



## TEST REPORT

### Ordinance Article 2 paragraph 1 item (19)

Compiled by:  
( position+printed name+signature)

Jacky Chen  
(File administrators)

*Jacky Chen*

Tested by:  
( position+printed name+signature)

Peter peng  
(Test Engineer)

*Peter peng*

Approved by:  
( position+printed name+signature)

Jim he  
(Manager)

*Jim he*

**Product Name**.....: Mini PC

**Model/Type reference**.....: GN34

**List Model(s)**.....: S40,S41,GD41,U500-H,U700,N33,N40,DMAF5,UM300

**Trade Mark**.....: IMIlab

**Applicant's name**.....: BESSTAR TECH LIMITED

**Address of applicant**.....: 19H Maxgrand Plaza, No.3 Tai Yau Street, San Po Kong,  
Kowloon Hong Kong

#### Representative Laboratory

**Name** .....: **Shenzhen Yacetong Testing Technology Services Co., Ltd**

Room 5009 Baode Industry Center,Baode Industry Center,  
**Address**.....: Lixin South Road,Huaide Community Fuyong Street,  
Baoan District,Shenzhen,China

**Test specification**.....:

Standard.....: **Ordinance Article 2 paragraph 1 item (19)**

TRF Originator.....: Shenzhen Yacetong Testing Technology Services Co., Ltd

**Date** ..... **of** May. 13, 2020  
**Receipt**.....:

**Date of Test Date**.....: May. 13, 2020 - Jun. 05, 2020

**Data of Issue**.....: Jun. 05, 2020

**Result**.....: Positive

**Shenzhen Yacetong Testing Technology Services Co., Ltd. All rights reserved.**

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Yacetong Testing Technology Services Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Yacetong Testing Technology Services Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.



## TEST REPORT

Equipment under Test : Mini PC

Model /Type : GN34

Listed Models : S40,S41,GD41,U500-H,U700,N33,N40,DMAF5,UM300

**Applicant : BESSTAR TECH LIMITED**

Address : 19H Maxgrand Plaza, No.3 Tai Yau Street, San Po Kong,  
Kowloon Hong Kong

**Manufacturer : Shenzhen Meigao Electronic Equipment Co. LTD**

Address : Room 309, Building 2, Quansen Kapok Creative Park, No.4  
Jingnan Road, Longzhu Community, Buji Street, Longgang  
District, Shenzhen

Test result	Pass *
-------------	--------

\* In the configuration tested, the EUT complied with the standards specified page 5.

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



## Table of Contents

## Page

1. SUMMARY .....	4
1.1. TEST STANDARDS .....	4
1.2. TEST DESCRIPTION .....	4
1.3. TEST FACILITY .....	5
1.4. MEASUREMENT UNCERTAINTY .....	5
2. GENERAL INFORMATION .....	6
2.1. ENVIRONMENTAL CONDITIONS .....	6
2.2. GENERAL DESCRIPTION OF EUT .....	7
2.3. DESCRIPTION OF TEST MODES .....	8
2.4. MEASUREMENT INSTRUMENTS LIST .....	9
3. TEST CONDITIONS AND RESULTS .....	10
3.1. FREQUENCY ERROR .....	10
3.2. ANTENNA OUTPUT POWER AND OUTPUT POWER TOLERANCE .....	13
3.3. OCCUPIED BANDWIDTH AND SPREADING BANDWIDTH .....	18
3.4. UNWANTED EMISSION STRENGTH .....	22
3.5. SECONDARY RADIATED EMISSION STRENGTH .....	27
3.6. CONSTRUCTION PROTECTION METHOD .....	29
3.7. REFERENCE PREVENTION FUNCTION .....	30
4. TEST SETUP PHOTOS OF THE EUT .....	31



## 1. SUMMARY

### 1.1. Test Standards

The tests were performed according to following standards:

[MIC Notice No.88 Appendix No.43](#)

### 1.2. Test Description

Test Item	TEST REQUIREMENT	Result
Frequency Error	III	Pass
Antenna Output Power and Output Power Tolerance	VI	Pass
Occupied Bandwidth and Spread spectrum bandwidth	IV	Pass
Unwanted Emission Strength	V	Pass
Secondary Radiated Emission Strength	VII	Pass
Interference Prevention Function	X	Pass



### 1.3. Test Facility

#### 1.3.1 Address of the test laboratory

Shenzhen Yacetong Testing Technology Services Co., Ltd.  
Room 5009 Baode Industry Center, Baode Industry Center, Lixin South  
Road, Huaide Community Fuyong Street, Baoan District, Shenzhen, China

### 1.4. Measurement Uncertainty

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR100028-1 [2] and shall correspond to an expansion factor (coverage factor)  $K=1.96$  or  $K=2$  (which provide confidence levels of respectively 95% and 95.5% in the case where the distributions characterizing the actual measurement uncertainties are normal).

Parameter	Uncertainty
Frequency error / 99%&90% bandwidth	$\pm 1.62 \times 10^{-6}$
Total RF power, conducted	$\pm 0.8\text{dB}$
Spurious emissions, conducted	$\pm 0.8\text{dB}$
DC and low frequency voltages	$\pm 0.05\%$
Humidity	$\pm 5\%$
Temperature	$\pm 1^\circ\text{C}$





## 2. GENERAL INFORMATION

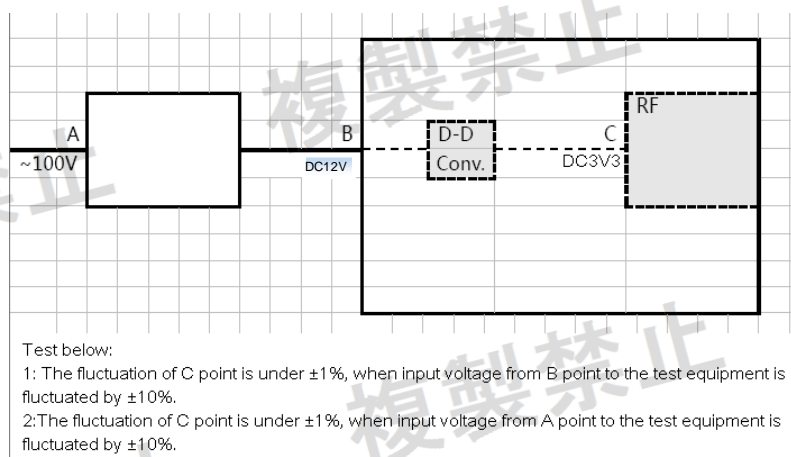
### 2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

**Power supply:** INPUT: DC 12V by Adapter AC 100-240V/50-60Hz

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 DC12V



The measurement result of the voltage fluctuation at RF circuit when 12Vdc  $\pm 10\%$

DC12V	DC 3.3V
13.2V	3.3V
12V	3.3V
10.8V	3.3V

**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.



## 2.2. General Description of EUT

Product Name:	Mini PC
Model/Type reference:	GN34
Listed Model(s):	S40,S41,GD41,U500-H,U700,N33,N40,DMAF5,UM300
Model differences:	PCB board, circuit, structure and internal of these model(s) are the same, only model name is different for these models.
Power supply:	DC 12V by adapter AC100V/60Hz
Hardware version:	V1.1
Software version:	V1.0
<b>Bluetooth BLE</b>	
Supported type:	BT 4.2
Modulation:	GFSK
Operation frequency:	2402MHz to 2480MHz
Channel number:	40
Channel separation:	2 MHz
Antenna type:	FPC antenna
Antenna gain:	2dBi

Note: This EUT has two antennas, Main Antenna A supports Bluetooth, WIFI2.4G/5G , AUX Antenna B supports WIFI2.4G/5G, WIFI5G/2.4G can not transmit simultaneously.



## 2.3. Description of Test Modes

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

### Operation Frequency List BT4.2 BLE:

Channel	Frequency (MHz)
00	2402
01	2404
02	2406
⋮	⋮
19	2440
⋮	⋮
37	2480
38	2478
39	2480

Note: Test performed at the lowest/middle/highest frequencies selected in the list above for EUT supported while working on specified mode.

Test software:DRTU_V1.7.1_03376			
Test mode	Power level	Rating power mW	Transmission rate Mbps
BLE GFSK	1	2	1





## 2.4. Measurement Instruments List

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	N9020A	MY112299	2020.03.27	2021.03.26	1 year
2	RF Cable 1#	FUJIKURA	5D-2W	01	2020.03.27	2021.03.26	1 year
3	DC power supply	ANS	JS122D	00415	2020.03.27	2021.03.26	1 year

Calibration by the calibration agencies listed in the table correspond to paragraph 4 (ii) (c) of Article 24-2 in the Radio Law".



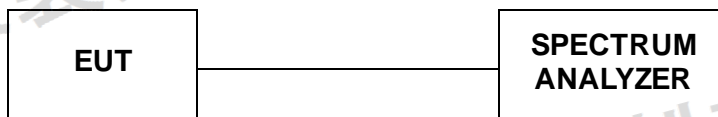
### 3. Test conditions and Results

#### 3.1. Frequency Error

##### LIMIT

± 50ppm

##### TEST CONFIGURATION



##### TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: non-modulation

Spectrum Condition:

Frequency: test frequency

Span: 1 MHz

RBW: 10 KHz

VBW: 10 KHz

Sweep time: Auto

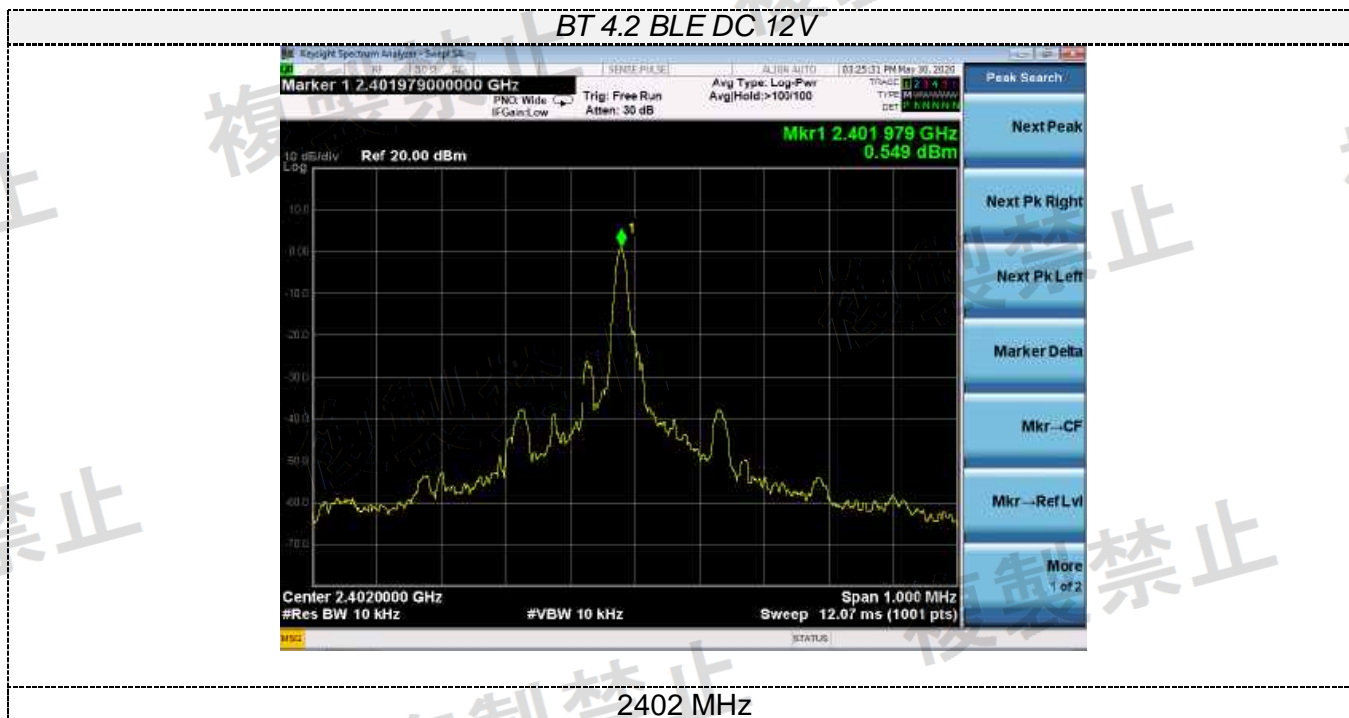
Detector mode: Positive peak

Indication mode: max hold



## TEST RESULTS

BT4.2						
Test voltage (V)	Frequency (MHz)	Read (MHz)	Deviation (MHz)	Tolerance (ppm)	Limit (ppm)	Result
DC 12V	2402.00	2401.979	-0.021	-8.74	±50.00	Pass
	2440.00	2439.979	-0.021	-8.60		
	2480.00	2479.978	-0.022	-8.87		





2440MHz



2480MHz





### 3.2. Antenna Output Power and Output Power Tolerance

#### LIMIT

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

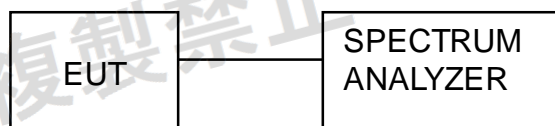
The Output Power Tolerance must be within +20%, -80%.

E.i.r.p:

- I ≤ 12.14dBm/MHz(OFDM,DS form 2400-2483.5MHz)

Note: E.I.R.P will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

#### TEST CONFIGURATION



#### TEST PROCEDURE

Step 1:

Connect the UUT to the spectrum analyzer as TEST CONFIGURATION and use the following settings:

- Centre Frequency: The centre frequency of the channel under test.
- RBW: 1 MHz
- VBW: 1 MHz
- Span: Wide enough to cover the complete power envelope of the signal of the UUT.
- Detector: Peak
- Trace Mode: Max Hold

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyzer:

- Centre Frequency: Equal to the frequency recorded in step 2.
- Span: 0 MHz
- RBW: 1 MHz
- VBW: 1 MHz
- Detector: RMS
- Trace Mode: Clear Write



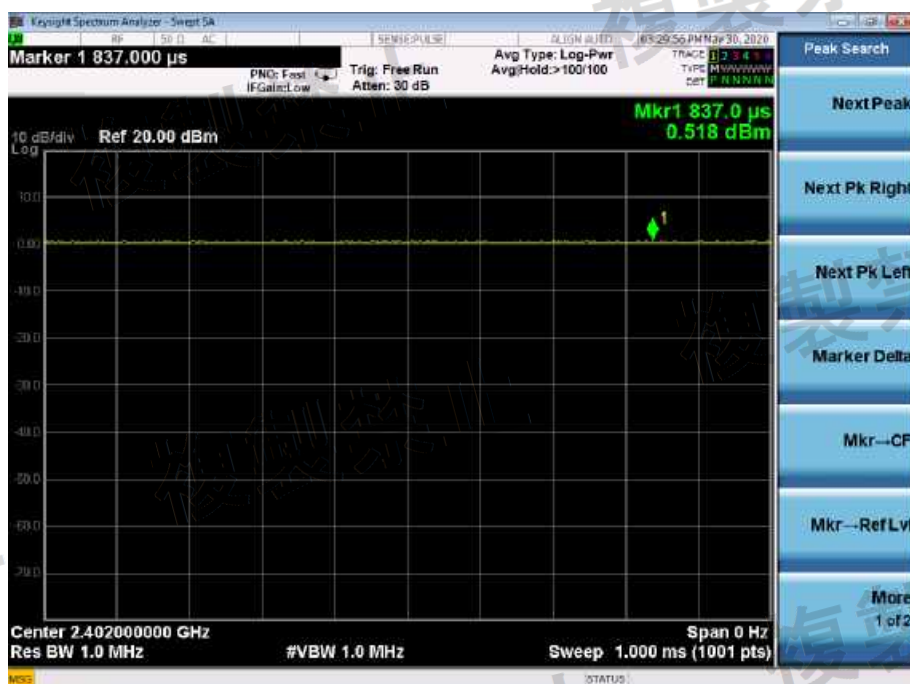
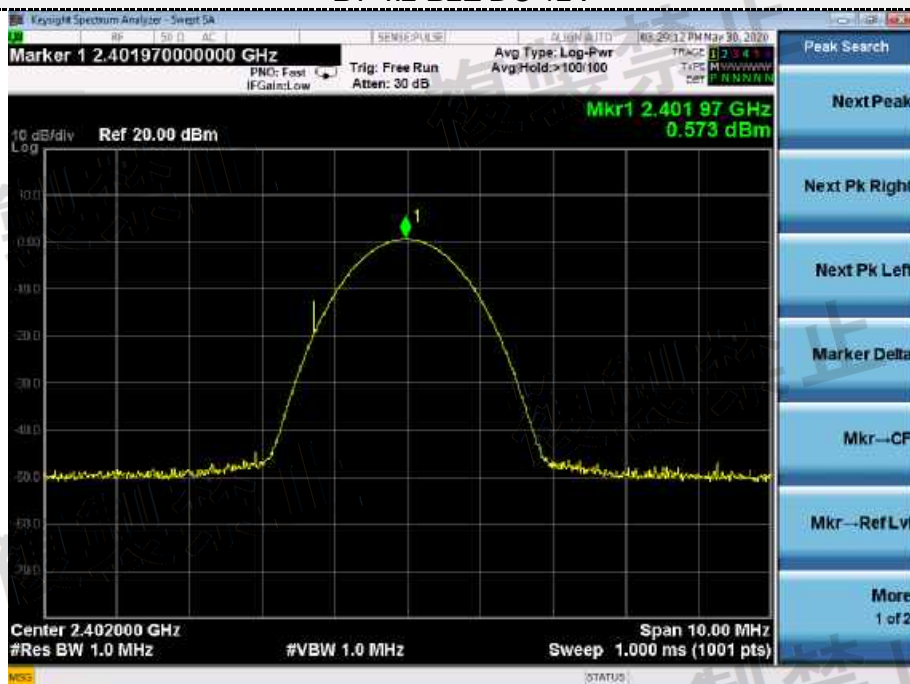


**TEST RESULTS**

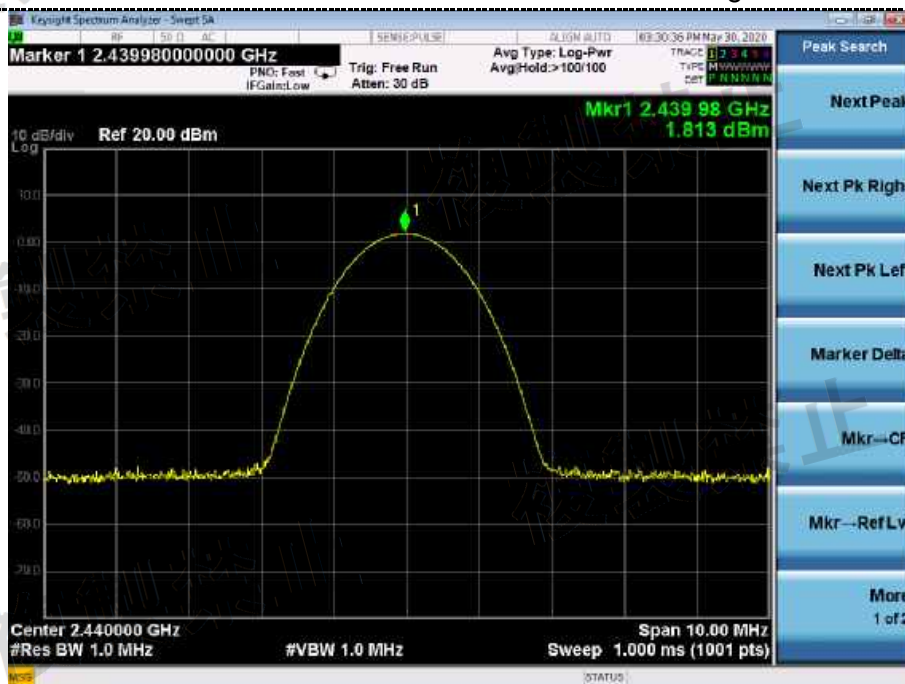
DC 12V								
Mode	Channel (MHz)	Output power(dBm)	Output power (mW)	Limit (mW)	Rated output power (mW)	Tolerance (%)	Limit	Result
BT 4.2 BLE	2402	0.518	1.13	10	2	-43.67%	-80%~20%	Pass
	2440	1.81	1.52	10	2	-24.15%		
	2480	1.881	1.54	10	2	-22.90%		



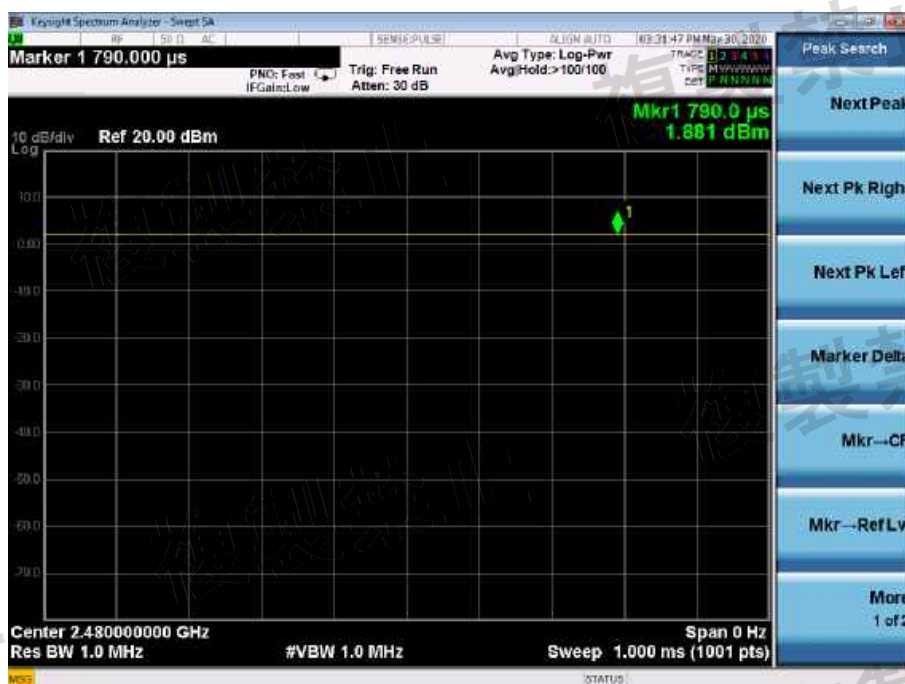
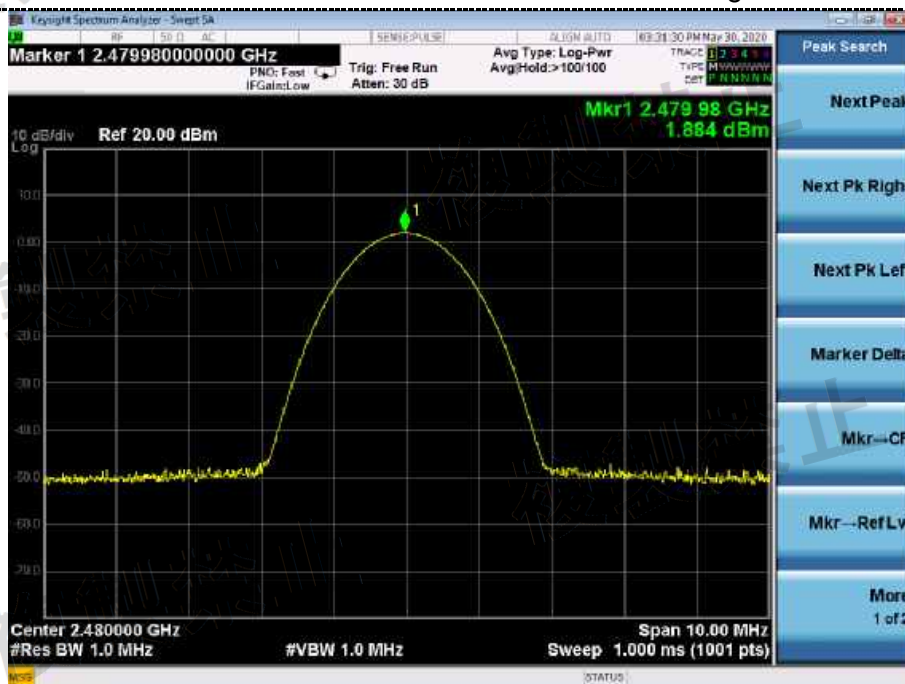
BT 4.2 BLE DC 12V



2402 MHz



2440MHz



2480MHz



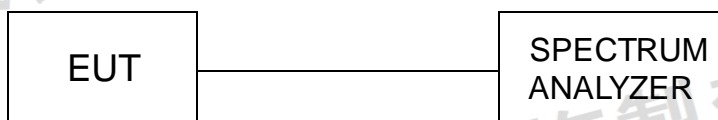


### 3.3. OCCUPIED BANDWIDTH AND SPREADING BANDWIDTH

#### LIMIT

- Occupied bandwidth: FH $\leq$ 83.5 MHz; OFDM $\leq$ 38 MHz, DS $\leq$ 26 MHz; Others $\leq$ 26 MHz
- Spread Bandwidth: $\geq$  500 kHz(FH,DS)
- Spread factor $>$ 5.

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. Setting of SA is following as fellow:  
RBW: 100 kHz  
VB: 300 kHz  
Sweep time: Auto  
Sweep Mode: Continuous sweep  
Detect mode: Positive peak  
Trace mode: Max hold
2. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.
3. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 90% of occupied bandwidth to measure spread bandwidth.
4. Spread Factor=Spread Bandwidth/modulation rate. The modulation rate: MR=1.375Mbps for 2.4g





**TEST RESULTS**

**BT4.2 BLE 99% BANDWIDTH**

Test Condition	Test Mode	Test Channel	Test Result[MHz]	Limit [MHz]	Verdict
TNVN	GFSK	2402	1.0692	$\leq 26$	PASS
TNVN	GFSK	2440	1.0753	$\leq 26$	PASS
TNVN	GFSK	2480	1.0686	$\leq 26$	PASS



DC 12V

BT 4.2



2402MHz



2440MHz



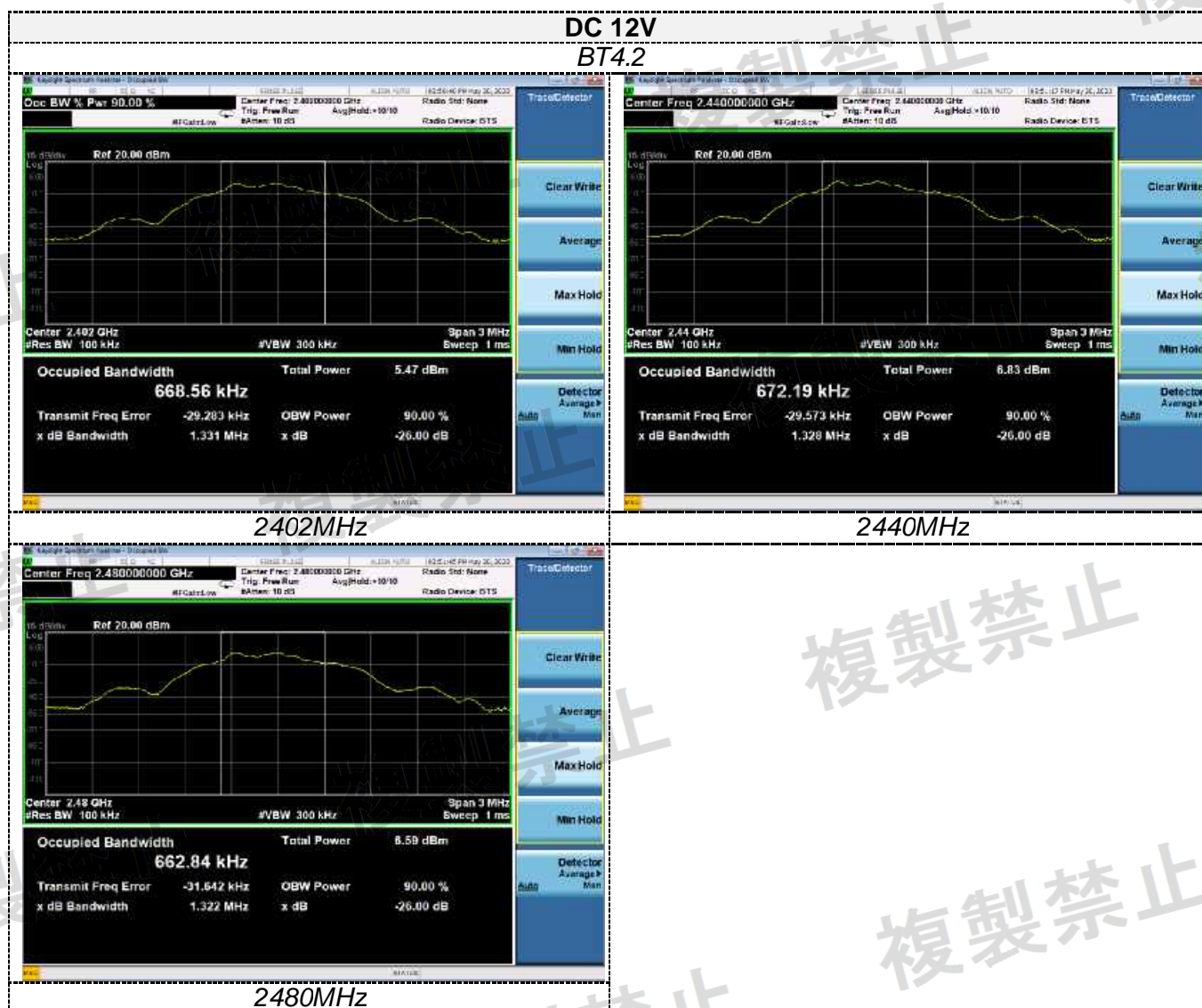
2480MHz



**BT4.2 BLE 90% BANDWIDTH**

Test voltage (V)	Type	Channel (MHz)	Spread Bandwidth (MHz)	Spread Factor	Spread Bandwidth Limit (MHz)	Spread Factor Limit	Result
DC 12V	BT4.2	2402	0.669	N/A	$\geq 0.5$	N/A	Pass
		2440	0.672				
		2480	0.663				

Note: N/A means not applicable to this modulation type.





### 3.4. Unwanted Emission Strength

#### LIMIT

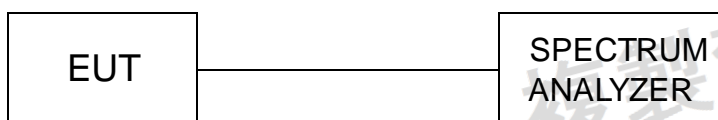
Below 2387 MHz: 2.5 $\mu$ W/MHz or less

2387 to 2400 MHz: 25 $\mu$ W/MHz or less

2483.5 Through 2496.5 MHz: 25 $\mu$ W/MHz or less

Over 2496.5 MHz: 2.5 $\mu$ W/MHz or less

#### TEST CONFIGURATION



#### TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: modulation

Spectrum Condition:

Frequency: 30MHz-13GHz

RBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-13GHz)

VBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-13GHz)

Sweep time: Auto

Detector mode: Positive peak

Indication mode: max hold

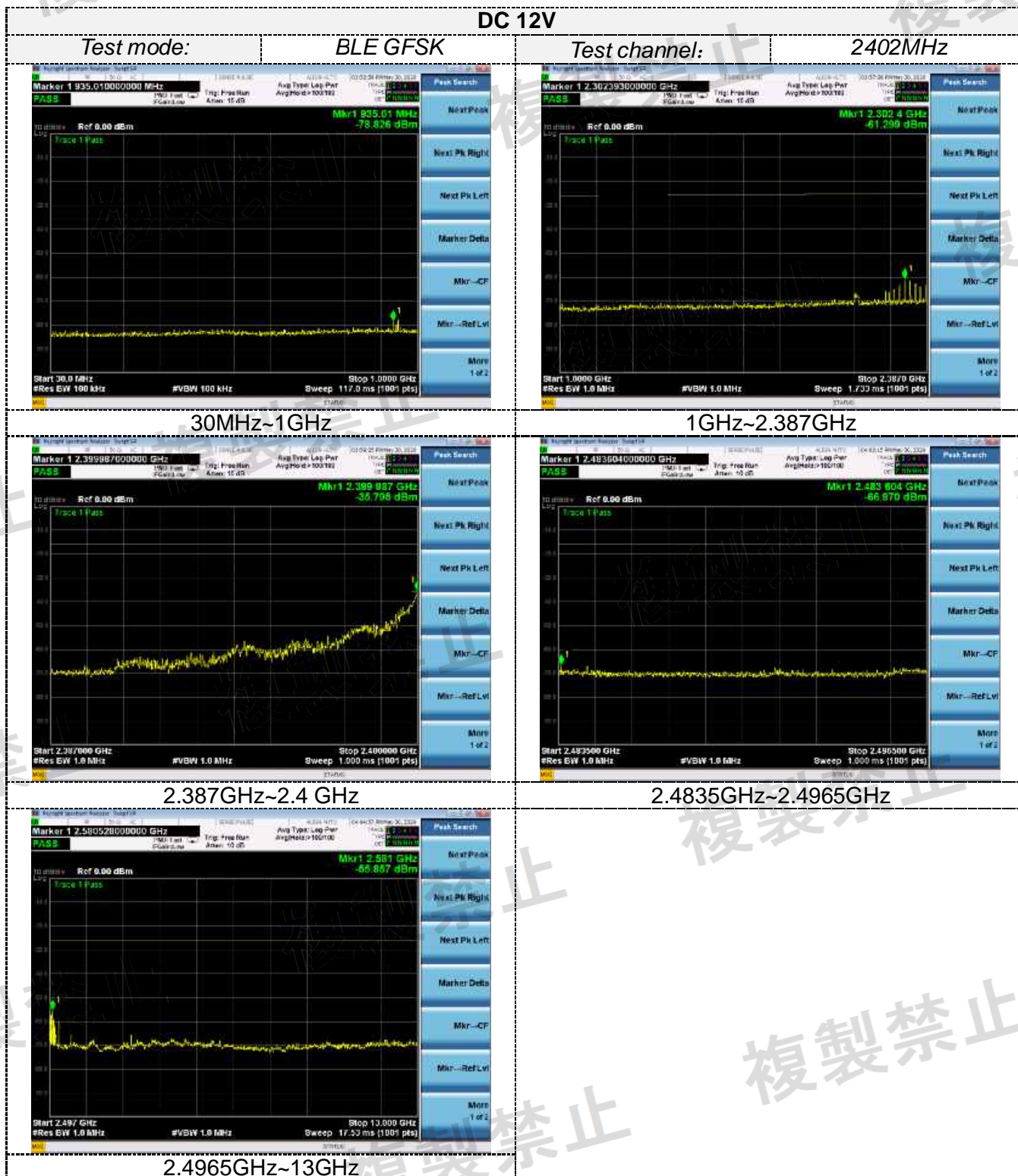


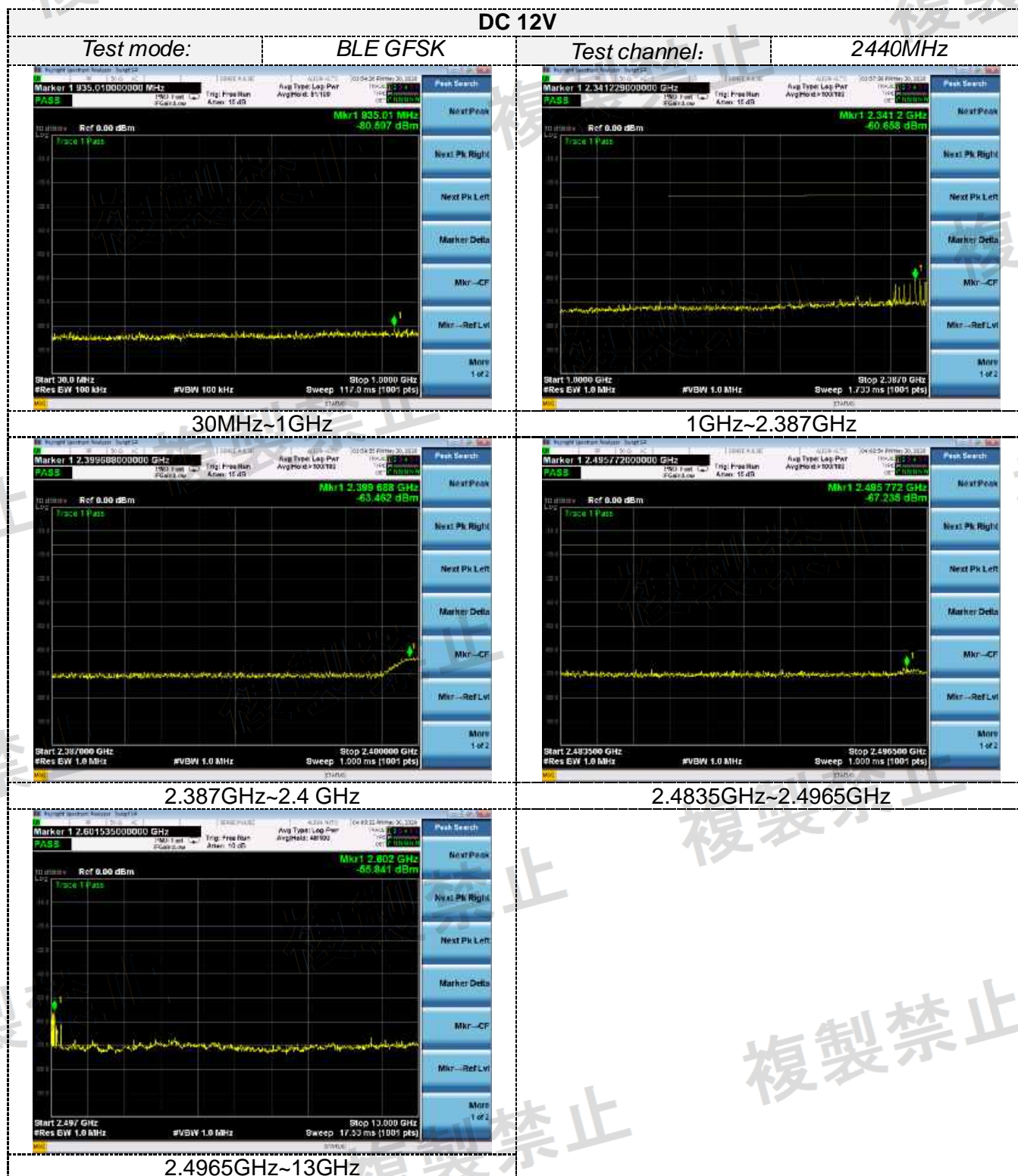


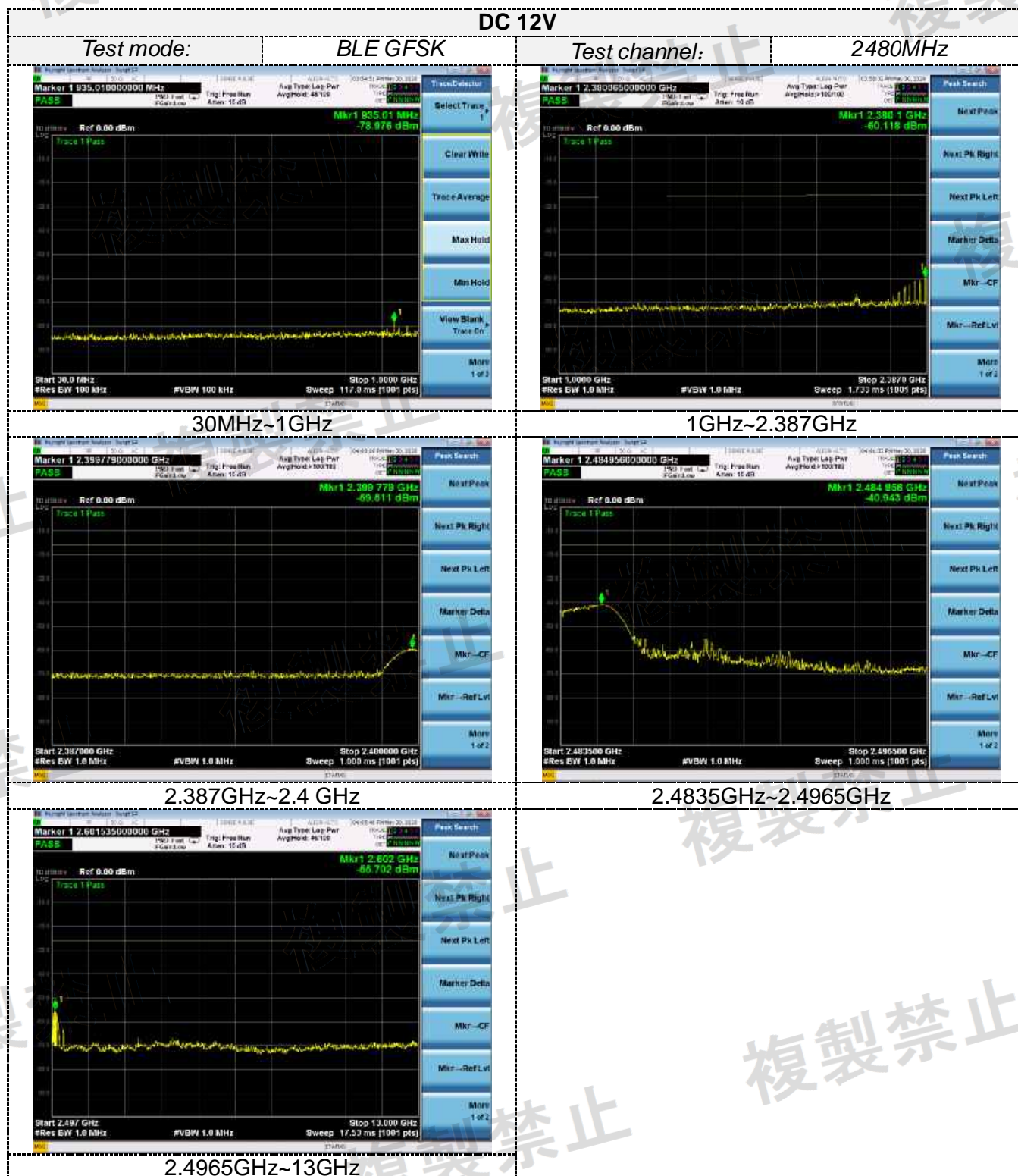
# TEST RESULTS

Modulation Type	Test channel	Test Freq. Range	Max. test value dBm	Limit dBm	Result
GFSK	LOW	$30\text{MHz} \leq f \leq 1000\text{MHz}$	-78.826	-36	PASS
		$1000\text{MHz} < f \leq 2387\text{MHz}$	-61.299	-26	PASS
		$2387\text{MHz} < f \leq 2400\text{MHz}$	-35.795	-16	PASS
		$2483.5\text{MHz} \leq f < 2496.5\text{MHz}$	-66.970	-16	PASS
		$2496.5\text{MHz} \leq f < 12500\text{MHz}$	-55.857	-26	PASS
GFSK	MID	$30\text{MHz} \leq f \leq 1000\text{MHz}$	-80.597	-36	PASS
		$1000\text{MHz} < f \leq 2387\text{MHz}$	-60.658	-26	PASS
		$2387\text{MHz} < f \leq 2400\text{MHz}$	-63.462	-16	PASS
		$2483.5\text{MHz} \leq f < 2496.5\text{MHz}$	-67.235	-16	PASS
		$2496.5\text{MHz} \leq f < 12500\text{MHz}$	-55.841	-26	PASS
GFSK	HIG	$30\text{MHz} \leq f \leq 1000\text{MHz}$	-78.976	-36	PASS
		$1000\text{MHz} < f \leq 2387\text{MHz}$	-60.118	-26	PASS
		$2387\text{MHz} < f \leq 2400\text{MHz}$	-59.511	-16	PASS
		$2483.5\text{MHz} \leq f < 2496.5\text{MHz}$	-40.943	-16	PASS
		$2496.5\text{MHz} \leq f < 12500\text{MHz}$	-55.702	-26	PASS













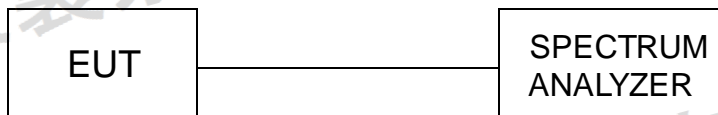
### 3.5. Secondary Radiated Emission Strength

#### LIMIT

Below 1GHz: 4.0nW or less

Above 1GHz: 20nW or less

#### TEST CONFIGURATION



#### TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: modulation

Spectrum Condition:

Frequency: 30MHz-13GHz

RBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-13GHz)

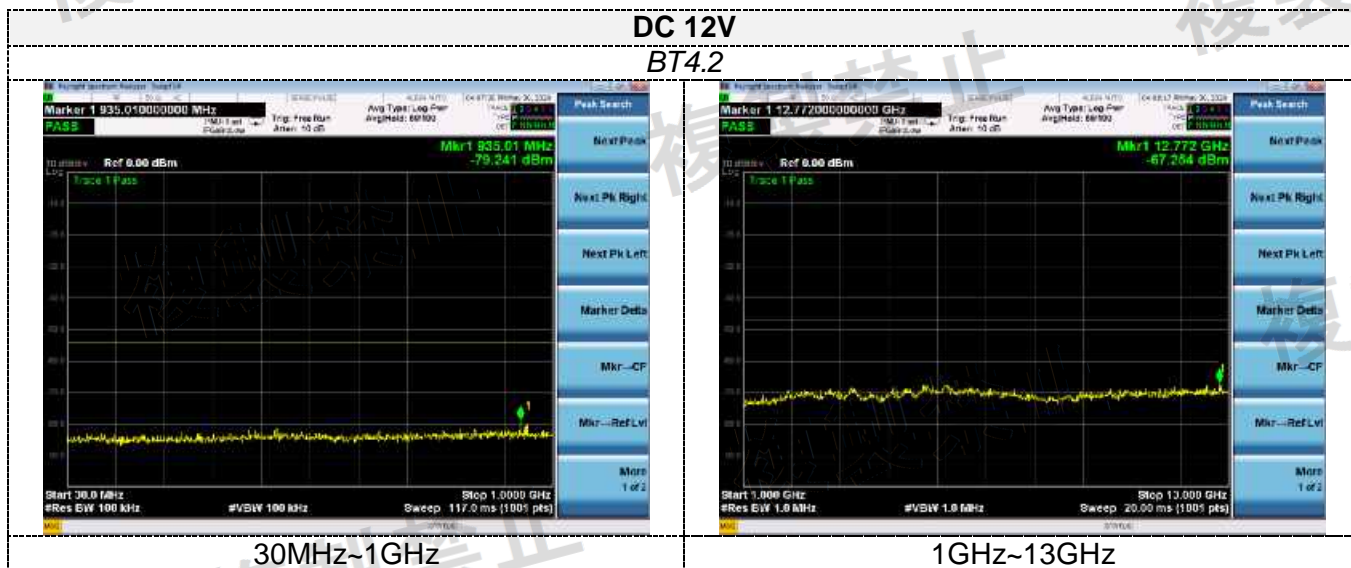
VBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-13GHz)

Sweep time: Auto

Detector mode: Positive peak

Indication mode: max hold

#### TEST RESULTS



Modulation Type	Test mode	Test Freq. Range	Max. test value dBm	Limit dBm	Result
GFSK	RX	30MHz $\leq$ f $\leq$ 1000MHz	-79.241	-54	PASS
		1000MHz<f $\leq$ 13000MHz	-67.254	-47	PASS





### 3.6. Construction protection method

#### Requirement

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

We apply the product for Japan RF certification. All high-frequency section and modulation section packet in one IC, and The RF IC is Soldering BT RF IC in PCB, end user can not open it easily. Please refer to following for photo for details.

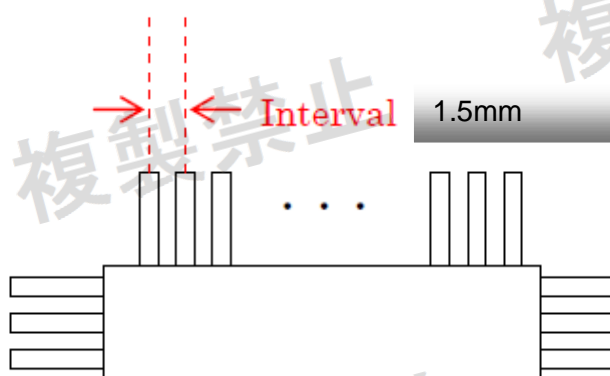
The interval of terminals: 1.5mm  
Number of the terminals:40

FPC  
antenna

RF CHIP



interval of terminals:





### 3.7. erference Prevention Function

#### Requirement

Clarify, the one automatically to transmit and to receive identification code with the wireless equipment of the wireless station used in the same premises.

#### Interference Prevention Function Confirm

A communication link was made where the ID code is correct (Identical).

#### TEST PROCEDURE

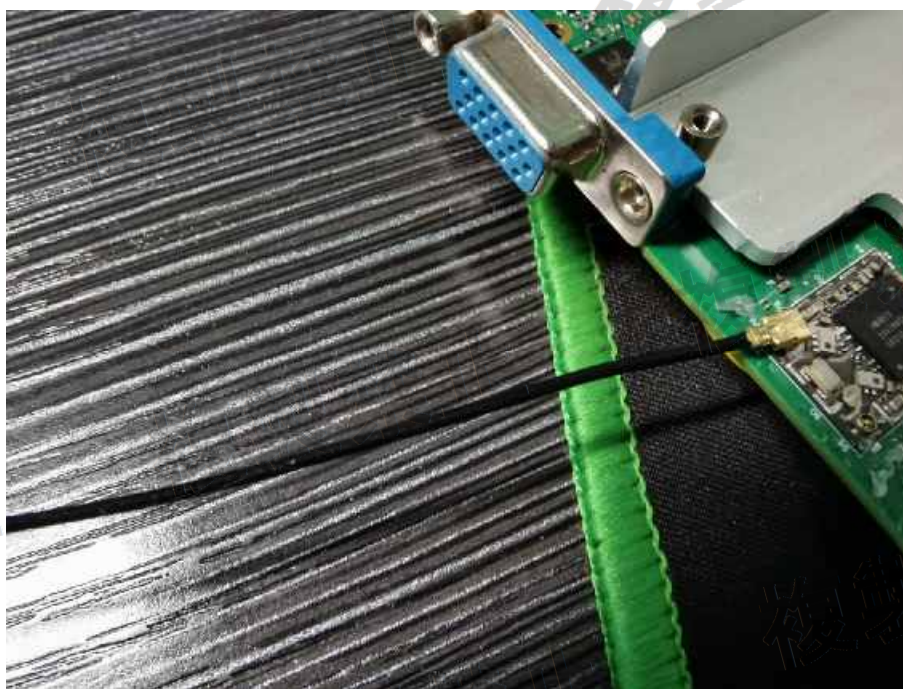
1. Connect the EUT in network
2. Open the software
3. We can get the information as follows:  
BT MAC: 00:5e:f3:00:2:c6

#### TEST RESULTS





#### 4. Test Setup Photos of the EUT



\*\*\*\*\*THE END\*\*\*\*\*