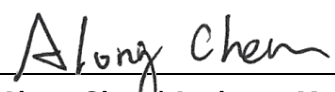


FCC Test Report

FCC ID : PRDMU65
Equipment : 2.4G BlueTrace Mouse
Model No. : GM5
Brand Name : ACROX
Applicant : ACROX Technologies Co., Ltd.
Address : 4F., No.89, Minshan St., Neihu Dist., Taipei City
114, Taiwan, R.O.C.
Standard : 47 CFR FCC Part 15.249
Received Date : Jan. 13, 2018
Tested Date : Feb. 02, 2018

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:


Along Chen / Assistant Manager

Approved by:

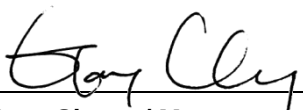

Gary Chang / Manager



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Local Support Equipment List	7
1.3	Test Setup Chart	7
1.4	The Equipment List	8
1.5	Test Standards	9
1.6	Measurement Uncertainty	9
2	TEST CONFIGURATION	10
2.1	Testing Condition	10
2.2	The Worst Test Modes and Channel Details	10
3	TRANSMITTER TEST RESULTS.....	11
3.1	Radiated Emission	11
3.2	20dB and Occupied Bandwidth	23
4	TEST LABORATORY INFORMATION	24

Release Record

Report No.	Version	Description	Issued Date
FR813102	Rev. 01	Initial issue	Feb. 22, 2018
FR813102	Rev. 02	Updating equipment information	Mar. 15, 2018

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.249(a)	Field Strength of Fundamental	Meet the requirement of limit	Pass
15.249(a)(d)	Field Strength of Harmonics and Emissions Radiated outside of the Specified Frequency Bands	Meet the requirement of limit	Pass
15.215(c)	20dB bandwidth	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Modulation	Ch. Freq. (MHz)	Channel Number	Data Rate
2408-2474	FSK	2408-2474	1-34 [34]	1 Mbps

1.1.2 Antenna Details

Ant. No.	Type	Gain (dBi)	Connector	Remark
1	Printed	-1.55	---	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	1.5Vdc from battery
-------------------	---------------------

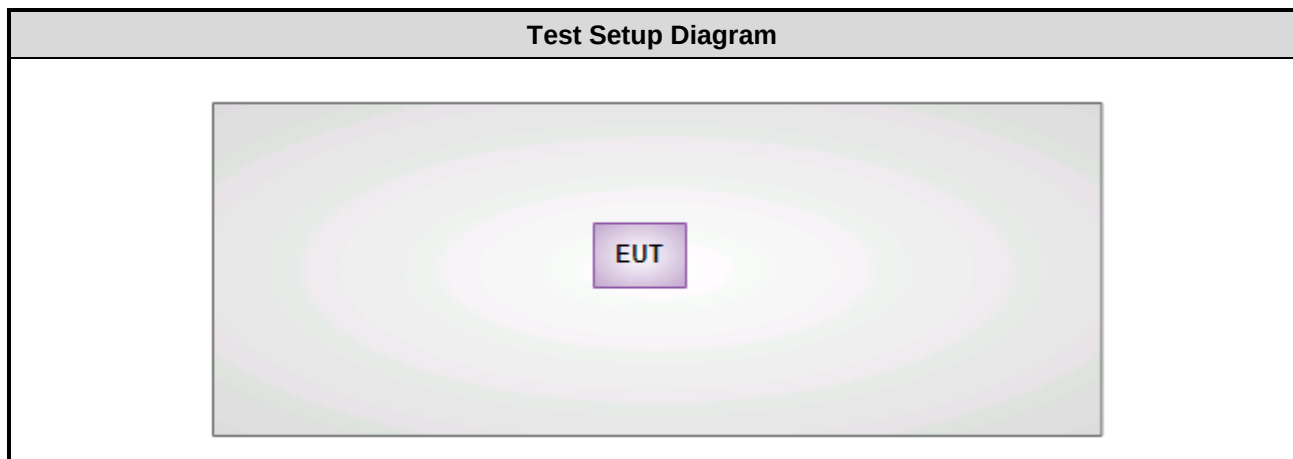
1.1.4 Channel List

Frequency band (MHz)		2408~2474	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2408	18	2442
2	2410	19	2444
3	2412	20	2446
4	2414	21	2448
5	2416	22	2450
6	2418	23	2452
7	2420	24	2454
8	2422	25	2456
9	2424	26	2458
10	2426	27	2460
11	2428	28	2462
12	2430	29	2464
13	2432	30	2466
14	2434	31	2468
15	2436	32	2470
16	2438	33	2472
17	2440	34	2474

1.2 Local Support Equipment List

Support Equipment List						
No.	Equipment	Brand	Model	S/N	FCC ID	Signal cable / Length (m)
1	---	---	---	---	---	---

1.3 Test Setup Chart



1.4 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber 3 / (03CH03-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101499	Jan. 03, 2018	Jan. 02, 2019
Receiver	R&S	ESR3	101658	Nov. 20, 2017	Nov. 19, 2018
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 28, 2017	Apr. 27, 2018
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Jan. 18, 2018	Jan. 17, 2019
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 23, 2017	Nov. 22, 2018
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2017	Nov. 12, 2018
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 07, 2017	Dec. 06, 2018
Preamplifier	EMC	EMC02325	980187	Sep. 04, 2017	Sep. 03, 2018
Preamplifier	Agilent	83017A	MY53270014	Aug. 21, 2017	Aug. 20, 2018
Preamplifier	EMC	EMC184045B	980192	Aug. 22, 2017	Aug. 21, 2018
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Nov. 27, 2017	Nov. 26, 2018
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY32487/4	Nov. 27, 2017	Nov. 26, 2018
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Nov. 27, 2017	Nov. 26, 2018
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Nov. 27, 2017	Nov. 26, 2018
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Nov. 27, 2017	Nov. 26, 2018
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Nov. 27, 2017	Nov. 26, 2018
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Mar. 15, 2017	Mar. 14, 2018
Power Meter	Anritsu	ML2495A	1241002	Oct. 16, 2017	Oct. 15, 2018
Power Sensor	Anritsu	MA2411B	1207366	Oct. 16, 2017	Oct. 15, 2018
DC POWER SOURCE	GW INSTRON	GPC-6030D	EM892433	Oct. 26, 2017	Oct. 25, 2018
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.249

ANSI C63.10-2013

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$))

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.134 Hz
Radiated emission ≤ 1 GHz	± 3.87 dB
Radiated emission > 1 GHz	± 5.60 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH03-WS	19°C / 63%	Vincent Yeh
RF Conducted	TH01-WS	19°C / 63%	Vincent Yeh

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- IC site registration No.: 10807C-1

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Field Strength of Fundamental	FSK	2408, 2440, 2474	1 Mbps	---
Radiated Emissions $\leq$ 1GHz	FSK	2474	1 Mbps	---
Radiated Emissions $>$ 1GHz	FSK	2408, 2440, 2474	1 Mbps	---
20dB bandwidth	FSK	2408, 2440, 2474	1 Mbps	---

3 Transmitter Test Results

3.1 Radiated Emission

This section includes field strength of fundamental, field strength of harmonics and emissions radiated outside of the operating frequency bands.

3.1.1 Limit of field strength of fundamental and field strength of harmonics

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
2400–2483.5 MHz	50	500

3.1.2 Limit of Unwanted Emissions

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 radiated emission limits in below table, whichever is the lesser attenuation.

Radiated emission limits			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:

Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:

Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.1.3 Test Procedures

1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

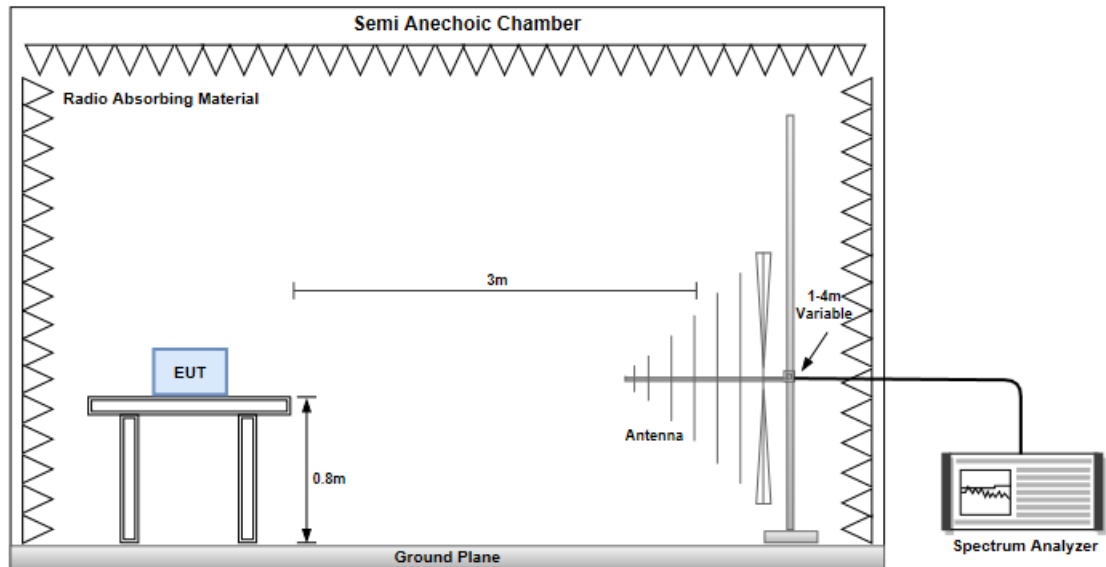
1. Radiated emission below 1GHz
120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission
2. Radiated emission above 1GHz / Peak value except fundamental
RBW=1MHz, VBW=3MHz and Peak detector

Radiated emission above 1GHz / Average value for field strength of fundamental and harmonics
The average value is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
3.
$$20\log (\text{Duty cycle}) = 20\log \frac{7 * 0.15797 \text{ ms}}{100 \text{ ms}} = -39.13\text{dB}$$

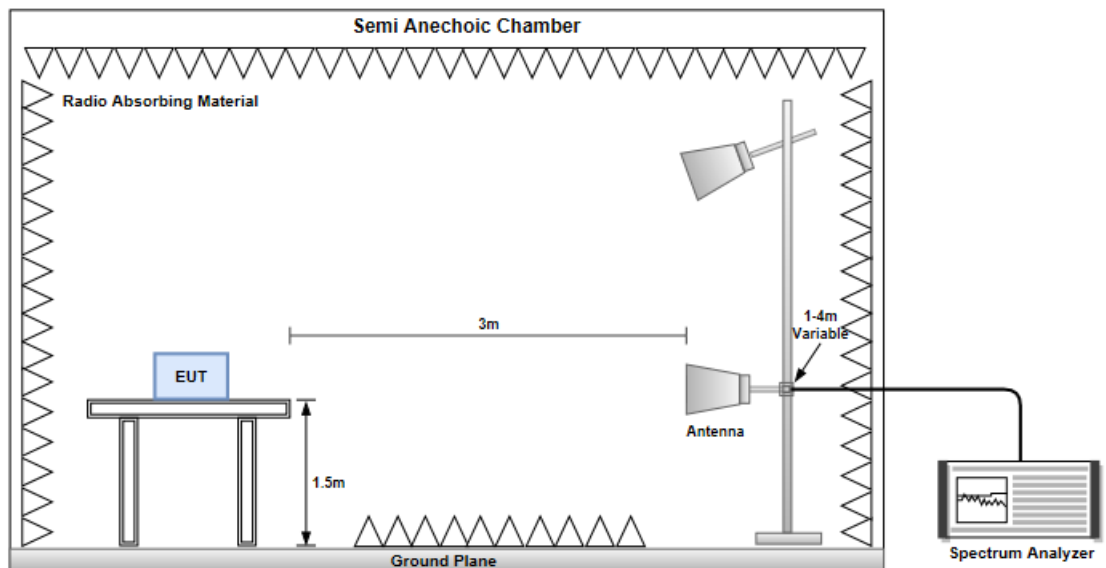
Please see page 22 for plotted duty
4. Radiated emission above 1GHz / Average value for other emissions
RBW=1MHz, VBW=10Hz and Peak detector
5. Radiated emission Peak value for fundamental
RBW=3MHz, VBW=10MHz and Peak detector

3.1.4 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



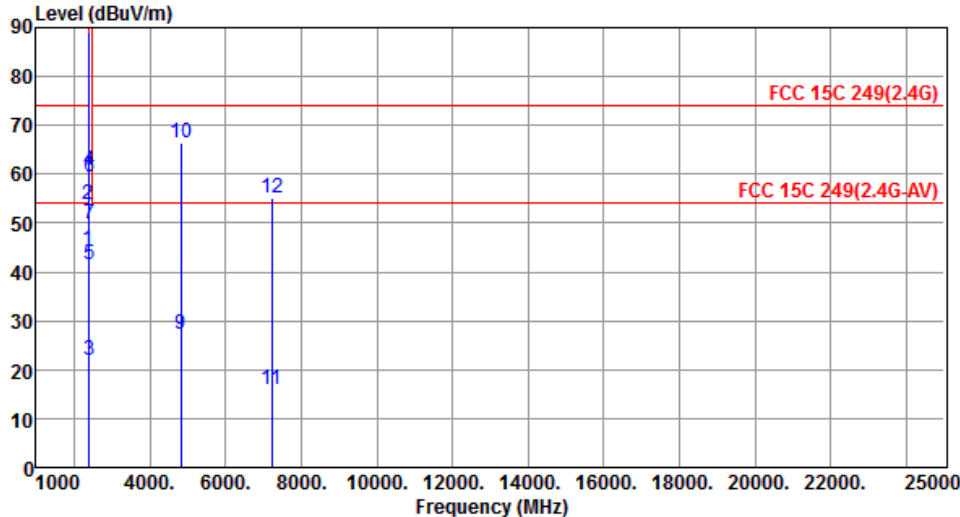
3.1.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2474
Polarization	Horizontal		
Level (dBUV/m)			

Modulation	GFSK	Test Freq. (MHz)	2474
Polarization	Vertical		
Level (dBuV/m)			

3.1.6 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2408
Polarization	Horizontal		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	44.54	54.00	-9.46	45.75	-1.21	Average	136	25
2	2390.00	53.76	74.00	-20.24	54.97	-1.21	Peak	136	25
3	2396.00	21.77	54.00	-32.23	22.95	-1.18	Average	136	25
4	2396.00	60.90	74.00	-13.10	62.08	-1.18	Peak	136	25
5	2400.00	41.40	54.00	-12.60	42.57	-1.17	Average	136	25
6	2400.00	59.51	74.00	-14.49	60.68	-1.17	Peak	136	25
7	2408.00	49.77	94.00	-44.23	50.90	-1.13	Average	136	25
8	2408.00	88.90	114.00	-25.10	90.03	-1.13	Peak	136	25
9	4816.00	27.14	54.00	-26.86	21.49	5.65	Average	100	277
10	4816.00	66.27	74.00	-7.73	60.62	5.65	Peak	100	277
11	7224.00	15.93	54.00	-38.07	5.36	10.57	Average	100	324
12	7224.00	55.06	74.00	-18.94	44.49	10.57	Peak	100	324

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	GFSK	Test Freq. (MHz)	2408						
Polarization	Vertical								
Level (dBUV/m) 90 80 70 60 50 40 30 20 10 0 8 6 5 4 3 10 9 12 11 FCC 15C 249(2.4G) FCC 15C 249(2.4G-AV) Frequency (MHz) 1000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 25000									
	Freq.	Emission level	Limit	Margin	SA	Factor	Remark	ANT	Turn
	MHz	dBuV/m	dBuV/m	dB	reading	dB		High	Table
					dBuV			cm	deg
1	2390.00	38.47	54.00	-15.53	39.68	-1.21	Average	331	100
2	2390.00	50.51	74.00	-23.49	51.72	-1.21	Peak	331	100
3	2396.00	15.37	54.00	-38.63	16.55	-1.18	Average	331	100
4	2396.00	54.50	74.00	-19.50	55.68	-1.18	Peak	331	100
5	2400.00	38.15	54.00	-15.85	39.32	-1.17	Average	331	100
6	2400.00	52.43	74.00	-21.57	53.60	-1.17	Peak	331	100
7	2408.00	45.26	94.00	-48.74	46.39	-1.13	Average	331	100
8	2408.00	84.39	114.00	-29.61	85.52	-1.13	Peak	331	100
9	4816.00	21.37	54.00	-32.63	15.72	5.65	Average	327	312
10	4816.00	60.50	74.00	-13.50	54.85	5.65	Peak	327	312
11	7224.00	13.67	54.00	-40.33	3.10	10.57	Average	100	195
12	7224.00	52.80	74.00	-21.20	42.23	10.57	Peak	100	195

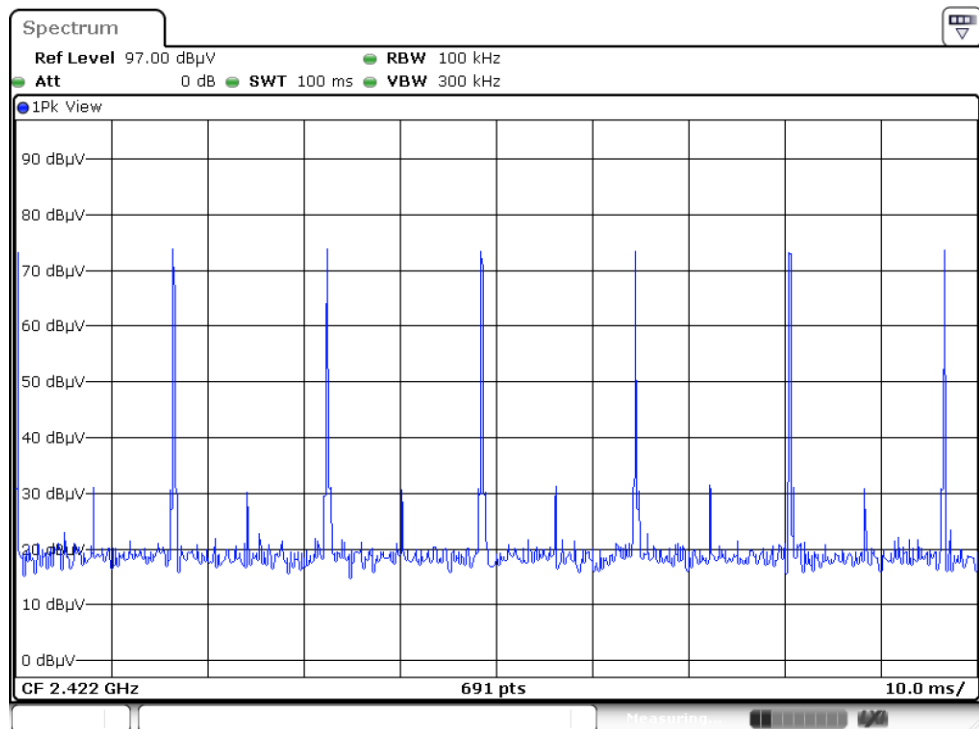
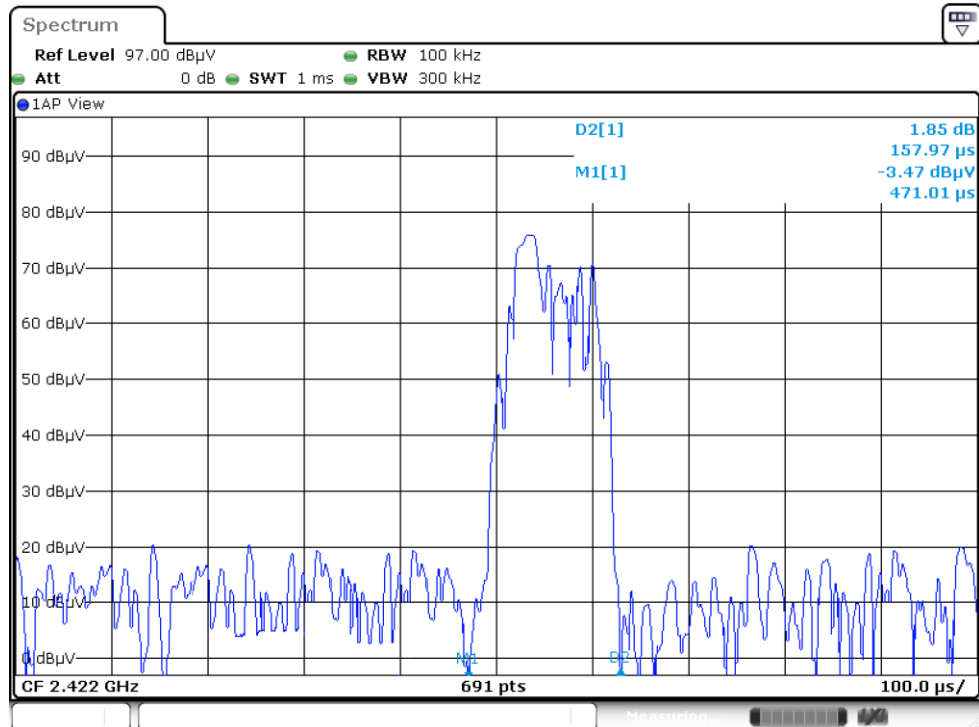
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Horizontal		
Level (dBUV/m) </			

Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Vertical		
Level (dBUV/m) 90 80 70 60 50 40 30 20 10 0 1000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 25000 Frequency (MHz) 6 10 12 9 11 2390 2390 2400 2400 2440 2440 2483.50 2483.50 4880 4880 7320 7320 38.19 50.77 38.09 50.83 46.85 85.98 38.51 50.92 20.66 59.79 13.51 52.64 54.00 74.00 54.00 74.00 94.00 114.00 54.00 74.00 54.00 74.00 54.00 74.00 -15.81 -23.23 -15.91 -23.17 -47.15 -28.02 -15.49 -23.08 -33.34 -14.21 -40.49 -21.36 39.40 51.98 39.26 52.00 47.87 87.00 39.37 51.78 14.84 53.97 2.52 41.65 -1.21 -1.21 -1.17 -1.17 -1.02 -1.02 -0.86 -0.86 5.82 5.82 10.99 10.99 Average Peak Average Peak Average Peak Average Peak Average Peak Average Peak 365 365 365 365 365 365 365 365 317 317 100 100 98 98 98 98 98 98 98 98 316 316 212 212 </			

Modulation	GFSK	Test Freq. (MHz)	2474
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	GFSK	Test Freq. (MHz)	2474
Polarization	Vertical		
Level (dBuV/m) </			



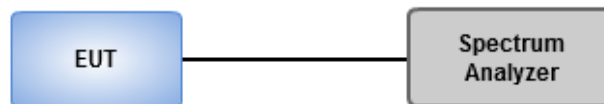
$$20\log(\text{Duty cycle}) = 20\log \frac{7 \times 0.15797 \text{ ms}}{100 \text{ ms}} = -39.13\text{dB}$$

3.2 20dB and Occupied Bandwidth

3.2.1 Test Procedures

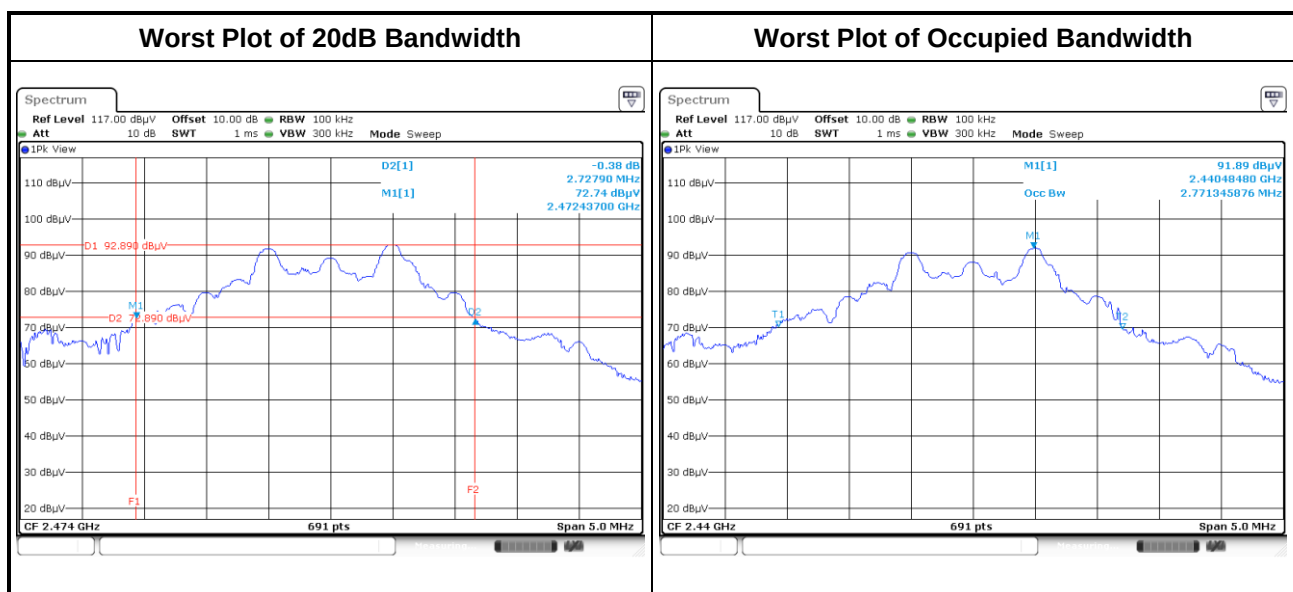
1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
2. Detector = Peak(20 dB bandwidth) / Sample(Occupied bandwidth), Trace mode = max hold
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20dB relative to the maximum level measured in the fundamental emission.
5. Use the occupied measurement function of spectrum analyzer to measure 99% occupied bandwidth

3.2.2 Test Setup



3.2.3 20dB and Occupied Bandwidth

Freq. (MHz)	20dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
2408	2.66	2.76
2440	2.71	2.77
2474	2.73	2.70



4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin
Kou District, New Taipei City,
Taiwan, R.O.C.

Kwei Shan

Tel: 886-3-271-8666

No. 3-1, Lane 6, Wen San 3rd St.,
Kwei Shan District, Tao Yuan City
333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd
St., Kwei Shan District, Tao Yuan
City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666

Fax: 886-3-318-0155

Email: ICC_Service@icertifi.com.tw

==END==