


JAPAN MIC TEST REPORT

For

House of Marley, LLC

3000 Pontiac Trail, Commerce Township, Oakland MI 48390 United States of America

Model: EM-FE063

Report Type: Original Report	Product Type: Sport Bluetooth Ear Bud
Report Number: RSZ180124801-07B	
Report Date: 2018-03-20	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The EUT (model name: EM-FE063) is a Sport Bluetooth Ear Bud which is powered by internal polymer Lithium battery with 3.7Vdc nominal output voltage. It can be recharged through the micro-USB port Located in outer of enclosure by external power supply with rated 5Vdc output voltage.

** All measurement and test data in this report was gathered from production sample serial number: 180124801 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-01-12.*

Objective

The objective of the manufacturer is to demonstrate compliance with Radio Law of Japan item 19 of Article 2 Paragraph 1, rules and limits for this device including:

- Frequency Error
- Occupied Bandwidth
- Transmitter Spurious Emission and Unwanted Emission Intensity
- Antenna Output Power And Output Power Tolerance
- Transmission Antenna Gain
- Transmission Radiation Angle Width
- Receiver Spurious Emission Strength
- Construction Protection Confirmation

Related Submittal(s)/Grant(s)

Item 19 of Article 2 Paragraph 1 for BT 3.0

Test Methodology

All measurements contained in this report were conducted with technical regulations of the Radio Law of Japan.

EUT TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a testing mode by some software.

40 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
...
...
...
18	2438	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

Test voltage:

Normal voltage: 3.7 Vdc

Low voltage: 3.5 Vdc

High voltage: 4.1 Vdc

EUT Exercise Software

“Airoha.AB152x_verC_LabTestTool.exe” software was used. And the power level is default.

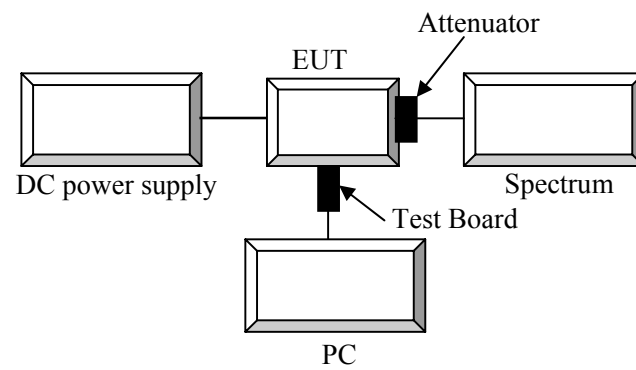
Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Long Wei	DC Power Supply	TPR-6420D	398363
N/A	Test Board	N/A	N/A
HP	PC	Compaq CQ45	5CG33407QL

Configuration of Test Setup



SUMMARY OF TEST RESULTS

MIC Notice No.88 Appendix No.43 Article 2, Paragraph 1, Item 19 Rules Section	Description of Test	Result
3	Frequency Error	Compliance
4	Occupied Bandwidth	Compliance
5	Transmitter Spurious Emission and Unwanted Emission Intensity	Compliance
6	Antenna Output Power and Output Power Tolerance	Compliance
7	Receiver Spurious Emission and Unwanted Emission Intensity	Compliance
8	Transmission Antenna Gain	Not Applicable
10	Carrier sense capability	Not Applicable**
9	Transmission Radiation Angle Width	Not Applicable
11	Frequency Hopping Dwell Time	Not Applicable*
12	Interference Prevention Function	Compliance
Note 1	Construction Protection Confirmation	Compliance

Not Applicable* -Testing is only required for FHSS system devices.

Not Applicable**-The OBW of EUT is less than 26 MHz, and it's not used for radio control for remote airplane model.

Not Applicable - This test item was not required for the output power less than 12.14 dBm (E.I.R.P)

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Signal Generator	8648C	3426A01345	2017-04-19	2018-04-19
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2017-12-05	2018-12-05
Agilent	P-Series Power Meter	N1912A	MY5000448	2017-12-05	2018-12-05
Agilent	Wideband Power Sensor	N1921A	MY54210016	2017-12-05	2018-12-05
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Fluke	Digital Multimeter	287	19000011	2017-04-09	2018-04-19

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FREQUENCY ERROR

Limit

50 ppm or below

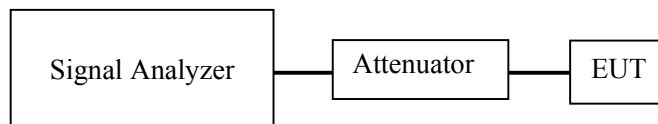
Test Procedure

Set the EUT to the measurement frequency without modulation.
Setting of SA is following as:

- Center Frequency: Frequency to measure
- RBW: 1 kHz, VBW: 30 kHz
- Span: 300kHz
- Sweep time: Auto
- Log scale: 10dB/Div, Data points: 400 points or more
- Reference level: Enough level for maximum dynamic range
- Detection: Positive Peak
- Sweep mode: Single Sweep
- Marker: Spot

Record the peak spot frequency.

If the EUT can't set at un-modulation mode, measure the 10dBc center frequency.



Test Data

Environmental Conditions

Temperature:	24°C
Relative Humidity:	55 %
ATM Pressure:	100.0 kPa

The testing was performed by Tracy Hu on 2018-02-02.

Test Result: Compliant

Test Mode: Transmitting (test without modulation)

Normal Voltage

Frequency (MHz)	Measure frequency (MHz)	Frequency tolerance (ppm)	Limit (ppm)
2402	2402.01154	4.80	< 50
2440	2440.01202	4.93	
2480	2480.01202	4.85	

High Voltage

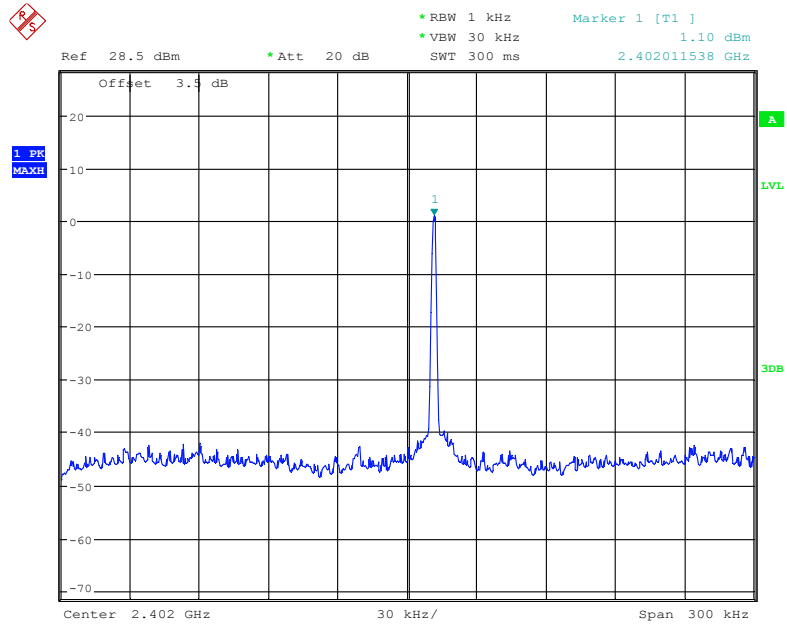
Frequency (MHz)	Measure frequency (MHz)	Frequency tolerance (ppm)	Limit (ppm)
2402	2402.01180	4.91	< 50
2440	2440.01213	4.97	
2480	2480.01203	4.85	

Low Voltage

Frequency (MHz)	Measure frequency (MHz)	Frequency tolerance (ppm)	Limit (ppm)
2402	2402.01359	5.66	< 50
2440	2440.01657	6.79	
2480	2480.01250	5.04	

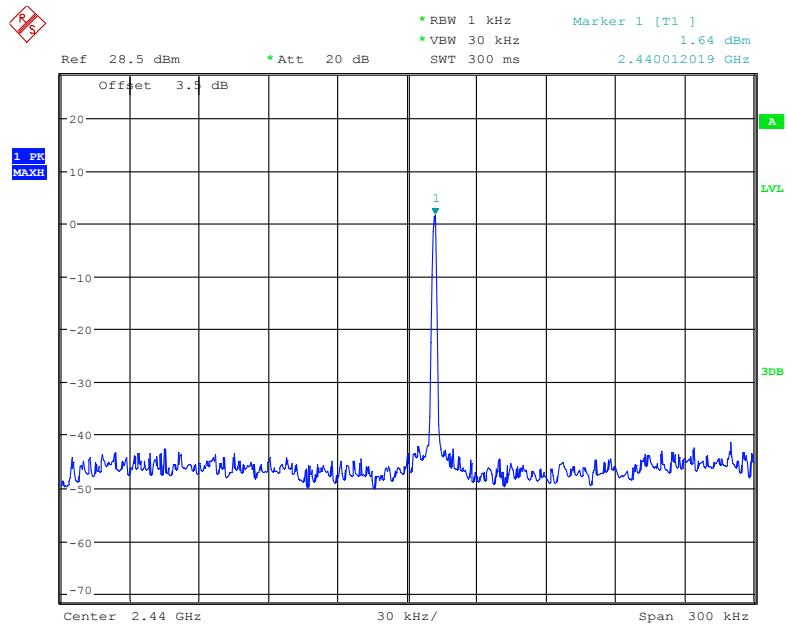
Please refer to the plots for normal voltage test.

Low Channel



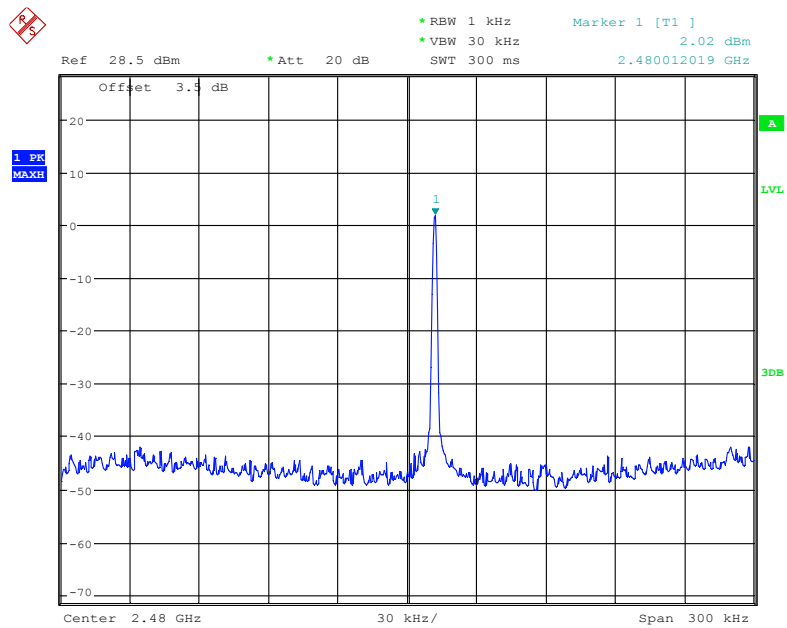
Date: 2.FEB.2018 21:36:00

Middle Channel



Date: 2.FEB.2018 21:34:49

High Channel



Date: 2.FEB.2018 21:36:46

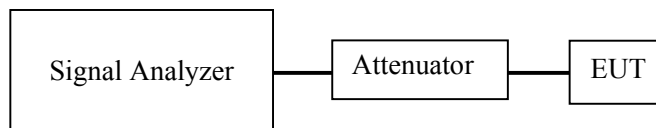
OCCUPIED BANDWIDTH

Limit

- Occupied bandwidth: FH \leq 83.5 MHz; OFDM, DS \leq 26 MHz; Others \leq 26 MHz

Test Procedure

- Setting of SA is following as:
 - Center Frequency: Frequency to measure
 - RBW: 30 kHz, VBW: 30 kHz
 - Span: (OBW limit * 3) MHz (example; 10MHz)
 - Sweep time: Auto
 - Log scale: 10dB/Div, Data points: 400 points or more
 - Reference level: Enough level for maximum dynamic range
 - Detection: Positive Peak
 - Sweep mode: Continuous Sweep
 - Marker: Spot
- EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.



Test Data

Environmental Conditions

Temperature:	24°C
Relative Humidity:	55 %
ATM Pressure:	100.0 kPa

The testing was performed by Tracy Hu on 2018-02-02.

Test Result: Compliant

Test Mode: Transmitting

Voltage	Frequency	2402 MHz	2440 MHz	2480MHz	Limit
Normal Voltage	Occupied bandwidth (MHz)	1.138	1.122	1.154	≤26MHz
High Voltage	Occupied bandwidth (MHz)	1.142	1.125	1.151	≤26MHz
Low Voltage	Occupied bandwidth (MHz)	1.136	1.120	1.158	≤26MHz

Please refer to the plots for normal voltage test.

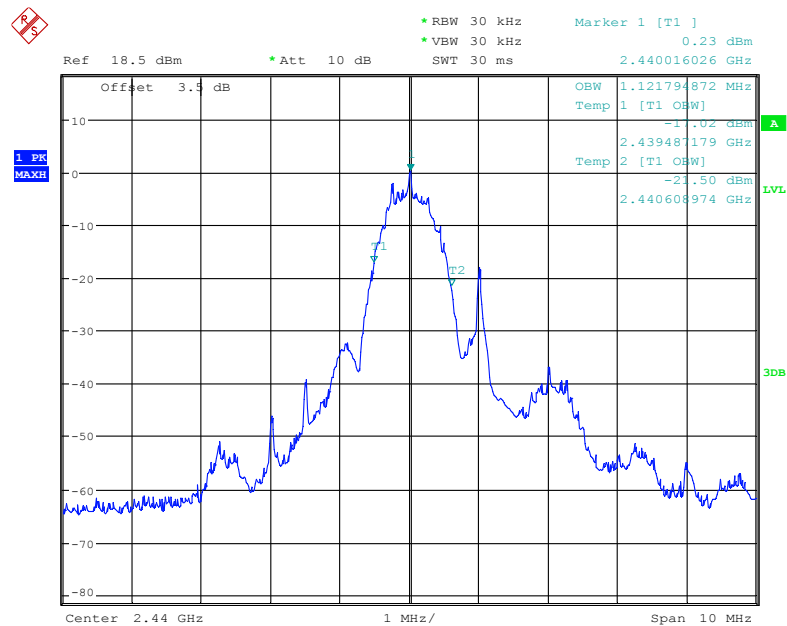
Occupied Bandwidth:

Low Channel



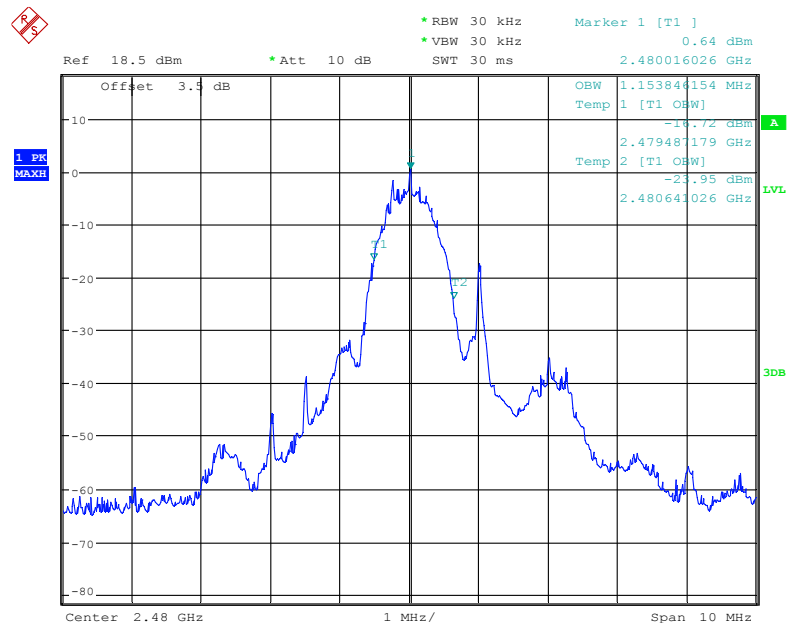
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Middle Channel



Date: 2.FEB.2018 21:45:46

High Channel



Date: 2.FEB.2018 21:42:46

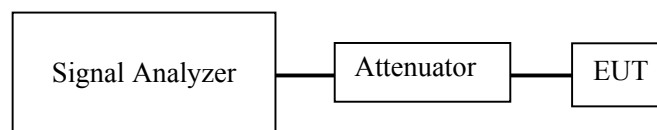
TRANSMITTER SPURIOUS EMISSION STRENGTH AND UNWANTED EMISSION INTENSITY

Limit

- $f < 2387 \text{ MHz}, f > 2496.5 \text{ MHz}: \leq 2.5 \mu\text{W/MHz}$
- $2387 \text{ MHz} \leq f \leq 2400 \text{ MHz}; 2483.5 \text{ MHz} < f \leq 2496.5 \text{ MHz}: \leq 25 \mu\text{W/MHz}$

Test Procedure

Measurement System Diagram



Conditions of Application Equipment (EUT)

- The modulation state shall be in continuously transmitting mode.

Spectrum Analyzer Conditions

- Span: Measuring Frequency Range
- RBW: 1MHz (frequency range; 1GHz over), 100kHz (frequency range; 30MHz to 1GHz)
- VBW: Same as RBW (1MHz or 100kHz)
- Sweep time: Auto(Minimum time to ensure measurement accuracy.)
- Data points : 400 points or more
- Reference level: Enough level for maximum dynamic range
- Detection: Positive Peak

If the measured value is under the technical standard value, do not need to measure more detail.

Test Data

Environmental Conditions

Temperature:	24°C
Relative Humidity:	55 %
ATM Pressure:	100.0 kPa

The testing was performed by Tracy Hu on 2018-02-02.

Test Result: Compliant

Normal Voltage:

	Raw data				
Frequency Band	Band I (dBm/100kHz)	Band II (dBm/MHz)	Band III (dBm/MHz)	Band IV (dBm/MHz)	Band V (dBm/MHz)
2402 MHz	-64.23	-53.12	-21.96	-55.17	-47.58
2441 MHz	-62.34	-56.14	-55.16	-55.58	-41.30
2480 MHz	-58.84	-57.76	-55.68	-30.08	-39.75
Limit	-36	-26	-16	-16	-26

High Voltage:

	Raw data				
Frequency Band	Band I (dBm/100kHz)	Band II (dBm/MHz)	Band III (dBm/MHz)	Band IV (dBm/MHz)	Band V (dBm/MHz)
2402 MHz	-63.11	-53.43	-22.25	-54.56	-46.97
2441 MHz	-63.74	-55.95	-55.25	-54.07	-40.10
2480 MHz	-58.53	-56.86	-56.06	-30.61	-39.59
Limit	-36	-26	-16	-16	-26

Low Voltage:

	Raw data				
Frequency Band	Band I (dBm/100kHz)	Band II (dBm/MHz)	Band III (dBm/MHz)	Band IV (dBm/MHz)	Band V (dBm/MHz)
2402 MHz	-62.64	-52.27	-22.09	-54.93	-47.25
2441 MHz	-61.81	-56.23	-55.58	-55.62	-41.51
2480 MHz	-57.69	-56.82	-56.21	-29.01	-38.58
Limit	-36	-26	-16	-16	-26

Note:

2.5 μ W/MHz = -26 dBm/MHz = -36 dBm/100kHz

25 μ W/MHz = -16 dBm/MHz

Band I : 30MHz-1000MHz

Band II : 1000MHz-2387MHz

Band III:2387MHz-2400MHz

Band IV:2483.5MHz-2496.5MHz

Band V: 2496.5MHz-12500MHz

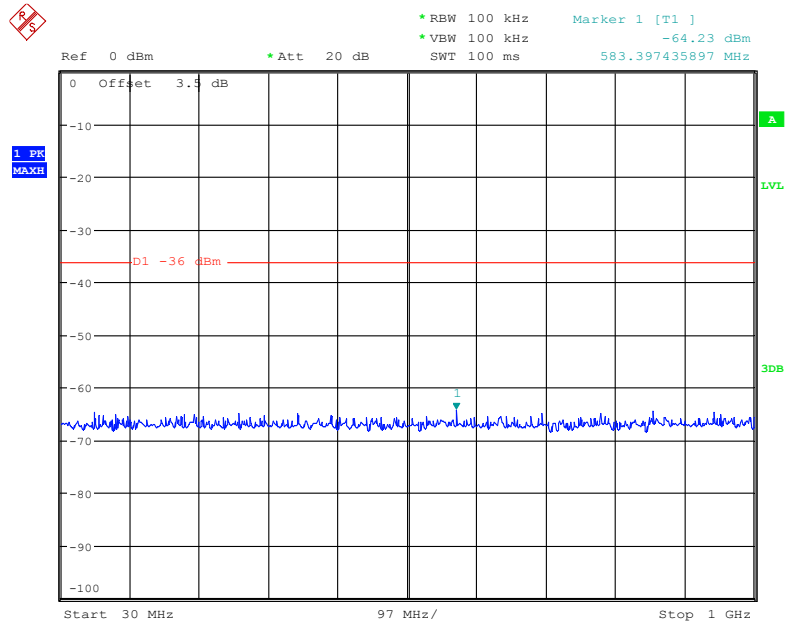
If searched value is under the technical standard value, do not need to measure more detail.

Normal Condition Test Data as below:

Please refer to the below plots and table

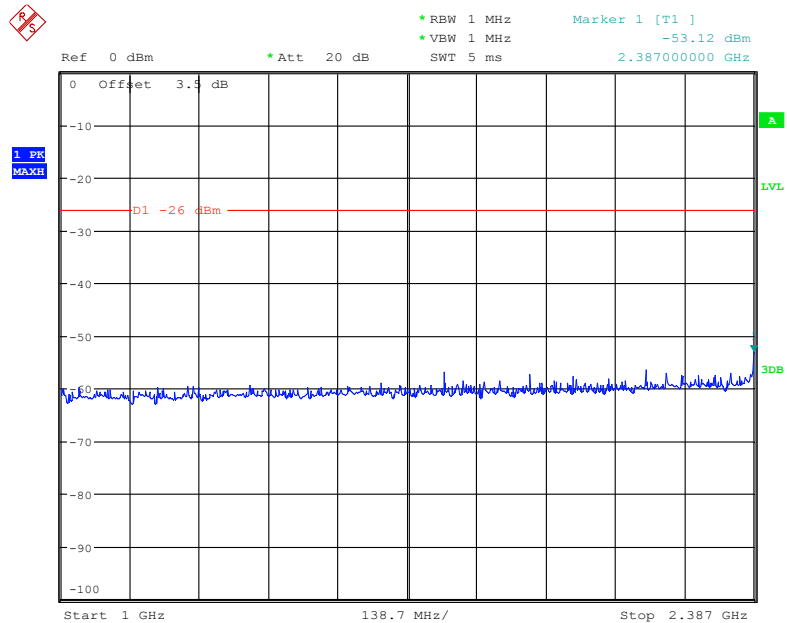
Low Channel:

30MHz - 1000MHz



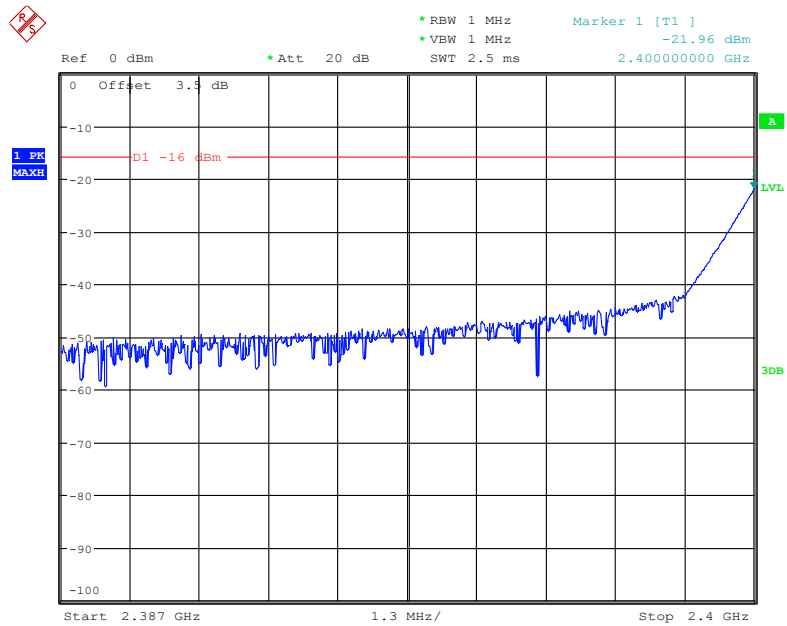
Date: 2.FEB.2018 22:41:00

1000MHz - 2387MHz



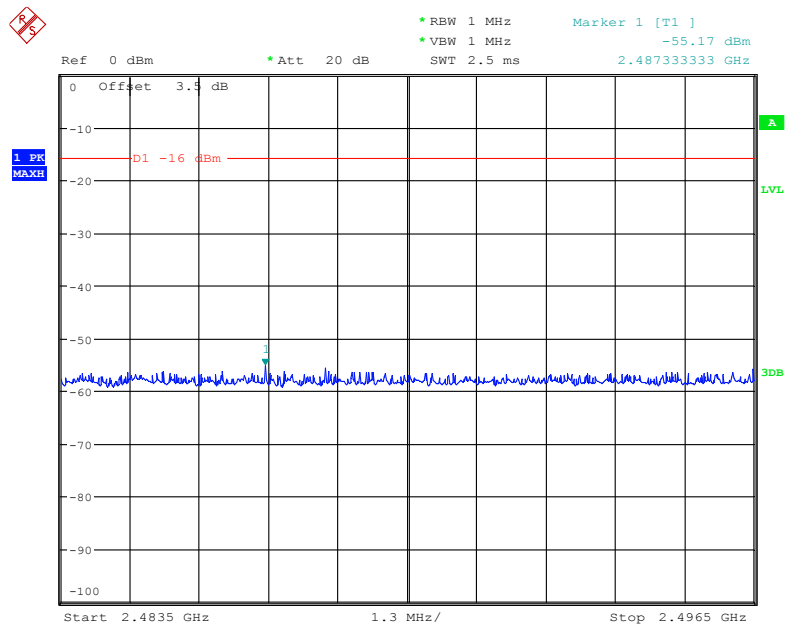
Date: 2.FEB.2018 22:43:37

2387MHz - 2400MHz



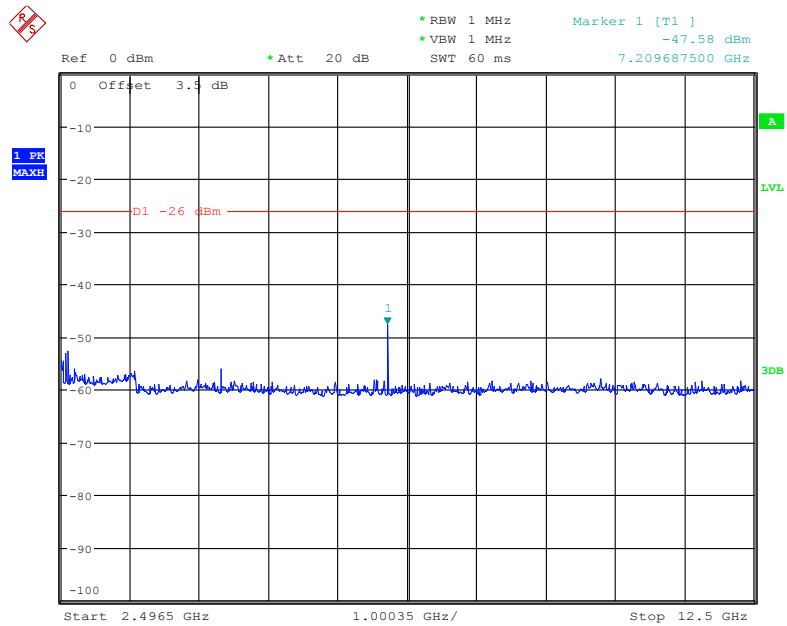
Date: 2.FEB.2018 22:44:56

2483.5MHz - 2496.5MHz



Date: 2.FEB.2018 22:47:58

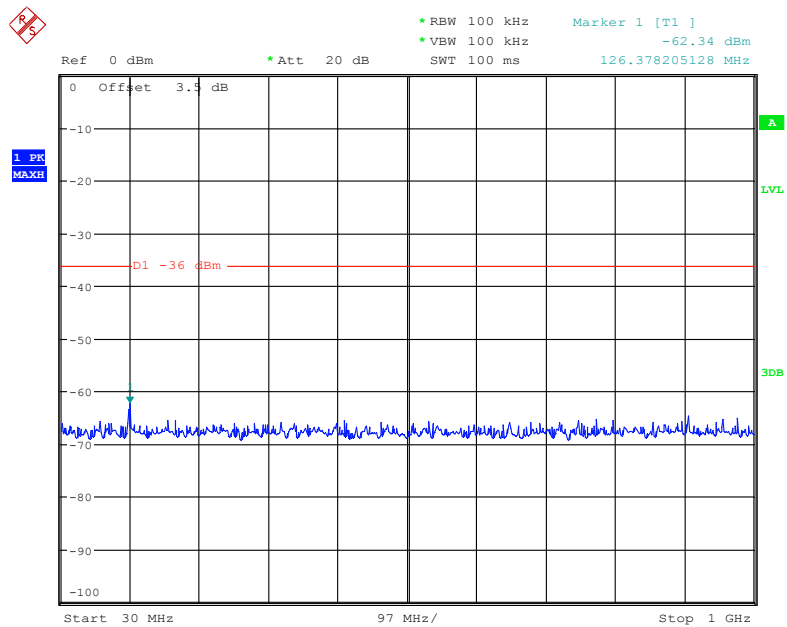
2496.5MHz - 12500MHz



Date: 2.FEB.2018 22:49:52

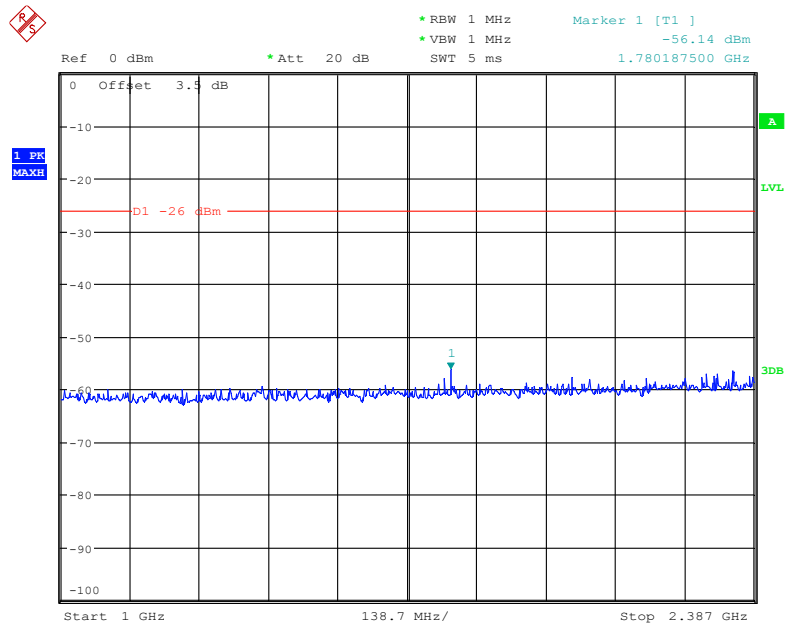
Middle Channel:

30MHz - 1000MHz



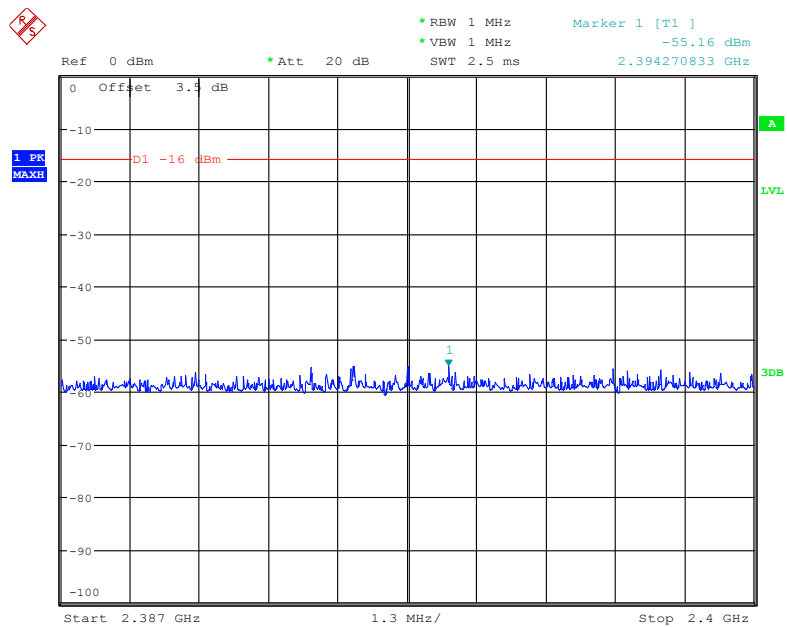
Date: 2.FEB.2018 22:41:46

1000MHz - 2387MHz



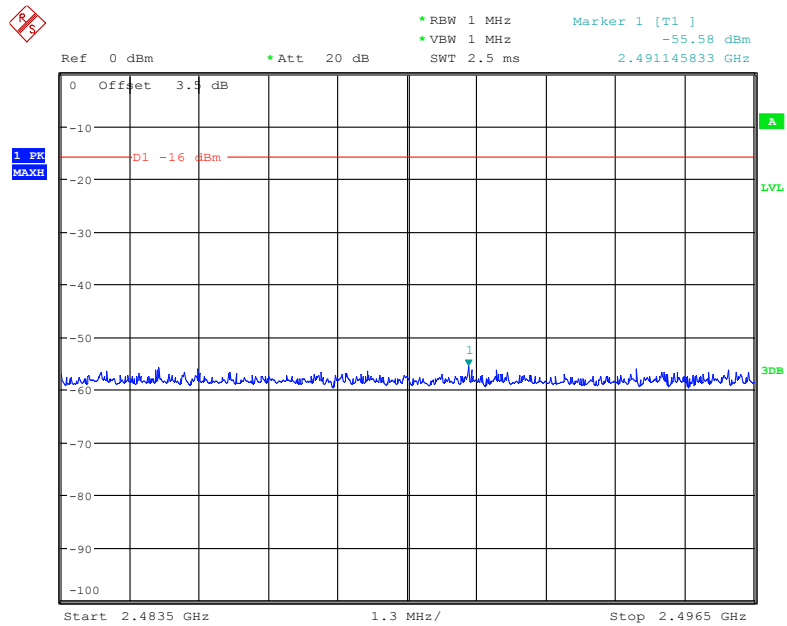
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2387MHz - 2400MHz



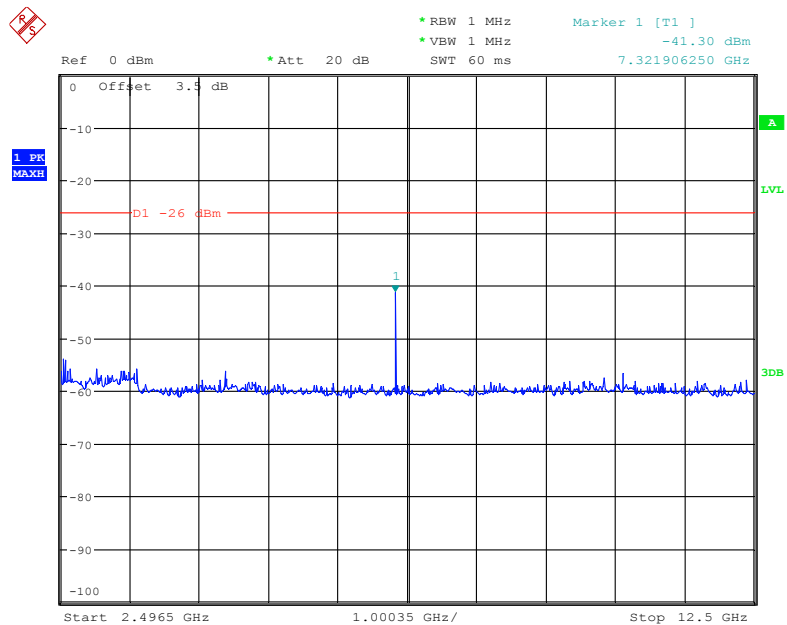
Date: 2.FEB.2018 22:45:38

2483.5MHz - 2496.5MHz



Date: 2.FEB.2018 22:47:35

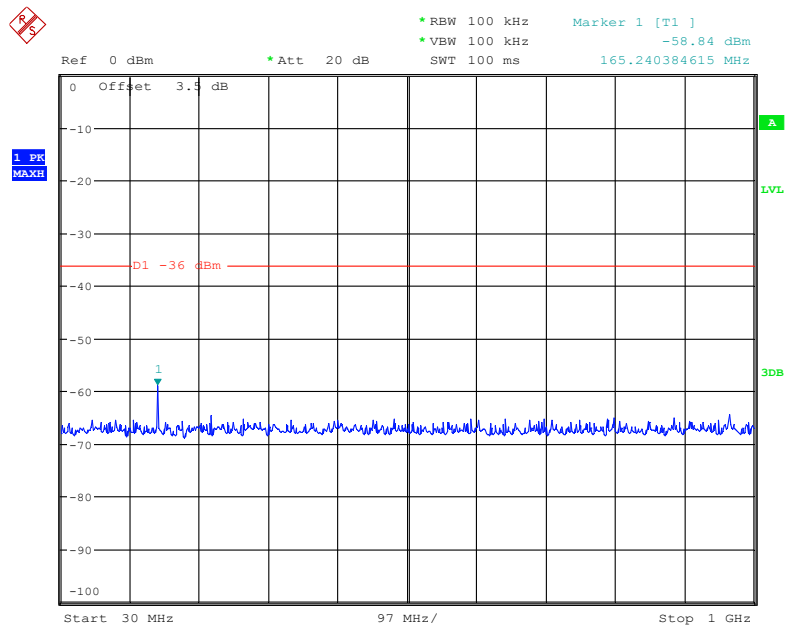
2496.5MHz - 12500MHz



Date: 2.FEB.2018 22:49:17

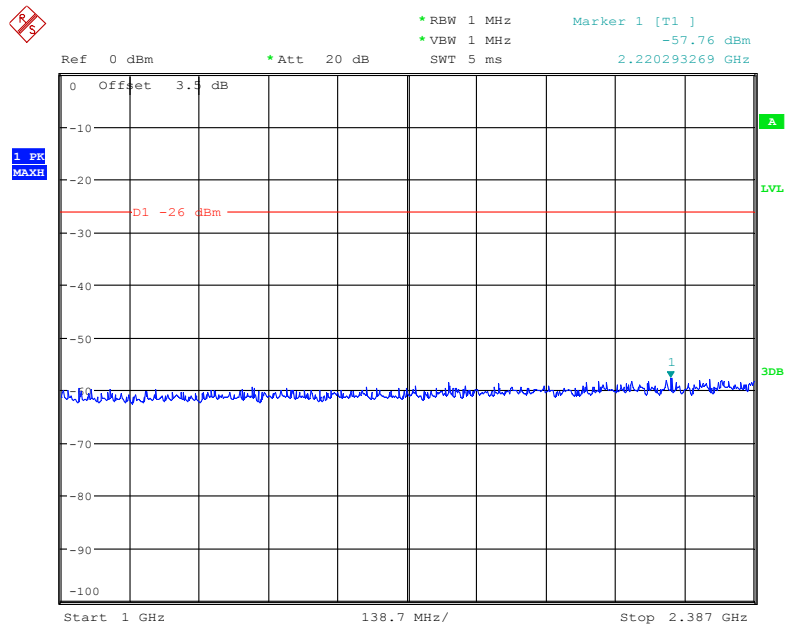
High Channel:

30MHz - 1000MHz



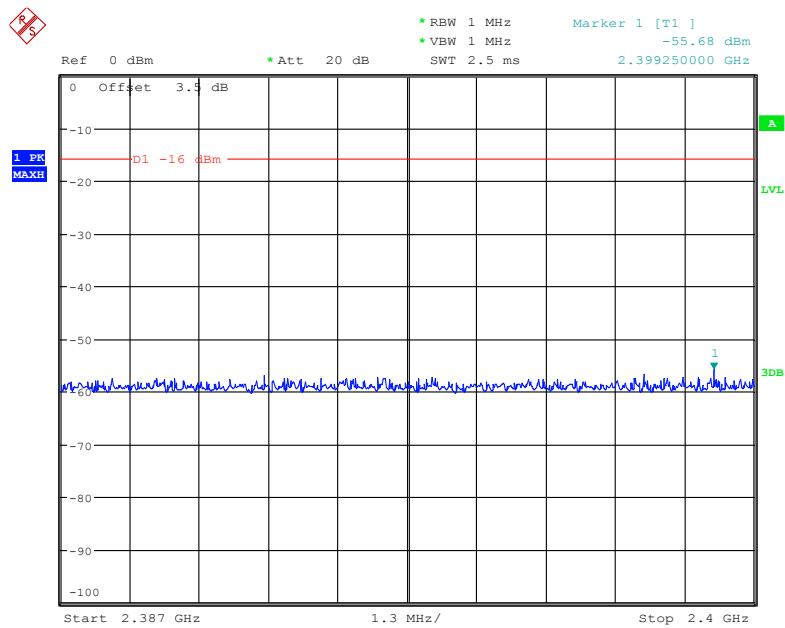
Date: 2.FEB.2018 22:42:08

1000MHz - 2387MHz



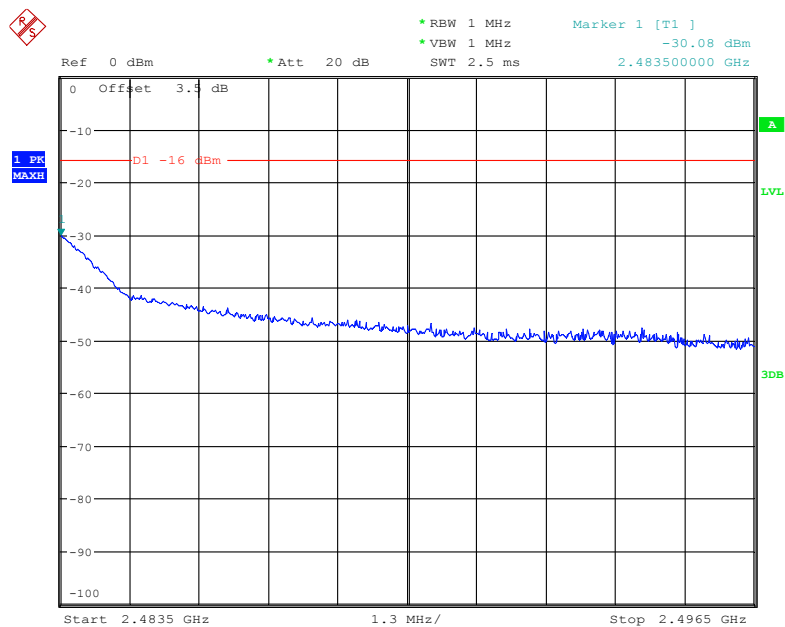
Date: 2.FEB.2018 22:42:48

2387MHz - 2400MHz



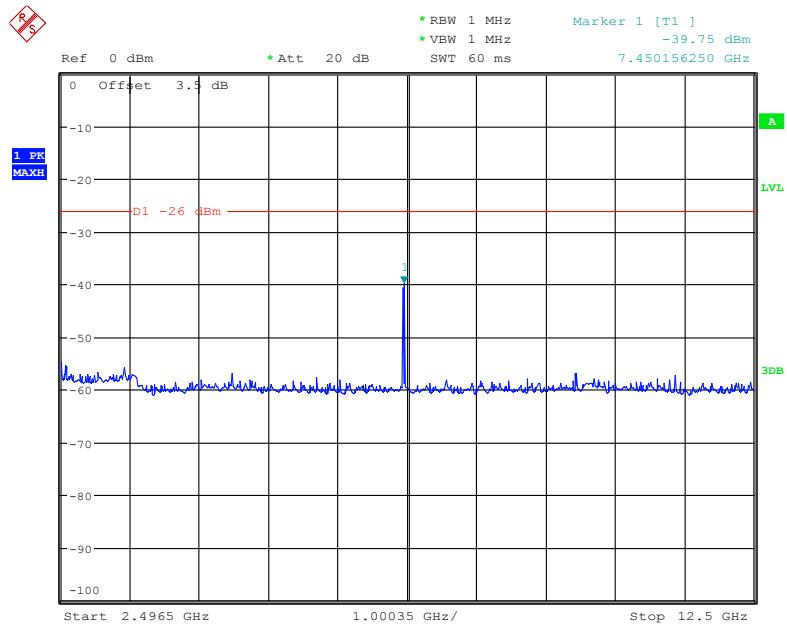
Date: 2.FEB.2018 22:46:14

2483.5MHz - 2496.5MHz



Date: 2.FEB.2018 22:47:05

2496.5MHz - 12500MHz



Date: 2.FEB.2018 22:50:20

ANTENNA OUTPUT POWER AND ANTENNA POWER TOLERANCE

Limit

- ≤ 3 mW /MHz(FHSS from 2402-2480 MHz)
- ≤ 10 mW/MHz (OFDM, DSSS from 2400-2483.5 MHz)
- ≤ 10 mW (other from 2400-2483.5 MHz)

The Output Power Tolerance must be within +20%, -80%.

Test Procedure

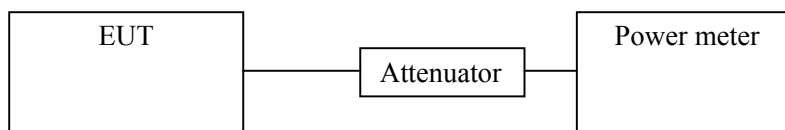
Step 1: Measure the total power by Power Meter in a state of hopping mode or non-hopping mode (with Average Sensor)

Step 2: If it's the burst wave, please measure the burst ratio. Then calculate the real total power by burst ratio.

Step 3: Calculate the mean power.

Output Power Density (mW) = Total Output Power (mW) / Duty cycle

Test Setup Block diagram



Test Data

Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2018-02-02.

Test Result: Compliant

Test Mode: Transmitting

Low channel

Frequency	Normal voltage	Low voltage	High voltage	Limit
Antenna Output Power (dBm)	2.20	2.27	2.69	
Antenna Output Power (mW)	1.660	1.687	1.858	
Duty cycle (%)	43.88	43.13	44.07	
Antenna Output Power (mW)	3.783	3.911	4.216	10
Antenna Output Power Tolerance (%)	-31.22	-28.88	-23.35	-80 ~ +20
EIRP(dBm)	6.58	6.72	7.05	12.14

Middle channel

Frequency	Normal voltage	Low voltage	High voltage	Limit
Antenna Output Power (dBm)	2.76	2.49	2.5	
Antenna Output Power (mW)	1.888	1.774	1.778	
Duty cycle (%)	43.88	43.00	43.60	
Antenna Output Power (mW)	4.303	4.126	4.078	10
Antenna Output Power Tolerance (%)	-21.76	-24.99	-25.85	-80 ~ +20
EIRP(dBm)	7.14	6.95	6.90	12.14

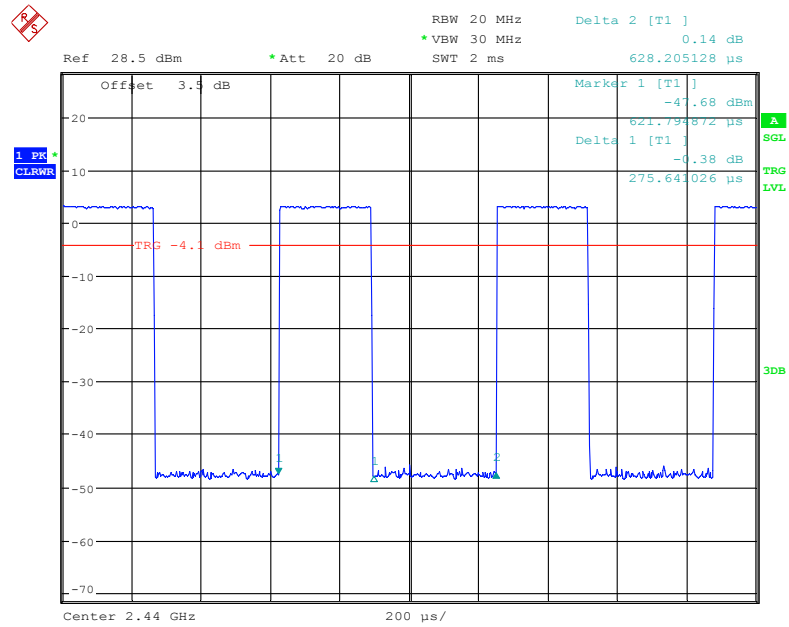
High channel

Frequency	Normal voltage	Low voltage	High voltage	Limit
Antenna Output Power (dBm)	3.20	3.03	3.86	
Antenna Output Power (mW)	2.089	2.009	2.432	
Duty cycle (%)	43.88	44.46	43.61	
Antenna Output Power (mW)	4.761	4.519	5.577	10
Antenna Output Power Tolerance (%)	-13.44	-17.84	1.39	-80 ~ +20
EIRP(dBm)	7.58	7.35	8.26	12.14

Note 1: The nominal Output power is 5.5mW, which was declared by manufacturer.
Antenna gain is 0.8dBi.

Please refer to the plots for normal voltage test about the Duty cycle.

Duty cycle



Date: 2.FEB.2018 21:05:34

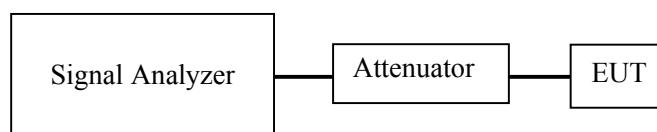
RECEIVER SPURIOUS EMISSION AND UNWANTED EMISSION INTENSITY

Limit

- $\leq 4 \text{ nW}$ ($30 \text{ MHz} \leq f \leq 1000 \text{ MHz}$)
- $\leq 20 \text{ nW}$ ($1 \text{ GHz} \leq f \leq 12.5 \text{ GHz}$)

Test Procedure

Measurement System Diagram



Conditions of Application Equipment (EUT)

- The modulation state shall be “continuous receiving mode”.

Spectrum Analyzer Conditions

- Start Frequency: Start Frequency of frequency range to measure (30MHz or 1GHz)
- Stop Frequency: Stop Frequency of frequency range to measure (1GHz or 12.75GHz)
- Span: AUTO (Measurement Range)
- RBW: 100 kHz, VBW: 100 kHz for Frequency < 1 GHz
- RBW: 1MHz, VBW: 1MHz for Frequency > 1 GHz
- Sweep time: AUTO or more
- Sweep mode: Auto Sweep
- Detection: Positive Peak
- Reference Level: Enough level for maximum dynamic range

Measurement Result**Environmental Conditions**

Temperature:	23 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2018-02-02.

Test Result: Compliant, please see the below tables and plots

Test Mode: Receiving

Normal

Item	Frequency Band	2402MHz	2440MHz	2480MHz	Limited
Raw data	Band VI (dBm)	-67.80	-67.83	-68.08	-54
	Band VII (dBm)	-55.87	-56.07	-56.60	-47

High Voltage

Item	Frequency Band	2402MHz	2440MHz	2480MHz	Limited
Raw data	Band VI (dBm)	-67.45	-69.00	-67.86	-54
	Band VII (dBm)	-57.47	-57.33	-58.19	-47

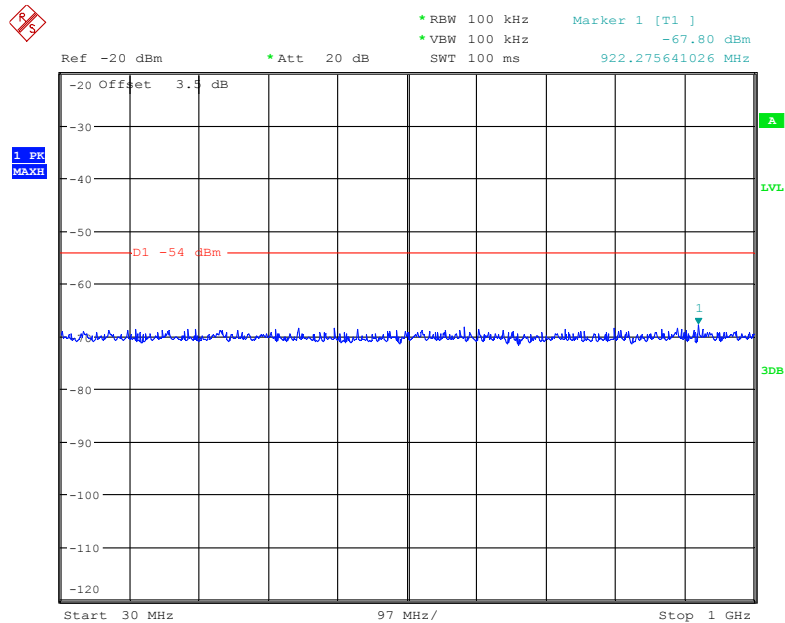
Low Voltage

Item	Frequency Band	2402MHz	2440MHz	2480MHz	Limited
Raw data	Band VI (dBm)	-67.97	-67.62	-67.95	-54
	Band VII (dBm)	-57.19	-56.04	-57.82	-47

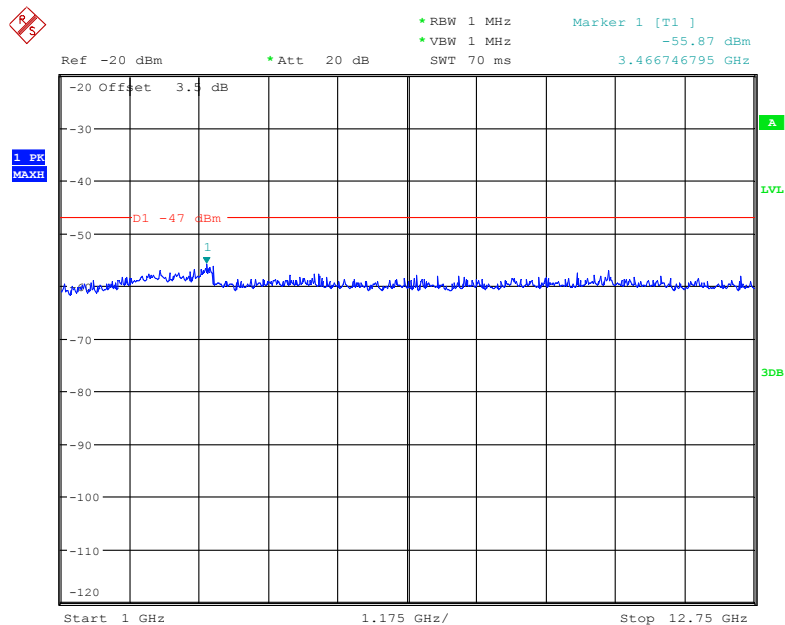
Note: 30 MHz~1000 MHz, Limit is 4 nW = -54 dBm;
1000 MHz~12500MHz, Limit is 20 nW = -47 dBm;

If searched value is under the technical standard value, do not need to measure more detail.

Normal Condition Test Data as below:

Low Channel:**30 MHz – 1 GHz**

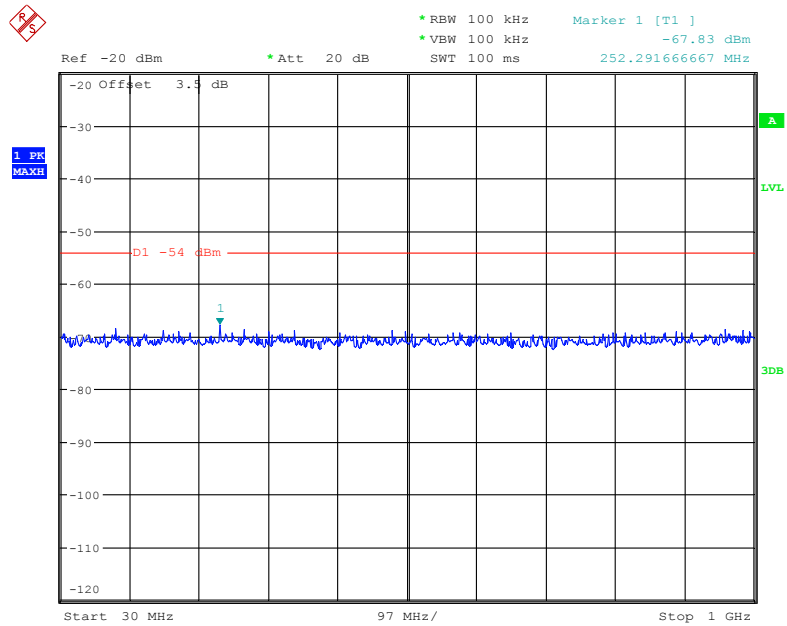
Date: 2.FEB.2018 22:20:56

1 GHz – 12.75 GHz

Date: 2.FEB.2018 22:35:11

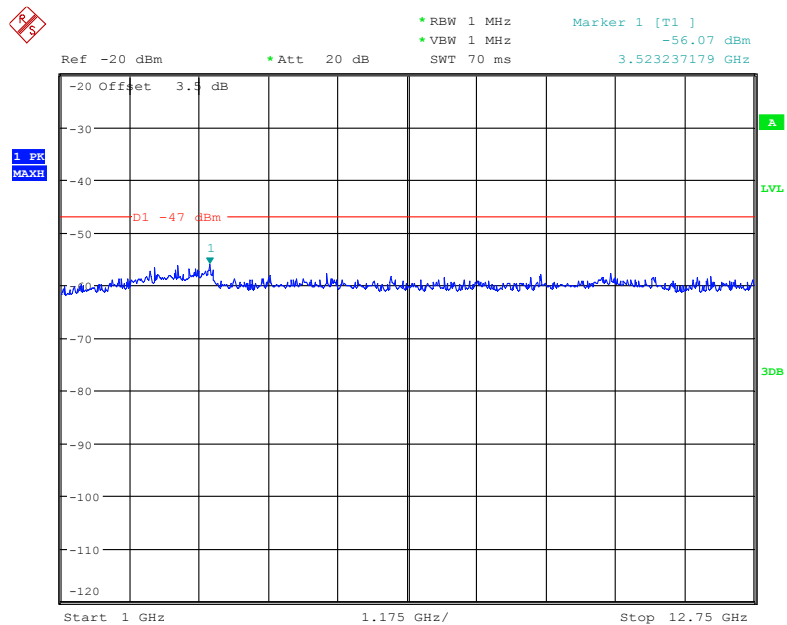
Middle Channel:

30 MHz – 1 GHz



Date: 2.FEB.2018 22:22:22

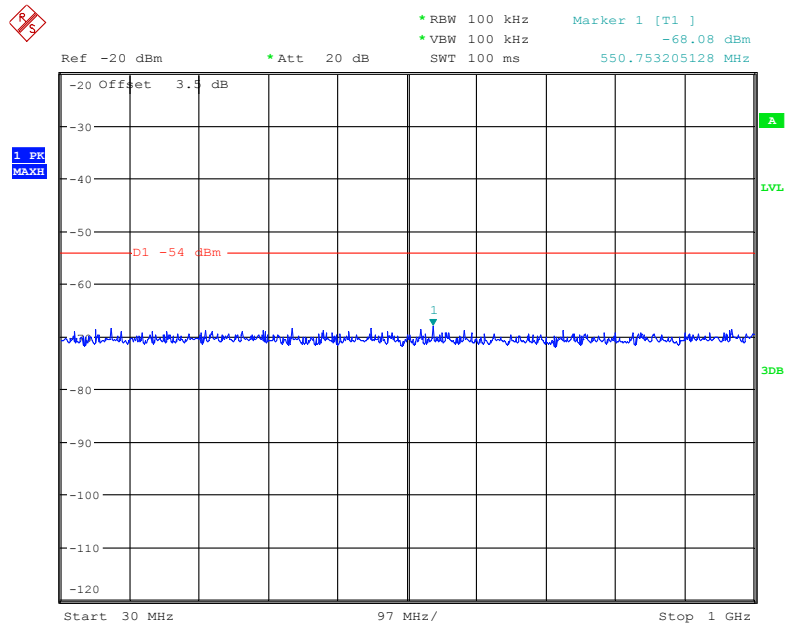
1 GHz – 12.75 GHz



Date: 2.FEB.2018 22:34:57

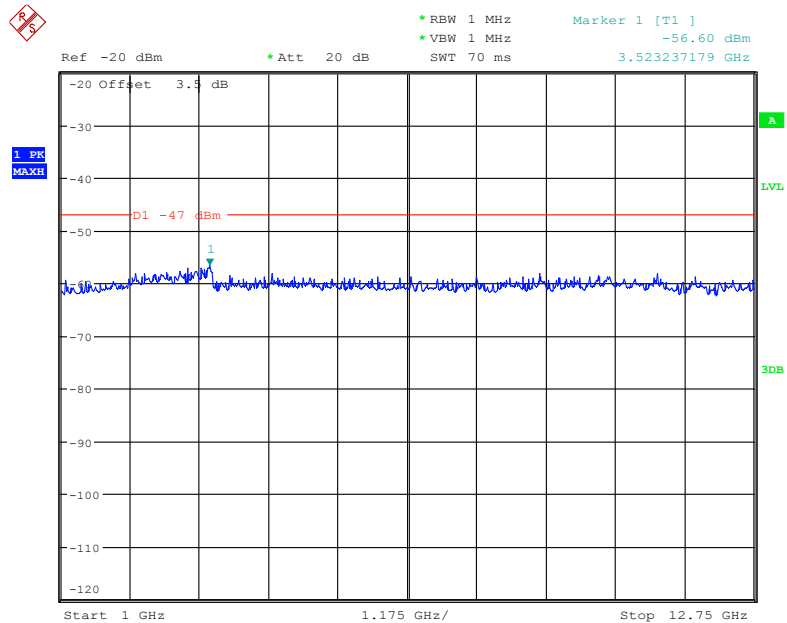
High Channel:

30 MHz – 1 GHz



Date: 2.FEB.2018 22:22:41

1 GHz – 12.75 GHz



Date: 2.FEB.2018 22:34:26

INTERFERENCE PREVENTION FUNCTION

Requirement

The EUT shall have the interference prevention capability to transmit or to receive the identification automatically, so that sender and receiver shall exclude other equipment.

Test Procedure

In the case that the EUT has the function of automatically transmitting the identification code:

1. Transmit the predetermined identification codes from EUT
2. Check the transmitted identification codes with the demodulator.

In the case of receiving the identification codes:

1. Transmit the predetermined identification codes from the counterpart.
2. Check if communication is normal
3. Transmit the signal other than predetermined ID codes from the counterpart.
4. Check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

Measurement Result

Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2018-02-02.

Test Result: Good.

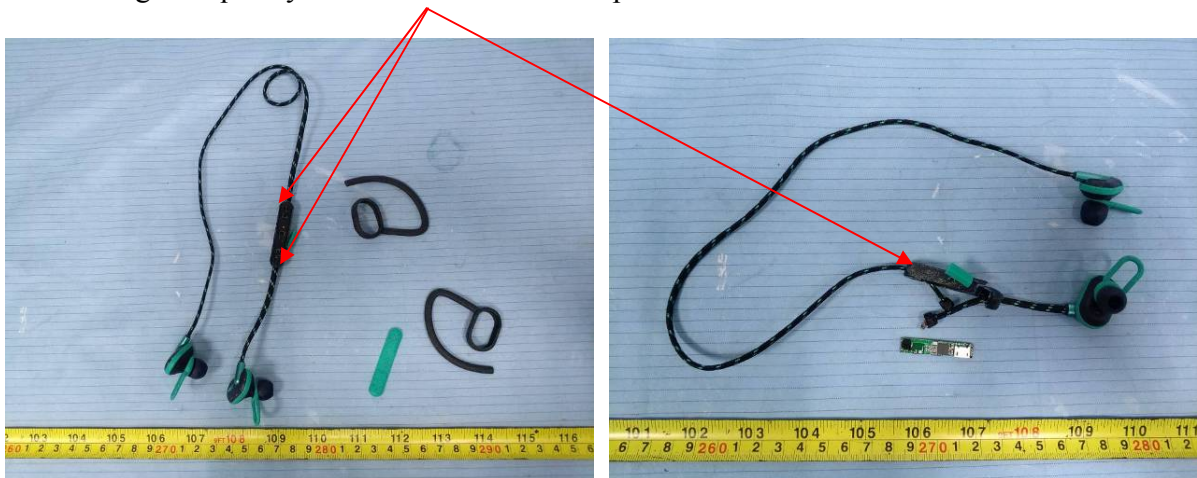
CONSTRUCTION PROTECTION CONFIRMATION

Limit

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

Confirmation Method

The EUT has some buckles on the edge of the housing that can't be opened easily and shielding cover the high-frequency section. Please refer the photos below.



****END OF REPORT****