

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)
Report No.: RFBDKG-WTW-P22120773A
FCC ID: JNZMR0097
Product: Wireless Mouse
Brand: logitech G ,G
Model No.: MR0097
Received Date: 2023/9/25
Test Date: 2023/9/27 ~ 2023/10/4
Issued Date: 2023/10/23

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory
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Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / 723255 / TW2022
Designation Number:

Approved by: _____



, Date: _____

2023/10/23

Wen Yu / Assistant Manager

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Prepared by : Phoenix Huang / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBDKG-WTW-P22120773A	Original release.	2023/10/23

1 Certificate

Product: Wireless Mouse

Brand: logitech G ,G

Test Model: MR0097

Sample Status: Engineering sample

Applicant: Logitech Far East Ltd.

Test Date: 2023/9/27 ~ 2023/10/4

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)

Measurement ANSI C63.10-2013

procedure: KDB 558074 D01 15.247 Meas Guidance v05r02

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Standard / Clause	Test Item	Result	Remark
15.247(b)	RF Output Power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	NA	Refer to Note 1 below
15.247(a)(2)	6 dB Bandwidth	NA	Refer to Note 1 below
15.247(d)	Conducted Out of Band Emissions	NA	Refer to Note 1 below
15.207	AC Power Conducted Emissions	NA	Refer to Note 1 below
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -15.2 dB at 56.38 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -4.3 dB at 2350.00 MHz
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note:

1. Only RF Output Power and Unwanted Emissions test items were performed for this addendum. The others testing data refer to original test report.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Parameter	Specification	Uncertainty (±)
RF Output Power	-	1.1 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.1 dB
	30 MHz ~ 1 GHz	5.4 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	5.0 dB
	18 GHz ~ 40 GHz	5.3 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description

Product	Wireless Mouse
Brand	logitech G ,G
Test Model	MR0097
Status of EUT	Engineering sample
Power Supply Rating	5 Vdc from USB interface or 3.8 Vdc from battery
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	2 Mbps
Operating Frequency	2.403 GHz ~ 2.479 GHz
Number of Channel	77
Output Power	3.041 mW (4.83 dBm)
Accessory	USB to Type C cable x 1 (Shielded with one core, 1.85 m)

Note:

- This report is prepared for FCC class II change. The difference compared with the Report No.: RFBDKG-WTW-P22120773 as the following:
 - ◆ Change address of applicant
 - ◆ Adjust polling rate up to 4 kHz by update firmware.
- According to above condition, only RF Output Power and Unwanted Emissions test items need to be performed. All data for meeting the requirement is verified.
- The EUT may have a lot of colors for marketing requirement.
- The EUT must be supplied with rechargeable battery as the following table:

Battery 1		
Brand	Model	Specification
Springpower technology(ShenZhen) Co., Ltd.	533-000229 or 521730	Power Rating : 290 mAh, 1.102 Wh, 3.8 V
Battery 2		
Brand	Model	Specification
SYNergy ScienTech Corp.	533-000228 or AHB521630HPJT	Power Rating : 290 mAh, 1.102 Wh, 3.8 V

- The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 Antenna Description of EUT

- The antenna information is listed as below.

Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
3.02	2.4~2.4835	PIFA	None

* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

3.3 Channel List

77 channels are provided to this EUT:

Channel	Freq. (MHz)						
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460		
19	2421	39	2441	59	2461		
20	2422	40	2442	60	2462		

3.4 Test Mode Applicability and Tested Channel Detail

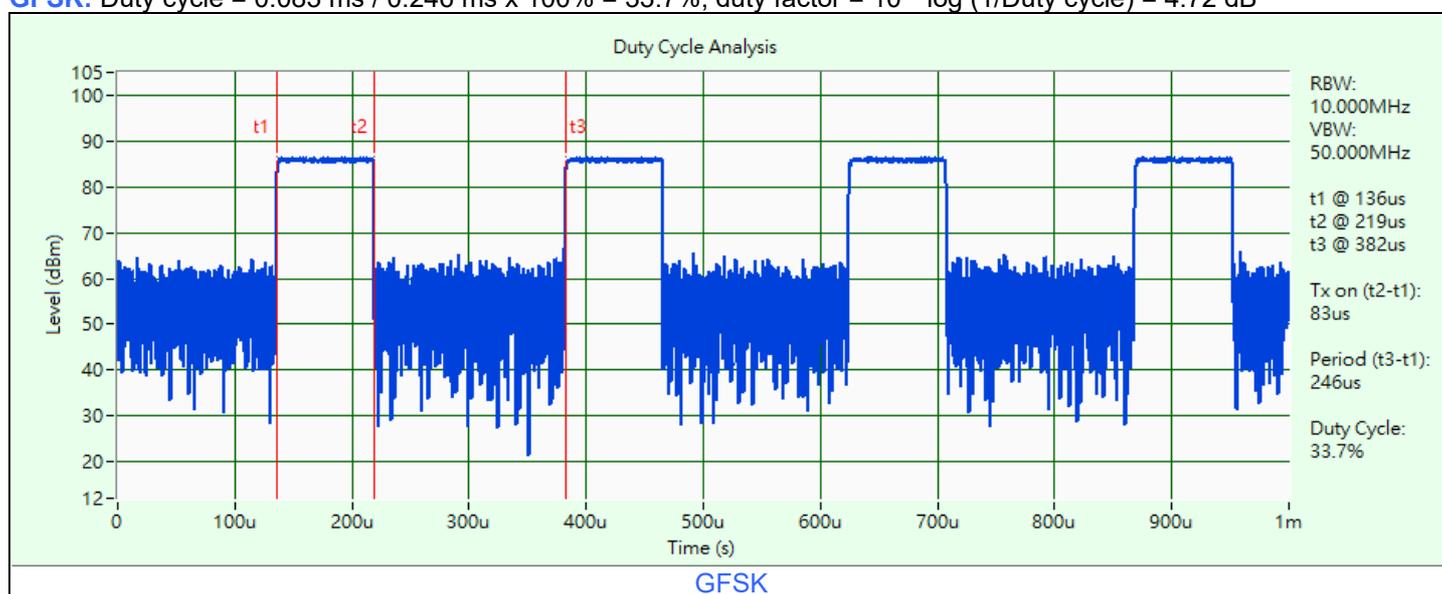
Following channel(s) was (were) selected for the final test as listed below:

Test Item	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	1, 40, 77	GFSK	2Mb/s
Unwanted Emissions below 1 GHz	40	GFSK	2Mb/s
Unwanted Emissions above 1 GHz	1, 40, 77	GFSK	2Mb/s

Note:
 In the original report, for Unwanted Emission the worst mode: Power from USB Adapter (include Battery: 533-000228 or AHB521630HPJT)

3.5 Duty Cycle of Test Signal

GFSK: Duty cycle = $0.083 \text{ ms} / 0.246 \text{ ms} \times 100\% = 33.7\%$, duty factor = $10 * \log (1/\text{Duty cycle}) = 4.72 \text{ dB}$

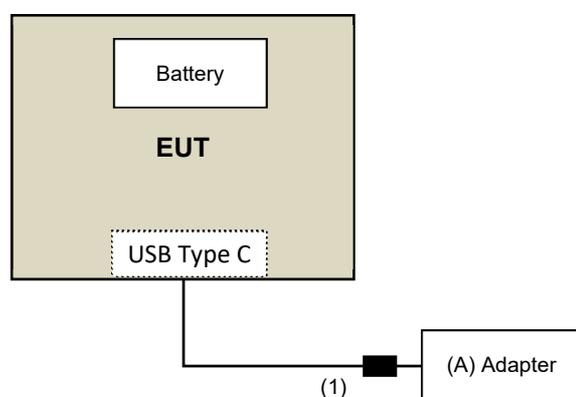


3.6 Test Program Used and Operation Descriptions

Controlling software (RF Sample with Receiver [Number Lock]) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

Test Item	Operation Description
RF Output Power / Unwanted Emissions above 1 GHz	LS2 TX Modulated 2403MHz LS2 TX Modulated 2442MHz LS2 TX Modulated 2479MHz
Unwanted Emissions below 1 GHz	LS2 TX Modulated 2442MHz

3.7 Connection Diagram of EUT and Peripheral Devices



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Aadpter	ASUS	EXA1205UA	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB to Type C cable	1	1.85	Yes	1	Supplied by applicant

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Power Meter Anritsu	ML2495A	1529002	2023/6/17	2024/6/16
Pulse Power Sensor Anritsu	MA2411B	1726434	2023/6/19	2024/6/18

Notes:

1. The test was performed in Oven room 2.
2. Tested Date: 2023/9/27

4.2 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-361	2022/10/21	2023/10/20
Fix tool for Boresight antenna tower BV	FBA-01	FBA_SIP01	N/A	N/A
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	2023/9/7	2024/9/6
Loop Antenna Electro-Metrics	EM-6879	264	2023/2/21	2024/2/20
MXE EMI Receiver Agilent	N9038A	MY50010156	2023/6/13	2024/6/12
Preamplifier EMCI	EMC330N	980852	2023/2/20	2024/2/19
	EMC001340	980142	2023/5/8	2024/5/7
RF Coaxial Cable JYEBAO	5D-FB	LOOPCAB-001	2022/12/19	2023/12/18
		LOOPCAB-002	2022/12/19	2023/12/18
RF Coaxial Cable PEWC	8D	966-3-2	2023/2/17	2024/2/16
		966-3-3	2023/2/17	2024/2/16
		966-4-1	2023/2/18	2024/2/17
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in 966 Chamber No. 3.
2. Tested Date: 2023/9/27

4.3 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	N/A	N/A
Fix tool for Boresight antenna tower BV	FBA-01	FBA_SIP01	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-406	2022/11/13	2023/11/12
	BBHA 9170	9170-739	2022/11/13	2023/11/12
MXE EMI Receiver Agilent	N9038A	MY50010156	2023/6/13	2024/6/12
Preamplifier EMCI	EMC12630SE	980384	2023/8/9	2024/8/8
	EMC184045SE	980387	2023/8/9	2024/8/8
PXA Signal Analyzer Keysight	N9030B	MY57142938	2023/4/6	2024/4/5
RF Coaxial Cable EMCI	EMC-KM-KM-4000	200214	2023/2/20	2024/2/19
	EMC102-KM-KM-1200	160924	2023/8/9	2024/8/8
	EMC104-SM-SM-1500	180504	2023/3/27	2024/3/26
	EMC104-SM-SM-2000	180601	2023/6/2	2024/6/1
	EMC104-SM-SM-6000	210201	2023/5/8	2024/5/7
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in 966 Chamber No. 3.
2. Tested Date: 2023/9/27 ~ 2023/10/4

5 Limits of Test Items

5.1 RF Output Power

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)

5.2 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (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

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

5.3 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
Above 960	500	3

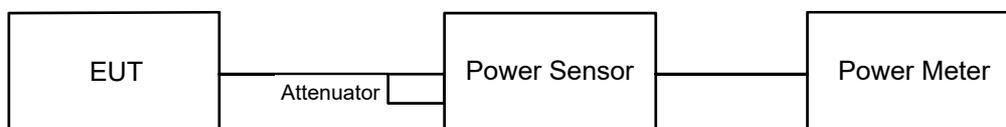
Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup



6.1.2 Test Procedure

Peak Power:

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

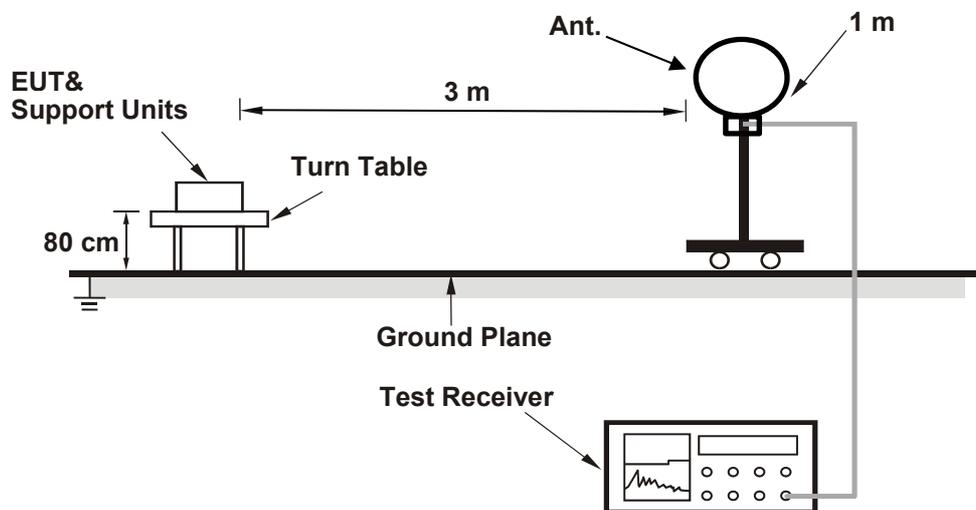
Average Power:

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

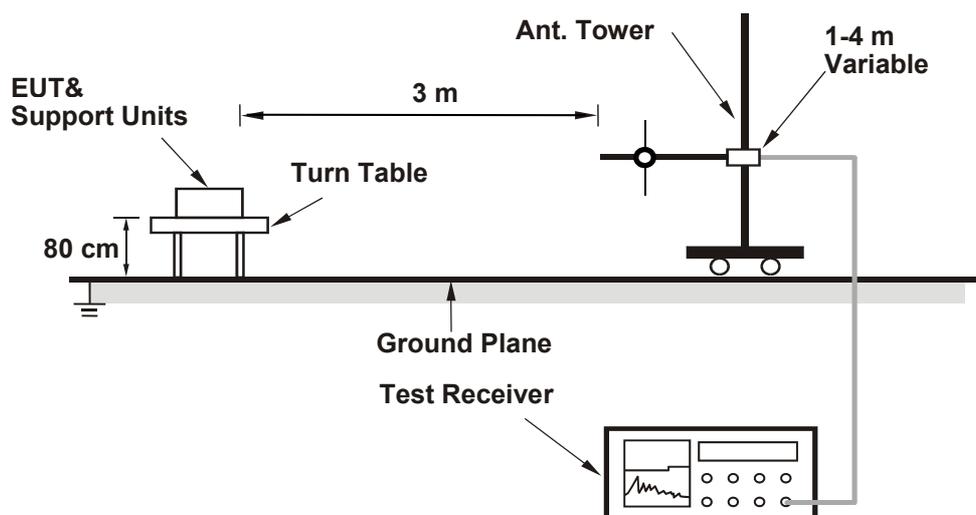
6.2 Unwanted Emissions below 1 GHz

6.2.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.2.2 Test Procedure

For Radiated emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated emission above 30 MHz

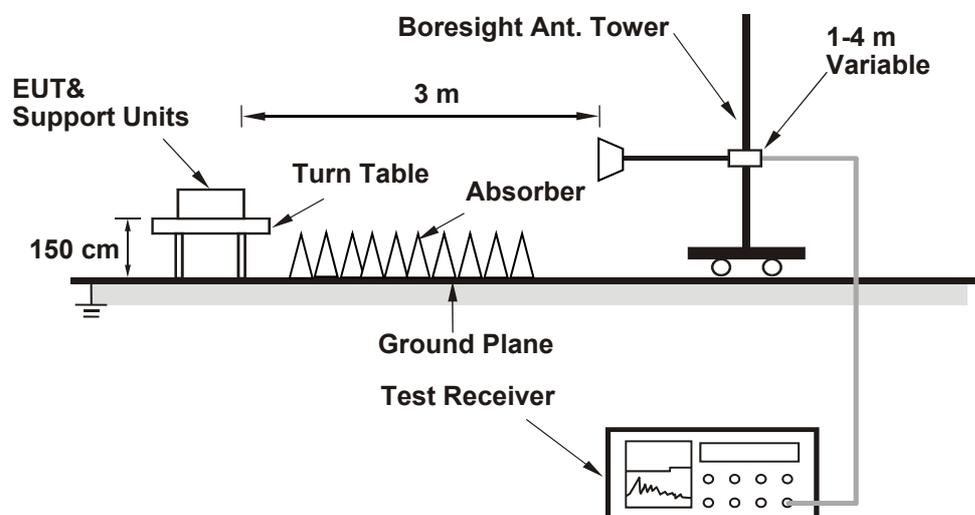
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

6.3 Unwanted Emissions above 1 GHz

6.3.1 Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.3.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Notes:

- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
- For fundamental and harmonic signal measurement, according to KDB 558074 D01 15.247 Meas Guidance v05r02 section 8.1(c)(3). The spectrum analyzer settings meet the requirements of 11.12.2.4 in ANSI C63.10 for making a Peak measurement, the average value = Peak value + duty cycle correction factor. The duty cycle measurement refers to FCC 47 CFR Part 15C section 15.35 (c). For duty cycle correction factor values, see the Test Signal Duty Cycle section in this report.
- All modes of operation were investigated and the worst-case emissions are reported.

7 Test Results of Test Item

7.1 RF Output Power

Input Power:	3.8 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Sampson Chen
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For Peak Power

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
1	2403	2.951	4.70	30	Pass
40	2442	3.041	4.83	30	Pass
77	2479	2.951	4.70	30	Pass

Note: The antenna gain is 3.02 dBi < 6 dBi, so the output power limit shall not be reduced.

For Average Power

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
1	2403	2.891	4.61
40	2442	2.972	4.73
77	2479	2.931	4.67

7.2 Unwanted Emissions below 1 GHz

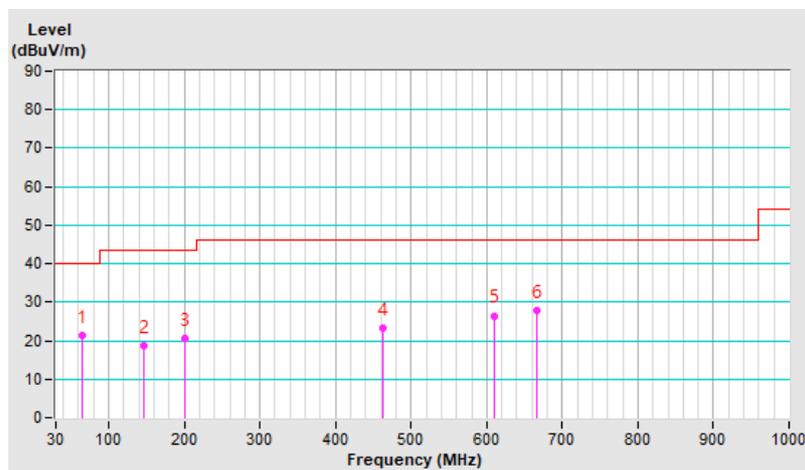
RF Mode	GFSK	Channel	CH 40 : 2442 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	20°C, 75% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	64.07	21.4 QP	40.0	-18.6	1.00 H	360	35.6	-14.2
2	146.42	18.8 QP	43.5	-24.7	1.00 H	360	31.3	-12.5
3	200.50	20.4 QP	43.5	-23.1	2.00 H	301	35.9	-15.5
4	463.08	23.3 QP	46.0	-22.7	3.00 H	149	30.8	-7.5
5	610.04	26.5 QP	46.0	-19.5	3.00 H	195	30.8	-4.3
6	666.73	27.8 QP	46.0	-18.2	1.00 H	1	31.1	-3.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

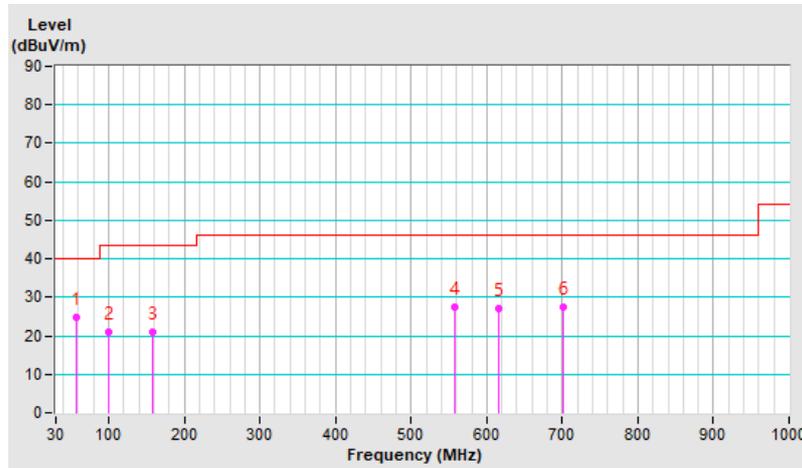


RF Mode	GFSK	Channel	CH 40 : 2442 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	20°C, 75% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	56.38	24.8 QP	40.0	-15.2	2.00 V	360	37.9	-13.1
2	100.25	21.0 QP	43.5	-22.5	3.00 V	30	37.8	-16.8
3	157.51	20.8 QP	43.5	-22.7	1.00 V	12	33.3	-12.5
4	558.43	27.5 QP	46.0	-18.5	3.00 V	240	33.1	-5.6
5	615.73	27.2 QP	46.0	-18.8	2.00 V	49	31.3	-4.1
6	701.68	27.6 QP	46.0	-18.4	2.00 V	137	30.4	-2.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



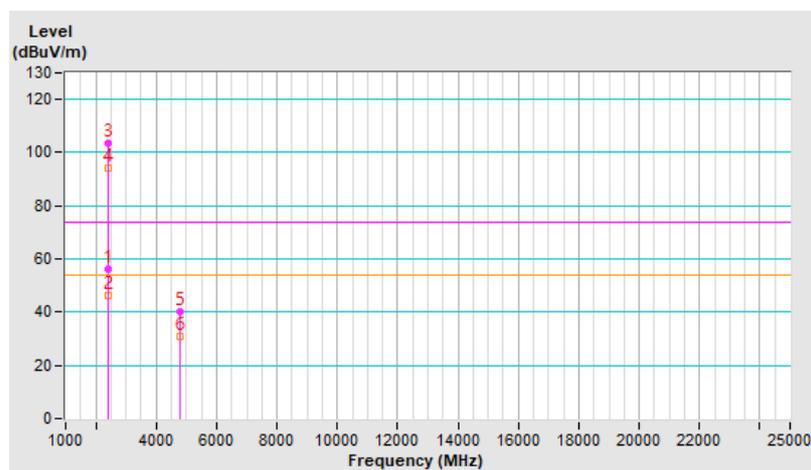
7.3 Unwanted Emissions above 1 GHz

RF Mode	GFSK	Channel	CH 1 : 2403 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	56.1 PK	74.0	-17.9	1.50 H	15	58.3	-2.2
2	2390.00	46.1 AV	54.0	-7.9	1.50 H	15	48.3	-2.2
3	*2403.00	103.4 PK			1.50 H	15	105.6	-2.2
4	*2403.00	94.0 AV			1.50 H	15	96.2	-2.2
5	4806.00	40.1 PK	74.0	-33.9	1.21 H	352	38.0	2.1
6	4806.00	30.7 AV	54.0	-23.3	1.21 H	352	28.6	2.1

Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(0.083 \text{ ms} / 0.246 \text{ ms}) = -9.4 \text{ dB}$

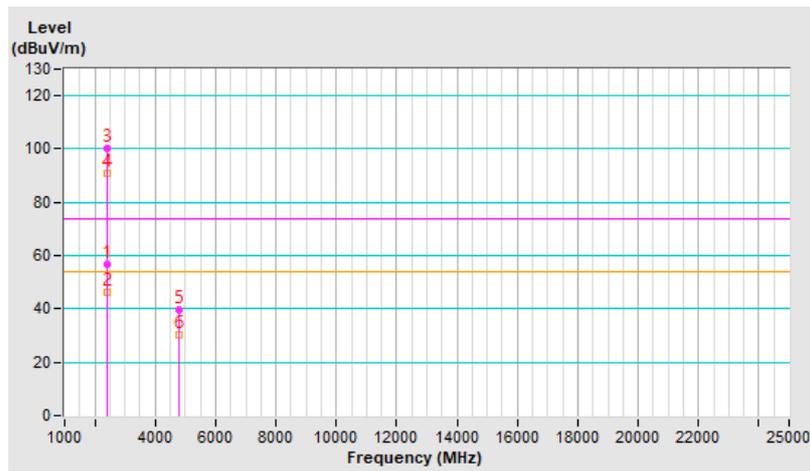


RF Mode	GFSK	Channel	CH 1 : 2403 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	56.9 PK	74.0	-17.1	3.32 V	105	59.1	-2.2
2	2390.00	46.4 AV	54.0	-7.6	3.32 V	105	48.6	-2.2
3	*2403.00	100.1 PK			3.32 V	105	102.3	-2.2
4	*2403.00	90.7 AV			3.32 V	105	92.9	-2.2
5	4806.00	39.8 PK	74.0	-34.2	1.50 V	347	37.7	2.1
6	4806.00	30.4 AV	54.0	-23.6	1.50 V	347	28.3	2.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(0.083 \text{ ms} / 0.246 \text{ ms}) = -9.4 \text{ dB}$

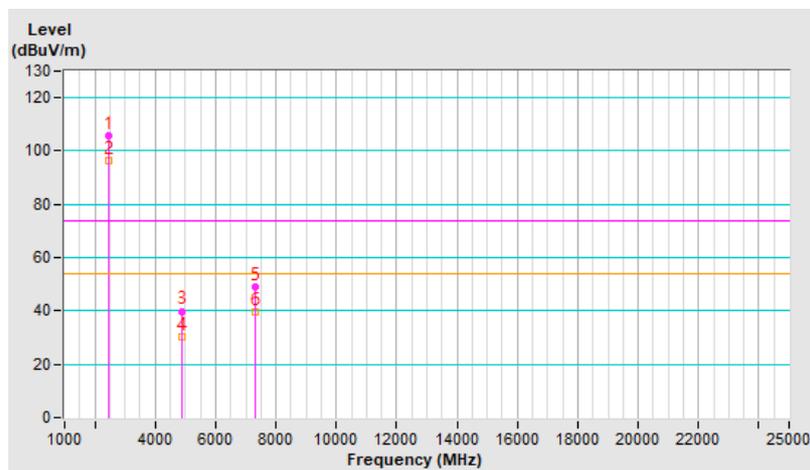


RF Mode	GFSK	Channel	CH 40 : 2442 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2442.00	105.6 PK			1.55 H	9	107.7	-2.1
2	*2442.00	96.2 AV			1.55 H	9	98.3	-2.1
3	4884.00	39.9 PK	74.0	-34.1	1.27 H	345	38.0	1.9
4	4884.00	30.5 AV	54.0	-23.5	1.27 H	345	28.6	1.9
5	7326.00	49.2 PK	74.0	-24.8	1.12 H	346	41.4	7.8
6	7326.00	39.8 AV	54.0	-14.2	1.12 H	346	32.0	7.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(0.083 \text{ ms} / 0.246 \text{ ms}) = -9.4 \text{ dB}$

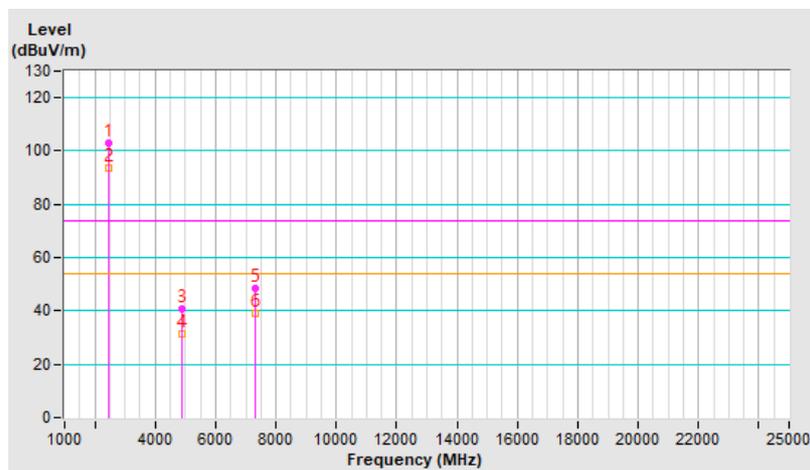


RF Mode	GFSK	Channel	CH 40 : 2442 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2442.00	103.0 PK			3.36 V	90	105.1	-2.1
2	*2442.00	93.6 AV			3.36 V	90	95.7	-2.1
3	4884.00	40.8 PK	74.0	-33.2	1.55 V	355	38.9	1.9
4	4884.00	31.4 AV	54.0	-22.6	1.55 V	355	29.5	1.9
5	7326.00	48.7 PK	74.0	-25.3	1.00 V	190	40.9	7.8
6	7326.00	39.3 AV	54.0	-14.7	1.00 V	190	31.5	7.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(0.083 \text{ ms} / 0.246 \text{ ms}) = -9.4 \text{ dB}$

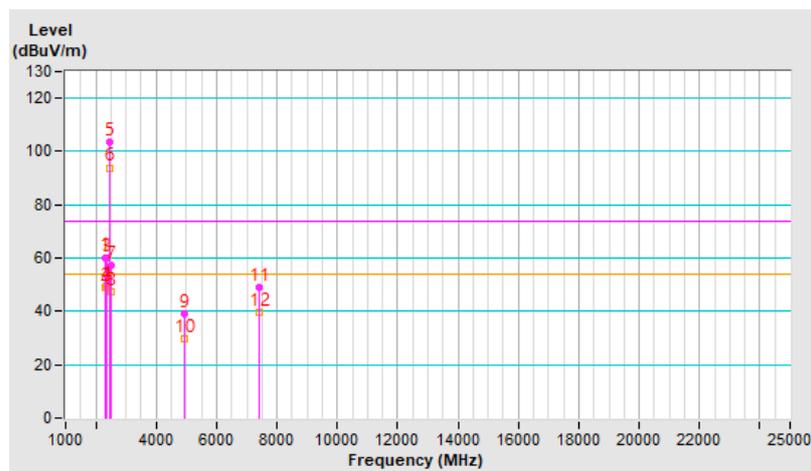


RF Mode	GFSK	Channel	CH 77 : 2479 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2335.00	60.3 PK	74.0	-13.7	1.20 H	24	62.4	-2.1
2	2335.00	49.2 AV	54.0	-4.8	1.20 H	24	51.3	-2.1
3	2350.00	60.1 PK	74.0	-13.9	1.20 H	24	62.1	-2.0
4	2350.00	49.7 AV	54.0	-4.3	1.20 H	24	51.7	-2.0
5	*2479.00	103.3 PK			1.20 H	24	105.5	-2.2
6	*2479.00	93.9 AV			1.20 H	24	96.1	-2.2
7	2483.50	57.3 PK	74.0	-16.7	1.20 H	24	59.5	-2.2
8	2483.50	47.3 AV	54.0	-6.7	1.20 H	24	49.5	-2.2
9	4958.00	39.3 PK	74.0	-34.7	1.21 H	353	37.2	2.1
10	4958.00	29.9 AV	54.0	-24.1	1.21 H	353	27.8	2.1
11	7437.00	49.0 PK	74.0	-25.0	1.13 H	357	40.8	8.2
12	7437.00	39.6 AV	54.0	-14.4	1.13 H	357	31.4	8.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(0.083 \text{ ms} / 0.246 \text{ ms}) = -9.4 \text{ dB}$

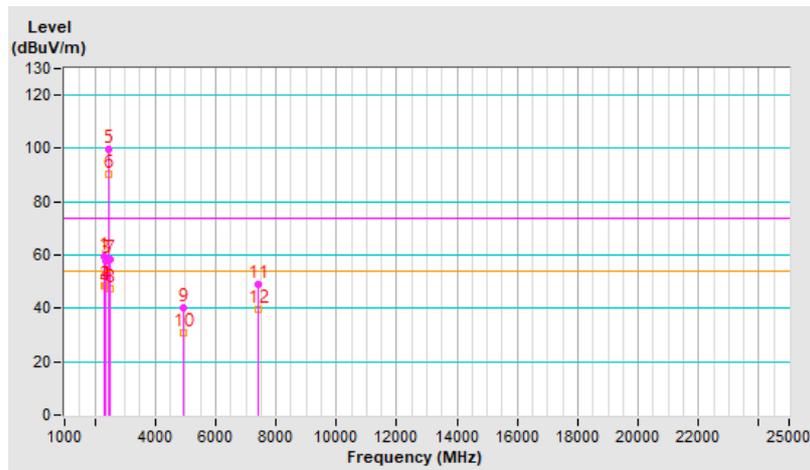


RF Mode	GFSK	Channel	CH 77 : 2479 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25°C, 75% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2335.00	59.3 PK	74.0	-14.7	4.00 V	94	61.4	-2.1
2	2335.00	48.7 AV	54.0	-5.3	4.00 V	94	50.8	-2.1
3	2350.00	58.1 PK	74.0	-15.9	4.00 V	94	60.1	-2.0
4	2350.00	48.2 AV	54.0	-5.8	4.00 V	94	50.2	-2.0
5	*2479.00	99.9 PK			4.00 V	94	102.1	-2.2
6	*2479.00	90.5 AV			4.00 V	94	92.7	-2.2
7	2483.50	58.2 PK	74.0	-15.8	4.00 V	94	60.4	-2.2
8	2483.50	47.1 AV	54.0	-6.9	4.00 V	94	49.3	-2.2
9	4958.00	40.2 PK	74.0	-33.8	1.54 V	358	38.1	2.1
10	4958.00	30.8 AV	54.0	-23.2	1.54 V	358	28.7	2.1
11	7437.00	49.0 PK	74.0	-25.0	1.00 V	181	40.8	8.2
12	7437.00	39.6 AV	54.0	-14.4	1.00 V	181	31.4	8.2

Remarks:

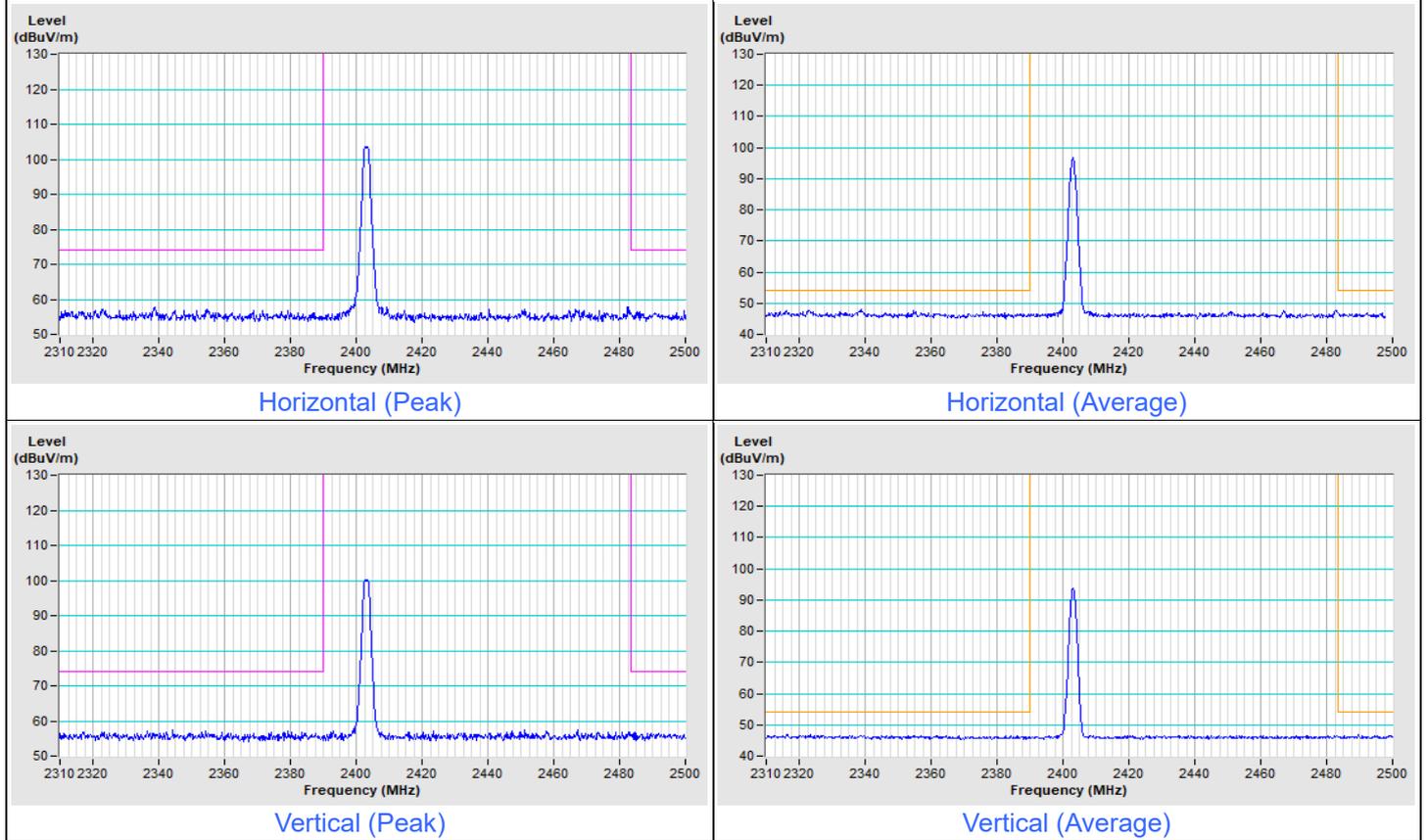
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(0.083 \text{ ms} / 0.246 \text{ ms}) = -9.4 \text{ dB}$



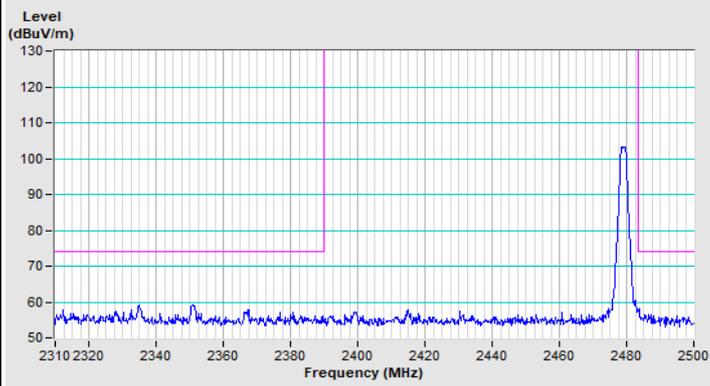
Plot of Band Edge

Frequency Range	2.31 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
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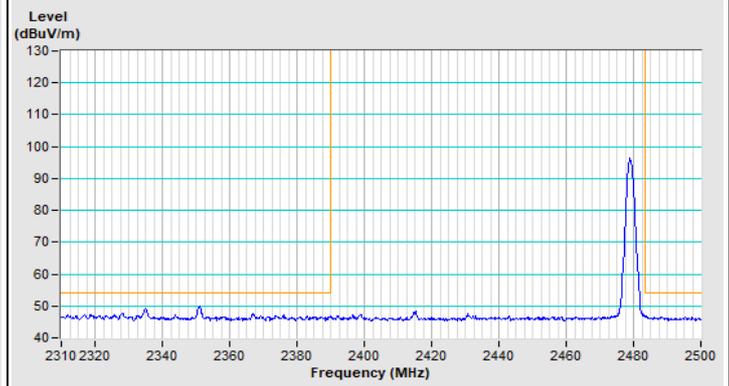
GFSK Channel 1



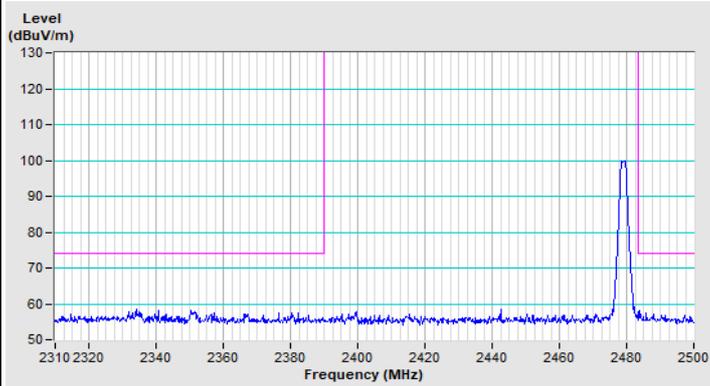
GFSK Channel 77



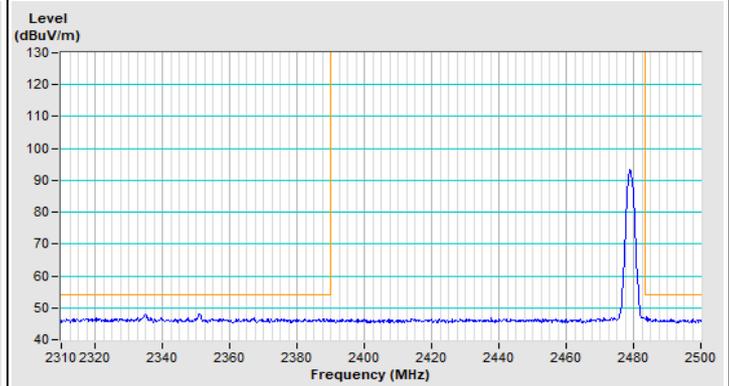
Horizontal (Peak)



Horizontal (Average)



Vertical (Peak)



Vertical (Average)

8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Email: service.adt@bureauveritas.com

Web Site: <http://ee.bureauveritas.com.tw>

The address and road map of all our labs can be found in our web site also.

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