

## FCC Test Report

**Report No.:** RFBDYV-WTW-P21110296

**FCC ID:** PRDMU104

**Test Model:** HSA-A018M

**Received Date:** 2021/11/8

**Test Date:** 2021/11/12 ~ 2021/12/13

**Issued Date:** 2022/1/6

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Designation Number:** 198487 / TW2021



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### Release Control Record

Issue No.	Description	Date Issued
RFBDYV-WTW-P21110296	Original release.	2022/1/6



## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.249)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	N/A	Power supply is 1.5Vdc from battery
15.215	Channel Bandwidth Measurement	PASS	Meet the requirement of limit.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -10.66dB at 4960.00MHz.
15.203	Antenna Requirement	PASS	No antenna connector is used.

Note: 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:

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Conducted Emissions	9kHz ~ 40GHz	2.63 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.70 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.21 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Wireless Mouse
Brand	hp
Test Model	HSA-A018M
Status of EUT	Engineering sample
Power Supply Rating	1.5Vdc from battery
Modulation Type	GFSK
Operating Frequency	2402MHz ~ 2480MHz
Number of Channel	40
Field Strength	61.48dBuV/m (3m)
Antenna Type	PCB antenna with 0.9dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note: The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

#### 3.2 Description of Test Modes

40 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
1	2402	11	2422	21	2442	31	2462
2	2404	12	2424	22	2444	32	2464
3	2406	13	2426	23	2446	33	2466
4	2408	14	2428	24	2448	34	2468
5	2410	15	2430	25	2450	35	2470
6	2412	16	2432	26	2452	36	2472
7	2414	17	2434	27	2454	37	2474
8	2416	18	2436	28	2456	38	2476
9	2418	19	2438	29	2458	39	2478
10	2420	20	2440	30	2460	40	2480

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	Note	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement  
**RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission  
**APCM**: Antenna Port Conducted Measurement

NOTE: No need to concern of Conducted Emission due to the EUT is powered by battery

#### **Radiated Emission Test (Above 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1 to 40	1, 20, 40	GFSK

#### **Radiated Emission Test (Below 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1 to 40	40	GFSK

#### **Antenna Port Conducted Measurement:**

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

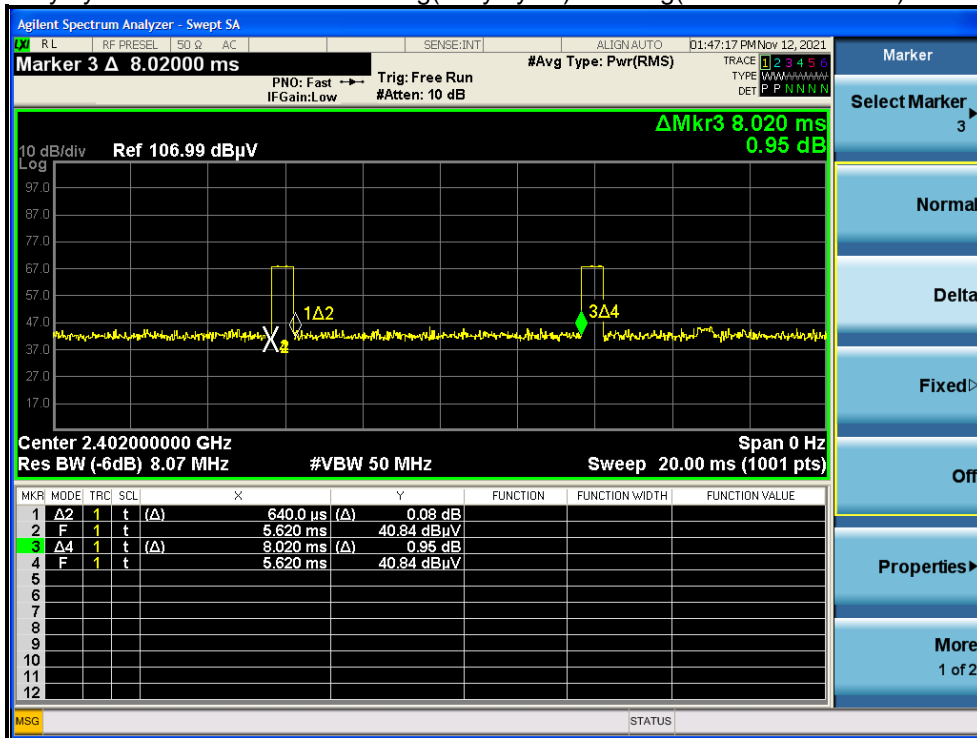
EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1 to 40	1, 20, 40	GFSK

#### **Test Condition:**

Applicable To	Environmental Conditions	Input Power	Tested By
RE $\geq$ 1G	24deg. C, 56%RH	1.5Vdc	Jed Wu
RE<1G	24deg. C, 56%RH	1.5Vdc	Jed Wu
APCM	25deg. C, 76%RH	1.5Vdc	Dalen Dai

### 3.3 Duty Cycle of Test Signal

Duty cycle correction factor =  $20 \log(\text{Duty cycle}) = 20 \log(0.64 \text{ ms} / 8.02 \text{ ms}) = -21.9 \text{ dB}$

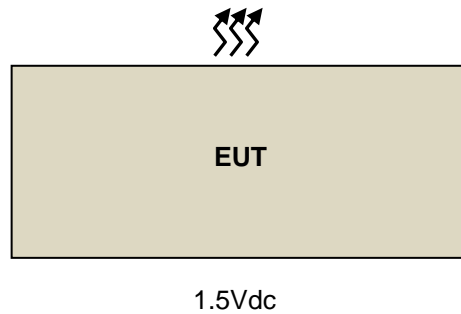




### 3.4 Description of Support Units

The EUT has been tested as an independent unit together without other necessary accessories or support units.

#### 3.4.1 Configuration of System under Test



### 3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.249)**

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

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

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

**NOTE:**

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 1000MHz, 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 20dB under any condition of modulation.

#### 4.1.2 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Test Receiver Agilent	N9038A	MY51210129	2021/3/12	2022/3/11
Software BVADT	ADT_Radiated_V8.7.08	NA	NA	NA
Software BVADT	ADT_RF Test Software V6.6.5.4	NA	NA	NA
Auto Control System(Antenna Tower, Table, Controller) ADT	SC100+AT100+TT100	0306	NA	NA
Pre_Amplifier EMC1	EMC001340	980269	2021/6/29	2022/6/28
LOOP ANTENNA EMC1	LPA600	270	2021/9/2	2023/9/1
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2021/7/13	2022/7/12
Pre_Amplifier HP	8447D	2432A03504	2021/2/18	2022/2/17
Bi-log Broadband Antenna Schwarzbeck	VULB9168	139	2020/11/6 2021/11/1	2021/11/5 2022/10/31
Attenuator Mini-Circuits	UNAT-5+	PAD-CH6-01	2021/7/13	2022/7/12
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2021/7/13	2022/7/12
Antenna(Horn) EMCO	3115	00028257	2020/11/22 2021/11/14	2021/11/21 2022/11/13
Test Receiver Agilent	N9038A	MY51210129	2021/3/12	2022/3/11
Pre-amplifier HP	8449B	3008A01201	2021/2/19	2022/2/18
RF Coaxial Cable NEAT BAR PROER SUHNER	SF-102	Cable-CH6-01	2021/7/8	2022/7/7
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	2021/5/28	2022/5/27
Fix tool for Boresight	BAF-01	5	NA	NA
Pre_Amplifier MITEQ	AMF-6F-260400-33-8P	892164	2021/2/19	2022/2/18
Antenna(Horn) Schwarzbeck	BBHA-9170	BBHA9170190	2020/11/22 2021/11/14	2021/11/21 2022/11/13
Spectrum Analyzer R&S	FSV40	101544	2021/5/24	2022/5/23
RF Coaxial Cable WOKEN	WC01	Cable-CH10-03	2021/7/8	2022/7/7
RF Coaxial Cable Rosnol	K1K50-UP0279-K1K50-3000	Cable-CH10(3m)-04	2021/7/8	2022/7/7
Highpass filter SUHNER	11SH10-7000/T18000-O/OP	SN 4	2021/5/28	2022/5/27

- NOTE:**
1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
  2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  3. The test was performed in LK - 966 chamber 1.
  4. Tested Date: 2021/11/12 ~ 2021/11/23

#### 4.1.3 Test Procedures

##### **For Radiated emission below 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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.

##### **NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

##### **For Radiated emission above 30MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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.
- f. The test-receiver system was set to peak and average detect 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.

##### **Note:**

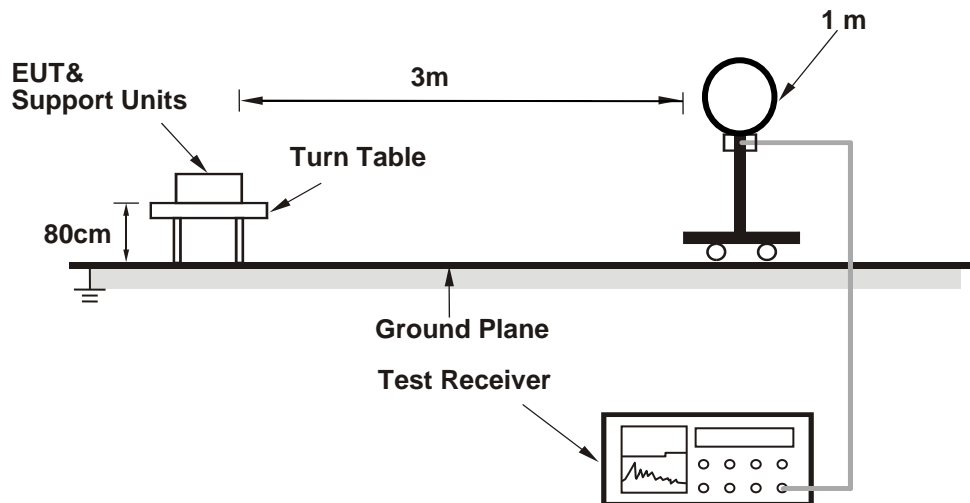
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection at frequency above 1GHz. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty factor. The duty factor refer to Chapter 3.3 of this report.
3. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

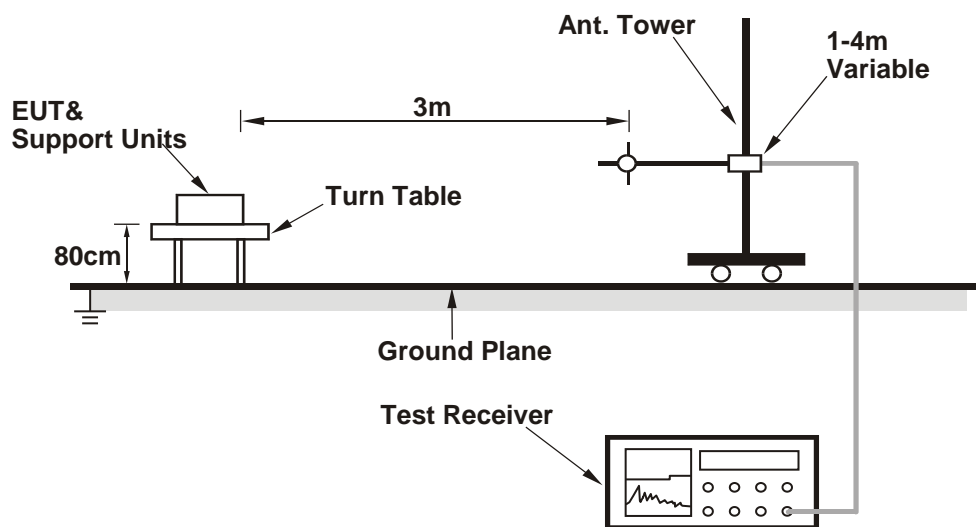
No deviation.

#### 4.1.5 Test Setup

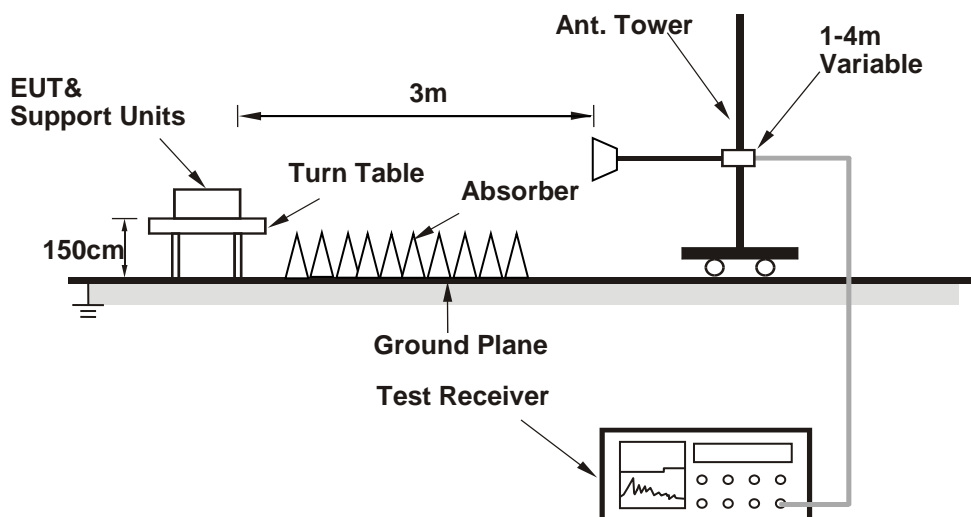
##### For Radiated emission below 30MHz



##### For Radiated emission 30MHz to 1GHz



**For Radiated emission above 1GHz**



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

**4.1.6 EUT Operating Conditions**

Set the EUT under transmission condition continuously at specific channel frequency.

#### 4.1.7 Test Results

#### ABOVE 1GHz DATA

<b>RF Mode</b>	TX_GFSK	<b>Channel</b>	CH 1 : 2402 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	Peak (PK) Average (AV)

#### 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	51.80 PK	74.00	-22.20	1.15 H	140	54.17	-2.37
2	2390.00	41.04 AV	54.00	-12.96	1.15 H	140	43.41	-2.37
3	2400.00	33.28 PK	74.00	-40.72	1.15 H	140	35.63	-2.35
4	2400.00	11.38 AV	54.00	-42.62	1.15 H	140	13.73	-2.35
5	*2402.00	82.14 PK	114.00	-31.86	1.15 H	140	84.49	-2.35
6	*2402.00	60.24 AV	94.00	-33.76	1.15 H	140	62.59	-2.35
7	4804.00	63.32 PK	74.00	-10.68	1.27 H	342	57.96	5.36
8	4804.00	41.42 AV	54.00	-12.58	1.27 H	342	36.06	5.36

#### 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	51.71 PK	74.00	-22.29	3.42 V	289	54.08	-2.37
2	2390.00	40.96 AV	54.00	-13.04	3.42 V	289	43.33	-2.37
3	2400.00	30.54 PK	74.00	-43.46	3.42 V	289	32.89	-2.35
4	2400.00	8.64 AV	54.00	-45.36	3.42 V	289	10.99	-2.35
5	*2402.00	76.51 PK	114.00	-37.49	3.42 V	289	78.86	-2.35
6	*2402.00	54.61 AV	94.00	-39.39	3.42 V	289	56.96	-2.35
7	4804.00	61.16 PK	74.00	-12.84	1.00 V	231	55.80	5.36
8	4804.00	39.26 AV	54.00	-14.74	1.00 V	231	33.90	5.36

#### 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 value = Peak value + 20 log(Duty cycle) Where the Duty cycle correction factor is calculated from following formula:  
 $20 \log(\text{Duty cycle}) = 20 \log(0.64 \text{ ms} / 8.02 \text{ ms}) = -21.9\text{dB}$   
 Please refer to the plotted duty (see section 3.3)

<b>RF Mode</b>	TX_GFSK	<b>Channel</b>	CH 20 : 2440 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	Peak (PK) Average (AV)

**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	*2440.00	83.18 PK	114.00	-30.82	1.47 H	146	85.38	-2.20
2	*2440.00	61.28 AV	94.00	-32.72	1.47 H	146	63.48	-2.20
3	4880.00	62.14 PK	74.00	-11.86	2.92 H	342	56.57	5.57
4	4880.00	40.24 AV	54.00	-13.76	2.92 H	342	34.67	5.57

**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	*2440.00	77.22 PK	114.00	-36.78	3.38 V	293	79.42	-2.20
2	*2440.00	55.32 AV	94.00	-38.68	3.38 V	293	57.52	-2.20
3	4880.00	60.04 PK	74.00	-13.96	1.48 V	229	54.47	5.57
4	4880.00	38.14 AV	54.00	-15.86	1.48 V	229	32.57	5.57

**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 value = Peak value + 20 log(Duty cycle) Where the Duty cycle correction factor is calculated from following formula:  
 $20 \log(\text{Duty cycle}) = 20 \log(0.64 \text{ ms} / 8.02 \text{ ms}) = -21.9\text{dB}$   
 Please refer to the plotted duty (see section 3.3)



<b>RF Mode</b>	TX_GFSK	<b>Channel</b>	CH 40 : 2480 MHz
<b>Frequency Range</b>	1GHz ~ 25GHz	<b>Detector Function</b>	Peak (PK) Average (AV)

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	*2480.00	83.38 PK	114.00	-30.62	1.12 H	138	85.40	-2.02
2	*2480.00	61.48 AV	94.00	-32.52	1.12 H	138	63.50	-2.02
3	2483.50	59.34 PK	74.00	-14.66	1.12 H	138	61.34	-2.00
4	2483.50	37.44 AV	54.00	-16.56	1.12 H	138	39.44	-2.00
<b>5</b>	<b>4960.00</b>	<b>63.34 PK</b>	<b>74.00</b>	<b>-10.66</b>	<b>1.08 H</b>	<b>341</b>	<b>57.75</b>	<b>5.59</b>
6	4960.00	41.44 AV	54.00	-12.56	1.08 H	341	35.85	5.59

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	*2480.00	75.92 PK	114.00	-38.08	4.00 V	297	77.94	-2.02
2	*2480.00	54.02 AV	94.00	-39.98	4.00 V	297	56.04	-2.02
3	2483.50	52.89 PK	74.00	-21.11	4.00 V	297	54.89	-2.00
4	2483.50	30.99 AV	54.00	-23.01	4.00 V	297	32.99	-2.00
5	4960.00	61.23 PK	74.00	-12.77	1.43 V	231	55.64	5.59
6	4960.00	39.33 AV	54.00	-14.67	1.43 V	231	33.74	5.59

**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 value = Peak value + 20 log(Duty cycle) Where the Duty cycle correction factor is calculated from following formula:  
 $20 \log(\text{Duty cycle}) = 20 \log(0.64 \text{ ms} / 8.02 \text{ ms}) = -21.9\text{dB}$   
 Please refer to the plotted duty (see section 3.3)

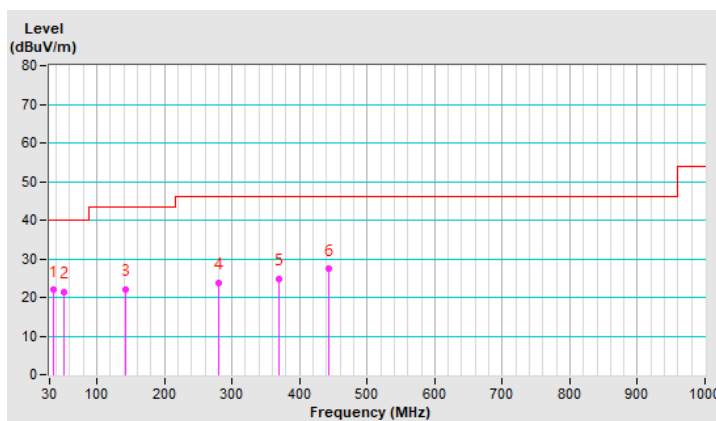
### BELOW 1GHz WORST-CASE DATA

<b>RF Mode</b>	TX GFSK	<b>Channel</b>	CH 40 : 2480 MHz
<b>Frequency Range</b>	9kHz ~ 1GHz	<b>Detector Function</b>	Quasi-Peak (QP)

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	35.97	21.94 QP	40.00	-18.06	1.78 H	336	30.16	-8.22
2	51.34	21.45 QP	40.00	-18.55	1.63 H	47	28.24	-6.79
3	141.74	22.18 QP	43.50	-21.32	1.89 H	194	28.85	-6.67
4	280.65	23.69 QP	46.00	-22.31	1.42 H	2	28.35	-4.66
5	370.03	24.69 QP	46.00	-21.31	2.11 H	50	27.40	-2.71
6	443.95	27.34 QP	46.00	-18.66	1.06 H	209	28.25	-0.91

#### 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 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

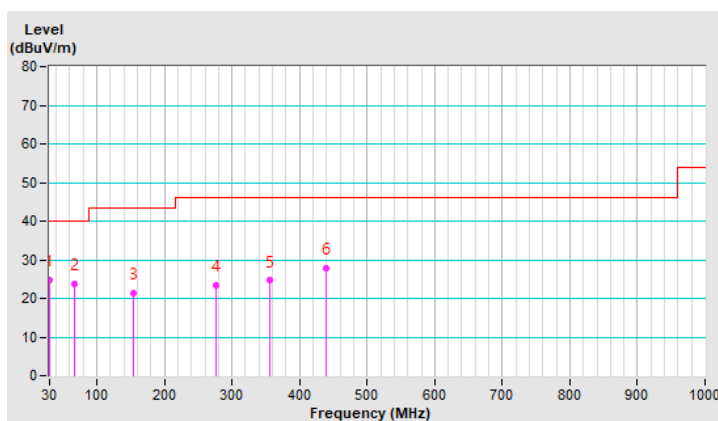


<b>RF Mode</b>	TX GFSK	<b>Channel</b>	CH 40 : 2480 MHz
<b>Frequency Range</b>	9kHz ~ 1GHz	<b>Detector Function</b>	Quasi-Peak (QP)

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	30.58	24.90 QP	40.00	-15.10	1.52 V	355	33.61	-8.71
2	66.57	23.66 QP	40.00	-16.34	1.81 V	5	31.74	-8.08
3	153.68	21.50 QP	43.50	-22.00	2.46 V	279	27.73	-6.23
4	275.46	23.35 QP	46.00	-22.65	2.31 V	360	28.20	-4.85
5	356.45	24.66 QP	46.00	-21.34	1.96 V	51	27.78	-3.12
6	439.73	27.78 QP	46.00	-18.22	1.18 V	127	28.72	-0.94

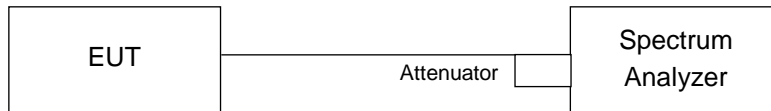
**Remarks:**

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 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



## 4.2 Channel Bandwidth

### 4.2.1 Test Setup



### 4.2.2 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Spectrum Analyzer R&S	FSV40	101544	2021/5/24	2022/5/23

- NOTE:**
1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in LK - Oven
  2. Tested Date: 2021/12/13.

### 4.2.3 Test Procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

### 4.2.4 Deviation from Test Standard

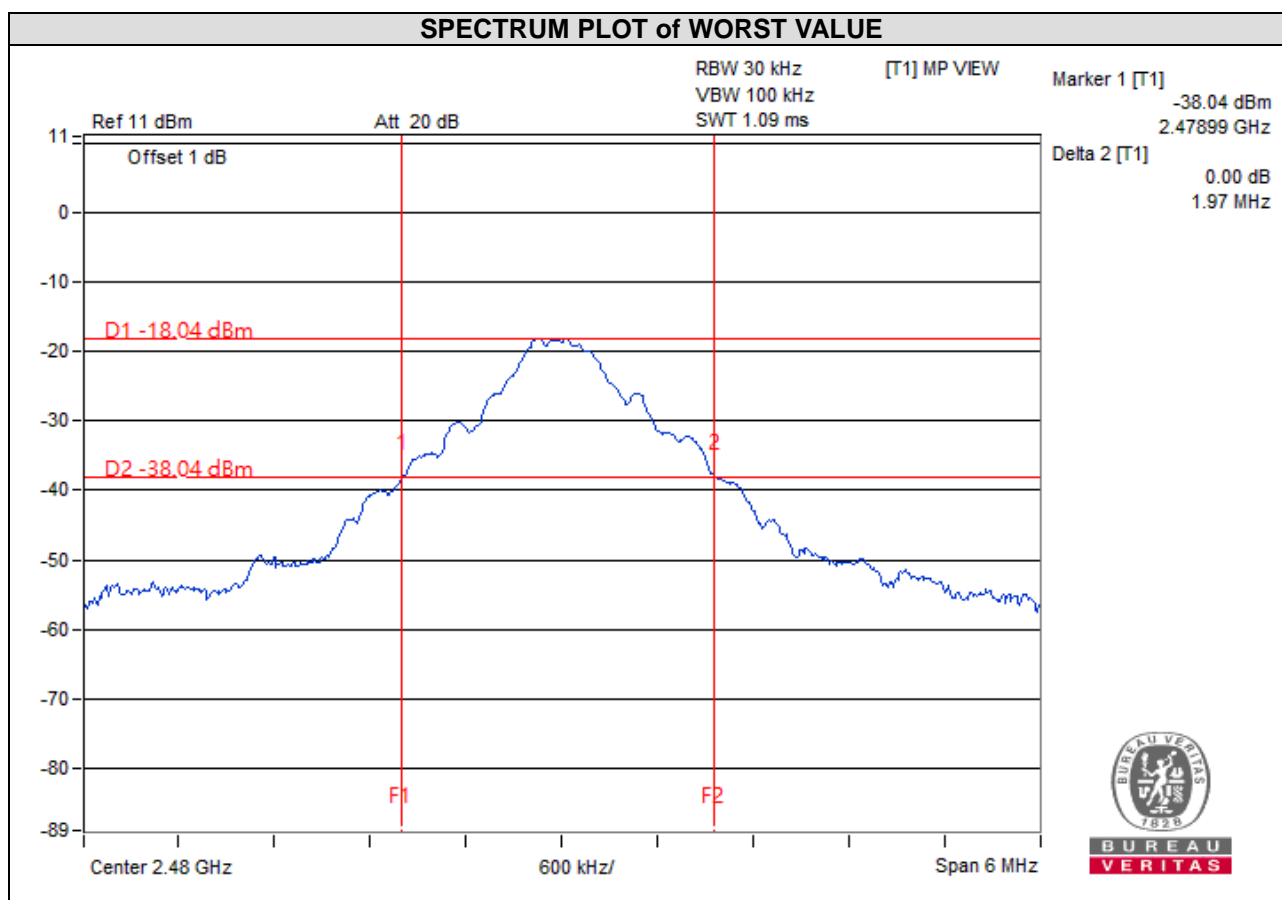
No deviation.

### 4.2.5 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.2.6 Test Results

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
1	2402	1.88
20	2440	1.91
40	2480	1.97



## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

## Appendix – 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.

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

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