

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:

Approved by:

ong Cher





Along Cherly/ Assistant Manager Gary Chang / Manager



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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 c	onsumes DC power from battery, so the test is n	ot 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.	Туре	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).
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Note: The equipment tests are performed using a new battery.

1.1.4 Accessories

N/A

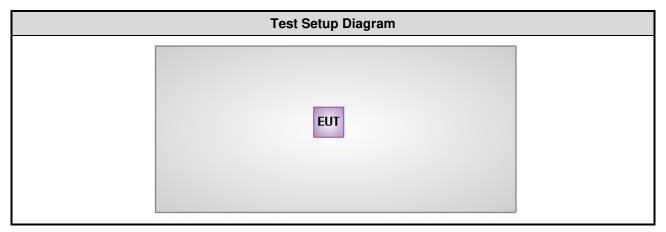


1.1.5 Channel List

	Frequency	band (MHz)			2400~2	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





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-N M-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		

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							



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 \leq 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)	requency Range (MHz) Field Strength (uV/m) Field S		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:

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

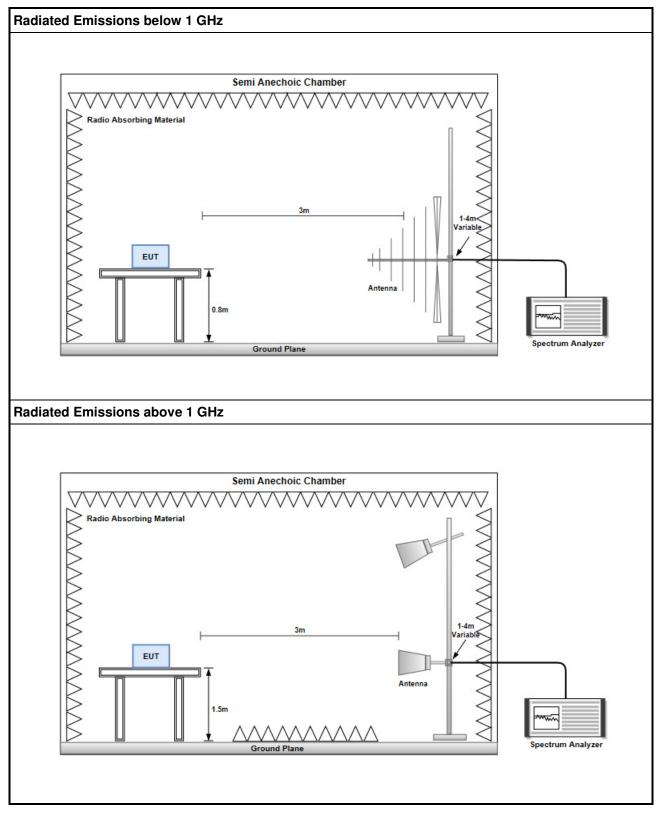
3. $20\log (\text{Duty cycle}) = 20\log \frac{2* 0.41449 \text{ ms}}{100 \text{ ms}} = -41.63 \text{dB}$

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





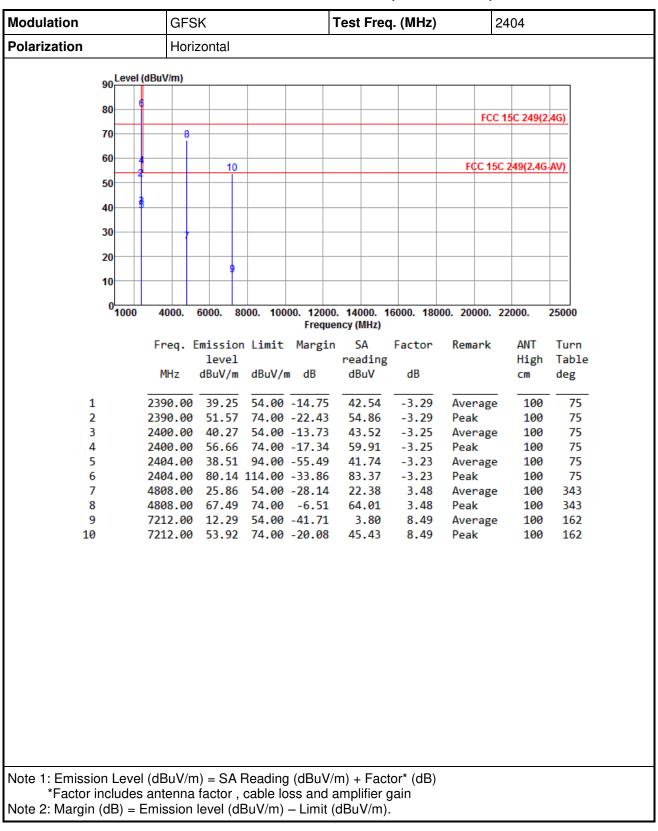
Modulation	GFS	GFSK Test Freq. (MHz) 2441								
Polarization	arization Horizontal									
	0 Level (d	1BuV/m)								
9	0									
8	0									
7	0									
6	0								FCC CLAS	C D
5	0								FUULAS	
4										J
							6			
3	1	2		3	4 5		ĭ			
2	0									
1	0									
	0 <mark>30 10</mark>	0. 20	0. 300	0. 40	00. 50	00. 600). 700.	800.	900.	1000
						ency (MHz)				
		Freq.	Emission level	Limit	Margir	n SA reading	Factor	Remark	ANT High	Turn Table
		MHz	dBuV/m	dBuV/r	n dB	dBuV	dB		cm	deg
1		F2 24	20.91	40.00	10.00	- 20, 00	7.90	Deals		
1 2			19.36			28.80 27.61	-7.89 -8.25	Peak Peak		
3		340.40	22.75	46.00	-23.25	29.26	-6.51	Peak		
4 5			23.83 25.69				-4.69 -3.05	Peak Peak		
6			28.19				-0.42	Peak		
Note 1: Emission										
*Factor inc	ludes	antenna	factor,	cable lo	ss and	amplifier	gain			
Note 2: Margin (c Note 3: All spurio								ha limit		
		5310113 0		vii iz al		nan 20 U				

3.1.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)



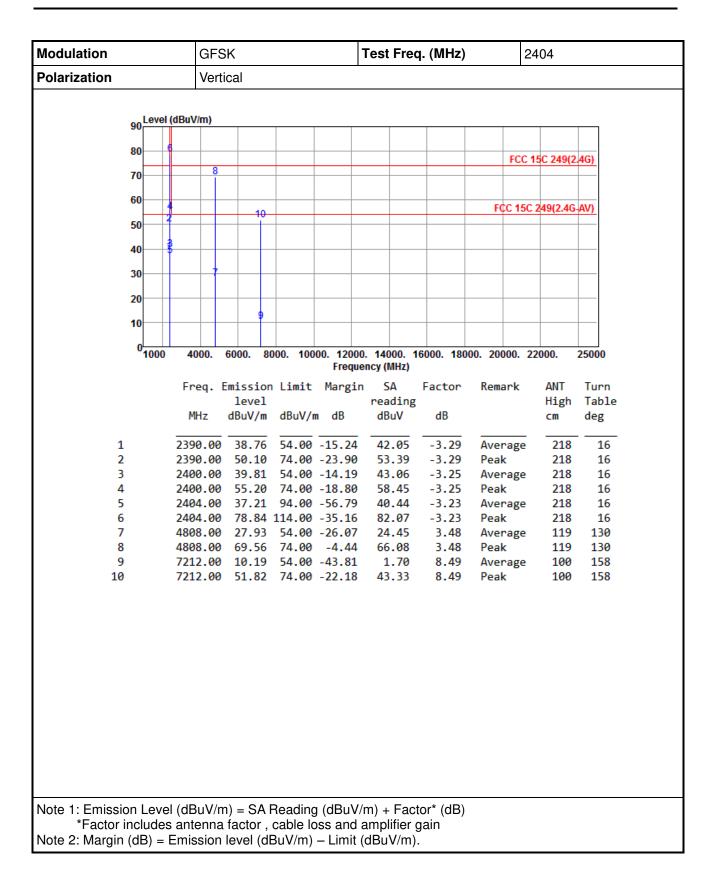
Modulation	GFSK Test Freq. (MHz) 2441										
Polarization			Vert	ical							
	Lev	el (dBuV	//m)								
	90		,								
	80										
	70										
	60									FCC CLAS	SS-B
	50										
	40										
	30	2					5	6			
	20		3		4						
	10										
	⁰ 30	100.	20	0. 30	0. 4	00. 50 Freque	0. 60 ncy (MHz)	0. 700	. 800.	900.	1000
		Fr	eq.	Emissior	n Limit	Margin		Factor	Remark	ANT	Turn
				level		_	reading	g		High	
		M	Hz	dBuV/m	aBuv/	m ab	dBuV	dB		CM	deg
	1 2		6.79 0.74			-13.74 -12.01	34.49 38.77	-8.23	Peak Peak		
	2 3			21.99			30.51	-10.78 -8.52	Peak		
	4			25.02			30.29		Peak		
	5 6					-18.43 -16.12	30.32 30.34		Peak Peak		
Note 1: Emiss	ion I ev	el (dR	luV/r	n) <u>- S</u>	Reading	n (dRuV/i	m) ⊥ Fac	tor* (dR)			
*Factor	r include	es ante	enna	factor,	cable lo	oss and a	amplifier	gain			
Note 2: Margi									the limit		
Note 3: All spi	urious e	erriissi(JUS	below 30	ivinz ar	e more ti	nan 20 0		the limit.		



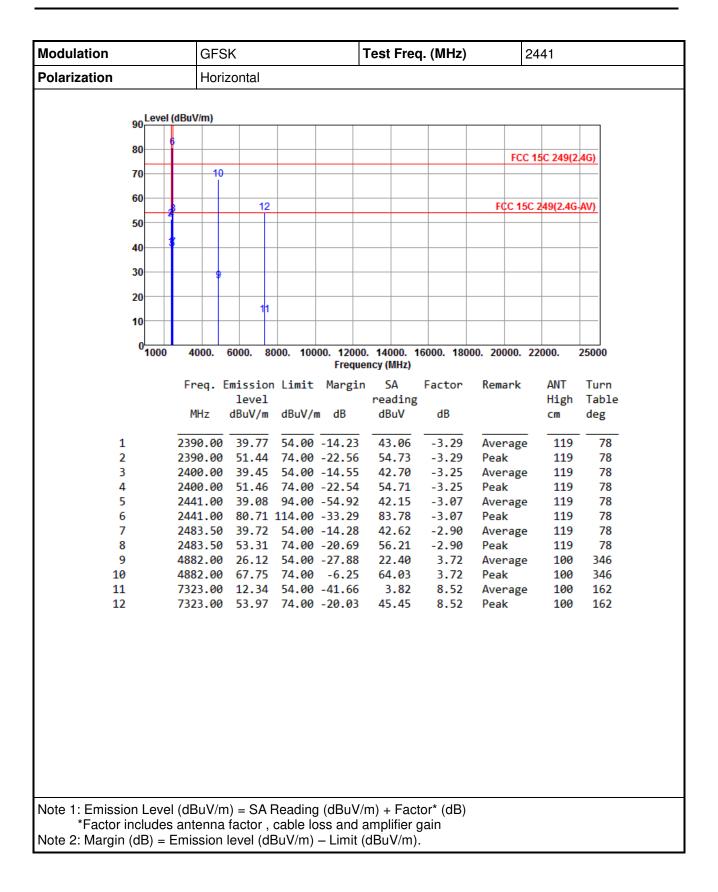


3.1.6 Transmitter Radiated Unwanted Emissions (Above 1GHz)

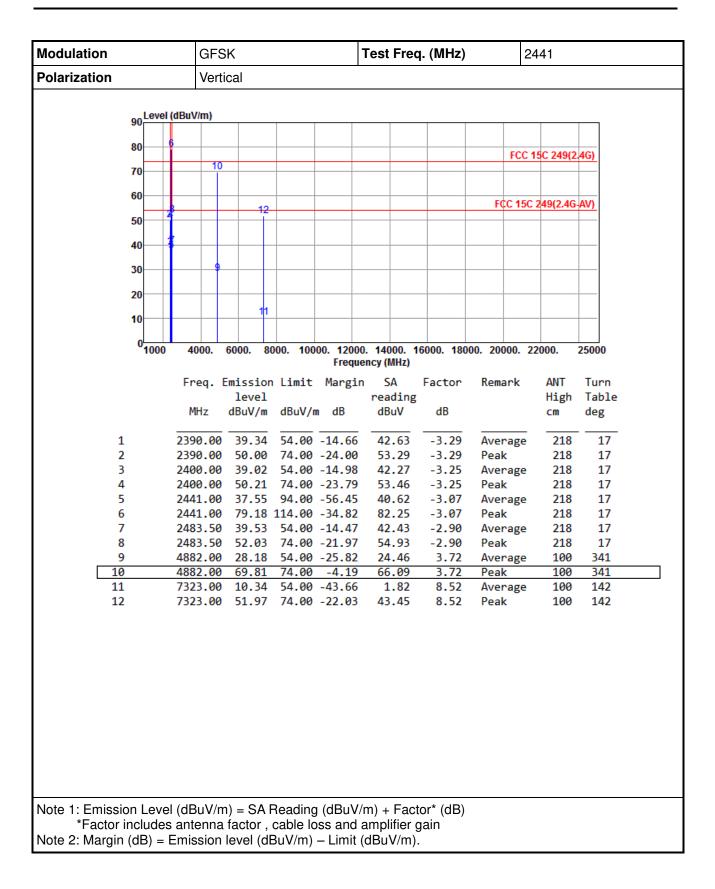




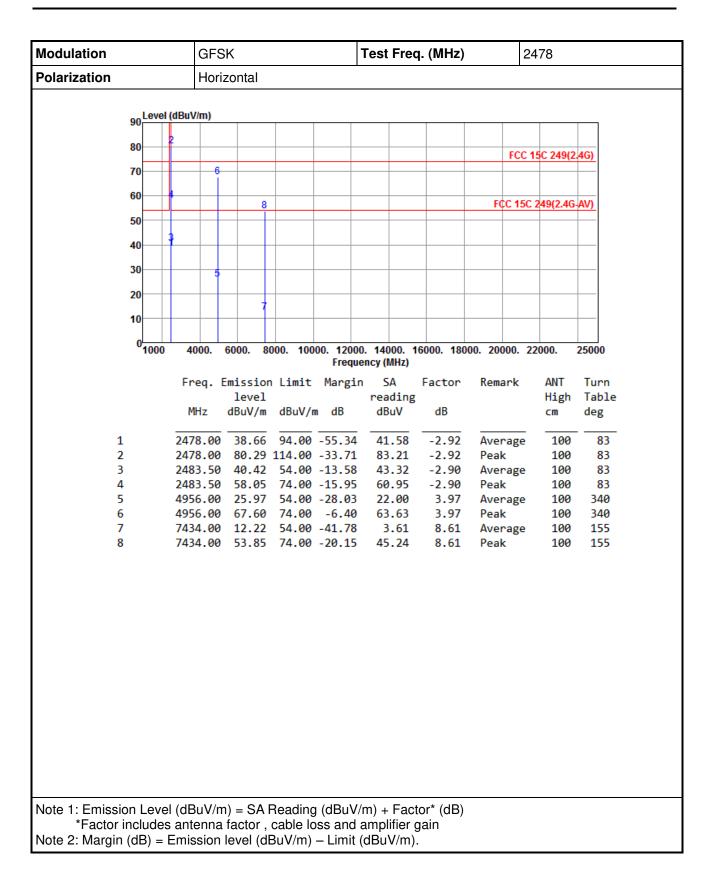




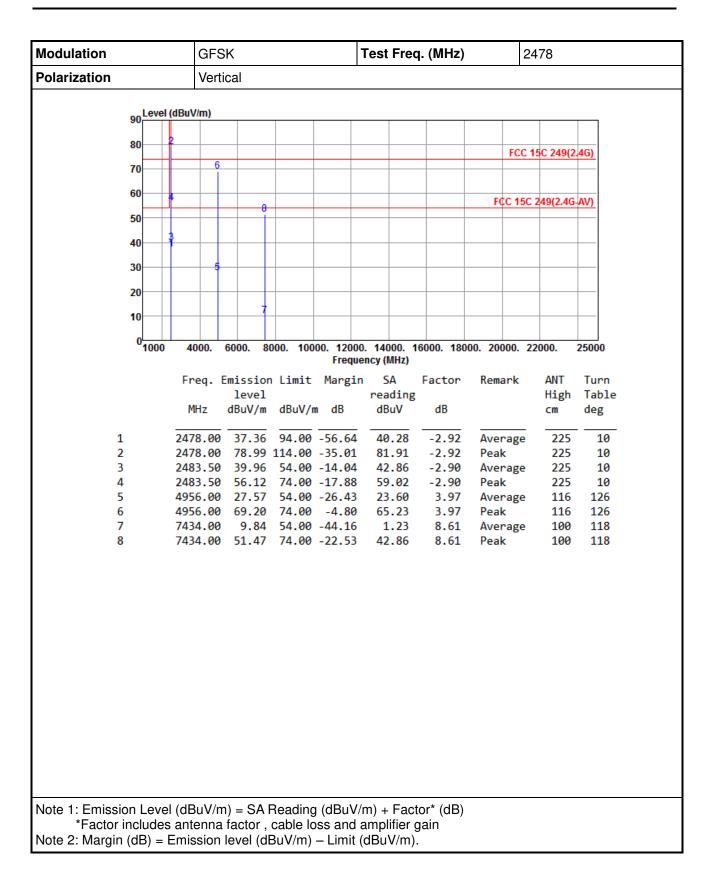




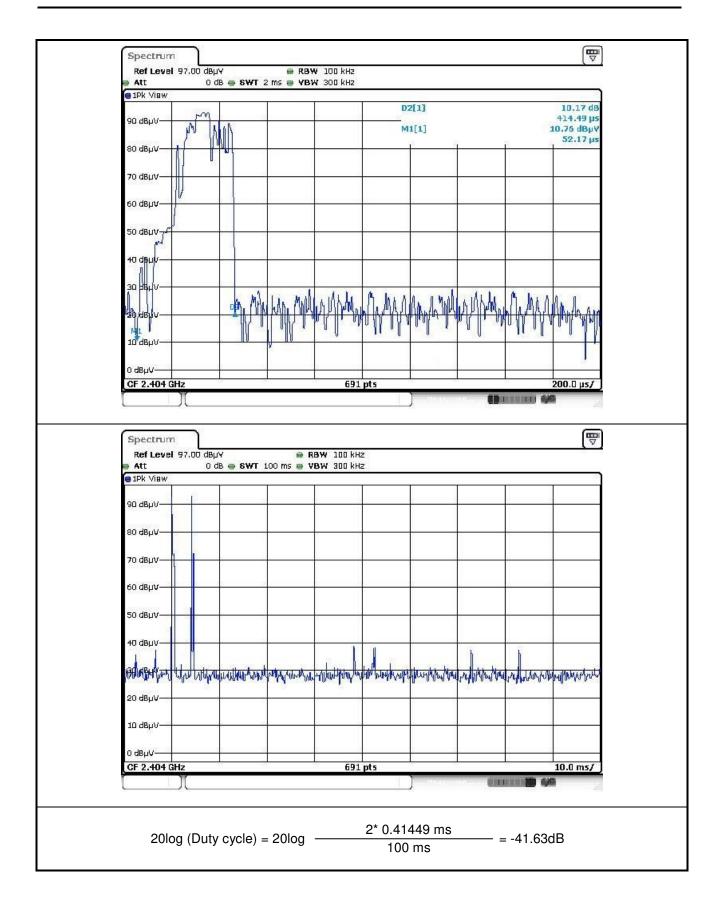












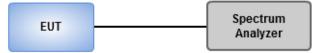


3.2 20dB and Occupied Bandwidth

3.2.1 Test Procedures

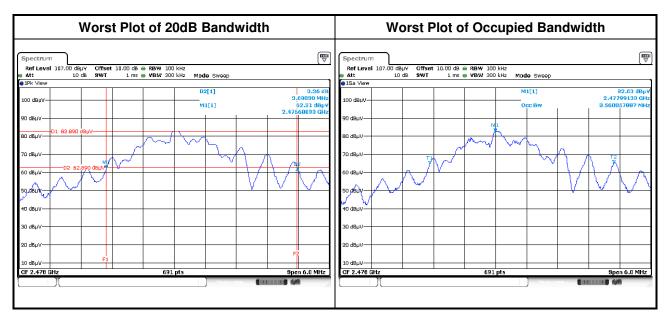
- 1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
- 2. Detector = Peak(20 dB bandwidth) / Sample(Occupied bandwidth), Trace mode = max hold.
- 3. Sweep = auto couple, Allow the trace to stabilize.
- 4. Measure the maximum width of the emission that is constrained by the frequencies 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			





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 <u>http://www.icertifi.com.tw</u>.

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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