FCC RF Test Report

APPLICANT : Altocumulous LLC

EQUIPMENT: Digital Media Receiver

MODEL NAME : RS03QR

FCC ID : 2AHSE-2045

STANDARD : FCC Part 15 Subpart C §15.247

CLASSIFICATION: (DSS) Spread Spectrum Transmitter

This is a variant report which is only valid together with the original test report. The testing was completed on Oct. 12, 2016. 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



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: 2AHSE-2045 Page Number : 1 of 17
Report Issued Date : Oct. 14, 2016

Report Version : Rev. 01

Report Template No.: BU5-FR15CBT Version 1.1

1190

TABLE OF CONTENTS

RE	VISIO	ON HISTORY	3
SU	мма	RY OF TEST RESULT	4
1	GEN	NERAL DESCRIPTION	5
	1.1	Applicant	5
	1.2	Product Feature of Equipment Under Test	5
	1.3	Product Specification of Equipment Under Test	5
	1.4	Modification of EUT	5
	1.5	Testing Location	6
	1.6	Applicable Standards	6
2	TES	T CONFIGURATION OF EQUIPMENT UNDER TEST	7
	2.1	Descriptions of Test Mode	7
	2.2	Test Mode	7
	2.3	Connection Diagram of Test System	8
	2.4	EUT Operation Test Setup	8
3	TES	T RESULT	9
	3.1	Radiated Band Edges and Spurious Emission Measurement	9
	3.2	Antenna Requirements	15
4	LIST	OF MEASURING EQUIPMENT	16
5	UNC	CERTAINTY OF EVALUATION	17
ΑP	PEND	DIX A. RADIATED SPURIOUS EMISSION	
ΑP	PEND	DIX B. RADIATED SPURIOUS EMISSION PLOTS	

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 2 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No. : FR631725-02A

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR631725-02A	Rev. 01	Initial issue of report	Oct. 14, 2016

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 3 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No. : FR631725-02A

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result
3.1	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass
3.2	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 4 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No. : FR631725-02A

1 General Description

1.1 Applicant

Altocumulous LLC

300 E. Business Way, Suite 200, Summit Woods Corporate Center Cincinnati, Ohio 45241

1.2 Product Feature of Equipment Under Test

	Product Feature				
Equipment	Digital Media Receiver				
Model Name	RS03QR				
FCC ID	2AHSE-2045				
	WLAN 11b/g/n HT20				
EUT supports Radios application	WLAN 11a/n HT20/HT40				
	Bluetooth v4.1 EDR/LE				

Report No.: FR631725-02A

Remark: This is a variant report by adding 2nd RF crystal. All the test cases were performed on original report which can be referred to Sporton Report Number FR631725-01A. Based on the original report, the RF output power, radiated band edges, and radiated spurious emission worst case was verified.

1.3 Product Specification of Equipment Under Test

Standards-related Product Specification				
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz			
Number of Channels	79			
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78			
	Bluetooth BR(1Mbps) : 7.59 dBm (0.0057 W)			
Maximum Output Power to Antenna	Bluetooth EDR (2Mbps) : 6.60 dBm (0.0046 W)			
	Bluetooth EDR (3Mbps) : 6.91 dBm (0.0049 W)			
Antenna Type / Gain	Fixed Internal Antenna type with gain 1.47 dBi			
	Bluetooth BR (1Mbps) : GFSK			
Type of Modulation	Bluetooth EDR (2Mbps) : π /4-DQPSK			
	Bluetooth EDR (3Mbps) : 8-DPSK			

1.4 Modification of EUT

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

 SPORTON INTERNATIONAL INC.
 Page Number
 : 5 of 17

 TEL: 886-3-327-3456
 Report Issued Date
 : Oct. 14, 2016

 FAX: 886-3-328-4978
 Report Version
 : Rev. 01

FCC ID: 2AHSE-2045 Report Template No.: BU5-FR15CBT Version 1.1

1.5 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

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

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

Test Site	SPORTON INTERNATIONAL INC.	
	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist,	
Test Site Location	Taoyuan City, Taiwan (R.O.C.)	
lest Site Location	TEL: +886-3-327-0868	
	FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
Test Site No.	03CH12-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
- ANSI C63.10-2013

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

SPORTON INTERNATIONAL INC.

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 6 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No.: FR631725-02A

2 Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

Preliminary tests were performed in different data rates and recorded the RF output power in the following table:

Report No.: FR631725-02A

		В	luetooth RF Output Powe	er	
Channal	nel Frequency		Data Rate / Modulation	n	
Channel		GFSK	π/4-DQPSK	8-DPSK	
		1Mbps	2Mbps	3Mbps	
Ch00	2402MHz	7.59 dBm	6.60 dBm	6.91 dBm	
Ch39	2441MHz	7.45 dBm	6.52 dBm	6.81 dBm	
Ch78	Ch78 2480MHz 7.25 dBm		6.34 dBm	6.68 dBm	

Remark:

- 1. All the test data for each data rate were verified, but only the worst case was reported.
- 2. The data rate was set in 1Mbps for all the test items due to the highest RF output power.
- 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: radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

2.2 Test Mode

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

	Summary table of Test Cases					
Radiated	Radiated Bluetooth BR 1Mbps GFSK					
Test Cases	Mode 1: CH78_2480 MHz					

Remark: For radiated test cases, the worst mode data rate 1Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and the conducted spurious emissions and conducted band edge measurement for each data rate are no worse than 1Mbps, and no other significantly frequencies found in conducted spurious emission.

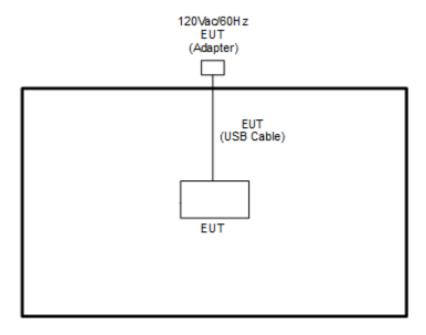
 SPORTON INTERNATIONAL INC.
 Page Number
 : 7 of 17

 TEL: 886-3-327-3456
 Report Issued Date
 : Oct. 14, 2016

 FAX: 886-3-328-4978
 Report Version
 : Rev. 01

FCC ID : 2AHSE-2045 Report Template No.: BU5-FR15CBT Version 1.1

2.3 Connection Diagram of Test System



2.4 EUT Operation Test Setup

For Bluetooth function, programmed RF utility, "Compliance.exe" installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 8 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No.: FR631725-02A

3 Test Result

3.1 Radiated Band Edges and Spurious Emission Measurement

3.1.1 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. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency	Field Strength	Measurement Distance		
(MHz)	(microvolts/meter)	(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		

3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

SPORTON INTERNATIONAL INC.

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 9 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No.: FR631725-02A

3.1.3 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.
- 1. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 2. 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.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. 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, RBW=1MHz for f>1GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
 - (3) For average measurement: use duty cycle correction factor method per 15.35(c).Duty cycle = On time/100 milliseconds

On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$

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(Duty cycle)

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

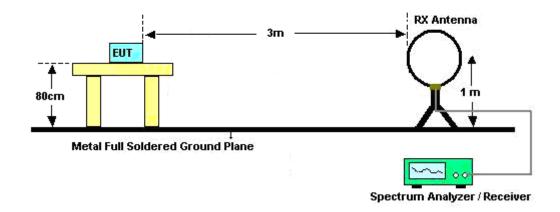
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (24.79dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 10 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

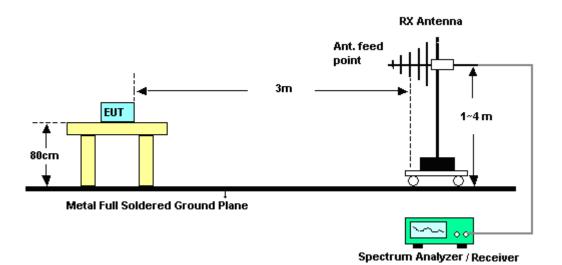
Report No.: FR631725-02A

3.1.4 Test Setup

For radiated emissions below 30MHz



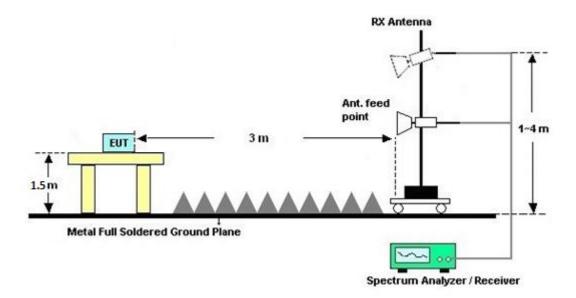
For radiated emissions from 30MHz to 1GHz



TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 11 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No.: FR631725-02A

For radiated emissions above 1GHz



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

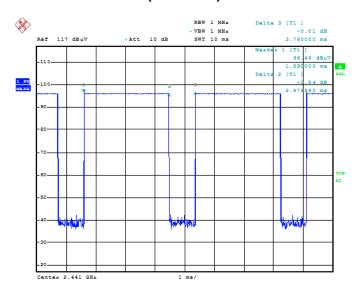
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 12 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No.: FR631725-02A

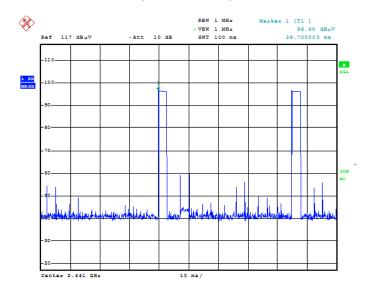
3.1.6 Duty cycle correction factor for average measurement

DH5 on time (One Pulse) Plot on Channel 39



Date: 11.0CT.2016 20:45:29

DH5 on time (Count Pulses) Plot on Channel 39



Date: 11.0CT.2016 20:52:06

Note:

- 1. Worst case Duty cycle = on time/100 milliseconds = $2 \times 2.88 / 100 = 5.76 \%$
- 2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.79 dB
- 3. DH5 has the highest duty cycle worst case and is reported.

SPORTON INTERNATIONAL INC.

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 13 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No.: FR631725-02A

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the period to have DH5 packet completing one hopping sequence is

 $2.88 \text{ ms } \times 20 \text{ channels} = 57.6 \text{ ms}$

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. [100ms / 57.6ms] = 2 hops

Thus, the maximum possible ON time:

2.88 ms x 2 = 5.76 ms

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

 $20 \times log(5.76 \text{ ms/}100\text{ms}) = -24.79 \text{ dB}$

3.1.7 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B

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

Please refer to Appendix A and B

Page Number : 14 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No.: FR631725-02A

3.2 Antenna Requirements

3.2.1 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 FCC rule.

3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.2.3 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.

SPORTON INTERNATIONAL INC.

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 15 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No.: FR631725-02A

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Agilent	E4416A	GB412923 44	300MHz~40GH z	Jan. 08, 2016	Oct. 03, 2016	Jan. 07, 2017	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US404415 48	300MHz~40GH z	Jan. 07, 2016	Oct. 03, 2016	Jan. 06, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 23, 2015	Oct. 03, 2016	Nov. 22, 2016	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Oct. 11, 2016 ~ Oct. 12, 2016	Sep. 01, 2017	Radiation (03CH12-HY)
Loop Cable	Rohde & Schwarz	N/A	N/A	9KHz~30MHz	Dec. 03, 2015	Oct. 11, 2016 ~ Oct. 12, 2016	Dec. 02, 2016	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	35413&02	30MHz~1GHz	Jan. 13, 2016	Oct. 11, 2016 ~ Oct. 12, 2016	Jan. 12, 2017	Radiation (03CH12-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 20, 2015	Oct. 11, 2016 ~ Oct. 12, 2016	Nov. 19, 2016	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 21, 2015	Oct. 11, 2016 ~ Oct. 12, 2016	Dec. 20, 2016	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120D	9120D-132 8	1GHz ~ 18GHz	Nov. 02, 2015	Oct. 11, 2016 ~ Oct. 12, 2016	Nov. 01, 2016	Radiation (03CH12-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1815698	1GHz~18GHz	Dec. 14, 2015	Oct. 11, 2016 ~ Oct. 12, 2016	Dec. 13, 2016	Radiation (03CH12-HY)
Preamplifier	Keysight	83017A	MY532701 48	1GHz~26.5GHz	Jan. 30, 2016	Oct. 11, 2016 ~ Oct. 12, 2016	Jan. 29, 2017	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500- B	N/A	1m~4m	N/A	Oct. 11, 2016 ~ Oct. 12, 2016	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Oct. 11, 2016 ~ Oct. 12, 2016	N/A	Radiation (03CH12-HY)
Preamplifier	MITEQ	JS44-180040 00-33-8P	1840917	18GHz ~ 40GHz	Jun. 14, 2016	Oct. 11, 2016 ~ Oct. 12, 2016	Jun. 13, 2017	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 584	18GHz- 40GHz	Nov. 02, 2015	Oct. 11, 2016 ~ Oct. 12, 2016	Nov. 01, 2016	Radiation (03CH12-HY)

TEL: 886-3-327-3456 FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 16 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No. : FR631725-02A

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence	5.1
of 95% (U = 2Uc(y))	5.1

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

Measuring Uncertainty for a Level of Confidence	F 2
of 95% (U = 2Uc(y))	5.2

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

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

SPORTON INTERNATIONAL INC. TEL: 886-3-327-3456

FAX: 886-3-328-4978 FCC ID: 2AHSE-2045 Page Number : 17 of 17
Report Issued Date : Oct. 14, 2016
Report Version : Rev. 01

Report No.: FR631725-02A

Appendix A. Radiated Spurious Emission

Test Engineer :	Karl Hou, Nick Yu, and Peter Chiu	Temperature :	22~24°C
rest Engineer .	l ' '	Relative Humidity :	53~56%

Report No.: FR631725-02A

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

ВТ	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)
	*	2482	103.19	-	-	99.87	27.26	7.53	31.47	400	264	Р	Н
	*	2482	78.39	-	-	-	-	-	-	-	-	Α	Н
		2483.56	62.84	-11.16	74	59.52	27.26	7.53	31.47	400	264	Р	Н
		2483.56	38.04	-15.96	54	-	-	-	-	-	-	Α	Н
DT													Н
BT CH 78													Н
2480MHz	*	2482	101.08	-	-	97.76	27.26	7.53	31.47	100	328	Р	٧
240UNITI2	*	2482	76.28	-	-	-	-	-	-	-	-	Α	V
		2483.6	62.84	-11.16	74	59.52	27.26	7.53	31.47	100	328	Р	٧
		2483.6	38.04	-15.96	54	-	-	-	-	-	-	Α	V
													٧
													٧
Remark	1. No	o other spurious	s found.										

SPORTON INTERNATIONAL INC. Page Number : A1 of A5

TEL: 886-3-327-3456 FAX: 886-3-328-4978

^{2.} All results are PASS against Peak and Average limit line.

2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

ВТ	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)		(P/A)	
		4962	39.64	-34.36	74	55.03	31.45	11.19	58.03	100	0	Р	Н
		4962	14.84	-39.16	54	-	-	-	-	-	-	Α	Н
		7440	43.69	-30.31	74	52.08	36.46	14.32	59.17	100	0	Р	Н
BT		7440	18.89	-35.11	54	-	-	-	-	-	-	Α	Н
CH 78 2480MHz		4960	40.2	-33.8	74	55.59	31.45	11.19	58.03	100	0	Р	V
240UNITI2		4960	15.4	-38.6	54	-	-	-	-	-	-	Α	V
		7440	43.27	-30.73	74	51.66	36.46	14.32	59.17	100	0	Р	V
		4960	18.47	-35.53	54	-	-	-	-	-	-	Α	V
Remark		o other spurious		Dook ond	Averagelim	it line							

TEL: 886-3-327-3456 FAX: 886-3-328-4978

Emission below 1GHz

2.4GHz BT (LF)

вт	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)
		145.02	28.02	-15.48	43.5	40.85	17.84	1.75	32.42	-	-	Р	Н
		189.84	28.46	-15.04	43.5	43.57	15.6	1.7	32.41	100	0	Р	Н
		246.54	23.16	-22.84	46	35.19	18.47	1.83	32.33	-	-	Р	Н
		746.6	33.46	-12.54	46	34.37	27.43	3.97	32.31	-	-	Р	Н
		853.7	30.62	-15.38	46	29.5	28.7	4.28	31.86	-	-	Р	Н
		977.6	32.87	-21.13	54	29	30	4.75	30.88	-	-	Р	Н
													Н
													Н
													Н
													Н
													Н
2.4GHz													Н
BT LF		35.13	33.13	-6.87	40	41.51	23.3	0.78	32.46	-	-	Р	V
LF		46.74	26.05	-13.95	40	40.86	16.87	0.78	32.46	-	-	Р	V
		74.55	25.41	-14.59	40	43.61	13.19	1.06	32.45	-	-	Р	V
		745.9	40.04	-5.96	46	40.97	27.41	3.97	32.31	100	0	Р	V
		927.2	31.91	-14.09	46	29.23	29.41	4.6	31.33	-	-	Р	V
		948.2	33.41	-12.59	46	29.84	29.97	4.75	31.15	-	-	Р	V
													V
													V
													V
													V
													V
													V

SPORTON INTERNATIONAL INC.

TEL: 886-3-327-3456 FAX: 886-3-328-4978 Page Number

: A3 of A5

Note symbol

Report No. : FR631725-02A

*	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

SPORTON INTERNATIONAL INC. Page Number : A4 of A5

TEL: 886-3-327-3456 FAX: 886-3-328-4978

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

Report No.: FR631725-02A

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	Р	Н
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	Α	Н

1. Level($dB\mu V/m$) =

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

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

For Peak Limit @ 2390MHz:

- 1. Level(dBµV/m)
- = Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) Preamp Factor(dB)
- $= 32.22(dB/m) + 4.58(dB) + 54.51(dB\mu V) 35.86 (dB)$
- $= 55.45 (dB\mu V/m)$
- 2. Over Limit(dB)
- = Level(dBµV/m) Limit Line(dBµV/m)
- $= 55.45(dB\mu V/m) 74(dB\mu V/m)$
- = -18.55(dB)

For Average Limit @ 2390MHz:

- Level(dBµV/m)
- = Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) Preamp Factor(dB)
- $= 32.22(dB/m) + 4.58(dB) + 42.6(dB\mu V) 35.86 (dB)$
- $= 43.54 (dB\mu V/m)$
- 2. Over Limit(dB)
- = Level($dB\mu V/m$) Limit Line($dB\mu V/m$)
- $= 43.54(dB\mu V/m) 54(dB\mu V/m)$
- = -10.46(dB)

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

SPORTON INTERNATIONAL INC. Page Number : A5 of A5

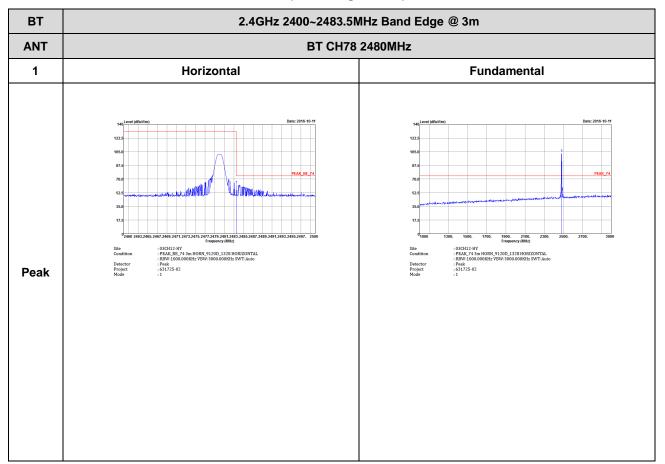
TEL: 886-3-327-3456 FAX: 886-3-328-4978

Appendix B. Radiated Spurious Emission Plots

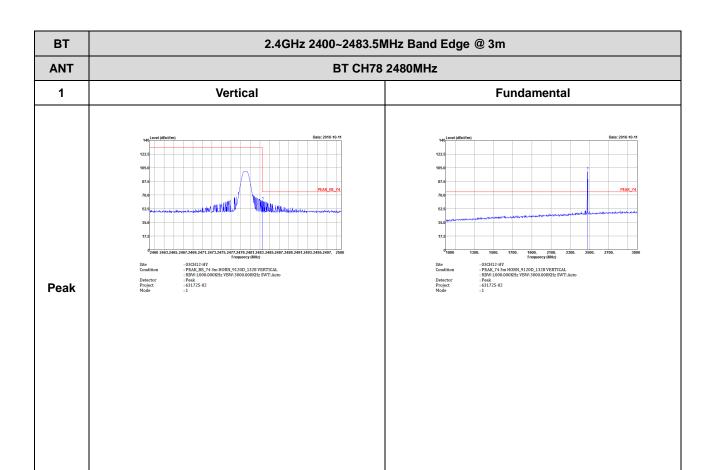
Test Engineer :		Temperature :	22~24°C
rest Engineer .	Karl Hou, Nick Yu and Peter Chiu	Relative Humidity :	53~56%

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)



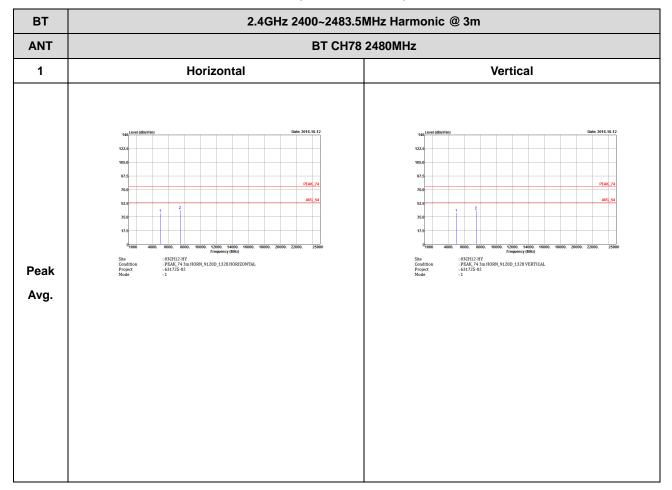
TEL: 886-3-327-3456 FAX: 886-3-328-4978



TEL: 886-3-327-3456 FAX: 886-3-328-4978

2.4GHz 2400~2483.5MHz

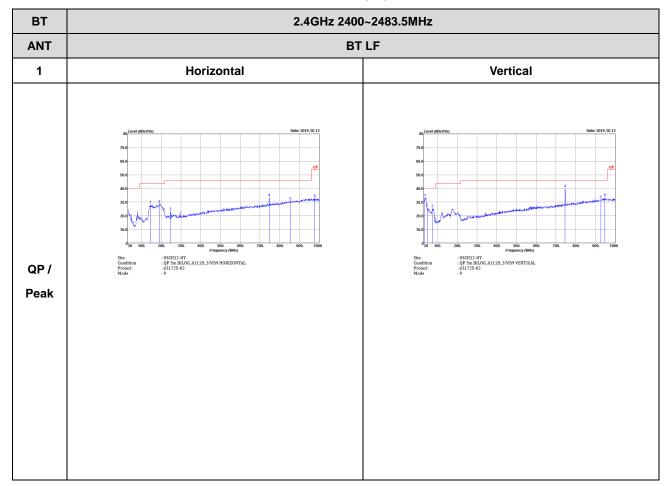
BT (Harmonic @ 3m)



TEL: 886-3-327-3456 FAX: 886-3-328-4978

Emission below 1GHz

2.4GHz BT (LF)



TEL: 886-3-327-3456 FAX: 886-3-328-4978