



**SGS-CSTC Standards Technical Services Co., Ltd.
Guangzhou Branch**

198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technological
Development District, Guangzhou, China 510663

Telephone: +86 (0) 20 82155555
Fax: +86 (0) 20 82075059
Email: ee.guangzhou@sgs.com

Report No.: GZEM181000546701
Page: 1 of 35

TEST REPORT

Application No.: GZEM1810005467CR
Applicant: Beautiful Light Technology Corporation
Address of Applicant: No. 16-2, Dingshanmen, Neighbor 12, Jinlan Village, Jhongpu Township, Chiayi, Taiwan
Manufacturer: The same as Applicant
Address of Manufacturer: The same as Applicant
Factory: The same as Applicant
Address of Factory: The same as Applicant
Equipment Under Test (EUT):
EUT Name: Bluetooth Low Energy Module
Model No.: BM021
Standard(s) : MIC Item 19 of Article 2 Paragraph 1
Date of Receipt: 2018-10-19
Date of Test: 2018-11-12
Date of Issue: 2018-12-12

Test Result:	Pass*
---------------------	--------------

* In the configuration tested, the EUT complied with the standards specified above.

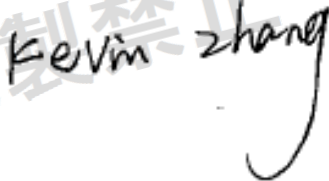


Kobe Jian
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2018-12-12		Original

Authorized for issue by:		
Tested By		
	Kevin_Zhang /Project Engineer	2018-11-12 Date
Checked By		
	Jerry_Chan /Reviewer	2018-11-16 Date

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	MIC Item 19 of Article 2 Paragraph 1	N/A	MIC Item 19 of Article 2 Paragraph 1	Pass
Interference prevention capability	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
RF accessibility	MIC Item 19 of Article 2 Paragraph 1	N/A	MIC Item 19 of Article 2 Paragraph 1	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Frequency Error	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Occupied Bandwidth (99%)	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Antenna Power	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Spurious emission Intensity	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass
Limit of secondary radiated emissions	MIC Item 19 of Article 2 Paragraph 1	MIC Notice No.88 Appendix No.43	MIC Item 19 of Article 2 Paragraph 1	Pass

3 Contents

	Page
1 Cover Page.....	1
2 Test Summary.....	3
3 Contents.....	4
4 General Information	6
4.1 Details of E.U.T.....	6
4.2 Description of Support Units	6
4.3 Measurement Uncertainty.....	7
4.4 Test Location	7
4.5 Test Facility.....	8
4.6 Deviation from Standards	9
4.7 Abnormalities from Standard Conditions	9
5 Equipment List.....	10
6 Radio Spectrum Technical Requirement	11
6.1 E.U.T. Test Conditions.....	11
6.1.1 Test Setup Diagram & test point	11
6.2 Antenna Requirement.....	13
6.2.1 Test Requirement.....	13
6.2.2 Conclusion.....	13
6.3 Interference prevention capability.....	14
6.3.1 Test Requirement.....	14
6.3.2 Test Setup Diagram.....	14
6.3.3 Conclusion.....	14
6.4 RF accessibility.....	15
6.4.1 Test Requirement.....	15
6.4.2 Conclusion.....	15
7 Radio Spectrum Matter Test Results.....	16
7.1 Frequency Error.....	16
7.1.1 E.U.T. Operation.....	16
7.1.2 Test Setup Diagram.....	16
7.1.3 Measurement Procedure and Data	16
7.2 Occupied Bandwidth (99%)	17
7.2.1 E.U.T. Operation.....	17
7.2.2 Test Setup Diagram.....	17
7.2.3 Measurement Procedure and Data	17
7.3 Antenna Power	18
7.3.1 E.U.T. Operation.....	18
7.3.2 Test Setup Diagram.....	18
7.3.3 Measurement Procedure and Data	18
7.4 Spurious emission Intensity	21
7.4.1 E.U.T. Operation.....	21
7.4.2 Test Setup Diagram.....	21
7.4.3 Measurement Procedure and Data	22
7.5 Limit of secondary radiated emissions.....	23

7.5.1	E.U.T. Operation.....	23
7.5.2	Test Setup Diagram.....	23
7.5.3	Measurement Procedure and Data	23
8	Photographs	24
8.1	EUT Test Setup	24
8.2	EUT Constructional Details.....	25
9	Appendix	26
9.1	Appendix MIC19-2	26

4 General Information

4.1 Details of E.U.T.

Power Supply:	DC 3.3V
Test Voltage:	DC 3.3V
Cable:	N/A
Power Class:	<10mW
Software:	EMI_Test_Tool_v1.3
Antenna Gain:	1.5 dBi
BT Version:	Bluetooth 4.0 BLE
Antenna Type:	Integrated Antenna
Number of channels:	40
Channel Spacing:	2MHz
Modulation Type:	GFSK
Operation Frequency:	2402MHz to 2480MHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	T430u	REF. No.SEA1800

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Timeout	$\pm 2s$
3	Duty cycle	$\pm 0.37\%$
4	Occupied Bandwidth	$\pm 3\%$
5	RF Conducted power	$\pm 0.75dB$
6	RF Power Density	$\pm 2.84dB$
7	Conducted Spurious Emissions	$\pm 0.75dB$
8	RF Radiated Power	$\pm 4.5dB$ (below 1GHz)
		$\pm 4.8dB$ (above 1GHz)
9	Radiated Spurious Emission Test	$\pm 4.5dB$ (30MHz-1GHz)
		$\pm 4.8dB$ (1GHz-18GHz)
10	Temperature	$\pm 0.4^{\circ}C$
11	Humidity	$\pm 1.3\%$
12	Supply Voltages	$\pm 1.5\%$
13	Time	$\pm 3\%$

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555

Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

● **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

● **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

● **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

● **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

● **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

● **Industry Canada (Registration No.: 4620B-1)**

The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

● **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584, G-449 and T-1179 respectively.

● **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

Frequency Error						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	Cal by
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-10	2018-03-10	2019-03-09	CEPREI

Occupied Bandwidth (99%)						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	Cal by
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-10	2018-03-10	2019-03-09	CEPREI

Antenna Power & Power Stability						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	Cal by
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-10	2018-03-10	2019-03-09	CEPREI

Spurious emission Intensity						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	Cal by
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-10	2018-03-10	2019-03-09	CEPREI

Limit of secondary radiated emissions						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	Cal by
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-10	2018-03-10	2019-03-09	CEPREI

Antenna Requirement						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	Cal by
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-10	2018-03-10	2019-03-09	CEPREI

General used equipment						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	Cal by
DMM	Fluke	73III	EMC0006	2018-07-20	2019-07-19	GRGT
DMM	Fluke	73III	EMC0007	2018-07-19	2019-07-18	GRGT

6 Radio Spectrum Technical Requirement

6.1 E.U.T. Test Conditions

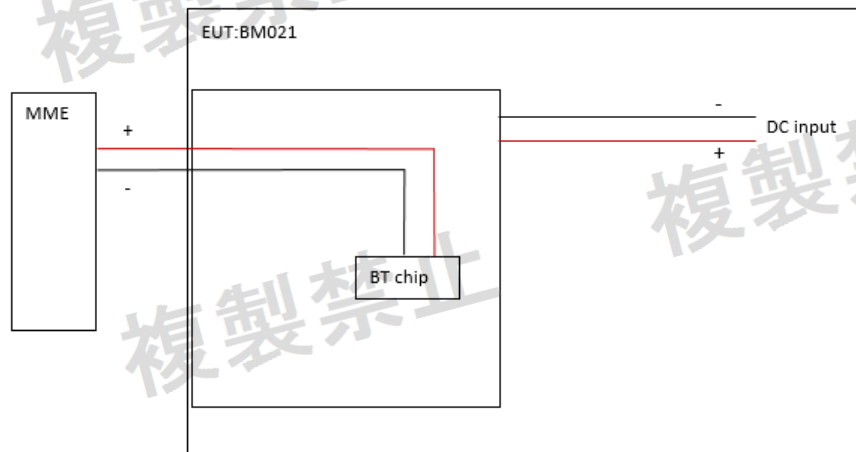
Power supply: the RF unit supplied by 3.3V.
The EUT has the input voltage to the circuit of RF unit complies with output voltage limitation ($\pm 1\%$) against input voltage fluctuation ($\pm 10\%$).
So, all measurements were conducted at only rated voltage DC 3.3V.
The measurement result of the voltage fluctuation at RF circuit when AC 100V $\pm 10\%$.

Battery output (DC 3.3V)	Measured value (3.3V)
DC 2.97V	3.3V
DC 3.3V	3.32V
DC 3.63V	3.28V

Temperature: 5.0 -35.0 °C
Humidity: 45-85 % RH
Atmospheric Pressure: 1000 -1010 mbar
Test frequencies:

If the EUT can be set to 3 or more different (carrier) frequencies in 1 allocated band, testing shall be performed using the Lowest, Middle and the Highest frequency (L, M and H). If there are 2 or fewer frequencies, testing shall be performed with the available frequencies.

6.1.1 Test Setup Diagram & test point



EUT channels and frequencies list:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

Selected Test Channel	
Channel	Frequency
The lowest channel (CH0)	2402MHz
The middle channel (CH20)	2442MHz
The highest channel (CH39)	2480MHz

6.2 Antenna Requirement

6.2.1 Test Requirement:

MIC Item 19 of Article 2 Paragraph 1

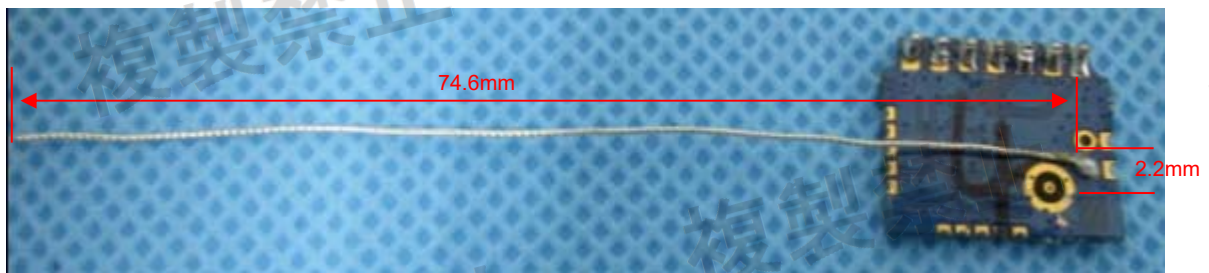
6.2.2 Conclusion

Standard requirement:

Applicable for equipment with an antenna terminal, including testing terminals. If an antenna connector is available, all relevant tests will be carried out conducted. If not, tests will be carried out in an anechoic room or with a suitable test-fixtured.

EUT Details:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1.5 dBi.



Result:

An antenna connector is available, all relevant tests will be carried out conducted.

6.3 Interference prevention capability

6.3.1 Test Requirement:

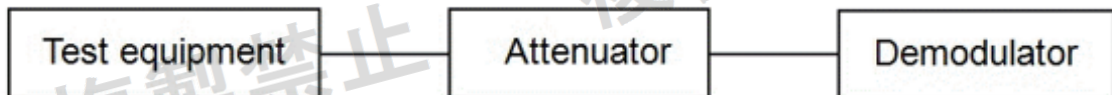
MIC Item 19 of Article 2 Paragraph 1

Limit:

Article 2, Item (19) Notice 88 Appendix 43, 44, 45

The EUT shall be constructed in such a way that sensitive RF parts, (like modulation and oscillator parts) cannot be reached easily by the user. These parts shall be covered by soldered metal caps or glue or by other mechanical covers. If the covers are fixed with screws, these shall be not the common type(s) like a Phillips, but special versions like Torx, so that the user cannot open the device with common tools.

6.3.2 Test Setup Diagram



6.3.3 Conclusion

Standard Requirement:

- 1) Measurement system diagram as shown above and test equipment keep transmitting identification code.
- 2) Condition of measuring instrument
 - (1) Demodulator must be able to demodulate the transmitting signal emitted by test equipment and to indicate the identification code.
- 3) Condition of test equipment. The mode of normal use.
- 4) Measuring operation procedure
 - (1) When test equipment has the function to transmit identification code automatically:
 - A) Transmit the predetermined identification code from test equipment.
 - B) Confirm the transmitted identification code by demodulator.

68:EC:62:00:B4:E7

EUT Details:

The unit does meet the requirements (Good).

6.4 RF accessibility

6.4.1 Test Requirement:

MIC Item 19 of Article 2 Paragraph 1

6.4.2 Conclusion

Standard Requirement:

The EUT shall be constructed in such a way that sensitive RF parts, (like modulation and oscillator parts) cannot be reached easily by the user. These parts shall be covered by soldered metal caps or glue or by other mechanical covers. If the covers are fixed with screws, these shall be not the common type(s) like a Phillips, but special versions like Torx, so that the user cannot open the device with common tools.



EUT Details:

RF and Modulation parts are mounted on PCB with surface mount technology, and there is no any adjustable parts on PCB or adjustable parts are exposed.

7 Radio Spectrum Matter Test Results

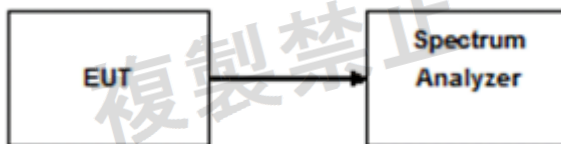
7.1 Frequency Error

Test Requirement: MIC Item 19 of Article 2 Paragraph 1
Test Method: MIC Notice No.88 Appendix No.43
Limit: Tolerance of frequency: $\pm 50\text{E-}6$

7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 23.9 °C Humidity: 70.6 % RH Atmospheric Pressure: 1010 mbar
Test mode a: TX_Keep the EUT in transmitting mode

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

- Continuous or burst transmission
- Un-modulated or modulated
- Spread/Hopping OFF

3. Spectrum Analyzer conditions:

Frequency: Test Frequency

Span: 1MHz

RBW: 10 kHz (Modulation OFF),

VBW: 10 kHz (Modulation OFF),

Sweep Time: Auto

Detector mode: Positive peak

Indication mode: Max hold

Alternative method:

Frequency: Test Frequency

Span: 2 times channel bandwidth

RBW: 100 kHz (Modulation ON),

VBW: 100 kHz (Modulation ON),

Sweep Time: Auto

Detector mode: Positive peak

Indication mode: Max hold

The detailed test data see: Appendix MIC19-2

7.2 Occupied Bandwidth (99%)

Test Requirement	MIC Item 19 of Article 2 Paragraph 1
Test Method:	MIC Notice No.88 Appendix No.43
Limit:	FH: 83.5MHz or less FH + DS: 83.5MHz or less FH + OFDM: 83.5MHz or less OFDM: 38MHz or less Others: 26MHz or less

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 26.1 °C Humidity: 69.3 % RH Atmospheric Pressure: 1020 mbar

Test mode a: TX_ Keep the EUT in transmitting mode

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

Modulation/Spread/Hopping ON, Modulation Tx

For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.

3. Spectrum Analyzer conditions:

Frequency: Test Frequency

Span: 2-3.5 times the technical standard

RBW: Within 3% of the technical standard

VBW: Same as RBW

Sweep Time: Auto

Sweep data points: 1001 or greater

detector mode: Positive peak

Indication mode: Max hold

BW setting: OBW 99%

The detailed test data see: Appendix MIC19-2

7.3 Antenna Power

Test Requirement

MIC Item 19 of Article 2 Paragraph 1

Test Method:

MIC Notice No.88 Appendix No.43

Limit:

The difference between measured output power and the rated output power (declared in the construction design document) shall be within a tolerance of +20% to -80%. In addition, the rated output power shall not be over the limits shown below:

Limit (rated output power, upper limit)

- | | |
|---|------------------|
| (1) FHSS, FHSS+DSSS, FHSS+OFDM
(in range 2427.0 - 2470.75 MHz) | 3mW/MHz or less |
| (2) OFDM OBW < 26MHz, DSSS, FHSS other (1) | 10mW/MHz or less |
| (3) OFDM OBW 26 – 38MHz | 5mW/MHz or less |
| (4) Other than (1), (2), (3) | 10mW/MHz or less |

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 26.1 °C

Humidity: 69.3 % RH

Atmospheric Pressure: 1020 mbar

Test mode a: TX_Keep the EUT in transmitting mode

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

- Continuous or burst transmission
- Modulated
- Rated output power declared in the construction design document

3. Spectrum Analyzer conditions:

Setting 1 - Search for peak power frequency

Frequency: Test Frequency

Span: Approximately twice the occupied bandwidth

RBW: 1MHz

VBW: Approximately three times the RBW

Sweep Time: Auto

Sweep data points: 1001 or greater

detector mode: Positive peak

Indication mode: Max hold

Setting 2 - Measurement of average antenna power for FHSS, DSSS, OFDM

Frequency: Frequency of peak power found using [Setting 1]

Span: 0Hz

RBW: 3MHz (FHSS in below procedure 1)

1MHz (DSSS, OFDM, FHSS in below procedure 2)

Detector mode: Sample

Sweep: Minimum time required to make an accurate measurement.

For burst type (intermittent) transmission, sweep time shall be greater than one burst interval.

Sweep data points: 1001 or greater

Setting 3 - Measurement of average antenna power other than for FHSS, DSSS, OFDM

Frequency: Frequency of peak power found using [Setting 1]

Span: 0Hz

RBW: Bandwidth sufficient to cover that occupied by the carrier

VBW: Bandwidth sufficient to cover that occupied by the carrier

Detector mode: Sample

Sweep: Minimum time required to make an accurate measurement.

For burst type (intermittent) transmission, sweep time shall be greater than one burst interval.

Sweep data points: 1001 or greater

4. Test procedure:

Procedure 1 for FHSS systems with the following characteristics:

- A hopping transmission separation of 1MHz or less with a constant transmission interval
- The transmission probability is equal for all hopping frequencies.

① After configuring the spectrum analyser to [Setting 1], find the frequency of maximum transmitted power;

② After configuring the spectrum analyser to [Setting 2], measure the average burst power of the frequency found in (1)

③ Calculate antenna power using the following formula:

$$\text{Antenna Power (W/MHz)} = \text{Average Burst Power (W)} / \text{Spread Bandwidth (MHz)}$$

Note:

*Spread Bandwidth in the formula above is derived from the data collected in section 7.3 (Spread Bandwidth (90%))

④ If the EUT has multiple antennas then each antenna power output shall be measured individually – the sum of these individual measurements shall represent the power output value.

Procedure 2 for FHSS systems other than the above

- ① After configuring the spectrum analyser to [Setting 1], find the frequency of maximum transmitted power;
- ② After configuring the spectrum analyser to [Setting 2], measure the average burst power of the frequency found in (1)

$$\text{Antenna Power (W/MHz)} = \text{Average Burst Power}$$

Procedure 3 for DSSS, FHSS systems

- ① After configuring the spectrum analyser to [Setting 1], find the frequency of maximum transmitted power;
- ② After configuring the spectrum analyser to [Setting 2], measure the average burst power of the frequency found in (1)

$$\text{Antenna Power (W/MHz)} = \text{Average Burst Power}$$

Procedure 4 for other than FHSS, DSSS, FHSS systems

- ① After configuring the spectrum analyser to [Setting 1], find the frequency of maximum transmitted power;
- ② After configuring the spectrum analyser to [Setting 3], measure the average burst power of the frequency found in (1)

$$\text{Antenna Power (Watts)} = \text{Average Burst Power}$$

The detailed test data see: Appendix MIC19-2

7.4 Spurious emission Intensity

Test Requirement	MIC Item 19 of Article 2 Paragraph 1
Test Method:	MIC Notice No.88 Appendix No.43
Limit:	(1) Below 2387 MHz: 2.5 μ W (-26dBm)/MHz or less (2) 2387 to 2400 MHz: 25 μ W (-16dBm)/MHz or less (3) 2483.5 through 2496.5 MHz: 25Mw (-16dBm)/MHz or less (4) Over 2496.5 MHz: 2.5Mw (-26DbM)/MHz or less

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25.4 °C Humidity: 62.3 % RH Atmospheric Pressure: 1020 mbar

Test mode a: TX_Keep the EUT in transmitting mode

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

- Continuous or burst transmission
- Modulated
- Rated output power declared in the construction design document

3. Spectrum Analyzer conditions:

Setting 1

Frequency: (see Note 1)

RBW: 1 MHz

VBW: 1 MHz

Sweep Time: Minimum time required to make an accurate measurement

Sweep data points: 1001 or greater

detector mode: Positive peak

Indication mode: Max hold (see Note 2)

Note 1: Measurement range shall be 30 MHz to 12.5 GHz, except for the following cases:

- FHSS, FHSS+DSSS, FHSS+ODFM: 2374 MHz to 2509.5 MHz
- Other than FHSS, FHSS+DSSS, FHSS+ODFM: 2400 MHz to 2483.5 MHz

Note 2: Sweep shall be repeated until the max hold waveform is stable

Setting 2

Frequency: 2374 MHz to 2400 MHz ,2483.5MHz to 2509.5 MHz

RBW: 30 kHz

VBW: 30 kHz

Sweep Time: Minimum time required to make an accurate measurement

Sweep data points: 1001 or greater

detector mode: Positive peak

Indication mode: Max hold

The detailed test data see: Appendix MIC19-2

7.5 Limit of secondary radiated emissions

Test Requirement	MIC Item 19 of Article 2 Paragraph 1
Test Method:	MIC Notice No.88 Appendix No.43
Limit:	(1) Below 1 GHz: 4 nW (-54dBm) or less (2) Above 1 GHz: 20 nW (-47dBm) or less

7.5.1 E.U.T. Operation

Operating Environment:

Temperature:	25.4 °C	Humidity:	62.3 % RH	Atmospheric Pressure:	1020 mbar
Test mode	b: RX_Keep the EUT in receiving mode				

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

1. Test Conditions:

Spectrum Analyzer is used for measurement.

2. EUT conditions:

- Continuous receive

3. Spectrum Analyzer conditions:

Frequency: 30MHz to 12.5 GHz

RBW: 100kHz (Below 1 GHz)

1MHz (above 1 GHz)

VBW 100kHz (Below 1 GHz)

1MHz (above 1 GHz)

Sweep Time: Auto

Sweep data points: 1001 or greater

Detector mode: Positive peak

Indication mode: Max hold

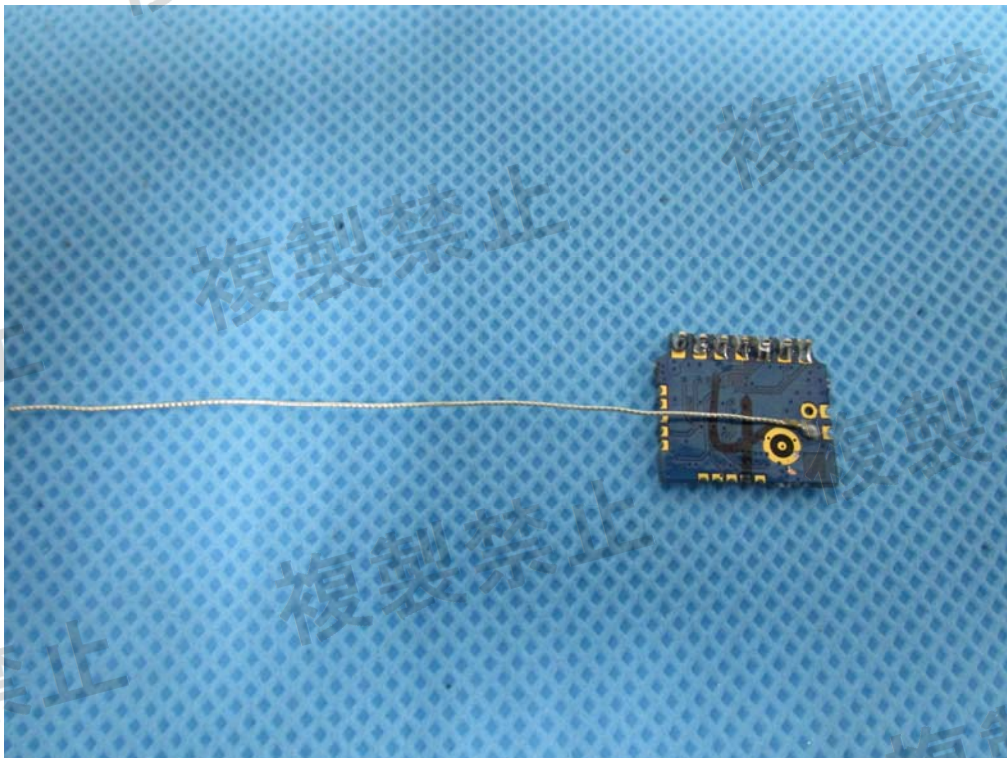
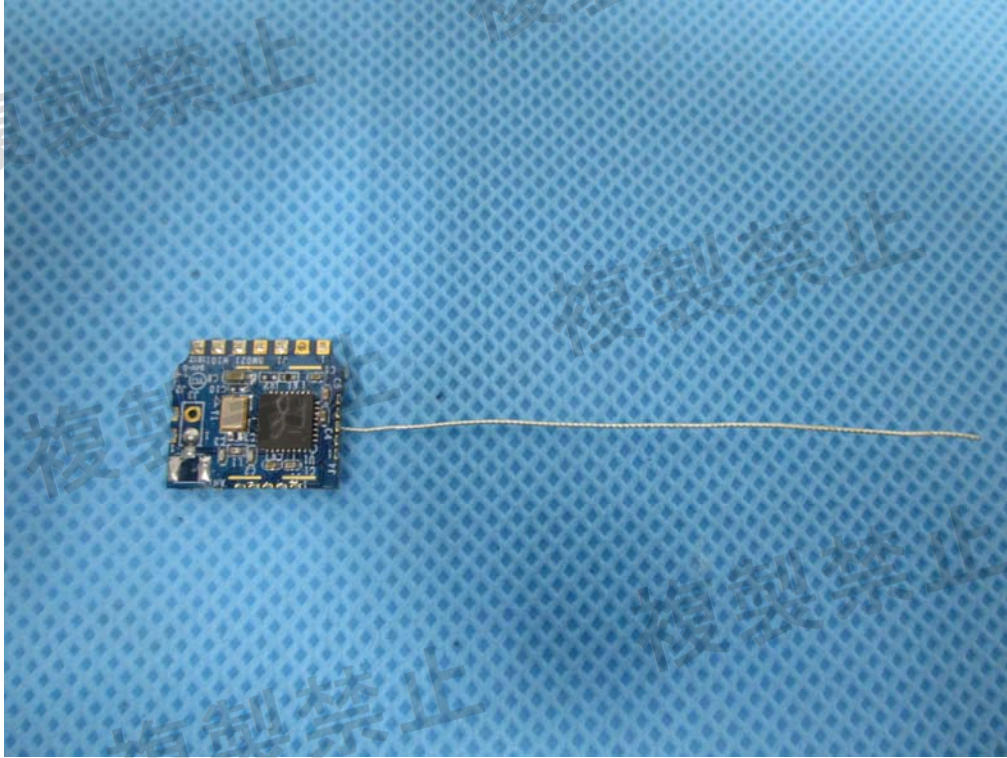
The detailed test data see: Appendix MIC19-2

8 Photographs

8.1 EUT Test Setup



8.2 EUT Constructional Details

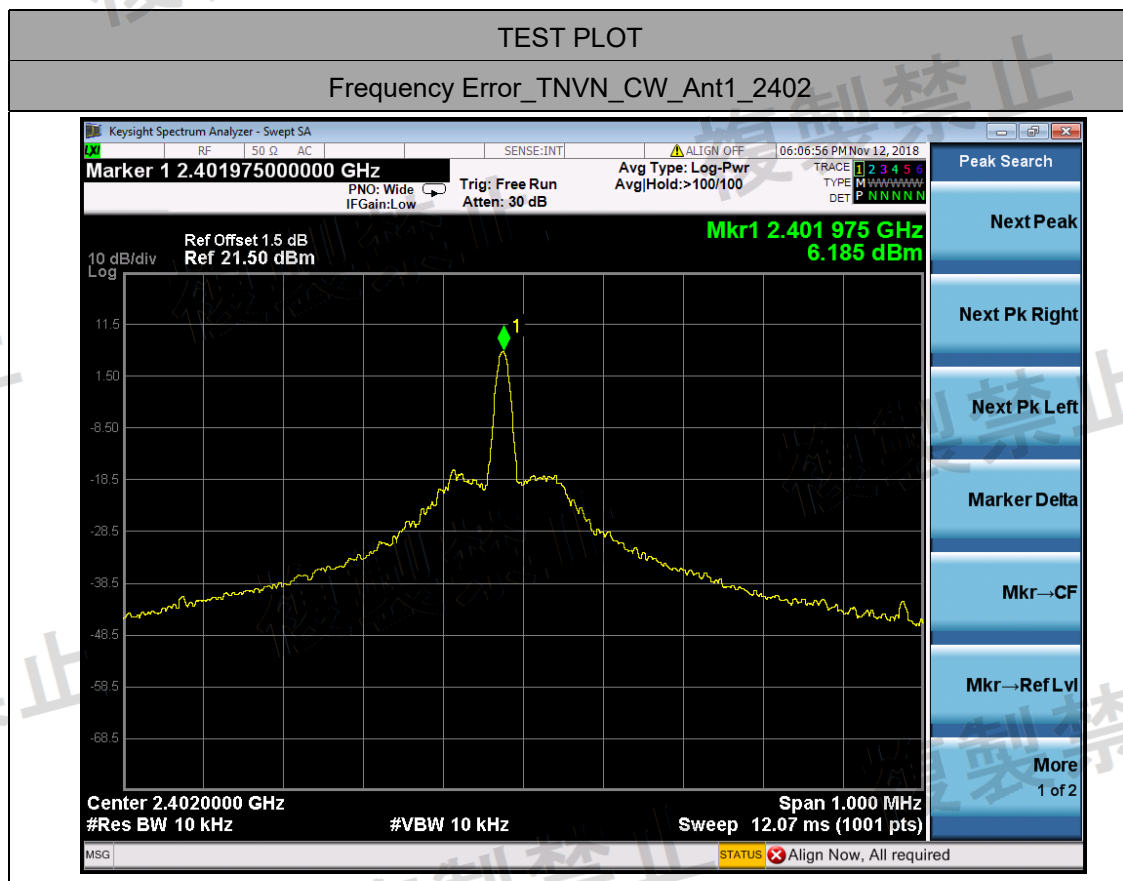


9 Appendix

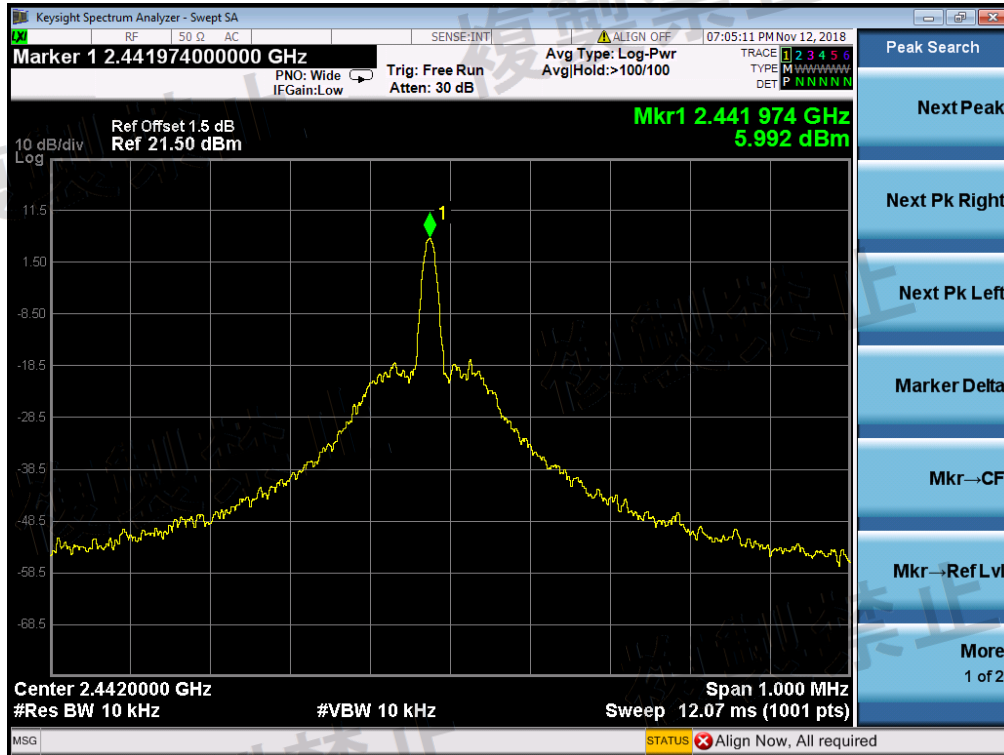
9.1 Appendix MIC19-2

1.Frequency Error

Test Condition	Test Mode	Test Channel	Ant	Result [MHz]	Result [PPM]	Limit [PPM]	Verdict
TNVN	CW	2402	Ant1	2401.975	-10.4	<=+/-50	PASS
TNVN	CW	2442	Ant1	2441.974	-10.6	<=+/-50	PASS
TNVN	CW	2480	Ant1	2479.974	-10.5	<=+/-50	PASS



Frequency Error_TNVN_CW_Ant1_2441

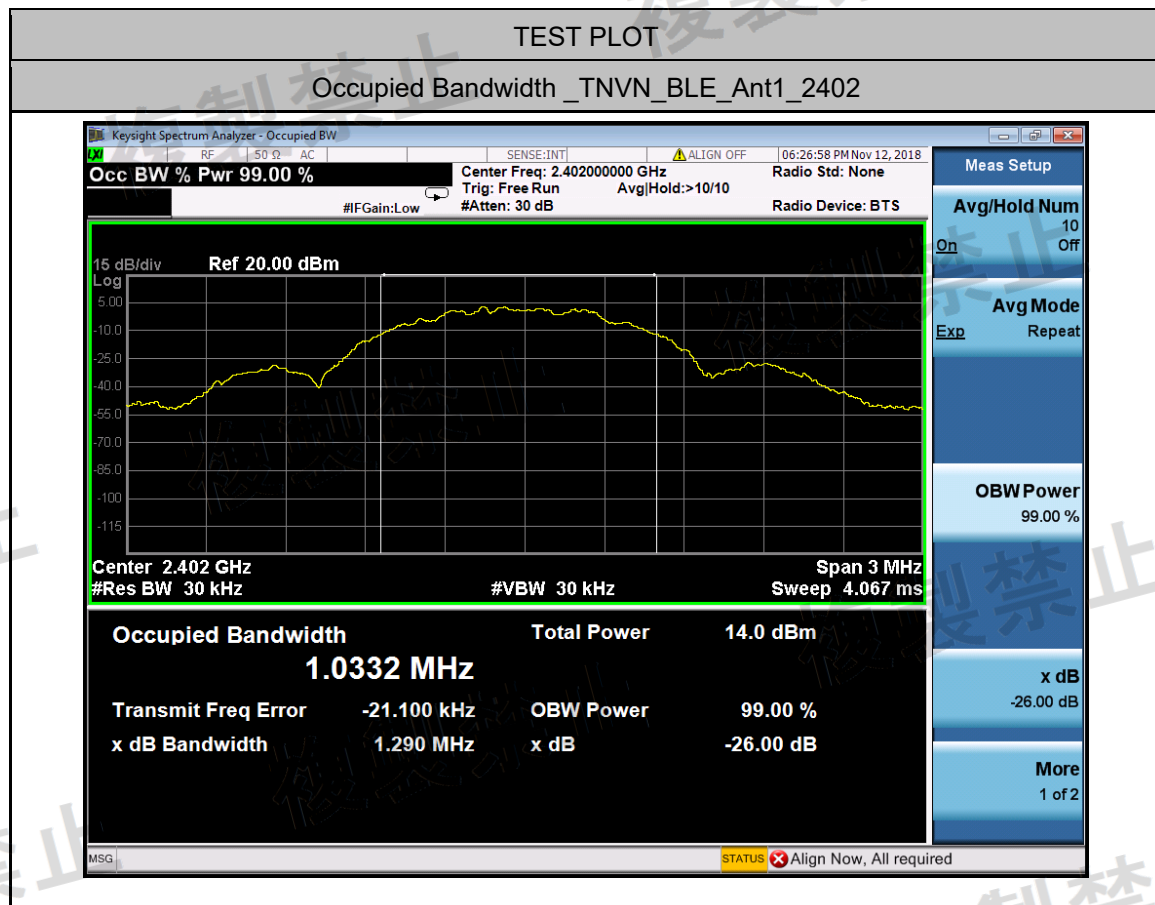


Frequency Error_TNVN_CW_Ant1_2480

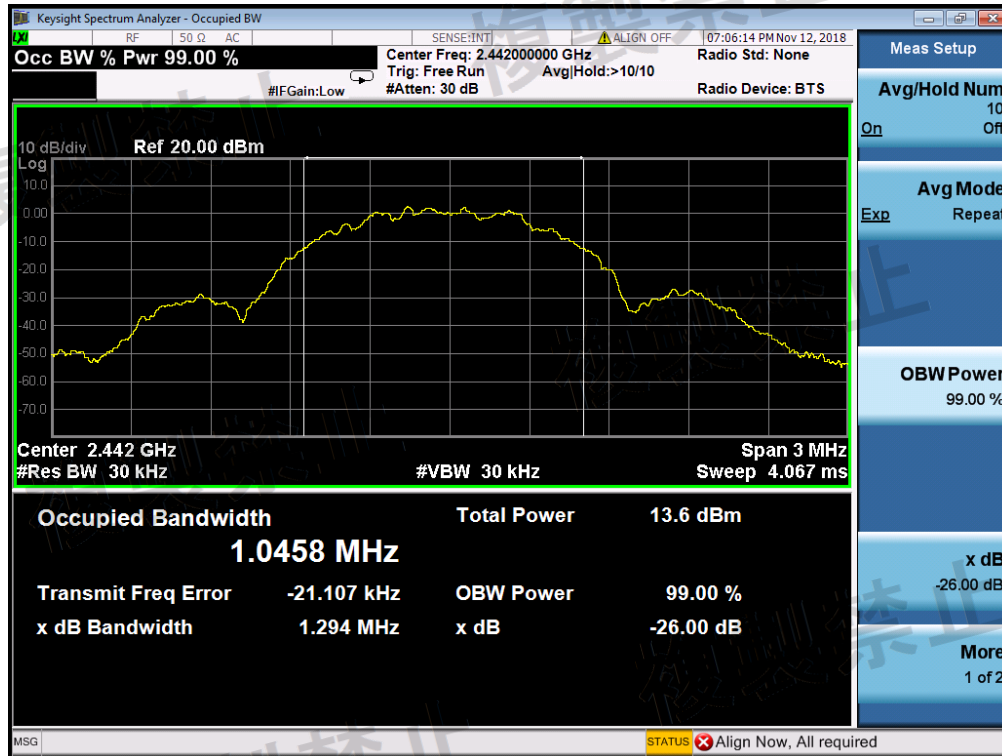


2.Occupied Bandwidth (99%)

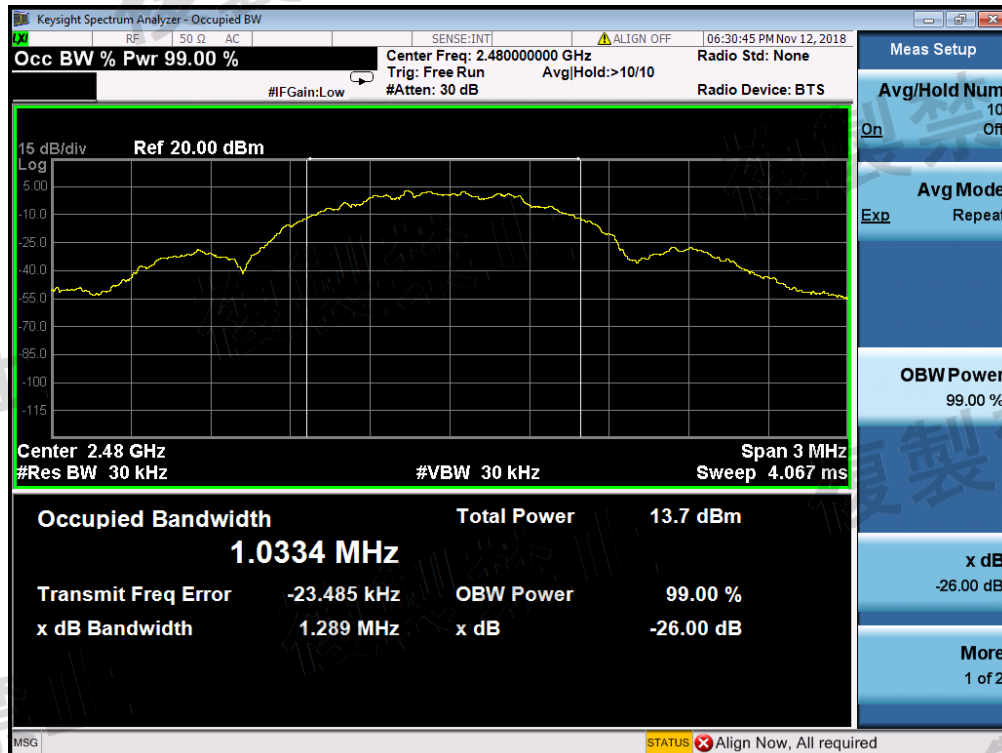
Test Condition	Test Mode	Test Channel	Ant	Test Result [MHz]	Limit [MHz]	Verdict
TNVN	BLE	2402	Ant1	1.033	<=26	PASS
TNVN	BLE	2442	Ant1	1.046	<=26	PASS
TNVN	BLE	2480	Ant1	1.033	<=26	PASS



Occupied Bandwidth_TNVN_BLE_Ant1_2442

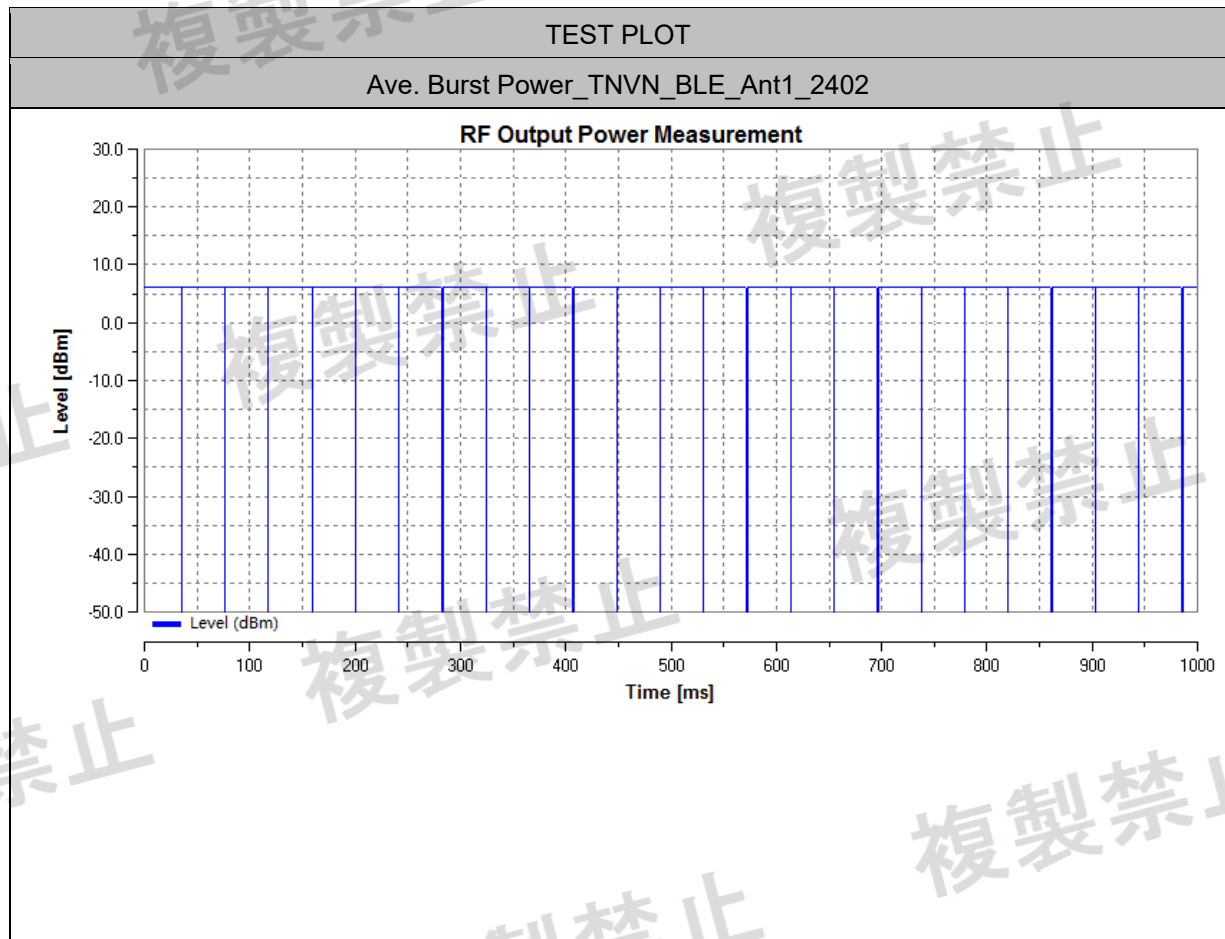


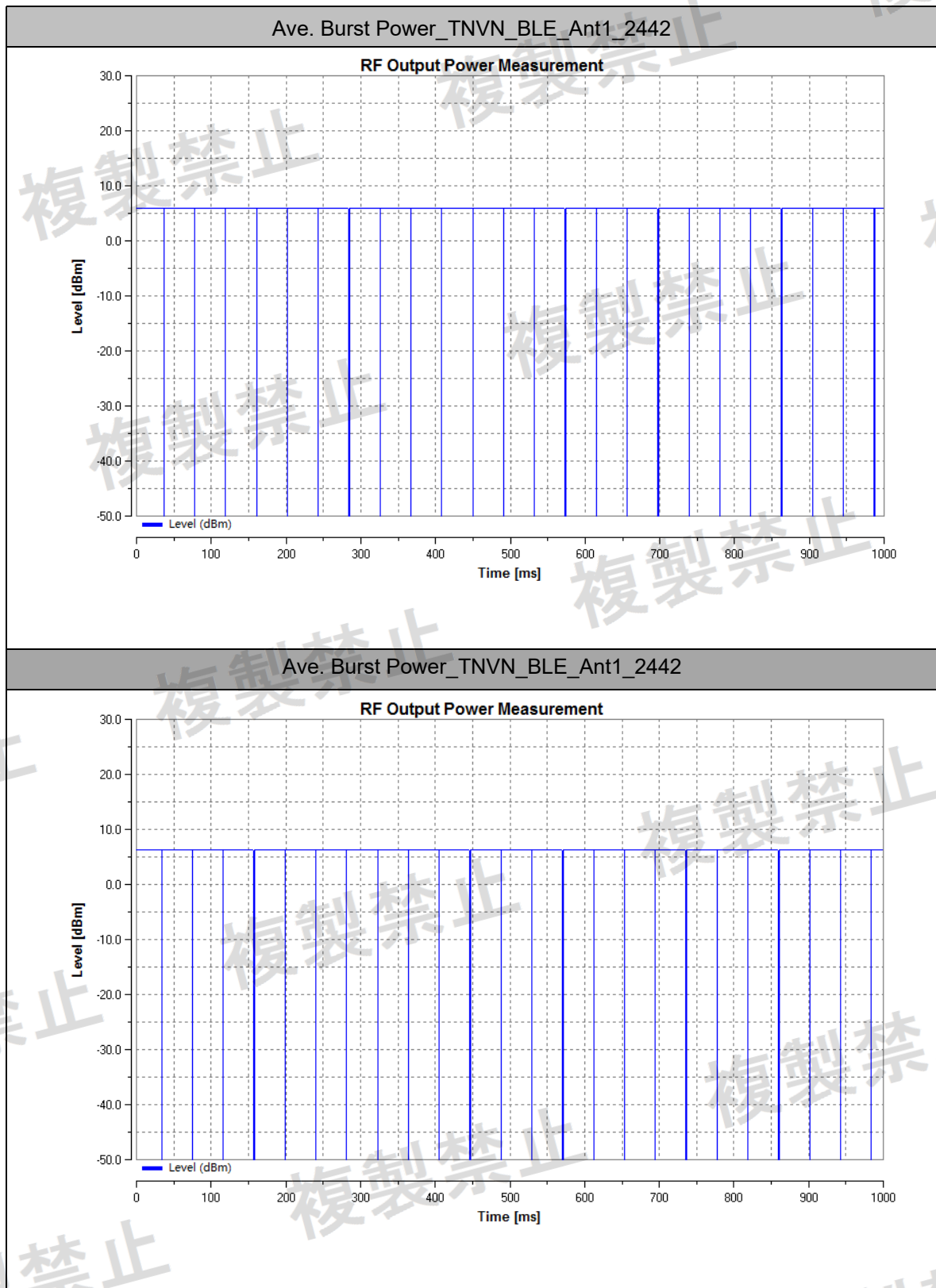
Occupied Bandwidth_TNVN_BLE_Ant1_2480



3. Antenna Power

Test Condition	Test Mode	Test Channel	Ant	Ave. Burst Power [mW]	Limit [mW]	Tolerance [%]	Limit [%]	Verdict
TNVN	BLE	2402	Ant1	3.873	10	-3.18	-80 to +20	PASS
TNVN	BLE	2442	Ant1	3.945	10	-1.38	-80 to +20	PASS
TNVN	BLE	2480	Ant1	4.042	10	1.05	-80 to +20	PASS
Remark: Rated antenna power: 4mW								



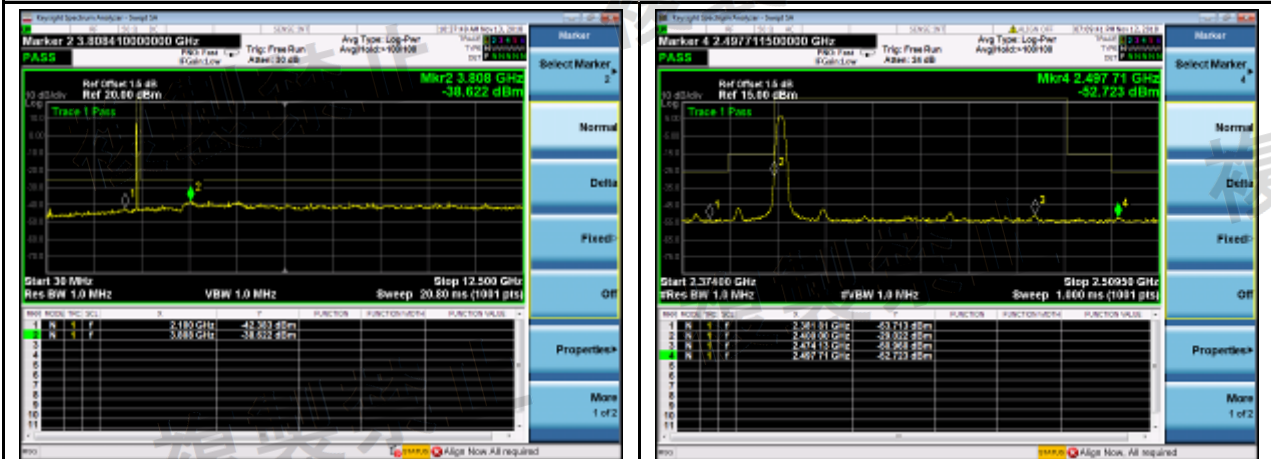


4. Spurious Emissions of Tx

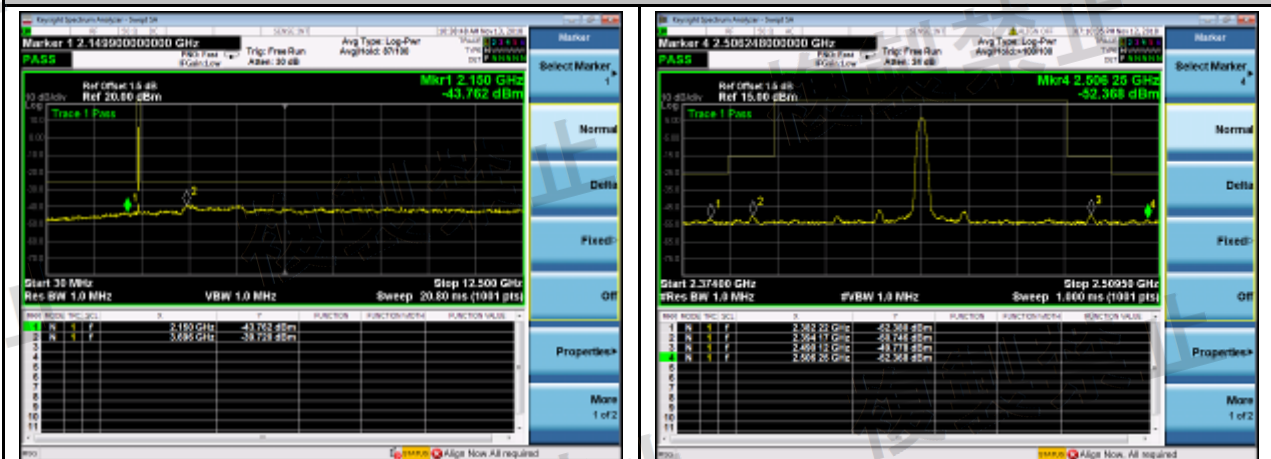
Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	Test Result [dBm]	Limit [μW]	Verdict
BLE	2402	30	2387	< -26	2.5	PASS
BLE	2402	2387	2400	< -16	25	PASS
BLE	2402	2483.5	2496.5	< -16	25	PASS
BLE	2402	2496.5	13000	< -26	2.5	PASS
BLE	2442	30	2387	< -26	2.5	PASS
BLE	2442	2387	2400	< -16	25	PASS
BLE	2442	2483.5	2496.5	< -16	25	PASS
BLE	2442	2496.5	13000	< -26	2.5	PASS
BLE	2480	30	2387	< -26	2.5	PASS
BLE	2480	2387	2400	< -16	25	PASS
BLE	2480	2483.5	2496.5	< -16	25	PASS
BLE	2480	2496.5	13000	< -26	2.5	PASS

EST PLOT

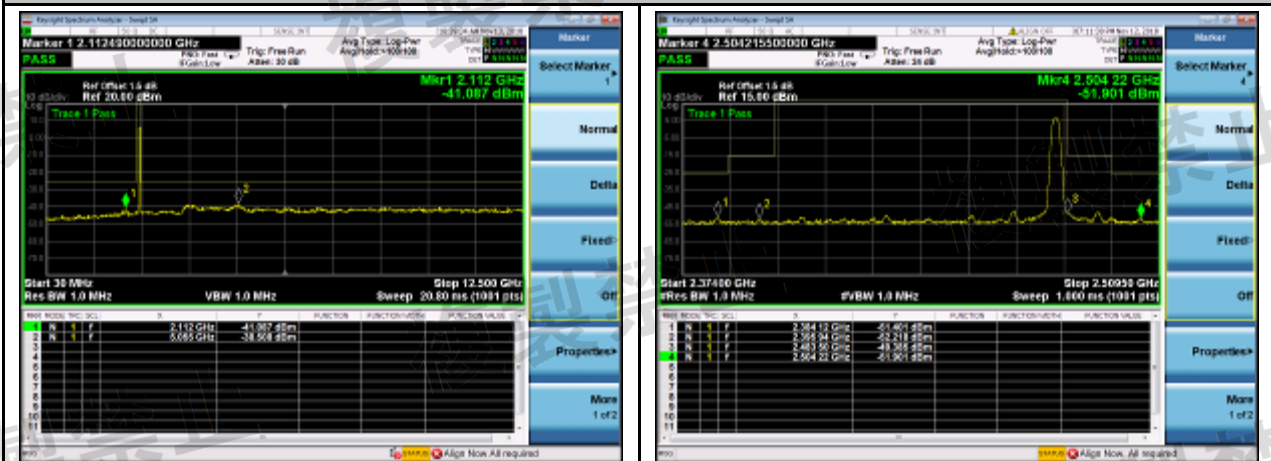
Spurious Emissions of Tx_TNVN_BLE_2402_Ant1



Spurious Emissions of Tx_TNVN_BLE_2442_Ant1



Spurious Emissions of Tx_TNVN_BLE_2480_Ant1

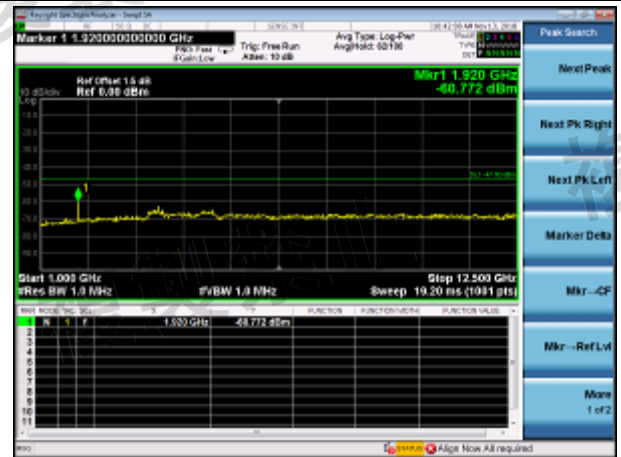
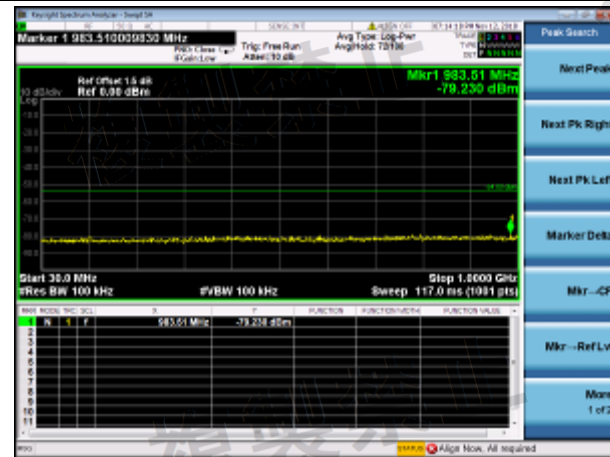


7. Spurious Emissions of Rx

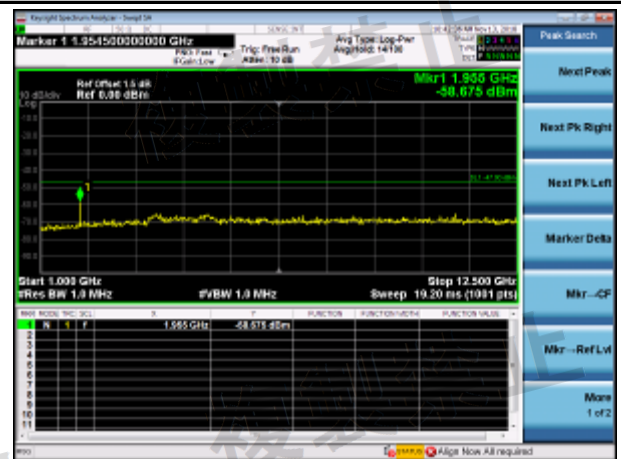
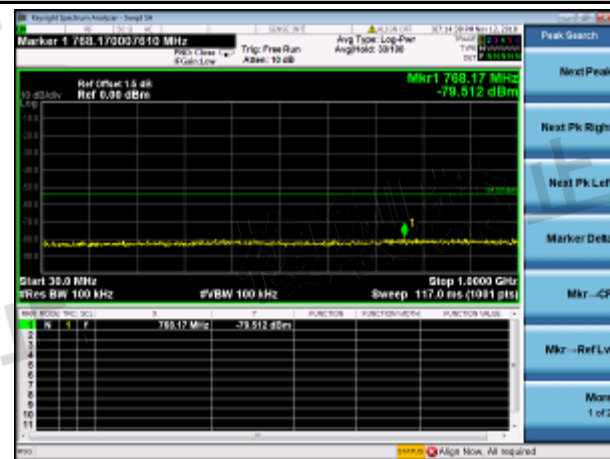
Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	Test Result [dBm]	Limit [μW]	Verdict
BLE	2402	30	1000	< -54	4	PASS
BLE	2402	1000	13000	< -47	20	PASS
BLE	2442	30	1000	< -54	4	PASS
BLE	2442	1000	13000	< -47	20	PASS
BLE	2480	30	1000	< -54	4	PASS
BLE	2480	1000	13000	< -47	20	PASS

TEST PLOT

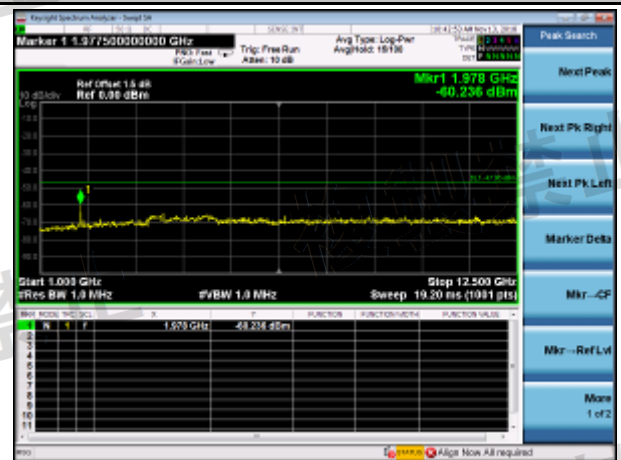
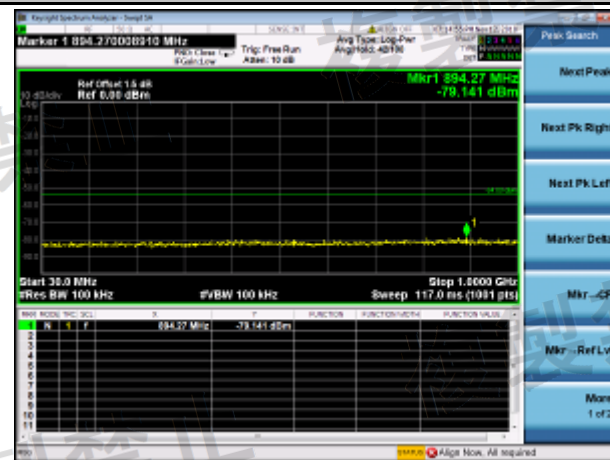
Spurious Emissions of Rx_TNVN_DH5_2402_Ant1



Spurious Emissions of Rx_TNVN_DH5_2441_Ant1



Spurious Emissions of Rx_TNVN_DH5_2480_Ant1



--End of Report--