



# TEST REPORT

Report No. : AB0021966(2) Date : 20 May 2022

Application No. : LB003868(3)

Applicant : Bell Sports Inc.  
5550 Scotts Valley Drive,  
Scotts Valley, California,  
United States, 95066

Sample Description : One(1) item of submitted sample stated to be Krash Speaker Helmet with USB Rechargeable Battery  
Supply voltage : 3.7V rechargeable battery  
: USB 5V for charging  
Radio Frequency : 2402MHz – 2480MHz  
No. of submitted sample : 8 sets

Date Received : 14 Feb 2022.  
21 Feb 2022.

Test Period : 14 Feb 2022 to 20 May 2022


Test Requested : FCC Certification for FCC Part 15, subpart C

Test Method : 47 CFR Part 15 (10-1-20 Edition),  
ANSI C63.10 – 2013,  
ANSI C63.4 – 2014

Test Engineer : Mr. Leung Shu Kan, Ken

Conclusion : The submitted sample was found to comply with technical requirement of FCC Part 15 Subpart C, section 15.247.

For and on behalf of  
CMA Industrial Development Foundation Limited

Authorized Signature :  \_\_\_\_\_ Page 1 of 71  
Wong Lap Pong / Andrew  
Deputy Technical Manager

FCC ID: QH6CPMKHLMTSPKR

The conformity statement stated in Conclusion above is based on the decision made by the FCC/ISPC and FCC/ISPC. Ref No. RT-EL-EMC-048 / Issue Date: 03 Mar 2019 / Edition: 2  
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### RESULT SUMMARY

Test Item	FCC Requirement	Test Method	Result
Number of hopping frequency	§15.247(a)(1)(iii)	ANSI C63.10 §7.8.3	PASS
Band-edge	§15.247(d)	ANSI C63.10 §7.8.6 and 6.10	PASS
Carrier frequency separation	§15.247(a)	ANSI C63.10 §7.8.2	PASS
Time of occupancy (dwell time)	§15.247(a)	ANSI C63.10 §7.8.4	PASS
Output power	§15.247(b)(1)	ANSI C63.10 §7.8.5	PASS
Occupied bandwidth	§15.247(a)	ANSI C63.10 §7.8.7 and 6.9.2	PASS
Conducted spurious emission (Transmitter)	§15.247(d)	ANSI C63.10 §7.8.8, and §11.12.2.1	PASS
Radiated spurious emission (Transmitter)	§15.247(d)	ANSI C63.10 §6.4 – 6.6	PASS
Radiated spurious emission (Receiving, Charging)	§15.109(a)	ANSI C63.4 §8.3	PASS
Conducted emission on AC mains	§15.207(a)	ANSI C63.4 §7.3	PASS
Frequency Hopping System Requirement	§15.247(a)(1), (g), (h)	N/A	PASS

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### 1 Product Information

#### 1.1 General Information

Product Description:	Model:
Bluetooth Helmet	QC210036

Primary function : Receive audio signal through the Bluetooth communication

Power supply : DC 3.7V (Li-ion Rechargeable battery)  
DC 5.0V (micro-usb input)

RF related function : Bluetooth non-BLE communication

Electric Accessories sold with : Nil

Interconnection cable associated sold with : 60cm (head to head) USB to Micro USB cable

Operating condition : Not specified

Model difference : Not applicable

Remark : N/A

#### 1.2 Technical Information

Operating Frequency : 2402 – 2480MHz

Digital Modulation : FHSS

Modulation : GFSK,  $\pi/4$ DQPSK

Number of Channel : 79

Channel Bandwidth : 1.0MHz

20dB Bandwidth : 1.300MHz

Occupied Bandwidth : 1.180MHz

Signal Type : Data

Number of Antenna : One

Antenna Type : PCB Type

Antenna Gain : 0dBi

Rated Input Voltage : DC3.7V (Li-ion rechargeable battery)  
DC5.0V (micro-usb input)

RF Technology Used : Bluetooth 5.0+EDR (non BLE)

Simplex or Duplex : Half-duplex

Adaptivity : FHSS adaptivity

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### 1.3 Associated Electric Information

N/A

### 1.4 Associated Cables

N/A

## **2.0 Equipment Units Tested (EUT)**

Product Description : Bluetooth Helmet  
Model : QC210036  
Serial No. : Not specified  
Sample Type : Production Sample and engineering sample  
Rationale of selection : Only one model number

## **3.0 Location of Test Facility**

CMA Industrial Development Foundation Ltd.  
Room 1302, Yan Hing Centre,  
9-13 Wong Chuk Yeung,  
Fo Tan, Shatin,  
New Territories  
Hong Kong.

FCC Accredited Lab (Designation Number: HK0004)

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### 4.0 List of test equipment, supporting equipment and cables

#### 4.1 Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date	Calibration Period
EMI Test Receiver	Rohde & Schwarz	ESCI	100152	14 Dec 2022	1Year
Spectrum Analyzer	R&S	FSV40	100964	14 Oct 2022	1Year
Log Periodic Antenna	TESEQ	UPA6109	Log Periodic Antenna	29 Nov 2022	2Years
Biconical Antenna	Rohde & Schwarz	HK116	Biconical Antenna	29 Nov 2022	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	02 Feb 2023	3Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	02 Feb 2023	3Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	16 Nov 2023	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	08 Dec 2023	2Years
Coaxial Cable	Suhner	Sucoflex 106	N/A	03 May 2023	2Years
Coaxial Cable	Suhner	Sucoflex_104	N/A	31 May 2022	2Years
LISN	Rohde & Schwarz	ENV216	101323	14 Dec 2022	1Year
Coaxial Cable	Tyco Electronics	RG 58C/U	N/A	19 Oct 2022	1Year
<b>Rohde &amp; Schwarz TS8997 Testing System</b>					
Spectrum Analyzer	Rohde & Schwarz	FSV 40	101190	14 Oct 2022	1Year
OSP	Rohde & Schwarz	OSP	OSP-B157W	12 Jul 2022	1Year

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### 4.2 Supporting equipment

Equipment Name	Manufacturer	Model	Serial	Provided by
USB UART adaptor *	WinChipHead	CH340	Not labelled	Applicant
AC/DC adaptor	Apple	A1299	Not labelled	CMA
iPad	Apple	A1432	F7PLXDEKF196	CMA

Remark: \*only used for configure engineering mode

### 4.3 Cables

Nil

### 4.4 Software

Software Name	Version	Function	Provided by
FCC Assist*	V1.0.0.2	Configure Engineering mode	Applicant

Remark: \*only used for configure engineering mode

## 5.0 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%.

### Radiated emissions

Frequency	Uncertainty ( $U_{lab}$ )
30MHz ~ 200MHz (Horizontal)	4.59dB
30MHz ~ 200MHz (Vertical)	4.49dB
200MHz ~1000MHz (Horizontal)	4.94dB
200MHz ~1000MHz (Vertical)	4.97dB
1GHz ~6GHz	4.52dB
6GHz ~18GHz	4.58dB
18GHz~40GHz	4.66dB

### Line-conducted emissions

Frequency	Uncertainty ( $U_{lab}$ )
150kHz~30MHz	2.80dB

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### 6.0 Measurement

#### 6.1 General Test condition

Temperature : 24.7°C  
Test Voltage : DC 3.7V and AC 120V  
Humidity : 54.9%  
Atmosphere Pressure : 100.6kPa

#### 6.2 Number of hopping frequency

##### 6.2.1 Measurement

Requirement : FCC Part 15 § 15.247(a)(1)(iii)  
Measuring procedure : ANSI C63.10:2013, clause 7.8.3  
Span : 83.5MHz  
RBW : 300kHz  
VBW : 300kHz  
Frequency range : 2.4000 – 2.4835GHz  
Modulation tested : GFSK  
Packet Type tested : DH5  
Additional measuring procedure : Nil

##### 6.2.2 Final Result

No. of hopping channels measured	Limit	Result	Worst case mode
79	≥ 15	PASS	GFSK and DH5

Remark:

1. Detail test result and equipment setting refer to Page 29.

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### 6.3 Band-edge measurement

#### 6.3.1 Measurement

Requirement : FCC Part 15 §15.247(d)  
Measuring procedure : ANSI C63.10:2013, section 7.8.6 and 6.10  
Hopping mode : Enabled and Disable  
RBW : 100kHz  
VBW : 300kHz  
Frequency range : 2310 – 2400MHz and 2483.5 – 2500MHz  
Modulation tested : GFSK,  $\pi/4$ DQPSK  
Packet Type tested : DH5, 2DH5  
Channel tested for non-hopping mode : 2402MHz for lowed band edge and 2480MHz for higher band edge  
Additional measuring procedure : For lower band edge (2400MHz)

1. Using the “Measurement 1” setting shown below the scan plot within the frequency span from 2400 – 2483.5MHz to measure the maximum peak value of fundamental
2. Using the “Measurement 2” setting shown below the scan plot within the frequency span from 2310 – 2400MHz to measure the bandedge reading
3. Compare that reading in procedure with the limit which equal to the measured maximum peak in procedure 1 minus 20dB

For Upper bandedge (2483.5MHz)

1. Using the “Measurement 1” setting shown below the scan plot within the frequency span from 2400 – 2483.5MHz to measure the maximum peak value of fundamental
2. Using the “Measurement 2” setting shown below the scan plot within the frequency span from 2483.5 – 2500MHz to measure the bandedge reading
3. Compare that reading in procedure with the limit which equal to the measured maximum peak in procedure 1 minus 20dB

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### 6.3.2 Final Result

Bandedge frequency for lower bandedge (Worst Case)	Worst case (dBc) <sup>2</sup>	Detector	Limit <sup>1</sup> (dBc)	Result	Worst case
2398.175000	33.0	Peak	≥20.0	PASS	GFSK and DH5
Bandedge frequency for higher bandedge (Worst Case)	Worst case in (dBc) <sup>2</sup>	Detector	Limit <sup>1</sup>	Result	Worst case
2483.525000	45.7	Peak	≥20.0	PASS	GFSK and DH5

**Remark:**

1. The limit is based on the transmitter demonstrated compliance with peak conducted power limit on section 6.6.2 of this report.
2. The Worst case dBc is the peak values measured in procedure 1 minus the worst case bandedge emission.
3. Detail test result and equipment setting refer to Page 51-58.

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### 6.4 Carrier Frequency Separation

#### 6.4.1 Measurement

- Requirement : FCC Part 15 §15.247(a)  
 Measuring procedure : ANSI C63.10:2013, section 7.8.2
- a) Span: Wide enough to capture the peaks of two adjacent channels.
  - b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
  - c) Video (or average) bandwidth (VBW)  $\geq$  RBW.
  - d) Sweep: Auto.
  - e) Detector function: Peak.
  - f) Trace: Max hold.
  - g) Allow the trace to stabilize.
- Hopping mode : Enabled  
 RBW : 300kHz  
 VBW : 300kHz  
 Frequency range : 2401-2404MHz, 2440-2443MHz, 2478-2481MHz  
 Modulation tested : GFSK<sup>2</sup>  
 Packet Type tested : DH5<sup>2</sup>  
 Additional measuring procedure : Nil
- Remark : 1) Since the measured value is more than 1.5 times of limit, only middle channel is measured.  
 2) Since the modulation and packet type does not affect the channel separation, GFSK and DH5 are selected as represented modulation and data type

#### 6.4.2 Final Result

Carrier Frequency Separation	Limit <sup>1</sup>	Result	Worst case mode
1.009900MHz	0.866667MHz	PASS	GFSK and DH5

Remark:

1. Limit is 2/3 of the 20dB bandwidth in section 6.7 and conducted peak power is less than 0.125W in section 6.6 of this report.
2. Detail test result and equipment setting refer to Page 48-50.

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### 6.5 Time of occupancy (dwell time)

#### 6.5.1 Measurement

Requirement	:	FCC Part 15 §15.247(a)
Measuring procedure	:	ANSI C63.10:2013, section 7.8.4
Hopping mode	:	Disable
RBW	:	500kHz
VBW	:	1MHz
Modulation tested	:	GFSK <sup>1</sup>
Packet Type tested	:	DH1, DH3, DH5
Channel tested for non-hopping mode	:	2441MHz
Additional measuring procedure	:	<ol style="list-style-type: none"> <li>1) Setup engineering sample to channel 2441MHz and DH1 packet size to perform the measurement according to ANSI C63.10, section 7.8.4</li> <li>2) Find the worst case packet size</li> <li>3) Repeat procedure 1 with the worst case packet size for channel 2402MHz and 2480MHz</li> </ol>
Remark	:	<ol style="list-style-type: none"> <li>1) Since the modulation does not affect the dwell time, GFSK is selected as represented modulation.</li> </ol>

#### 6.5.2 Final Result

Dwell time (worst case)	Limit	Result	Worst case mode
199.630ms	≤400ms	PASS	GFSK and DH5

Remark:

1. Detail test result and equipment setting refer to Page 30-32.

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### 6.7 Occupied Bandwidth

#### 6.7.1 Measurement

- Requirement : FCC Part 15 §15.247(a)  
Measuring procedure : ANSI C63.10:2013, section 7.8.7 and 6.9.2
- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
  - b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
  - c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than  $[10 \log (OBW/RBW)]$  below the reference level.
  - d) Steps a) through c) might require iteration to adjust within the specified tolerances.
  - e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
  - f) Set detection mode to peak and trace mode to max hold.
  - g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
  - h) Determine the “-xx dB down amplitude” using  $[(\text{reference value}) - xx]$ . Alternatively, this calculation may be made by using the marker-delta function of the instrument.
  - i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).
  - j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-xx dB down amplitude” determined in step h). If a marker is below this “-xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency

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difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “-xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

Hopping mode : Disable  
 Modulation tested : GFSK,  $\pi/4$ DQPSK  
 Packet Type tested : DH5<sup>1</sup>  
 Channel tested for non-hopping mode : 2402MHz, 2441MHz, 2480MHz  
 Additional measuring procedure : Nil  
 Remark : 1) Since the packet size does not affect the bandwidth, DH5 is selected as represented packet size.

### 6.7.2 Final Result

20dB bandwidth	99% OBW	Modulation
925.0kHz	855.0kHz	GFSK
1300.0kHz	1180.0kHz	$\pi/4$ DQPSK

Remark:

1. Detail test result and equipment setting refer to Page 36-47.

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### 6.8 Conducted Spurious emission (Transmitter)

#### 6.8.1 Measurement

- |                                     |   |
|-------------------------------------|---|
| Requirement                         | : FCC Part 15 §15.247(d)  |
| Measuring procedure                 | : ANSI C63.10:2013, section 5.5, 5.6, 7.8.8 and 11.12.2.1   |
| Hopping mode                        | : Disable   |
| RBW                                 | : Refer to pre-measurement and final measurement setting  |
| Detector                            | : Refer to pre-measurement and final measurement setting  |
| Modulation tested                   | : GFSK <sup>1</sup>   |
| Packet Type tested                  | : DH5 <sup>2</sup>  |
| Channel tested for non-hopping mode | :   |
| Additional measuring procedure      | : 1) Setup engineering sample to channel 2402MHz to perform the measurement according to ANSI C63.10, section 7.8.8 with pre-measurement setting<br>2) If the pre-measurement is over the limit, the final measurement is performed for the specific frequency according to final measurement setting or restricted band frequency<br>3) For non-restricted band frequency, peak detector and 100kHz RBW will be used for final measurement.<br>4) Repeat the procedure 1 to 3 for channel frequency of 2441MHz and 2480MHz |
| Remark                              | : 1) Since the GFSK generates a higher SPD with power level, GFSK is selected as represented modulation for testing.<br>2) Since DH5 generates a higher dwell time, DH5 is selected as representative packet size for testing   |

#### 6.8.2 Final Result

Worst case spurious emission frequency	Worst case spurious emission power <sup>1</sup>	Limit <sup>2</sup>	Margin	Result	Worst case mode
2395.021008MHz	-38.9dBm	-26.4dBm	-12.5dB	PASS	GFSK and DH5

Remark:

1. Spurious emission power = measured conducted power + antenna gain(dBi) +ground reflection factor according to ANSI C63.10 section 11.12.2.2 for restricted band emission.
2. For restricted band emission, limit = restricted band field strength limit (dBuV/m) – 9.54 + 104.75dB according to ANSI C63.10 section 11.12.2.2. For non-restricted band, limit = SPD/100kHz – 20dB.
3. Detail test result and equipment setting refer to Page 59-64.

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### 6.9 Radiated Spurious emission (Transmitter)

#### 6.9.1 Measurement

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 0.4m and 0.8m high above the ground for below 1GHz measurement and 1.5m high above the ground for above 1GHz measurement. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

For 30MHz to 300MHz, biconical antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. And the reference point of antenna shall be 1 m above the ground. Same procedure for frequency 300MHz to 1000MHz but Log-periodic antenna is used for final measurements.

For above 1GHz, horn antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. Preamplifier and High Pass filter was used for measurements. The reference point of antenna shall be 1 m above the ground.

The device was rotated through three X, Y, Z orthogonal to determine which attitude and configuration produce the highest emission during measurement for Radiated Emission measurement.

The Frequencies from fundamental up to the tenth harmonics were investigated, and emissions more 20dB below limit were not reported.

Bluetooth hopping + charging mode with GFSK modulation and DH5 packet type are selected as worst case mode for spurious radiated emission test from cabinet.

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**CMA Industrial Development Foundation Limited**

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## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### 6.9.2 Final Result

a) Test mode: Bluetooth + charging

Polarization	Frequency (MHz)	Reading at 3m (dBμV)	Transducer Factor (dB/m)	Field Strength at 3m <sup>1</sup> (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)	Detector (PK/QP/AV)
H	2398.064	68.9	-6.6	62.3	74.0	-11.7	PK
H	2398.179	60.4	-6.6	53.8	54.0	-0.2	AV
V	2397.977	66.0	-6.6	59.4	74.0	-14.6	PK
V	2398.183	57.0	-6.6	50.4	54.0	-3.6	AV
H	4803.754	52.0	3.1	55.1	74.0	-18.9	PK
H	4804.188	42.9	3.1	46.0	54.0	-8.0	AV
V	4803.768	51.4	3.1	54.5	74.0	-19.5	PK
V	4804.188	42.1	3.1	45.2	54.0	-8.8	AV
H	4881.682	55.8	3.1	58.9	74.0	-15.1	PK
H	4882.180	45.2	3.1	48.3	54.0	-5.7	AV
V	4881.754 <sup>4</sup>	50.7	3.1	53.8	54.0	-0.2	PK
H	4959.740	58.0	3.1	61.1	74.0	-12.9	PK
H	4960.203	47.8	3.1	50.9	54.0	-3.1	AV
V	4959.855	53.0	3.1	56.1	74.0	-17.9	PK
V	4960.203	39.4	3.1	42.5	54.0	-11.5	AV
H	7205.855 <sup>4</sup>	37.7	10.7	48.4	54.0	-5.6	PK
V	7206.535 <sup>4</sup>	39.8	10.7	50.5	54.0	-3.5	PK
H	7322.493 <sup>4</sup>	40.0	10.7	50.7	54.0	-3.3	PK
V	7322.682 <sup>4</sup>	41.0	10.7	51.7	54.0	-2.3	PK
H	7439.855	43.5	10.7	54.2	74.0	-19.8	PK
H	7440.188	33.8	10.7	44.5	54.0	-9.5	AV
V	7439.349 <sup>4</sup>	39.3	10.7	50.0	54.0	-4.0	PK

Remark:

1. Field Strength = Reading + transducer factor.
2. Other emission with more than 20dB margin are not reported in this report.
3. If peak measurement value is lower than average limit, then the measured value will compare with average limit
4. The peak measurement value is over the average limit, therefore the peak measurement value is compared with peak limit and need to take average measurement.

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## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### 6.10 Radiated Spurious emission (other mode)

#### 6.10.1 Measurement

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 0.4m and 0.8m high above the ground for below 1GHz measurement and 1.5m high above the ground for above 1GHz measurement. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

For 30MHz to 300MHz, biconical antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. And the reference point of antenna shall be 1 m above the ground. Same procedure for frequency 300MHz to 1000MHz but Log-periodic antenna is used for final measurements.

For above 1GHz, horn antenna with its vertical and horizontal plane is placed 3m from the EUT and rotated about its vertical and horizontal axis for maximum response at each azimuth about the EUT. Preamplifier and High Pass filter was used for measurements. The reference point of antenna shall be 1 m above the ground.

The device was rotated through three X, Y, Z orthogonal to determine which attitude and configuration produce the highest emission during measurement for Radiated Emission measurement.

The Frequencies from fundamental up to the tenth harmonics were investigated, and emissions more 20dB below limit were not reported.

Receiving mode and charging are selected for spurious radiated emission test from cabinet.

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## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### 6.10.2 Final Result

Test mode: Receiving mode + Charging

Polarization	Frequency (MHz)	Reading at 3m (dB $\mu$ V)	Transducer Factor (dB/m)	Field Strength at 3m <sup>1</sup> (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)	Detector (PK/QP/AV)
H	87.934	8.9	9.0	17.9	40.0	-22.1	QP
V	168.786	6.5	13.3	19.8	43.5	-23.7	QP
H	252.891	10.2	12.5	22.7	46.0	-23.3	QP
V	384.806	14.4	14.6	29.0	46.0	-17.0	QP
H	421.214	12.9	17.3	30.2	46.0	-15.8	QP
V	513.307	10.1	19.4	29.5	46.0	-16.5	QP
H	589.823	11.4	19.4	30.8	46.0	-15.2	QP

Remark:

1. Field Strength = Reading + transducer factor.
2. Other emissions with more than 20dB margin are not reported in this report.

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## TEST REPORT

Report No. : AB0021966(2)

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### 6.11 Conducted Emission

#### 6.11.1 Measurement

Requirement : FCC Part 15 §15.207(a)  
Measuring procedure : ANSI C63.4:2014, section 7.3  
Test mode : Bluetooth + Charging  
RBW : 9kHz  
VBW : 30kHz  
Modulation tested : Nil  
Packet Type tested : Nil  
Additional measuring procedure : Nil  
Remark : Nil

#### 6.11.2 Final Result

Worst case conducted emission frequency	Worst case conducted emission	Limit	Margin	Detector	Lines	Worst case mode	Result
630.5kHz	34.40dB $\mu$ V	46.00dB $\mu$ V	-11.60dB	AV	L	Bluetooth + Charging	PASS

Remark:

1. Detail test result and equipment setting refer to Page 65.

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## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### 7.0 Frequency Hopping System Requirement

#### Test Requirement: Section 15.247(a)(1), (g), (h)

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom order list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

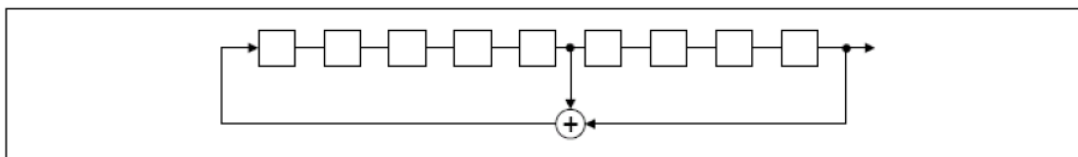
Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmissions bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

#### Compliance for section 15.247(a)(1)

According to Bluetooth Core Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5<sup>th</sup> and 9<sup>th</sup> stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

- Number of shift register stage: 9
- Length of pseudorandom sequence:  $2^9-1=511$  bits
- Longest sequence of zero: 8 (non-inverted signal)



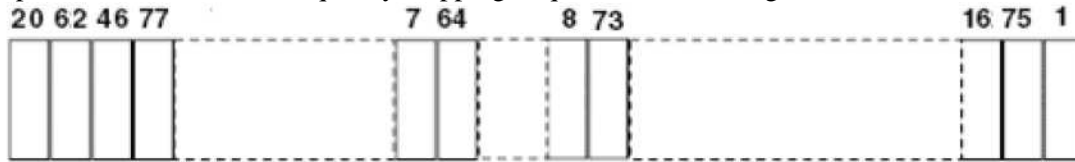
Linear Feedback Shift Register for Generation of the PRBS sequence

## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

An example of Pseudorandom Frequency Hopping Sequence as following:



Each frequency used equally on the average by each transmitter.

According to Bluetooth Core Specification, Bluetooth receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any Bluetooth transmitters and shift frequencies in synchronization with the transmitted signals.

### **Compliance for section 15.247(g)**

According to Bluetooth Core Specification, the Bluetooth system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

### **Compliance for section 15.247(h)**

According to Bluetooth Core specification, the Bluetooth system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

According to the Bluetooth Core specification, the Bluetooth system is designed not have the ability to coordinate with other FHSS System in effort to avoid the simultaneous occupancy of the individual hopping frequencies by multiple transmitter.





## TEST REPORT

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Date : 20 May 2022

### 8.0 External photo, Internal Photo and Test configuration Photo

The External Photo, Internal Photo and Test Configuration Photo associated with this report for the tested product are saved in separated pdf file listed in the following

File content	File name
External Photo	External photo.pdf
Internal Photo	Internal photo.pdf
Test Configuration Photo	Test setup photo.pdf

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## **TEST REPORT**

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## **APPENDIX A Test Result**

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## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### **FCC Part 47 §15.247 2400-2483.5 MHz 2020**

#### **DUT Information**

##### Frequencies

BT CH 0 (2402 MHz)	BT CH 1 (2403 MHz)	BT CH 2 (2404 MHz)
BT CH 3 (2405 MHz)	BT CH 4 (2406 MHz)	BT CH 5 (2407 MHz)
BT CH 6 (2408 MHz)	BT CH 7 (2409 MHz)	BT CH 8 (2410 MHz)
BT CH 9 (2411 MHz)	BT CH 10 (2412 MHz)	BT CH 11 (2413 MHz)
BT CH 12 (2414 MHz)	BT CH 13 (2415 MHz)	BT CH 14 (2416 MHz)
BT CH 15 (2417 MHz)	BT CH 16 (2418 MHz)	BT CH 17 (2419 MHz)
BT CH 18 (2420 MHz)	BT CH 19 (2421 MHz)	BT CH 20 (2422 MHz)
BT CH 21 (2423 MHz)	BT CH 22 (2424 MHz)	BT CH 23 (2425 MHz)
BT CH 24 (2426 MHz)	BT CH 25 (2427 MHz)	BT CH 26 (2428 MHz)
BT CH 27 (2429 MHz)	BT CH 28 (2430 MHz)	BT CH 29 (2431 MHz)
BT CH 30 (2432 MHz)	BT CH 31 (2433 MHz)	BT CH 32 (2434 MHz)
BT CH 33 (2435 MHz)	BT CH 34 (2436 MHz)	BT CH 35 (2437 MHz)
BT CH 36 (2438 MHz)	BT CH 37 (2439 MHz)	BT CH 38 (2440 MHz)
BT CH 39 (2441 MHz)	BT CH 40 (2442 MHz)	BT CH 41 (2443 MHz)
BT CH 42 (2444 MHz)	BT CH 43 (2445 MHz)	BT CH 44 (2446 MHz)
BT CH 45 (2447 MHz)	BT CH 46 (2448 MHz)	BT CH 47 (2449 MHz)
BT CH 48 (2450 MHz)	BT CH 49 (2451 MHz)	BT CH 50 (2452 MHz)
BT CH 51 (2453 MHz)	BT CH 52 (2454 MHz)	BT CH 53 (2455 MHz)
BT CH 54 (2456 MHz)	BT CH 55 (2457 MHz)	BT CH 56 (2458 MHz)
BT CH 57 (2459 MHz)	BT CH 58 (2460 MHz)	BT CH 59 (2461 MHz)
BT CH 60 (2462 MHz)	BT CH 61 (2463 MHz)	BT CH 62 (2464 MHz)
BT CH 63 (2465 MHz)	BT CH 64 (2466 MHz)	BT CH 65 (2467 MHz)
BT CH 66 (2468 MHz)	BT CH 67 (2469 MHz)	BT CH 68 (2470 MHz)
BT CH 69 (2471 MHz)	BT CH 70 (2472 MHz)	BT CH 71 (2473 MHz)
BT CH 72 (2474 MHz)	BT CH 73 (2475 MHz)	BT CH 74 (2476 MHz)
BT CH 75 (2477 MHz)	BT CH 76 (2478 MHz)	BT CH 77 (2479 MHz)
BT CH 78 (2480 MHz)		

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## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### **Hardware Setup: WMS Measurements\TS8997**

Spectrum Analyzer: SA FSV 40 (SA FSV 40) @ VISA (ADR)  
TCPIP::192.168.48.148::inst0::instr), SN 1321.3008K39/101190,  
FW 2.30 SP4

Vector Generator: VG SMBV100A (VG SMBV100A) @ VISA (ADR)  
TCPIP::192.168.48.149::inst0::instr), SN 262024, FW 3.1.19.8-  
3.20.281.28.7

Generator: SMB100A (SMB100A) @ VISA (ADR)  
TCPIP::192.168.48.152::inst0::instr), SN 103230, FW 3.20.390.24  
/ Drv:Rev 2.21.0, 07/2016, CVI 2015

OSP: OSP-B157W (OSP-B157W) @ VISA (ADR)  
TCPIP::192.168.48.157::inst0::instr), SN 1527.1144.03 / 101057,  
FW 1.27.0.0

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## TEST REPORT

Report No. : AB0021966(2)

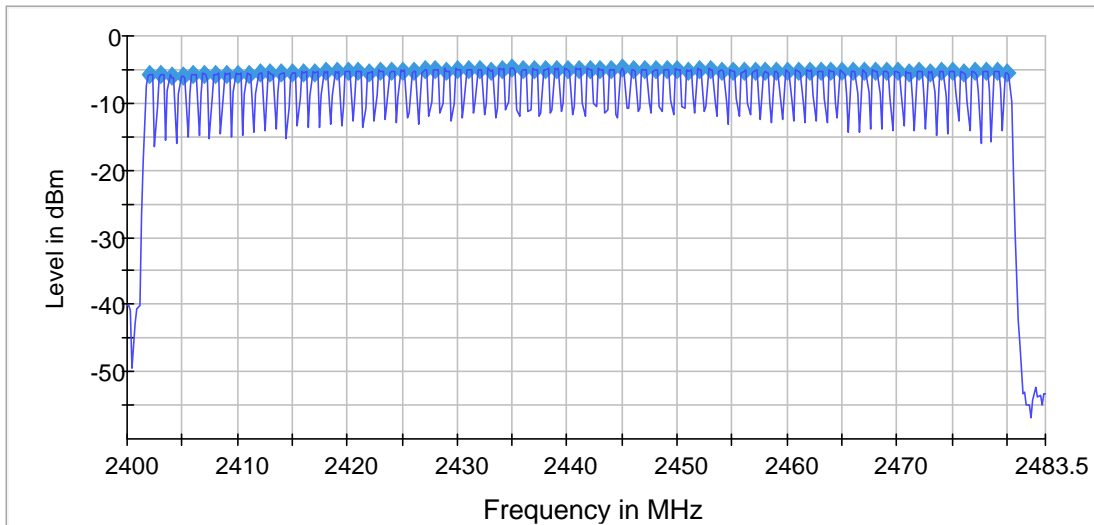
Date : 20 May 2022

### Hopping Frequencies (Hopping; GFSK; DH5)

#### Channels

Channels	Limit Min	Limit Max	Result
79	15	---	PASS

Sequence



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	200.000 kHz	<= 299.000 kHz
VBW	200.000 kHz	>= 200.000 kHz
SweepPoints	418	~ 418
Sweeptime	1.060 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	78 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.38 dB	0.50 dB

FCC ID: QH6CPMKHLM TSPKR



## TEST REPORT

Report No. : AB0021966(2)

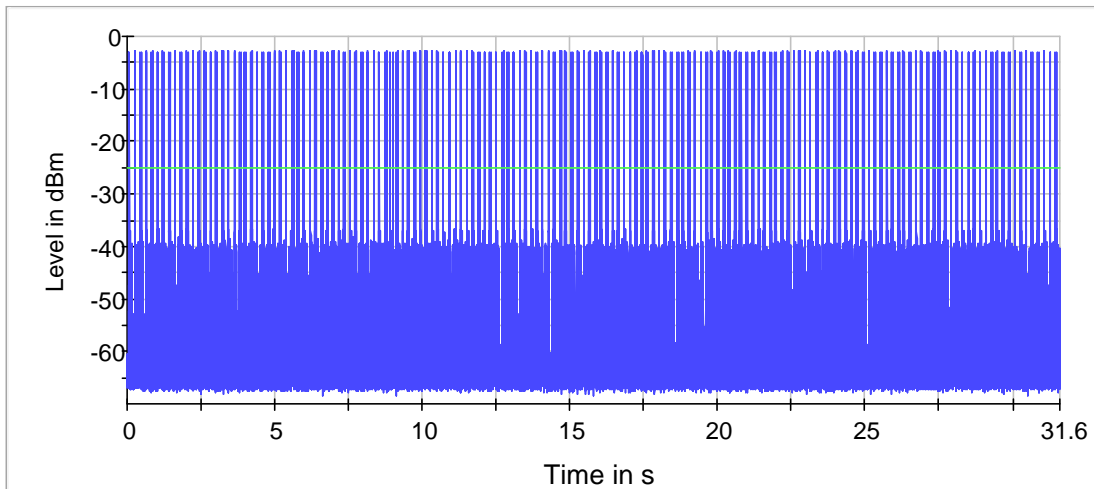
Date : 20 May 2022

### Time of Channel Occupancy (2441 MHz; GFSK; DH1)

#### Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	319	124.440	-25.0

Time of Channel Occupancy



— Trace      — Threshold

#### Measurement

Setting	Instrument Value	Target Value
Center Frequency	2.44100 GHz	2.44100 GHz
Span	ZeroSpan	ZeroSpan
RBW	500.000 kHz	~ 500.000 kHz
VBW	1.000 MHz	~ 1.500 MHz
SweepPoints	30001	~ 30001
SweepTime	31.600 s	31.600 s
Reference Level	-20.000 dBm	-20.000 dBm
Attenuation	0.000 dB	0.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Clear Write	Clear Write
Sweeptype	Sweep	AUTO
Preamp	off	off
Trigger	External	External
Trigger Offset	0.000 s	0.000 s

#### OSP

Setting	Instrument Value	Target Value
Measurement Time	31.600 s	31.600 s
Tracepoints	31600000	31600000

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

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<b>Time resolution</b>	<b>1.000 <math>\mu</math>s</b>	<b>1.000 <math>\mu</math>s</b>
<b>Detector</b>	<b>RMS</b>	<b>RMS</b>

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

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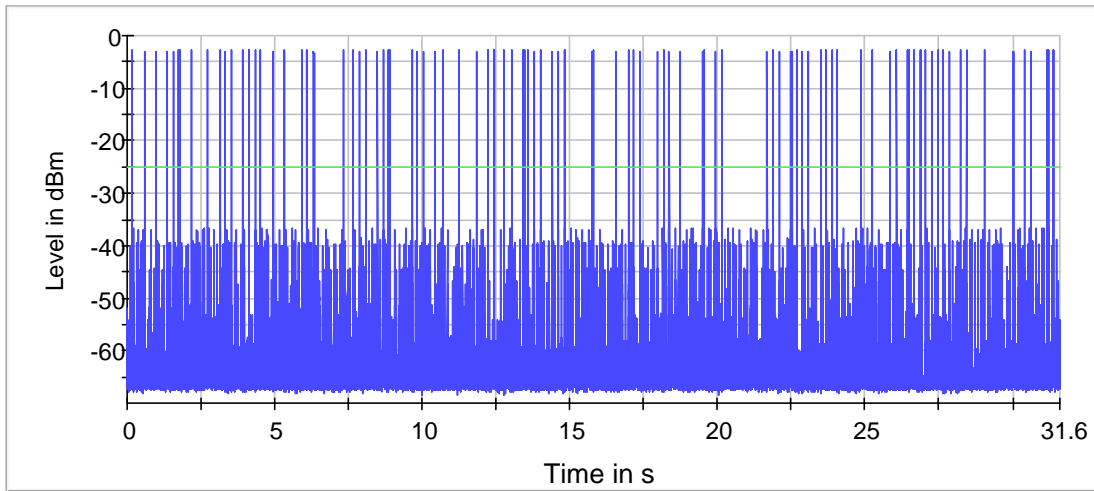
Date : 20 May 2022

### Time of Channel Occupancy(2) (2441 MHz; GFSK; DH3)

#### Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	105	174.330	-25.0

Time of Channel Occupancy(2)



— Trace      — Threshold

#### Measurement

Setting	Instrument Value	Target Value
Center Frequency	2.44100 GHz	2.44100 GHz
Span	ZeroSpan	ZeroSpan
RBW	500.000 kHz	~ 500.000 kHz
VBW	1.000 MHz	~ 1.500 MHz
SweepPoints	30001	~ 30001
SweepTime	31.600 s	31.600 s
Reference Level	-20.000 dBm	-20.000 dBm
Attenuation	0.000 dB	0.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Clear Write	Clear Write
SweepType	Sweep	AUTO
Preamp	off	off
Trigger	External	External
Trigger Offset	0.000 s	0.000 s

#### OSP

Setting	Instrument Value	Target Value
Measurement Time	31.600 s	31.600 s
Tracepoints	31600000	31600000
Time resolution	1.000 μs	1.000 μs

FCC ID: QH6CPMKHLM TSPKR





## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

Detector	RMS	RMS
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FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

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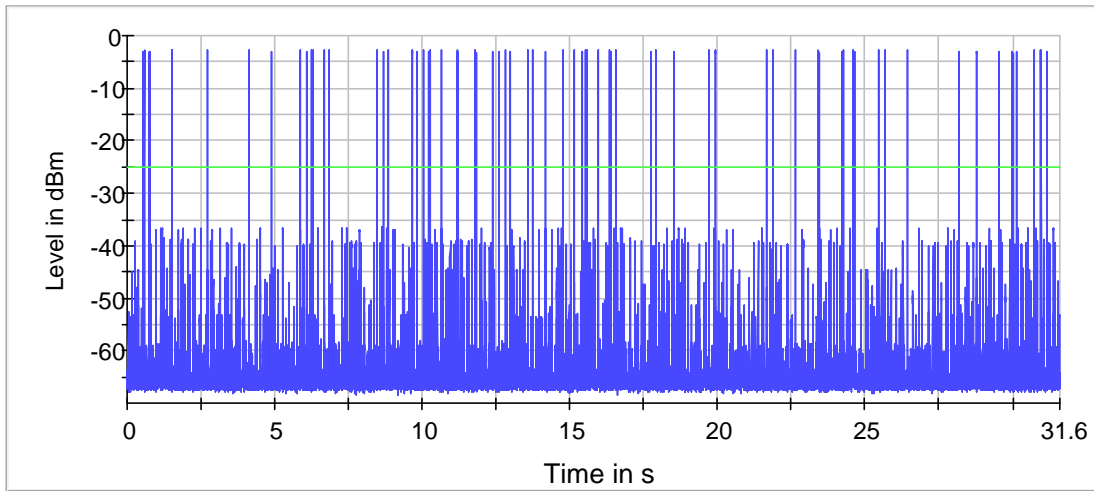
Date : 20 May 2022

### Time of Channel Occupancy(3) (2441 MHz; GFSK; DH5)

#### Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	68	199.630	-25.0

Time of Channel Occupancy(3)



— Trace      — Threshold

#### Measurement

Setting	Instrument Value	Target Value
Center Frequency	2.44100 GHz	2.44100 GHz
Span	ZeroSpan	ZeroSpan
RBW	500.000 kHz	~ 500.000 kHz
VBW	1.000 MHz	~ 1.500 MHz
SweepPoints	30001	~ 30001
SweepTime	31.600 s	31.600 s
Reference Level	-20.000 dBm	-20.000 dBm
Attenuation	0.000 dB	0.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Clear Write	Clear Write
SweepType	Sweep	AUTO
Preamp	off	off
Trigger	External	External
Trigger Offset	0.000 s	0.000 s

#### OSP

Setting	Instrument Value	Target Value
Measurement Time	31.600 s	31.600 s
Tracepoints	31600000	31600000
Time resolution	1.000 µs	1.000 µs

FCC ID: QH6CPMKHLM TSPKR



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Detector	RMS	RMS
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# TEST REPORT

Report No. : AB0021966(2)

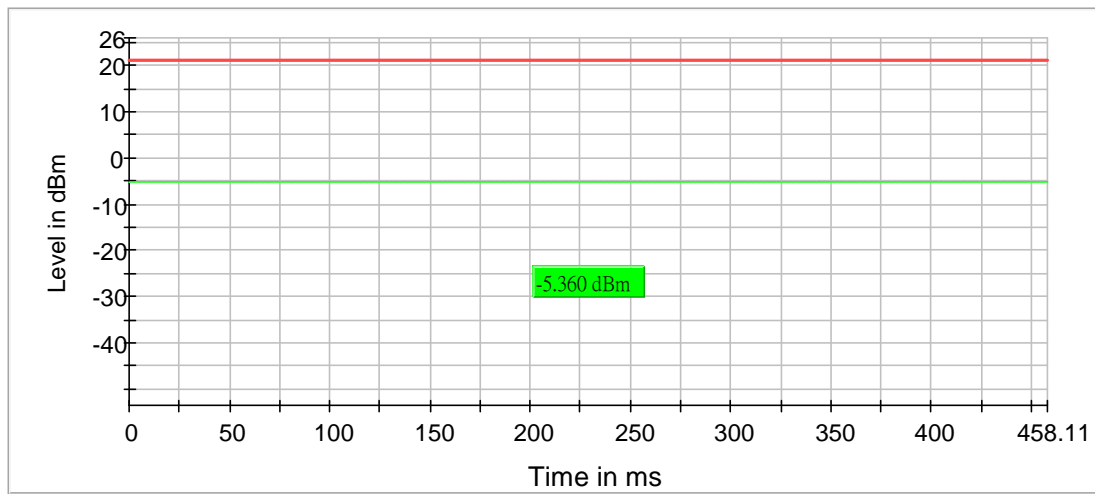
Date : 20 May 2022

## RF output power (2402 MHz; GFSK; DH5)

### Result

DUT Frequency (MHz)	Gated Peak (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2402.000000	-5.4	21.0	-5.4	46.116	PASS

Gated Trace



— Gated Trace   
 — Overall   
 — Limit

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

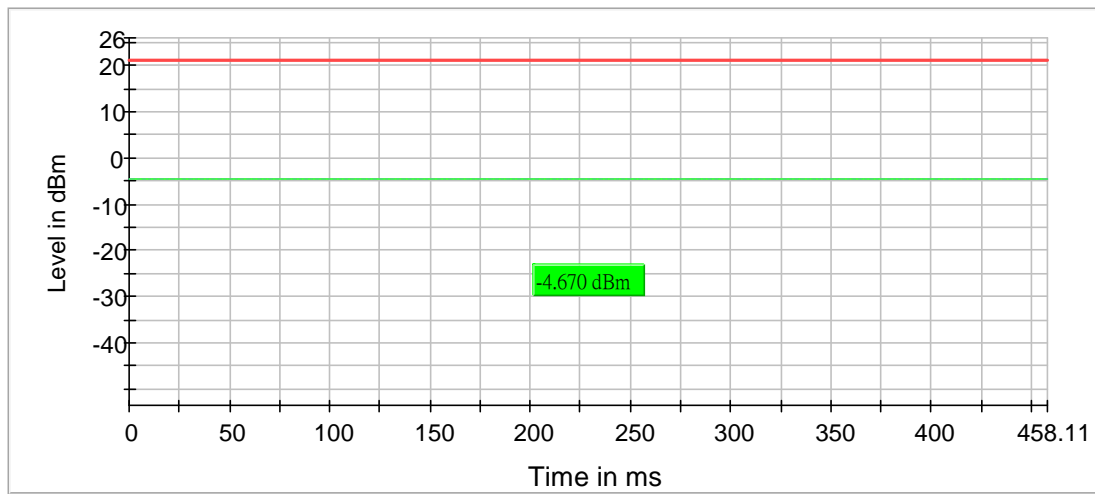
Date : 20 May 2022

### RF output power (2441 MHz; GFSK; DH5)

#### Result

DUT Frequency (MHz)	Gated Peak (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2441.000000	-4.7	21.0	-4.7	46.116	PASS

Gated Trace



— Gated Trace   
 — Overall   
 — Limit

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

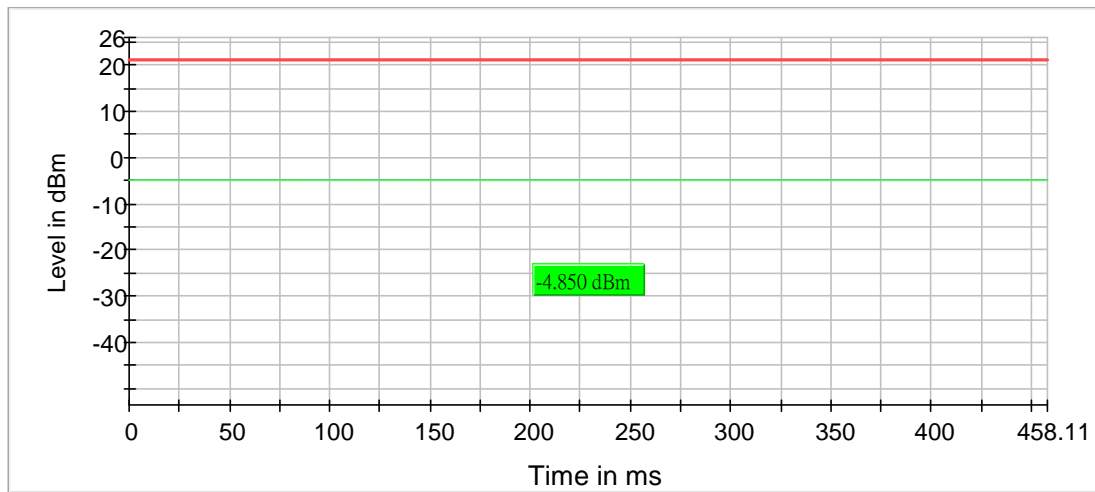
Date : 20 May 2022

### RF output power (2480 MHz; GFSK; DH5)

#### Result

DUT Frequency (MHz)	Gated Peak (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2480.000000	-4.8	21.0	-4.8	46.116	PASS

Gated Trace



— Gated Trace   
 — Overall   
 — Limit

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

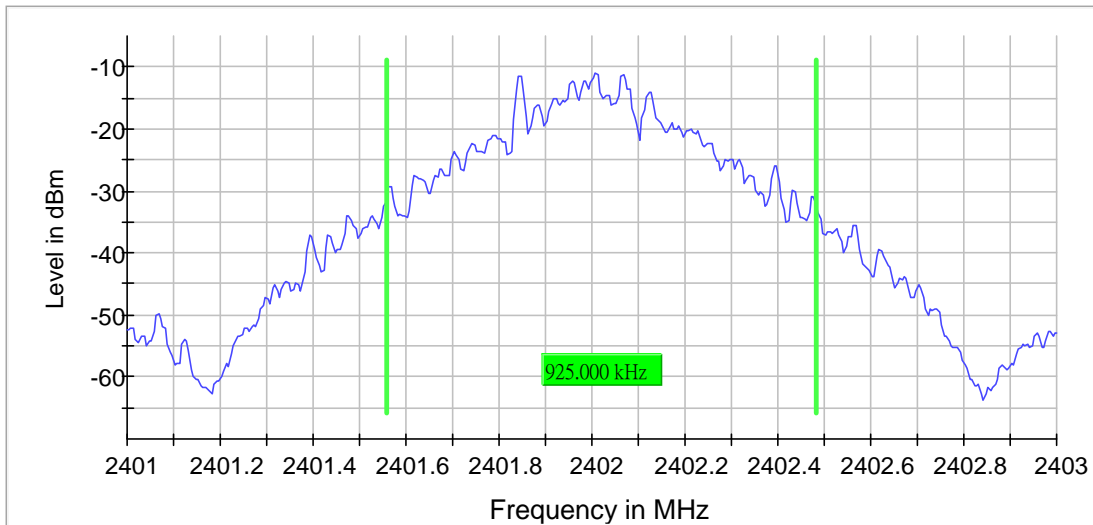
Date : 20 May 2022

### Emission Bandwidth 20 dB (2402 MHz; GFSK; DH5)

#### 20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.925000	---	---	2401.557500	2402.482500

20 dB Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	10.000 kHz	>= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	400	~ 400
SweepTime	189.648 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	12 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.11 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

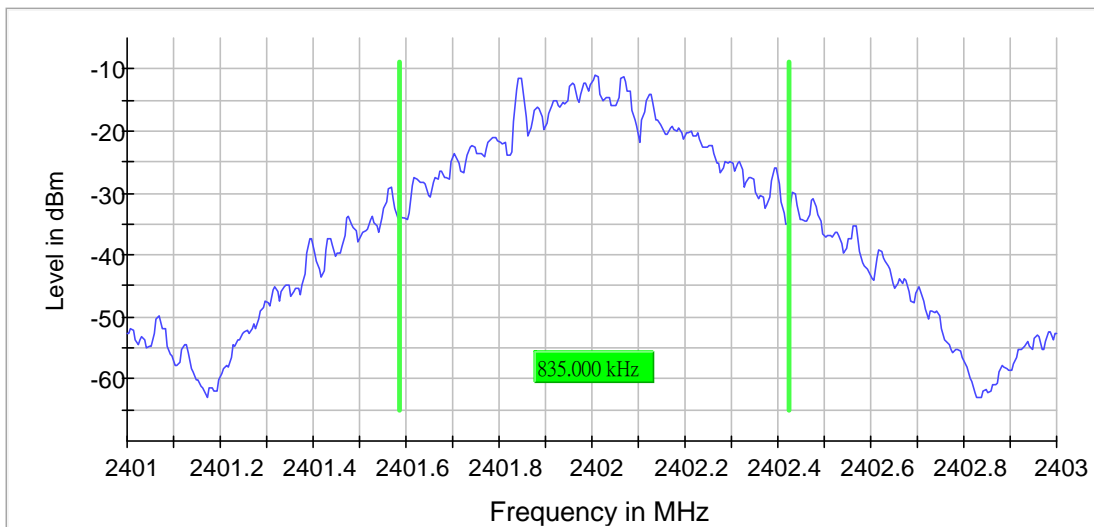
Date : 20 May 2022

### Occupied Channel Bandwidth 99% (2402 MHz; GFSK; DH5)

#### 99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.835000	---	---	2401.587500	2402.422500

99 % Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	10.000 kHz	>= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	400	~ 400
Sweeptime	189.648 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.19 dB	0.30 dB

FCC ID: QH6CPMKHLMTSPKR





## TEST REPORT

Report No. : AB0021966(2)

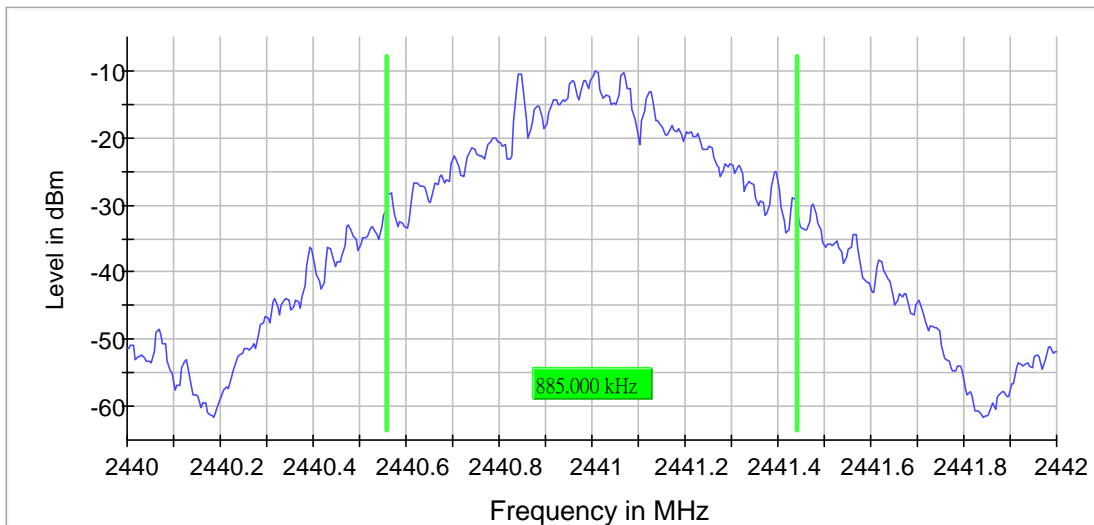
Date : 20 May 2022

### Emission Bandwidth 20 dB (2441 MHz; GFSK; DH5)

#### 20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	0.885000	---	---	2440.557500	2441.442500

20 dB Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.44000 GHz	2.44000 GHz
Stop Frequency	2.44200 GHz	2.44200 GHz
Span	2.000 MHz	2.000 MHz
RBW	10.000 kHz	>= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	400	~ 400
SweepTime	189.648 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	3 dB Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.09 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

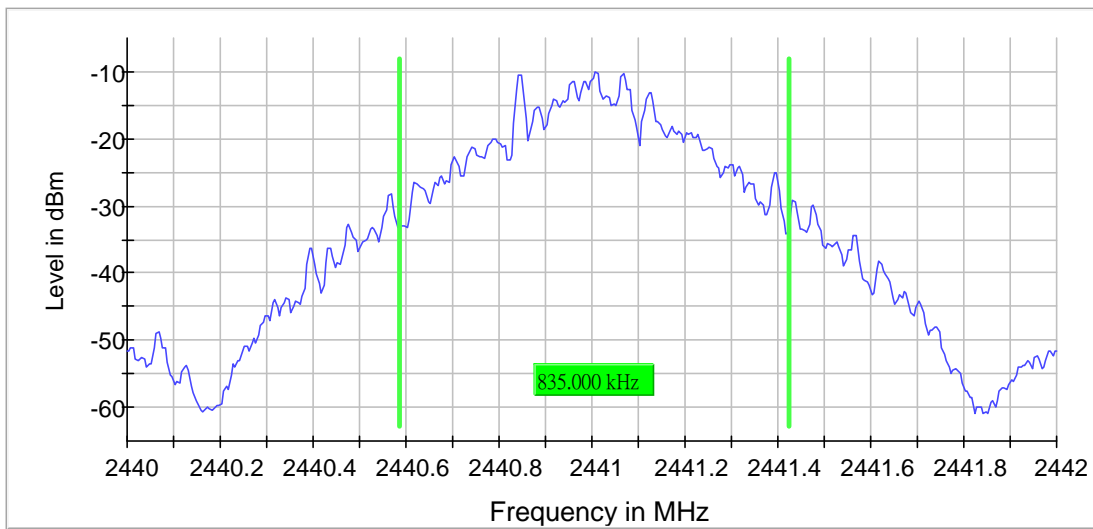
Date : 20 May 2022

### Occupied Channel Bandwidth 99% (2441 MHz; GFSK; DH5)

#### 99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	0.835000	---	---	2440.587500	2441.422500

99 % Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.44000 GHz	2.44000 GHz
Stop Frequency	2.44200 GHz	2.44200 GHz
Span	2.000 MHz	2.000 MHz
RBW	10.000 kHz	>= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	400	~ 400
Sweeptime	189.648 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.08 dB	0.30 dB

FCC ID: QH6CPMKHLMTSPKR

## TEST REPORT

Report No. : AB0021966(2)

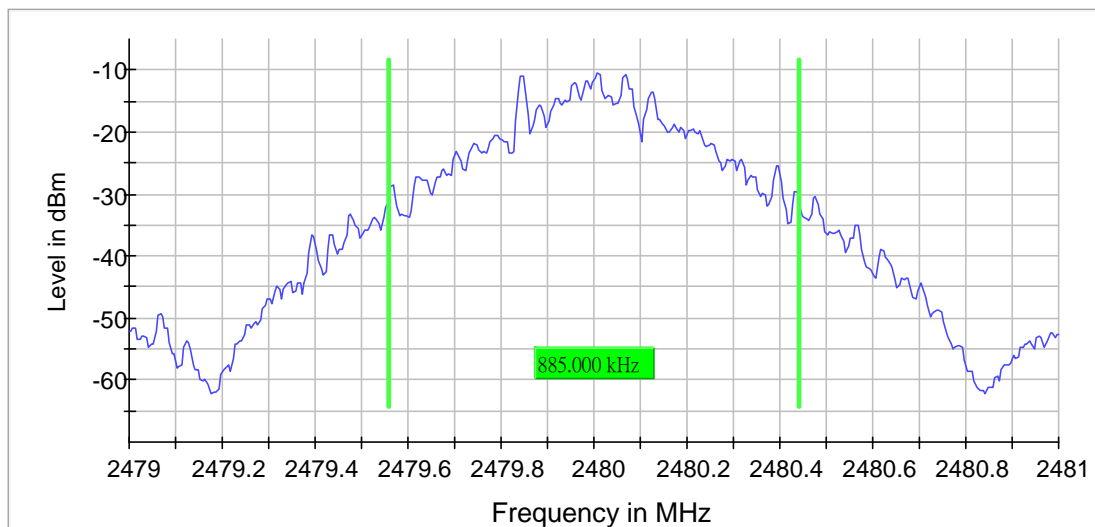
Date : 20 May 2022

### Emission Bandwidth 20 dB (2480 MHz; GFSK; DH5)

#### 20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	0.885000	---	---	2479.557500	2480.442500

20 dB Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47900 GHz	2.47900 GHz
Stop Frequency	2.48100 GHz	2.48100 GHz
Span	2.000 MHz	2.000 MHz
RBW	10.000 kHz	>= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	400	~ 400
SweepTime	189.648 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	3 dB Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.09 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

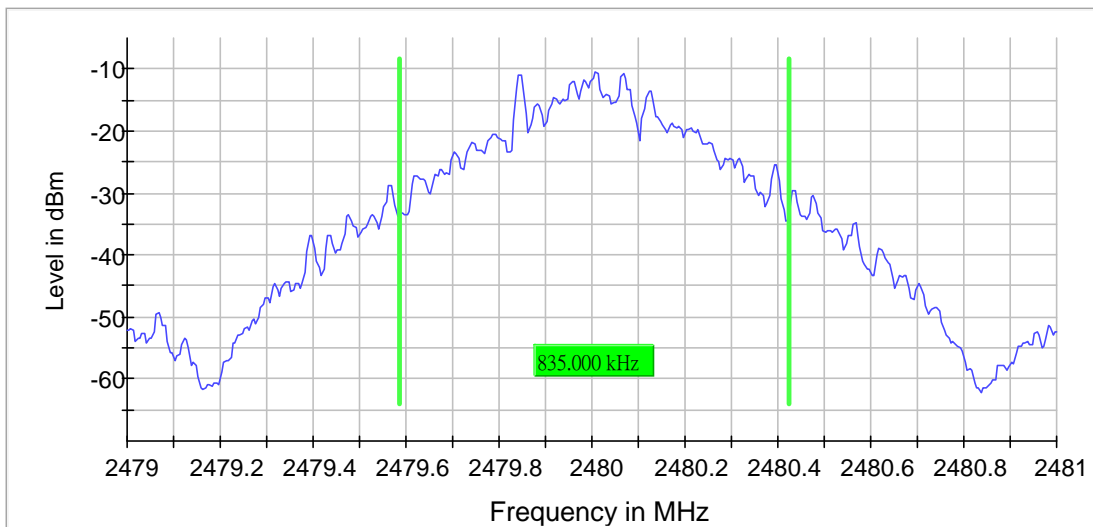
Date : 20 May 2022

### Occupied Channel Bandwidth 99% (2480 MHz; GFSK; DH5)

#### 99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.00000	0.835000	---	---	2479.587500	2480.422500

99 % Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47900 GHz	2.47900 GHz
Stop Frequency	2.48100 GHz	2.48100 GHz
Span	2.000 MHz	2.000 MHz
RBW	10.000 kHz	>= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	400	~ 400
Sweeptime	189.648 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.11 dB	0.30 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

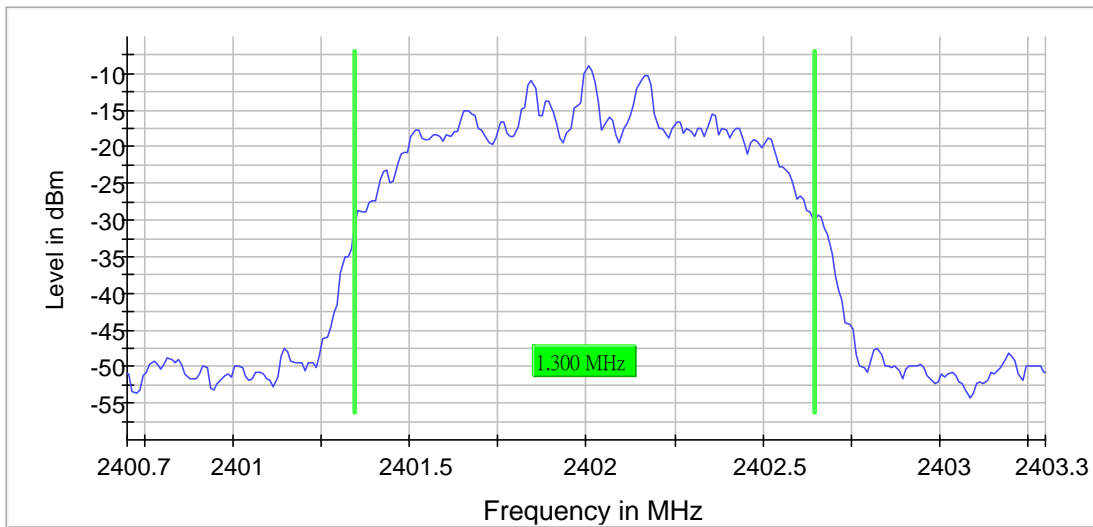
Date : 20 May 2022

### Emission Bandwidth 20 dB (2402 MHz; $\pi/4$ DQPSK; 2DH5)

#### 20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.300000	---	---	2401.345000	2402.645000

20 dB Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40070 GHz	2.40070 GHz
Stop Frequency	2.40330 GHz	2.40330 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	18 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.11 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

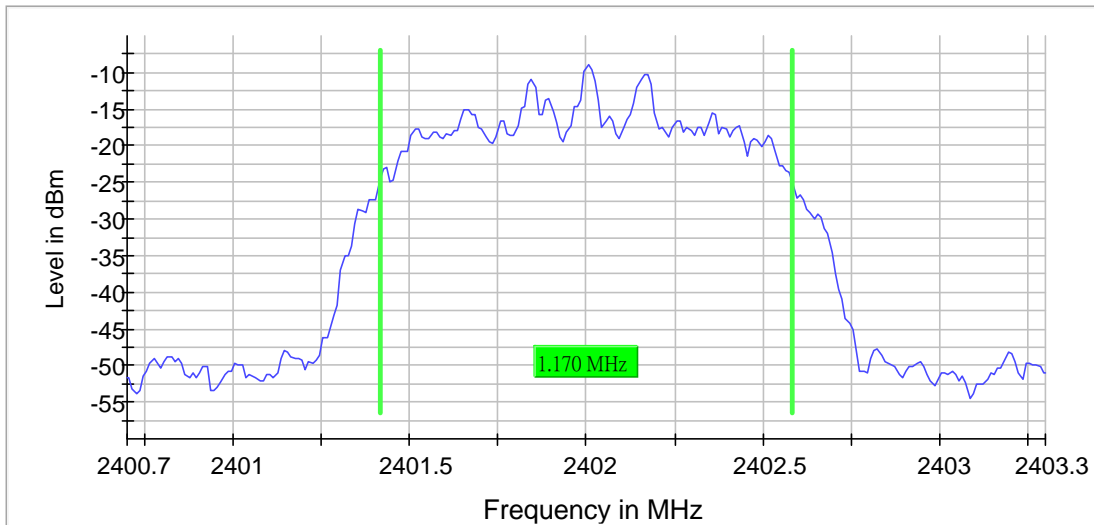
Date : 20 May 2022

### Occupied Channel Bandwidth 99% (2402 MHz; $\pi/4$ DQPSK; 2DH5)

#### 99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.180000	---	---	2401.415000	2402.585000

99 % Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40070 GHz	2.40070 GHz
Stop Frequency	2.40330 GHz	2.40330 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
SweepTime	94.727 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.04 dB	0.30 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

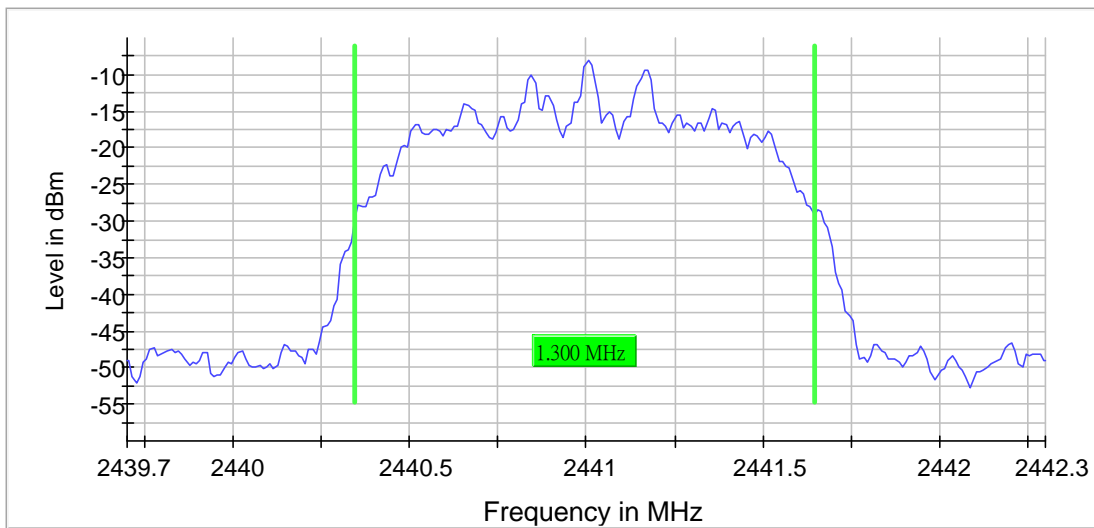
Date : 20 May 2022

### Emission Bandwidth 20 dB (2441 MHz; $\pi/4$ DQPSK; 2DH5)

#### 20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.300000	---	---	2440.345000	2441.645000

20 dB Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43970 GHz	2.43970 GHz
Stop Frequency	2.44230 GHz	2.44230 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
SweepTime	94.727 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.07 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

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## TEST REPORT

Report No. : AB0021966(2)

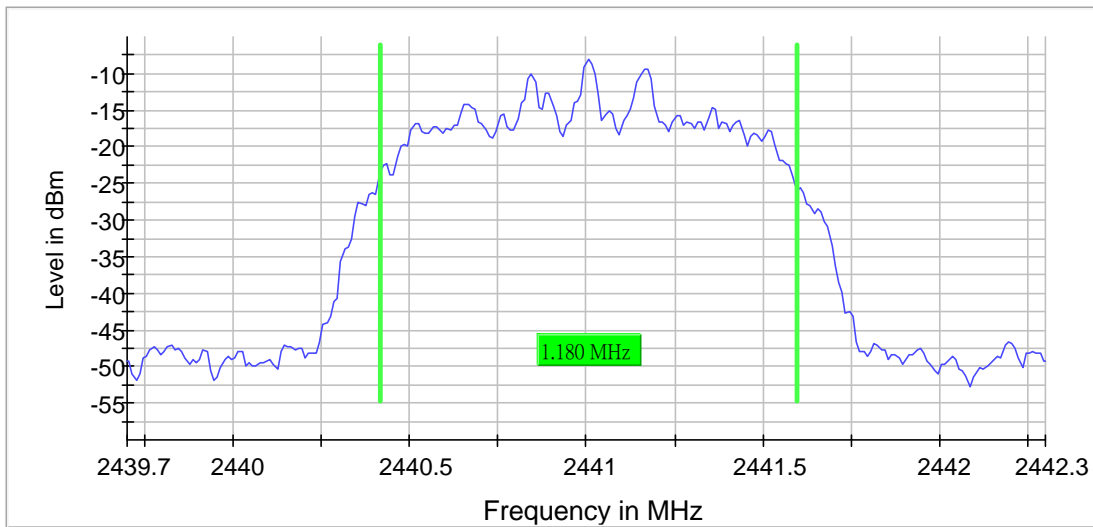
Date : 20 May 2022

### Occupied Channel Bandwidth 99% (2441 MHz; $\pi/4$ DQPSK; 2DH5)

#### 99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.180000	---	---	2440.415000	2441.595000

99 % Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43970 GHz	2.43970 GHz
Stop Frequency	2.44230 GHz	2.44230 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.03 dB	0.30 dB

FCC ID: QH6CPMKHLM TSPKR

## TEST REPORT

Report No. : AB0021966(2)

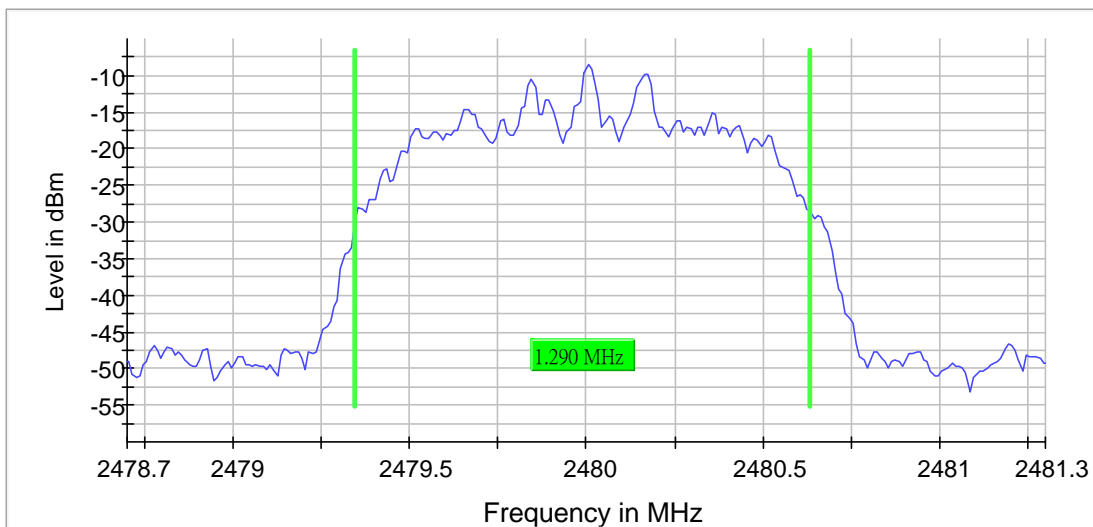
Date : 20 May 2022

### Emission Bandwidth 20 dB (2480 MHz; $\pi/4$ DQPSK; 2DH5)

#### 20 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.300000	---	---	2479.345000	2480.635000

20 dB Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47870 GHz	2.47870 GHz
Stop Frequency	2.48130 GHz	2.48130 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
Sweeptime	94.727 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.11 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

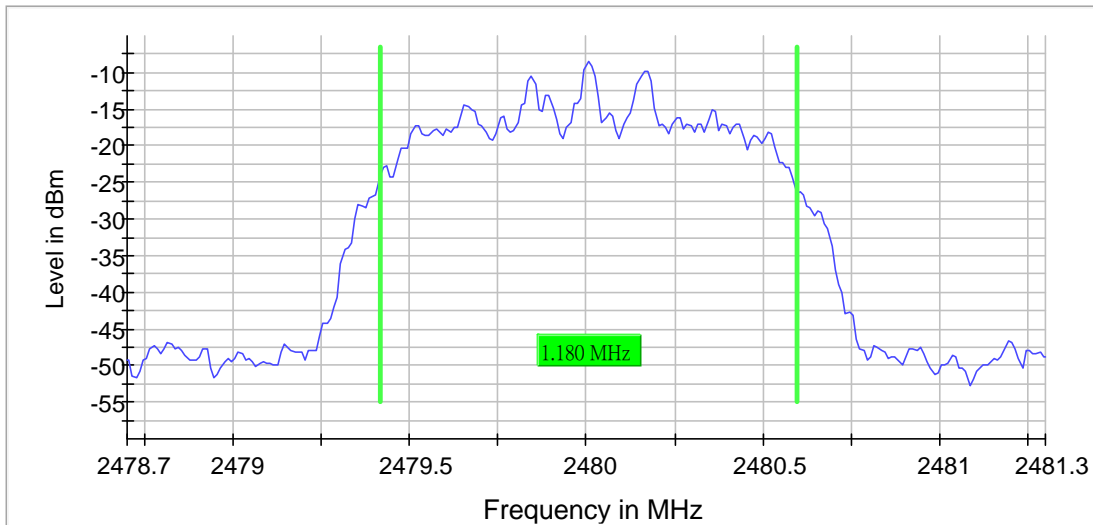
Date : 20 May 2022

### Occupied Channel Bandwidth 99% (2480 MHz; $\pi/4$ DQPSK; 2DH5)

#### 99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.180000	---	---	2479.415000	2480.595000

99 % Bandwidth



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47870 GHz	2.47870 GHz
Stop Frequency	2.48130 GHz	2.48130 GHz
Span	2.600 MHz	2.600 MHz
RBW	20.000 kHz	>= 13.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
SweepPoints	260	~ 260
SweepTime	94.727 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.07 dB	0.30 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

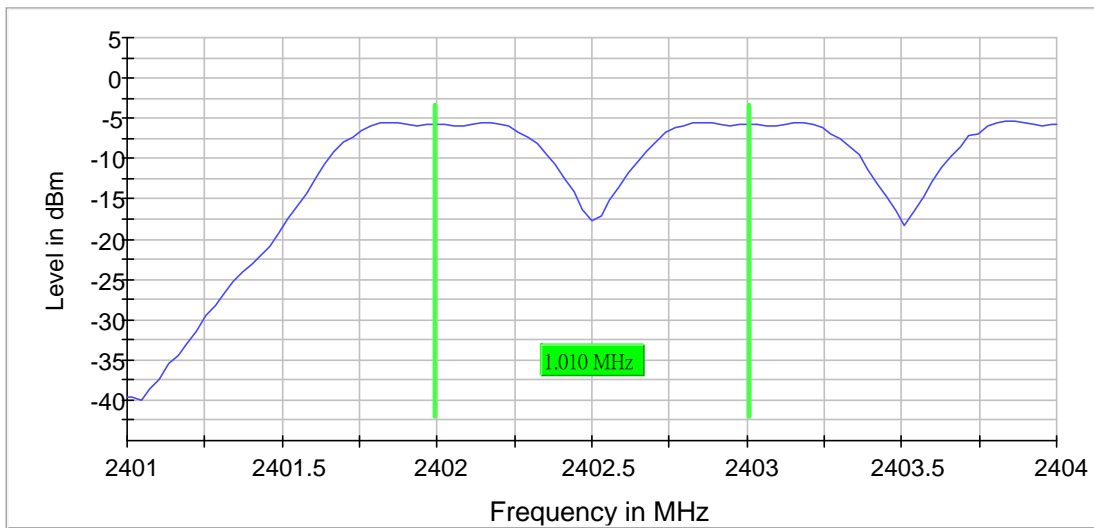
Date : 20 May 2022

### Carrier Frequency Separation (2402 MHz; GFSK; DH5)

#### Result

DUT Frequency (MHz)	Frequency Separation (MHz)	Limit Min (MHz)	Limit Max (MHz)	Center Frequency low Channel (MHz)	Center Frequency high Channel (MHz)
2402.000000	1.009900	0.616667	---	2401.995050	2403.004950

CFS



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40400 GHz	2.40400 GHz
Span	3.000 MHz	3.000 MHz
RBW	300.000 kHz	<= 300.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	101	~ 10
SweepTime	1.000 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	21 / max. 150	max. 150
Stable	10 / 10	10
Max Stable Difference	0.03 dB	0.50 dB

FCC ID: QH6CPMKHLM TSPKR



## TEST REPORT

Report No. : AB0021966(2)

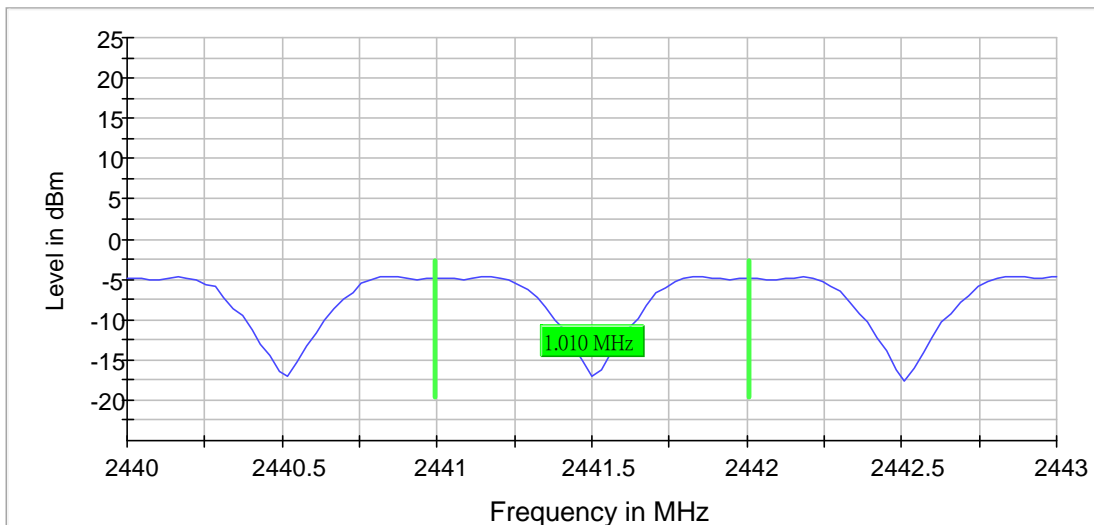
Date : 20 May 2022

### Carrier Frequency Separation (2441 MHz; GFSK; DH5)

#### Result

DUT Frequency (MHz)	Frequency Separation (MHz)	Limit Min (MHz)	Limit Max (MHz)	Center Frequency low Channel (MHz)	Center Frequency high Channel (MHz)
2441.000000	1.009900	0.616667	---	2440.995050	2442.004950

CFS



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.44000 GHz	2.44000 GHz
Stop Frequency	2.44300 GHz	2.44300 GHz
Span	3.000 MHz	3.000 MHz
RBW	300.000 kHz	<= 300.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	101	~ 10
SweepTime	1.000 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	12 / max. 150	max. 150
Stable	10 / 10	10
Max Stable Difference	0.00 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

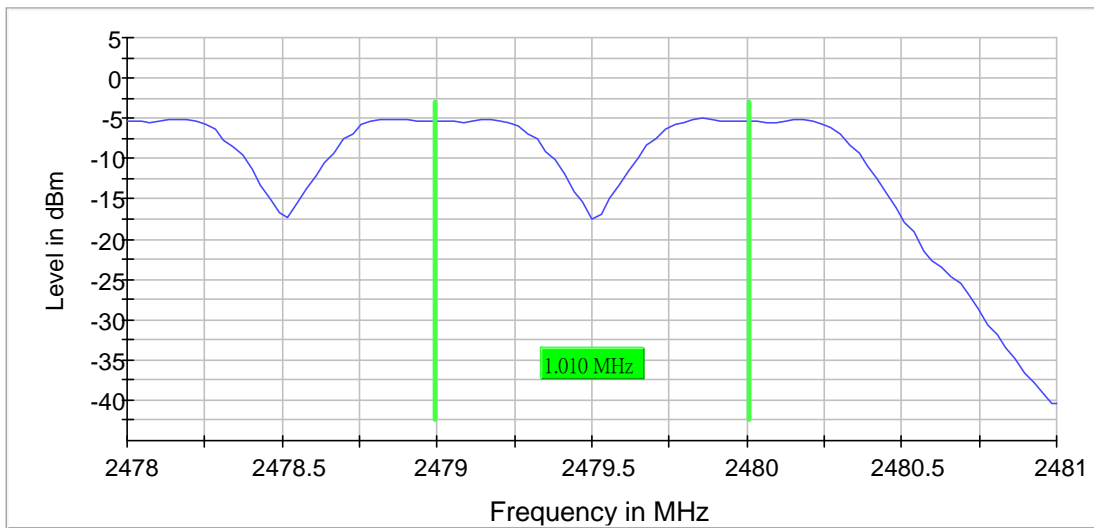
Date : 20 May 2022

### Carrier Frequency Separation (2480 MHz; GFSK; DH5)

#### Result

DUT Frequency (MHz)	Frequency Separation (MHz)	Limit Min (MHz)	Limit Max (MHz)	Center Frequency low Channel (MHz)	Center Frequency high Channel (MHz)
2480.000000	1.009900	0.616667	---	2478.995050	2480.004950

CFS



#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47800 GHz	2.47800 GHz
Stop Frequency	2.48100 GHz	2.48100 GHz
Span	3.000 MHz	3.000 MHz
RBW	300.000 kHz	<= 300.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	101	~ 10
SweepTime	1.000 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	25 / max. 150	max. 150
Stable	10 / 10	10
Max Stable Difference	0.00 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



# TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

## Band Edge low (Hopping; GFSK; DH5)

### Result

DUT Frequency (MHz)	Result
hopping	PASS

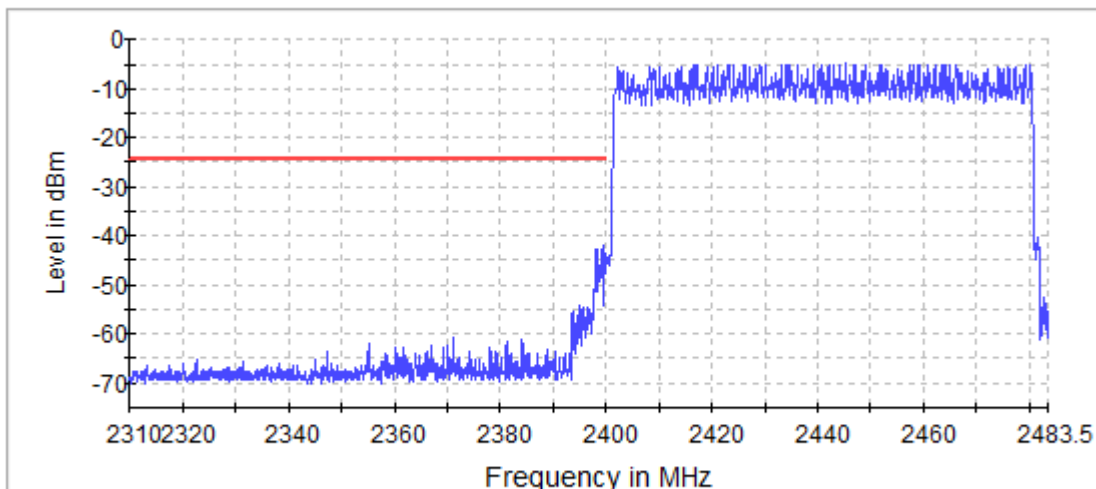
### Inband Peak

Frequency (MHz)	Level (dBm)
2445.175000	-4.7

### Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.175000	-41.9	7.2	-24.7	PASS
2399.225000	-42.5	7.8	-24.7	PASS
2397.875000	-42.7	8.0	-24.7	PASS
2398.025000	-42.8	8.0	-24.7	PASS
2398.275000	-42.8	8.1	-24.7	PASS
2397.825000	-42.9	8.2	-24.7	PASS
2398.075000	-43.1	8.4	-24.7	PASS
2399.125000	-43.2	8.5	-24.7	PASS
2398.325000	-43.5	8.7	-24.7	PASS
2399.975000	-43.5	8.7	-24.7	PASS
2399.025000	-43.5	8.8	-24.7	PASS
2399.925000	-43.6	8.8	-24.7	PASS
2399.875000	-44.1	9.4	-24.7	PASS
2399.275000	-44.5	9.7	-24.7	PASS
2398.225000	-44.5	9.8	-24.7	PASS

Band Edge



— Limit    — Sum Level    × Fail

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	1.800 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

### Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	1.670 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	117 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR





## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Band Edge high (Hopping; GFSK; DH5)

#### Result

DUT Frequency (MHz)	Result
hopping	PASS

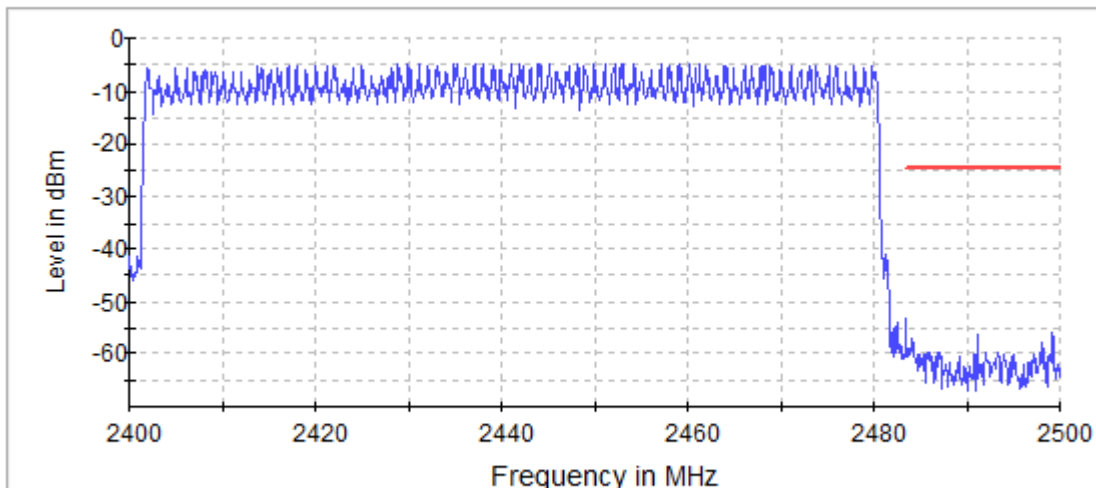
#### Inband Peak

Frequency (MHz)	Level (dBm)
2445.175000	-4.7

#### Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2499.175000	-55.8	21.1	-24.7	PASS
2491.175000	-56.2	21.4	-24.7	PASS
2499.125000	-56.4	21.7	-24.7	PASS
2491.125000	-57.0	22.3	-24.7	PASS
2499.225000	-57.2	22.5	-24.7	PASS
2484.175000	-57.3	22.5	-24.7	PASS
2484.125000	-57.6	22.9	-24.7	PASS
2498.175000	-57.8	23.0	-24.7	PASS
2491.225000	-57.8	23.0	-24.7	PASS
2498.125000	-58.1	23.3	-24.7	PASS
2484.225000	-58.2	23.5	-24.7	PASS
2484.325000	-58.4	23.6	-24.7	PASS
2484.275000	-58.4	23.7	-24.7	PASS
2483.725000	-58.9	24.2	-24.7	PASS
2483.825000	-59.0	24.3	-24.7	PASS

Band Edge



— Limit    — Sum Level    × Fail

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	1.670 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	149 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

### Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.48350 GHz	2.48350 GHz
Stop Frequency	2.50000 GHz	2.50000 GHz
Span	16.500 MHz	16.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	330	~ 330
SweepTime	37.969 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	14 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Band Edge low (2402 MHz; GFSK; DH5)

#### Result

DUT Frequency (MHz)	Result
2402.000000	PASS

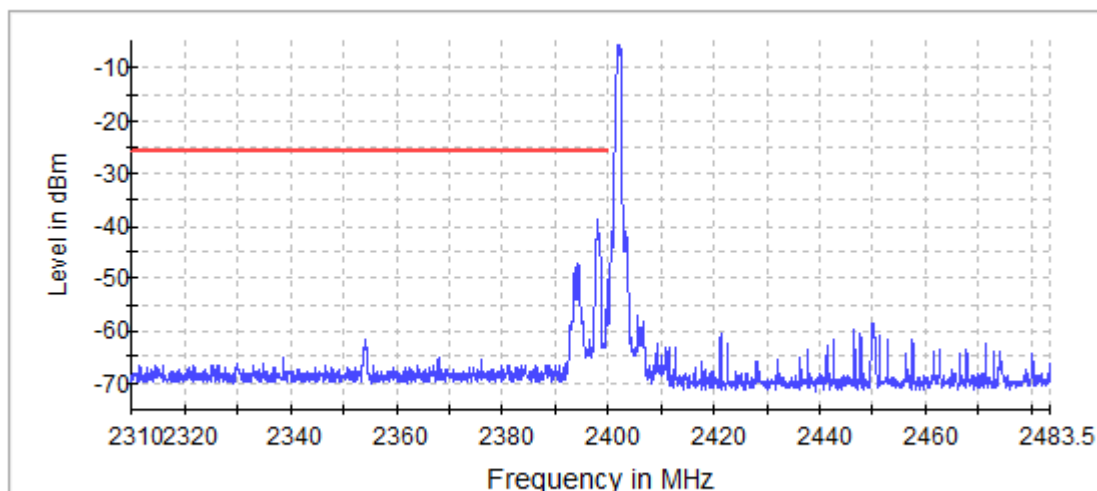
#### Inband Peak

Frequency (MHz)	Level (dBm)
2401.875000	-5.6

#### Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2398.175000	-38.6	3.0	-25.6	PASS
2397.875000	-38.6	3.0	-25.6	PASS
2398.025000	-38.9	3.3	-25.6	PASS
2397.825000	-39.2	3.6	-25.6	PASS
2398.075000	-39.5	3.9	-25.6	PASS
2398.225000	-39.8	4.2	-25.6	PASS
2397.975000	-40.3	4.7	-25.6	PASS
2397.925000	-40.4	4.8	-25.6	PASS
2398.125000	-41.1	5.5	-25.6	PASS
2398.275000	-42.4	6.8	-25.6	PASS
2397.675000	-42.5	6.9	-25.6	PASS
2397.725000	-42.5	7.0	-25.6	PASS
2397.625000	-42.7	7.1	-25.6	PASS
2398.375000	-42.7	7.1	-25.6	PASS
2397.775000	-42.7	7.1	-25.6	PASS

Band Edge



— Limit    — Sum Level    × Fail

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	1.800 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.12 dB	0.50 dB

### Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	1.670 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	15 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.18 dB	0.50 dB

FCC ID: QH6CPMKHLM TSPKR



## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Band Edge high (2480 MHz; GFSK; DH5)

#### Result

DUT Frequency (MHz)	Result
2480.000000	PASS

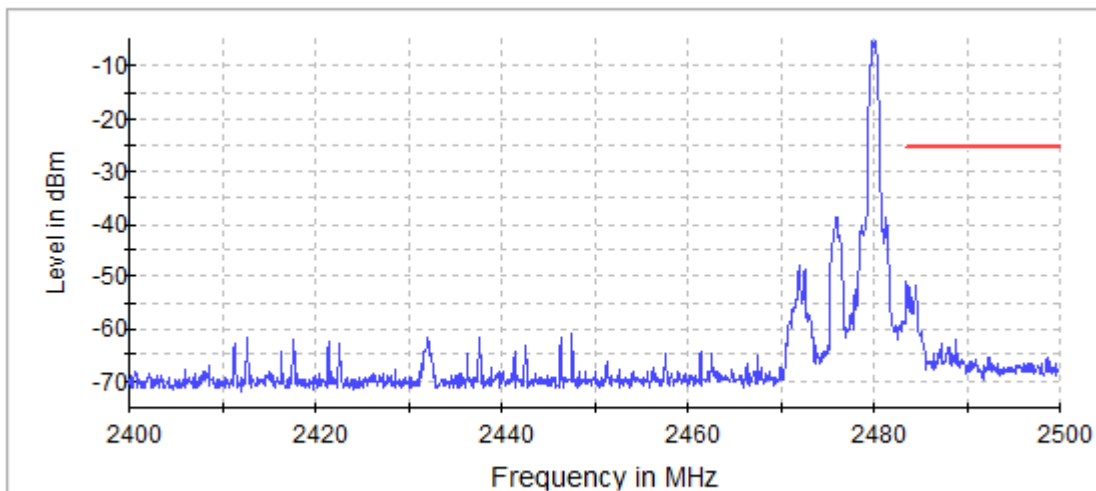
#### Inband Peak

Frequency (MHz)	Level (dBm)
2480.175000	-5.2

#### Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-50.9	15.7	-25.2	PASS
2483.575000	-51.6	16.4	-25.2	PASS
2484.475000	-51.7	16.5	-25.2	PASS
2484.525000	-52.1	16.8	-25.2	PASS
2483.975000	-52.1	16.9	-25.2	PASS
2484.025000	-52.3	17.1	-25.2	PASS
2484.425000	-54.0	18.8	-25.2	PASS
2483.925000	-55.0	19.8	-25.2	PASS
2484.075000	-55.2	19.9	-25.2	PASS
2483.625000	-55.2	20.0	-25.2	PASS
2484.375000	-55.5	20.3	-25.2	PASS
2483.675000	-55.9	20.7	-25.2	PASS
2483.725000	-56.2	21.0	-25.2	PASS
2483.875000	-56.4	21.2	-25.2	PASS
2483.825000	-56.7	21.5	-25.2	PASS

Band Edge



— Limit    — Sum Level    × Fail

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	1.670 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.20 dB	0.50 dB

### Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.48350 GHz	2.48350 GHz
Stop Frequency	2.50000 GHz	2.50000 GHz
Span	16.500 MHz	16.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	330	~ 330
SweepTime	37.969 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	13 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.46 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Tx Spurious Emission (2402 MHz; GFSK; DH5)

#### Result Inband Peak

Frequency (MHz)	Level (dBm)
2402.000	-6.4

#### Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
---	---	---	---	---	---

#### Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2395.021008	-38.9	12.5	-26.4
4807.166065	-46.4	19.9	-26.4
7205.789099	-50.2	23.7	-26.4
94.726891	-50.9	24.5	-26.4
9604.412133	-52.7	26.3	-26.4
7195.794836	-54.1	27.7	-26.4
64.852941	-54.2	27.8	-26.4
44.936975	-57.3	30.9	-26.4
2498.491394	-62.0	35.6	-26.4
74.810924	-62.0	35.6	-26.4
144.516807	-62.1	35.7	-26.4
2355.189076	-62.9	36.5	-26.4
104.684874	-65.1	38.7	-26.4
124.600840	-65.4	39.0	-26.4
194.306723	-66.0	39.6	-26.4

#### Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	2400.000000	1	1
2400.000000	2483.500000	1	1
2483.500000	26000.000000	1	1

FCC ID: QH6CPMKHLMTSPKR

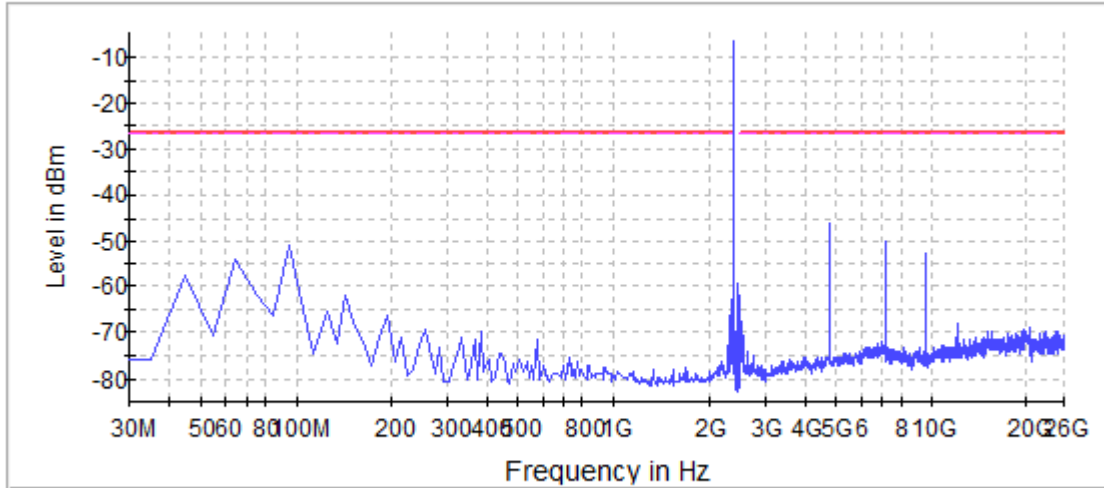


## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Spurious



— Limit   
 — Sum Level   
 - - - Threshold   
 × Critical   
 × Final Critical

### Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	238	~ 238
SweepTime	23.700 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	3	3
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.25 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR





## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Tx Spurious Emission (2441 MHz; GFSK;DH5)

#### Result Inband Peak

Frequency (MHz)	Level (dBm)
2441.000	-6.0

#### Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
---	---	---	---	---	---

#### Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4877.125903	-48.5	22.5	-26.0
4887.120166	-48.9	22.9	-26.0
7325.720251	-49.3	23.3	-26.0
94.726891	-50.7	24.7	-26.0
64.852941	-52.4	26.4	-26.0
9754.326073	-54.4	28.4	-26.0
7315.725988	-54.4	28.4	-26.0
2488.497131	-56.7	30.7	-26.0
44.936975	-57.3	31.3	-26.0
2538.468445	-59.1	33.1	-26.0
144.516807	-60.9	34.9	-26.0
2395.021008	-61.7	35.7	-26.0
74.810924	-62.1	36.1	-26.0
104.684874	-63.6	37.6	-26.0
124.600840	-64.5	38.5	-26.0

#### Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	2400.000000	1	1
2400.000000	2483.500000	1	1
2483.500000	26000.000000	1	1

FCC ID: QH6CPMKHLMTSPKR

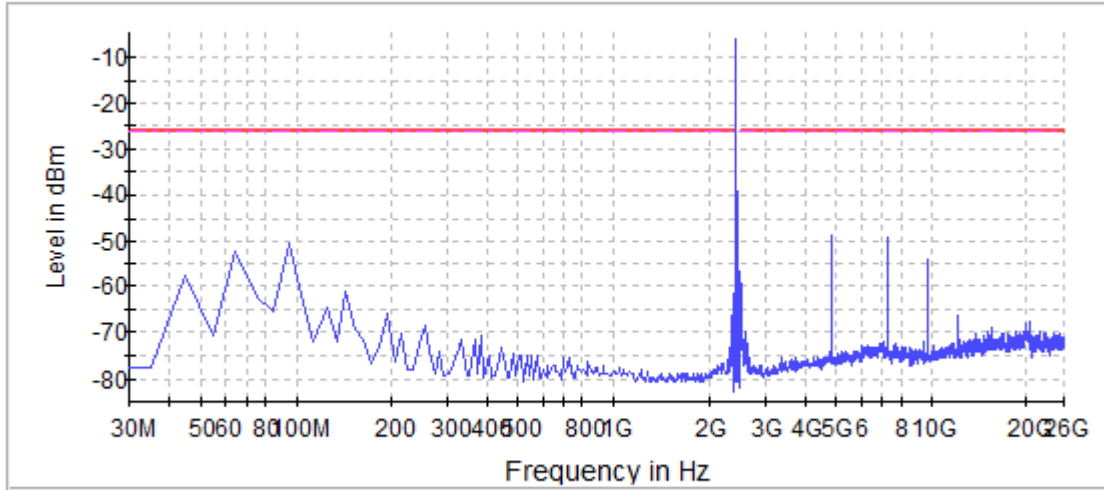


## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Spurious



— Limit   
 — Sum Level   
 - - - Threshold   
 × Critical   
 × Final Critical

### Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	238	~ 238
SweepTime	23.700 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	3	3
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Tx Spurious Emission (2480 MHz; GFSK;DH5)

#### Result Inband Peak

Frequency (MHz)	Level (dBm)
2480.000	-5.9

#### Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
---	---	---	---	---	---

#### Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4957.080004	-48.3	22.3	-25.9
7435.657140	-49.5	23.6	-25.9
94.726891	-50.6	24.7	-25.9
2488.497131	-53.9	27.9	-25.9
9914.234275	-55.1	29.2	-25.9
2528.474182	-56.4	30.5	-25.9
44.936975	-56.9	31.0	-25.9
7445.651402	-57.0	31.0	-25.9
144.516807	-60.9	34.9	-25.9
2578.445495	-61.6	35.7	-25.9
911.281513	-61.7	35.7	-25.9
74.810924	-62.4	36.4	-25.9
124.600840	-63.1	37.2	-25.9
104.684874	-64.8	38.9	-25.9
2548.462707	-65.0	39.0	-25.9

#### Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	2400.000000	1	1
2400.000000	2483.500000	1	1
2483.500000	26000.000000	1	1

FCC ID: QH6CPMKHLMTSPKR

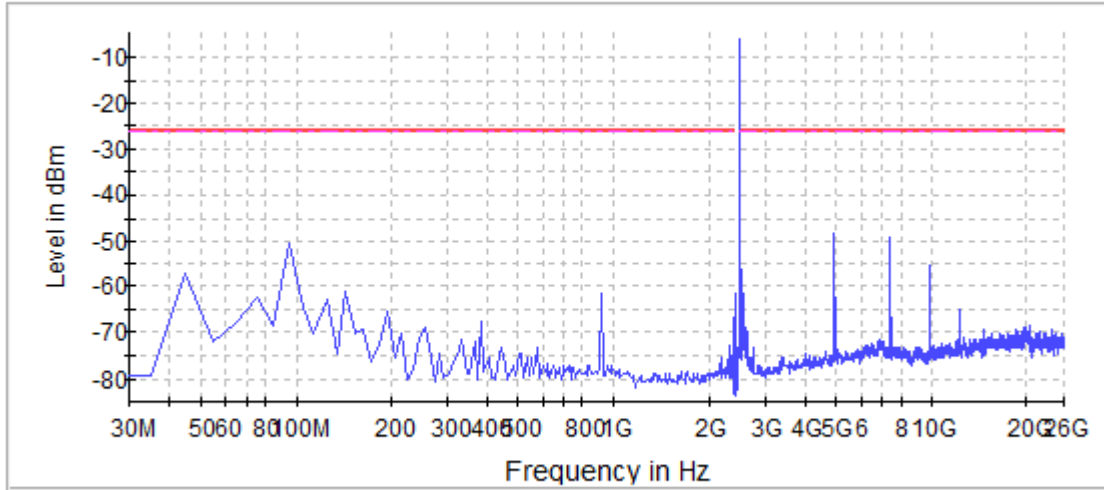


## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

### Spurious



— Limit   
 — Sum Level   
 - - - Threshold   
 × Critical   
 × Final Critical

### Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	238	~ 238
SweepTime	23.700 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	3	3
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

FCC ID: QH6CPMKHLMTSPKR



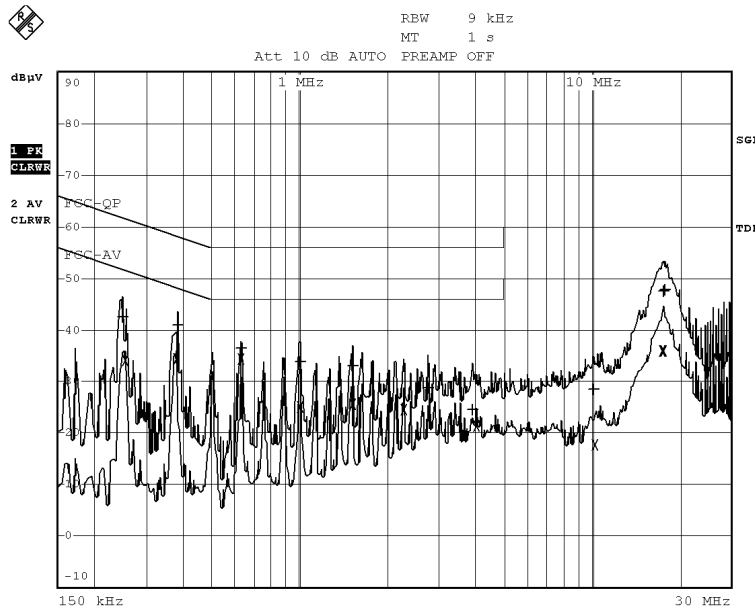
# TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

## Conducted Emission

Test mode: Bluetooth + Charging



FCC ID: QH6CPMKHLMTSPKR



## TEST REPORT

Report No. : AB0021966(2)

Date : 20 May 2022

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC-QP			
Trace2:	FCC-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	249 kHz	42.66	N gnd	-19.12
2 Average	253.5 kHz	34.28	L1 gnd	-17.36
2 Average	379.5 kHz	34.37	L1 gnd	-13.91
1 Quasi Peak	384 kHz	41.03	L1 gnd	-17.15
1 Quasi Peak	630.5 kHz	36.63	L1 gnd	-19.36
2 Average	630.5 kHz	34.40	L1 gnd	-11.60
1 Quasi Peak	1.0085 MHz	33.92	L1 gnd	-22.07
2 Average	1.0085 MHz	25.02	L1 gnd	-20.97
1 Quasi Peak	1.517 MHz	33.14	L1 gnd	-22.85
2 Average	1.517 MHz	25.44	L1 gnd	-20.55
2 Average	2.282 MHz	24.47	L1 gnd	-21.52
1 Quasi Peak	2.7725 MHz	28.62	L1 gnd	-27.37
1 Quasi Peak	3.9065 MHz	24.46	L1 gnd	-31.53
2 Average	4.0595 MHz	21.49	L1 gnd	-24.50
1 Quasi Peak	10.1255 MHz	28.46	N gnd	-31.53
2 Average	10.229 MHz	17.56	N gnd	-32.43
2 Average	17.537 MHz	36.07	N gnd	-13.92
1 Quasi Peak	17.5775 MHz	47.58	L1 gnd	-12.41
2 Average	17.7395 MHz	36.12	N gnd	-13.87
1 Quasi Peak	17.8295 MHz	47.90	L1 gnd	-12.10

## APPENDIX B Outlook

FCC ID: QH6CPMKHLMTSPKR

**TEST REPORT**

Report No. : AB0021966(2)

Date : 20 May 2022



\*\*\*\*\* End of Report \*\*\*\*\*

FCC ID: QH6CPMKHLMTSPKR