



FCC RF TEST REPORT

47 CFR FCC Part 15 Subpart C § 15.249

Equipment : Smartphone
MODEL NAME : 2Q3F300
FCC ID : NM82Q3F300

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.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR752311E	Rev. 01	Initial issue of report	Sep. 04, 2017



1. SUMMARY OF THE TEST RESULT

Applied Standard				
Part	FCC Rule	Description of Test	Result	Remark
3.1	15.207	AC Power Line Conducted Emissions	Complies	Under limit 5.50 dB at 13.558 MHz
3.2	2.1049	20dB & 99% Occupied Bandwidth	Complies	-
3.3	15.249(a)	Field Strength of Fundamental Emissions	Complies	Max level 9.24 dBµV/m at 2480.000 MHz
3.3	15.249(a)(d)	Radiated Spurious Emissions	Complies	Under limit 7.19 dB at 36.750MHz
3.4	15.203	Antenna Requirements	Complies	-

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.70
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.2
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.7
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2. GENERAL INFORMATION

2.1 Applicant

HTC Corporation

No. 23, Xinghua Rd., Taoyuan District, Taoyuan City, Taiwan 330

2.2 Manufacturer

HTC Corporation

No.23, Xinghua Rd., Taoyuan District, Taoyuan City, Taiwan 330

2.3 Product Details

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, NFC, and GPS

Product Specification subjective to this standard	
Sample 1	EUT with battery 1 and 1st PCB
Sample 2	EUT with battery 2 and 1st PCB
Sample 3	EUT with battery 1 and 2nd PCB
Antenna Type	WWAN: Fixed Internal Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna GPS/GLONASS/BDS: PIFA Antenna NFC: Loop Antenna

Remark:

1. There are 1st PCB and 2nd PCB, the hardware change are USB board, antenna board and speaker module. Regarding the differences, perform full RSE testing on sample 1 and sample 3.
2. For the LTE setting which controlled by software, there are two Skus of device. Sku 1 supports LTE category 9 (up to 450 Mbps), and Sku 2 support category 11 (up to 600 Mbps) and 256QAM downlink. Since the differences, we only performed on Sku 2 device.
3. All tests were performed with sample 1.

2.4 Modification of EUT

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



2.5 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
AC Power Line Conducted Emissions	CTX
Field Strength of Fundamental Emissions	CTX
Bandwidth	CTX
Radiated Emissions	CTX

Note:

1. CTX=continuously transmitting.
2. The programmed RF utility, "HTC SSD Test Tool" installed in the EUT to make the EUT get into the engineering modes to continuously transmit.
3. For Radiated Test Cases, The tests were performance with Adapter 1 and USB Cable 1.

2.6 Table for Testing Locations

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.

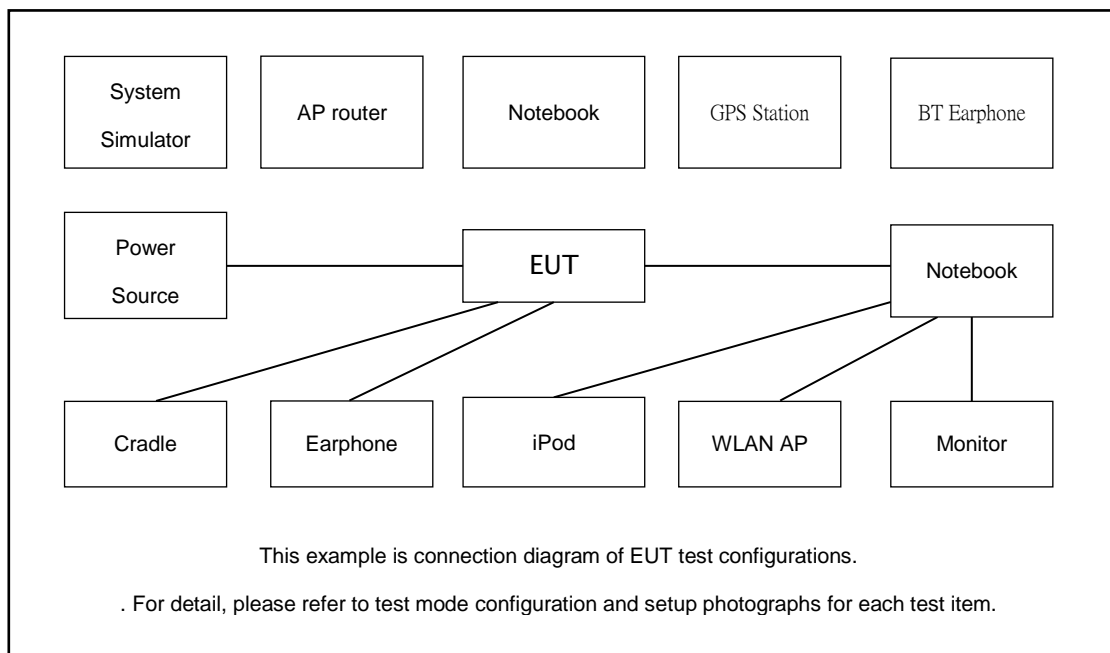
Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH12-HY	

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

2.7 Table for Supporting Units

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	NFC Card	N/A	N/A	N/A	N/A	N/A
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.8 Connection Diagram of Test System





3. TEST RESULT

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 Limit

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

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

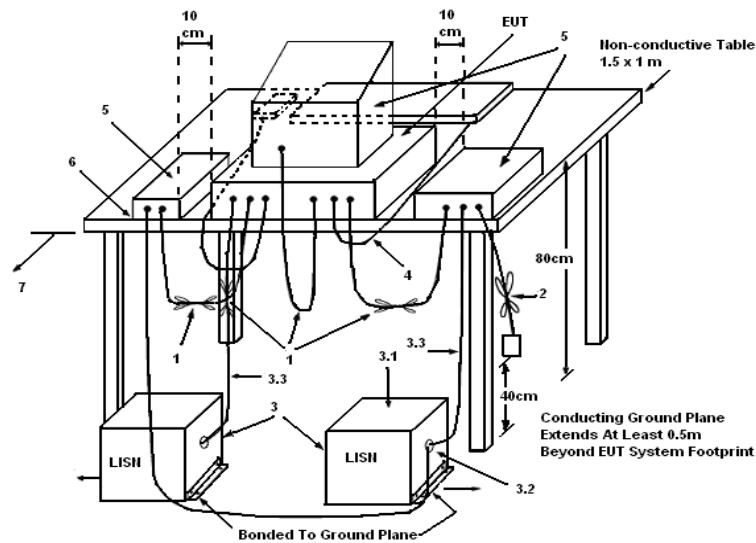
3.1.2 Measuring Instruments

Please refer to section 4 of equipment list in this report.

3.1.3 Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

3.1.4 Test Setup Layout



LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.
 - (3.1) All other equipment powered from additional LISN(s).
 - (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
 - (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.



3.1.5 Test Deviation

There is no deviation with the original standard.

3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

Please refer to Appendix A

3.2 20dB and & 99% Occupied Bandwidth

3.2.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band.

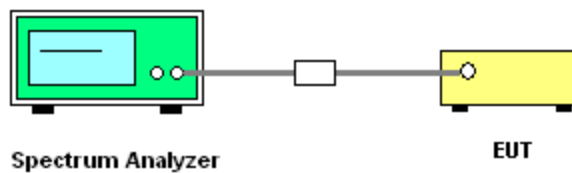
3.2.2 Measuring Instruments

Please refer to section 4 of equipment list in this report.

3.2.3 Test Procedures

1. The transmitter output port was connected to the spectrum analyzer.
2. Measured the spectrum width with highest power setting.

3.2.4 Test Setup Layout



3.2.5 Test Deviation

There is no deviation with the original standard.

3.2.6 EUT Operation during Test

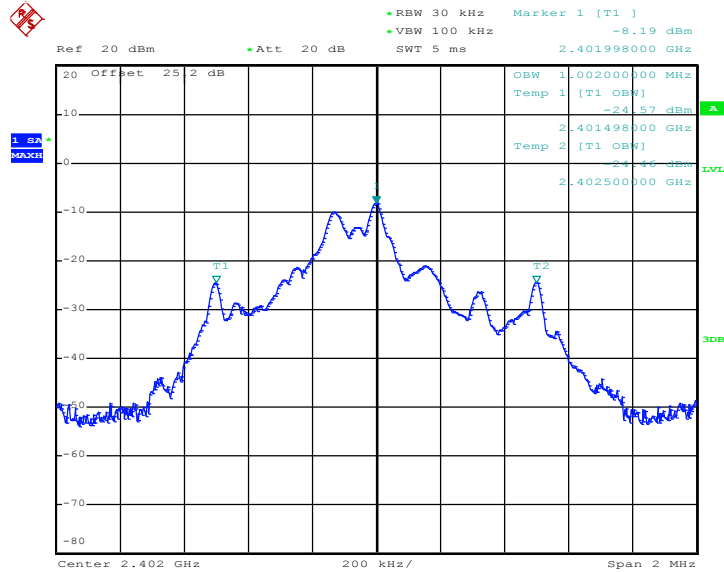
The EUT was programmed to be in continuously transmitting mode.



3.2.7 Test Result of 99% Occupied Bandwidth

Final Test Date	Jun. 01, 2017 ~ Jun. 28, 2017	Test Site No.	TH05-HY
Temperature	21~25°C	Humidity	51~54%
Test Engineer	Allen Lin		

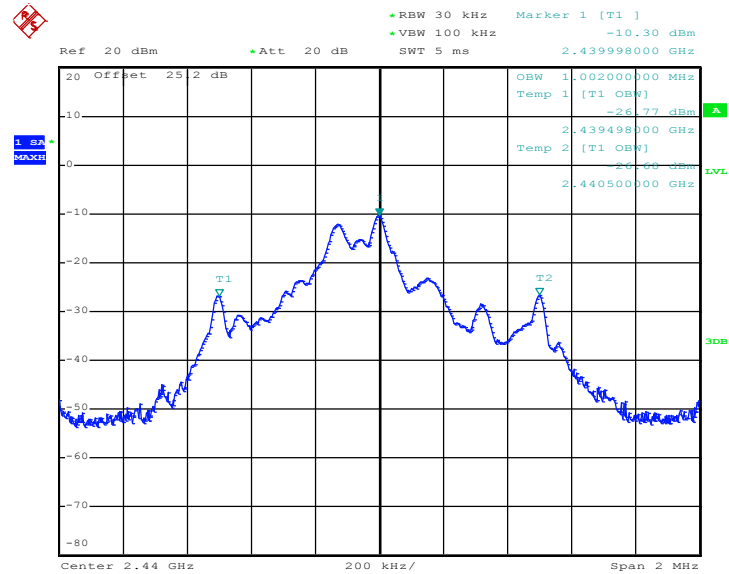
99% Occupied Bandwidth Plot on Channel 00



Date: 28.JUN.2017 18:01:06

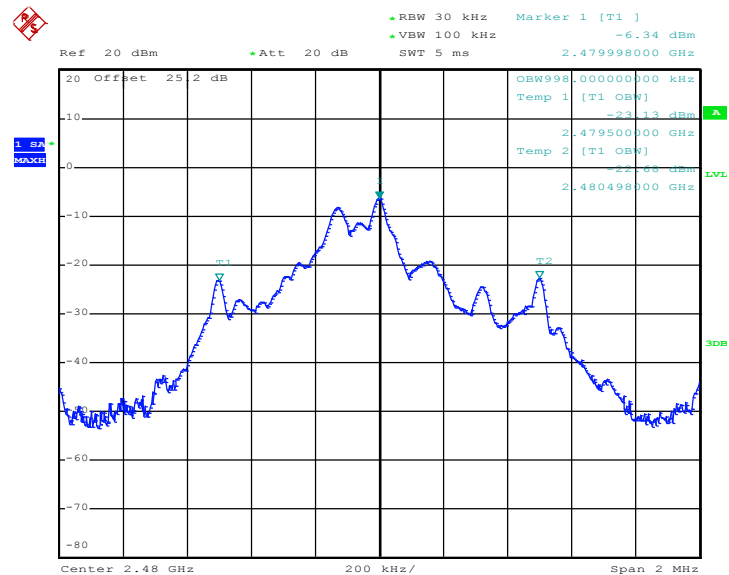


99% Occupied Bandwidth Plot on Channel 19



Date: 28.JUN.2017 18:12:36

99% Occupied Bandwidth Plot on Channel 39

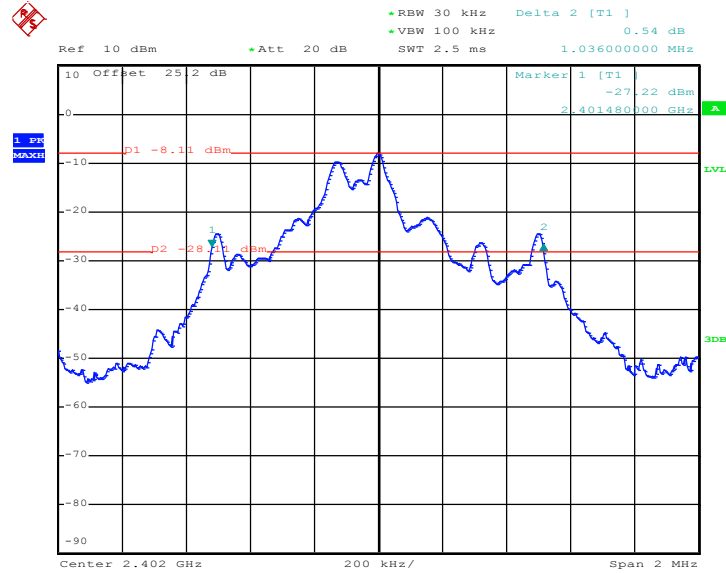


Date: 28.JUN.2017 18:21:07



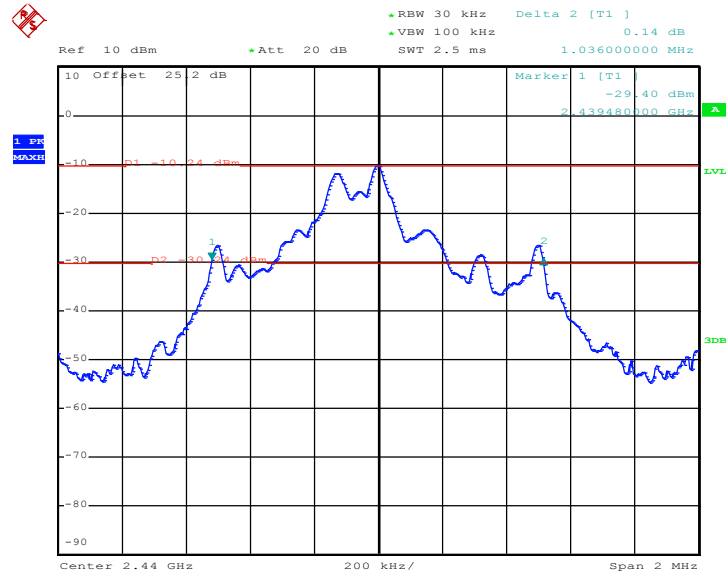
3.2.8 Test Result of 20dB Bandwidth

20 dB Bandwidth Plot on Channel 00



Date: 28.JUN.2017 17:58:47

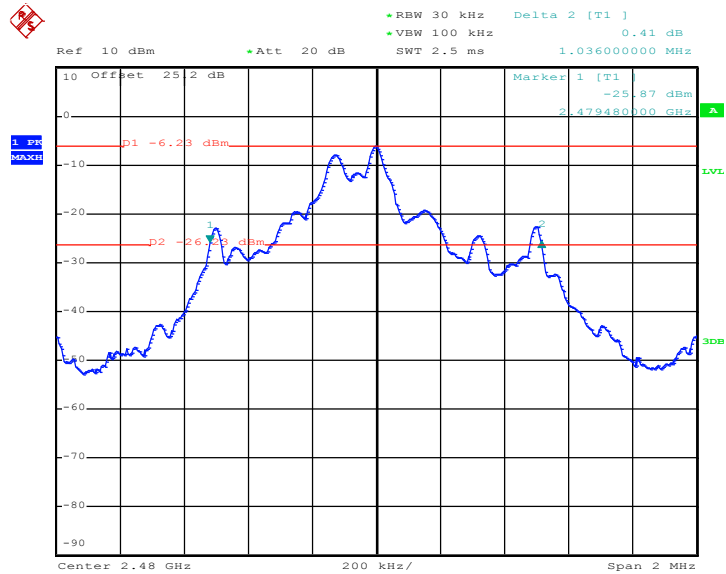
20 dB Bandwidth Plot on Channel 39



Date: 28.JUN.2017 18:11:10



20 dB Bandwidth Plot on Channel 78



Date: 28.JUN.2017 18:19:13



3.3 Field Strength of Fundamental Emissions and Radiated Spurious Emissions

3.3.1 Limit

The field strength measured at 3 meters shall not exceed the limits in the following table:

Fundamental Frequencies(MHz)	Field Strength(millivolts/m)	
	Fundamental	Harmonics
902~928	50	0.5
2400~2483.5	50	0.5
5725~5875	50	0.5

Note: The limits shown in the above table are based on measurements using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using a CISPR quasi-peak detector.

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 to the general field strength limits listed in 15.209 as below, whichever is less stringent.

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

3.3.2 Measuring Instruments

Please refer to section 4 of equipment list in this report.

3.3.3 Test Procedures

1. 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.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, 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 to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.

Remark:

1. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
2. For average measurement: use duty cycle correction factor method per 15.35(c).

Duty cycle = On time/100 milliseconds

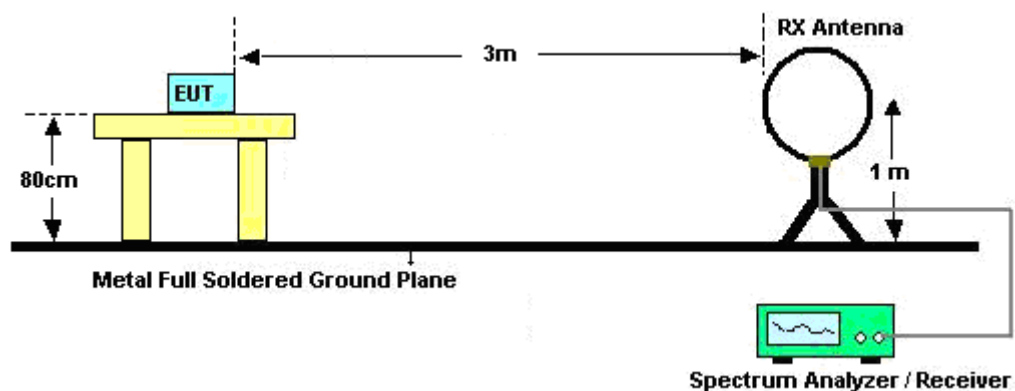
On time = $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$

Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.

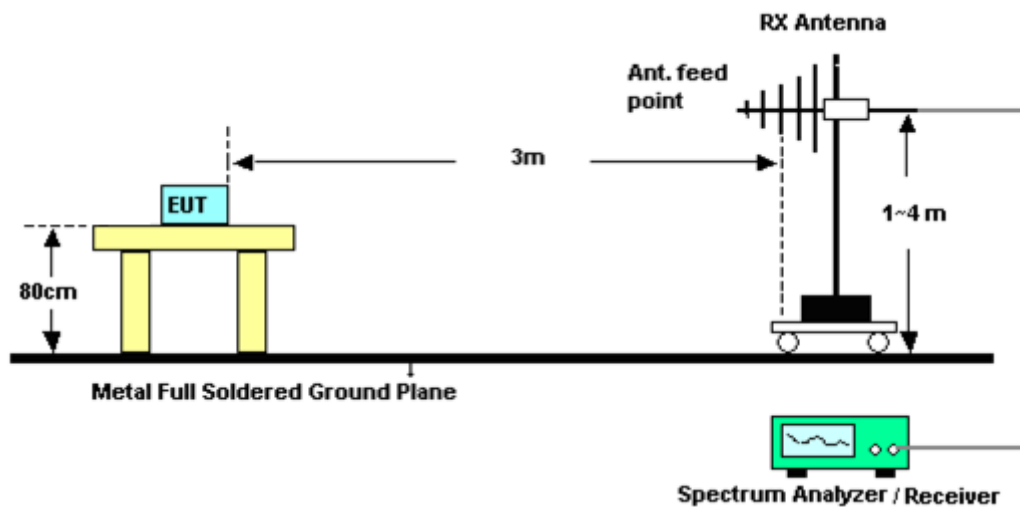
Average Emission Level = Peak Emission Level + $20 * \log(\text{Duty cycle})$

3.3.4 Test Setup Layout

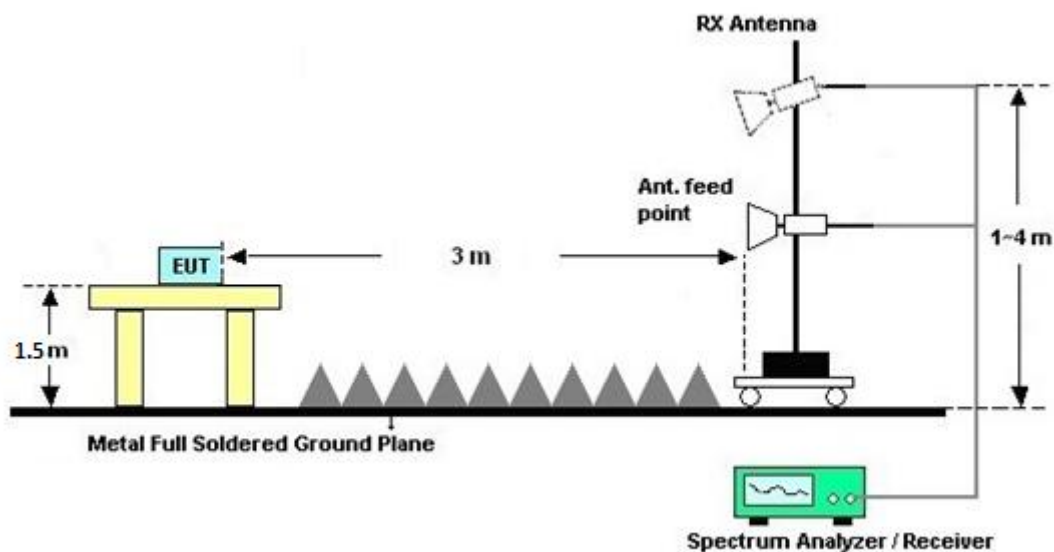
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.3.5 Test Deviation

There is no deviation with the original standard.

3.3.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



3.3.7 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 per 15.31(o) was not reported.

3.3.8 Duty cycle correction factor for average measurement

Please refer to Appendix D.

3.3.9 Test Result of Field Strength of Fundamental Emissions and Spurious Emissions

Please refer to Appendix B and C



3.4 Antenna Requirements

3.4.1 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.

3.4.2 Antenna Connector Construction

Embedded in Antenna.



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	Jun. 01, 2017 ~ Jun. 28, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Dec. 26, 2016	Jun. 01, 2017 ~ Jun. 28, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jul. 17, 2016	Jun. 01, 2017 ~ Jun. 28, 2017	Jul. 16, 2017	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 11, 2016	Jun. 01, 2017 ~ Jun. 28, 2017	Oct. 10, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jun. 25, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Jun. 25, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Jun. 25, 2017	Nov. 28, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 06, 2016	Jun. 25, 2017	Dec. 05, 2017	Conduction (CO05-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 23, 2017	Jun. 13, 2017 ~ Jun. 21, 2017	Mar. 22, 2018	Radiation (03CH12-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Oct. 20, 2016	Jun. 13, 2017 ~ Jun. 21, 2017	Oct. 19, 2018	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D&0080 0N1D01N-06	37059&01	30MHz~1GHz	Oct. 15, 2016	Jun. 13, 2017 ~ Jun. 21, 2017	Oct. 14, 2017	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 23, 2016	Jun. 13, 2017 ~ Jun. 21, 2017	Dec. 22, 2017	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Oct. 25, 2016	Jun. 13, 2017 ~ Jun. 21, 2017	Oct. 24, 2017	Radiation (03CH12-HY)
Preamplifier	MITEQ	AMF-7D-001 01800-30-10 P	1815698	1GHz~18GHz	Dec. 01, 2016	Jun. 13, 2017 ~ Jun. 21, 2017	Nov. 30, 2017	Radiation (03CH12-HY)
Preamplifier	Keysight	83017A	MY53270148	1GHz~26.5GHz	Jan. 12, 2017	Jun. 13, 2017 ~ Jun. 21, 2017	Jan. 11, 2018	Radiation (03CH12-HY)
Filter	Wainwright	WLJ4-1000- 1530-6000-4 0ST	SN3	1.53 GHz Lowpass	Jul. 07, 2016	Jun. 13, 2017 ~ Jun. 21, 2017	Jul. 06, 2017	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-27 00-3000-180 00-60ST	SN2	3 GHz Highpass	Jul. 07, 2016	Jun. 13, 2017 ~ Jun. 21, 2017	Jul. 06, 2017	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500 -B	N/A	1m~4m	N/A	Jun. 13, 2017 ~ Jun. 21, 2017	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jun. 13, 2017 ~ Jun. 21, 2017	N/A	Radiation (03CH12-HY)
Amplifier	MITEQ	TTA1840-35- HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 16, 2016	Jun. 13, 2017 ~ Jun. 21, 2017	Jul. 15, 2017	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA917058 4	18GHz- 40GHz	Nov. 08, 2016	Jun. 13, 2017 ~ Jun. 21, 2017	Nov. 07, 2017	Radiation (03CH12-HY)



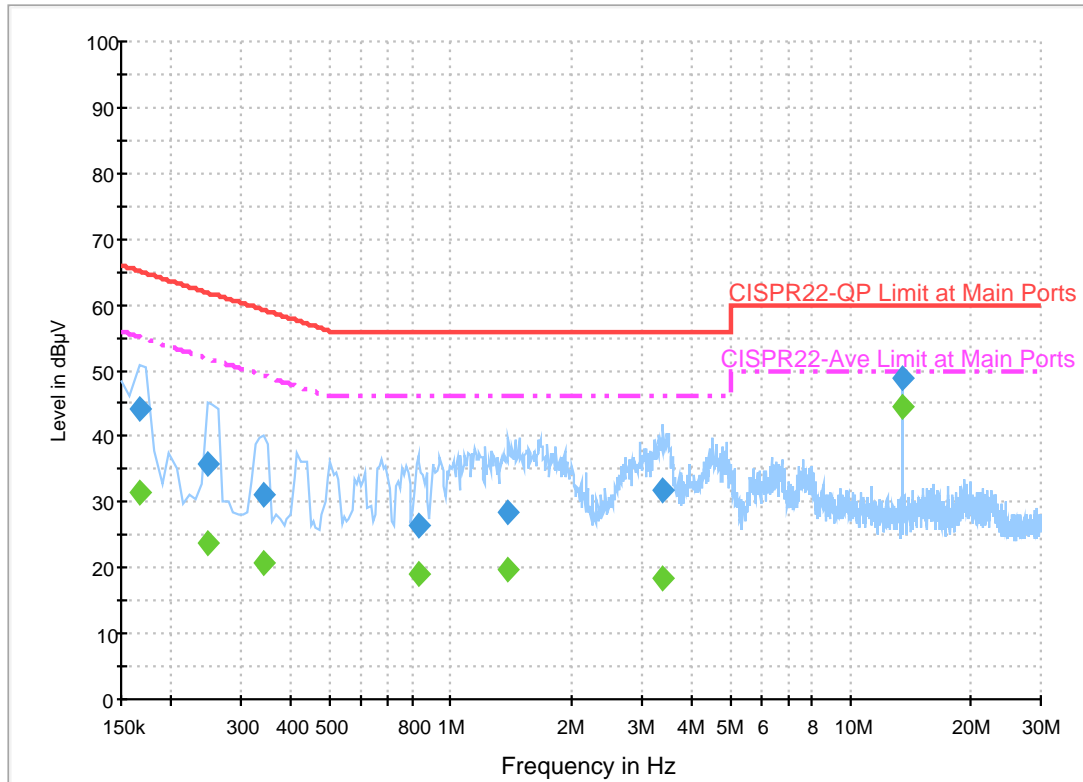
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Kai-Chun Chu	Temperature :	24~25°C
		Relative Humidity :	44~45%

EUT Information

Report NO : 752311
 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)
0.166000	44.1	Off	L1	19.6	21.1	65.2
0.246000	35.6	Off	L1	19.6	26.3	61.9
0.342000	31.0	Off	L1	19.6	28.2	59.2
0.830000	26.5	Off	L1	19.6	29.5	56.0
1.398000	28.3	Off	L1	19.6	27.7	56.0
3.414000	31.8	Off	L1	19.6	24.2	56.0
13.558000	48.8	Off	L1	20.2	11.2	60.0

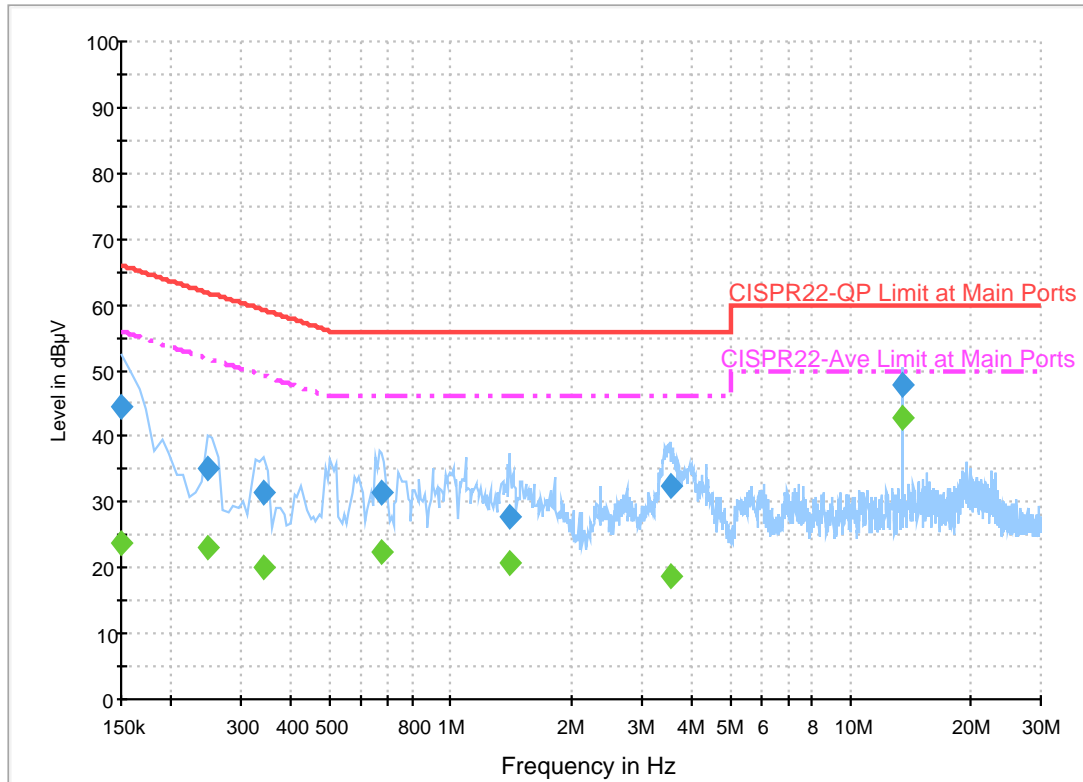
Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	31.3	Off	L1	19.6	23.9	55.2
0.246000	23.8	Off	L1	19.6	28.1	51.9
0.342000	20.9	Off	L1	19.6	28.3	49.2
0.830000	19.1	Off	L1	19.6	26.9	46.0
1.398000	19.6	Off	L1	19.6	26.4	46.0
3.414000	18.4	Off	L1	19.6	27.6	46.0
13.558000	44.5	Off	L1	20.2	5.5	50.0

EUT Information

Report NO : 752311
 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	44.5	Off	N	19.5	21.5	66.0
0.246000	35.0	Off	N	19.5	26.9	61.9
0.342000	31.6	Off	N	19.5	27.6	59.2
0.670000	31.5	Off	N	19.5	24.5	56.0
1.406000	27.9	Off	N	19.6	28.1	56.0
3.550000	32.3	Off	N	19.6	23.7	56.0
13.558000	47.8	Off	N	20.3	12.2	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	23.8	Off	N	19.5	32.2	56.0
0.246000	23.2	Off	N	19.5	28.7	51.9
0.342000	20.0	Off	N	19.5	29.2	49.2
0.670000	22.5	Off	N	19.5	23.5	46.0
1.406000	20.8	Off	N	19.6	25.2	46.0
3.550000	18.8	Off	N	19.6	27.2	46.0
13.558000	42.9	Off	N	20.3	7.1	50.0



Appendix B. Radiated Spurious Emission

Test Engineer :	Peter Liao and Nick Yu	Temperature :	21~23°C
		Relative Humidity :	54~56%

2.4GHz 2400~2483.5MHz

BT ANT+ (Band Edge @ 3m)

BT ANT+	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)	
BT ANT+ 2402MHz		2400	47.73	-26.27	74	48.08	27.1	4.04	31.49	260	20	P	H	
	*	2402	83.75	-30.25	114	84.09	27.11	4.04	31.49	260	20	P	H	
		2400	34.93	-19.07	54	35.28	27.1	4.04	31.49	260	20	A	H	
	*	2402	83.53	-10.47	94	83.87	27.11	4.04	31.49	260	20	A	H	
													H	
														H
			2400	50.26	-23.74	74	50.61	27.1	4.04	31.49	266	298	P	V
	*		2402	84.89	-29.11	114	85.23	27.11	4.04	31.49	266	298	P	V
			2400	34.19	-19.81	54	34.54	27.1	4.04	31.49	266	298	A	V
	*		2402	84.7	-9.3	94	85.04	27.11	4.04	31.49	266	298	A	V
														V
														V
BT ANT+ 2440MHz		2398.72	43.68	-30.32	74	44.03	27.1	4.04	31.49	270	34	P	H	
	*	2440	83.06	-30.94	114	83.25	27.22	4.07	31.48	270	34	P	H	
		2497.72	43.78	-30.22	74	43.74	27.39	4.11	31.46	270	34	P	H	
		2380.12	34.25	-19.75	54	34.67	27.04	4.03	31.49	270	34	A	H	
	*	2440	82.87	-11.13	94	83.06	27.22	4.07	31.48	270	34	A	H	
		2485.96	34.03	-19.97	54	34.03	27.36	4.11	31.47	270	34	A	H	
		2383.12	44.23	-29.77	74	44.64	27.05	4.03	31.49	256	300	P	V	
	*		2440	84.91	-29.09	114	85.1	27.22	4.07	31.48	256	300	P	V
			2493.76	43.74	-30.26	74	43.71	27.38	4.11	31.46	256	300	P	V
			2397.28	34.15	-19.85	54	34.51	27.09	4.04	31.49	256	300	A	V
	*		2440	84.69	-9.31	94	84.88	27.22	4.07	31.48	256	300	A	V
			2496.76	34.03	-19.97	54	33.99	27.39	4.11	31.46	256	300	A	V



BT ANT+ 2480MHz	*	2480	83.14	-30.86	114	83.18	27.34	4.09	31.47	385	25	P	H
		2490.4	43.44	-30.56	74	43.43	27.37	4.11	31.47	385	25	P	H
	*	2480	82.94	-11.06	94	82.98	27.34	4.09	31.47	385	25	A	H
		2495.68	34.46	-19.54	54	34.42	27.39	4.11	31.46	385	25	A	H
													H
													H
	*	2480	84.97	-29.03	114	85.01	27.34	4.09	31.47	253	347	P	V
		2490.04	44.31	-29.69	74	44.3	27.37	4.11	31.47	253	347	P	V
	*	2480	84.76	-9.24	94	84.8	27.34	4.09	31.47	253	347	A	V
		2496.52	34.13	-19.87	54	34.09	27.39	4.11	31.46	253	347	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

BT ANT+ (Harmonic @ 3m)

BT ANT+	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)
BT ANT+ 2402MHz		4804	39.95	-34.05	74	59.43	32.15	6.16	58.33	100	0	P	H
													H
													H
													H
		4804	40.93	-33.07	74	60.41	32.15	6.16	58.33	100	0	P	V
													V
													V
													V
BT ANT+ 2440MHz		4880	41.49	-32.51	74	60.72	32.28	6.21	58.24	100	0	P	H
		7320	46.32	-27.68	74	60.36	37	7.72	59.1	100	0	P	H
													H
													H
		4880	41.19	-32.81	74	60.42	32.28	6.21	58.24	100	0	P	V
		7320	46.27	-27.73	74	60.31	37	7.72	59.1	100	0	P	V
													V
													V
BT ANT+ 2480MHz		4960	40.8	-33.2	74	59.76	32.43	6.26	58.14	100	0	P	H
		7440	44.77	-29.23	74	58.54	37.33	7.75	59.17	100	0	P	H
													H
													H
		4960	40.59	-33.41	74	59.55	32.43	6.26	58.14	100	0	P	V
		7440	44.88	-29.12	74	58.65	37.33	7.75	59.17	100	0	P	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 BT ANT+ (LF)

BT ANT+	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz BT ANT+ LF		36.75	24.23	-15.77	40	32.99	21.05	0.48	30.27	-	-	P	H	
		91.29	21.89	-21.61	43.5	36.52	14.96	0.76	30.41	-	-	P	H	
		187.14	25.23	-18.27	43.5	39.24	14.98	1.14	30.29	-	-	P	H	
		735.4	30.92	-15.08	46	30.2	27.9	2.18	29.46	100	0	P	H	
		855.8	32.09	-13.91	46	29.48	29.36	2.36	29.24	-	-	P	H	
		982.5	33.98	-20.02	54	29.21	31.01	2.53	29	-	-	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
			36.75	32.81	-7.19	40	41.57	21.05	0.48	30.27	100	0	P	V
			89.94	22.43	-21.07	43.5	37.18	14.84	0.76	30.41	-	-	P	V
			192	19.57	-23.93	43.5	33.55	15.01	1.14	30.28	-	-	P	V
			729.8	31.71	-14.29	46	31.25	27.65	2.18	29.47	-	-	P	V
			746.6	35.78	-10.22	46	34.75	28.16	2.21	29.44	-	-	P	V
			946.1	33.48	-12.52	46	29.12	30.71	2.49	29.07	-	-	P	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

- 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. Radiated Spurious Emission Plots

Test Engineer :	Peter Liao and Nick Yu	Temperature :	21~23°C
		Relative Humidity :	54~56%



2.4GHz 2400~2483.5MHz

ANT+ (Band Edge @ 3m)

		2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	ANT+ 2402MHz		
1	Horizontal	Fundamental	
Peak	<p> Site : 03CH12-HY Condition : 15.249 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Detector : Peak Project : 752311 Mode : 10 Filter Type : CISPR(6dB) </p>		
Avg.	<p> Site : 03CH12-HY Condition : 15.249(AVG) 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000kHz VBW:10.000kHz SWT:Auto Detector : Peak Project : 752311 Mode : 10 Filter Type : CISPR(6dB) </p>		



2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	ANT+ 2402MHz
1	Vertical Fundamental
Peak	<p>Site : 03CH12-HY Condition : 15.249 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 752311 Mode : 10 Filter Type : CISPR(6dB)</p>
Avg	<p>Site : 03CH12-HY Condition : 15.249(AVG) 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 752311 Mode : 10 Filter Type : CISPR(6dB)</p>



		2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	ANT+ 2440MHz		
1	Horizontal	Fundamental	
Peak	<p> Site : 03CH12-HY Condition : 15.249 3m HORN_912ND_1328 HORIZONTAL Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Project : Peak Mode : 11 Filter Type : CISPR(6dB) </p>		
Avg.	<p> Site : 03CH12-HY Condition : 15.249(AVG) 3m HORN_912ND_1328 HORIZONTAL Detector : Peak Project : 752311 Mode : 11 Filter Type : CISPR(6dB) </p>		



2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	ANT+ 2440MHz
1	Vertical Fundamental
Peak	<p>Site : 03CH12-HY Condition : 15.249 3m HORN_9120D_1328 VERTICAL RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Detector : Peak Project : 752311 Mode : 11 Filter Type : CISPR(6dB)</p>
Avg.	<p>Site : 03CH12-HY Condition : 15.249(AVG) 3m HORN_9120D_1328 VERTICAL RBW:1000.000kHz VBW:10.000kHz SWT:Auto Detector : Peak Project : 752311 Mode : 11 Filter Type : CISPR(6dB)</p>



2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	ANT+ 2480MHz
1	Horizontal Fundamental
Peak	<p>Site : 03CH12-HY Condition : 15.249 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 752311 Mode : 12 Filter Type : CISPR(6dB)</p>
Avg.	<p>Site : 03CH12-HY Condition : 15.249(AVG) 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:10.000KHz SWT:Auto Detector : Peak Project : 752311 Mode : 12 Filter Type : CISPR(6dB)</p>

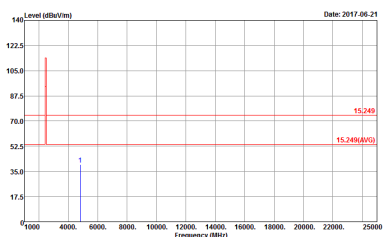
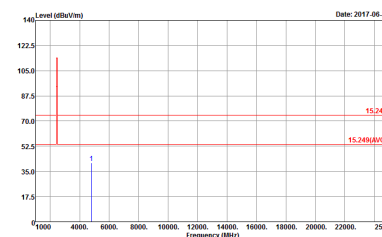


2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	ANT+ 2480MHz
1	Vertical Fundamental
Peak	<p>Site : 03CH12-HY Condition : 15.249 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 752311 Mode : 12 Filter Type : CISPR(6dB)</p>
Avg.	<p>Site : 03CH12-HY Condition : 15.249(AVG) 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 752311 Mode : 12 Filter Type : CISPR(6dB)</p>



2.4GHz 2400~2483.5MHz

ANT+ (Harmonic @ 3m)

		2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	ANT+ 2402MHz		
1	Horizontal	Vertical	
Peak Avg.	 <p>Site : 03CH12-IT1 Condition : 15.249 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 752311 Mode : 10</p>	 <p>Site : 03CH12-IT1 Condition : 15.249 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 752311 Mode : 10</p>	



2.4GHz 2400~2483.5MHz Harmonic @ 3m		
ANT	ANT+ 2440MHz	
1	Horizontal	Vertical
<p>Peak</p> <p>Avg.</p>	<p>Site : 03CH12-HY Condition : 15.249 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 752311 Mode : 11</p>	<p>Site : 03CH12-HY Condition : 15.249 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 752311 Mode : 11</p>



2.4GHz 2400~2483.5MHz Harmonic @ 3m		
ANT	ANT+ 2480MHz	
1	Horizontal	Vertical
Peak	<p>Site : 03CH12-HY Condition : 15.249 3m HORN_9120D_1328 HORIZONTAL Detector : Peak Project : 752311 Mode : 12</p>	<p>Site : 03CH12-HY Condition : 15.249 3m HORN_9120D_1328 VERTICAL Detector : Peak Project : 752311 Mode : 12</p>



Emission below 1GHz
2.4GHz ANT+ (LF)

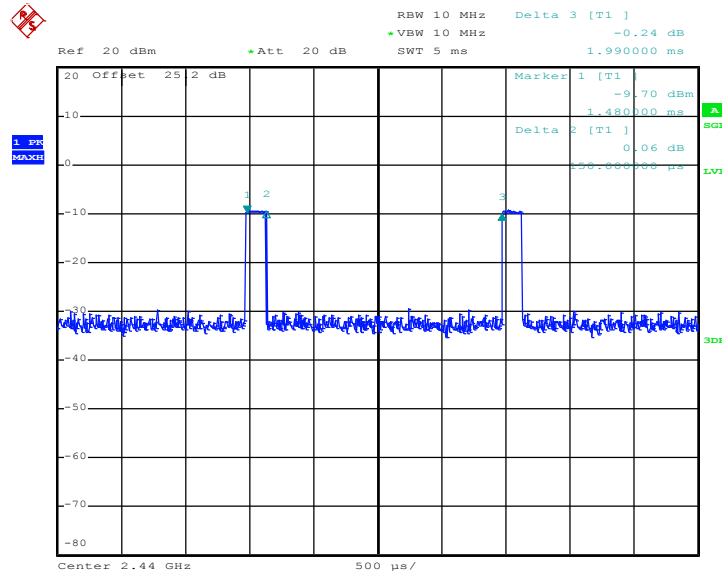
Table with 2 columns: ANT (1) and Frequency (2.4GHz 2400~2483.5MHz). It contains two sub-tables: Horizontal and Vertical. Each sub-table includes a graph of Level (dBuV/m) vs Frequency (MHz) and a data block with fields: Site, Condition, Detector, Project, Mode.



Appendix D. Duty Cycle Plots

Band	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting
ANT+	7.54	150.00	6.67	10kHz

ANT+



Date: 7.JUN.2017 21:47:52