

TEST REPORT

Application No.: SZEM1903011558CR
Applicant: Foundation Fitness, LLC
Address of Applicant: 606 SE 9th Ave Portland Oregon United States 97214
Manufacturer: Foundation Fitness, LLC
Address of Manufacturer: 606 SE 9th AVE, PORTLAND, OR 97214
Factory: iDT Technology Limited
Address of Factory: Chentian Industrial Estate Xixiang, BaoAn, Shenzhen, PRC
Equipment Under Test (EUT):
EUT Name: Wireless GPS Cycling Computer
Model No.: SDL2
Trade mark: StagesDash®
Standard(s) : MIC Item 19 of Article 2 Paragraph 1
Date of Receipt: 2019-03-12
Date of Test: 2019-04-29
Date of Issue: 2019-05-08

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-05-08		Original

Authorized for issue by:		
		 _____ Leo Lai /Project Engineer
		 _____ Eric Fu /Reviewer



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
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



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4 General Information

4.1 Details of E.U.T.

Antenna Gain:	DC 3.8V from internal rechargeable battery
Cable:	USB cable: 100cm shielded with ferrite core at both ends
Operation Frequency:	2457MHz
Number of Channels:	1
Modulation Type:	GFSK
Antenna Type:	IFA Antenna
Antenna Gain:	3dBi

4.2 Test Conditions

Power Supply DC 3.8V from internal rechargeable battery

The RF unit is supplied DC 3.3V. The fluctuation of input voltage to the circuit of RF unit of test equipment is under $\pm 1\%$, when input voltage from DC 3.8V to the test equipment is fluctuated by $\pm 10\%$, So, all measurement has been conducted by only rated voltage.

The measurement result of the voltage fluctuation at RF circuit when
DC 3.8V $\pm 10\%$.

DC Input	DC3V30
4.18V	3.32V
3.8V	3.31V
3.42V	3.29V

Temperature: -10 - 50.0 °C
Humidity: 45-85 % RH
Atmospheric Pressure: 1000 -1010 mbar

Note:

VN: Normal Voltage
TN: Normal Temperature
TL: Low Extreme Test Temperature
TH: High Extreme Test Temperature

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.



4.3 Description of Support Units

The EUT has been tested as an independent unit.

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF conducted power	$\pm 0.75\text{dB}$
5	RF power density	$\pm 2.84\text{dB}$
6	Conducted Spurious emissions	$\pm 0.75\text{dB}$
7	RF Radiated power	$\pm 4.5\text{dB}$ (below 1GHz)
		$\pm 4.8\text{dB}$ (above 1GHz)
8	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
9	Temperature test	$\pm 1^\circ\text{C}$
10	Humidity test	$\pm 3\%$
11	Supply voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$



4.5 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch
No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China.
518057.
Tel: +86 755 2601 2053 Fax: +86 755 2671 0594
No tests were sub-contracted.

4.6 Test Facility

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

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



5 Equipment List

Equipment list							
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	Calibration body	Classification
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018-09-25	2019-09-24	CEPREI	(c)
Spectrum Analyzer (20Hz-43GHz)	Rohde & Schwarz	FSU43	SEM004-08	2019-04-01	2020-03-31	CEPREI	(c)
Signal Generator (9kHz-40GHz)	KEYSIGHT	N5173B	SEM006-05	2018-09-27	2019-09-26	CEPREI	(c)
Multimeter	FLUKE	Fluke 73III	SEM022-01	2019-04-03	2020-04-02	CEPREI	(c)
Bluetooth Tester	Rohde & Schwarz	CBT	W060-01	2018-06-21	2019-06-20	CEPREI	(c)
Universal Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-03	2019-04-02	2020-04-01	CEPREI	(c)
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2018-09-27	2019-09-26	CEPREI	(c)
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03	CEPREI	(c)

Remark:

- (a) Calibration conducted by the National Institute of Information and Communications Technology (NICT) in Japan (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1) in JRL.
- (b) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Act (Act No. 51 of 1992).
- (c) Calibration conducted in countries except Japan, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
- (d) Calibration, etc. conducted by using measuring instruments and other equipment listed in the right column of appended table No. 3, which shall have been given any type of calibration, etc. listed above from (a) to (c).

From JRL Article 24-2, paragraph 4, Item 2

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

MIC Item 19 of Article 2 Paragraph 1

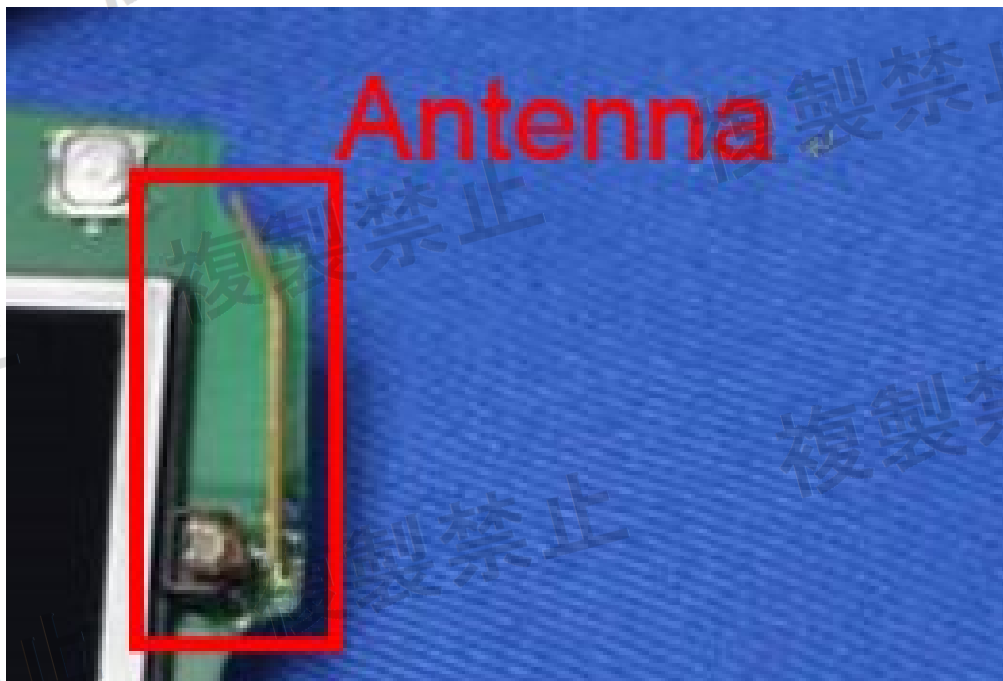
6.1.2 Conclusion

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-fixture.

EUT Details:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 3dBi.



Result:

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



6.2 Interference prevention capability

6.2.1 Test Requirement:

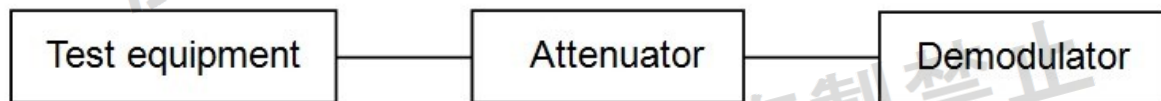
MIC Item 19 of Article 2 Paragraph 1

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.

6.2.2 Test Setup Diagram



6.2.3 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.

EUT Details:

00:27:63:45:9E:01

The unit does meet the requirements (Good).



6.3 RF accessibility

6.3.1 Test Requirement:

MIC Item 19 of Article 2 Paragraph 1

6.3.2 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:



The product was sealed with special screws. Shield case is welded at RF and modulation parts and 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 not exposed, user can't remove the component with common tools.



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7 Radio Spectrum Matter Test Results

7.1 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

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 56.4 % RH Atmospheric Pressure: 1020 mbar

Test mode b:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

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:

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 83.5 MHz (FHSS); 40/60 MHz (OFDM; DSSS); 2-5 times OBW (Others)

RBW 1 MHz (FHSS); 300kHz (OFDM; DSSS); 3% OBW (Others)

VBW 1 MHz (FHSS); 300kHz (OFDM; DSSS); 3 times RBW (Others)

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

OBW 99%

The detailed test data see: Appendix MIC19-2



7.2 Antenna Power

Test Requirement MIC Item 19 of Article 2 Paragraph 1
Test Method: MIC Notice No.88 Appendix No.43
Limit: Designated value
(1) FH, FH+DS, FH+OFDM: 3mW/MHz
(used in the range of 2427 - 2470.75 MHz)
(2) OFDM, DS other than (1) 10mW/MHz
(3) Other than (1) & (2) 10mW
(4) OFDM OBW 26 - 38MHz: 5mW/MHz
Tolerance: +20%, -80%

7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 25 °C Humidity: 56.6 % RH Atmospheric Pressure: 1020 mbar
Test mode b:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

- Test Conditions:
Spectrum Analyzer is used for measurement.
- 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.
- Spectrum Analyzer conditions:
Frequency: Test Frequency
Span 25 MHz(FHSS); 40/60 MHz (OFDM; DSSS); Enough to capture the emission (Others)
RBW 1 MHz (FHSS; OFDM; DSSS); More than OBW (Others)
VBW 1 MHz (FHSS; OFDM; DSSS); More than RBW (Others)
Sweep Time Auto
detector mode RMS
Indication mode Max hold

The detailed test data see: Appendix MIC19-2



7.3 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/MHz
- (2) 2387 to 2400 MHz : 25 μ W/MHz
- (3) 2483.5 through 2496.5 MHz : 25 μ W/MHz
- (4) Over 2496.5 MHz : 2.5 μ W/MHz

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 56.6 % RH Atmospheric Pressure: 1020 mbar

Test mode b:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.3.2 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:

Step 1

All spurious are measured from 30 MHz to 13 GHz by peak mode.

Step 2

IF the value measured by Step1 is 2 dB or less, measure in average mode.

Test setup for Step 1:

Frequency: 30 MHz – 2400 MHz , 2483.5 MHz –13 GHz

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

Test setup for Step 2:

Frequency: Spurious Frequency

RBW 1 MHz

VBW 1 MHz

Sweep Time Auto

detector mode Sample

Indication mode Max hold

The detailed test data see: Appendix MIC19-2



7.4 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 or less (2) 1 GHz and over : 20 nW or less

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7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 56.4 % RH Atmospheric Pressure: 1020 mbar

Test mode b:TX_Hop mode Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

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:

Modulation/Spread/Hopping ON

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

3. Spectrum Analyzer conditions:

Step 1

All spurious are measured from 30 MHz to 13 GHz by peak mode.

Step 2

IF the value measured by Step1 is 2 dB or less, measure in average mode.

Test setup for Step 1:

Frequency: 30 MHz – 2400 MHz , 2483.5 MHz –13 GHz

RBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz)

VBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz)

Sweep Time Auto

detector mode Positive peak

Indication mode Max hold

Test setup for Step 2:

Frequency: Spurious Frequency

Span 0 Hz

RBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz)

VBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz)

Sweep Time Auto

detector mode Sample

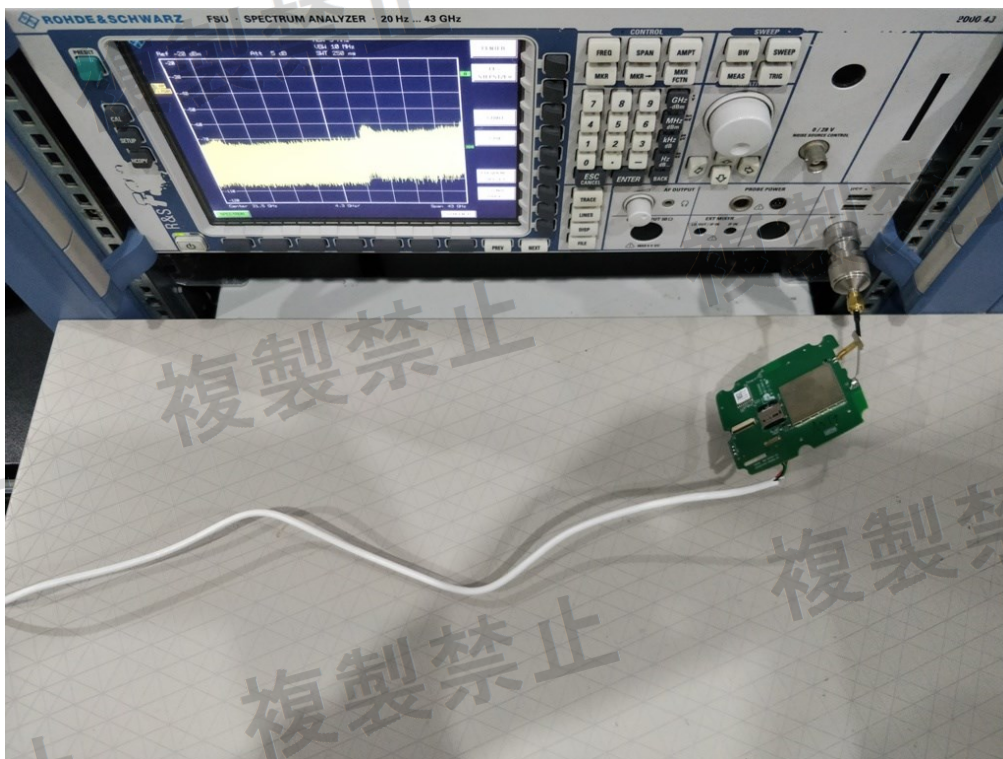
Indication mode Max hold

The detailed test data see: Appendix MIC19-2



8 Photographs

8.1 Test Setup



8.2 EUT Constructional Details (EUT Photos)

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1903011558CR.

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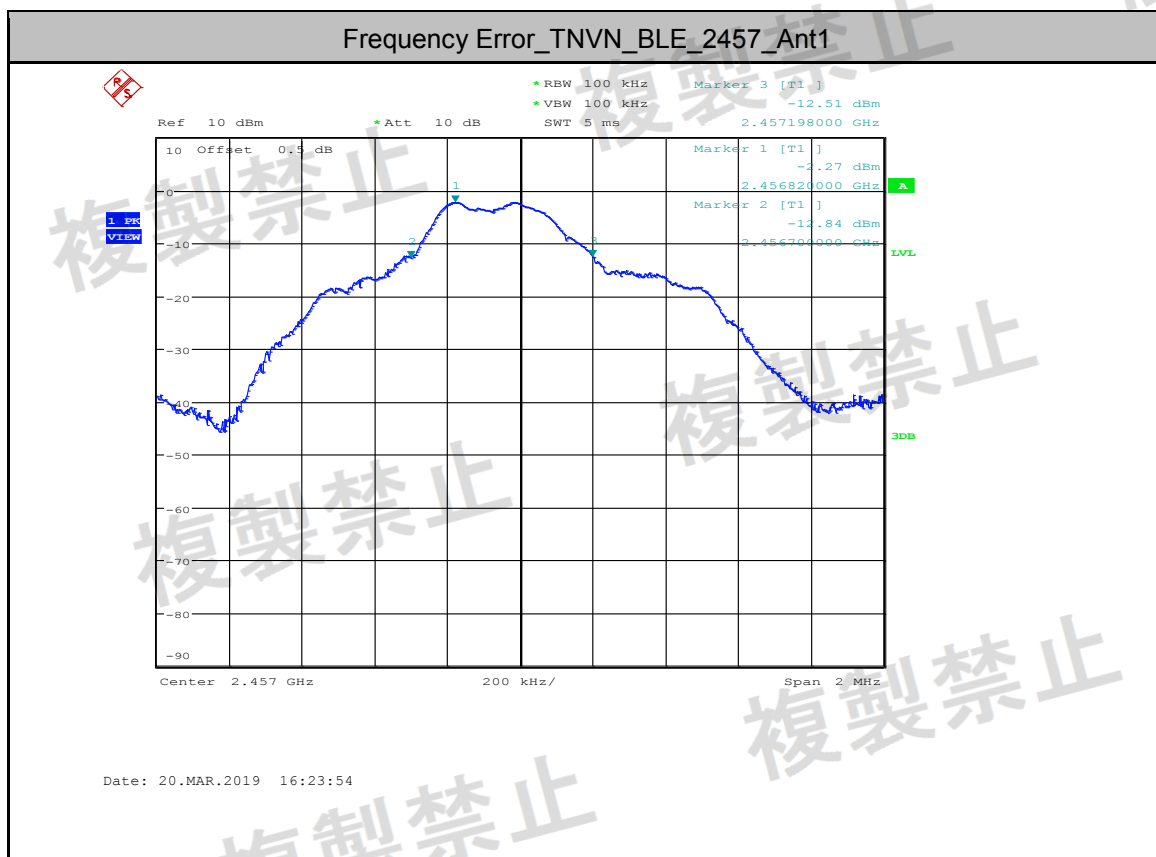
9 Appendix

9.1 Appendix MIC19-2

1.Frequency Error

Test Condition	Test Mode	Test Channel	Ant	Result [MHz]	Result [PPM]	Limit [PPM]	Verdict
TNVN	BLE	2457	Ant1	2456.95	-20.35	$\leq \pm 50$	PASS





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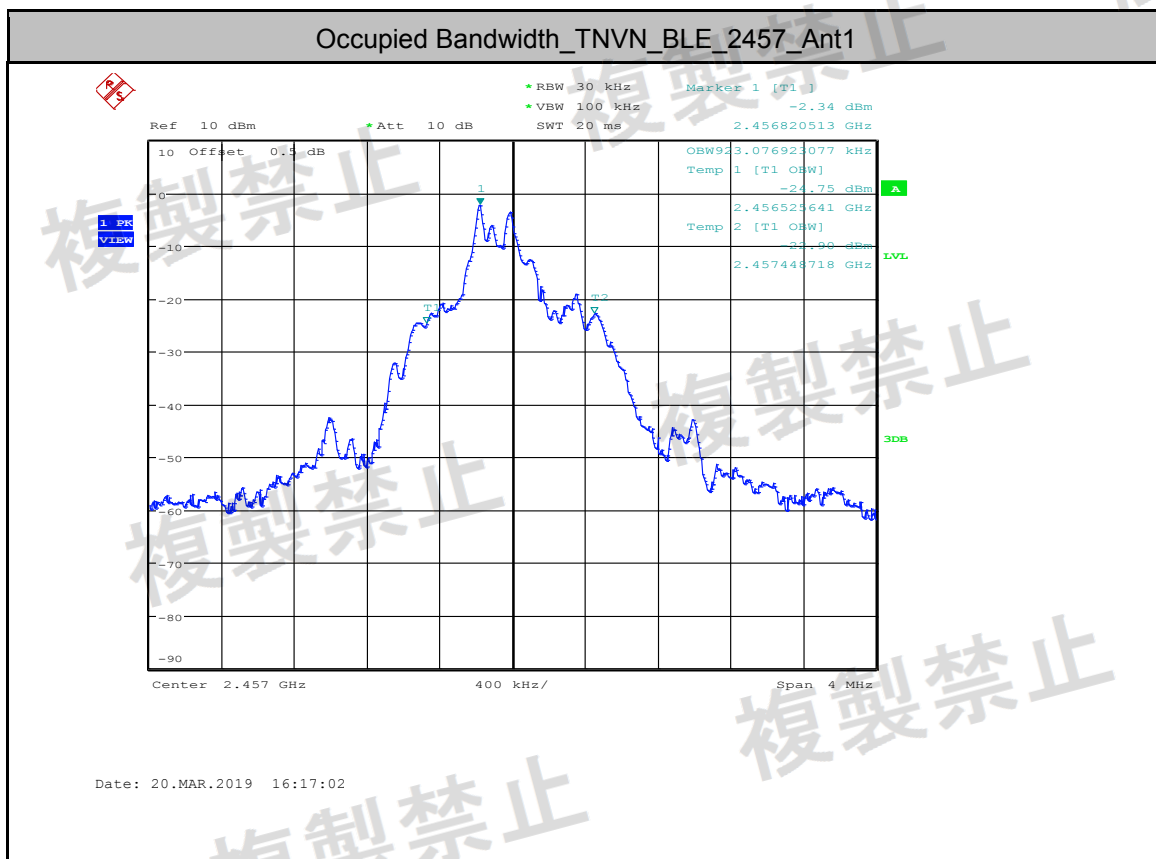
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2.Occupied Bandwidth (99%)

Test Condition	Test Mode	Test Channel	Ant	Test Result [MHz]	Limit [MHz]	Verdict
TNVN	BLE	2457	Ant1	0.923	<=26	PASS

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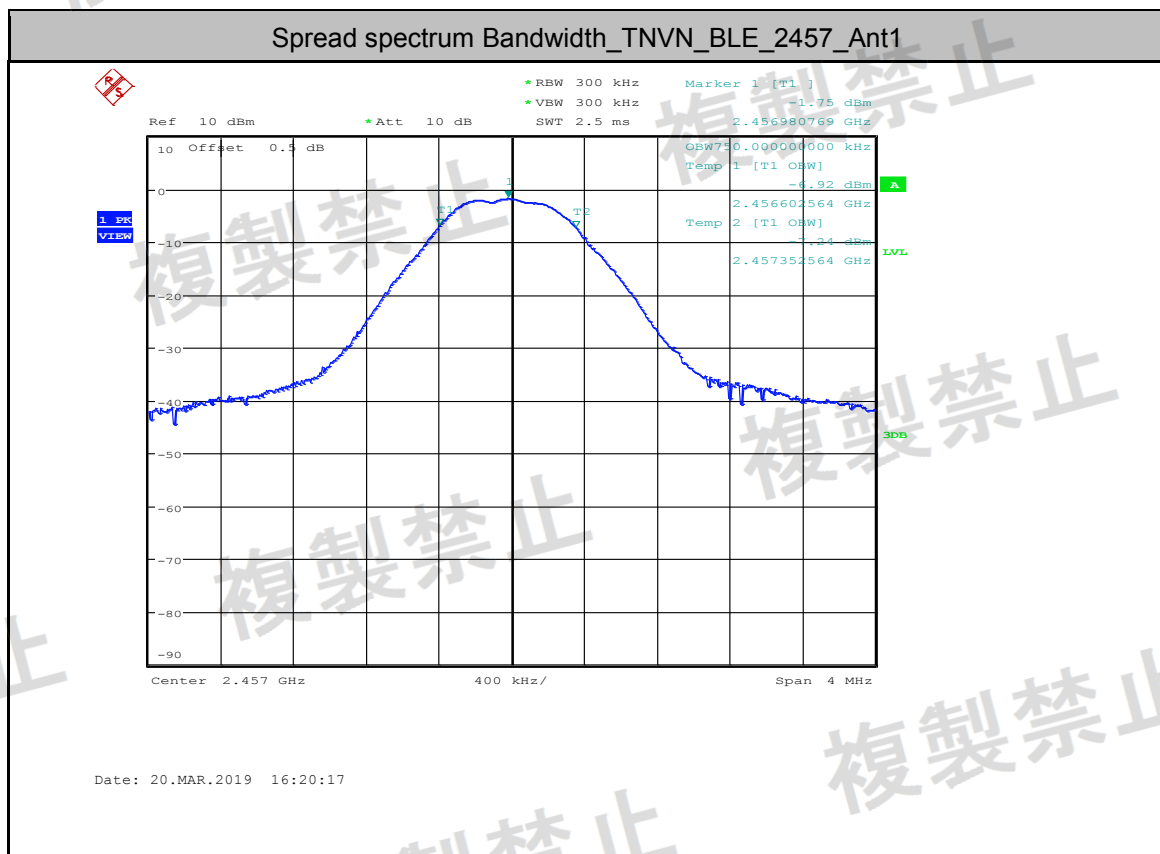


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3. Spread spectrum Bandwidth (90%)

Test Condition	Test Mode	Test Channel	Ant	Test Result[MHz]	Limit [MHz]	Verdict
TNVN	BLE	2457	Ant1	0.750	0.5	PASS

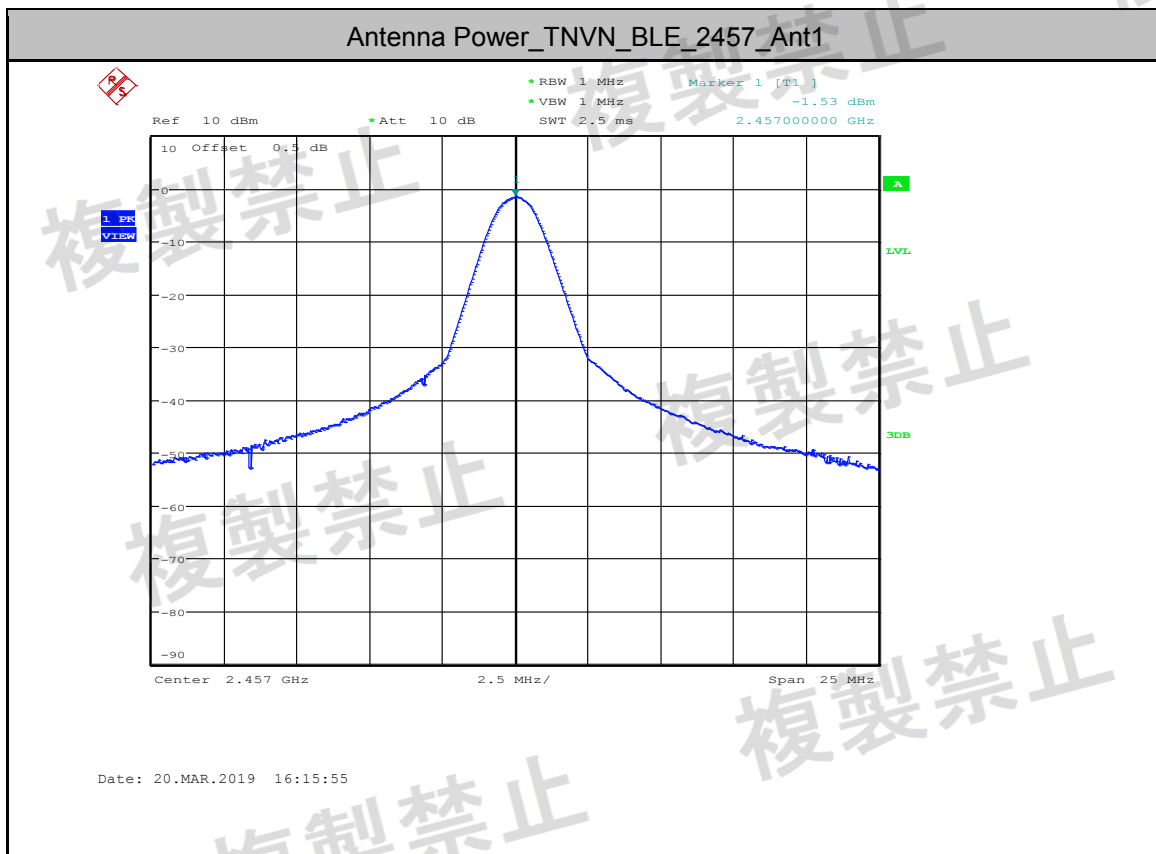


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4. Antenna Power

Test Condition	Test Mode	Test Channel	Ant	Power[mW]	Limit[mW]	Normal Power [mW]	Tolerance[%]	Limit [%]	Verdict
TNVN	BLE	2457	Ant1	0.7	10	0.7	0.000	-80 to +20	PASS



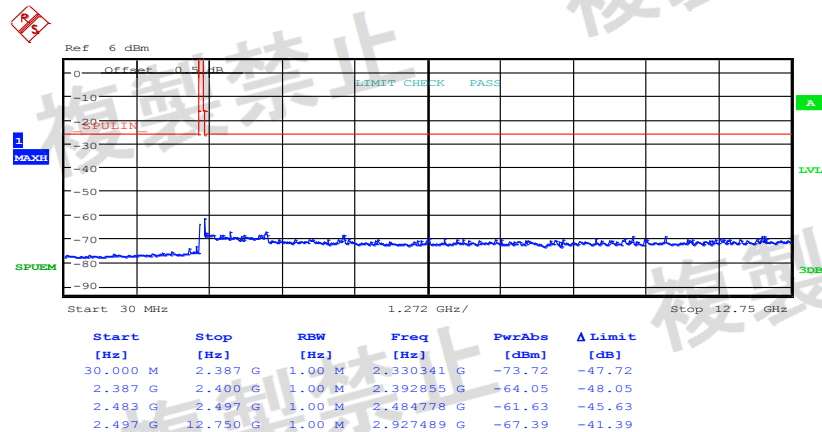
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5.Spurious Emissions of Tx

Test Mode	Test Channel	StartFre[MHz]	StopFre[MHz]	Max.Fre[MHz]	Max.Level[μW]	Limit [μW]	Verdict
BLE	2457	30	2387	2330.34	0.0000	2.5	PASS
BLE	2457	2387	2400	2392.86	0.0004	25.1	PASS
BLE	2457	2483.5	2496.5	2484.78	0.0007	25.1	PASS
BLE	2457	2496.5	13000	2927.49	0.0002	2.5	PASS

Spurious Emissions of Tx_TNVN_BLE_2457_Ant1



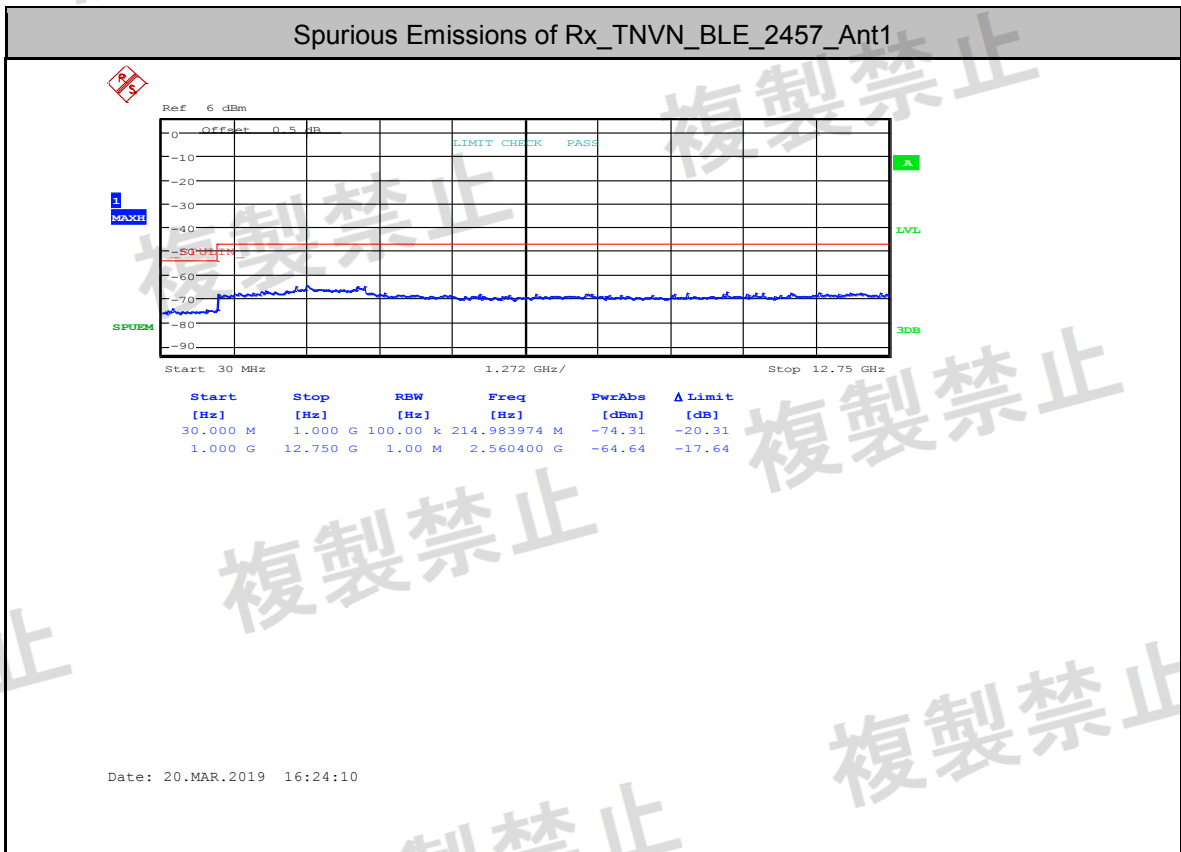
Date: 20.MAR.2019 16:20:56

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6.Spurious Emissions of Rx

Test Mode	Test Channel	StartFre[MHz]	StopFre[MHz]	Max.Fre[MHz]	Max.Level[nW]	Limit [nW]	Verdict
BLE	2457	1000	13000	2560.40	0.344	20	PASS
BLE	2457	30	1000	214.98	0.037	4	PASS



- End of the Report -