



RADIO TEST REPORT

For

RACER

IWARM SYSTEM

Test Model: V1.4

Prepared for : RACER
Address : 1 Rue de le Forge 13300 – Salon de Provence France

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : Room 101, 201, Building A and Room 301, Building C,
Juji Industrial Park, Yabianxueziwei, Shajing Street,
Bao'an District, Shenzhen, Guangdong, China

Tel : (+86)755-82591330
Fax : (+86)755-82591332
Web : www.LCS-cert.com
Mail : webmaster@LCS-cert.com

Date of receipt of test sample : April 06, 2022
Number of tested samples : 2
Serial number : Prototype
Date of Test : April 06, 2022 ~ May 16, 2022
Date of Report : May 18, 2022



**RADIO TEST REPORT**
MIC Notice No.88 Appendix No. 43

Second-Generation Low-Power Data Communication System/Wireless LAN System

Report Reference No. : LCS220401141AEA

Date of Issue : May 18, 2022

Testing Laboratory Name..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Address..... : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

Testing Location/ Procedure ... : Full application of Harmonised standards ■
Partial application of Harmonised standards □
Other standard testing method □**Applicant's Name..... : RACER**

Address..... : 1 Rue de le Forge 13300 – Salon de Provence France

Test Specification

Standard : MIC Notice No.88 Appendix No.43

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

Shenzhen LCS Compliance Testing Laboratory Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen LCS Compliance Testing Laboratory Ltd. is acknowledged as copyright owner and source of the material. Shenzhen LCS Compliance Testing Laboratory 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 Item Description. : IWARM SYSTEM

Trade Mark..... : RACER

Test Model : V1.4

Ratings..... : DC 7.4V by Li-ion Polymer Battery, 2200mAh

Result : **Positive****Compiled by:**

Jin Wang/ Administrator

Supervised by:

Cary Luo/ Technique principal

Approved by:

Gavin Liang/ Manager



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



RADIO -- TEST REPORT

Test Report No. : LCS220401141AEA	<u>May 18, 2022</u> Date of issue
------------------------------------------	--------------------------------------

Test Model.....	: V1.4
EUT.....	: IWARM SYSTEM
Applicant.....	: RACER
Address.....	: 1 Rue de le Forge 13300 – Salon de Provence France
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: RACER
Address.....	: 1 Rue de le Forge 13300 – Salon de Provence France
Telephone.....	: /
Fax.....	: /
Factory.....	: Shenzhen City Cardi St. Electronics Co., Ltd
Address.....	: Third floor, Building C, HeXingLong, Technology Park, No.19, Tianyang 1st Road, Songgang, Baoan, Shenzhen – 518105 Guangdong Province - RPC
Telephone.....	: /
Fax.....	: /

Test Result	Positive
--------------------	-----------------

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.



Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
Scan code to check authenticity



Revision History

Report Version	Issue Date	Revision Content	Revised By
000	May 18, 2022	Initial Issue	---





TABLE OF CONTENTS

1. GENERAL INFORMATION	6
1.1. DESCRIPTION OF DEVICE (EUT)	6
1.2. HOST SYSTEM CONFIGURATION LIST AND DETAILS	7
1.3. EXTERNAL I/O CABLE	7
1.4. DESCRIPTION OF TEST FACILITY	7
1.5. TEST CONDITIONS.....	7
1.6. FREQUENCY OF CHANNELS	7
2. TEST METHODOLOGY	8
2.1. EUT EXERCISE	8
2.2. MEASUREMENT UNCERTAINTY	8
2.3. TABLE FOR PARAMETERS OF TEST SOFTWARE SETTING.....	8
2.4. DESCRIPTION OF TEST MODES	8
2.5. TEST VOLTAGE	9
3. SYSTEM TEST CONFIGURATION.....	10
3.1. JUSTIFICATION	10
3.2. EUT EXERCISE SOFTWARE.....	10
3.3. SPECIAL ACCESSORIES	10
3.4. BLOCK DIAGRAM/SCHEMATICS.....	10
3.5. EQUIPMENT MODIFICATIONS	10
4. SUMMARY OF TEST RESULTS.....	11
5. TEST RESULT	12
5.1. FREQUENCY TOLERANCE	12
5.2. ANTENNA POWER	13
5.3. OCCUPIED FREQUENCY BANDWIDTH	14
5.4. SPREAD BANDWIDTH	15
5.5. TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED).....	16
5.6. CARRIER SENSING FUNCTION	17
5.7. INTERFERENCE PREVENTION FUNCTION.....	18
5.8. SECONDARY RADIATED EMISSIONS	19
6. PHOTOGRAPHS OF TEST SETUP.....	20
7. EXTERNAL PHOTOGRAPHS OF THE EUT.....	20
8. INTERNAL PHOTOGRAPHS OF THE EUT	20
9. LIST OF MEASURING EQUIPMENTS	20





1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : IWARM SYSTEM

Test Model : V1.4

Power Supply : DC 7.4V by Li-ion Polymer Battery, 2200mAh

Hardware Version : IWARM SYSTEM (Master & Slave PCBAs)

Software Version : /

Bluetooth

Frequency Range : 2402-2480MHz for Bluetooth
40 channels for Bluetooth V5.0(BT LE)
Channel Frequency=2402+2(K-1), K=1, 2, 340

Declared Antenna Power : Bluetooth V5.0(BT LE): 1.0mW

Modulation Technology : Bluetooth V5.0(BT LE): GFSK

Data Rate : Bluetooth V5.0(BT LE): 1Mbps

Antenna Description : Ceramic Antenna, 2.7dBi(Max.)





1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
---	---	---	---	---

1.3. External I/O Cable

I/O Port Description	Quantity	Cable
---	---	---

1.4. Description of Test Facility

FCC Registration Number is 254912.

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Industry Canada Registration Number is 9642A.

1.5. Test Conditions

Temperature Range	:	21-25℃
Humidity Range	:	45-85%
Pressure Range	:	86-106kPa

1.6. Frequency of Channels

Bluetooth V5.0 (BT LE)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2402	21	2442
2	2404	---	---
3	2406	---	---
---	---	38	2476
---	---	39	2478
19	2438	40	2480
20	2440		



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



2. TEST METHODOLOGY

2.1. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of MIC Notice No.88 Appendix No. 43.

2.2. Measurement Uncertainty

Test Item		MU	Remark
Bandwidth	:	+/- 0.2 E-6	/
Antenna Power	:	+/-0.33dB	/
Frequency Tolerance	:	+/- 0.3 E-6	/
Conducted spurious emission	:	+/-0.13dB	/
DC Power	:	+/-1%	/

- (1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.3. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters:

Test Software Version	NRF		
Frequency	2402MHz	2440MHz	2480MHz
Bluetooth V5.0(DTS)	Default	Default	Default

2.4. Description of Test Modes

Tested mode, channel, and data rate information				
Mode	Preliminary Test Data Rate (Mbps)	Final Test Data Rate (Mbps) (see Note)	Channel	Frequency (MHz)
Bluetooth V5.0 (BT LE)	1	1	Low :CH1	2402
	1	1	Middle: CH20	2440
	1	1	High: CH40	2480
Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.				





2.5. Test Voltage

POWER SUPPLY VOLTAGE FLUCTUATION TEST

Voltage Fluctuation Test	Normal Voltage	High Voltage +10% of Normal Voltage	Low Voltage -10% of Normal Voltage
Input To EUT	DC 7.4V	DC 8.1V	DC 6.7V
Output To RF Module	DC 3V	DC 3V	DC 3V
Voltage Variation (%)	--	--	--

Note:

As the EUT was powered by DC7.4V, and with the voltage stabilizing circuit used, the chip voltage received floating not exceed $\pm 1\%$ of nominal condition when working on extreme voltage, so all test performed at nominal voltage only.

Voltage Variation (%)

= (Output high or Low Voltage - Output Normal Voltage) / Output Normal Voltage * 100

During the input supply voltage to the EUT from the external power source is varied by $\pm 10\%$, if output voltage had been confirmed that the fluctuation of power supply to the RF circuit of EUT (excluding power source) is equal to or less than $\pm 1\%$. Exempt extremely high and low supply voltage condition test, EUT only operated in normal voltage to test all regulations.





3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in engineering mode.

3.2. EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software provided by application.

3.3. Special Accessories

N/A.

3.4. Block Diagram/Schematics

Please refer to the related document.

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.





4. SUMMARY OF TEST RESULTS

MIC Notice No.88 Appendix No.43 Article 2 Paragraph 1 Item 19		
Clause	Description of Test (Transmitter Parameters)	Result
3	Frequency Tolerance	PASS
6	Antenna Power	PASS
6	Tolerances for Antenna Power	PASS
4	Transmission Rate	PASS
4	Occupied Frequency Bandwidth	PASS
4	Spread Bandwidth	PASS
13	Dwell Time	N/A
5	Spurious Emissions	PASS
10	Transmission Antenna Gain (EIRP Antenna Power)	PASS
11	Transmission Radiated Angle Width (3dB Beam width)	PASS
12	Interference prevention function	PASS
8	Carrier Sensing function	N/A
Receiver Parameters		
7	Secondary Radiated Emissions	PASS
<i>Note: (1) N/A is an abbreviation for Not Applicable. (2) N/T means this test item is not tested.</i>		





5. TEST RESULT

5.1. Frequency Tolerance

5.1.1. Standard Applicable

Tolerance of frequency shall be $\pm 50 \times 10^{-6}$.

5.1.2. Test Procedures

- Set EUT work in test mode as described in clause 2.4.
- Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

Resolution BW: 10 KHz.

Video BW: 10 KHz.

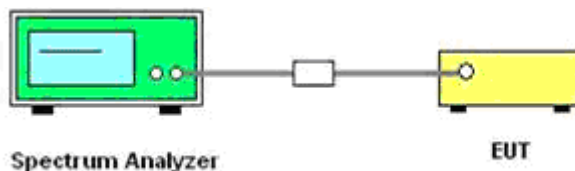
Span: 1MHz.

Detector: Peak.

Trace Mode: Max Hold.

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

5.1.3. Test Setup Layout



5.1.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.1.5. Test Result

Please refer to the Appendix A.1 for BT LE RF Test Data.





5.2. Antenna Power

5.2.1. Standard Applicable

Type	Limit
DTS	10mW
OFDM OBW<26MHz, DS	10mW/MHz
OFDM OBW 26-40MHz	5mW/MHz
Tolerance	+20%,-80%

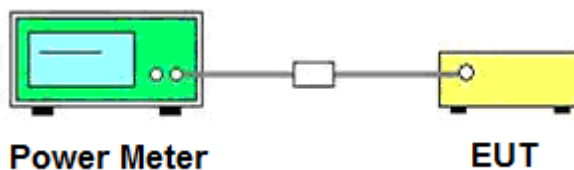
5.2.2. Measuring Instruments

Please refer to section 6 of equipments list in this report.

5.2.2. Test Procedures

- EUT have transmitted continuous maximum power
- Antenna Power Error is definition that actual measure antenna power tolerance between +20% to -80% power range that base on manufacturer declare the conducted power density.

5.2.3. Test Setup



5.2.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.5. Test Result

Please refer to the Appendix A.2 for BT LE RF Test Data.





5.3. Occupied Frequency Bandwidth

5.3.1. Standard Applicable

Permissible value for occupied bandwidth using the FH system, a hybrid system combining DS and FH systems, or a hybrid system combining FH and OFDM systems shall be 83.5 MHz or less, while necessary bandwidth (minimum occupied bandwidth sufficient to ensure information transmission of required quality at a required transmission rate for the system used under specified conditions for a given emission type) using a system other than any of the above shall be 26 MHz or less.

5.3.2. Test Procedures

- Set EUT work in test mode as described in clause 2.4.
- Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

RBW/VBW= 30KHz/30KHz

Span: Wide enough to cover the complete power envelope of the signal of the EUT.

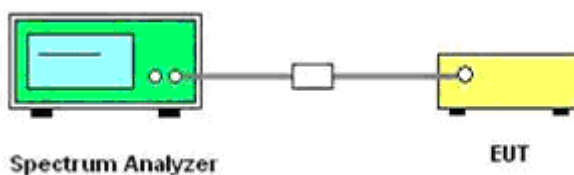
Sweep mode: Continuous sweeping.

Detector: Peak.

Trace Mode: Max Hold.

- When the trace is complete, measure the occupied bandwidth (99% bandwidth) with spectrum analyzer's bandwidth measure function.

5.3.3. Test Setup Layout



5.3.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.3.5. Test Result of 99% Spectrum Bandwidth

Please refer to the Appendix A.3 for BT LE RF Test Data.





5.4. Spread Bandwidth

5.4.1. Standard Applicable

In spread spectrum systems, spread bandwidth (which refers to a frequency bandwidth with an upper limit and lower limit such that each of the mean powers radiated above the upper frequency limit and below the lower frequency limit is equal to 5 % of the total mean power radiated; this also applies hereafter) shall be 500 kHz or more.

5.4.2. Test Procedures

- Set EUT work in test mode as described in clause 2.4.
- Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

RBW/VBW= 30KHz/30KHz

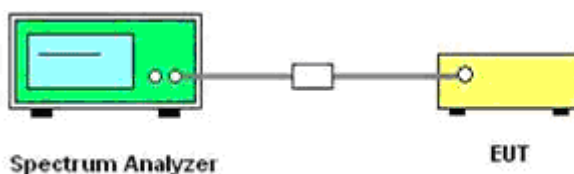
Span: Wide enough to cover the complete power envelope of the signal of the EUT.

Detector: Peak.

Trace Mode: Max Hold.

- When the trace is complete, measure the occupied bandwidth (90% bandwidth) with spectrum analyzer's bandwidth measure function.

5.4.3. Test Setup Layout



5.4.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.4.5. Test Result of 90% Occupied Bandwidth.

Please refer to the Appendix A.4 for BT LE RF Test Data.





5.5. Transmitter Spurious Emissions (conducted)

5.5.1. Standard Applicable

Permissible mean power of spurious emission of each frequency supplied to a feeder, that is, mean power of spurious emission in the 1 MHz bandwidth at frequency f other than frequency band used shall be as follows:

- | | |
|----------------------------------------------------|----------------------|
| a. 30MHz - 1,000MHz | 0.25 μ W or less |
| b. 1,000MHz - 2,387MHz | 2.5 μ W or less |
| c. 2,387MHz - 2,400MHz and 2,483.5MHz - 2,496.5MHz | 25 μ W or less |
| d. 2,496.5MHz - 13GHz | 2.5 μ W or less |

5.5.2. Test Procedures

- Set EUT work in test mode as described in clause 2.4.
- Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Below 1GHz: RBW/VBW= 100KHz/ 100KHz

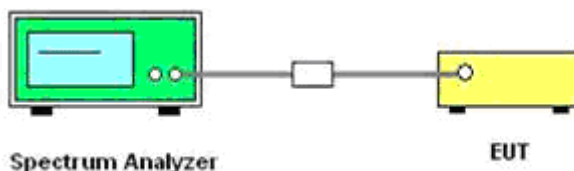
Above 1GHz: RBW/VBW= 1MHz / 1MHz.

Detector: Peak.

Trace Mode: Max Hold.

- All the emissions from 30MHz to 13GHz were measured and record.

5.5.3. Test Setup Layout



5.5.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.5.5. Test Results

Please refer to the Appendix A.5 for BT LE RF Test Data.

-Note:SA set to from 2.4965GHz to 13GHz, plot shows from 2.497GHz to 13GHz as of SA's default format.





5.6. Carrier sensing function

5.6.1. Standard Applicable

Item	Limits
Carrier Sense	Good – EUT stop RF transmission signal after carrier inject to EUT. (On $22.79+Gr-20*\log(f)$ [dBm] (Gr: dBi; f: MHz) or 100mV/m)

5.6.2. Instruments Setting

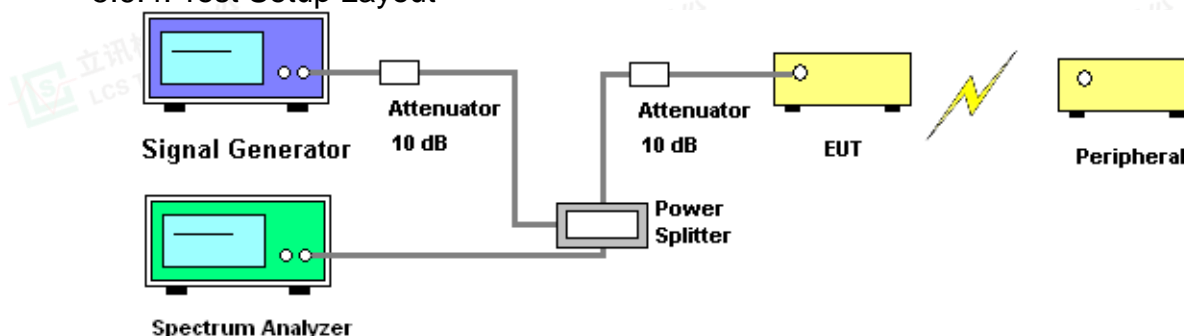
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
RB / VB	1 MHz
Span	0 MHz
Sweep	Continuous
Detector	Peak
Trigger mode	Video

5.6.3. Test Procedures

1. SSG adjusted the frequency as same as the EUT transmitted signal and emitted the absence of modulation from SSG and power level is (On $22.79+Gr-20*\log(f)$ [dBm] (Gr: dBi; f: MHz). Then turn off the RF signal of SSG.
2. EUT have transmitted the maximum modulation signal and fixed channelize.
3. Setting of SA is following as: RB: 1MHz / VB: 1MHz / SPAN: 50MHz / AT: 10dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak.
4. SSG RF Signal On.
5. EUT shall be stop the transmitted any signal and SSG RF Signal Off. Then EUT will be continuous transmitted signal.

5.6.4. Test Setup Layout



5.6.5. EUT Operation during Test

The EUT was programmed to be in normal transmitting mode.

5.6.6. Test Result

Not Applicable.





5.7. Interference prevention function

5.7.1. Standard Applicable

Item	Limits
Identification code	\geq 48 bits

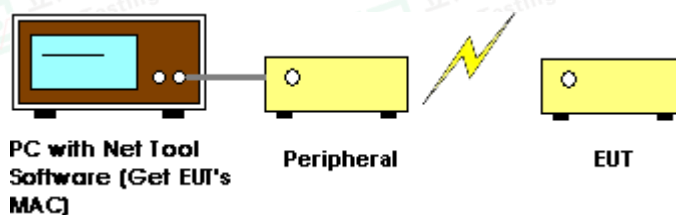
5.7.2. Measuring ID Code Software

PC with NetTool	Setting
MAC IP List	MAC Scan

5.7.3. Test Procedures

1. In the case that the EUT has the function of automatically transmitting the identification code: a. Transmit the predetermined identification codes from EUT. b. Check the transmitted identification codes with the demodulator.
2. In the case of receiving the identification code: a. Transmit the predetermined identification codes from the counterpart. b. Check if communication is normal. c. Transmit the other signals than predetermined ID codes from the counterpart. d. check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

5.7.4. Test Setup Layout



5.7.5. EUT Operation during Test

The EUT was programmed to be in normal transmitting mode.

5.7.6. Test Result

EUT ID	Performance index
32:7F:A9:F1:11:DA	Good





5.8. Secondary Radiated Emissions

5.8.1. Standard Applicable

The limit on secondary emissions radiated from the receiving equipment within which the function of other radio equipment will not be impaired shall be, in terms of the power of a dummy antenna circuit that has the same electrical constant as the receiving antenna, 4nW or less at a frequency below 1 GHz and 20 nW or less at a frequency of 1 GHz or higher as measured using the circuit

5.8.2. Test Procedures

- Set EUT work in test mode as described in clause 2.4.
- Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Resolution BW: 100 KHz for frequency below 1GHz and

1MHz for frequency above 1GHz

Video BW: 100 KHz for frequency below 1GHz and

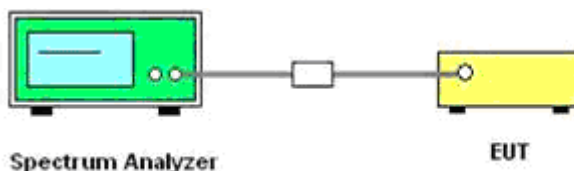
1MHz for frequency above 1GHz

Detector: Peak.

Trace Mode: Max Hold.

- All the emissions from 30MHz to 13GHz were measured and record.

5.8.3. Test Setup



5.8.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.8.5. Test Results

Please refer to the Appendix A.6 for BT LE RF Test Data.





6. PHOTOGRAPHS OF TEST SETUP

Please refer to separated files Appendix B for Test Setup Photographs

7. EXTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files Appendix C for External Photos of EUT

8. INTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files Appendix D for Internal Photos of EUT

9. LIST OF MEASURING EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	Rohde & Schwarz China	NRVS	100444	2021-06-21	2022-06-20
2	Power Sensor	Rohde & Schwarz China	NRV-Z81	100458	2021-06-21	2022-06-20
3	Power Sensor	Rohde & Schwarz China	NRV-Z32	10057	2021-06-21	2022-06-20
4	MXA Signal Analyzer	Agilent Technologies Inc.	N9020A	MY49100060	2021-11-16	2022-11-15
5	DC Power Supply	Agilent Technologies Inc.	E3642A	N/A	2021-11-25	2022-11-24
6	Oscilloscope	Tektronix	46084A/4609A	140920	2021-08-17	2022-08-16

-----THE END OF REPORT-----

