



# CMA Testing and Certification Laboratories

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## TEST REPORT

Report No. : AW0055081(8) Date : 18 Aug, 2018

Application No. : LW011265(4)

Applicant : Ambiq Micro, Inc.  
6500 River Place Blvd. Building 7,  
Suite 200 Austin, TX 78730, USA

Sample Description :	Sample Description	Model No.
	Apollo2 Blue EVB	AMA2BEVB

Date Received : 03 Apr 2018

Test Period : 09 Apr 2018 – 18 Apr 2018

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


Test Method : 47 CFR Part 15 (10-1-17 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 : \_\_\_\_\_

  
Mr. WONG Lap-pong, Andrew  
Manager  
Electrical Division

Page 1 of 52

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Table of Contents

Table of Contents .....	2
1 Product Information .....	4
1.1 General Information.....	4
1.2 Technical Information.....	4
1.3 Associated Electric Accessories Informatin .....	4
1.4 Associated Cables .....	4
2.0 Equipment Units Tested (EUT).....	5
3.0 Location of Test Facility.....	5
4.0 List of test equipment, supporting equipment and cables.....	6
4.1 Test equipment.....	6
4.2 Software .....	7
5.0 Measurement Uncertainty.....	7
6.0 Measurement .....	8
6.1 General Test condition.....	8
6.2 Output Power .....	9
6.2.1 Measurement.....	9
6.2.2 Final Result .....	9
6.3 Power Spectral Density.....	10
6.3.1 Measurement.....	10
6.3.2 Final Result .....	10
6.4 6dB Bandwidth .....	11
6.4.1 Measurement.....	11
6.4.2 Final Result .....	11
6.5 Band-edge measurement.....	12
6.5.1 Measurement.....	12
6.5.2 Final Result .....	13
6.6 Conducted Spurious emission (Transmitter).....	14
6.6.1 Measurement.....	14
6.6.2 Final Result .....	14
6.7 Radiated Spurious emission (Transmitter).....	15
6.7.1 Measurement.....	15
6.7.2 Final Result .....	16
6.8 Radiated Spurious emission (Receiver).....	17
6.8.1 Measurement.....	17
6.8.2 Final Result .....	18
6.9 Radiated emission (Data transfer).....	20
6.9.1 Measurement.....	20
6.9.2 Final Result .....	21
6.10 Conducted Emission.....	22
6.10.1 Measurement.....	22

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

6.10.2 Final Result .....	22
APPENDIX A Test Result .....	A1
APPENDIX B External Photo.....	A27
APPENDIX C Internal Photo.....	A29

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 1 Product Information

#### 1.1 General Information

Product Description:	Model:
Apollo2 Blue EVB	AMA2BEVB

Primary function : Bluetooth communication  
 Power supply : USB 5V  
 RF related function : Bluetooth communication  
 Electric Accessories sold : NIL  
 with  
 Interconnection cable : NIL  
 associated sold with  
 Operating condition : Not specified  
 Model difference : Not applicable

#### 1.2 Technical Information

Operating Frequency : 2402 – 2480MHz  
 Digital Modulation : Widband modulation  
 Modulation : GFSK  
 Number of Channel : 40  
 Channel Bandwidth : 2MHz  
 Occupied Bandwidth : 1.16MHz  
 Signal Type : Data  
 Number of Antenna : One  
 Antenna Type : Chip Antenna  
 Antenna Gain : -3.53 dBi  
 Rated Input Voltage : USB 5V  
 RF Technology Used : BLE  
 Simplex or Duplex : Half-duplex  
 Adaptivity : FHSS adaptivity

#### 1.3 Associated Electric Accessories Informatin

NIL

#### 1.4 Associated Cables

NIL

FCC ID: 2APPJ2102154165145





# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 2.0 Equipment Units Tested (EUT)

Product Description : Apollo2 Blue EVB  
Model : AMA2BEVB  
Serial No. : Not specified  
Sample Type : Production Sample and engineering sample  
Sample No. : RW013711-001-3(T)  
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: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 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	ESCS30	100001	01 Feb 2019	1Year
EMI Test Receiver	Rohde & Schwarz	ESCI	100152	07 Dec 2018	1Year
Spectrum Analyzer	R&S	FSV40	100964	08 Feb 2019	1Year
Biconical Antenna	Rohde & Schwarz	HK116	837414/004	18 Aug 2019	1Year
Log Periodic Antenna	Teseq	UPA6109	43666	27 Jul 2020	2Years
Loop Antenna	EMCO	6502	00056620	25 Jan 2020	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	21 Dec 2018	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	21 Dec 2018	2Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	02 Aug 2018	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	02 Aug 2018	2Years
Coaxial Cable	Schaffner	RG 213/U	N/A	13 May 2019	1Year
Coaxial Cable	Suhner	RG 214/U	N/A	13 May 2019	1Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	21 Dec 2018	1Year
LISN	Rohde & Schwarz	ENV216	101323	16 Jan 2019	1Year
Coaxial Cable	Tyco Electronics	RG 58C/U	N/A	24 Oct 2018	1Year
<b>Rohde &amp; Schwarz TS8997 Testing System</b>					
Spectrum Analyzer	Rohde & Schwarz	FSV 40	101190	09 Aug 2019	1Year
Vector Generator	Rohde & Schwarz	SMBV100A	262024	09 Aug 2019	1Year
Generator	Rohde & Schwarz	SMB100A	103230	09 Aug 2019	1Year
OSP	Rohde & Schwarz	OSP	OSP120 V02	09 Aug 2019	1Year

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 4.2 Software

Software Name	Version	Function	Provided by
Sscm*	V5.13.1	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

#### Line-conducted emissions

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

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.0 Measurement

#### 6.1 General Test condition

Temperature : 21°C  
Test Voltage : USB 5V  
Humidity : 60%  
Atmosphere Pressure : 102.1kPa

FCC ID: 2APPJ2102154165145





# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.2 Output Power

#### 6.2.1 Measurement

Requirement : FCC Part 15 §15.247(b) (1)  
 Measuring procedure : ANSI C63.10:2013, section 11.9.1  
 Hopping mode : Disable  
 Modulation tested : GFSK  
 Channel tested for non-hopping mode : 2402MHz, 2440MHz, 2480MHz  
 Additional measuring procedure : Nil  
 Remark : Nil

#### 6.2.2 Final Result

##### Maximum peak conducted output power

Maximum peak conducted output power	Limit(s)	Result	Modulation
-3.1dBm	≤30.0dBm	PASS	GFSK

Remark: Detail test result and equipment setting refer to appendix A, A3, A8, A11.

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.3 Power Spectral Density

#### 6.3.1 Measurement

Requirement : FCC Part 15 §15.247(a)  
 Measuring procedure : ANSI C63.10:2013, section 11.10  
 Hopping mode : Disable  
 Modulation tested : GFSK  
 Channel tested for non-hopping mode : 2402MHz, 2440MHz, 2480MHz  
 Additional measuring procedure : Nil  
 Remark : Nil

#### 6.3.2 Final Result

##### Maximum conducted power spectral density

Maximum peak conducted output power	Limit(s)	Result	Modulation
-23.4dBm	≤8.0dBm	PASS	GFSK

Remark: 1) Detail test result and equipment setting refer to appendix A, A5, A10, A13

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.4 6dB Bandwidth

#### 6.4.1 Measurement

Requirement : FCC Part 15 §15.247(a)  
 Measuring procedure : ANSI C63.10:2013, section 11.8  
 Hopping mode : Disable  
 Modulation tested : GFSK  
 Channel tested for non-hopping mode : 2402MHz, 2440MHz, 2480MHz  
 Additional measuring procedure : Nil  
 Remark : Nil

#### 6.4.2 Final Result

##### Maximum 6dB bandwidth

6dB bandwidth	Limit(s) <sup>1</sup>	Result	Modulation
675.247kHz	≥500kHz	PASS	GFSK

Remark: 1) Detail test result and equipment setting refer to appendix A, A4, A9, A12

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.5 Band-edge measurement

#### 6.5.1 Measurement

Requirement : FCC Part 15 §15.247(d)  
Measuring procedure : ANSI C63.10:2013, section 11.13 and 6.10  
Hopping mode : Disable  
RBW : 100kHz  
VBW : 300kHz  
Frequency range : 2310 – 2483.5MHz and 2400 – 2500MHz  
Modulation tested : GFSK  
Channel tested for non-hopping mode : 2402MHz for lowed band edge and 2480MHz for higher band edge  
Additional measuring procedure : For lower band edge (2400MHz)

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

#### For Upper bandedge (2483.5MHz)

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

FCC ID: 2APPJ2102154165145





# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.5.2 Final Result

Bandedge frequency for lower bandedge (Worst Case)	Worst case (dBc) <sup>2</sup>	Detector	Limit <sup>1</sup> (dBc)	Result	Worst case
2399.975000MHz	35.2	Peak	≥20.0	PASS	GFSK
Bandedge frequency for higher bandedge (Worst Case)	Worst case in (dBc) <sup>2</sup>	Detector	Limit <sup>1</sup>	Result	Worst case
2483.775000MHz	38.8	Peak	≥20.0	PASS	GFSK

Remark: 1) The limit is based on the transmitter demonstrated compliance with peak conducted power limit on section 6.2.2 of this report.

2) The Worst case dBc is the peak values measured in procedure 1 minus the worst case bandedge emission

3) Detail result and equipment setting refer to appendix A, A6, A7, A14, A15

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.6 Conducted Spurious emission (Transmitter)

#### 6.6.1 Measurement

- Requirement : FCC Part 15 §15.247(d)  
 Measuring procedure : ANSI C63.10:2013, section 5.5, 5.6, 7.8.8 and 11.12.2.1  
 Hopping mode : Disable  
 RBW : Refer to pre-measurement and final measurement setting  
 Detector : Refer to pre-measurement and final measurement setting  
 Modulation tested : GFSK  
 Channel tested for non-hopping mode : 2402MHz, 2440MHz, 2480MHz  
 Additional measuring procedure : 1) Setup engineering sample to channel 2402MHz to perform the measurement according to ANSI C63.10, section 7.8.8 with pre-measurement setting  
 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  
 3) For non-restricted band frequency, peak detector and 100kHz RBW will be used for final measurement.  
 4) Repeat the procedure 1 to 3 for channel frequency of 2440MHz and 2480MHz
- Remark : Nil

#### 6.6.2 Final Result

Worst case spurious emission frequency	Worst case spurious emission power <sup>1</sup>	Limit <sup>2</sup>	Margin	Result	Worst case mode
2399.750000MHz	-48.3dBm	-33.8dBm	14.4dB	PASS	GFSK

- 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) + 4,7dB – 104.8dB 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, A16-23

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.7 Radiated Spurious emission (Transmitter)

#### 6.7.1 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.

GFSK modulation is selected as worst case mode for spurious radiated emission test from cabinet.

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.7.2 Final Result

Test mode: Transmission mode

Polarization	Frequency (MHz)	Reading at 3m (dB $\mu$ V)	Transducer Factor (dB/m)	Field Strength at 3m <sup>1</sup> (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)	Detector (PK/QP/AV)
H	2390.000	57.1	-6.6	50.5	54.0	-3.5	PK
V	2390.000	53.3	-6.6	46.7	54.0	-7.3	PK
H	2400.000	78.1	-4.6	73.5	74.0	-0.5	PK
H	2400.000	32.9	-4.6	28.3	54.0	-25.7	AV
V	2400.000	77.0	-4.6	72.4	74.0	-1.6	PK
V	2400.000	32.4	-4.6	27.8	54.0	-26.2	AV
H	2483.500	74.4	-4.6	69.8	74.0	-4.2	PK
H	2483.500	31.0	-4.6	26.4	54.0	-27.6	AV
V	2483.500	74.5	-4.6	69.9	74.0	-4.1	PK
V	2483.500	31.1	-4.6	26.5	54.0	-27.5	AV
H	2500.000	46.8	-4.6	42.2	54.0	-11.8	PK
V	4803.443	45.9	3.2	49.1	54.0	-4.9	PK
V	4879.884	41.8	3.2	45.0	54.0	-9.0	PK
V	4959.350	43.9	3.8	47.7	54.0	-6.3	PK

- Remark: 1) Field Strength = Reading + transducer factor.  
 2) Other emission with more than 20dB margin are not reported in this report.  
 3) For emission above 1GHz, the Peak test data is compared with Average limit except emission 2400MHz and 2483.5MHz.

FCC ID: 2APPJ2102154165145





# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.8 Radiated Spurious emission (Receiver)

#### 6.8.1 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 receiving mode is selected for spurious radiated emission test from cabinet.

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.8.2 Final Result

Test mode: Receiving mode (2402MHz)

Polarization	Frequency (MHz)	Reading at 3m (dB $\mu$ V)	Transducer Factor (dB/m)	Field Strength at 3m <sup>1</sup> (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)	Detector (PK/QP/AV)
V	42.184	8.7	11.8	20.5	40.0	-19.5	QP
H	42.867	8.3	11.8	20.1	40.0	-19.9	QP
V	55.679	4.3	10.4	14.7	40.0	-25.3	QP
V	74.664	5.6	9.8	15.4	40.0	-24.6	QP
V	86.954	7.1	9.8	16.9	40.0	-23.1	QP
V	94.263	8.2	10.2	18.4	43.5	-25.1	QP
V	131.456	8.2	12.6	20.8	43.5	-22.7	QP

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

Test mode: Receiving mode (2440MHz)

Polarization	Frequency (MHz)	Reading at 3m (dB $\mu$ V)	Transducer Factor (dB/m)	Field Strength at 3m <sup>1</sup> (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)	Detector (PK/QP/AV)
V	42.372	8.7	11.8	20.5	40.0	-19.5	QP
H	42.454	8.6	11.8	20.4	40.0	-19.6	QP
V	55.320	4.4	10.4	14.8	40.0	-25.2	QP
V	75.123	5.2	9.8	15.0	40.0	-25.0	QP
V	86.952	7.2	9.8	17.0	40.0	-23.0	QP
V	93.315	7.9	10.2	18.1	43.5	-25.4	QP
V	130.965	8.1	12.6	20.7	43.5	-22.8	QP

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

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

Test mode: Receiving mode (2480MHz)

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	42.526	8.5	11.8	20.3	40.0	-19.7	QP
H	42.947	8.3	11.8	20.1	40.0	-19.9	QP
V	55.556	4.4	10.4	14.8	40.0	-25.2	QP
V	74.366	5.2	9.8	15.0	40.0	-25.0	QP
V	84.756	6.7	9.8	16.5	40.0	-23.5	QP
V	95.276	8.4	10.2	18.6	43.5	-24.9	QP
V	131.669	8.2	12.6	20.8	43.5	-22.7	QP

- Remark: 1) Field Strength = Reading + transducer factor.  
 2) Other emission with more than 20dB margin are not reported in this report.

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.9 Radiated emission (Data transfer)

#### 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.

The EUT connected with PC for data transfer.

FCC ID: 2APPJ2102154165145





# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.9.2 Final Result

Test mode: Data transfer 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	99.660	10.4	10.5	20.9	43.5	-22.6	QP
V	164.679	7.7	11.4	19.1	43.5	-24.4	QP
H	205.860	3.4	15.1	18.5	43.5	-25.0	QP
H	239.292	5.7	15.1	20.8	46.0	-25.2	QP
H	264.057	8.6	15.1	23.7	46.0	-22.3	QP
H	304.549	7.1	17.0	24.1	46.0	-21.9	QP
H	343.578	8.9	17.0	25.9	46.0	-20.1	QP

- Remark: 1) Field Strength = Reading + transducer factor.  
 2) Other emission with more than 20dB margin are not reported in this report.

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### 6.10 Conducted Emission

#### 6.10.1 Measurement

Requirement : FCC Part 15 §15.207(a) and RSS-Gen, clause 8.8  
 Measuring procedure : ANSI C63.4:2014, section 7.3  
 Test mode : Transmission  
 RBW : 9kHz  
 VBW : 30kHz  
 Modulation tested : GFSK<sup>1</sup>  
 Packet Type tested : DH5  
 Additional measuring procedure : Nil  
 Remark : Nil

#### 6.10.2 Final Result

Worst case conducted emission frequency	Worst case conducted emission	Limit	Margin	Detector	Lines	Worst case mode	Result
267kHz	54.20dB $\mu$ V	61.20dB $\mu$ V	-7.00dB	QP	N	Transmission	PASS

Remark: 1) Detail test result and equipment setting refer to appendix A, A25, A26.

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

## APPENDIX A Test Result

FCC ID: 2APPJ2102154165145

Page A1 of 52

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# CMA Testing and Certification Laboratories

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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

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

Frequencies

2402 MHz (2402 MHz)

2440 MHz (2440 MHz)

2480 MHz (2480 MHz)

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

Spectrum Analyzer:

SA FSV 40 (SA FSV 40) @ VISA (ADR  
TCPIP::192.168.48.148::INST0::INSTR), SN  
1321.3008K39/101190, FW 2.30 SP4

Vector Generator:

VG SMBV100A (VG SMBV100A) @ VISA (ADR  
TCPIP::192.168.48.149::INST0::INSTR), SN 262024, FW 5.1.0

Generator:

SMB100A (SMB100A) @ VISA (ADR  
TCPIP::192.168.48.152::INST0::INSTR), SN 103230, FW Rev  
2.20.1, 08/2012, CVI 2009

OSP:

TS8997 OSP (OSP) @ VISA (ADR  
TCPIP::192.168.48.147::INST0::INSTR), SN OSP120 V02,  
101611, FW 2.55.150506

Power Meter:

OSP-B157 Power Meter (OSP-B157 Power Meter) @ USB (ADR  
20), SN 27873972, FW 3.1

FCC ID: 2APPJ2102154165145

Page A2 of 52

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# CMA Testing and Certification Laboratories

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## TEST REPORT

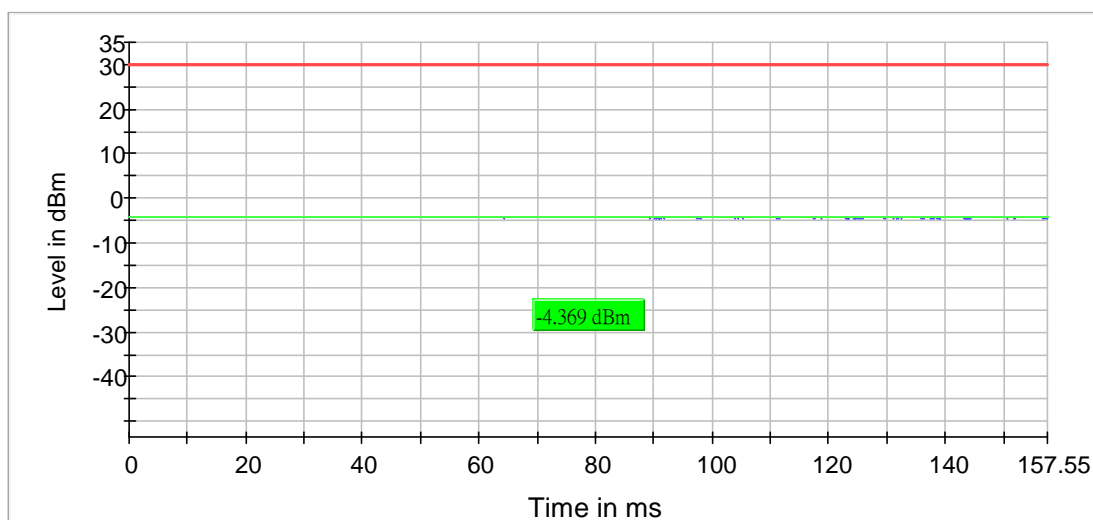
Report No. : AW0055081(8)

Date : 18 Aug, 2018

### RF output power (2402 MHz)

#### Result

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2402.000000	-4.4	30.0	15.605	PASS



— Gated Trace — Overall — Limit

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

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## TEST REPORT

Report No. : AW0055081(8)

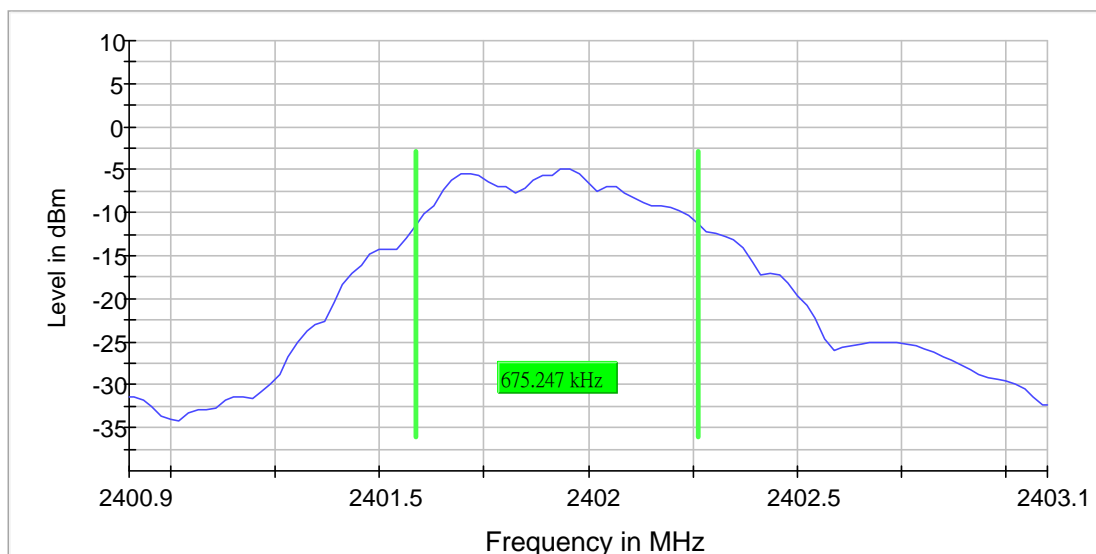
Date : 18 Aug, 2018

### Minimum Emission Bandwidth 6 dB

#### 6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.675247	0.500000	---	2401.586139	2402.261386

DUT Frequency (MHz)	Max Level (dBm)	Result
2402.000000	-5.0	PASS



### Measurement

Setting	Instrument Value	Target Value	Setting	Instrument Value	Target Value
Start Frequency	2.40090 GHz	2.40090 GHz	Stablemode	Trace	Trace
Stop Frequency	2.40310 GHz	2.40310 GHz	Stablevalue	0.50 dB	0.50 dB
Span	2.200 MHz	2.200 MHz	Run	8 / max. 150	max. 150
RBW	100.000 kHz	~ 100.000 kHz	Stable	5 / 5	5
VBW	300.000 kHz	~ 300.000 kHz	Max Stable Difference	0.27 dB	0.50 dB
SweepPoints	101	~ 22			
SweepTime	19.009 μs	AUTO			
Reference Level	-10.000 dBm	-10.000 dBm			
Attenuation	10.000 dB	AUTO			
Detector	MaxPeak	MaxPeak			
SweepCount	100	100			
Filter	3 dB	3 dB			
Trace Mode	Max Hold	Max Hold			
SweepType	FFT	AUTO			
Preamp	off	off			

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

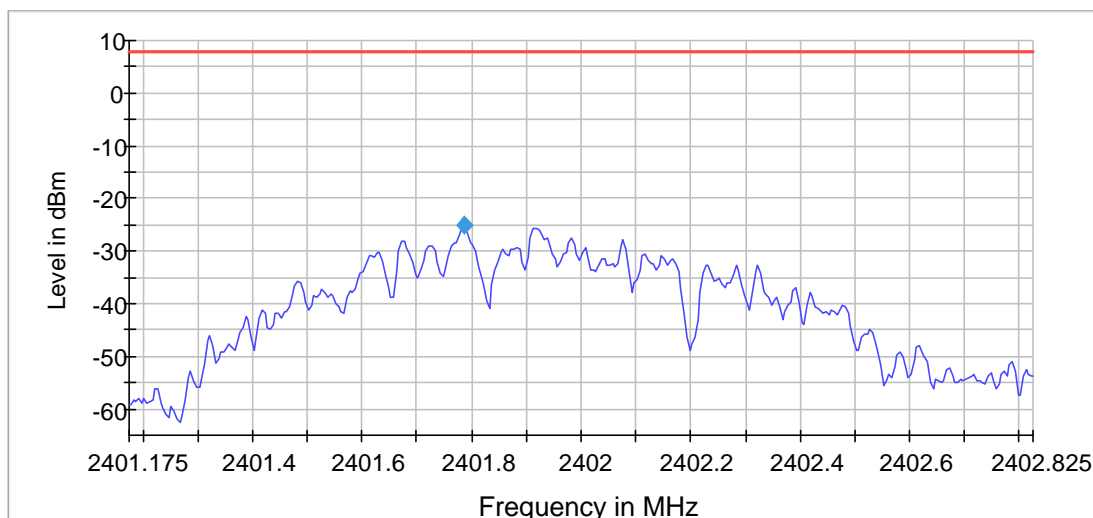
Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Power Spectral Density (2402 MHz)

#### Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2402.000000	2401.787500	-25.047	8.0	PASS



— Limit    — Sum Level    ◆ PSD

#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40118 GHz	2.40118 GHz
Stop Frequency	2.40283 GHz	2.40283 GHz
Span	1.650 MHz	1.650 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	330	~ 330
SweepTime	1.650 s	1.650 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.06 dB	0.50 dB

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Band Edge low (2402 MHz)

#### Result

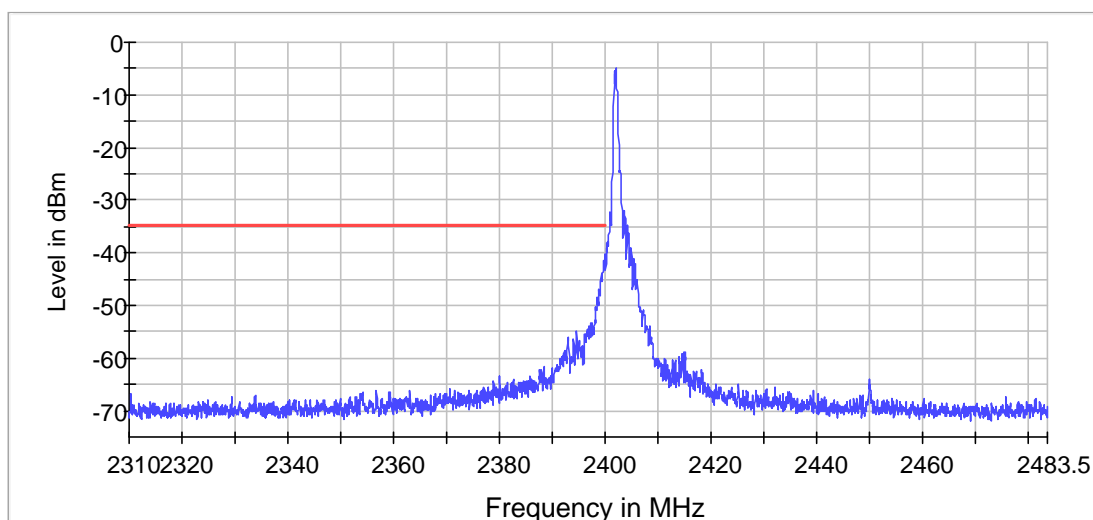
DUT Frequency (MHz)	Result
2402.000000	PASS

#### Inband Peak

Frequency (MHz)	Level (dBm)
2401.975000	-4.9

#### Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-40.1	5.3	-34.9	PASS
2399.925000	-41.1	6.2	-34.9	PASS
2399.825000	-41.4	6.5	-34.9	PASS
2399.775000	-41.5	6.6	-34.9	PASS
2399.875000	-41.8	6.9	-34.9	PASS
2399.725000	-42.2	7.3	-34.9	PASS
2399.675000	-42.3	7.4	-34.9	PASS
2399.625000	-43.2	8.3	-34.9	PASS
2399.525000	-43.6	8.7	-34.9	PASS
2399.575000	-43.7	8.9	-34.9	PASS
2399.475000	-43.8	9.0	-34.9	PASS
2399.225000	-43.9	9.0	-34.9	PASS
2399.175000	-44.0	9.1	-34.9	PASS
2399.275000	-44.6	9.8	-34.9	PASS
2399.425000	-45.2	10.3	-34.9	PASS



— Limit    — Sum Level    × Fail

FCC ID: 2APPJ2102154165145





# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	1.800 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	6 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.00 dB	0.50 dB

### Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	1.670 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.18 dB	0.50 dB

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

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## TEST REPORT

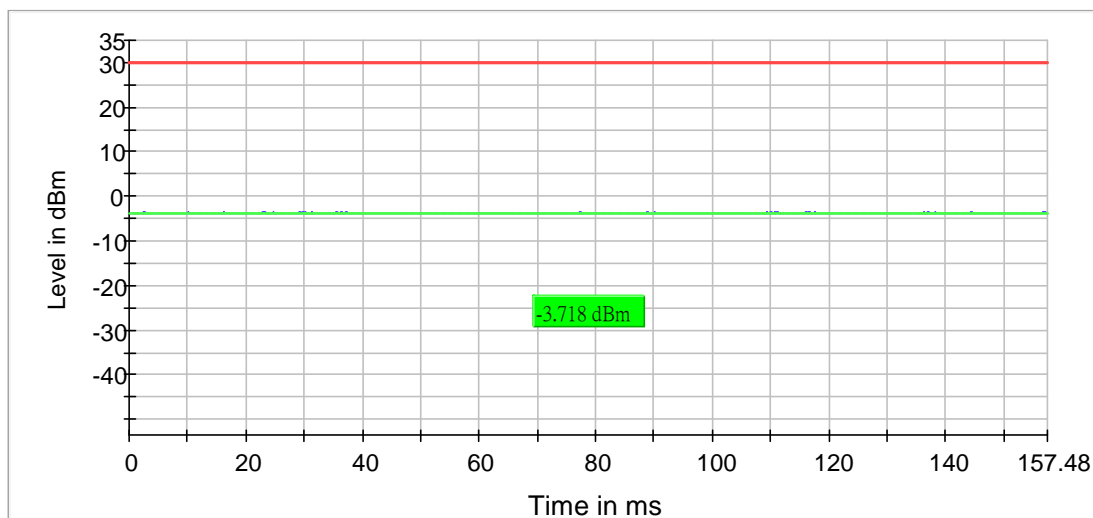
Report No. : AW0055081(8)

Date : 18 Aug, 2018

### RF output power (2440 MHz)

#### Result

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2440.000000	-3.7	30.0	15.598	PASS



— Gated Trace — Overall — Limit

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

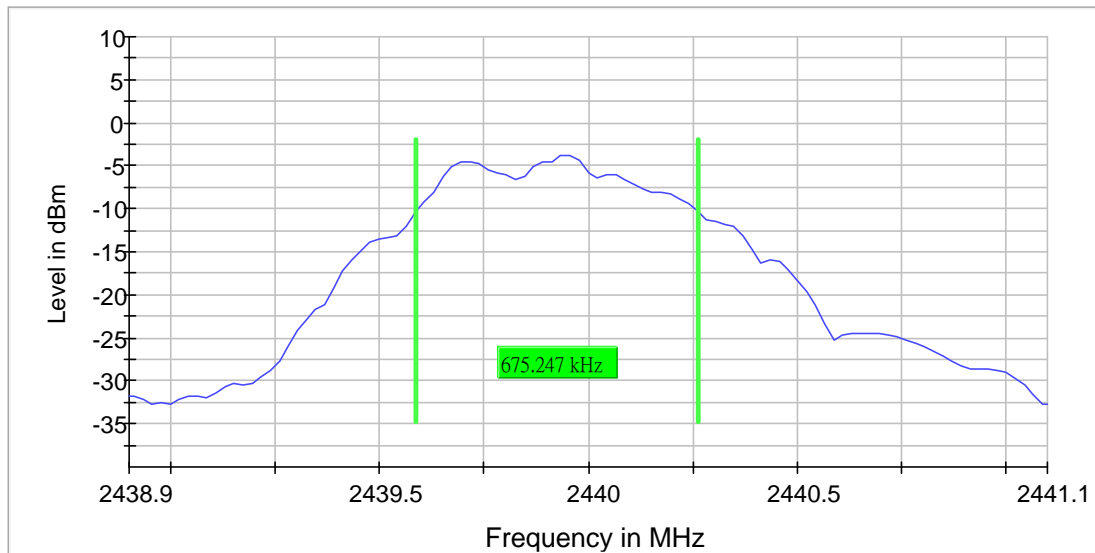
Date : 18 Aug, 2018

### Minimum Emission Bandwidth 6 dB

#### 6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2440.000000	0.675247	0.500000	---	2439.586139	2440.261386

DUT Frequency (MHz)	Max Level (dBm)	Result
2440.000000	-3.8	PASS



### Measurement

Setting	Instrument Value	Target Value	Setting	Instrument Value	Target Value
Start Frequency	2.43890 GHz	2.43890 GHz	Stablemode	Trace	Trace
Stop Frequency	2.44110 GHz	2.44110 GHz	Stablevalue	0.50 dB	0.50 dB
Span	2.200 MHz	2.200 MHz	Run	10 / max. 150	max. 150
RBW	100.000 kHz	~ 100.000 kHz	Stable	5 / 5	5
VBW	300.000 kHz	~ 300.000 kHz	Max Stable Difference	0.11 dB	0.50 dB
SweepPoints	101	~ 22			
SweepTime	19.009 μs	AUTO			
Reference Level	-10.000 dBm	-10.000 dBm			
Attenuation	10.000 dB	AUTO			
Detector	MaxPeak	MaxPeak			
SweepCount	100	100			
Filter	3 dB	3 dB			
Trace Mode	Max Hold	Max Hold			
SweepType	FFT	AUTO			
Preamp	off	off			

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

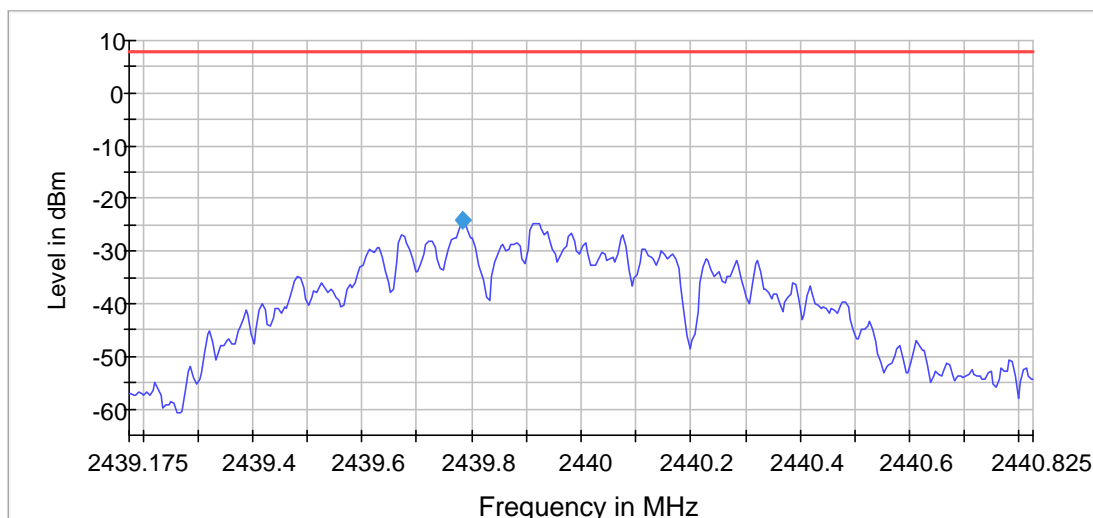
Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Power Spectral Density (2440 MHz)

#### Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2440.000000	2439.782500	-24.010	8.0	PASS



— Limit    — Sum Level    ◆ PSD

#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43918 GHz	2.43918 GHz
Stop Frequency	2.44083 GHz	2.44083 GHz
Span	1.650 MHz	1.650 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	330	~ 330
SweepTime	1.650 s	1.650 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.05 dB	0.50 dB

FCC ID: 2APPJ2102154165145





# CMA Testing and Certification Laboratories

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## TEST REPORT

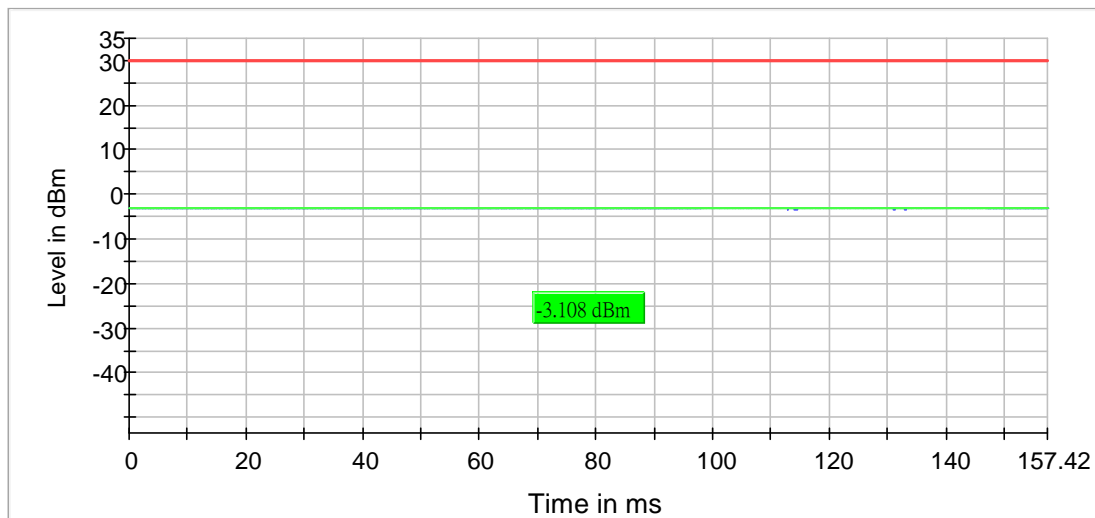
Report No. : AW0055081(8)

Date : 18 Aug, 2018

### RF output power (2480 MHz)

#### Result

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2480.000000	-3.1	30.0	15.592	PASS



— Gated Trace   
 — Overall   
 — Limit

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

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## TEST REPORT

Report No. : AW0055081(8)

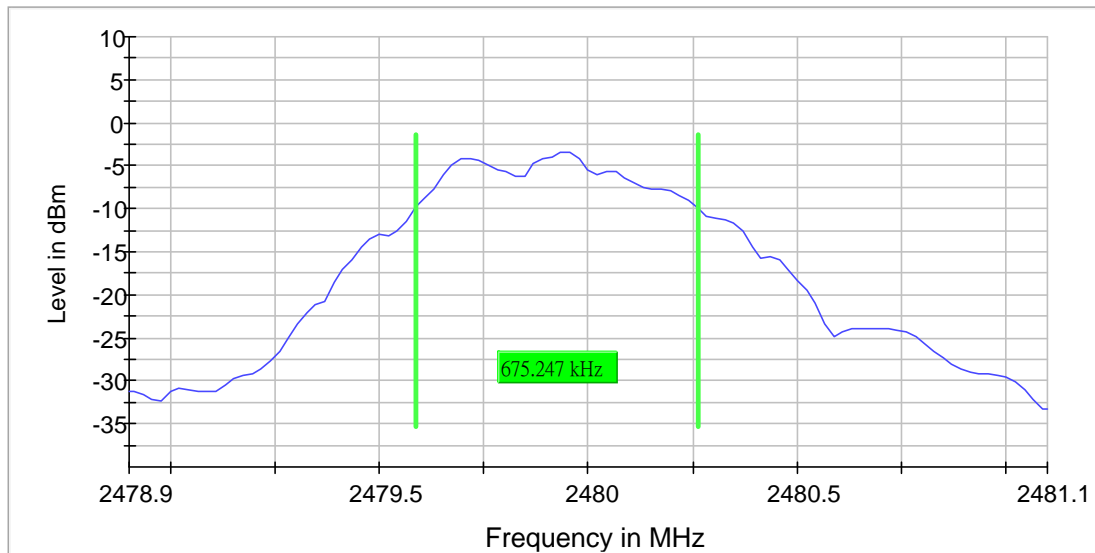
Date : 18 Aug, 2018

### Minimum Emission Bandwidth 6 dB

#### 6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	0.675247	0.500000	---	2479.586139	2480.261386

DUT Frequency (MHz)	Max Level (dBm)	Result
2480.000000	-3.4	PASS



### Measurement

Setting	Instrument Value	Target Value	Setting	Instrument Value	Target Value
Start Frequency	2.47890 GHz	2.47890 GHz	Stablemode	Trace	Trace
Stop Frequency	2.48110 GHz	2.48110 GHz	Stablevalue	0.50 dB	0.50 dB
Span	2.200 MHz	2.200 MHz	Run	9 / max. 150	max. 150
RBW	100.000 kHz	~ 100.000 kHz	Stable	5 / 5	5
VBW	300.000 kHz	~ 300.000 kHz	Max Stable Difference	0.07 dB	0.50 dB
SweepPoints	101	~ 22			
SweepTime	19.009 μs	AUTO			
Reference Level	-10.000 dBm	-10.000 dBm			
Attenuation	10.000 dB	AUTO			
Detector	MaxPeak	MaxPeak			
SweepCount	100	100			
Filter	3 dB	3 dB			
Trace Mode	Max Hold	Max Hold			
SweepType	FFT	AUTO			
Preamp	off	off			

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

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## TEST REPORT

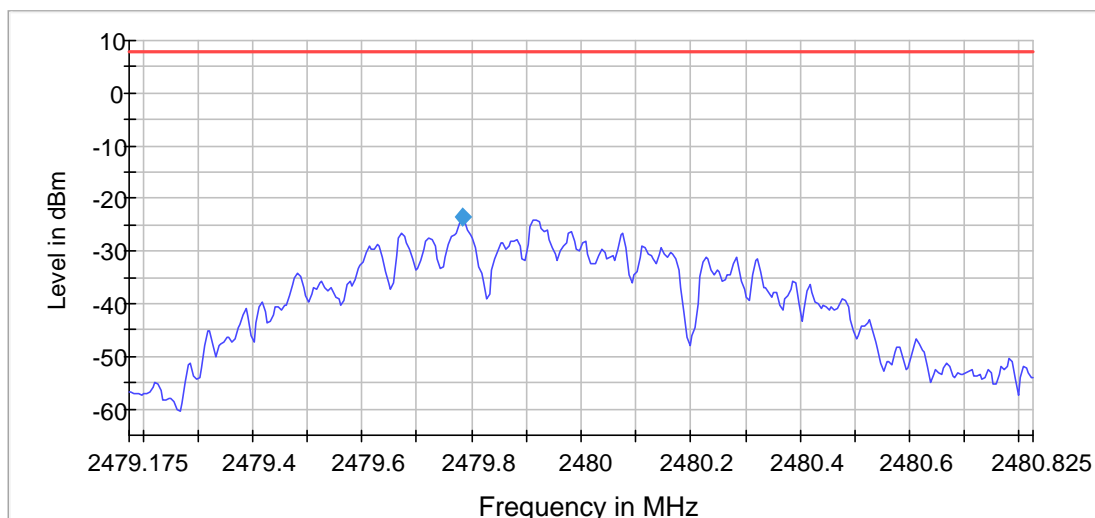
Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Power Spectral Density (2480 MHz)

#### Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2480.000000	2479.782500	-23.491	8.0	PASS



— Limit    — Sum Level    ◆ PSD

#### Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47918 GHz	2.47918 GHz
Stop Frequency	2.48083 GHz	2.48083 GHz
Span	1.650 MHz	1.650 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	330	~ 330
SweepTime	1.650 s	1.650 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.05 dB	0.50 dB

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Band Edge high (2480 MHz)

#### Result

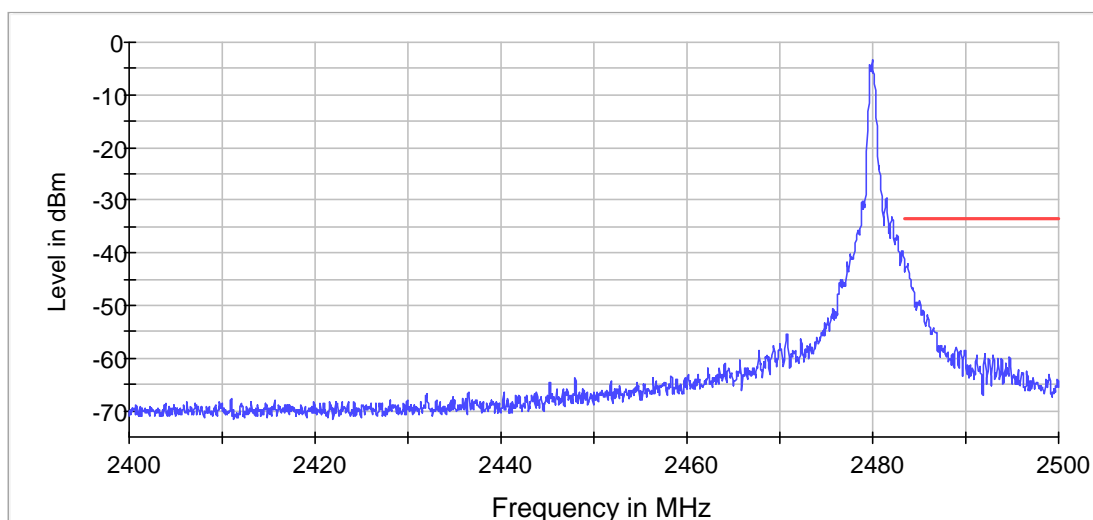
DUT Frequency (MHz)	Result
2480.000000	PASS

#### Inband Peak

Frequency (MHz)	Level (dBm)
2479.975000	-3.4

#### Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.775000	-42.2	8.8	-33.4	PASS
2483.725000	-42.3	8.9	-33.4	PASS
2483.825000	-42.3	8.9	-33.4	PASS
2483.675000	-42.6	9.2	-33.4	PASS
2483.625000	-42.7	9.3	-33.4	PASS
2483.575000	-42.7	9.3	-33.4	PASS
2483.875000	-42.9	9.5	-33.4	PASS
2483.525000	-42.9	9.5	-33.4	PASS
2483.925000	-43.8	10.4	-33.4	PASS
2483.975000	-44.8	11.4	-33.4	PASS
2484.025000	-44.9	11.5	-33.4	PASS
2484.075000	-45.3	11.9	-33.4	PASS
2484.125000	-45.8	12.4	-33.4	PASS
2484.175000	-46.4	13.0	-33.4	PASS
2484.325000	-46.7	13.3	-33.4	PASS



— Limit    — Sum Level    × Fail

FCC ID: 2APPJ2102154165145





# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	1.670 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	6 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.06 dB	0.50 dB

### Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.48350 GHz	2.48350 GHz
Stop Frequency	2.50000 GHz	2.50000 GHz
Span	16.500 MHz	16.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	330	~ 330
SweepTime	37.969 $\mu$ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.00 dB	0.50 dB

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Tx Spurious Emission (2402 MHz)

#### Result

DUT Frequency (MHz)	Result
2402.000000	PASS

#### Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
2399.750000	-34.7	-48.3	-33.8	14.4	PASS
4803.750000	-44.7	-54.8	-41.2	13.6	PASS

#### Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2399.750000	-34.7	0.9	-33.8
4803.750000	-44.7	3.5	-41.2
4804.750000	-44.8	3.6	-41.2
4804.250000	-44.9	3.7	-41.2
2397.250000	-37.5	3.7	-33.8
2397.750000	-37.7	3.8	-33.8
4803.250000	-45.1	3.9	-41.2
2399.250000	-38.4	4.5	-33.8
4805.250000	-46.4	5.2	-41.2
2398.750000	-39.4	5.5	-33.8
2394.750000	-40.4	6.5	-33.8
2389.250000	-47.8	6.6	-41.2
2393.750000	-40.5	6.6	-33.8
2395.250000	-40.5	6.6	-33.8
2391.250000	-40.6	6.8	-33.8

#### Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	1000.000000	1	1
1000.000000	2400.000000	2	2
2400.000000	2483.500000	2	2
2483.500000	7000.000000	2	2
7000.000000	18000.000000	2	2
18000.000000	26000.000000	2	2

FCC ID: 2APPJ2102154165145



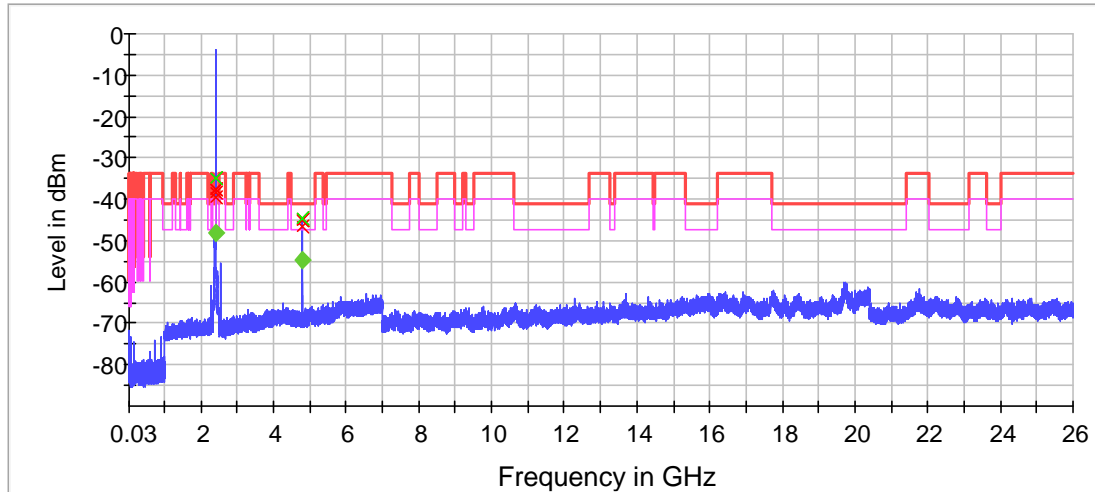
# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018



— Limit — Sum Level — Threshold × Critical  
◆ Final Critical ◆ Fail ◆ Pass

### Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	19400	~ 19400
SweepTime	19.400 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	30	30
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	Off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	6 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.00 dB	0.50 dB

### Pre Measurement 2

Setting	Instrument Value	Target Value
RBW	1.000 MHz	<= 1.000 MHz
VBW	3.000 MHz	>= 3.000 MHz
SweepPoints	2800	~ 2800
SweepTime	2.800 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	30	30

FCC ID: 2APPJ2102154165145



# CMA Testing and Certification Laboratories

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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.00 dB	0.50 dB

### Final Measurement 2

Setting	Instrument Value	Target Value
Span	ZeroSpan	ZeroSpan
RBW	1.000 MHz	~ 1.000 MHz
VBW	3.000 MHz	~ 3.000 MHz
SweepPoints	10001	~ 10001
SweepTime	1.000 s	1.000 s
Reference Level	-40.000 dBm	-40.000 dBm
Attenuation	0.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Clear Write	Clear Write
Sweeptype	Sweep	AUTO
Preamp	off	off

FCC ID: 2APPJ2102154165145





# CMA Testing and Certification Laboratories

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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Tx Spurious Emission (2440 MHz)

#### Result

DUT Frequency (MHz)	Result
2440.000000	PASS

#### Final measurements

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

#### Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4880.750000	-48.1	6.9	-41.2
4879.750000	-48.2	7.0	-41.2
4880.250000	-48.7	7.5	-41.2
4879.250000	-48.9	7.7	-41.2
4881.250000	-49.6	8.4	-41.2
4878.750000	-54.7	13.5	-41.2
4881.750000	-56.5	15.3	-41.2
2488.750000	-59.3	18.1	-41.2
37.675000	-79.1	19.2	-59.9
37.625000	-79.1	19.2	-59.9
38.075000	-79.3	19.4	-59.9
37.525000	-79.4	19.5	-59.9
2483.750000	-60.8	19.6	-41.2
19714.250000	-60.8	19.6	-41.2
2484.250000	-60.9	19.7	-41.2

#### Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	1000.000000	1	1
1000.000000	2400.000000	2	2
2400.000000	2483.500000	2	2
2483.500000	7000.000000	2	2
7000.000000	18000.000000	2	2
18000.000000	26000.000000	2	2

FCC ID: 2APPJ2102154165145



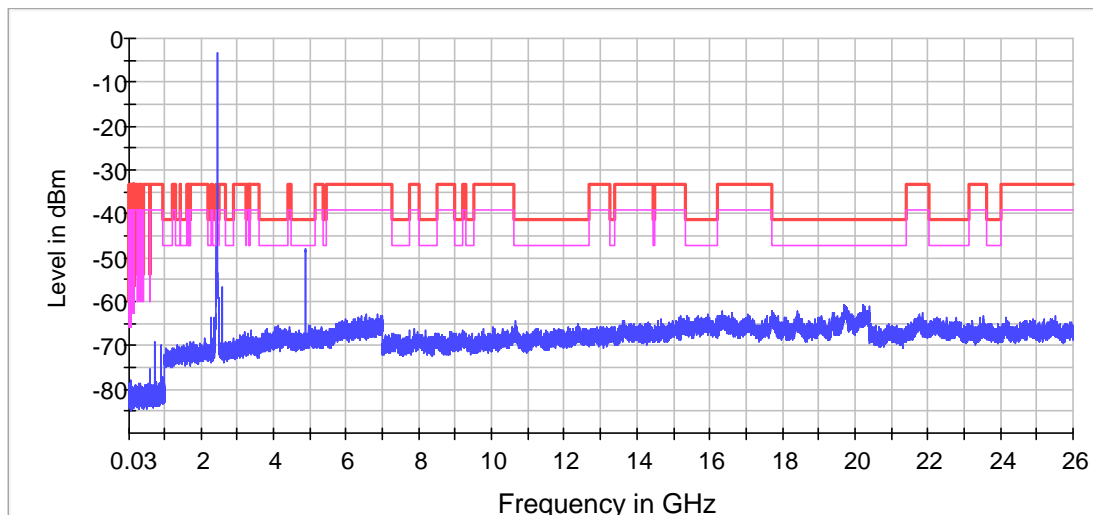
# CMA Testing and Certification Laboratories

廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018



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

### Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	19400	~ 19400
SweepTime	19.400 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	30	30
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.00 dB	0.50 dB

### Pre Measurement 2

Setting	Instrument Value	Target Value
RBW	1.000 MHz	<= 1.000 MHz
VBW	3.000 MHz	>= 3.000 MHz
SweepPoints	2800	~ 2800
SweepTime	2.800 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	30	30

FCC ID: 2APPJ2102154165145



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廠商會檢定中心

## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	Sweep	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.00 dB	0.50 dB

FCC ID: 2APPJ2102154165145

Page A21 of 52

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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Tx Spurious Emission (2480 MHz)

#### Result

DUT Frequency (MHz)	Result
2480.000000	PASS

#### Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
2484.750000	-34.0	-56.6	-41.2	15.4	PASS
2487.750000	-40.7	-65.0	-41.2	23.8	PASS
2493.250000	-43.0	-67.9	-41.2	26.7	PASS

#### Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2484.750000	-34.0	-7.2	-41.2
2483.750000	-40.2	-1.0	-41.2
2487.750000	-40.7	-0.5	-41.2
2487.250000	-41.1	-0.1	-41.2
2488.250000	-41.5	0.3	-41.2
2484.250000	-42.1	0.9	-41.2
2493.250000	-43.0	1.8	-41.2
2488.750000	-43.5	2.3	-41.2
2489.750000	-44.7	3.5	-41.2
2493.750000	-45.2	4.0	-41.2
2485.250000	-45.8	4.6	-41.2
2490.750000	-46.2	5.0	-41.2
2485.750000	-46.3	5.1	-41.2
2486.250000	-46.7	5.5	-41.2
2489.250000	-47.6	6.4	-41.2

#### Measurement Settings

Start Frequency (MHz)	Stop Frequency (MHz)	Pre Measurement	Final Measurement
30.000000	1000.000000	1	1
1000.000000	2400.000000	2	2
2400.000000	2483.500000	2	2
2483.500000	7000.000000	2	2
7000.000000	18000.000000	2	2
18000.000000	26000.000000	2	2

FCC ID: 2APPJ2102154165145





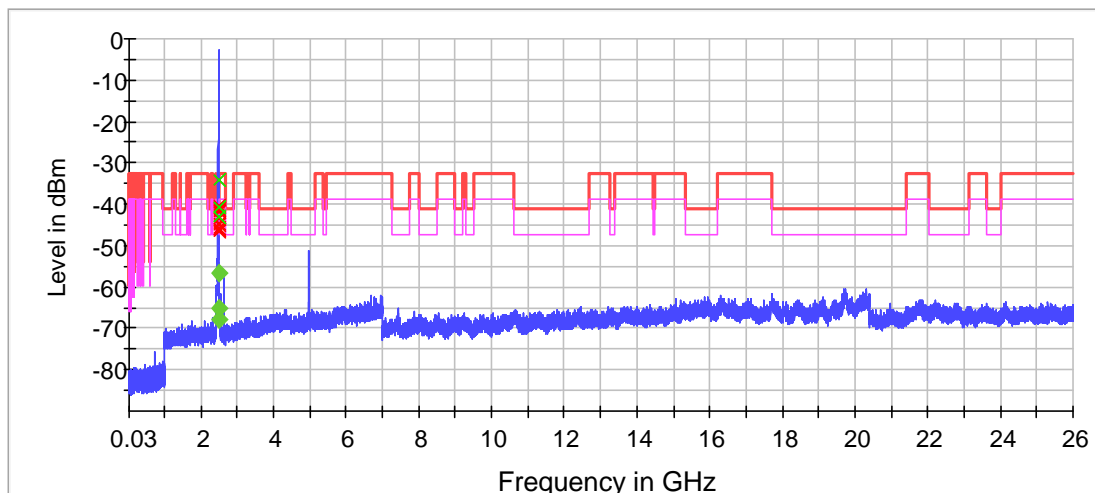
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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018



— Limit — Sum Level — Threshold × Critical  
× Final Critical ◆ Fail ◆ Pass

### Pre Measurement 1

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	19400	~ 19400
SweepTime	19.400 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	30	30
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.00 dB	0.50 dB

### Pre Measurement 2

Setting	Instrument Value	Target Value
RBW	1.000 MHz	<= 1.000 MHz
VBW	3.000 MHz	>= 3.000 MHz
SweepPoints	2800	~ 2800
SweepTime	2.800 ms	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	30	30

FCC ID: 2APPJ2102154165145



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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable	0.00 dB	0.50 dB

### Final Measurement 2

Setting	Instrument Value	Target Value
Span	ZeroSpan	ZeroSpan
RBW	1.000 MHz	~ 1.000 MHz
VBW	3.000 MHz	~ 3.000 MHz
SweepPoints	10001	~ 10001
SweepTime	1.000 s	1.000 s
Reference Level	-40.000 dBm	-40.000 dBm
Attenuation	0.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Clear Write	Clear Write
Sweeptype	Sweep	AUTO
Preamp	off	off

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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

### Conducted Emission

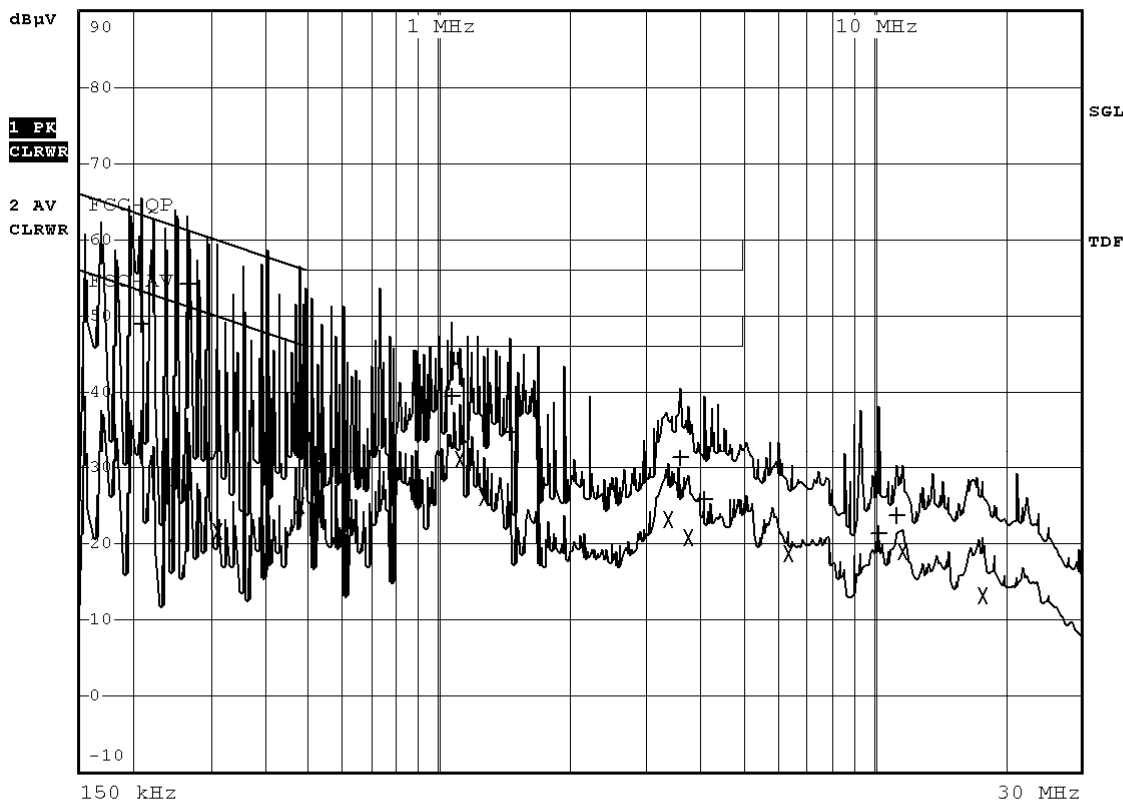
Bluetooth mode



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP OFF



FCC ID: 2APPJ2102154165145



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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC-QP			
Trace2:	FCC-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1 Quasi Peak	208.5 kHz	48.92	L1 gnd	-14.34
2 Average	249 kHz	28.72	N gnd	-23.06
1 Quasi Peak	267 kHz	54.20	N gnd	-7.00
2 Average	312 kHz	21.53	L1 gnd	-28.37
1 Quasi Peak	483 kHz	39.82	L1 gnd	-16.46
2 Average	483 kHz	25.00	L1 gnd	-21.28
1 Quasi Peak	1.076 MHz	39.38	N gnd	-16.61
2 Average	1.1165 MHz	31.01	N gnd	-14.98
2 Average	1.274 MHz	26.07	N gnd	-19.92
1 Quasi Peak	1.463 MHz	34.63	N gnd	-21.36
2 Average	3.3665 MHz	23.28	N gnd	-22.72
1 Quasi Peak	3.6005 MHz	31.29	L1 gnd	-24.70
2 Average	3.7625 MHz	20.87	N gnd	-25.12
1 Quasi Peak	4.0955 MHz	25.86	N gnd	-30.13
2 Average	6.404 MHz	18.62	N gnd	-31.37
1 Quasi Peak	10.247 MHz	21.36	N gnd	-38.63
1 Quasi Peak	11.2865 MHz	23.60	N gnd	-36.39
2 Average	11.6465 MHz	19.07	N gnd	-30.92
2 Average	17.8385 MHz	13.23	L1 gnd	-36.76

FCC ID: 2APPJ2102154165145





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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

## APPENDIX B External Photo

FCC ID: 2APPJ2102154165145

Page A27 of 52

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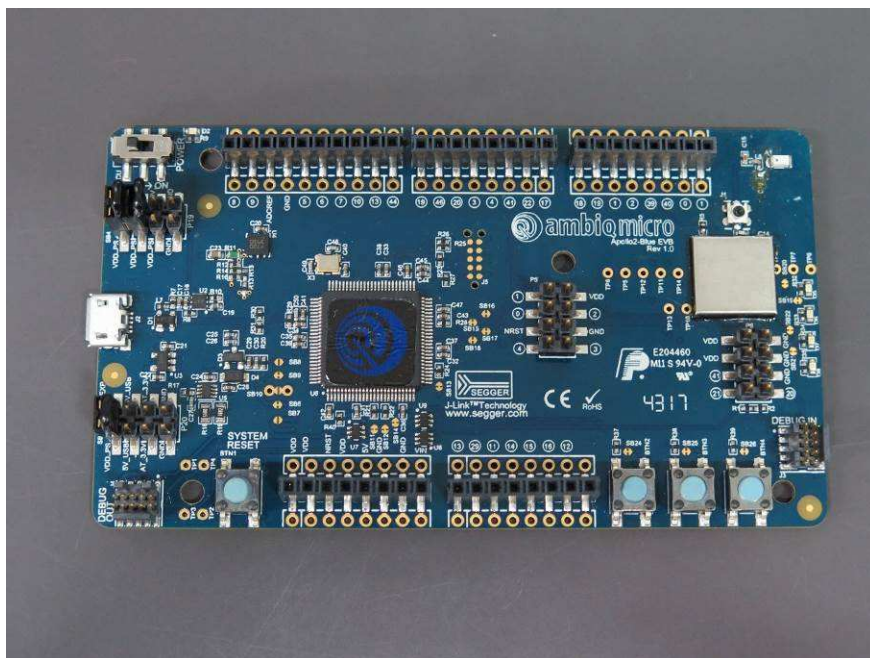
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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018



External Configuration 1



External Configuration 2

FCC ID: 2APPJ2102154165145



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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018

## APPENDIX C Internal Photo

FCC ID: 2APPJ2102154165145

Page A29 of 52

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## TEST REPORT

Report No. : AW0055081(8)

Date : 18 Aug, 2018



Internal Configuration 1

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

FCC ID: 2APPJ2102154165145