



## TEST REPORT

Report No. : AA0015629(1) Date : 31 Mar 2021

Application No. : LA006277(0)

Applicant : Three Champions Enterprise Co., Ltd.  
Flat E-105, 3/F., Tak Wing Industrial Building,  
3 Tsun Wen Road, Tuen Mun, Hong Kong

Buyer : RSI International Limited  
Room 1101, 11<sup>th</sup> Floor, Tower 2, China Hong Kong City, 33 Canton Road,  
Tsimshatsui, Kowloon, Hong Kong.

Sample Description : One (1) submitted sample stated to be

|                           |   |                     |
|---------------------------|---|---------------------|
| Sample                    | : | Ear bud/Speaker/USB |
| Item Name                 | : | AL-D BT EB MINT     |
| Claire's Category         | : | Young               |
| Claire's Order by Country | : | Int'l               |
| Department No.            | : | 49                  |
| Claire's Style No.        | : | 95489-1             |
| PO No.                    | : | 869649S             |
| PO Cancel Date            | : | 25 May 2021         |
| Vendor Style No.          | : | Z002-95489-1        |
| FOB Port                  | : | Hong Kong           |

Date Received : 22 Mar 2021

Test Period : 25 Mar 2021 to 31 Mar 2021

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

Test Method : 47 CFR Part 15 (10-1-19 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 66

Wong Lap Pong / Andrew  
Deputy Technical Manager

FCC ID: 2AVGC3CBT011

The conformity statement stated in Conclusion above is based on the decision made by the FCC/SEDA on 16 Mar 2021. Ref No. RT-EMC-048 / Issue Date: 16 Mar 2021 / Edition: 2  
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**Room 1302, Yan Hing Centre, 9-13 Wong Chuk Yeung St., Fo Tan, Shatin, N.T., Hong Kong.**

**Tel: (852) 2698 8198 Fax: (852) 2695 4177 E-mail: [info@cmateesting.org](mailto:info@cmateesting.org) Web Site: <http://www.cmateesting.org>**



## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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   |

FCC ID: 2AVGC3CBT011

Page 2 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### Table of Contents

|                                                                  |    |
|------------------------------------------------------------------|----|
| Table of Contents .....                                          | 3  |
| 1 Product Information .....                                      | 5  |
| 1.1 General Information.....                                     | 5  |
| 1.2 Technical Information.....                                   | 5  |
| 1.3 Associated Electric Accessories Information .....            | 6  |
| 1.4 Associated Cables .....                                      | 6  |
| 2.0 Equipment Units Tested (EUT).....                            | 6  |
| 3.0 Location of Test Facility.....                               | 6  |
| 4.0 List of test equipment, supporting equipment and cables..... | 7  |
| 4.1 Test equipment.....                                          | 7  |
| 4.2 Supporting equipment.....                                    | 8  |
| 4.3 Cables.....                                                  | 8  |
| 4.4 Software .....                                               | 8  |
| 5.0 Measurement Uncertainty.....                                 | 8  |
| 6.0 Measurement .....                                            | 9  |
| 6.1 General Test condition.....                                  | 9  |
| 6.2 Number of hopping frequency .....                            | 9  |
| 6.2.1 Measurement .....                                          | 9  |
| 6.2.2 Final Result .....                                         | 9  |
| 6.3 Band-edge measurement .....                                  | 10 |
| 6.3.1 Measurement .....                                          | 10 |
| 6.3.2 Final Result .....                                         | 11 |
| 6.4 Carrier Frequency Separation .....                           | 12 |
| 6.4.1 Measurement .....                                          | 12 |
| 6.4.2 Final Result .....                                         | 12 |
| 6.5 Time of occupancy (dwell time) .....                         | 13 |
| 6.5.1 Measurement .....                                          | 13 |
| 6.5.2 Final Result .....                                         | 13 |
| 6.6 Output Power .....                                           | 14 |
| 6.6.1 Measurement .....                                          | 14 |
| 6.6.2 Final Result .....                                         | 14 |
| 6.7 Occupied Bandwidth.....                                      | 15 |
| 6.7.1 Measurement .....                                          | 15 |
| 6.7.2 Final Result .....                                         | 15 |
| 6.8 Conducted Spurious emission (Transmitter).....               | 16 |
| 6.8.1 Measurement .....                                          | 16 |
| 6.8.2 Final Result .....                                         | 16 |
| 6.9 Radiated Spurious emission (Transmitter).....                | 17 |
| 6.9.1 Measurement .....                                          | 17 |
| 6.9.2 Final Result .....                                         | 18 |

FCC ID: 2AVGC3CBT011



## **TEST REPORT**

Report No. : AA0015629(1)

Date : 31 Mar 2021

|            |                                                                   |    |
|------------|-------------------------------------------------------------------|----|
| 6.10       | Radiated Spurious emission (other mode).....                      | 19 |
| 6.10.1     | Measurement .....                                                 | 19 |
| 6.10.2     | Final Result .....                                                | 20 |
| 6.11       | Conducted Emission.....                                           | 21 |
| 6.11.1     | Measurement .....                                                 | 21 |
| 6.11.2     | Final Result .....                                                | 21 |
| 7.0        | Frequency Hopping System Requirement .....                        | 22 |
| 8.0        | External photo, Internal Photo and Test configuration Photo ..... | 24 |
| APPENDIX A | Test Result .....                                                 | 25 |

FCC ID: 2AVGC3CBT011

Page 4 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 1 Product Information

#### 1.1 General Information

|                                     |         |
|-------------------------------------|---------|
| Product Description:                | Model:  |
| AL-D BT EB MINT Bluetooth Headphone | 3CBT011 |

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 : Nil

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, 8DPSK

Number of Channel : 79

Channel Bandwidth : 1.0MHz

Occupied Bandwidth : 1.18MHz

Signal Type : Data

Number of Antenna : One

Antenna Type : PCB Type

Antenna Gain : 0.0dBi

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

FCC ID: 2AVGC3CBT011

Page 5 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## **TEST REPORT**

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 1.3 Associated Electric Accessories Information

N/A

### 1.4 Associated Cables

N/A

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

|                        |                                            |
|------------------------|--------------------------------------------|
| Product Description    | : AL-D BT EB MINT                          |
| Model                  | : 3CBT011                                  |
| Serial No.             | : Not specified                            |
| Sample Type            | : Production Sample and engineering sample |
| Sample No.             | : RA030630-013(5)                          |
| 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)

FCC ID: 2AVGC3CBT011

Page 6 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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      | 23 Dec 2021          | 1Year              |
| Spectrum Analyzer       | R&S              | FSP30        | 100628      | 22 Oct 2021          | 2Years             |
| Biconical Antenna       | Rohde & Schwarz  | HK116        | 837414/004  | 29 Nov 2022          | 2Years             |
| Log Periodic Antenna    | Teseq            | UPA6109      | 43666       | 29 Nov 2022          | 2Years             |
| Loop Antenna            | EMCO             | 6502         | 00056620    | 27 Oct 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 | 15 Sep 2021          | 2Years             |
| Broadband Pre-Amplifier | Schwarzbeck      | BBV 9719     | 9719-010    | 12 Sep 2021          | 2Years             |
| Coaxial Cable           | Schaffner        | RG 213/U     | N/A         | 09 May 2021          | 1Year              |
| Coaxial Cable           | Suhner           | RG 214/U     | N/A         | 09 May 2021          | 1Year              |
| Coaxial Cable           | Suhner           | Sucoflex_104 | N/A         | 14 Jan 2022          | 2Years             |
| LISN                    | Rohde & Schwarz  | ENV216       | 101323      | 23 Dec 2021          | 1Year              |
| Coaxial Cable           | Tyco Electronics | RG 58C/U     | N/A         | 19 Oct 2021          | 1Year              |

FCC ID: 2AVGC3CBT011

Page 7 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 4.2 Supporting equipment

| Equipment Name      | Manufacturer | Model | Serial       | Provided by |
|---------------------|--------------|-------|--------------|-------------|
| USB to TTL adaptor* | Not provided | CH340 | Not labelled | Applicant   |
| AC/DC adaptor       | Apple        | A1299 | Not labelled | CMA         |

Remark: \*only used for configure engineering mode

### 4.3 Cables

Nil

### 4.4 Software

| Software Name | Version  | Function                   | Provided by |
|---------------|----------|----------------------------|-------------|
| FCC Assist*   | V1.0.2.2 | 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                    |

FCC ID: 2AVGC3CBT011



## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 6.0 Measurement

#### 6.1 General Test condition

Temperature : 27.7°C  
Test Voltage : DC 3.7V and AC 120V  
Humidity : 51.4%  
Atmosphere Pressure : 101.5kPa

#### 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 : 100kHz  
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: Detail test result and equipment setting refer to appendix A, p.27

FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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, 8DPSK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Packet Type tested                  | : DH5, 2DH5, 3DH5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 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) <ol style="list-style-type: none"><li>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</li><li>2. Using the “Measurement 2” setting shown below the scan plot within the frequency span from 2310 – 2400MHz to measure the bandedge reading</li><li>3. Compare that reading in procedure with the limit which equal to the measured maximum peak in procedure 1 minus 20dB</li></ol> For Upper bandedge (2483.5MHz) <ol style="list-style-type: none"><li>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</li><li>2. Using the “Measurement 2” setting shown below the scan plot within the frequency span from 2483.5 – 2500MHz to measure the bandedge reading</li><li>3. Compare that reading in procedure with the limit which equal to the measured maximum peak in procedure 1 minus 20dB</li></ol> |

FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 6.3.2 Final Result

| Banded frequency for lower bandedge (Worst Case)  | Worst case (dBc) <sup>2</sup>    | Detector | Limit <sup>1</sup> (dBc) | Result | Worst case   |
|---------------------------------------------------|----------------------------------|----------|--------------------------|--------|--------------|
| 2399.829625                                       | 41.23                            | Peak     | $\geq 20.0$              | PASS   | GFSK and DH5 |
| Banded frequency for higher bandedge (Worst Case) | Worst case in (dBc) <sup>2</sup> | Detector | Limit <sup>1</sup>       | Result | Worst case   |
| 2497.937500                                       | 52.10                            | Peak     | $\geq 20.0$              | 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 appendix A, p58-61



## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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                                                                                                                                                                                                                    |
| Hopping mode                   | : Enabled                                                                                                                                                                                                                                            |
| RBW                            | : 100kHz                                                                                                                                                                                                                                             |
| 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.<br>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 |
|------------------------------|--------------------|--------|-----------------|
| 1.002375MHz                  | 0.793333MHz        | 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 appendix A, p55-57

FCC ID: 2AVGC3CBT011

Page 12 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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>3</sup>                                                                                                                                                                                                                                                   |
| Packet Type tested                  | : DH1, DH3, DH5                                                                                                                                                                                                                                                       |
| Channel tested for non-hopping mode | : 2441MHz                                                                                                                                                                                                                                                             |
| Additional measuring procedure      | : 1) Setup engineering sample to channel 2441MHz and DH1 packet size to perform the measurement according to ANSI C63.10, section 7.8.4<br>2) Find the worst case packet size<br>3) Repeat procedure1 with the worst case packet size for channel 2402MHz and 2480MHz |
| Remark                              | : 1) Since the modulation does not affect the dwell time, GFSK is selected as represented modulation.                                                                                                                                                                 |

#### 6.5.2 Final Result

| Dwell time (worst case) | Limit  | Result | Worst case mode |
|-------------------------|--------|--------|-----------------|
| 318.010ms               | ≤400ms | PASS   | GFSK and DH5    |

Remark: 1) Detail test result and equipment setting refer to appendix A, p28-33

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 6.6 Output Power

#### 6.6.1 Measurement

Requirement : FCC Part 15 §15.247(b) (1)  
 Measuring procedure : ANSI C63.10:2013, section 7.8.5  
 Hopping mode : Disable  
 Modulation tested : GFSK,  $\pi/4$ DQPSK, 8DPSK  
 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 output power, DH5 is selected as represented packet size.

#### 6.6.2 Final Result

##### (a) Maximum peak conducted output power

| Maximum peak conducted output power | Limit(s) <sup>1</sup> | Result | Modulation |
|-------------------------------------|-----------------------|--------|------------|
| -9.75dBm                            | ≤21.0dBm              | PASS   | GFSK       |

Remark: 1) 0.125W (21.0dBm) limit is used for 2/3 20dB bandwidth requirement for channel separation.

2) Detail test result and equipment setting refer to appendix A, p34-36

##### (b) Maximum peak e.i.r.p.

| Maximum peak e.i.r.p. <sup>1</sup> | Limit(s) <sup>2</sup> | Result | Modulation |
|------------------------------------|-----------------------|--------|------------|
| -9.75dBm                           | ≤27.0dBm              | PASS   | GFSK       |

Remark: 1) Maximum peak e.i.r.p. = Maximum peak conducted output power + antenna gain (dBi)

2) Maximum peak e.i.r.p. limit = Maximum peak conducted output power limit + 0dBi

3) Detail test result and equipment setting refer to appendix A, p34-36



## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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  
Hopping mode : Disable  
Modulation tested : GFSK,  $\pi/4$ DQPSK, 8DPSK  
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    |
|----------------|-----------|---------------|
| 953.250k       | 867.750k  | GFSK          |
| 1304.625k      | 1180.500k | $\pi/4$ DQPSK |
| 1283.625k      | 1170.000k | 8DPSK         |

Remark: 1) Detail test result and equipment setting refer to appendix A, p37-54.

FCC ID: 2AVGC3CBT011

Page 15 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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**Tel: (852) 2698 8198 Fax: (852) 2695 4177 E-mail: [info@cmateesting.org](mailto:info@cmateesting.org) Web Site: <http://www.cmateesting.org>**

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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                                 | : 100kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Detector                            | : 300kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Modulation tested                   | : GFSK <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Packet Type tested                  | : DH5 <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Channel tested for non-hopping mode | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Additional measuring procedure      | : <ol style="list-style-type: none"> <li>1) Setup engineering sample to channel 2402MHz to perform the measurement according to ANSI C63.10, section 7.8.8 with pre-measurement setting</li> <li>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</li> <li>3) For non-restricted band frequency, peak detector and 100kHz RBW will be used for final measurement.</li> <li>4) Repeat the procedure 1 to 3 for channel frequency of 2441MHz and 2480MHz</li> </ol> |
| Remark                              | : <ol style="list-style-type: none"> <li>1) Since the GFSK generates a higher SPD with power level, GFSK is selected as represented modulation for testing.</li> <li>2) Since DH5 generates a higher dwell time, DH5 is selected as representative packet size for testing</li> </ol>                                                                                                                                                                                                                                                                                                           |

#### 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 |
|----------------------------------------|-------------------------------------------------|--------------------|----------|--------|-----------------|
| 1734.202500MHz                         | -48.19dBm                                       | -30.51dBm          | -17.68dB | 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 appendix A, p62-64

FCC ID: 2AVGC3CBT011



## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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.

FCC ID: 2AVGC3CBT011

Page 17 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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**Tel: (852) 2698 8198 Fax: (852) 2695 4177 E-mail: [info@cmateesting.org](mailto:info@cmateesting.org) Web Site: <http://www.cmateesting.org>**

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 6.9.2 Final Result

#### a) Test mode: Bluetooth

| 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            | 2400.000        | 59.6                 | -4.7                     | 54.9                                       | 74.0                 | -19.1       | PK                  |
| H            | 2400.000        | 54.7                 | -4.7                     | 50.0                                       | 54.0                 | -4.0        | AV                  |
| V            | 2400.000        | 59.6                 | -4.7                     | 54.9                                       | 74.0                 | -19.1       | PK                  |
| V            | 2400.000        | 55.0                 | -4.7                     | 50.3                                       | 54.0                 | -3.7        | AV                  |
| H            | 2483.500        | 51.7                 | -4.7                     | 47.0                                       | 54.0                 | -7.0        | PK                  |
| V            | 2483.500        | 51.2                 | -4.7                     | 46.5                                       | 54.0                 | -7.5        | PK                  |
| H            | 4804.010        | 40.4                 | 3.1                      | 43.5                                       | 54.0                 | -10.5       | PK                  |
| V            | 4803.813        | 41.6                 | 3.1                      | 44.7                                       | 54.0                 | -9.3        | PK                  |
| H            | 4882.333        | 44.1                 | 3.1                      | 47.2                                       | 54.0                 | -6.8        | PK                  |
| V            | 4882.199        | 43.7                 | 3.1                      | 46.8                                       | 54.0                 | -7.2        | PK                  |
| H            | 4960.247        | 44.4                 | 3.1                      | 47.5                                       | 54.0                 | -6.5        | PK                  |
| V            | 4960.198        | 45.8                 | 3.1                      | 48.9                                       | 54.0                 | -5.1        | PK                  |
| H            | 7205.541        | 33.6                 | 10.7                     | 44.3                                       | 54.0                 | -9.7        | PK                  |
| V            | 7205.837        | 33.5                 | 10.7                     | 44.2                                       | 54.0                 | -9.8        | PK                  |
| H            | 7323.044        | 34.4                 | 10.7                     | 45.1                                       | 54.0                 | -8.9        | PK                  |
| V            | 7323.011        | 34.1                 | 10.7                     | 44.8                                       | 54.0                 | -9.2        | PK                  |
| H            | 7439.982        | 35.2                 | 10.7                     | 45.9                                       | 54.0                 | -8.1        | PK                  |
| V            | 7439.901        | 35.2                 | 10.7                     | 45.9                                       | 54.0                 | -8.1        | PK                  |

Remark: 1) Field Strength = Reading + transducer factor.

2) Other emission with more than 20dB margin are not reported in this report.

3) If the peak measured values are lower than the average limit then the measured value compared with average limit.

FCC ID: 2AVGC3CBT011

Page 18 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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**Tel: (852) 2698 8198 Fax: (852) 2695 4177 E-mail: [info@cmatesting.org](mailto:info@cmatesting.org) Web Site: <http://www.cmatesting.org>**



## **TEST REPORT**

Report No. : AA0015629(1)

Date : 31 Mar 2021

### **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.

FCC ID: 2AVGC3CBT011

Page 19 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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**Tel: (852) 2698 8198 Fax: (852) 2695 4177 E-mail: [info@cmateesting.org](mailto:info@cmateesting.org) Web Site: <http://www.cmateesting.org>**

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 6.10.2 Final Result

Test mode: Receiving mode

| 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            | 61.484          | 4.6                  | 10.7                     | 15.3                                       | 40.0                 | -24.7       | QP                  |
| V            | 99.387          | 8.2                  | 11.1                     | 19.3                                       | 43.5                 | -24.2       | QP                  |
| H            | 130.790         | 6.7                  | 13.7                     | 20.4                                       | 43.5                 | -23.1       | QP                  |
| V            | 162.396         | 3.0                  | 15.8                     | 18.8                                       | 43.5                 | -24.7       | QP                  |
| H            | 200.462         | 3.2                  | 15.1                     | 18.3                                       | 43.5                 | -25.2       | QP                  |
| V            | 238.853         | 5.3                  | 15.1                     | 20.4                                       | 46.0                 | -25.6       | QP                  |
| H            | 284.393         | 7.9                  | 15.1                     | 23.0                                       | 46.0                 | -23.0       | QP                  |
| V            | 334.701         | 7.4                  | 17.7                     | 25.1                                       | 46.0                 | -20.9       | QP                  |

Remark: 1) Field Strength = Reading + transducer factor.

2) Other emissions with more than 20dB margin are not reported in this report.

Test mode: 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) |
|--------------|-----------------|----------------------|--------------------------|--------------------------------------------|----------------------|-------------|---------------------|
| V            | 111.038         | 13.3                 | 12.2                     | 25.5                                       | 43.5                 | -18.0       | QP                  |
| H            | 129.531         | 7.0                  | 13.7                     | 20.7                                       | 43.5                 | -22.8       | QP                  |
| V            | 166.250         | 19.8                 | 15.8                     | 35.6                                       | 43.5                 | -7.9        | QP                  |
| H            | 166.437         | 12.7                 | 15.8                     | 28.5                                       | 43.5                 | -15.0       | QP                  |
| V            | 189.187         | 13.0                 | 16.8                     | 29.8                                       | 43.5                 | -13.7       | QP                  |
| H            | 200.375         | 6.7                  | 15.1                     | 21.8                                       | 43.5                 | -21.7       | QP                  |
| H            | 228.875         | 8.8                  | 15.1                     | 23.9                                       | 46.0                 | -22.1       | QP                  |

Remark: 1) Field Strength = Reading + transducer factor.

2) Other emissions with more than 20dB margin are not reported in this report

FCC ID: 2AVGC3CBT011



## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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 : 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 |
|-----------------------------------------|-------------------------------|-----------|----------|----------|-------|-----------------|--------|
| 17.888MHz                               | 48.83dBμV                     | 56.00dBμV | -11.16dB | QP       | L     | charging        | PASS   |

Remark: 1) Detail test result and equipment setting refer to appendix A, p65, 66

FCC ID: 2AVGC3CBT011

Page 21 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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**Tel: (852) 2698 8198 Fax: (852) 2695 4177 E-mail: [info@cmatesting.org](mailto:info@cmatesting.org) Web Site: <http://www.cmatesting.org>**

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### 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.

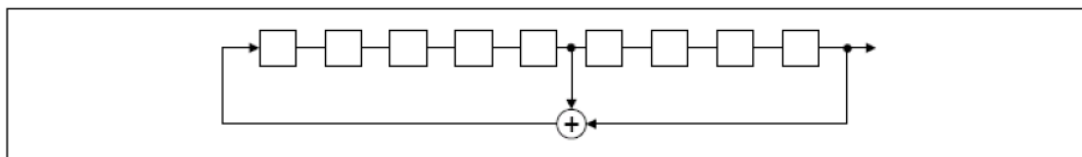
Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented 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)



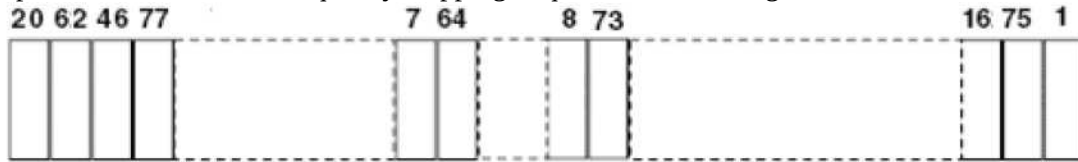
Linear Feedback Shift Register for Generation of the PRBS sequence

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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**

Report No. : AA0015629(1)

Date : 31 Mar 2021

### **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

| <b>File content</b>      | <b>File name</b>                  |
|--------------------------|-----------------------------------|
| External Photo           | 2AVGC3CBT011 External photo.pdf   |
| Internal Photo           | 2AVGC3CBT011 Internal photo.pdf   |
| Test Configuration Photo | 2AVGC3CBT011 Test setup photo.pdf |

FCC ID: 2AVGC3CBT011

Page 24 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## **TEST REPORT**

Report No. : AA0015629(1)

Date : 31 Mar 2021

## **APPENDIX A Test Result**

FCC ID: 2AVGC3CBT011

Page 25 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### **FCC Part 47 §15.247 2400-2483.5 MHz 2016**

#### **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) |                     |                     |

FCC ID: 2AVGC3CBT011

Page 26 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Channels

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



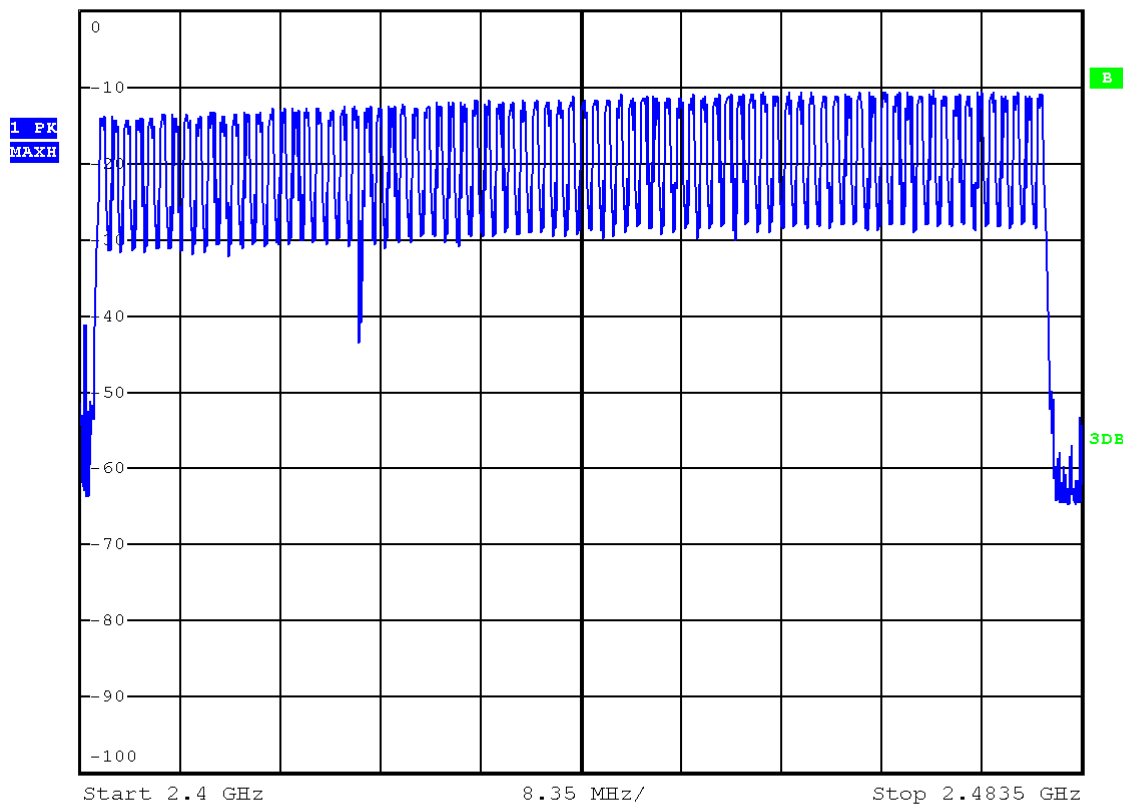
\*RBW 100 kHz

VBW 300 kHz

\*SWT 500 ms

Ref 0 dBm

\*Att 10 dB



FCC ID: 2AVGC3CBT011

Page 27 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

| DUT Frequency (MHz) | Result | Number of Hops in 3.16s | Number of Hops in 31.6s | Time of one pulse (ms) | Average time of occupancy (ms) |
|---------------------|--------|-------------------------|-------------------------|------------------------|--------------------------------|
| 2441.000000         | PASS   | 32                      | 320                     | 0.386                  | 123.520                        |



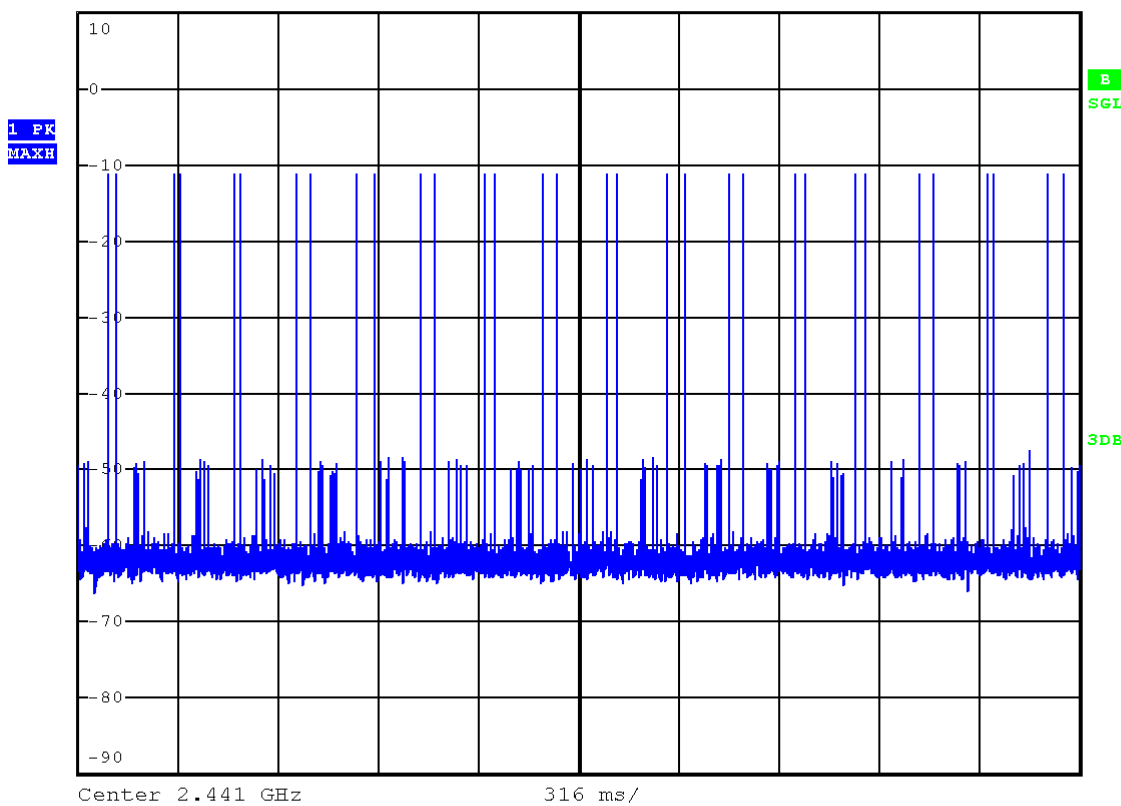
RBW 100 kHz

VBW 300 kHz

SWT 3.16 s

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

Page 28 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021



RBW 100 kHz Delta 1 [T1]  
VBW 300 kHz -3.16 dB  
SWT 5 ms 386.875000  $\mu$ s

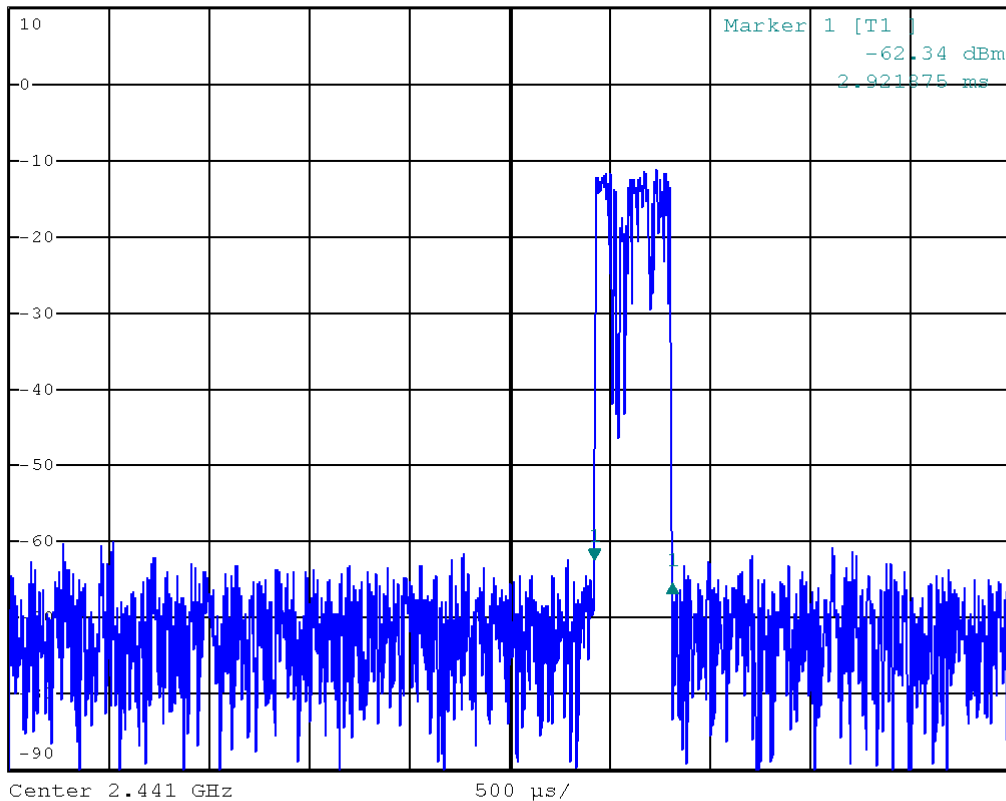
Ref 10 dBm

\*Att 20 dB

SWT 5 ms

386.875000  $\mu$ s

1 PK  
MAXH



FCC ID: 2AVGC3CBT011

Page 29 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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Tel: (852) 2698 8198 Fax: (852) 2695 4177 E-mail: [info@cmatesting.org](mailto:info@cmatesting.org) Web Site: <http://www.cmatesting.org>

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

| DUT Frequency (MHz) | Result | Number of Hops in 3.16s | Number of Hops in 31.6s | Time of one pulse (ms) | Average time of occupancy (ms) |
|---------------------|--------|-------------------------|-------------------------|------------------------|--------------------------------|
| 2441.000000         | PASS   | 19                      | 190                     | 1.643                  | 312.170                        |



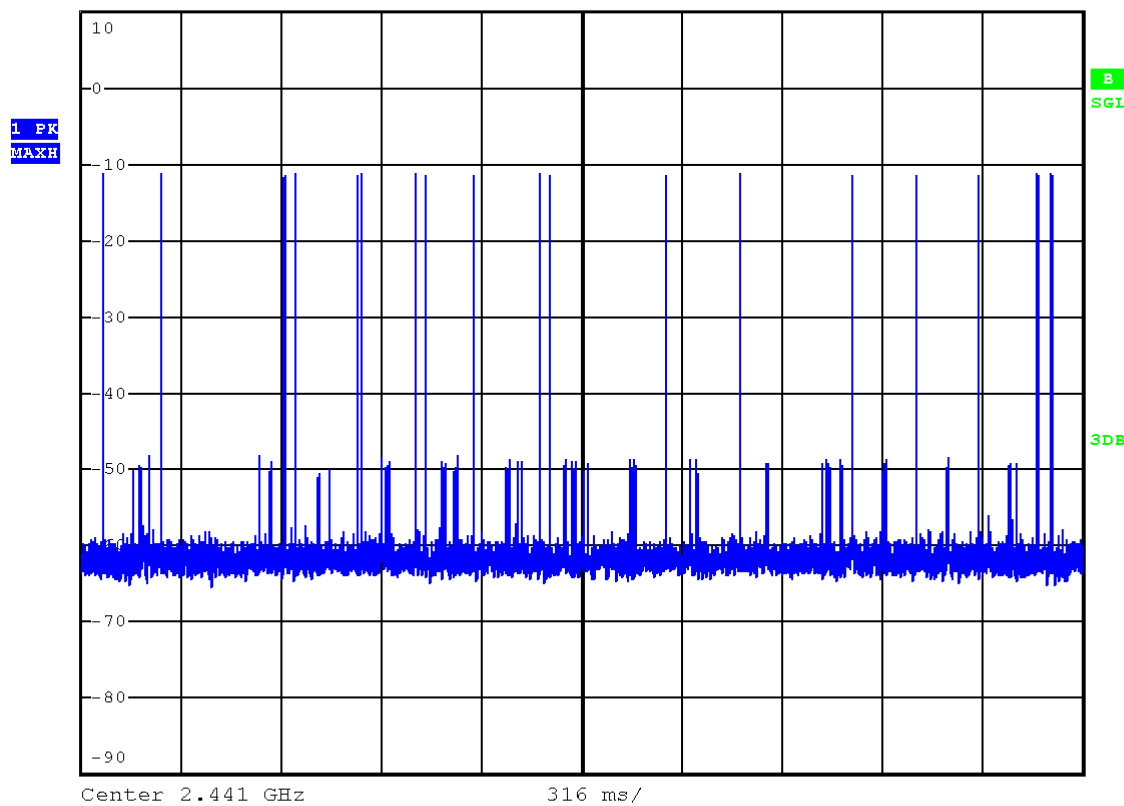
RBW 100 kHz

VBW 300 kHz

SWT 3.16 s

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

Page 30 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021



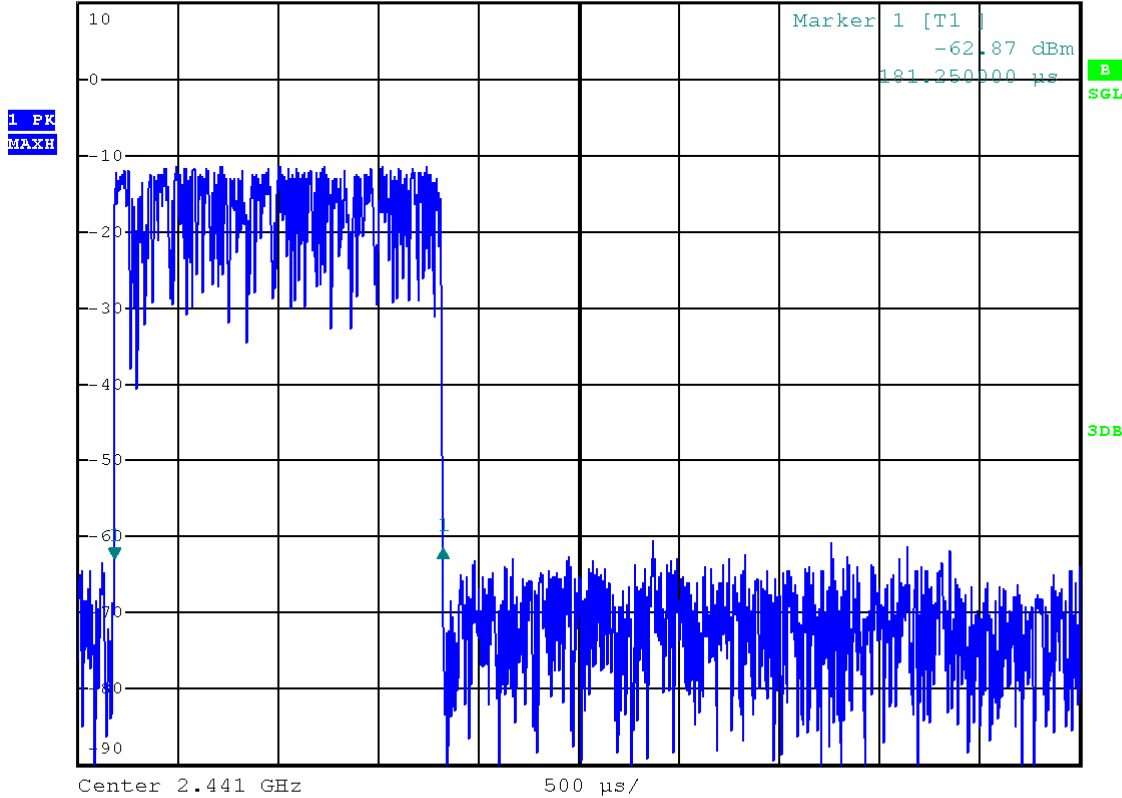
RBW 100 kHz Delta 1 [T1]  
VBW 300 kHz 1.42 dB  
SWT 5 ms 1.643125 ms

Ref 10 dBm

\*Att 20 dB

SWT 5 ms

1.643125 ms



FCC ID: 2AVGC3CBT011

Page 31 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

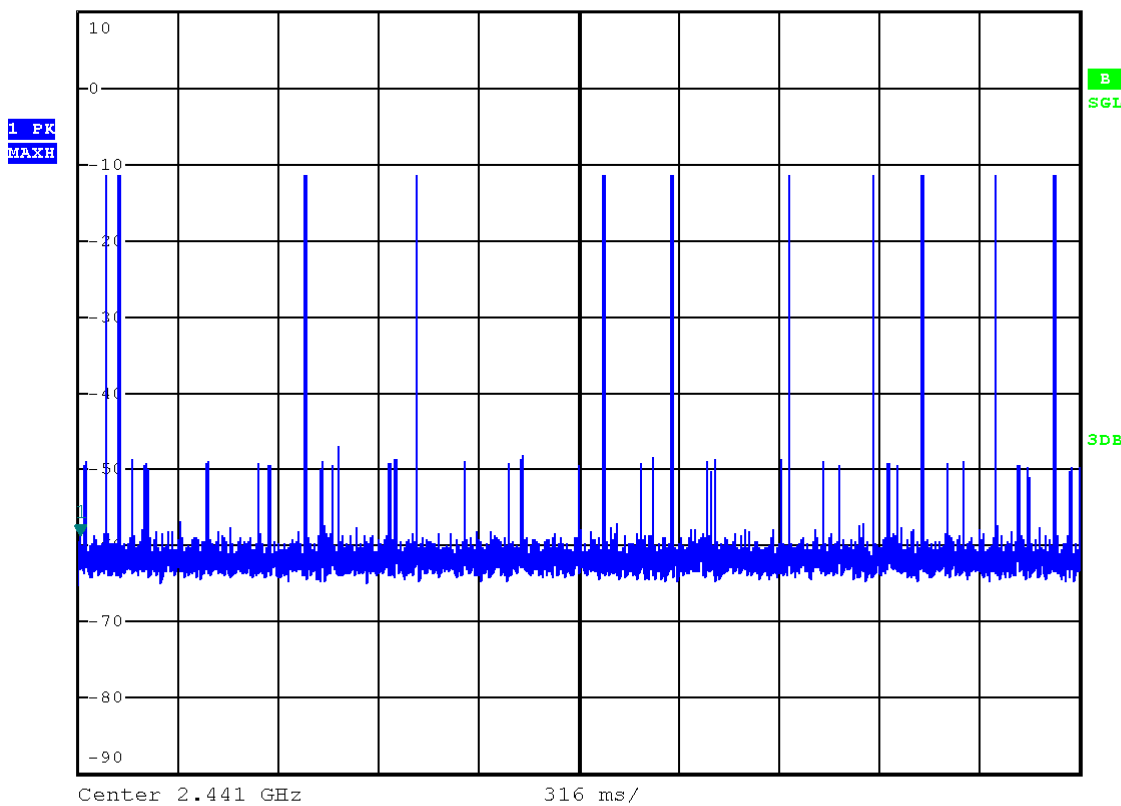
| DUT Frequency (MHz) | Result | Number of Hops in 3.16s | Number of Hops in 31.6s | Time of one pulse (ms) | Average time of occupancy (ms) |
|---------------------|--------|-------------------------|-------------------------|------------------------|--------------------------------|
| 2441.000000         | PASS   | 11                      | 110                     | 2.891                  | 318.010                        |



RBW 100 kHz Marker 1 [T1 ]  
VBW 300 kHz -58.65 dBm  
SWT 3.16 s 8.776250 ms

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

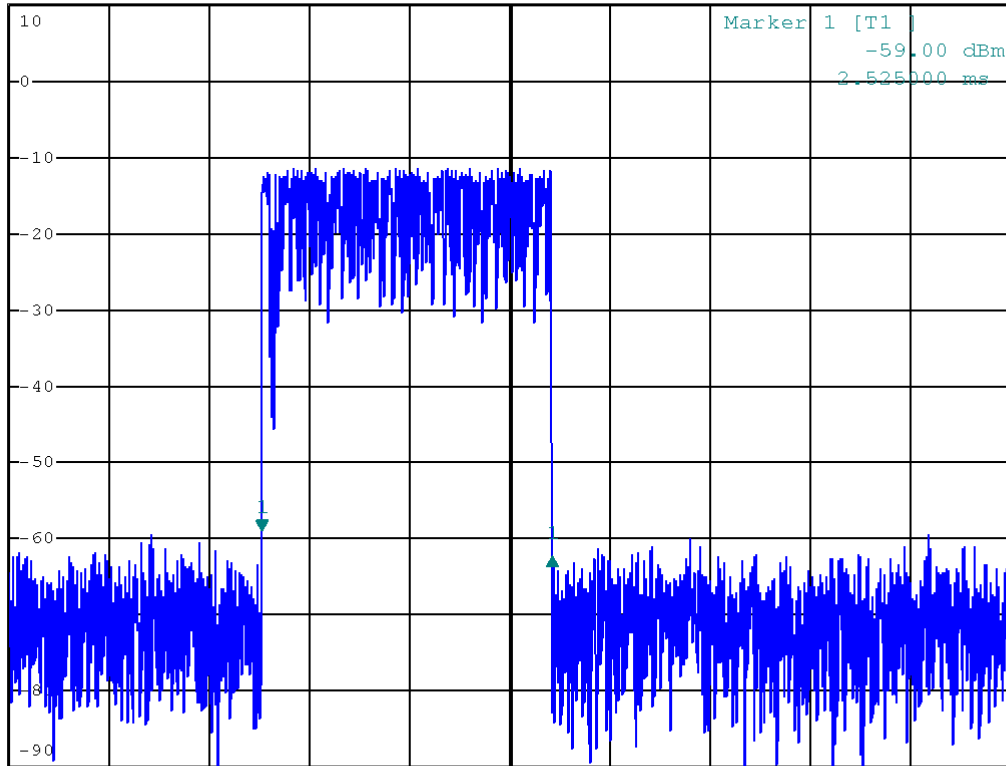


RBW 100 kHz Delta 1 [T1]  
VBW 300 kHz -3.25 dB  
SWT 10 ms 2.891250 ms

Ref 10 dBm

\*Att 20 dB

1 PK  
MAXH



Center 2.441 GHz

1 ms/

FCC ID: 2AVGC3CBT011

Page 33 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

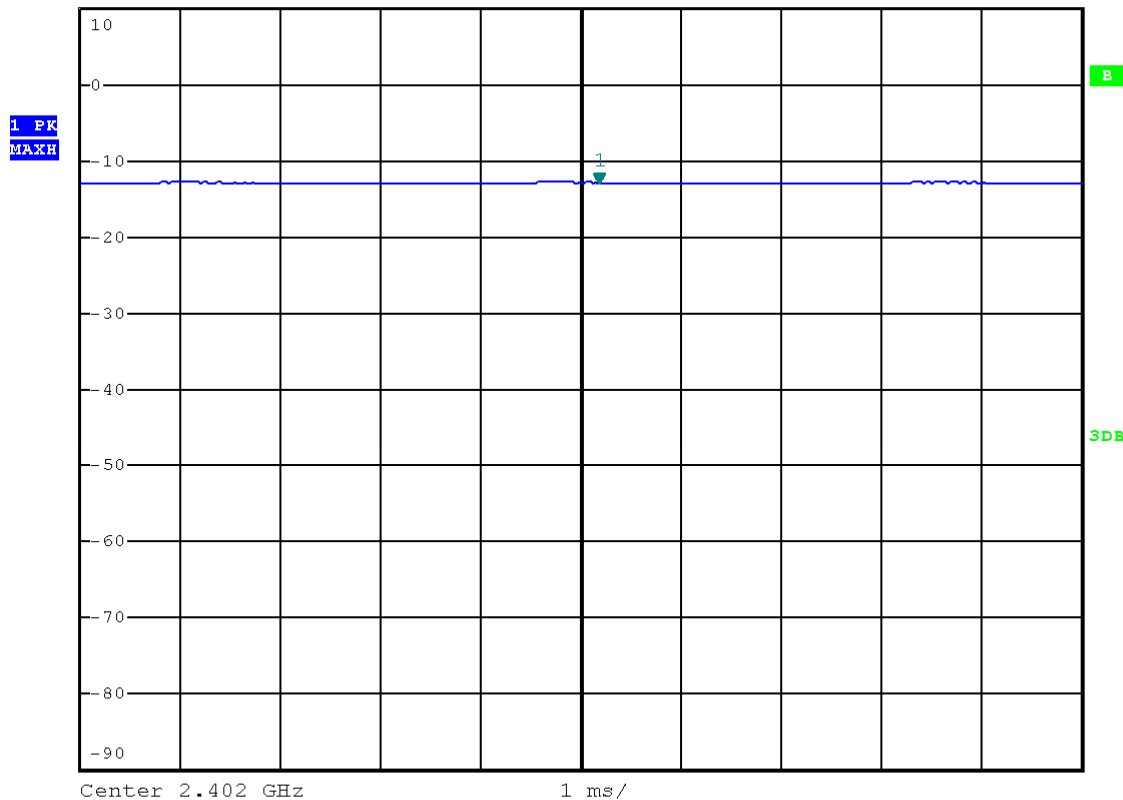
| DUT Frequency (MHz) | Measured power (dBm) | Limit Max (dBm) | Result |
|---------------------|----------------------|-----------------|--------|
| 2402.000000         | -12.86               | 21.0            | PASS   |



RBW 1 MHz Marker 1 [T1 ]  
 VBW 3 MHz -12.86 dBm  
 SWT 10 ms 5.176250 ms

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

Page 34 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

## TEST REPORT

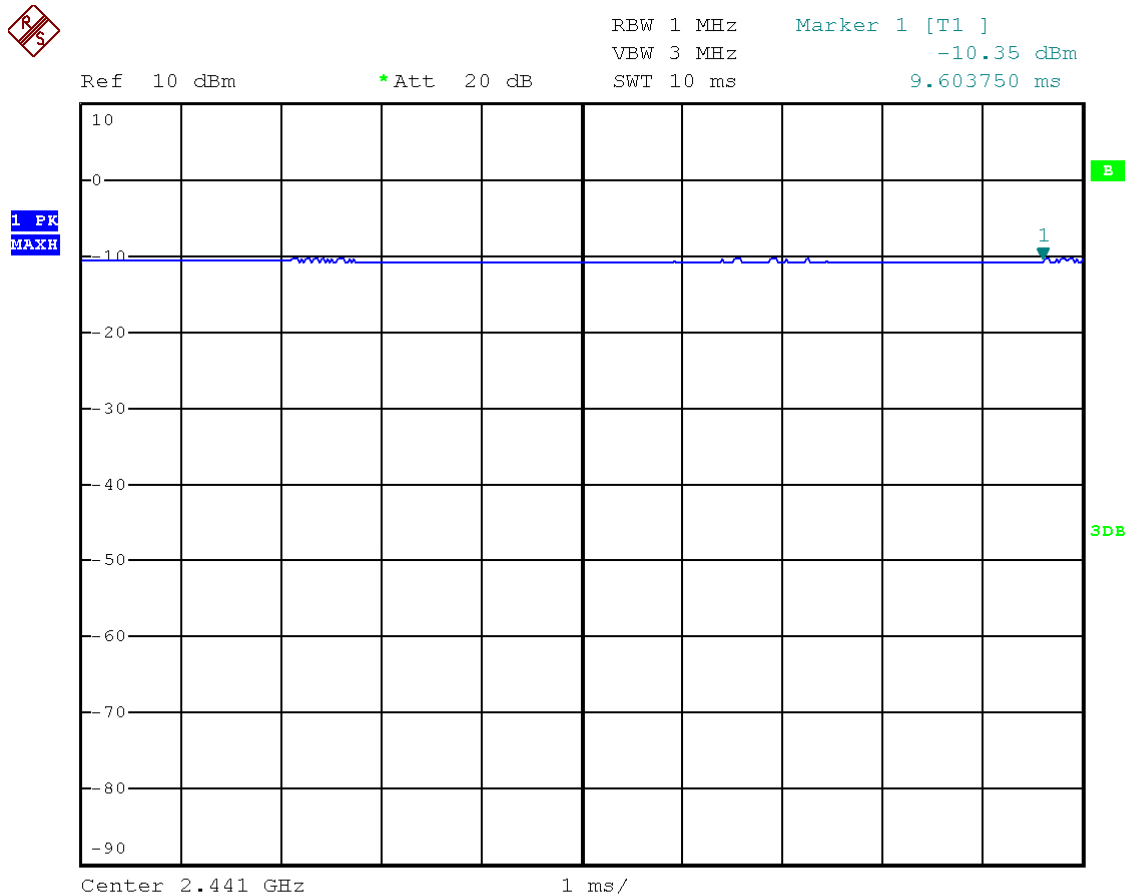
Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

| DUT Frequency (MHz) | Measured power (dBm) | Limit Max (dBm) | Result |
|---------------------|----------------------|-----------------|--------|
| 2441.000000         | -10.35               | 21.0            | PASS   |



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

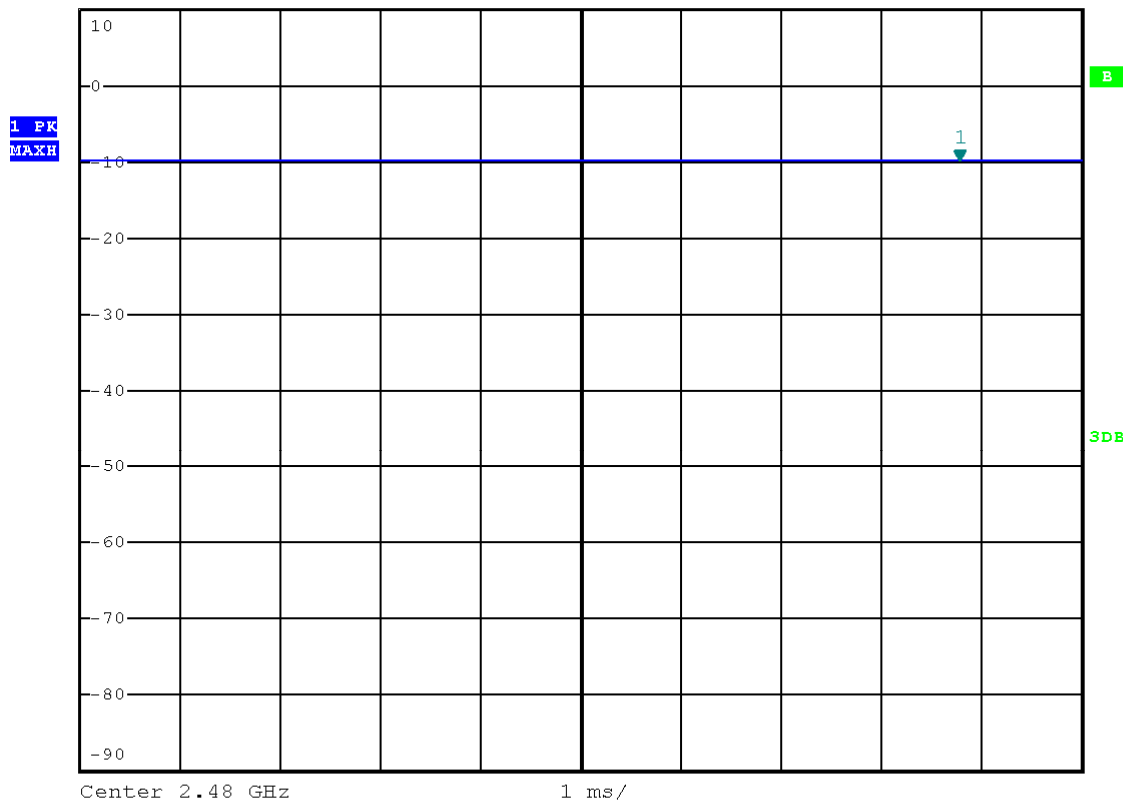
| DUT Frequency (MHz) | Measured power (dBm) | Limit Max (dBm) | Result |
|---------------------|----------------------|-----------------|--------|
| 2480.000000         | -9.75                | 21.0            | PASS   |



RBW 1 MHz      Marker 1 [T1 ]  
 VBW 3 MHz      -9.75 dBm  
 SWT 1.0 ms      8.776250 ms

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

Page 36 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 20 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2402.000000         | 0.952125        | ---             | ---             |



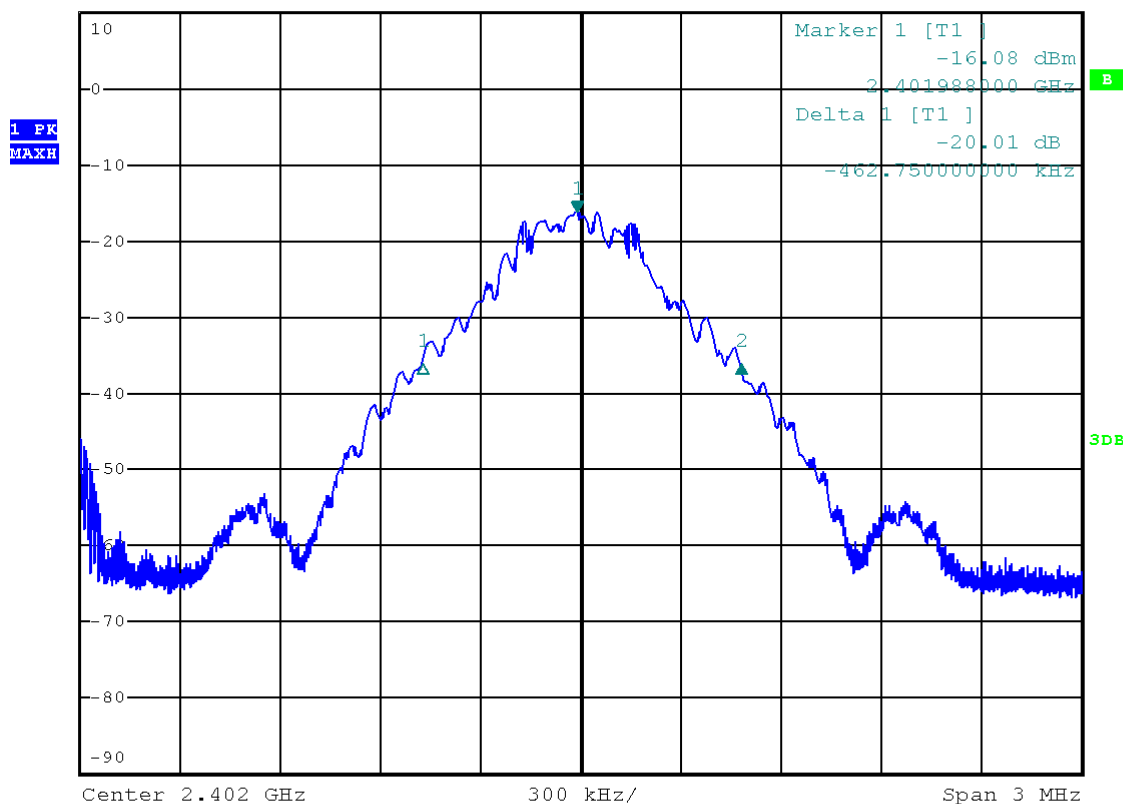
\*RBW 30 kHz Delta 2 [T1 ]  
 VBW 100 kHz -20.00 dB  
 \*Att 20 dB \*SWT 500 ms 489.375000000 kHz

Ref 10 dBm

\*Att 20 dB

\*SWT 500 ms

489.375000000 kHz



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2402.000000         | 0.866250        | ---             | ---             |

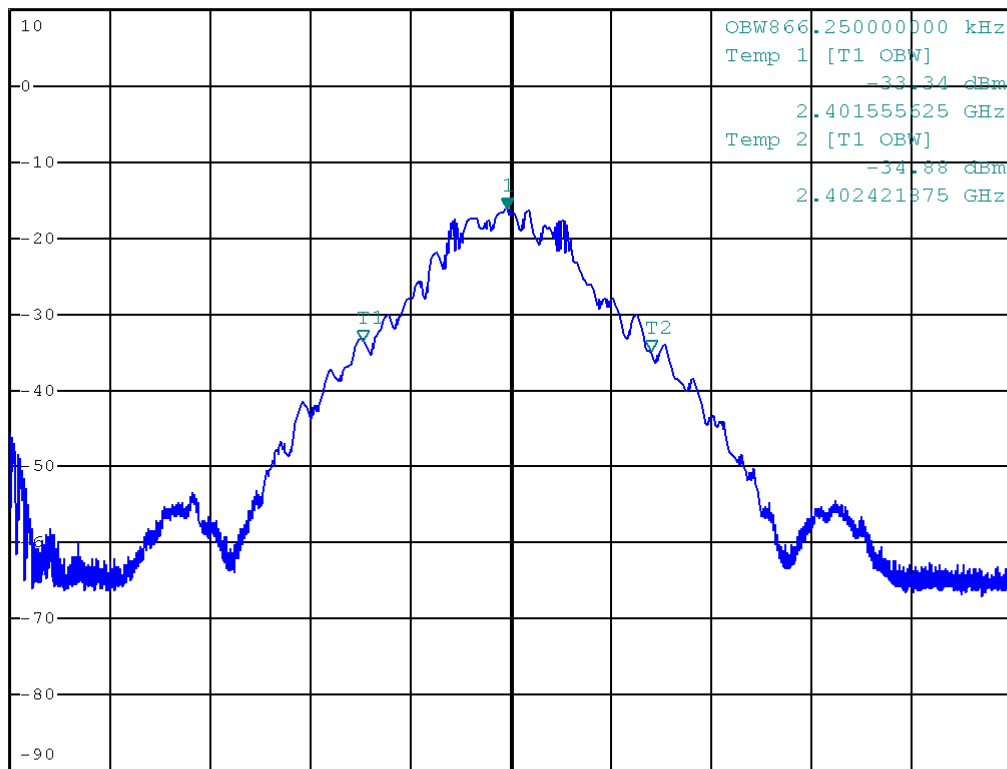


\*RBW 30 kHz Marker 1 [T1 ]  
 VBW 100 kHz -16.10 dBm  
 \*SWT 500 ms 2.401989125 GHz

Ref 10 dBm

\*Att 20 dB

1 PK  
MAXH



Center 2.402 GHz

300 kHz/

Span 3 MHz

FCC ID: 2AVGC3CBT011

## TEST REPORT

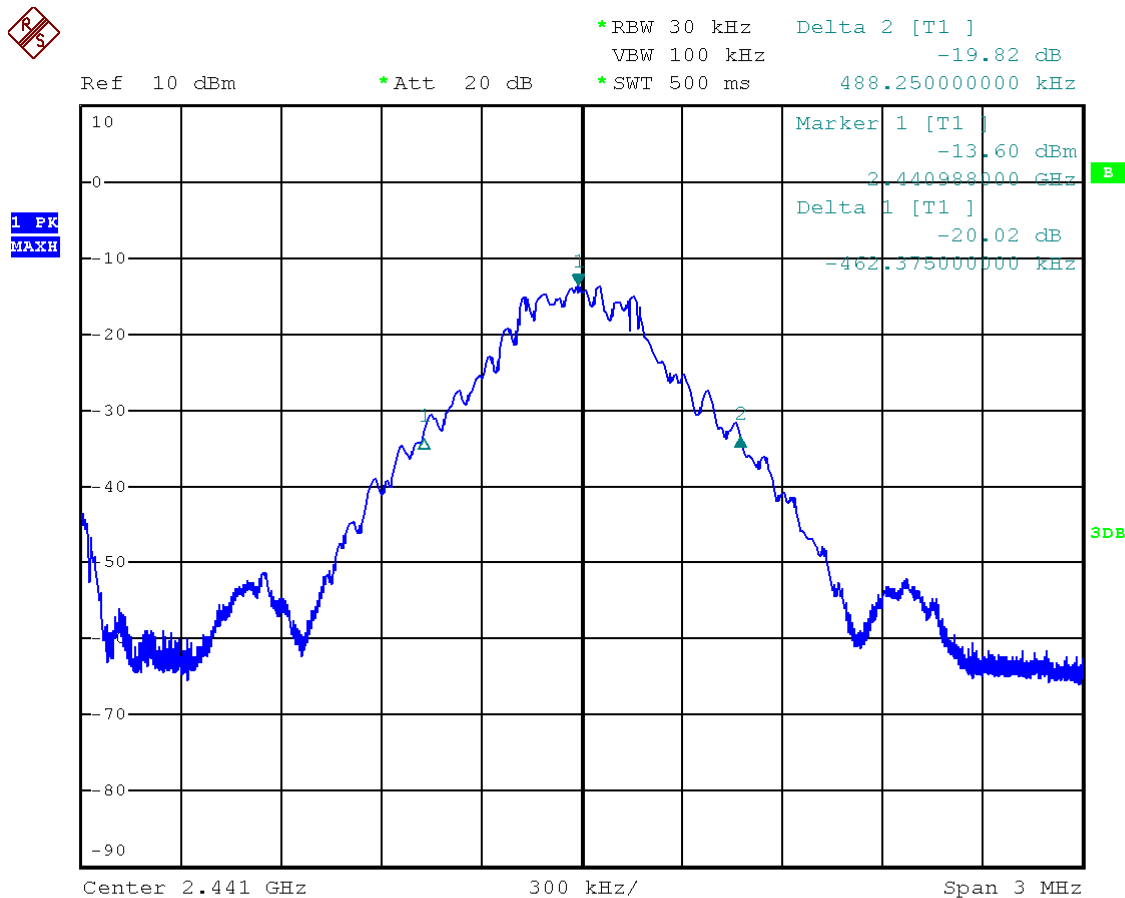
Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 20 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2441.000000         | 0.950625        | ---             | ---             |



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2441.000000         | 0.865125        | ---             | ---             |

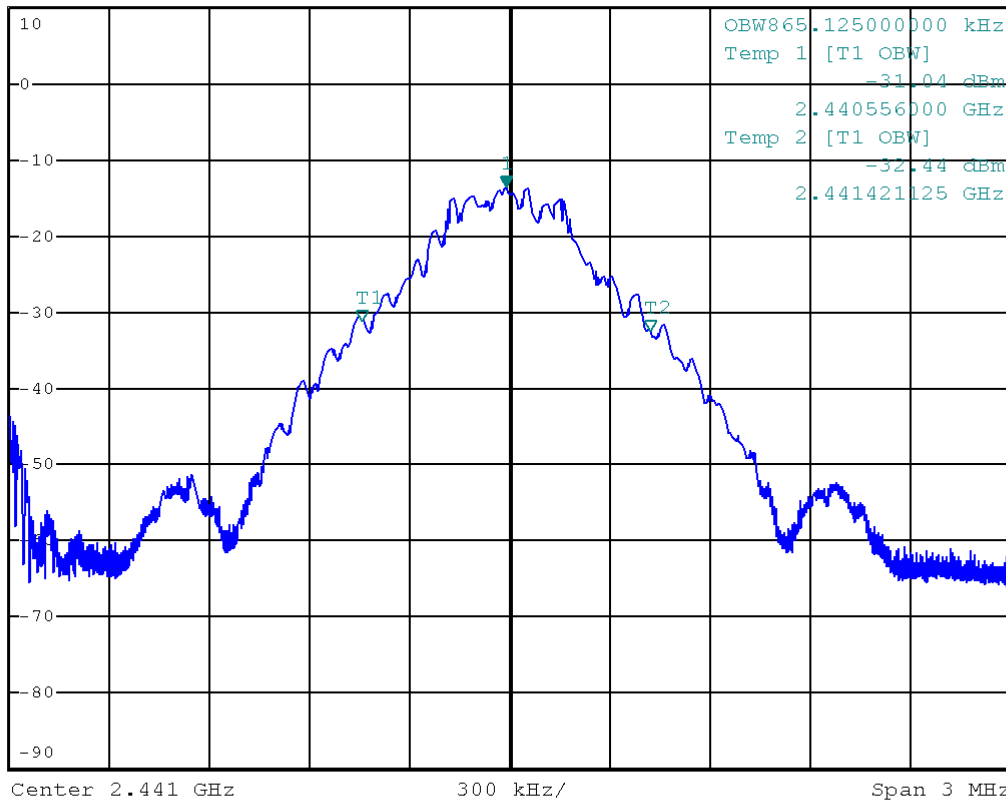


\*RBW 30 kHz      Marker 1 [T1 ]  
 VBW 100 kHz      -13.61 dBm  
 \*SWT 500 ms      2.440987250 GHz

Ref 10 dBm

\*Att 20 dB

1 PK  
MAXH



FCC ID: 2AVGC3CBT011

## TEST REPORT

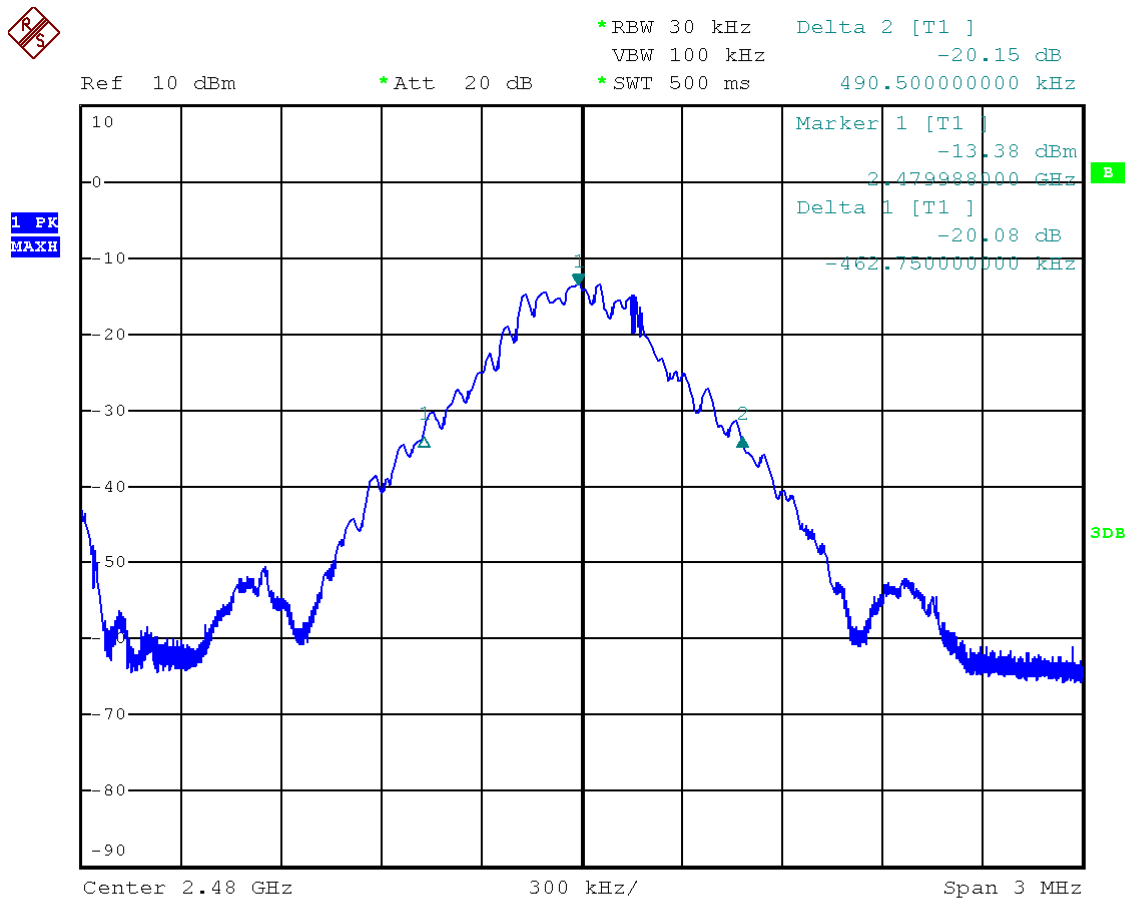
Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 20 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2480.000000         | 0.953250        | ---             | ---             |



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2480.000000         | 0.867750        | ---             | ---             |

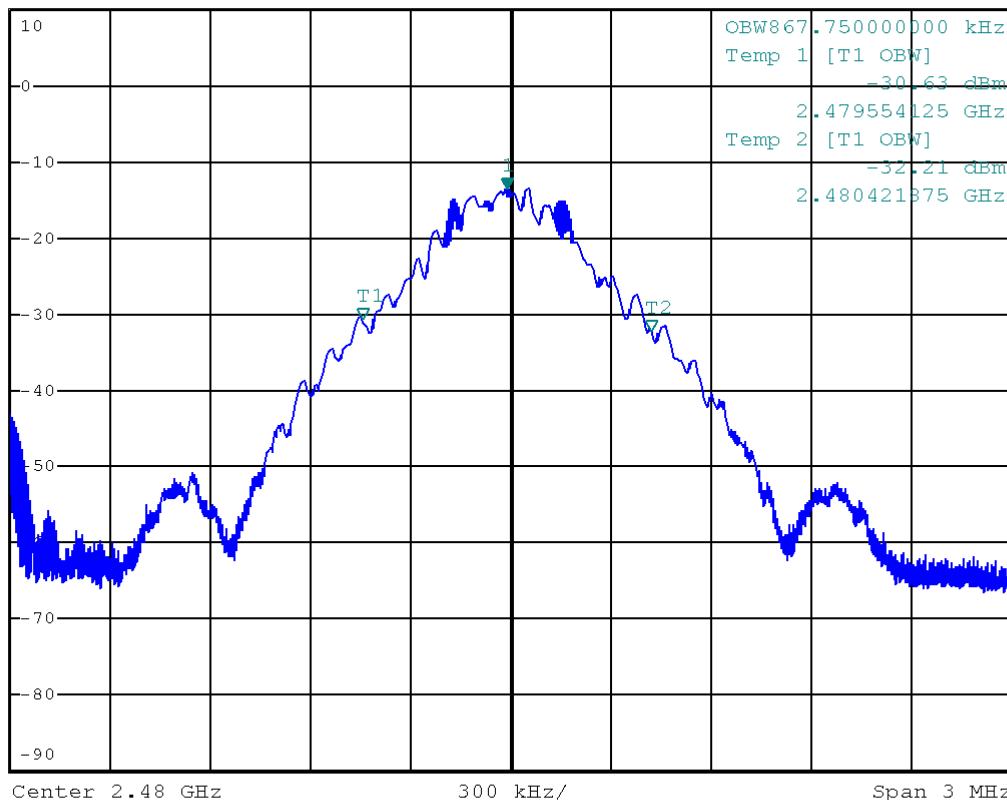


\*RBW 30 kHz      Marker 1 [T1 ]  
 VBW 100 kHz      -13.47 dBm  
 \*SWT 500 ms      2.479989875 GHz

Ref 10 dBm

\*Att 20 dB

1 PK  
MAXH



FCC ID: 2AVGC3CBT011

Page 42 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

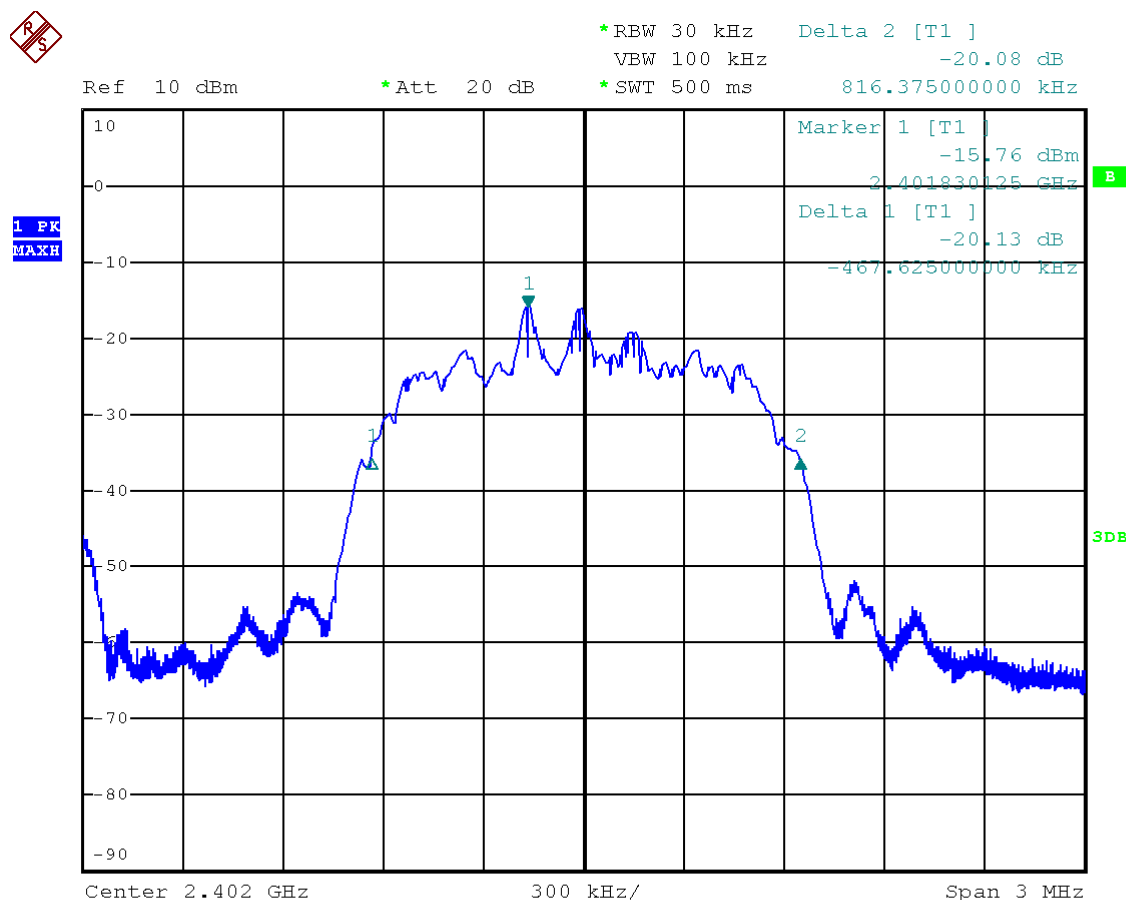
Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 20 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2402.000000         | 1.284000        | ---             | ---             |



FCC ID: 2AVGC3CBT011

Page 43 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2402.000000         | 1.180500        | ---             | ---             |

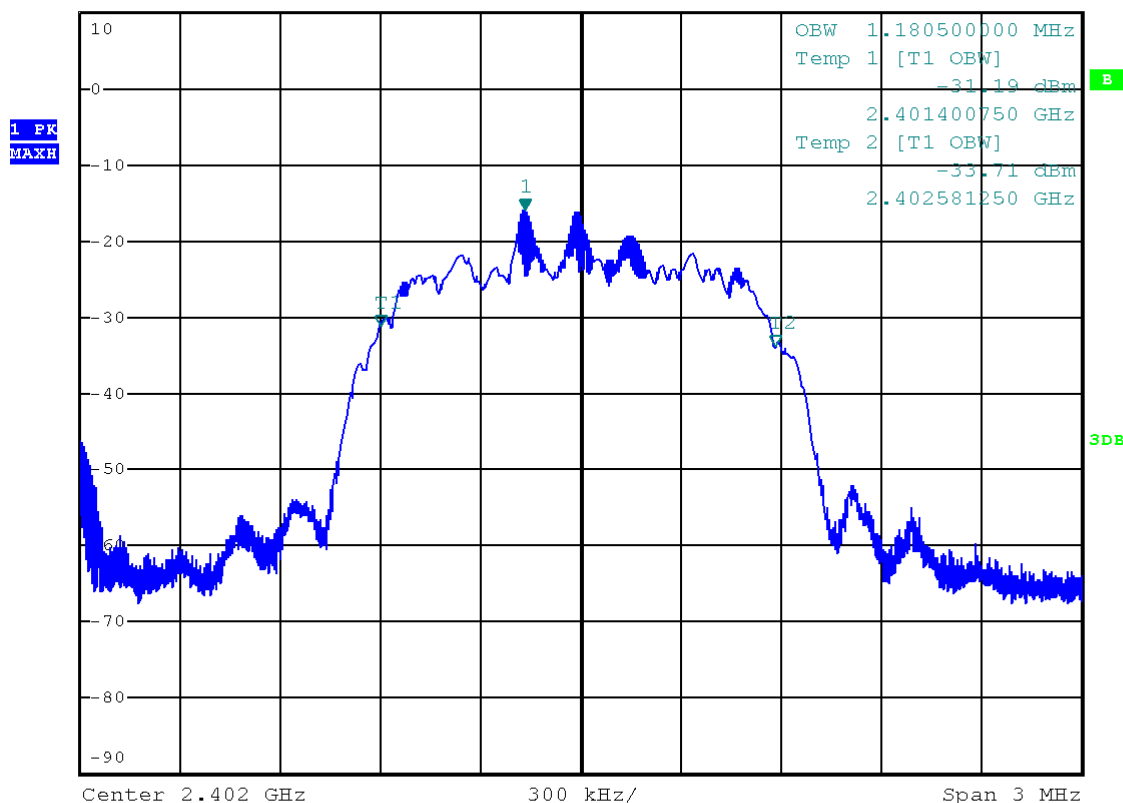


\*RBW 30 kHz Marker 1 [T1 ]  
 VBW 100 kHz -15.80 dBm  
 \*Att 20 dB 2.401829375 GHz  
 \*SWT 500 ms

Ref 10 dBm

\*Att 20 dB

2.401829375 GHz



FCC ID: 2AVGC3CBT011

## TEST REPORT

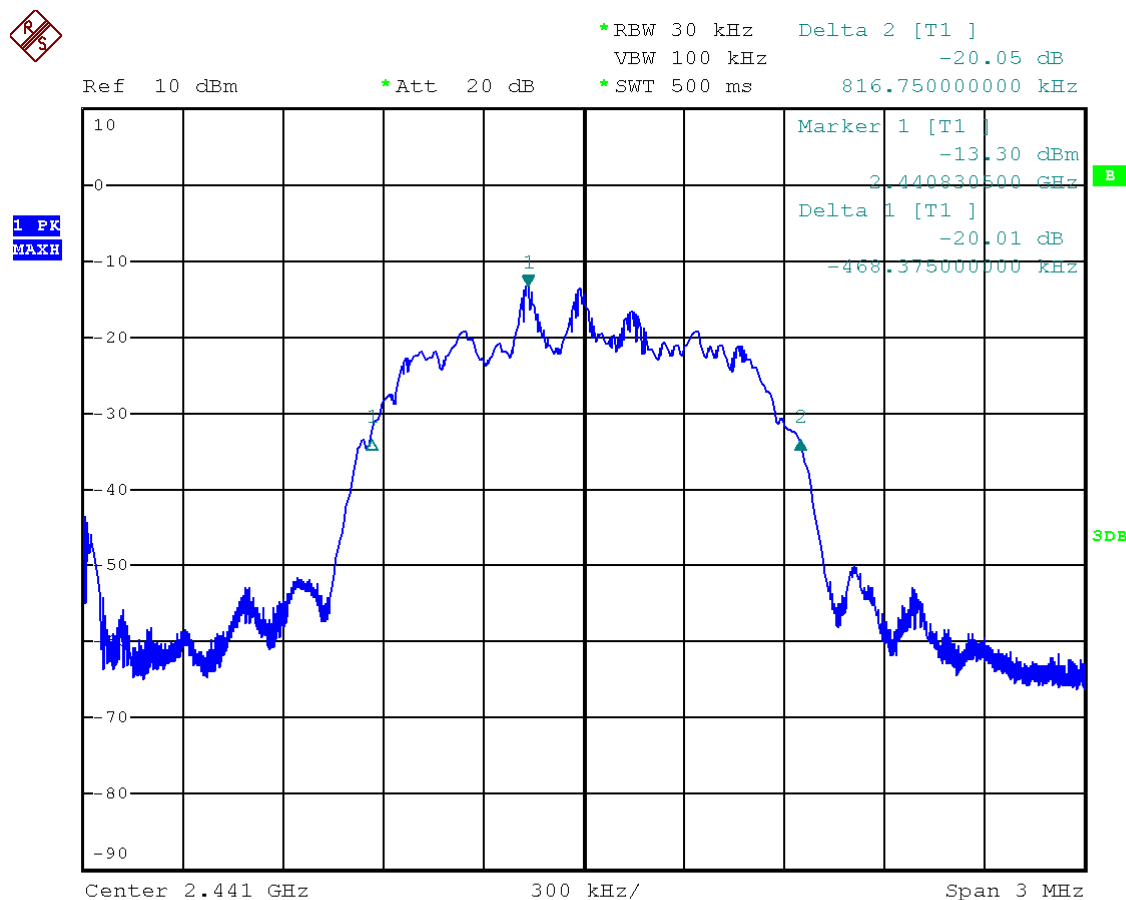
Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 20 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2441.000000         | 1.285125        | ---             | ---             |



FCC ID: 2AVGC3CBT011

Page 45 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2441.000000         | 1.172250        | ---             | ---             |



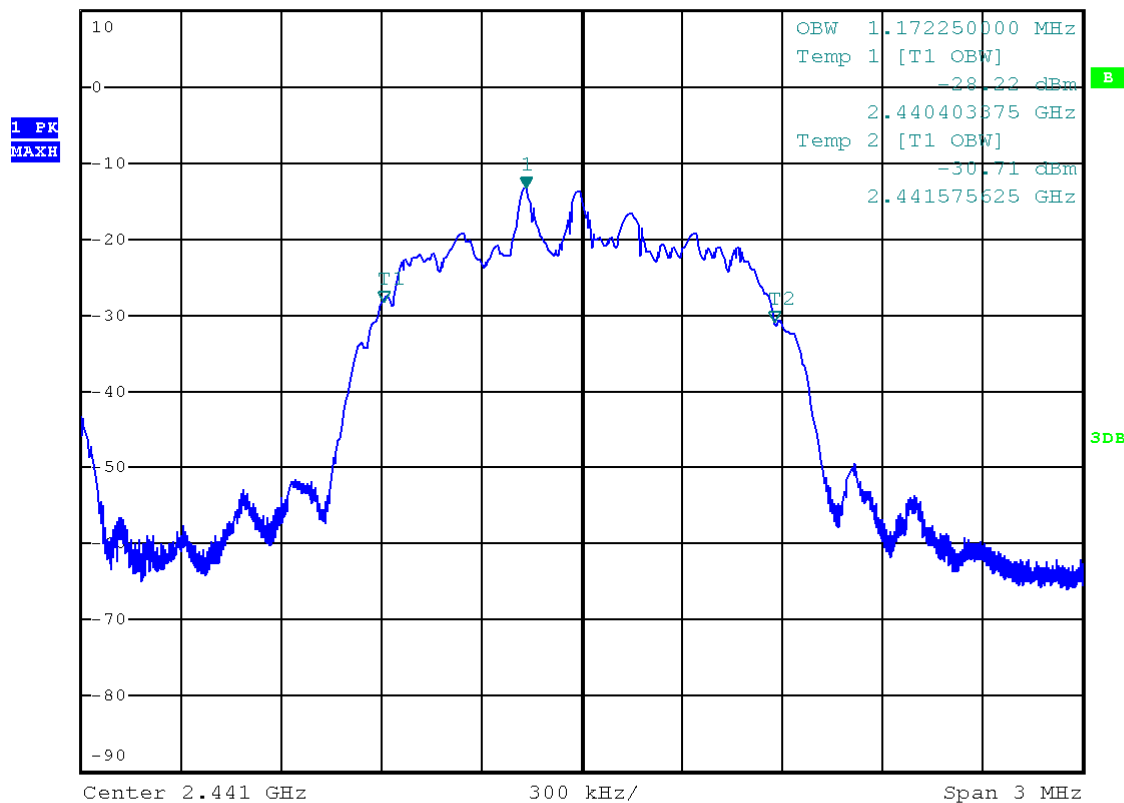
\*RBW 30 kHz      Marker 1 [T1 ]  
 VBW 100 kHz      -13.31 dBm  
 \*Att 20 dB      \*SWT 500 ms      2.440830500 GHz

Ref 10 dBm

\*Att 20 dB

\*SWT 500 ms

2.440830500 GHz



FCC ID: 2AVGC3CBT011



## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### 99 % Bandwidth

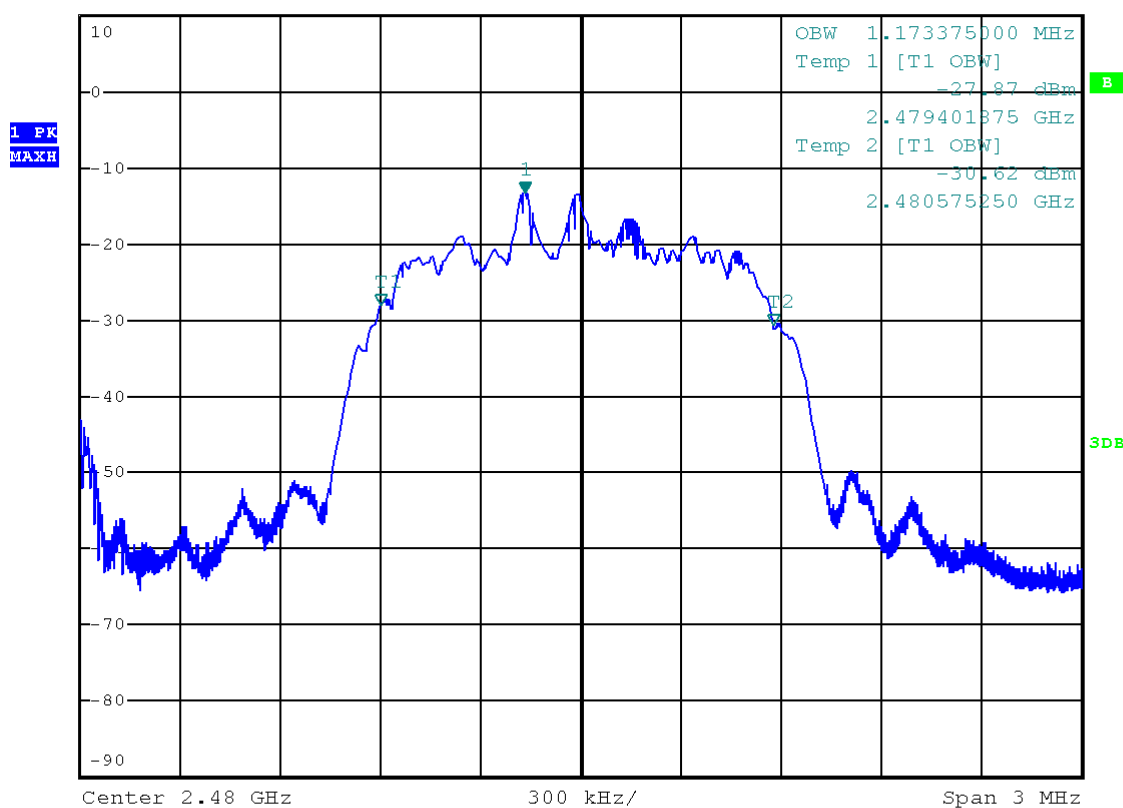
| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2480.000000         | 1.173375        | ---             | ---             |



\*RBW 30 kHz Marker 1 [T1 ]  
 VBW 100 kHz -13.11 dBm  
 \*SWT 500 ms 2.479830125 GHz

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

Page 48 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### Emission Bandwidth 20 dB (2402 MHz; 8DPSK; 3DH5)

#### 20 dB Bandwidth

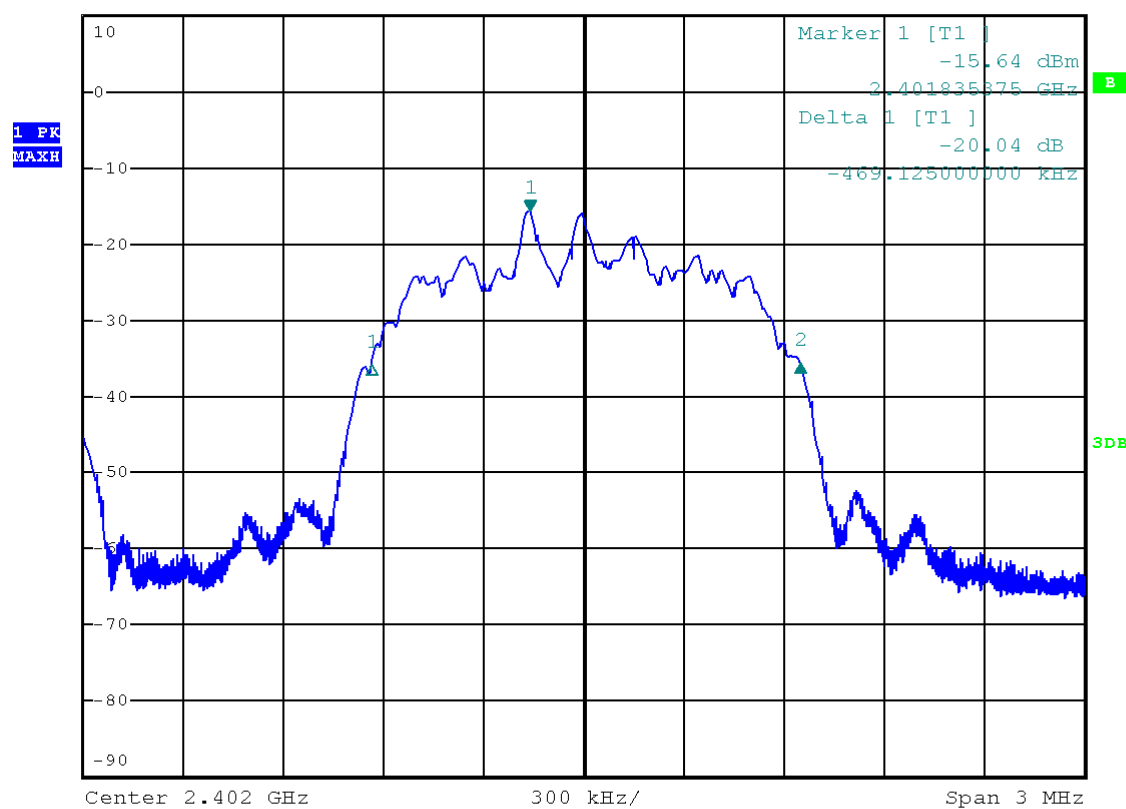
| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2402.000000         | 1.283625        | ---             | ---             |



\*RBW 30 kHz Delta 2 [T1 ]  
 VBW 100 kHz -20.00 dB  
 \*SWT 500 ms 814.500000000 kHz

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

**Occupied Channel Bandwidth 99% (2402 MHz; 8DPSK; 3DH5)**

### 99 % Bandwidth

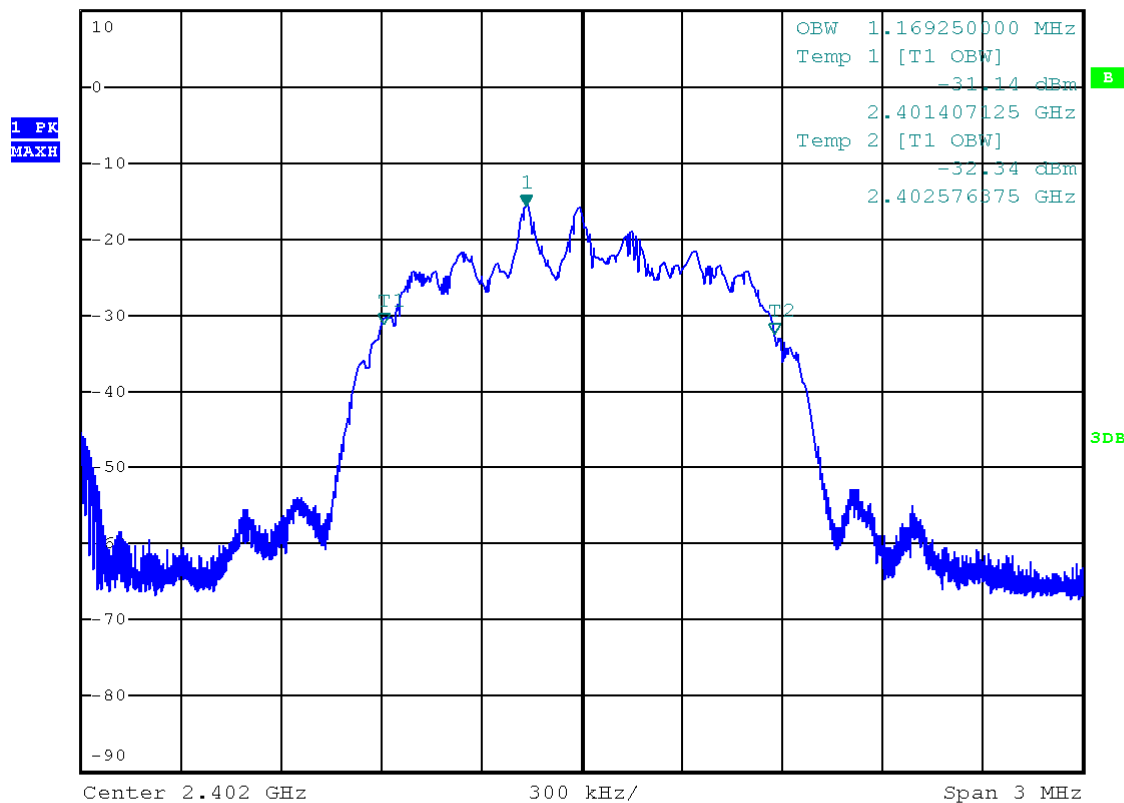
| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2402.000000         | 1.169250        | ---             | ---             |



\*RBW 30 kHz      Marker 1 [T1 ]  
 VBW 100 kHz      -15.68 dBm  
 \*Att 20 dB      2.401834625 GHz  
 \*SWT 500 ms

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

## TEST REPORT

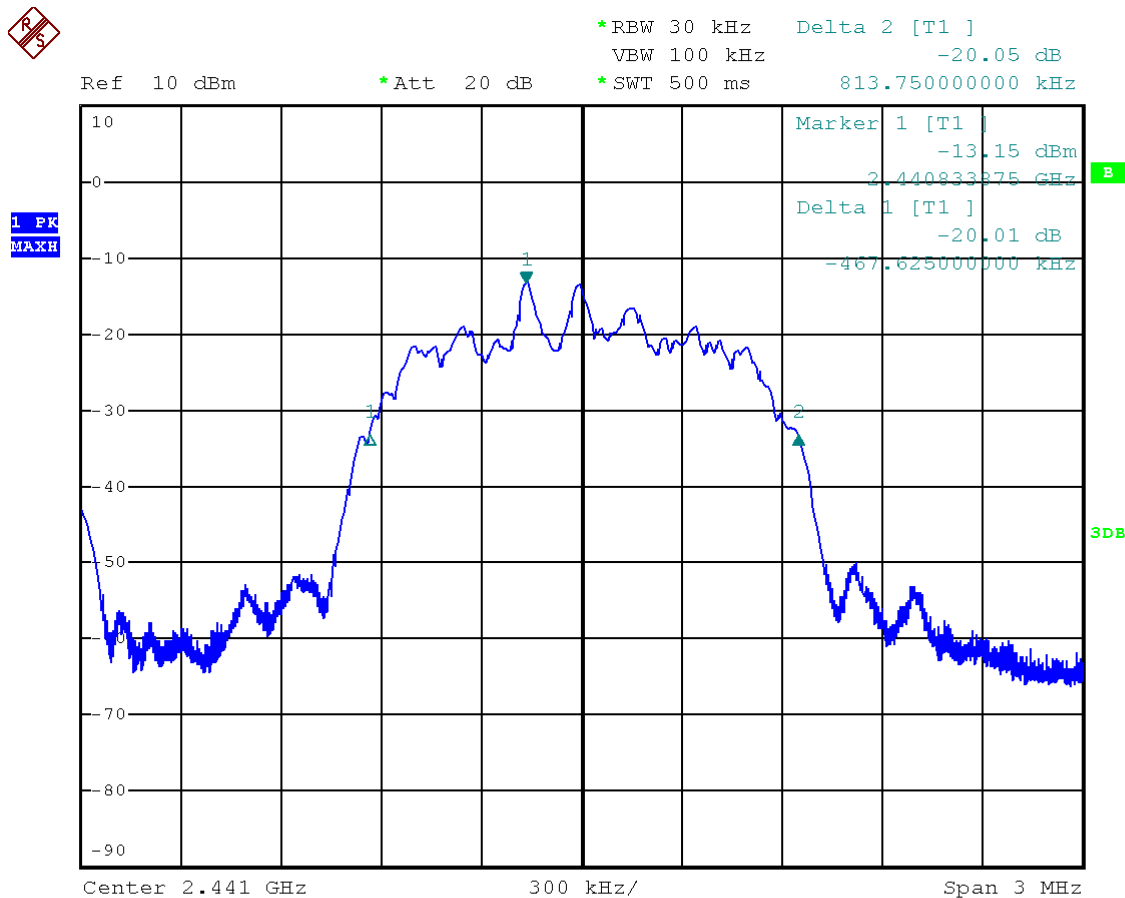
Report No. : AA0015629(1)

Date : 31 Mar 2021

### Emission Bandwidth 20 dB (2441 MHz; 8DPSK; 3DH5)

#### 20 dB Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2441.000000         | 1.281375        | ---             | ---             |



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### Occupied Channel Bandwidth 99% (2441 MHz; 8DPSK; 3DH5)

#### 99 % Bandwidth

| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2441.000000         | 1.170000        | ---             | ---             |

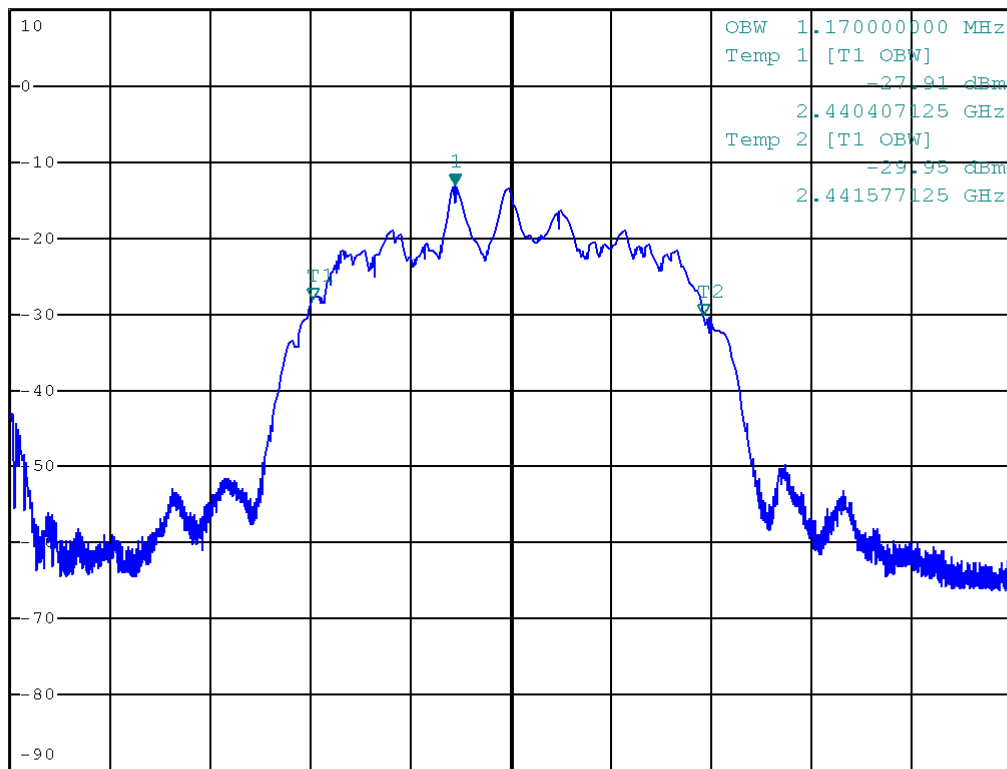


\*RBW 30 kHz      Marker 1 [T1 ]  
 VBW 100 kHz      -13.06 dBm  
 \*SWT 500 ms      2.440834250 GHz

Ref 10 dBm

\*Att 20 dB

1 PK  
MAXH



Center 2.441 GHz

300 kHz/

Span 3 MHz

FCC ID: 2AVGC3CBT011

Page 52 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

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## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### Emission Bandwidth 20 dB (2480 MHz; 8DPSK; 3DH5)

#### 20 dB Bandwidth

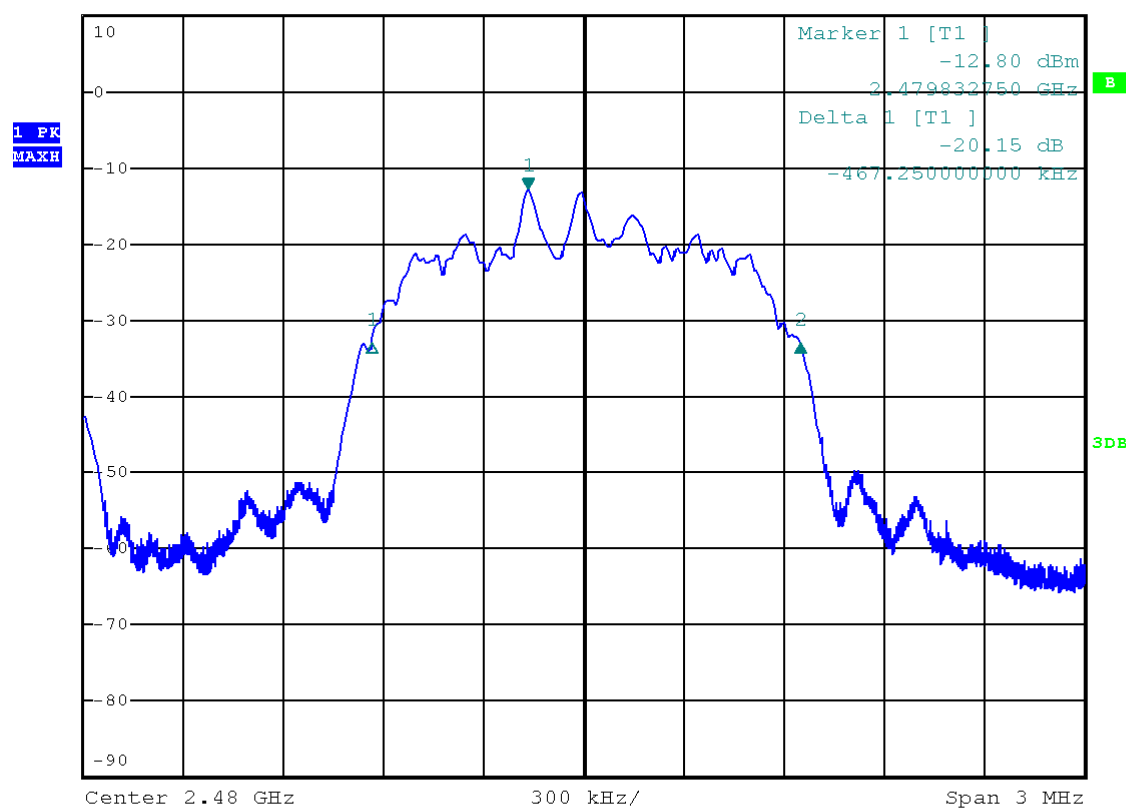
| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2480.000000         | 1.281750        | ---             | ---             |



\*RBW 30 kHz Delta 2 [T1 ]  
 VBW 100 kHz -20.07 dB  
 \*SWT 500 ms 814.500000000 kHz

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### Occupied Channel Bandwidth 99% (2480 MHz; 8DPSK; 3DH5)

#### 99 % Bandwidth

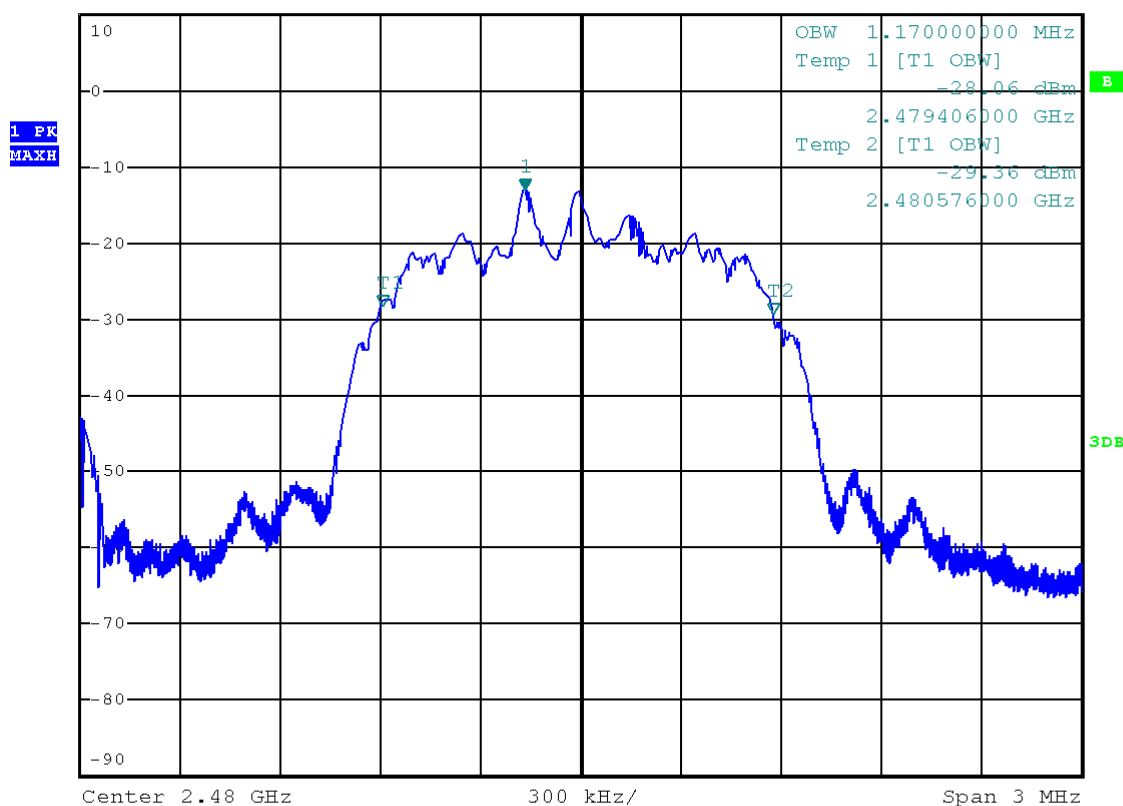
| DUT Frequency (MHz) | Bandwidth (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|-----------------|-----------------|-----------------|
| 2480.000000         | 1.170000        | ---             | ---             |



\*RBW 30 kHz Marker 1 [T1 ]  
 VBW 100 kHz -12.90 dBm  
 \*SWT 500 ms 2.479833500 GHz

Ref 10 dBm

\*Att 20 dB



FCC ID: 2AVGC3CBT011

## TEST REPORT

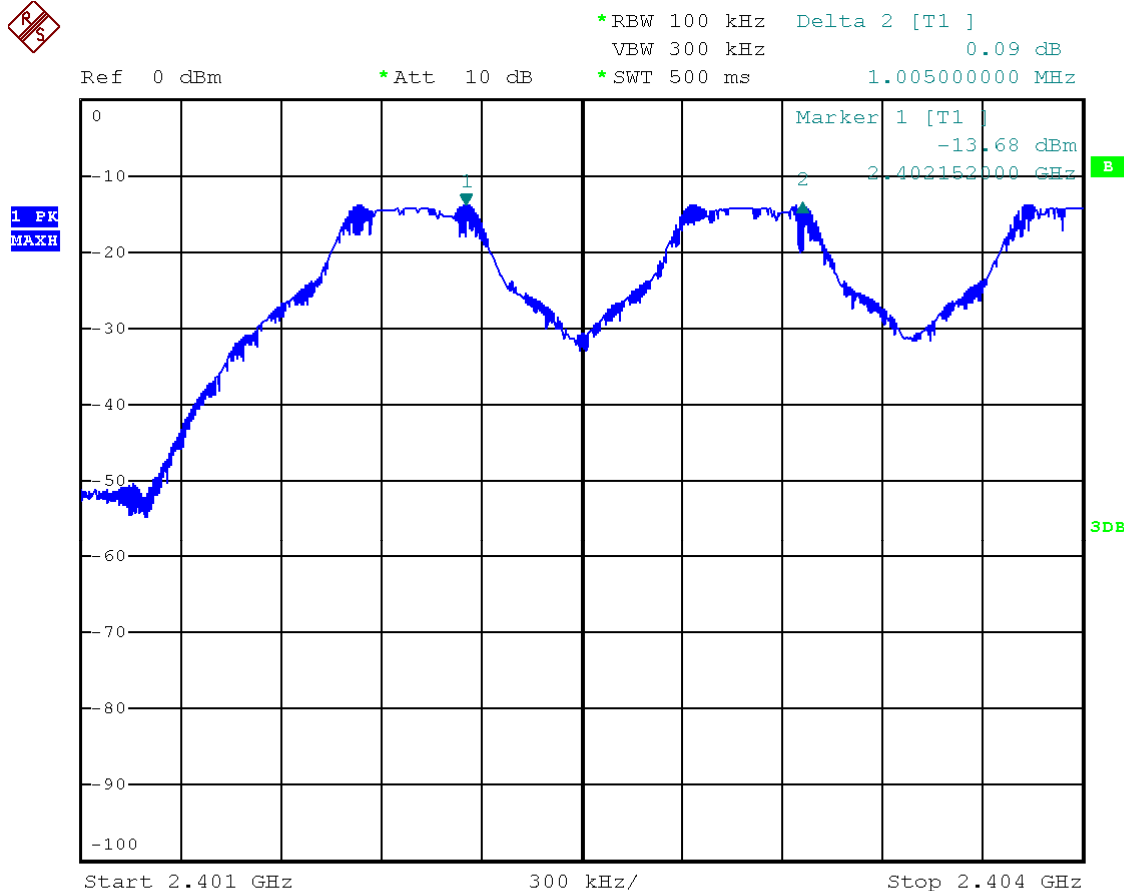
Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

| DUT Frequency (MHz) | Frequency Separation (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|----------------------------|-----------------|-----------------|
| 2402.000000         | 1.005000                   | 0.635500        | ---             |



FCC ID: 2AVGC3CBT011

Page 55 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

## TEST REPORT

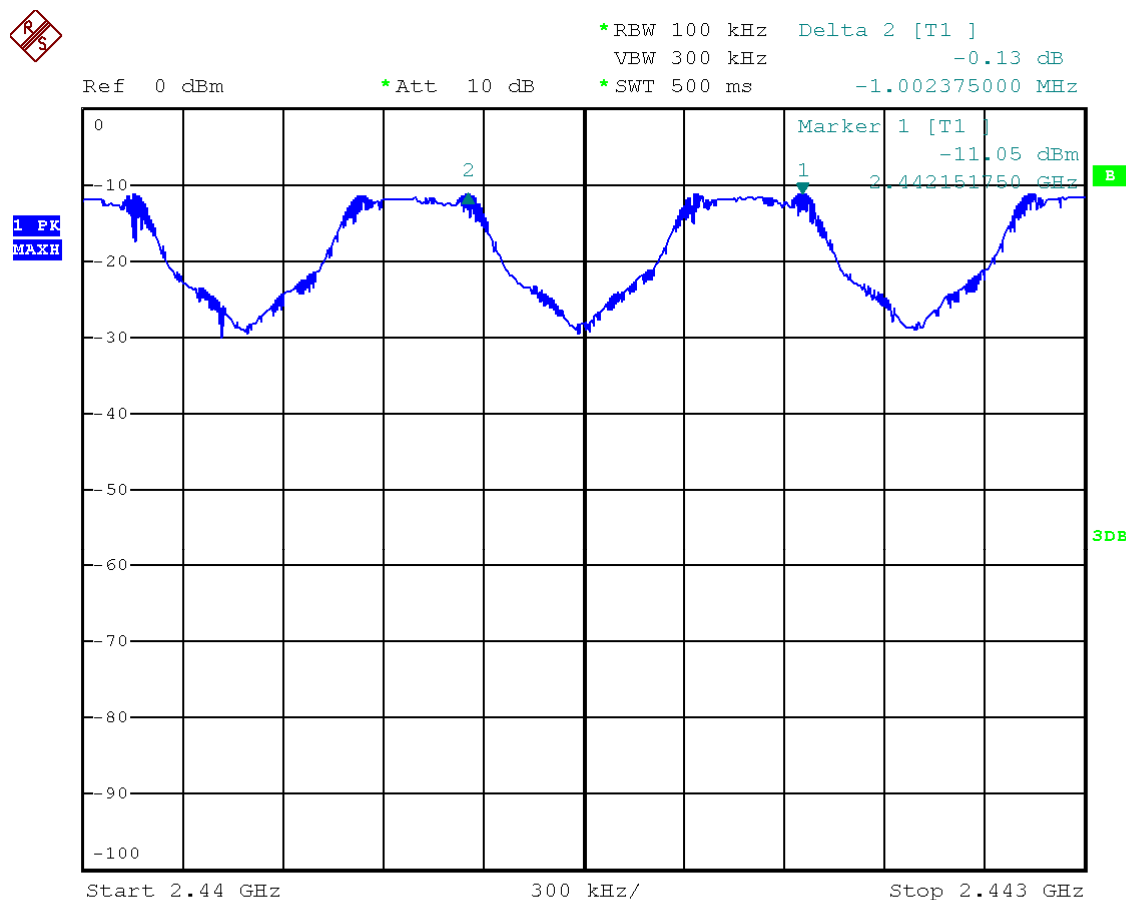
Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

| DUT Frequency (MHz) | Frequency Separation (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|----------------------------|-----------------|-----------------|
| 2441.000000         | 1.002375                   | 0.635500        | ---             |



FCC ID: 2AVGC3CBT011

Page 56 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

## TEST REPORT

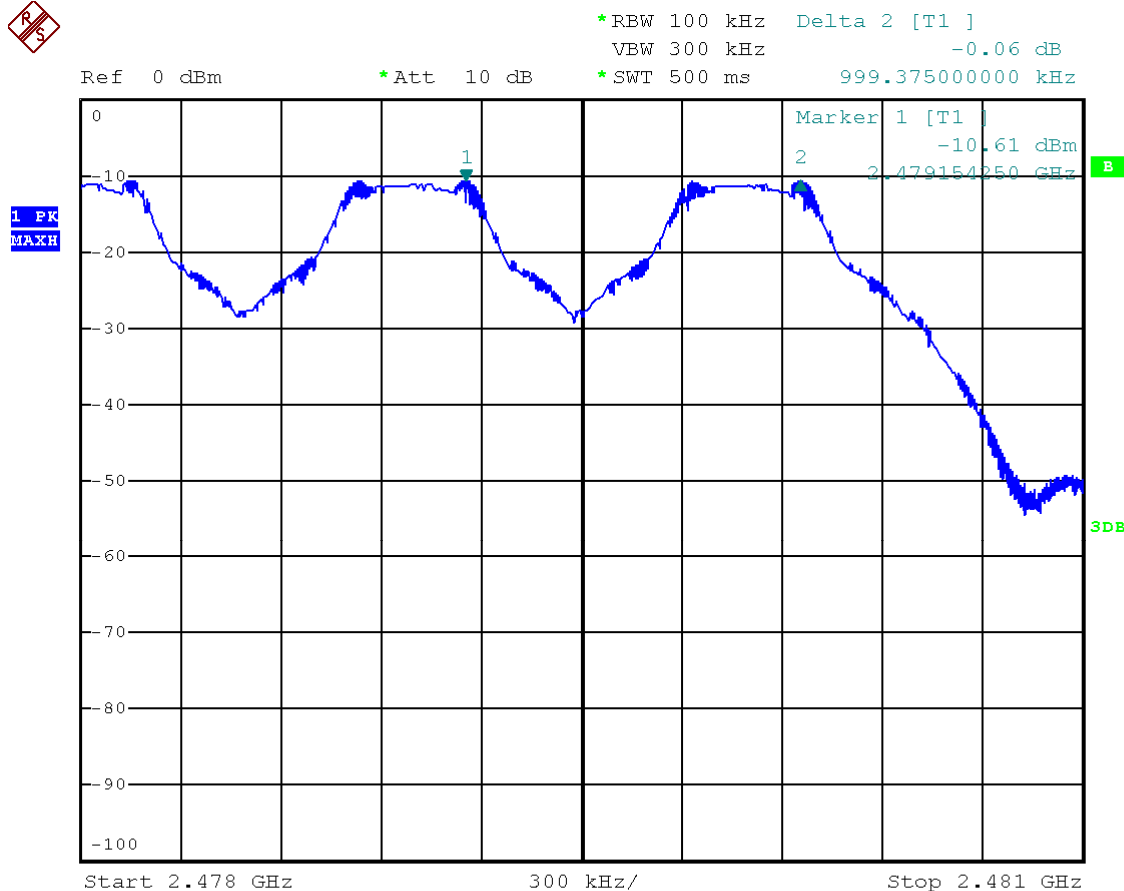
Report No. : AA0015629(1)

Date : 31 Mar 2021

### Carrier Frequency Separation (2479 MHz; GFSK; DH5)

#### Result

| DUT Frequency (MHz) | Frequency Separation (MHz) | Limit Min (MHz) | Limit Max (MHz) |
|---------------------|----------------------------|-----------------|-----------------|
| 2479.000000         | 0.999375                   | 0.635500        | ---             |



FCC ID: 2AVGC3CBT011

Page 57 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

### TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

##### Result

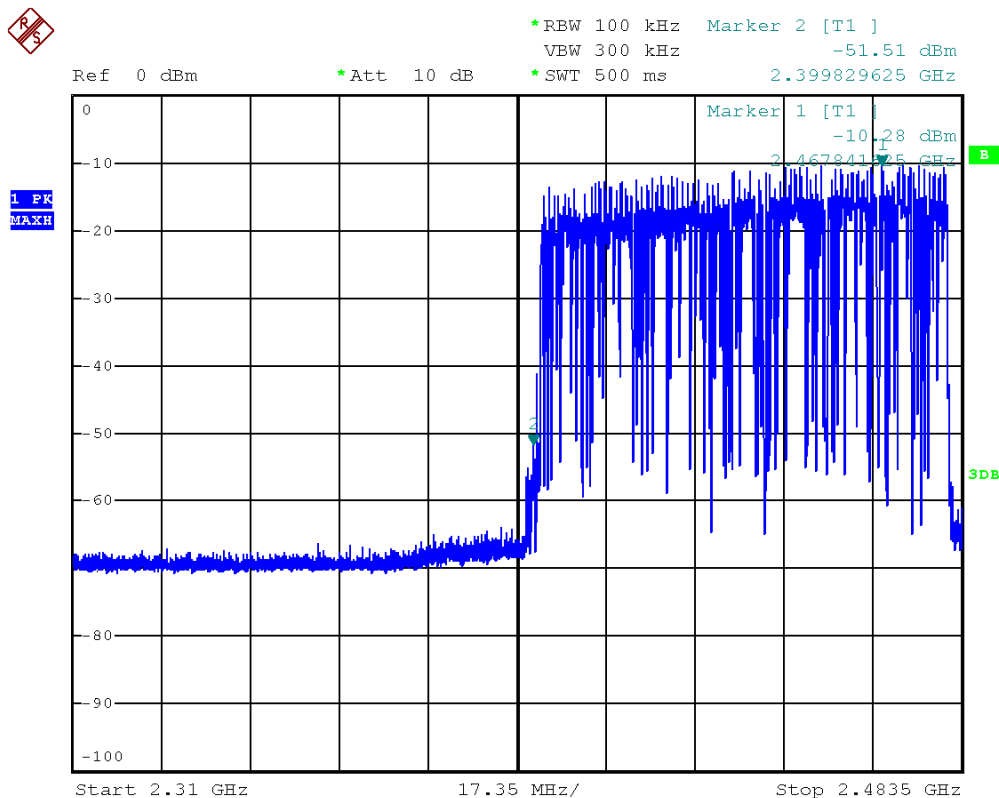
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| hopping             | PASS   |

##### Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2425.025000     | -11.7       |

##### Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2395.325000     | -55.8       | 14.2        | -41.7       | PASS   |



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

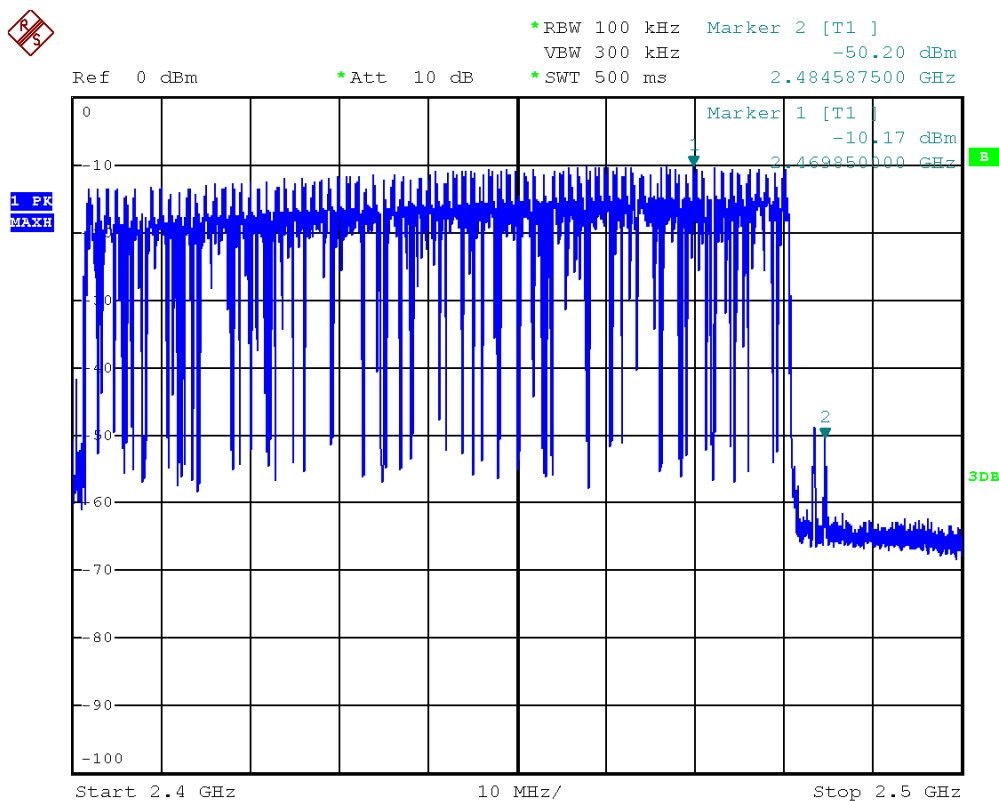
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| hopping             | PASS   |

#### Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2426.025000     | -11.7       |

#### Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2483.825000     | -57.8       | 16.1        | -41.7       | PASS   |



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

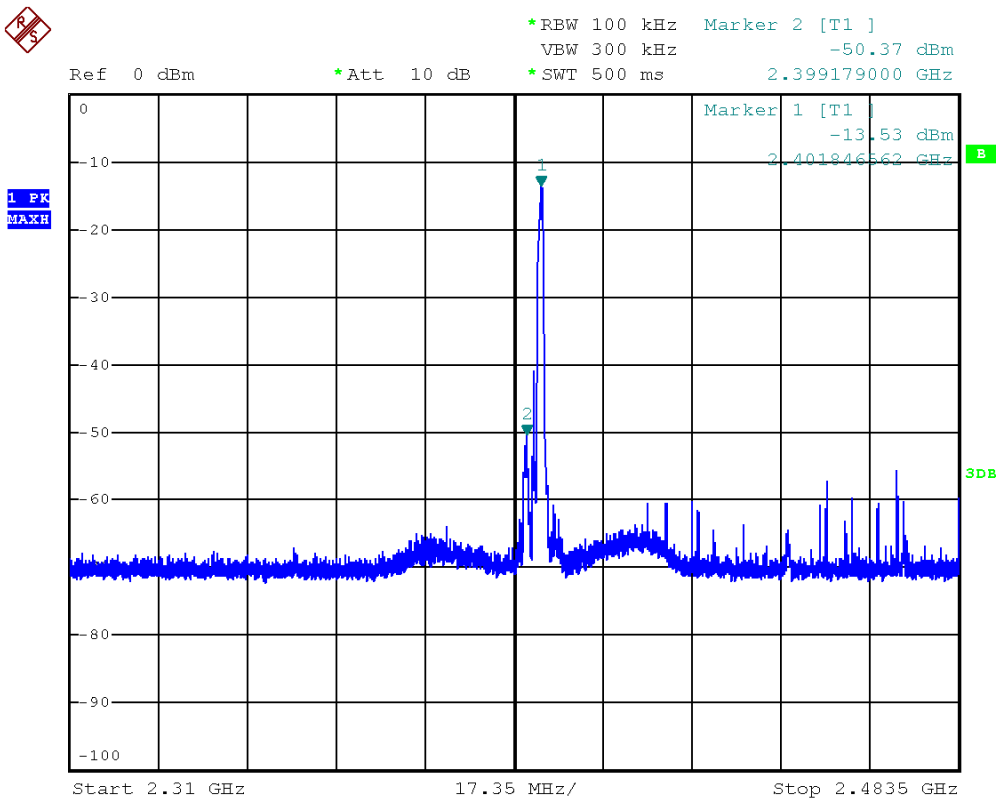
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2402.000000         | PASS   |

#### Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2402.025000     | -12.5       |

#### Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2399.825000     | -52.5       | 10.0        | -42.5       | PASS   |



FCC ID: 2AVGC3CBT011

### TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

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

#### Result

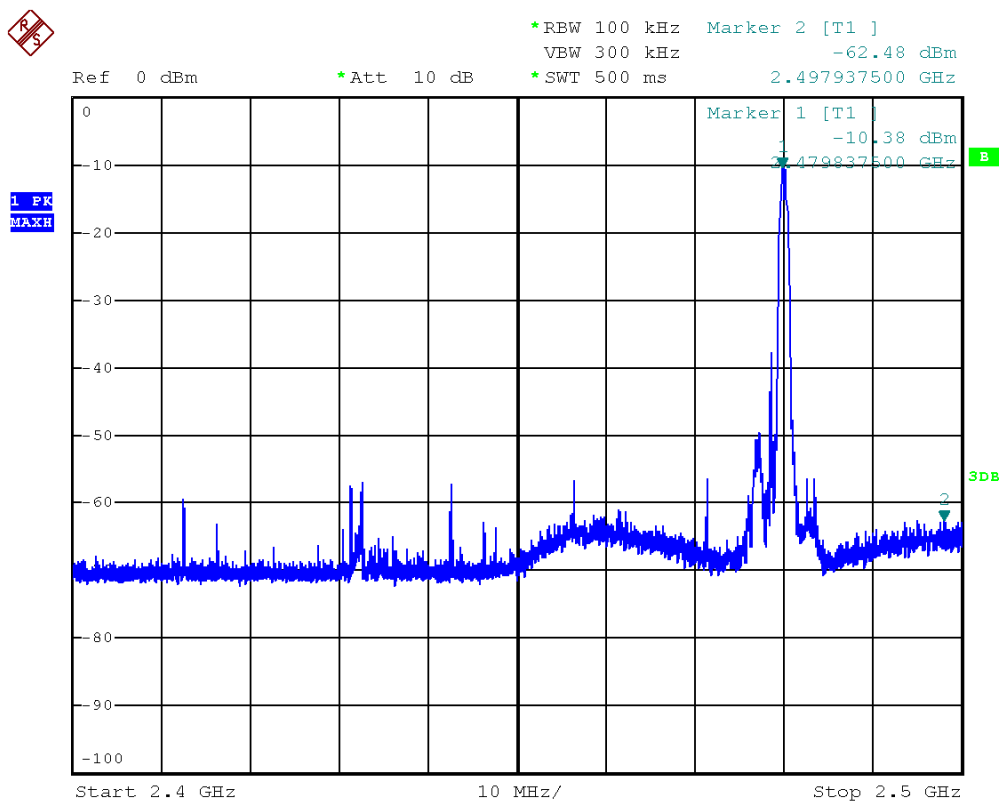
| DUT Frequency (MHz) | Result |
|---------------------|--------|
| 2480.000000         | PASS   |

#### Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2480.025000     | -12.2       |

#### Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 2484.275000     | -56.3       | 14.0        | -42.2       | PASS   |



FCC ID: 2AVGC3CBT011

### TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

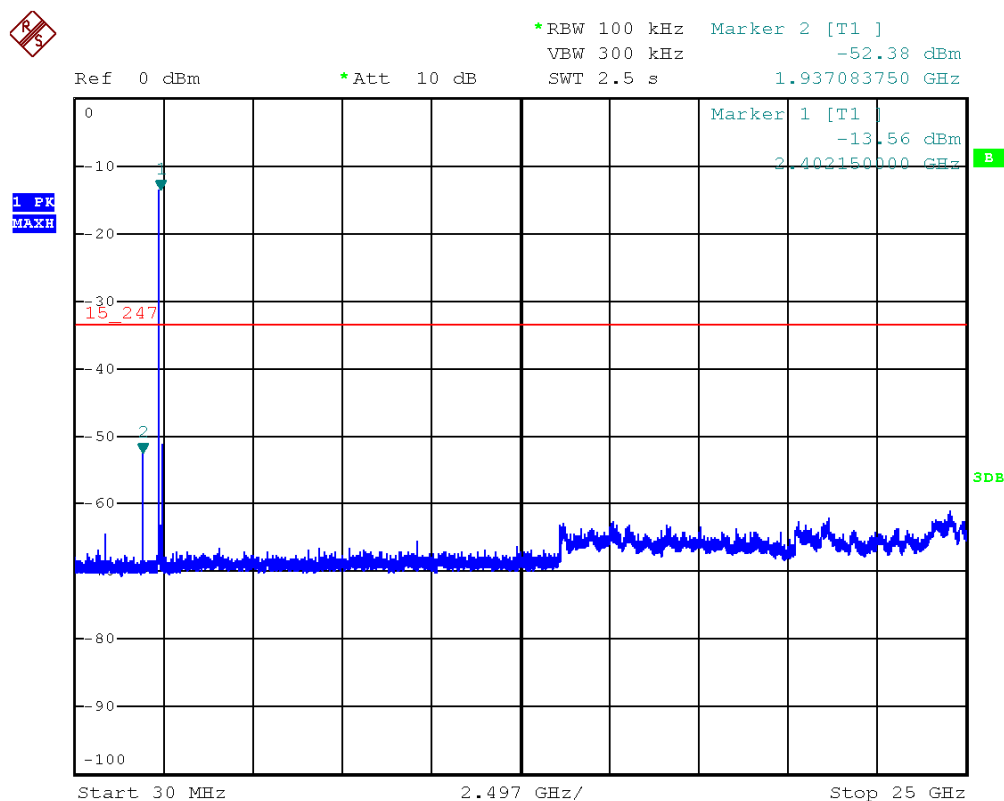
### Tx Spurious Emission (2402 MHz; GFSK; DH5)

#### Result Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2402.000        | -13.56      |

#### Final measurements

| Frequency (MHz) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 1937.083750     | -52.38      | -33.56      | 18.82       | PASS   |



FCC ID: 2AVGC3CBT011

### TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

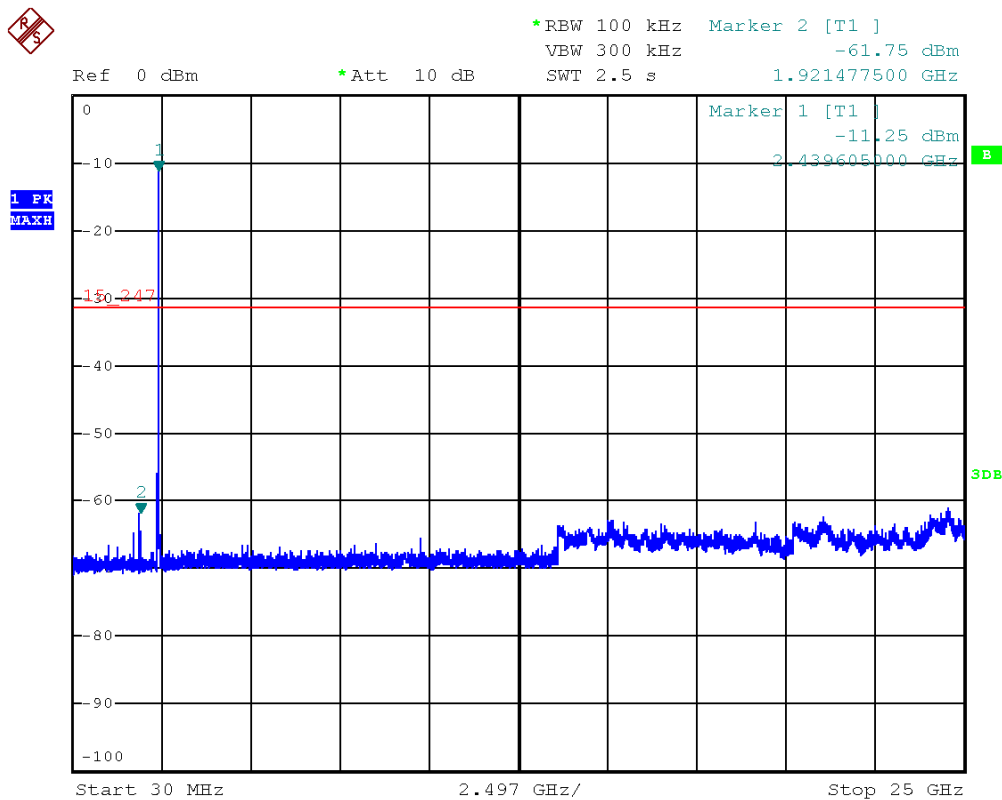
### Tx Spurious Emission (2441 MHz; GFSK;DH5)

#### Result Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2441.000        | -11.25      |

#### Final measurements

| Frequency (MHz) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 1921.477500     | -61.75      | -31.25      | 30.50       | PASS   |



FCC ID: 2AVGC3CBT011

Page 63 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

### TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

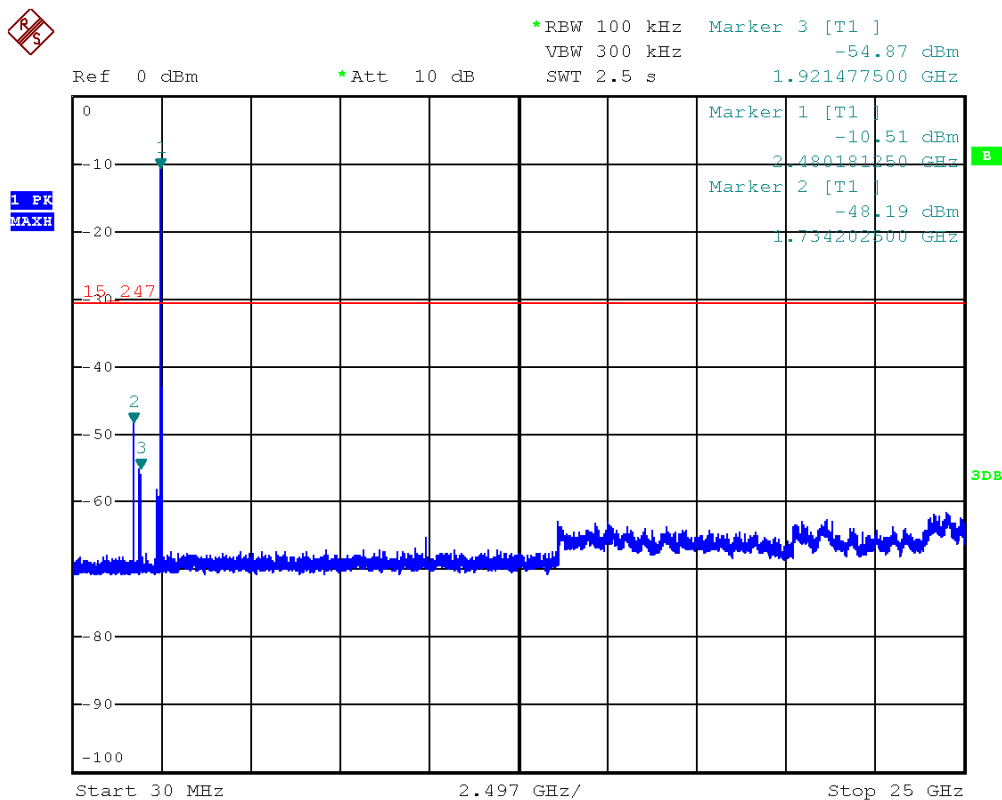
#### Tx Spurious Emission (2480 MHz; GFSK;DH5)

#### Result Inband Peak

| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2480.000        | -10.51      |

#### Final measurements

| Frequency (MHz) | level (dBm) | Limit (dBm) | Margin (dB) | Result |
|-----------------|-------------|-------------|-------------|--------|
| 1734.202500     | -48.19      | -30.51      | 17.68       | PASS   |
| 1921.477500     | -54.87      | -30.51      | 24.36       | PASS   |



FCC ID: 2AVGC3CBT011

## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

### Conducted Emission

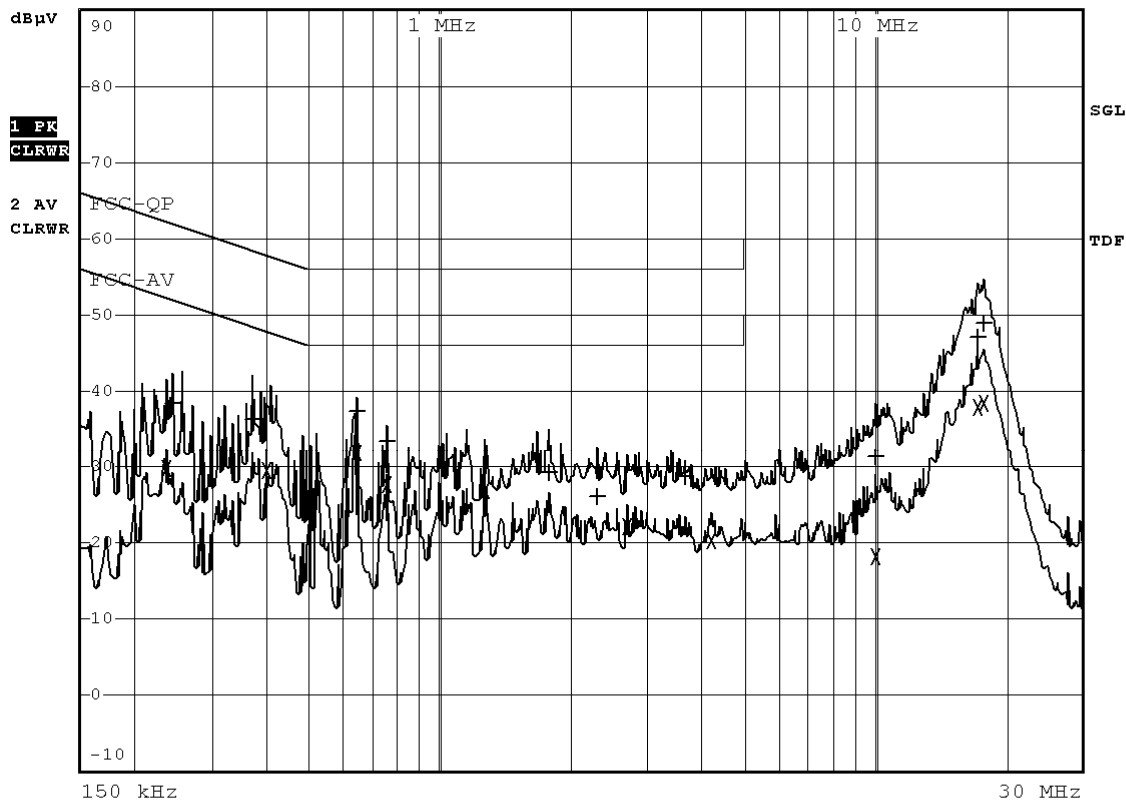
Test mode: charging



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP OFF



FCC ID: 2AVGC3CBT011



## TEST REPORT

Report No. : AA0015629(1)

Date : 31 Mar 2021

| EDIT PEAK LIST (Final Measurement Results) |             |            |        |                |
|--------------------------------------------|-------------|------------|--------|----------------|
| Trace1:                                    | FCC-QP      |            |        |                |
| Trace2:                                    | FCC-AV      |            |        |                |
| Trace3:                                    | ---         |            |        |                |
| TRACE                                      | FREQUENCY   | LEVEL dBµV |        | DELTA LIMIT dB |
| 2 Average                                  | 235.5 kHz   | 29.78      | L1 gnd | -22.46         |
| 1 Quasi Peak                               | 244.5 kHz   | 38.32      | N gnd  | -23.61         |
| 1 Quasi Peak                               | 375 kHz     | 36.29      | L1 gnd | -22.09         |
| 2 Average                                  | 402 kHz     | 29.51      | L1 gnd | -18.30         |
| 1 Quasi Peak                               | 639.5 kHz   | 37.49      | L1 gnd | -18.50         |
| 2 Average                                  | 639.5 kHz   | 31.82      | L1 gnd | -14.17         |
| 1 Quasi Peak                               | 752 kHz     | 33.43      | L1 gnd | -22.57         |
| 2 Average                                  | 752 kHz     | 27.72      | L1 gnd | -18.27         |
| 2 Average                                  | 1.274 MHz   | 26.81      | L1 gnd | -19.18         |
| 1 Quasi Peak                               | 1.7915 MHz  | 29.29      | L1 gnd | -26.70         |
| 1 Quasi Peak                               | 2.3135 MHz  | 26.03      | L1 gnd | -29.96         |
| 2 Average                                  | 2.705 MHz   | 22.13      | L1 gnd | -23.86         |
| 1 Quasi Peak                               | 3.6635 MHz  | 28.63      | L1 gnd | -27.36         |
| 2 Average                                  | 4.208 MHz   | 20.22      | L1 gnd | -25.77         |
| 1 Quasi Peak                               | 10.0355 MHz | 31.22      | L1 gnd | -28.77         |
| 2 Average                                  | 10.0355 MHz | 18.16      | N gnd  | -31.83         |
| 1 Quasi Peak                               | 17.2625 MHz | 47.03      | L1 gnd | -12.96         |
| 2 Average                                  | 17.3435 MHz | 37.79      | L1 gnd | -12.20         |
| 1 Quasi Peak                               | 17.888 MHz  | 48.83      | L1 gnd | -11.16         |
| 2 Average                                  | 17.888 MHz  | 38.43      | L1 gnd | -11.56         |

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

FCC ID: 2AVGC3CBT011

Page 66 of 66

Document name: FCC/ISED for FHSS - Document Ref No: RT-EL-EMC-048 - Issue Date: 13 Mar 2019 - Edition: 2

**CMA Industrial Development Foundation Limited**

**Room 1302, Yan Hing Centre, 9-13 Wong Chuk Yeung St., Fo Tan, Shatin, N.T., Hong Kong.**

**Tel: (852) 2698 8198 Fax: (852) 2695 4177 E-mail: [info@cmateesting.org](mailto:info@cmateesting.org) Web Site: <http://www.cmateesting.org>**