

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.249)
Report No.: RFBDBG-WTW-P22030645B
FCC ID: JNZYR0055
Product: 2.4GHz Cordless Keyboard
Brand: Logitech, logi, logitech
Model No.: Y-R0055
Received Date: 2024/12/4
Test Date: 2024/12/12 ~ 2025/1/6
Issued Date: 2025/1/14
Applicant: LOGITECH FAR EAST LTD
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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: _____



Wen Yu / Assistant Manager

, Date: _____

2025/1/14

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Prepared by : Claire Kuan / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBDKG-WTW-P22030645B	Original release.	2025/1/14

1 Certificate

Product: 2.4GHz Cordless Keyboard

Brand: Logitech, logi, logitech

Test Model: Y-R0055

Sample Status: Engineering sample

Applicant: LOGITECH FAR EAST LTD

Test Date: 2024/12/12 ~ 2025/1/6

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.249)

Measurement procedure: ANSI C63.10-2013

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 15.249)			
Standard / Clause	Test Item	Result	Remark
15.207	AC Power Conducted Emissions	N/A	Refer to Note 1 below
15.209 / 15.249(d)	Radiated Emissions below 1 GHz	Pass	Minimum passing margin is -15.7 dB at 57.65 MHz
15.209 / 15.249(a) / 15.249(d) / 15.249(e)	Radiated Emissions above 1 GHz	Pass	Minimum passing margin is -7.5 dB at 2400.00 MHz
15.215 (c)	20 dB Bandwidth	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note:

1. Only Radiated Emissions and 20 dB Bandwidth 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 (±)
Radiated Emissions below 1 GHz	9 kHz ~ 30 MHz	3.1 dB
	30 MHz ~ 1 GHz	5.5 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	5.1 dB
	18 GHz ~ 40 GHz	5.3 dB
20 dB Bandwidth	-	1050.00 Hz

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	2.4GHz Cordless Keyboard
Brand	Logitech, logi, logitech
Test Model	Y-R0055
Status of EUT	Engineering sample
Power Supply Rating	3 Vdc from batteries
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	2 Mbps
Operating Frequency	2.405 GHz ~ 2.474 GHz
Number of Channel	12
Field Strength Of Fundamental	58.1 dBuV/m (Average) at 3 meters

Note:

- This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RFBDKG-WTW-P22030645A as the following:
 - ◆ Add 2nd source antenna. (The antenna type, gain as same as the original.)
 - ◆ Change the antenna match component for C15 and C19 and remove C6.
 - ◆ Add 3rd source touch IC
 - ◆ Add 2nd source balun

Manufacturer	Model
Murata	LFB182G45BG4D729

- According to above conditions, only Radiated Emissions and 20 dB Bandwidth 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 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

1. The antenna information is listed as below.

Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
3.43	2.4~2.4835	PIFA	None

* Due to radiated measurements are made and the antenna gain is already accounted for this device, so provide an antenna datasheet and/or antenna measurement report is not required. The antenna dimensions and pictures (include antenna wire length if have) are stated in EUT photo exhibit.

3.3 Channel List

12 channels are provided to this EUT:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	7	2441
2	2408	8	2444
3	2414	9	2462
4	2417	10	2465
5	2432	11	2471
6	2435	12	2474

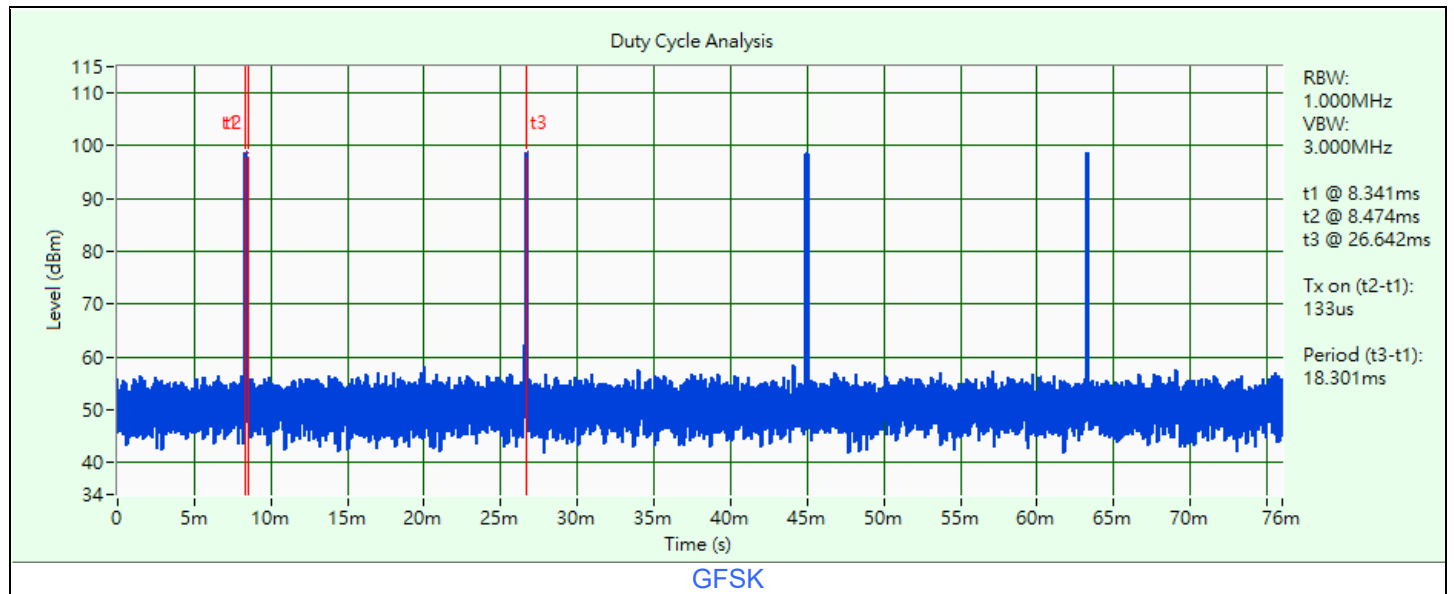
3.4 Test Mode Applicability and Tested Channel Detail

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

Test Item	Tested Channel	Modulation	Data Rate Parameter
Radiated Emissions above 1 GHz	1, 8, 12	GFSK	2Mb/s
Radiated Emissions below 1 GHz	1	GFSK	2Mb/s
20 dB Bandwidth	1, 8, 12	GFSK	2Mb/s

3.5 Duty Cycle of Test Signal

GFSK: Duty cycle = $0.133 \text{ ms} / 18.301 \text{ ms} \times 100\% = 0.7\%$

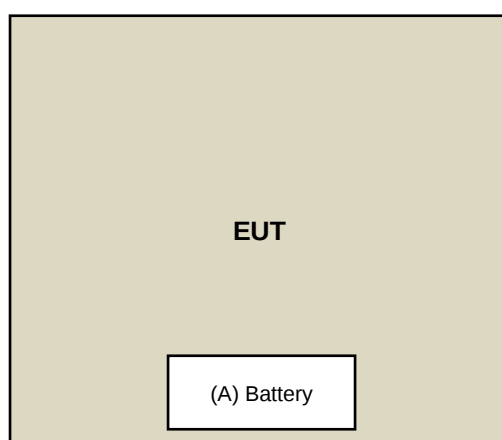


3.6 Test Program Used and Operation Descriptions

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
20 dB Bandwidth / Radiated Emissions above 1 GHz	UFY TX Modulated low duty cycle 2405MHz UFY TX Modulated low duty cycle 2444MHz UFY TX Modulated low duty cycle 2474MHz
Radiated Emissions below 1 GHz	UFY TX Modulated low duty cycle 2405MHz

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	Battery*2	Duracell	AAA	N/A	N/A	Provided by Lab

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 Radiated Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-406	2024/10/8	2025/10/7
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	N/A	N/A
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-03	2024/2/17	2025/2/16
Loop Antenna TESEQ	HLA 6121	63620	2024/10/17	2025/10/16
MXE EMI Receiver Agilent	N9038A	MY51210202	2024/7/29	2025/7/28
Preamplifier EMCI	EMC330N	980701	2024/2/17	2025/2/16
	EMC001340	980142	2024/2/19	2025/2/18
RF Coaxial Cable JYEBAO	5D-FB	LOOPCAB-001	2024/2/19	2025/2/18
		LOOPCAB-002	2024/2/19	2025/2/18
RF Coaxial Cable mTJ	100100-CFD400LW-200	CFD400-200	2024/2/17	2025/2/16
	100100-CFD400LW-400	CFD400-400	2024/2/17	2025/2/16
	100100-CFD400LW-800	CFD400-800	2024/2/17	2025/2/16
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in 966 Chamber No. 4.
2. Tested Date: 2024/12/17

4.2 Radiated Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-783	2024/11/10	2025/11/9
	BBHA 9170	9170-739	2024/11/10	2025/11/9
MXA Signal Analyzer Keysight	N9020B	MY60112410	2024/3/13	2025/3/12
Preamplifier EMCI	EMC12630SE	980688	2024/8/8	2025/8/7
	EMC184045SE	980387	2024/8/8	2025/8/7
RF Coaxial Cable EMCI	EMC102-KM-KM-1200	160924	2024/1/29	2025/1/28
	EMC102-KM-KM-4000	200214	2024/1/29	2025/1/28
	EMC104-SM-SM-1200	160922	2024/1/29	2025/1/28
	EMC104-SM-SM-2000	180502	2024/1/29	2025/1/28
	EMC104-SM-SM-6000	210704	2024/10/30	2025/10/29
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in 966 Chamber No. 4.
2. Tested Date: 2024/12/12 ~ 2025/1/6

4.3 20 dB Bandwidth

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030A	MY55410176	2024/6/12	2025/6/11
Software	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room 2.
2. Tested Date: 2024/12/13

5 Limits of Test Items

5.1 Radiated Emissions below 1 GHz

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

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).

5.2 Radiated Emissions above 1 GHz

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.

5.3 20 dB Bandwidth

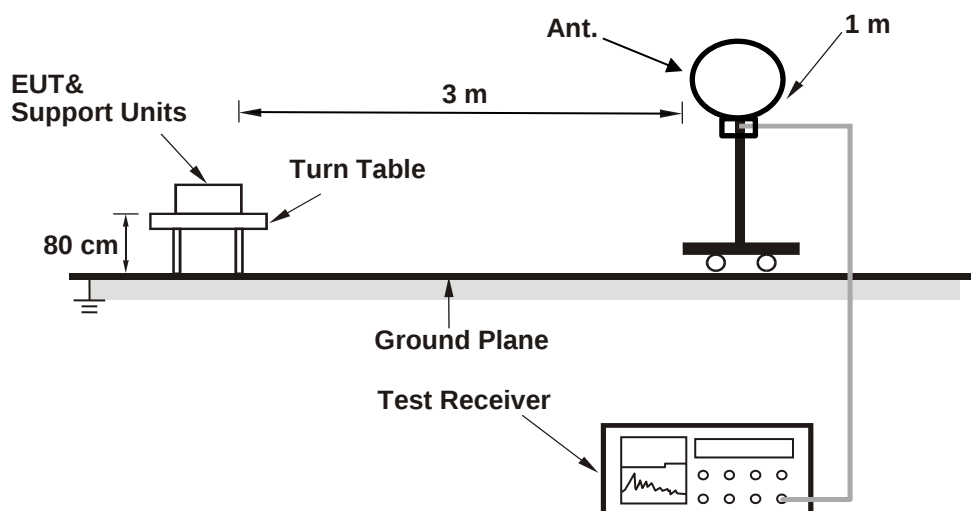
The 20dB bandwidth shall be specified in operating frequency band.

6 Test Arrangements

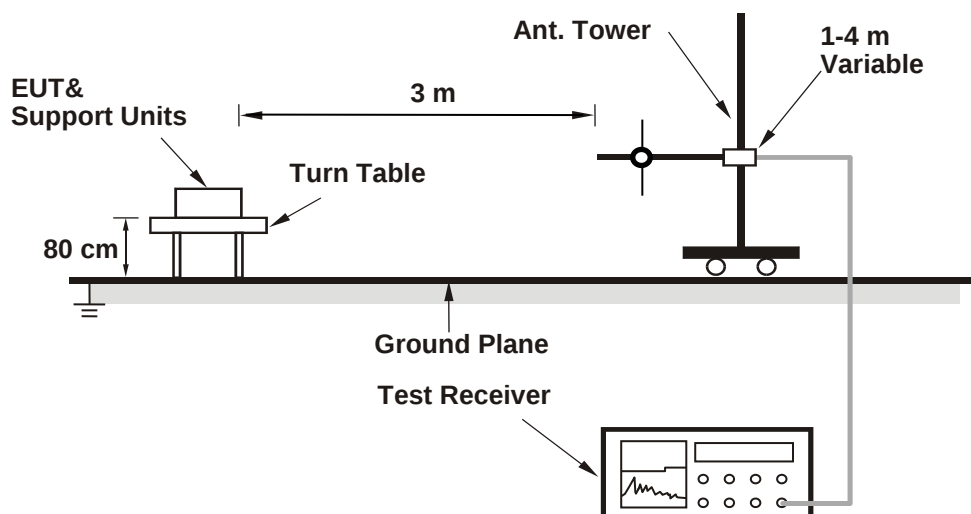
6.1 Radiated Emissions below 1 GHz

6.1.1 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).

6.1.2 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

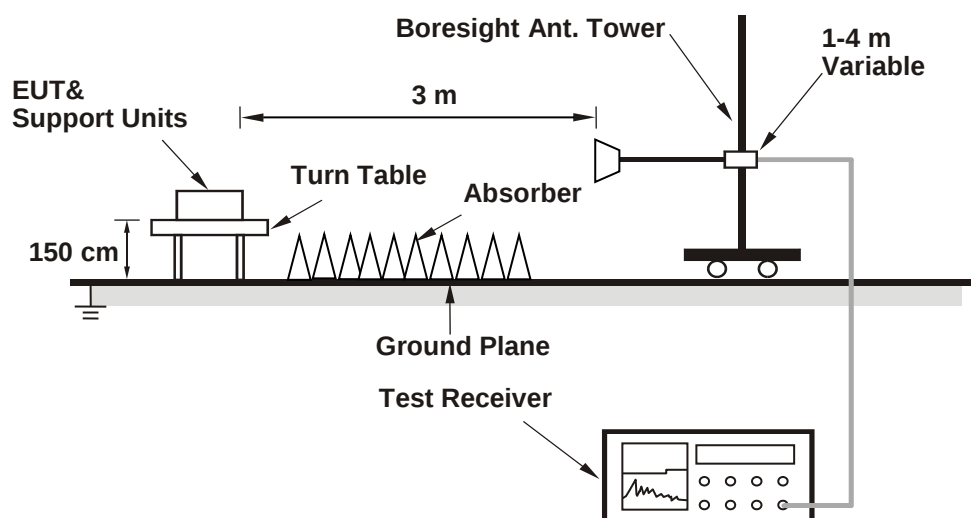
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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.

6.2 Radiated Emissions above 1 GHz

6.2.1 Test Setup



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

6.2.2 Test Procedure

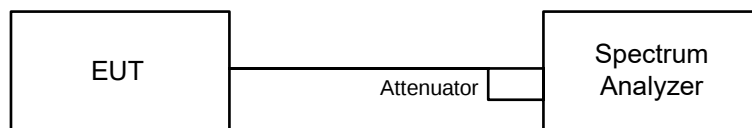
- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top 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.
- According to ANSI C63.10 section 6.6.4 and 4.1.4.2.2. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. 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.

6.3 20 dB Bandwidth

6.3.1 Test Setup



6.3.2 Test Procedure

- Set resolution bandwidth (RBW) = 1% to 5% of the OBW.
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

7 Test Results of Test Item

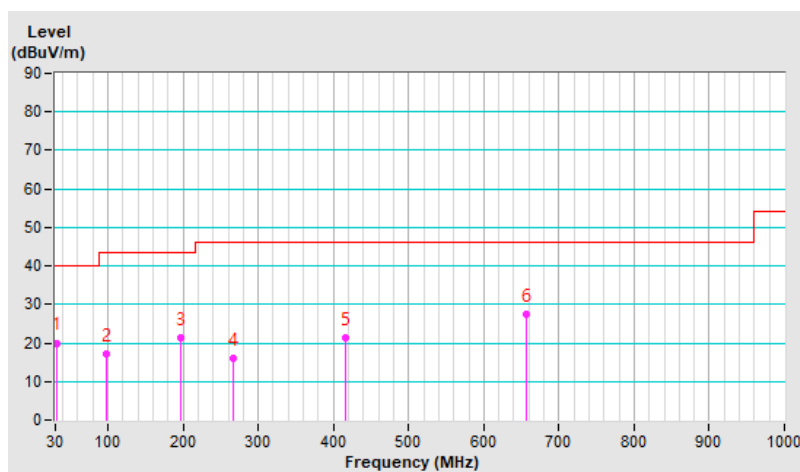
7.1 Radiated Emissions below 1 GHz

RF Mode	GFSK	Channel	CH 1 : 2405 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	3 Vdc	Environmental Conditions	21 °C, 67 % RH
Tested By	Tank Wu		

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	31.80	20.0 QP	40.0	-20.0	1.50 H	66	33.8	-13.8
2	98.32	17.2 QP	43.5	-26.3	2.50 H	199	34.7	-17.5
3	197.69	21.3 QP	43.5	-22.2	2.00 H	184	37.5	-16.2
4	266.03	16.1 QP	46.0	-29.9	1.00 H	236	29.6	-13.5
5	416.78	21.3 QP	46.0	-24.7	2.50 H	51	30.5	-9.2
6	655.82	27.5 QP	46.0	-18.5	3.00 H	254	31.5	-4.0

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.

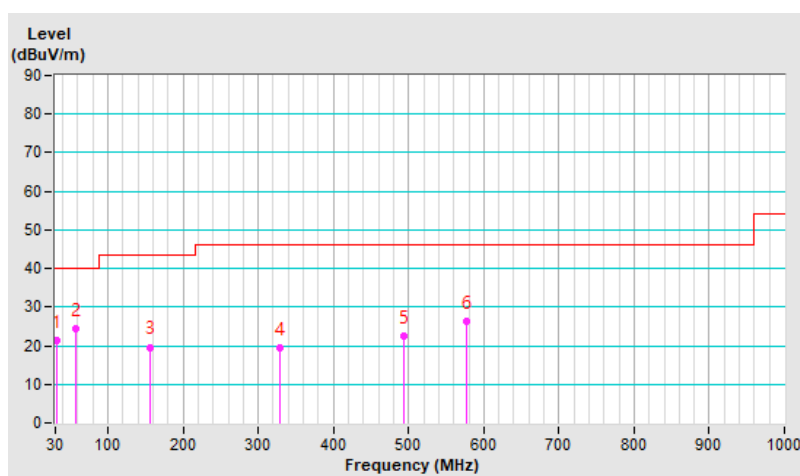


RF Mode	GFSK	Channel	CH 1 : 2405 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak
Input Power	3 Vdc	Environmental Conditions	21 °C, 67 % RH
Tested By	Tank Wu		

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	31.75	21.5 QP	40.0	-18.5	1.50 V	255	35.3	-13.8
2	57.65	24.3 QP	40.0	-15.7	1.50 V	66	37.9	-13.6
3	156.35	19.6 QP	43.5	-23.9	1.50 V	67	32.5	-12.9
4	329.12	19.5 QP	46.0	-26.5	2.00 V	106	31.0	-11.5
5	492.77	22.5 QP	46.0	-23.5	1.50 V	311	30.0	-7.5
6	577.49	26.3 QP	46.0	-19.7	2.50 V	200	31.9	-5.6

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.



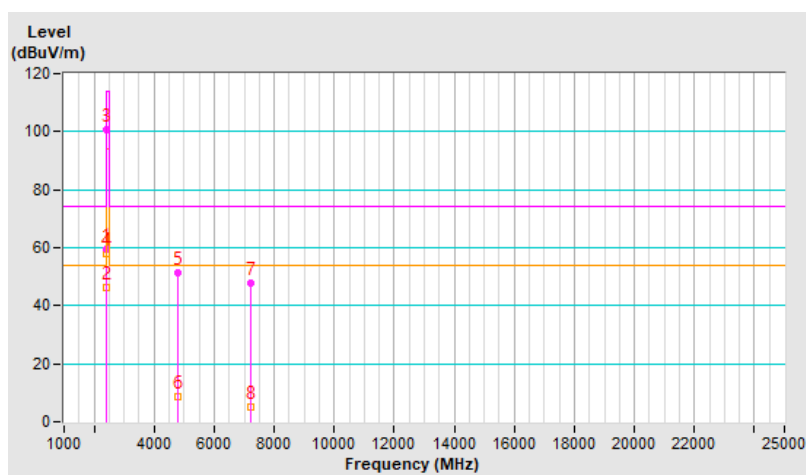
7.2 Radiated Emissions above 1 GHz

RF Mode	GFSK	Channel	CH 1 : 2405 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	3 Vdc	Environmental Conditions	25 °C, 65 % RH
Tested By	Tank Wu		

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	2400.00	59.7 PK	74.0	-14.3	1.47 H	41	59.9	-0.2
2	2400.00	46.5 AV	54.0	-7.5	1.47 H	41	46.7	-0.2
3	*2405.00	100.9 PK	114.0	-13.1	1.47 H	41	101.1	-0.2
4	*2405.00	58.1 AV	94.0	-35.9	1.47 H	41	58.3	-0.2
5	4810.00	51.5 PK	74.0	-22.5	1.24 H	45	47.1	4.4
6	4810.00	8.7 AV	54.0	-45.3	1.24 H	45	4.3	4.4
7	7215.00	47.9 PK	74.0	-26.1	2.07 H	16	36.4	11.5
8	7215.00	5.1 AV	54.0	-48.9	2.07 H	16	-6.4	11.5

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 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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.133 \text{ ms} / 18.301 \text{ ms}) = -42.8 \text{ dB}$



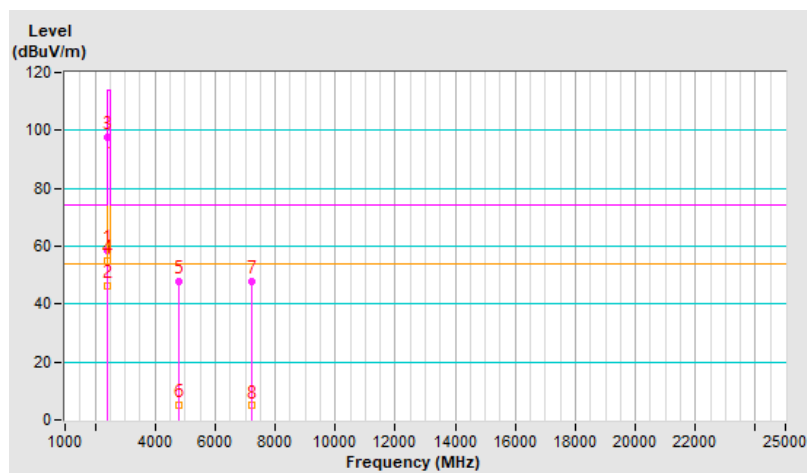
RF Mode	GFSK	Channel	CH 1 : 2405 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	3 Vdc	Environmental Conditions	25 °C, 65 % RH
Tested By	Tank Wu		

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	2400.00	58.7 PK	74.0	-15.3	2.04 V	83	58.9	-0.2
2	2400.00	46.2 AV	54.0	-7.8	2.04 V	83	46.4	-0.2
3	*2405.00	97.8 PK	114.0	-16.2	2.04 V	83	98.0	-0.2
4	*2405.00	55.0 AV	94.0	-39.0	2.04 V	83	55.2	-0.2
5	4810.00	47.9 PK	74.0	-26.1	1.90 V	93	43.5	4.4
6	4810.00	5.1 AV	54.0	-48.9	1.90 V	93	0.7	4.4
7	7215.00	47.7 PK	74.0	-26.3	1.26 V	152	36.2	11.5
8	7215.00	4.9 AV	54.0	-49.1	1.26 V	152	-6.6	11.5

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.
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:

$$20 \log(\text{Duty cycle}) = 20 \log(0.133 \text{ ms} / 18.301 \text{ ms}) = -42.8 \text{ dB}$$

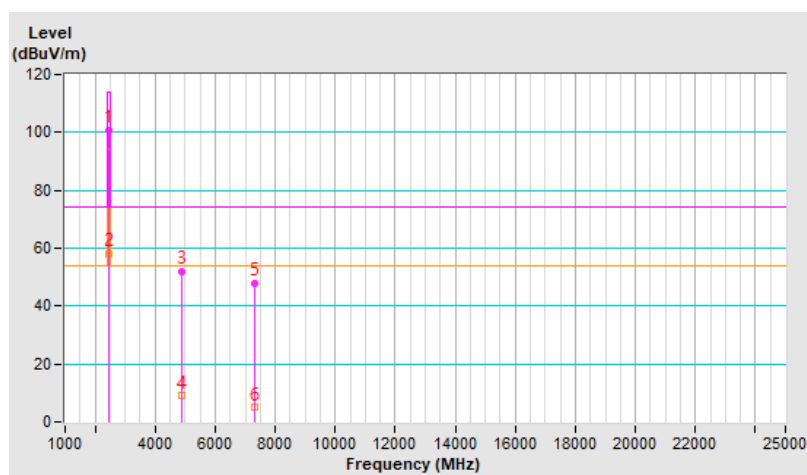


RF Mode	GFSK	Channel	CH 8 : 2444 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	3 Vdc	Environmental Conditions	25 °C, 65 % RH
Tested By	Tank Wu		

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	*2444.00	100.7 PK	114.0	-13.3	1.49 H	42	101.0	-0.3
2	*2444.00	57.9 AV	94.0	-36.1	1.49 H	42	58.2	-0.3
3	4888.00	51.7 PK	74.0	-22.3	1.23 H	60	47.1	4.6
4	4888.00	8.9 AV	54.0	-45.1	1.23 H	60	4.3	4.6
5	7332.00	47.7 PK	74.0	-26.3	2.09 H	22	36.3	11.4
6	7332.00	4.9 AV	54.0	-49.1	2.09 H	22	-6.5	11.4

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.
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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.133 \text{ ms} / 18.301 \text{ ms}) = -42.8 \text{ dB}$

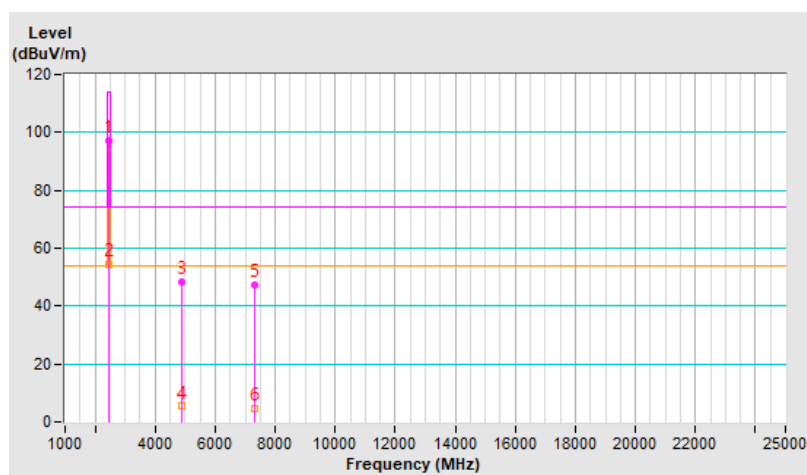


RF Mode	GFSK	Channel	CH 8 : 2444 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	3 Vdc	Environmental Conditions	25 °C, 65 % RH
Tested By	Tank Wu		

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	*2444.00	97.3 PK	114.0	-16.7	1.99 V	85	97.6	-0.3
2	*2444.00	54.5 AV	94.0	-39.5	1.99 V	85	54.8	-0.3
3	4888.00	48.2 PK	74.0	-25.8	1.88 V	90	43.6	4.6
4	4888.00	5.4 AV	54.0	-48.6	1.88 V	90	0.8	4.6
5	7332.00	47.4 PK	74.0	-26.6	1.22 V	163	36.0	11.4
6	7332.00	4.6 AV	54.0	-49.4	1.22 V	163	-6.8	11.4

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.
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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.133 \text{ ms} / 18.301 \text{ ms}) = -42.8 \text{ dB}$

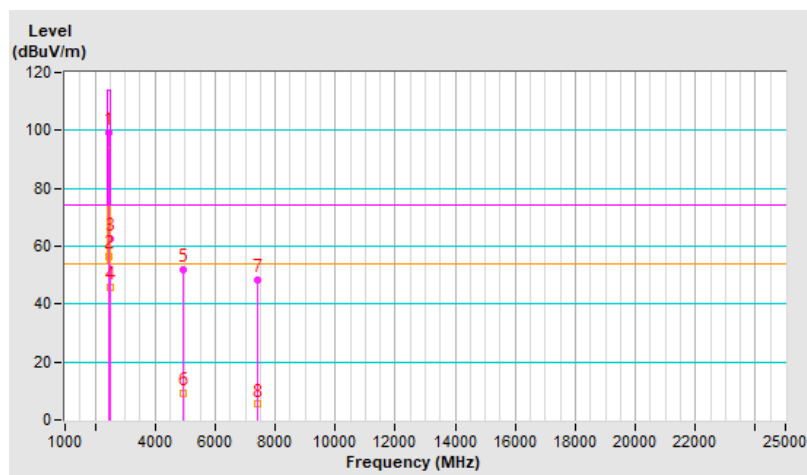


RF Mode	GFSK	Channel	CH 12 : 2474 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	3 Vdc	Environmental Conditions	25 °C, 65 % RH
Tested By	Tank Wu		

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	*2474.00	99.3 PK	114.0	-14.7	1.42 H	43	99.6	-0.3
2	*2474.00	56.5 AV	94.0	-37.5	1.42 H	43	56.8	-0.3
3	2483.50	62.4 PK	74.0	-11.6	1.42 H	43	62.7	-0.3
4	2483.50	45.8 AV	54.0	-8.2	1.42 H	43	46.1	-0.3
5	4948.00	52.0 PK	74.0	-22.0	1.25 H	29	47.2	4.8
6	4948.00	9.2 AV	54.0	-44.8	1.25 H	29	4.4	4.8
7	7422.00	48.2 PK	74.0	-25.8	2.07 H	31	36.2	12.0
8	7422.00	5.4 AV	54.0	-48.6	2.07 H	31	-6.6	12.0

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.
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:
 $20 \log(\text{Duty cycle}) = 20 \log(0.133 \text{ ms} / 18.301 \text{ ms}) = -42.8 \text{ dB}$



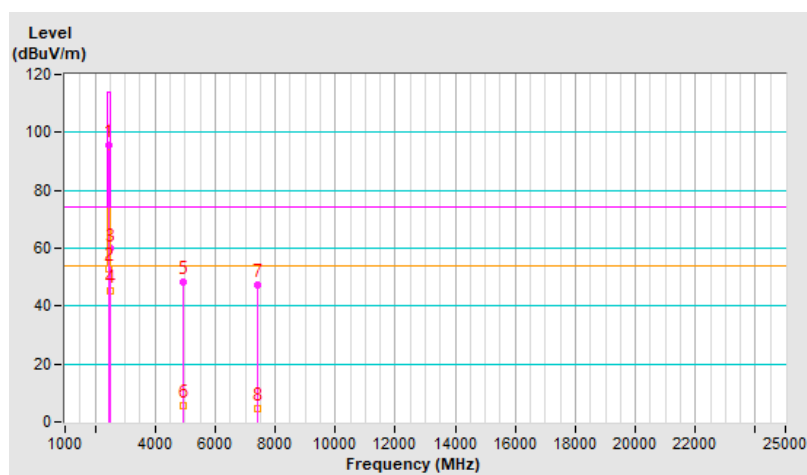
RF Mode	GFSK	Channel	CH 12 : 2474 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	3 Vdc	Environmental Conditions	25 °C, 65 % RH
Tested By	Tank Wu		

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	*2474.00	95.7 PK	114.0	-18.3	1.77 V	68	96.0	-0.3
2	*2474.00	52.9 AV	94.0	-41.1	1.77 V	68	53.2	-0.3
3	2483.50	59.8 PK	74.0	-14.2	1.77 V	68	60.1	-0.3
4	2483.50	45.1 AV	54.0	-8.9	1.77 V	68	45.4	-0.3
5	4948.00	48.4 PK	74.0	-25.6	1.87 V	104	43.6	4.8
6	4948.00	5.6 AV	54.0	-48.4	1.87 V	104	0.8	4.8
7	7422.00	47.4 PK	74.0	-26.6	1.20 V	159	35.4	12.0
8	7422.00	4.6 AV	54.0	-49.4	1.20 V	159	-7.4	12.0

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.
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:

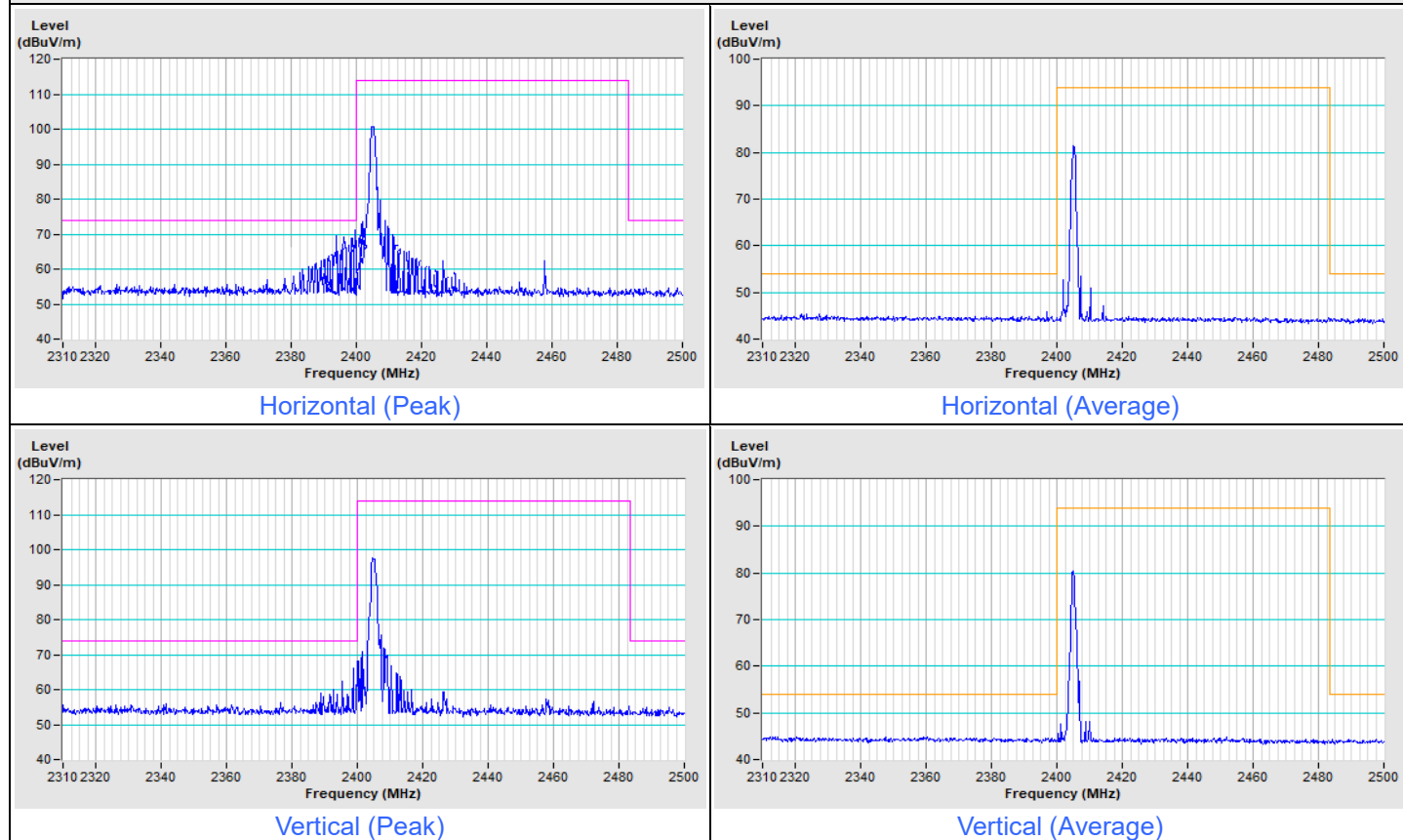
$$20 \log(\text{Duty cycle}) = 20 \log(0.133 \text{ ms} / 18.301 \text{ ms}) = -42.8 \text{ dB}$$



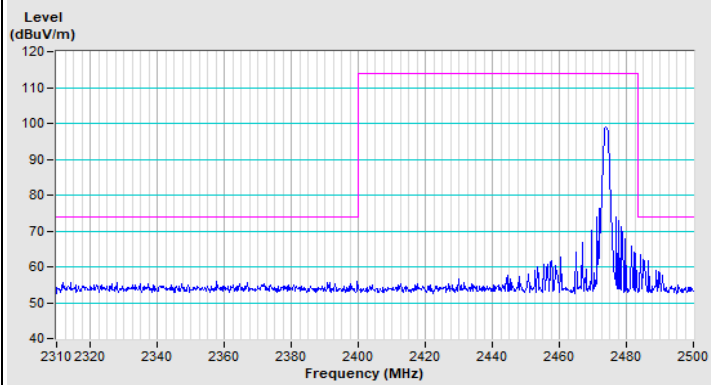
Plot of Band Edge

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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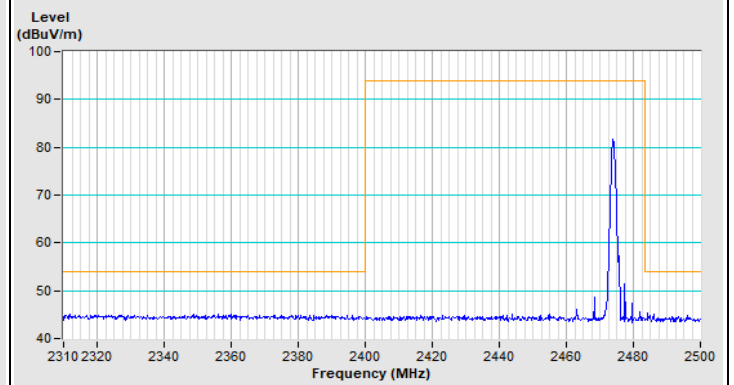
GFSK Channel 1



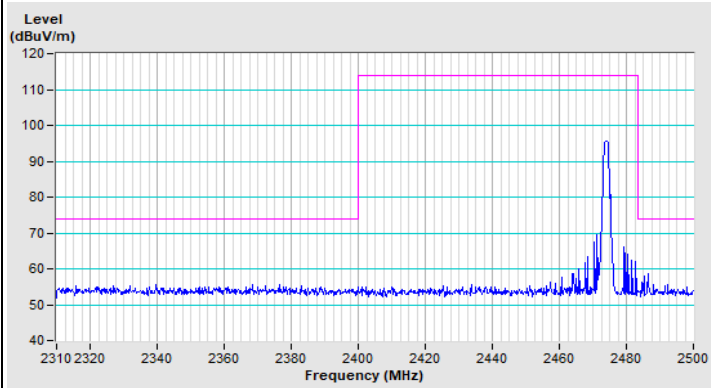
GFSK Channel 12



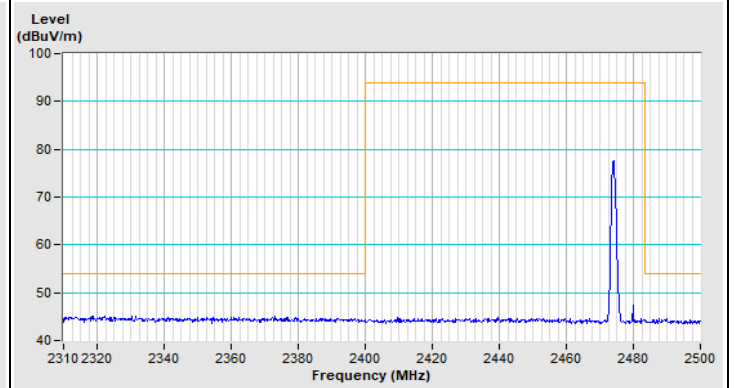
Horizontal (Peak)



Horizontal (Average)



Vertical (Peak)



Vertical (Average)

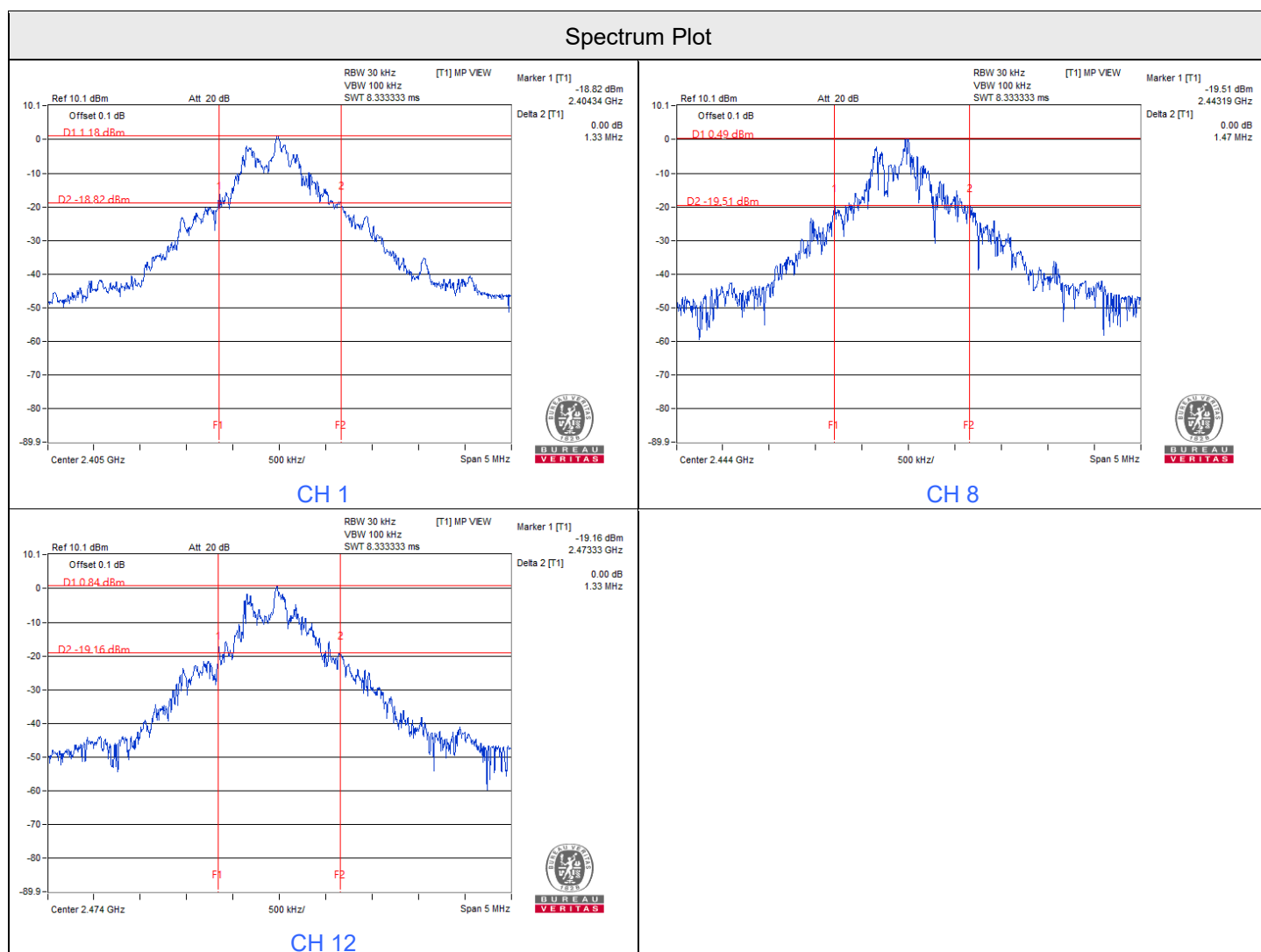
7.3 20 dB Bandwidth

Input Power:	3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Louis Yang
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Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)	Measured Frequencies		Operating Frequency Band (MHz)	Test Result
			FL (MHz)	FH (MHz)		
1	2405	1.33	2404.34	2405.67	2400 ~ 2483.5	Pass
8	2444	1.47	2443.19	2444.66		Pass
12	2474	1.33	2473.33	2474.66		Pass

Notes:

1. FL is the lowest frequency of the 20 dB bandwidth of power envelope.
2. FH is the highest frequency of the 20 dB bandwidth of power envelope.



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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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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