY532701 95	1GHz~26.5GHz	Aug. 24, 2016	Jul. 18, 2017 ~ Jul. 26, 2017	Aug. 23, 2017	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	N9030A	MY523502 76	3Hz~44GHz	Mar. 23, 2017	Jul. 18, 2017 ~ Jul. 26, 2017	Mar. 22, 2018	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jul. 18, 2017 ~ Jul. 26, 2017	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jul. 18, 2017 ~ Jul. 26, 2017	N/A	Radiation (03CH15-HY)



4 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% ($U = 2Uc(y)$)	5.14
---	------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.48
---	------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.12
---	------



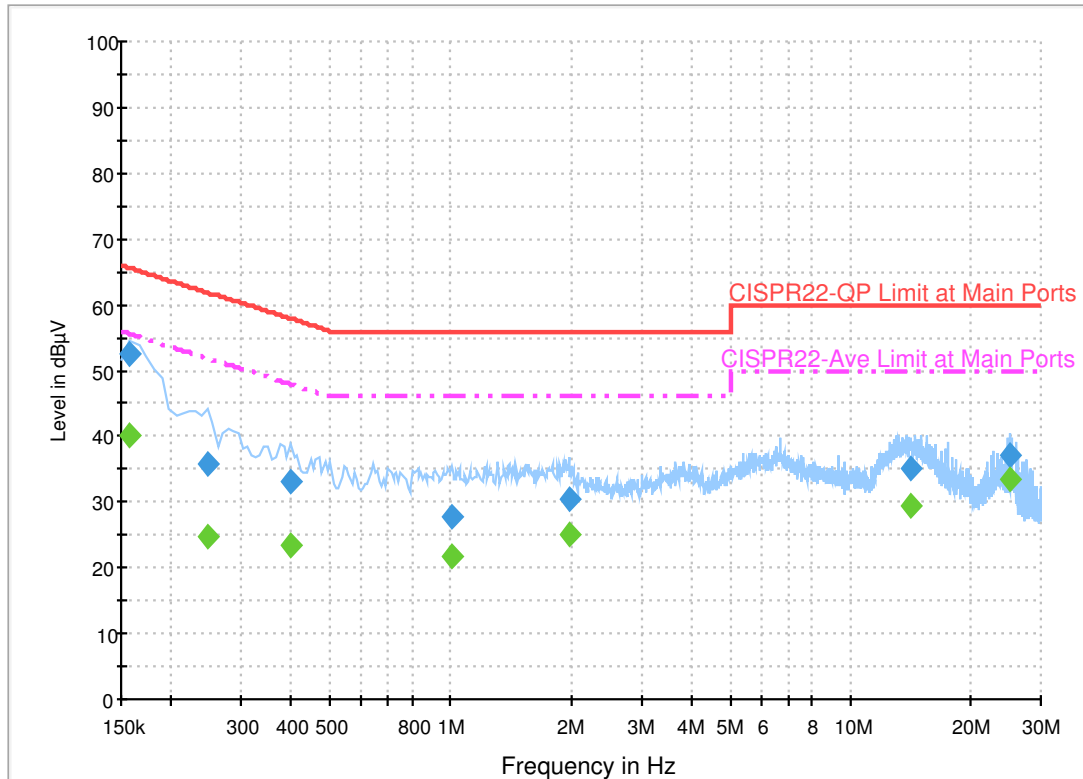
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Kai-Chun Chu	Temperature :	26~27°C
		Relative Humidity :	53~54%

EUT Information

Report NO : 762122
 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)
0.158000	52.6	Off	L1	19.6	13.0	65.6
0.246000	35.8	Off	L1	19.6	26.1	61.9
0.398000	33.3	Off	L1	19.6	24.6	57.9
1.006000	27.8	Off	L1	19.6	28.2	56.0
1.982000	30.4	Off	L1	19.6	25.6	56.0
14.118000	35.0	Off	L1	20.3	25.0	60.0
25.126000	37.1	Off	L1	20.8	22.9	60.0

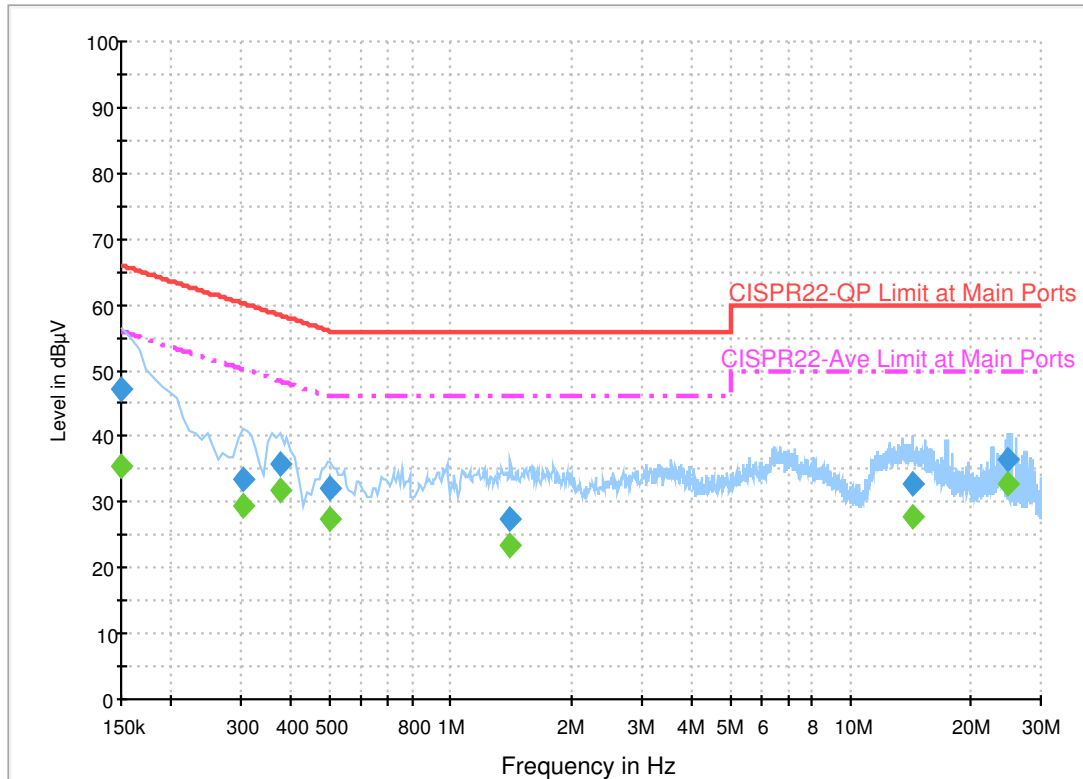
Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	40.0	Off	L1	19.6	15.6	55.6
0.246000	24.6	Off	L1	19.6	27.3	51.9
0.398000	23.5	Off	L1	19.6	24.4	47.9
1.006000	21.7	Off	L1	19.6	24.3	46.0
1.982000	24.9	Off	L1	19.6	21.1	46.0
14.118000	29.5	Off	L1	20.3	20.5	50.0
25.126000	33.6	Off	L1	20.8	16.4	50.0

EUT Information

Report NO : 762122
 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	47.2	Off	N	19.5	18.8	66.0
0.302000	33.5	Off	N	19.5	26.7	60.2
0.374000	35.8	Off	N	19.5	22.6	58.4
0.502000	32.2	Off	N	19.5	23.8	56.0
1.414000	27.3	Off	N	19.6	28.7	56.0
14.350000	32.8	Off	N	20.3	27.2	60.0
24.750000	36.6	Off	N	20.9	23.4	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	35.4	Off	N	19.5	20.6	56.0
0.302000	29.5	Off	N	19.5	20.7	50.2
0.374000	31.7	Off	N	19.5	16.7	48.4
0.502000	27.6	Off	N	19.5	18.4	46.0
1.414000	23.3	Off	N	19.6	22.7	46.0
14.350000	27.8	Off	N	20.3	22.2	50.0
24.750000	32.8	Off	N	20.9	17.2	50.0



Appendix B. Cabinet Radiation Data

Test Engineer :	Karl Hou, Watt Tseng	Temperature :	22~24°C
		Relative Humidity :	45~47%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency (MHz)	Level (dBm)	Over Limit (dB)	Limit Line (dBm)	Read Level (dBm)	Antenna Factor (dBi)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
BLE CH 00 2402MHz		2363.76	50.62	-23.38	74	40.75	26.96	3.94	30.95	100	244	P	H	
		2367.23	41.5	-12.5	54	31.61	26.96	3.94	30.93	100	244	A	H	
	*	2402	74.23	-	-	64.19	27.07	3.97	30.92	100	244	P	H	
	*	2402	73.35	-	-	63.31	27.07	3.97	30.92	100	244	A	H	
													H	
														H
			2387.81	51.01	-22.99	74	40.99	27.07	3.96	30.93	290	98	P	V
			2389.28	41.69	-12.31	54	31.67	27.07	3.96	30.93	290	98	A	V
	*		2402	72.63	-	-	62.59	27.07	3.97	30.92	290	98	P	V
	*		2402	72.08	-	-	62.04	27.07	3.97	30.92	290	98	A	V
														V
														V
BLE CH 19 2440MHz		2385.74	50.87	-23.13	74	40.85	27.07	3.96	30.93	100	247	P	H	
		2384.34	41.59	-12.41	54	31.63	27.01	3.96	30.93	100	247	A	H	
	*	2440	78.83	-	-	68.59	27.23	4	30.91	100	247	P	H	
	*	2440	78.19	-	-	67.95	27.23	4	30.91	100	247	A	H	
			2499.44	51.71	-22.29	74	41.23	27.4	4.04	30.88	100	247	P	H
			2493.98	42.19	-11.81	54	31.71	27.4	4.04	30.88	100	247	A	H
			2389.38	50.72	-23.28	74	40.7	27.07	3.96	30.93	285	96	P	V
			2376.64	41.52	-12.48	54	31.56	27.01	3.96	30.93	285	96	A	V
	*		2440	75.23	-	-	64.99	27.23	4	30.91	285	96	P	V
	*		2440	74.57	-	-	64.33	27.23	4	30.91	285	96	A	V
			2485.72	51.69	-22.31	74	41.28	27.34	4.04	30.89	285	96	P	V
			2500	42.06	-11.94	54	31.58	27.4	4.04	30.88	285	96	A	V



BLE CH 39 2480MHz	*	2480	80.34	-	-	69.94	27.34	4.03	30.89	100	253	P	H
	*	2480	79.61	-	-	69.21	27.34	4.03	30.89	100	253	A	H
		2492.84	52.57	-21.43	74	42.09	27.4	4.04	30.88	100	253	P	H
		2495.76	42.19	-11.81	54	31.71	27.4	4.04	30.88	100	253	A	H
													H
													H
	*	2480	76.36	-	-	65.96	27.34	4.03	30.89	302	103	P	V
	*	2480	75.71	-	-	65.31	27.34	4.03	30.89	302	103	A	V
		2496.4	51.52	-22.48	74	41.04	27.4	4.04	30.88	302	103	P	V
		2493.6	42.31	-11.69	54	31.83	27.4	4.04	30.88	302	103	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
BLE (Harmonic @ 3m)

BLE	Note	Frequency (MHz)	Level (dBm)	Over Limit (dB)	Limit Line (dBm)	Read Level (dBm)	Antenna Factor (dBi)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		4804	38.66	-35.34	74	64.84	31.66	6.45	64.75	100	0	P	H
													H
													H
													H
		4804	39.14	-34.86	74	65.32	31.66	6.45	64.75	100	0	P	V
													V
													V
BLE CH 19 2440MHz		4880	38.78	-35.22	74	64.73	31.78	6.51	64.7	100	0	P	H
		7320	43.55	-30.45	74	63.03	36.78	8.09	64.83	100	0	P	H
													H
													H
		4880	39.6	-34.4	74	65.55	31.78	6.51	64.7	100	0	P	V
		7320	43.82	-30.18	74	63.3	36.78	8.09	64.83	100	0	P	V
													V
BLE CH 39 2480MHz		4960	38.91	-35.09	74	64.56	31.94	6.58	64.63	100	0	P	H
		7440	44.2	-29.8	74	63.37	37.14	8.12	64.88	100	0	P	H
													H
													H
		4960	39.02	-34.98	74	64.67	31.94	6.58	64.63	100	0	P	V
		7440	43.82	-30.18	74	62.99	37.14	8.12	64.88	100	0	P	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.	
		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz BLE LF		82.38	26.61	-13.39	40	44.6	13.77	0.74	32.59	-	-	P	H	
		182.01	31.07	-12.43	43.5	47.26	15.06	1.06	32.52	-	-	P	H	
		285.96	37.32	-8.68	46	49.38	18.98	1.33	32.55	100	0	P	H	
		337.8	34.63	-11.37	46	45.62	20.06	1.44	32.56	-	-	P	H	
		399.4	33.45	-12.55	46	42.46	21.89	1.58	32.56	-	-	P	H	
		481.3	30.39	-15.61	46	37.4	23.77	1.74	32.62	-	-	P	H	
														H
														H
														H
														H
														H
														H
			33.51	36.57	-3.43	40	46.33	22.36	0.46	32.59	100	0	P	V
			97.77	26.46	-17.04	43.5	42.38	15.8	0.79	32.6	-	-	P	V
			266.52	37.98	-8.02	46	49.42	19.62	1.29	32.54	-	-	P	V
			337.8	28.91	-17.09	46	39.9	20.06	1.44	32.56	-	-	P	V
			773.9	29.8	-16.2	46	31.46	28.37	2.2	32.38	-	-	P	V
			885.9	32.34	-13.66	46	32.47	29.08	2.39	31.81	-	-	P	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

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

For Peak Limit @ 2390MHz:

- 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)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

- 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)
- 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. Cabinet Radiation Plots

Test Engineer :	Karl Hou, Watt Tseng	Temperature :	22~24°C
		Relative Humidity :	45~47%

Note symbol

-L	Low channel location
-R	High channel location



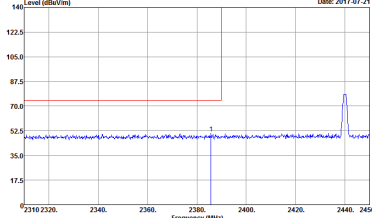
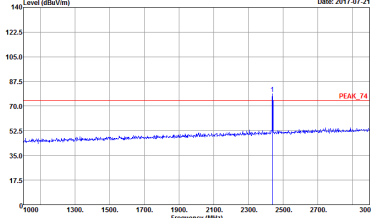
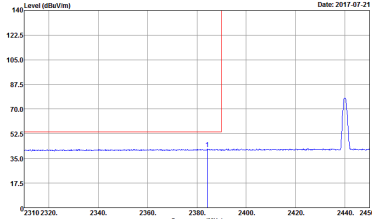
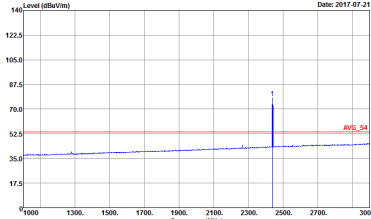
2.4GHz 2400~2483.5MHz
BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL Detector : Peak Project : 762122 Mode : 1</p>	<p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL Detector : Peak Project : 762122 Mode : 1</p>
Avg.	<p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL Detector : Peak Project : 762122 Mode : 1</p>	<p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL Detector : Peak Project : 762122 Mode : 1</p>

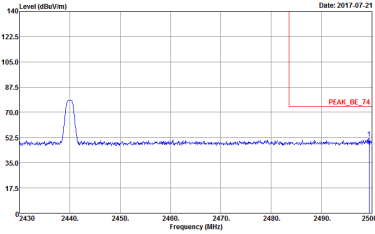
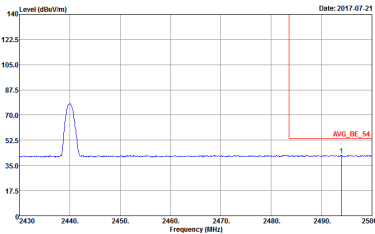


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH00 2402MHz	
1	Vertical	Fundamental
Peak	<p> Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 1 </p>	<p> Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 1 </p>
Avg	<p> Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 1 </p>	<p> Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 1 </p>

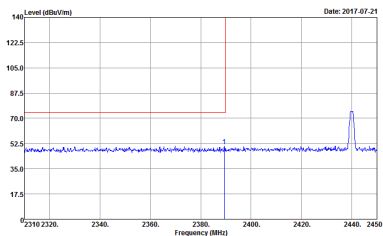
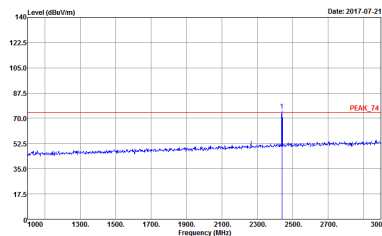
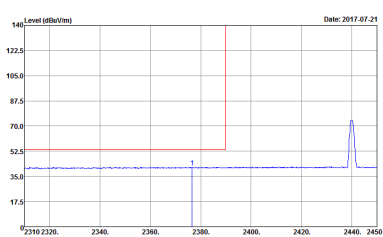
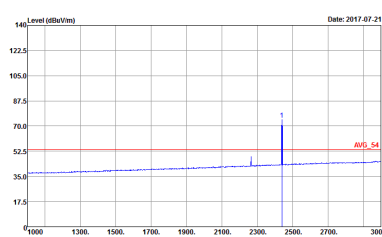


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Horizontal	Fundamental
Peak	 <p>Level (dBm/1m) vs Frequency (MHz) plot for Horizontal Peak. The plot shows a sharp peak at approximately 2440 MHz. The y-axis ranges from 17.5 to 140 dBm/1m, and the x-axis ranges from 2310 to 2450 MHz. A red line indicates the peak level at approximately 70 dBm/1m.</p> <p>Site : 03CH15-HV Condition : PEAK_BE_74 3m 9120d_15_1620 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 2</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot for Fundamental Peak. The plot shows a sharp peak at approximately 2440 MHz. The y-axis ranges from 17.5 to 140 dBm/1m, and the x-axis ranges from 1000 to 3000 MHz. A red line indicates the peak level at approximately 70 dBm/1m, labeled 'PEAK_74'.</p> <p>Site : 03CH15-HV Condition : PEAK_74 3m 9120d_15_1620 HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 2</p>
Avg.	 <p>Level (dBm/1m) vs Frequency (MHz) plot for Horizontal Average. The plot shows a broad peak at approximately 2440 MHz. The y-axis ranges from 17.5 to 140 dBm/1m, and the x-axis ranges from 2310 to 2450 MHz. A red line indicates the average level at approximately 55 dBm/1m.</p> <p>Site : 03CH15-HV Condition : AVG_BE_54 3m 9120d_15_1620 HORIZONTAL Detector : RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 2</p>	 <p>Level (dBm/1m) vs Frequency (MHz) plot for Fundamental Average. The plot shows a broad peak at approximately 2440 MHz. The y-axis ranges from 17.5 to 140 dBm/1m, and the x-axis ranges from 1000 to 3000 MHz. A red line indicates the average level at approximately 55 dBm/1m, labeled 'AVG_54'.</p> <p>Site : 03CH15-HV Condition : AVG_54 3m 9120d_15_1620 HORIZONTAL Detector : RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 2</p>

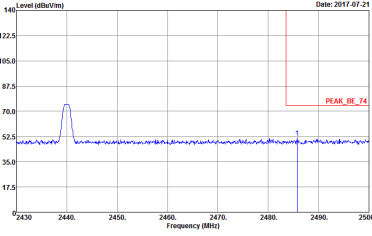
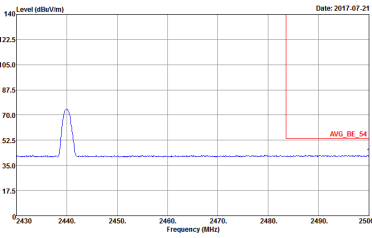


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Horizontal	Fundamental
<p>Peak</p>	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL RBW:1000.000kHz VBW:3000.000kHz SWF:Auto Detector : Peak Project : 762122 Mode : 2</p>	<p>Left blank</p>
<p>Avg.</p>	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL RBW:1000.000kHz VBW:3.000kHz SWF:Auto Detector : Peak Project : 762122 Mode : 2</p>	<p>Left blank</p>

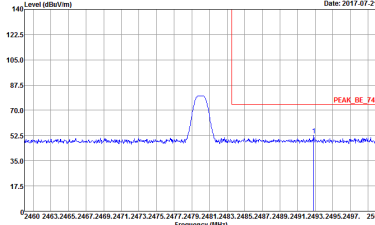
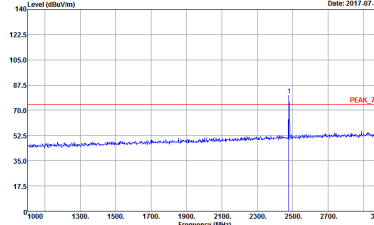
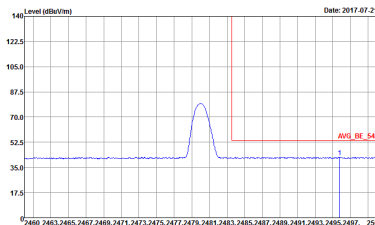
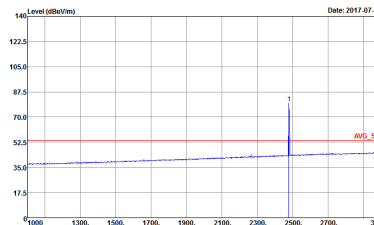


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - L	
1	Vertical	Fundamental
Peak	 <p> Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 2 </p>	 <p> Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 2 </p>
Avg.	 <p> Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 2 </p>	 <p> Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 2 </p>

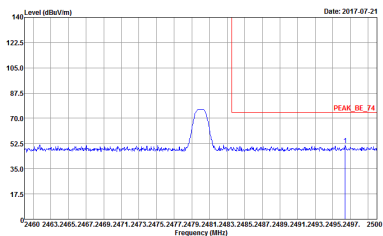
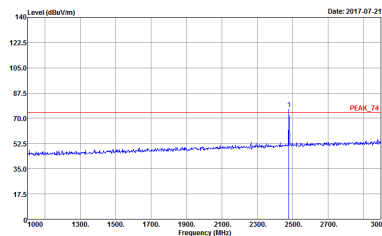
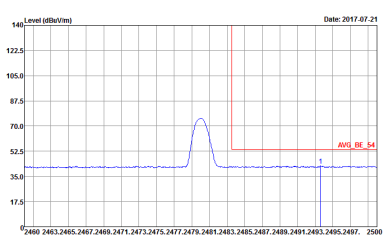
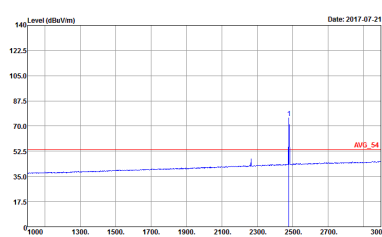


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH19 2440MHz - R	
1	Vertical	Fundamental
<p>Peak</p>	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL RBW:1000.000kHz VBW:3000.000kHz SWF:Auto Detector : Peak Project : 762122 Mode : 2</p>	<p>Left blank</p>
<p>Avg.</p>	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL RBW:1000.000kHz VBW:3.000kHz SWF:Auto Detector : Peak Project : 762122 Mode : 2</p>	<p>Left blank</p>



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 3</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 3</p>
Avg.	 <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 3</p>	 <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 3</p>



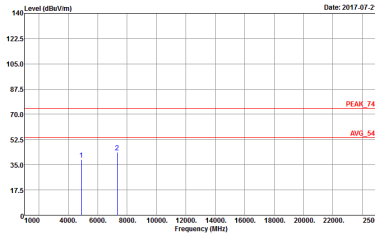
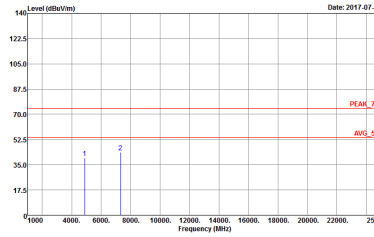
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Vertical	Fundamental
Peak	 <p>Date: 2017-07-21</p> <p>Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 3</p>	 <p>Date: 2017-07-21</p> <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 3</p>
Avg.	 <p>Date: 2017-07-21</p> <p>Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 3</p>	 <p>Date: 2017-07-21</p> <p>Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 762122 Mode : 3</p>



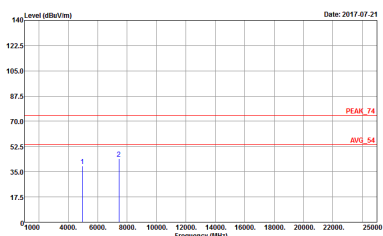
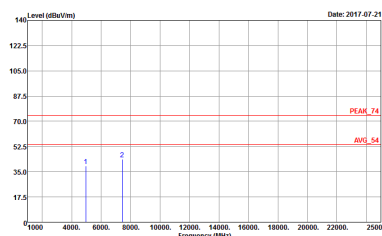
2.4GHz 2400~2483.5MHz
BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH00 2402MHz	
1	Horizontal	Vertical
<p>Peak</p> <p>Avg.</p>	<p>Site : 03CH15-1FY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL Detector : Peak Project : 762122 Mode : 1</p>	<p>Site : 03CH15-1FY Condition : PEAK_74 3m 91200_15_1620 VERTICAL Detector : Peak Project : 762122 Mode : 1</p>



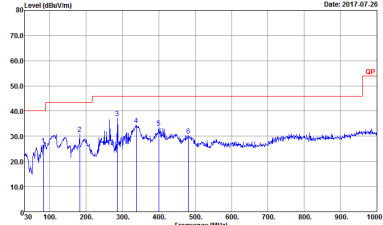
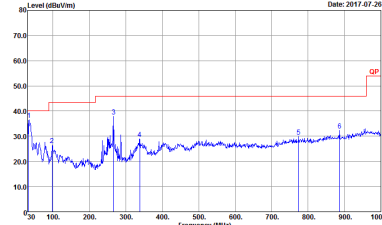
BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH19 2440MHz	
1	Horizontal	Vertical
<p>Peak Avg.</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL Detector : Peak Project : 762122 Mode : 2</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL Detector : Peak Project : 762122 Mode : 2</p>



BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Vertical
Peak	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL Detector : Peak Project : 762122 Mode : 3</p>	 <p>Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL Detector : Peak Project : 762122 Mode : 3</p>



Emission below 1GHz
2.4GHz BLE (LF)

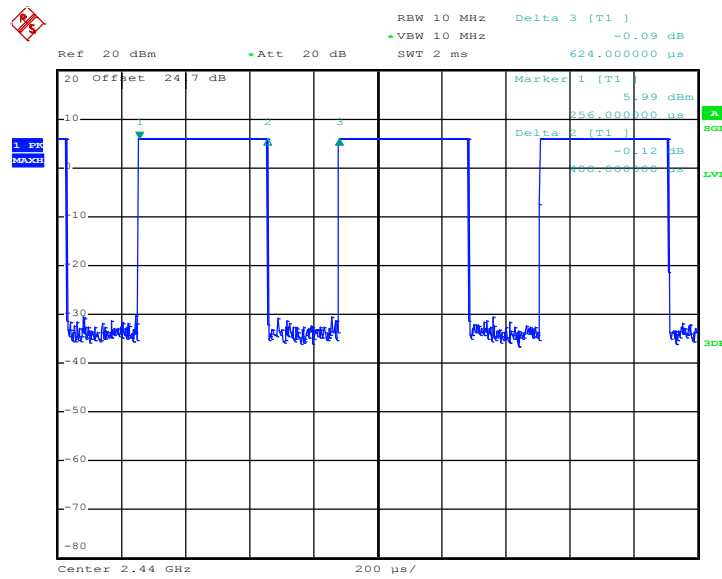
BLE	2.4GHz 2400~2483.5MHz	
ANT	BLE LF	
1	Horizontal	Vertical
<p>QP / Peak</p>	 <p>Site : 03CH15-HY Condition : QP 3m BTLOG_15_41912 HORIZONTAL Detector : Peak Project : 762122 Mode : 4</p>	 <p>Site : 03CH15-HY Condition : QP 3m BTLOG_15_41912 VERTICAL Detector : Peak Project : 762122 Mode : 4</p>



Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
Bluetooth -LE	64.10	400	2.5	3kHz

Bluetooth - LE



Date: 7.JUL.2017 17:47:25