FCC Test Report

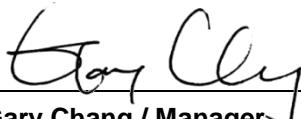|		
FCC ID	:	**OXM000076**
Equipment	:	**Wireless Optical Mouse**
Model No.	:	**AMW571A**
Brand Name	:	**Targus**
Applicant	:	**Targus International LLC**
Address	:	**1211 North Miller Street Anaheim, CA 92806 USA**
Standard	:	**47 CFR FCC Part 15.249**
Received Date	:	**Nov. 30, 2016**
Tested Date	:	**Dec. 07, 2016**

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:
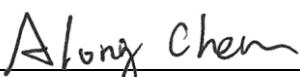
Along Chen / Assistant Manager

Approved by:

Gary Chang / Manager

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR6O1803-02	Rev. 01	Initial issue	Dec. 20, 2016
FR6O1803-02	Rev. 02	Modified FCC ID (Page 1)	Jan. 19, 2017

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	Note	N/A
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
Note: The EUT consumes DC power from battery, so the test is not required.			

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
2400-2483.5	GFSK	2404-2478	1-75 [75]	1 Mbps

1.1.2 Antenna Details

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

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3Vdc from battery (1.5Vdc AAA battery x2).

Note: The equipment tests are performed using a new battery.

1.1.4 Accessories

N/A

1.1.5 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2404	20	2423	39	2442	58	2461
2	2405	21	2424	40	2443	59	2462
3	2406	22	2425	41	2444	60	2463
4	2407	23	2426	42	2445	61	2464
5	2408	24	2427	43	2446	62	2465
6	2409	25	2428	44	2447	63	2466
7	2410	26	2429	45	2448	64	2467
8	2411	27	2430	46	2449	65	2468
9	2412	28	2431	47	2450	66	2469
10	2413	29	2432	48	2451	67	2470
11	2414	30	2433	49	2452	68	2471
12	2415	31	2434	50	2453	69	2472
13	2416	32	2435	51	2454	70	2473
14	2417	33	2436	52	2455	71	2474
15	2418	34	2437	53	2456	72	2475
16	2419	35	2438	54	2457	73	2476
17	2420	36	2439	55	2458	74	2477
18	2421	37	2440	56	2459	75	2478
19	2422	38	2441	57	2460	---	---

1.2   Test Setup Chart

Test Setup Diagram
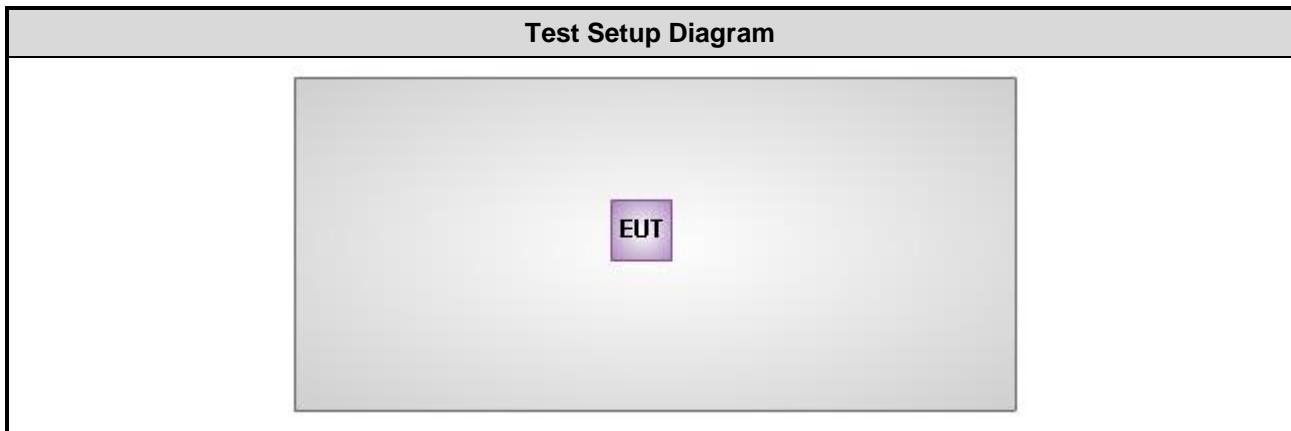
1.3   The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Nov. 25, 2016	Nov. 24, 2017
Receiver	R&S	ESR3	101658	Nov. 24, 2016	Nov. 23, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 16, 2015	Dec. 15, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 2017
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 10, 2016	Nov. 09, 2017
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 10, 2015	Dec. 09, 2016
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	16052	Dec. 10, 2015	Dec. 09, 2016
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 10, 2015	Dec. 09, 2016
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 10, 2015	Dec. 09, 2016
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	Feb. 17, 2016	Feb. 16, 2017
Power Meter	Anritsu	ML2495A	1241002	Oct. 06, 2016	Oct. 05, 2017
Power Sensor	Anritsu	MA2411B	1207366	Oct. 06, 2016	Oct. 05, 2017
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.4   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

1.5   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 ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.37 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	22°C / 62%	Vincent Yeh
RF Conducted	TH01-WS	22°C / 62%	Vincent Yeh

➢ FCC site registration No.: 181692

➢ IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Field Strength of Fundamental	GFSK	2404, 2441, 2478	1 Mbps	---
Radiated Emissions ≤ 1GHz	GFSK	2441	1 Mbps	---
Radiated Emissions > 1GHz	GFSK	2404, 2441, 2478	1 Mbps	---
20dB bandwidth	GFSK	2404, 2441, 2478	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 as 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.
$$20\log (\text{Duty cycle}) = 20\log \frac{2 * 0.41449 \text{ ms}}{100 \text{ ms}} = -41.63\text{dB}$$

   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=10MHz, VBW=10MHz and Peak detector

3.1.4 Test Setup
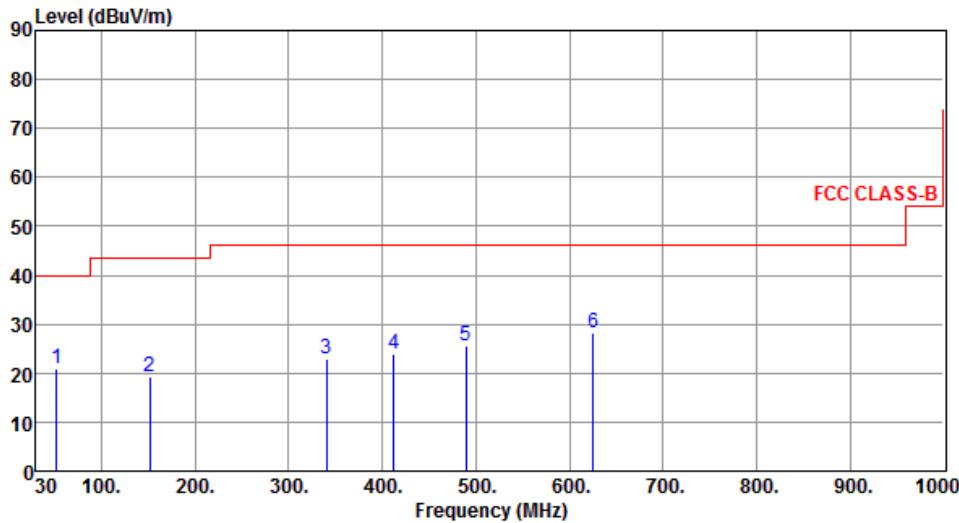
Radiated Emissions below 1 GHz
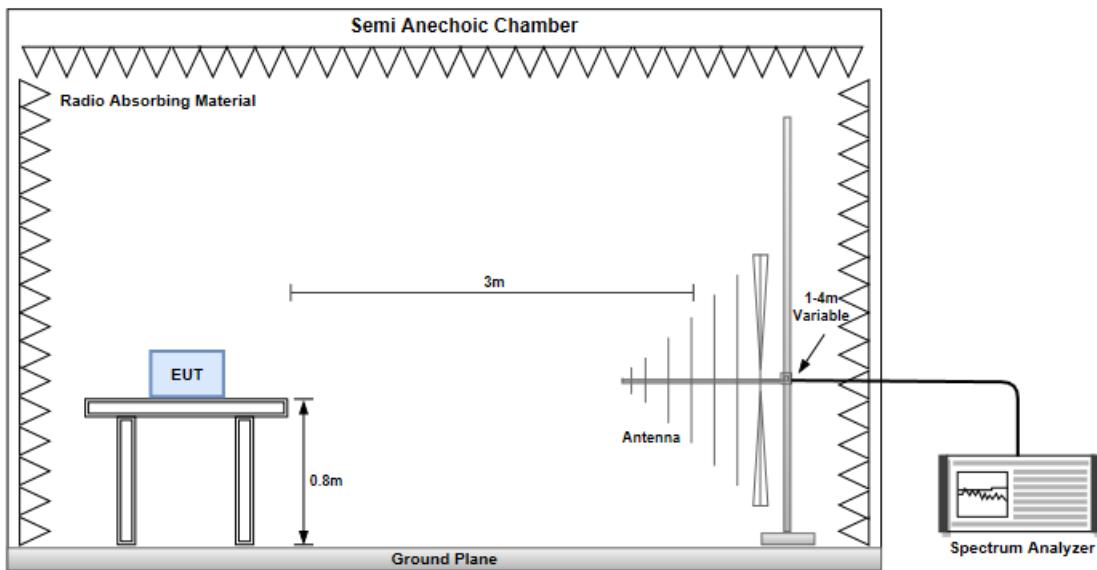
Radiated Emissions above 1 GHz
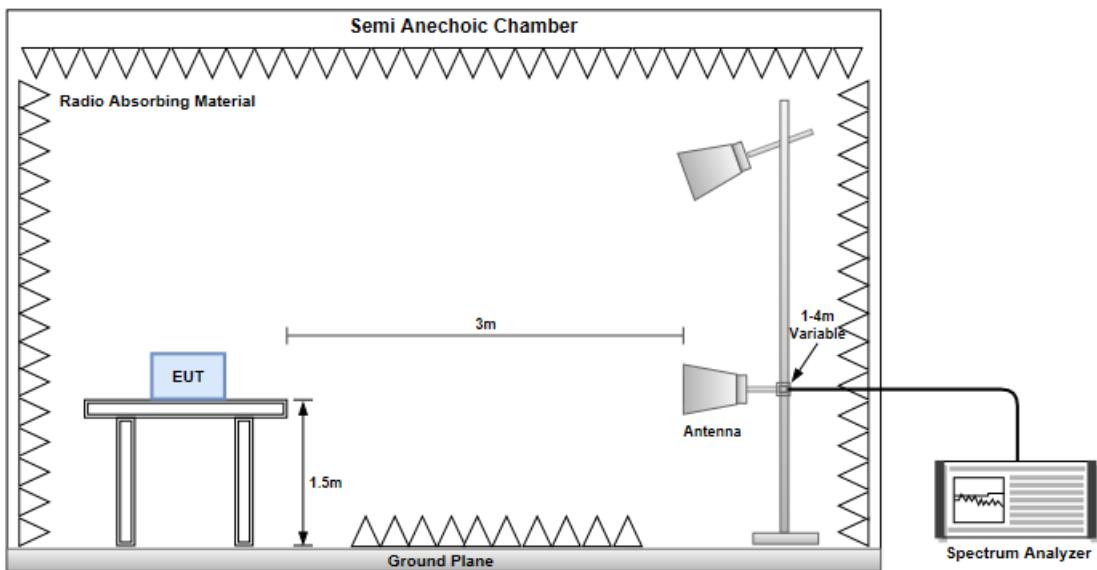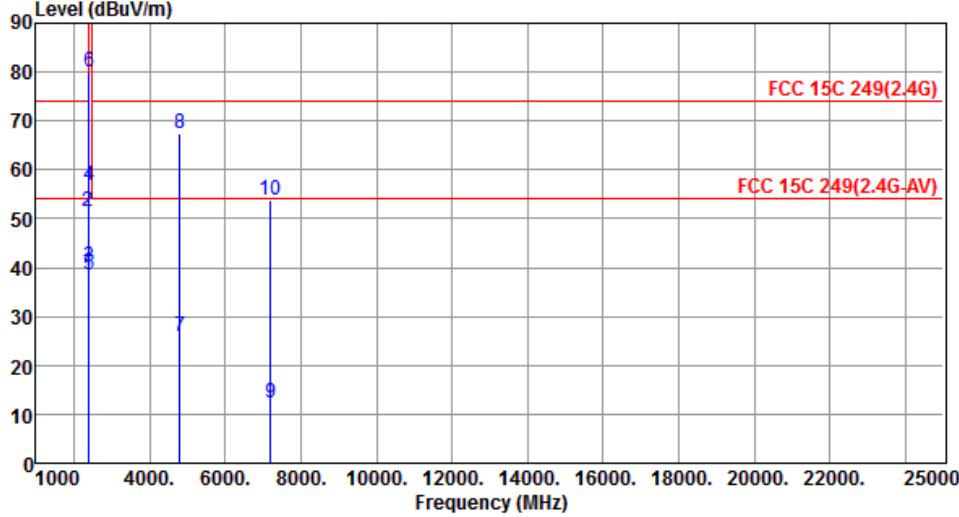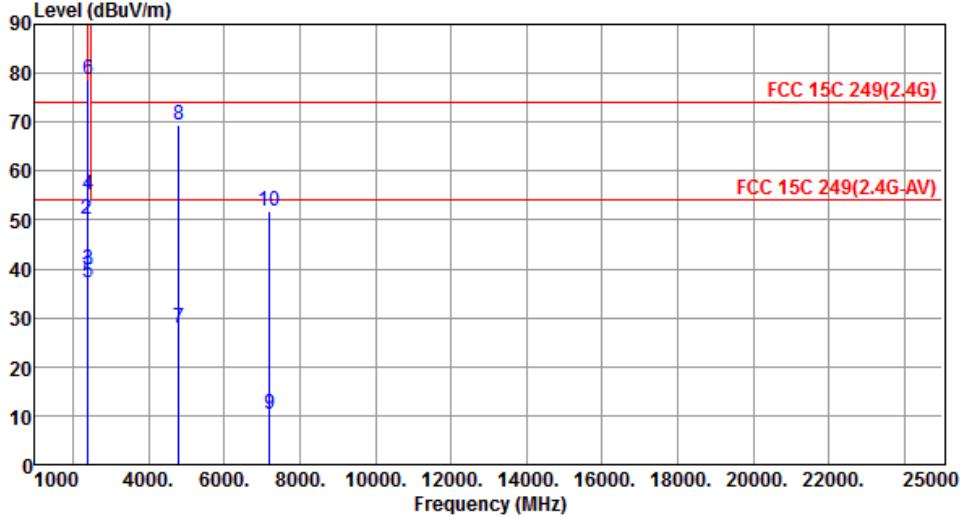
3.1.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)
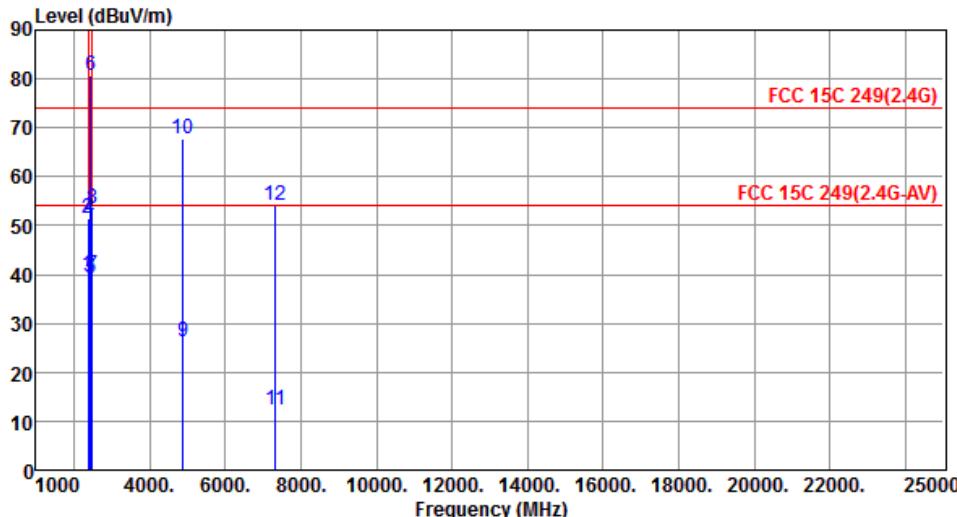
Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Horizontal		

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	52.31	20.91	40.00	-19.09	28.80	-7.89	Peak	---	---
2	151.25	19.36	43.50	-24.14	27.61	-8.25	Peak	---	---
3	340.40	22.75	46.00	-23.25	29.26	-6.51	Peak	---	---
4	412.18	23.83	46.00	-22.17	28.52	-4.69	Peak	---	---
5	489.78	25.69	46.00	-20.31	28.74	-3.05	Peak	---	---
6	625.58	28.19	46.00	-17.81	28.61	-0.42	Peak	---	---

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).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Vertical		

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	36.79	26.26	40.00	-13.74	34.49	-8.23	Peak	---	---
2	70.74	27.99	40.00	-12.01	38.77	-10.78	Peak	---	---
3	167.74	21.99	43.50	-21.51	30.51	-8.52	Peak	---	---
4	388.90	25.02	46.00	-20.98	30.29	-5.27	Peak	---	---
5	505.30	27.57	46.00	-18.43	30.32	-2.75	Peak	---	---
6	621.70	29.88	46.00	-16.12	30.34	-0.46	Peak	---	---

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).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.1.6 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2404
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	39.25	54.00	-14.75	42.54	-3.29	Average	100	75
2	2390.00	51.57	74.00	-22.43	54.86	-3.29	Peak	100	75
3	2400.00	40.27	54.00	-13.73	43.52	-3.25	Average	100	75
4	2400.00	56.66	74.00	-17.34	59.91	-3.25	Peak	100	75
5	2404.00	38.51	94.00	-55.49	41.74	-3.23	Average	100	75
6	2404.00	80.14	114.00	-33.86	83.37	-3.23	Peak	100	75
7	4808.00	25.86	54.00	-28.14	22.38	3.48	Average	100	343
8	4808.00	67.49	74.00	-6.51	64.01	3.48	Peak	100	343
9	7212.00	12.29	54.00	-41.71	3.80	8.49	Average	100	162
10	7212.00	53.92	74.00	-20.08	45.43	8.49	Peak	100	162

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)	2404
Polarization	Vertical		

	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	38.76	54.00	-15.24	42.05	-3.29	Average	218	16
2	2390.00	50.10	74.00	-23.90	53.39	-3.29	Peak	218	16
3	2400.00	39.81	54.00	-14.19	43.06	-3.25	Average	218	16
4	2400.00	55.20	74.00	-18.80	58.45	-3.25	Peak	218	16
5	2404.00	37.21	94.00	-56.79	40.44	-3.23	Average	218	16
6	2404.00	78.84	114.00	-35.16	82.07	-3.23	Peak	218	16
7	4808.00	27.93	54.00	-26.07	24.45	3.48	Average	119	130
8	4808.00	69.56	74.00	-4.44	66.08	3.48	Peak	119	130
9	7212.00	10.19	54.00	-43.81	1.70	8.49	Average	100	158
10	7212.00	51.82	74.00	-22.18	43.33	8.49	Peak	100	158

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)	2441
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	39.77	54.00	-14.23	43.06	-3.29	Average	119	78
2	2390.00	51.44	74.00	-22.56	54.73	-3.29	Peak	119	78
3	2400.00	39.45	54.00	-14.55	42.70	-3.25	Average	119	78
4	2400.00	51.46	74.00	-22.54	54.71	-3.25	Peak	119	78
5	2441.00	39.08	94.00	-54.92	42.15	-3.07	Average	119	78
6	2441.00	80.71	114.00	-33.29	83.78	-3.07	Peak	119	78
7	2483.50	39.72	54.00	-14.28	42.62	-2.90	Average	119	78
8	2483.50	53.31	74.00	-20.69	56.21	-2.90	Peak	119	78
9	4882.00	26.12	54.00	-27.88	22.40	3.72	Average	100	346
10	4882.00	67.75	74.00	-6.25	64.03	3.72	Peak	100	346
11	7323.00	12.34	54.00	-41.66	3.82	8.52	Average	100	162
12	7323.00	53.97	74.00	-20.03	45.45	8.52	Peak	100	162

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)	2441
Polarization	Vertical		

	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	39.34	54.00	-14.66	42.63	-3.29	Average	218	17
2	2390.00	50.00	74.00	-24.00	53.29	-3.29	Peak	218	17
3	2400.00	39.02	54.00	-14.98	42.27	-3.25	Average	218	17
4	2400.00	50.21	74.00	-23.79	53.46	-3.25	Peak	218	17
5	2441.00	37.55	94.00	-56.45	40.62	-3.07	Average	218	17
6	2441.00	79.18	114.00	-34.82	82.25	-3.07	Peak	218	17
7	2483.50	39.53	54.00	-14.47	42.43	-2.90	Average	218	17
8	2483.50	52.03	74.00	-21.97	54.93	-2.90	Peak	218	17
9	4882.00	28.18	54.00	-25.82	24.46	3.72	Average	100	341
10	4882.00	69.81	74.00	-4.19	66.09	3.72	Peak	100	341
11	7323.00	10.34	54.00	-43.66	1.82	8.52	Average	100	142
12	7323.00	51.97	74.00	-22.03	43.45	8.52	Peak	100	142

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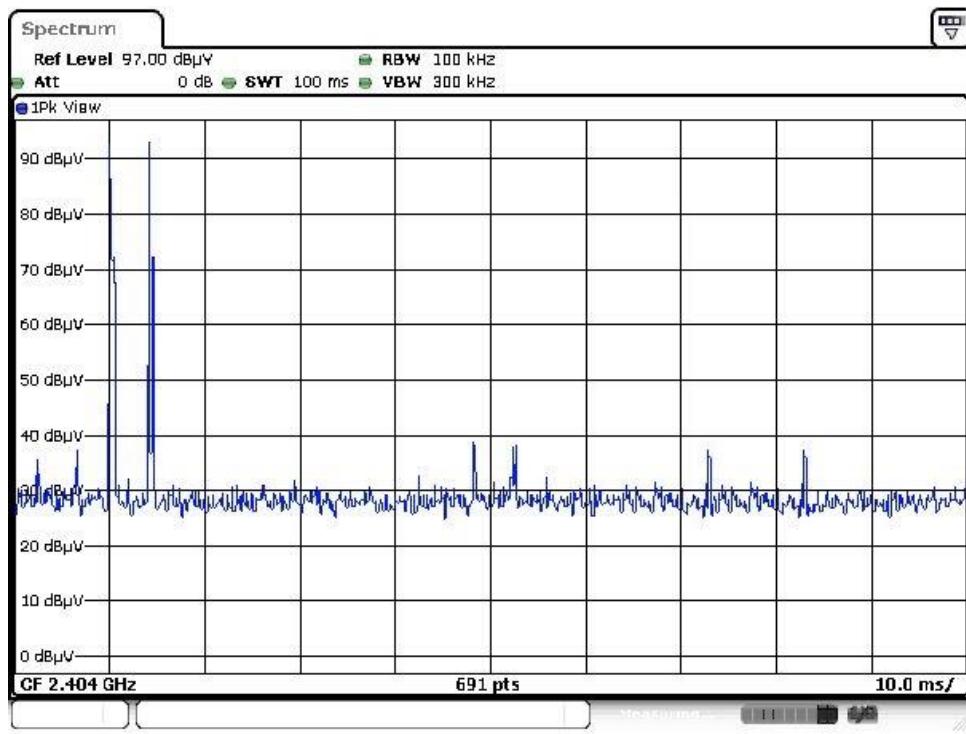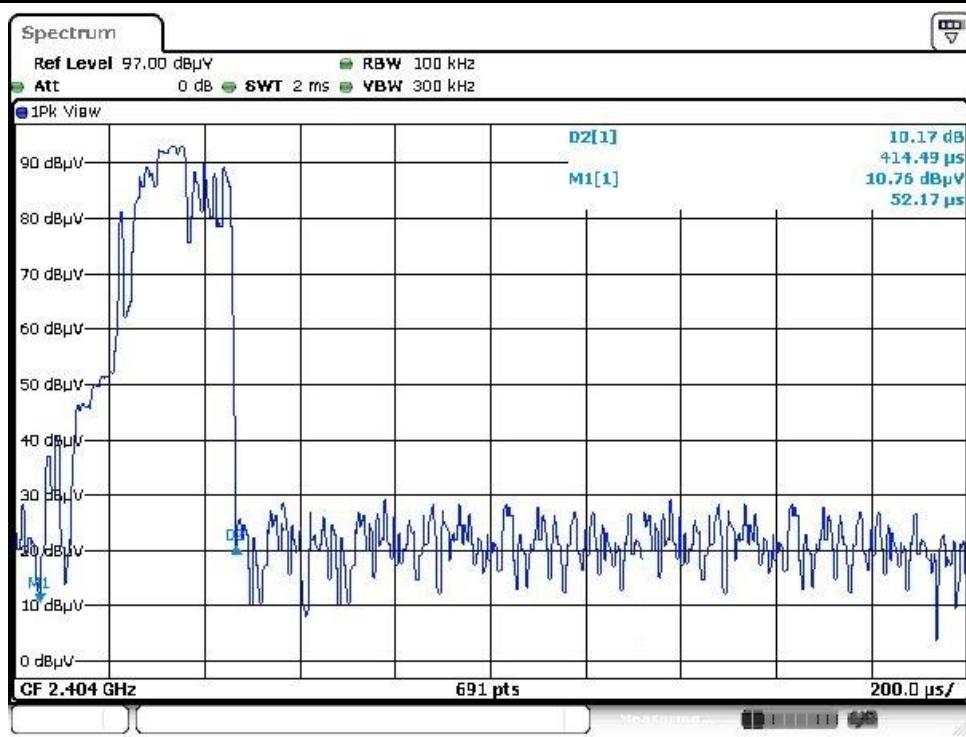Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	GFSK	Test Freq. (MHz)	2478
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	2478.00	38.66	94.00	-55.34	41.58	-2.92	Average	100	83
2	2478.00	80.29	114.00	-33.71	83.21	-2.92	Peak	100	83
3	2483.50	40.42	54.00	-13.58	43.32	-2.90	Average	100	83
4	2483.50	58.05	74.00	-15.95	60.95	-2.90	Peak	100	83
5	4956.00	25.97	54.00	-28.03	22.00	3.97	Average	100	340
6	4956.00	67.60	74.00	-6.40	63.63	3.97	Peak	100	340
7	7434.00	12.22	54.00	-41.78	3.61	8.61	Average	100	155
8	7434.00	53.85	74.00	-20.15	45.24	8.61	Peak	100	155

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)	2478
Polarization	Vertical		

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2478.00	37.36	94.00	-56.64	40.28	-2.92	Average	225	10
2	2478.00	78.99	114.00	-35.01	81.91	-2.92	Peak	225	10
3	2483.50	39.96	54.00	-14.04	42.86	-2.90	Average	225	10
4	2483.50	56.12	74.00	-17.88	59.02	-2.90	Peak	225	10
5	4956.00	27.57	54.00	-26.43	23.60	3.97	Average	116	126
6	4956.00	69.20	74.00	-4.80	65.23	3.97	Peak	116	126
7	7434.00	9.84	54.00	-44.16	1.23	8.61	Average	100	118
8	7434.00	51.47	74.00	-22.53	42.86	8.61	Peak	100	118

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).

$$20\log \text{(Duty cycle)} = 20\log \frac{2*\ 0.41449\ ms}{100\ ms} = -41.63dB$$

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 specturm analyzer to measure 99% occupied bandwidth

3.2.2 Test Setup
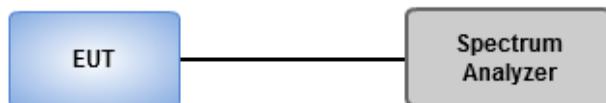
3.2.3 20dB and Occupied Bandwidth

Freq. (MHz)	20dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
2404	3.15	2.95
2441	2.20	2.03
2478	3.69	3.56

Worst Plot of 20dB Bandwidth	Worst Plot of Occupied Bandwidth
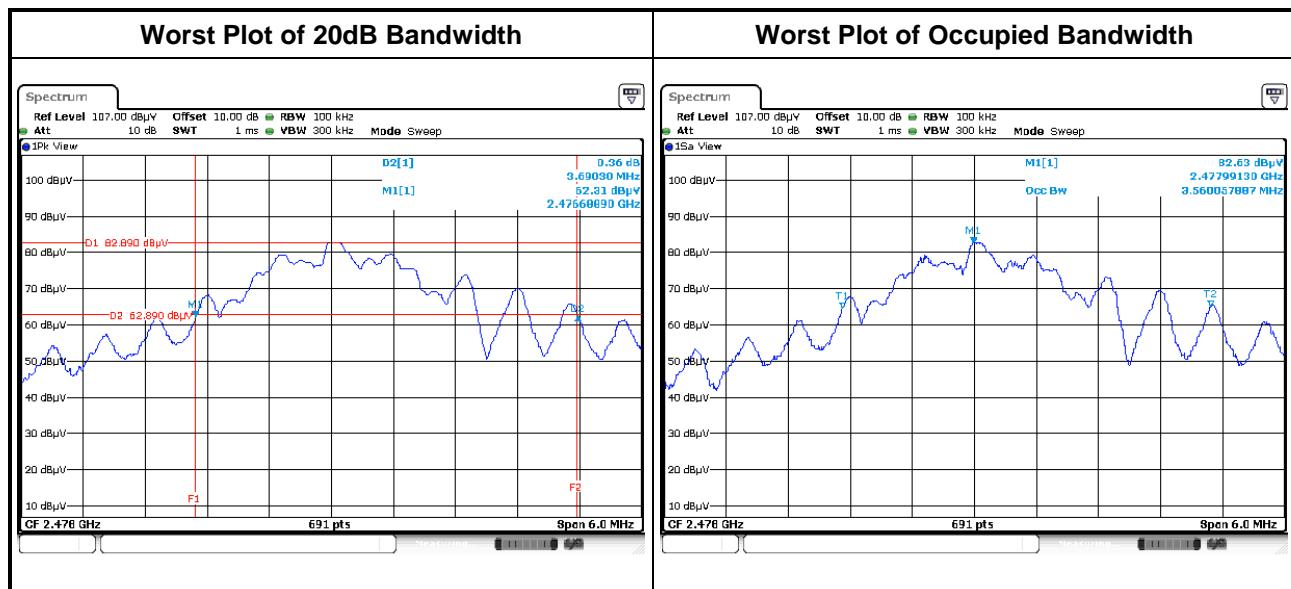
4 Test laboratory information

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

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