

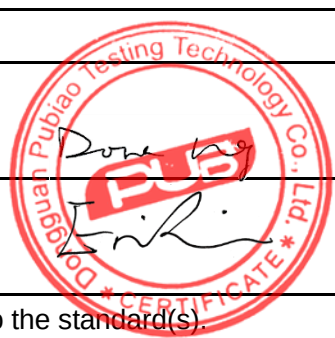
TEST REPORT		
Report Number.:	EP2608091F02	
Date of receipt of test item....:	2026-08-17	
Date (s) of performance of test	2026-08-18 to 2026-10-08	
Date of issue	2026-10-08	
Testing Laboratory name	Dongguan Pubiao Testing Technology Co., Ltd.	
Address	Room 101, Building 1, No.30, Minghua Road, Shijie,Shijie Town, Dongguan,Guangdong, 523250,People' s Republic of China	
Applicant's name.....:	Zhuhai Xprinter Electronics Technology Co., Ltd.	
Address	5/F, 1st Workshop, No.613 Huawei Road, Qianshan Industrial Zone, Xiangzhou District, Zhuhai City, Guangdong Province, P.R.China	
Manufacturer's name	Zhuhai Xprinter Electronics Technology Co., Ltd.	
Address	5/F, 1st Workshop, No.613 Huawei Road, Qianshan Industrial Zone, Xiangzhou District, Zhuhai City, Guangdong Province, P.R.China	
Factory's name	Zhuhai Xprinter Electronics Technology Co., Ltd.	
Address	5/F, 1st Workshop, No.613 Huawei Road, Qianshan Industrial Zone, Xiangzhou District, Zhuhai City, Guangdong Province, P.R.China	
Standard(s).....:	FCC 47 CFR Part 15, Subpart C	
Test item description	PORTABLE LABEL PRINTER	
Trade Mark	N/A	
Model/Type reference	XP-F1, F1	
FCC ID	2AWYK-F1	
Summary of Test Results	Pass	
Test Report Form No.....:	47 CFR Parts 15 C	
Master TRF.....:	Dated 2025-11	
Prepared by (+signature)	Dora Ning	
Approved by (+signature)	Eric Liu	
The Summary of Test Results based on a technical opinion belongs to the standard(s).		
General disclaimer: This report shall not be reproduced except in full, without the written approval of Dongguan Pubiao Testing Technology Co., Ltd. The test results in the report only apply to the tested sample.		

Table of Contents

1	EUT TECHNICAL DESCRIPTION	4
2	SUMMARY OF TEST RESULT	5
3	TEST METHODOLOGY	6
3.1	GENERAL DESCRIPTION OF APPLIED STANDARDS	6
3.2	MEASUREMENT EQUIPMENT USED.....	6
3.3	DESCRIPTION OF TEST MODES	7
4	FACILITIES AND ACCREDITATIONS	8
4.1	FACILITIES.....	8
4.2	TEST SYSTEM UNCERTAINTY.....	8
5	SETUP OF EQUIPMENT UNDER TEST.....	9
5.1	RADIO FREQUENCY TEST SETUP 1	9
5.2	RADIO FREQUENCY TEST SETUP 2	9
5.3	CONDUCTED EMISSION TEST SETUP	11
5.4	BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM	12
5.5	SUPPORT EQUIPMENT	12
6	TEST REQUIREMENTS.....	13
6.1	DTS 6DB BANDWIDTH	13
6.2	DUTY CYCLE	16
6.3	MAXIMUM PEAK CONDUCTED OUTPUT POWER.....	17
6.4	MAXIMUM POWER SPECTRAL DENSITY	21
6.5	CONDUCT BAND EDGE AND SPURIOUS EMISSIONS MEASUREMENT	24
6.6	RADIATED SPURIOUS EMISSION	30
6.7	CONDUCTED EMISSION TEST	44
6.8	ANTENNAAPPLICATION	47



Modified Information

Report No.	Revision Data	Summary
EP2608091F02	2026-10-08	Original Version

1 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product	PORTABLE LABEL PRINTER
Model Number	XP-F1, F1
Difference	All models are identical to each other except for model name. Here we choose F1 as the test EUT.
Modulation:	BLE(GFSK(1M))
Operating Frequency Range(s):	2402-2480MHz
Number of Channels:	40 channels
Antenna Type:	PCB Antenna
Antenna Gain:	-0.93 dBi
Power supply:	DC 3.7V from Battery DC 5V from USB

Note: for more details, please refer to the User's manual of the EUT.

2 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.247(a)(2)	DTS (6dB) Bandwidth	PASS	
15.247(b)(3)	Maximum Peak Conducted Output Power	PASS	
15.247(e)	Maximum Power Spectral Density Level	PASS	
15.247(d)	Band edge	PASS	
15.247(d)	Conducted Spurious Emission	PASS	
15.247(d) 15.209	Radiated Spurious Emission	PASS	
15.207	Conducted Emission Test	PASS	
15.247(b) 15.203	Antenna Application	PASS	
	NOTE1: N/A (Not Applicable) NOTE2: According to FCC OET KDB 558074, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.		

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2AWYK-F1 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

3 TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J;

FCC 47 CFR Part 15, Subpart C;

FCC KDB 558074 D01 15.247 Meas Guidance v05r02.

3.2 MEASUREMENT EQUIPMENT USED

3.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
EMI Test Receiver	ROHDE&SCHWARZ	ESCI3	101315	2026-05-18	1year
LISN	ROHDE&SCHWARZ	ENV216	102331	2026-05-18	1year
Test Cable	HUBER+SUHNER	RG 223/U	1-1#	2026-05-18	1year
10 db attenuator	N/A	DC-6G-10DB-N-JK	/	2026-05-18	1year
CE Testing software	EZ	EZ-EMC	/	/	/

3.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
EMI Test Receiver	Rohde & Schwarz	ESPI3	101918	2026-05-18	1year
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50531325	2026-05-18	1year
Preamplifier	ROHDE& SCHWARZ	8447E	2945A02763	2026-05-18	1year
Preamplifier	BOSST	BPA-001018G40B	8400019	2026-05-18	1year
Preamplifier	RF system	BPA-018040G45B	26031901	2026-04-22	1year
Bilog Antenna	Schwarzbeck	VULB 9168	01422	2026-03-04	3years
Loop Antenna	SCHWARZBECK	FMZB1519-60 D	1519-60 D-232	2026-04-21	3years
Horn Antenna	antsym	AS-DAH-L1000H18000G16/S-NK	antsym	2026-05-18	3years
Horn Antenna	Schwarzbeck	BBHA 9170	F143	2026-04-21	3years
The RF cable	HUBER+SUHNER	RG 223/U	1-3#	2026-05-18	1year
The RF cable	HUBER+SUHNER	RG 223/U	1-4#	2026-05-18	1year
The RF cable	HUBER+SUHNER	RG 223/U	1-5#	2026-05-18	1year
The RF cable	TIMES Microwave Systems	HF290-NMNM-14.00M	844011-0001	2026-04-13	1year

3.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Vector Signal Generater	Agilen	N5182A	MY50142585	2026-05-18	1year
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	132488-Sz	2026-05-18	1year
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50531325	2026-05-18	1year
DC Power Supper	KEYSIGHT	E3642A	MY41002348	2026-05-18	1year
RF control box	CDKMV	MW100-RFCB	MW210914PB	2026-01-09	1year
Power detection box	CDKMV	MW101-PSB	MW210914PB-22	2026-01-09	1year
RF Testing software	MW	MTS 8310	/	/	/

3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (BLE :1Mbps) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for BLE:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	19	2440	...	...
1	2404	20	2442	37	2476
2	2406	21	2444	38	2478
...	...	...	...	39	2480
Note: $f_c = 2402\text{MHz} + k \times 1\text{MHz}$ $k=1$ to 39					

Test Frequency and channel for BLE:

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	19	2440	39	2480

4 FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Site Description		
Name of Firm	:	Dongguan Pubiao Testing Technology Co., Ltd.
Site Location	:	Room 101, Building 1, No.30, Minghua Road, Shijie, Shijie Town, Dongguan, Guangdong, 523250, People's Republic of China
FCC Designation Number	:	CN1459
Test Firm Registration Number:		782062
FCC Test Firm Registration Number	:	7670.01

4.2 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

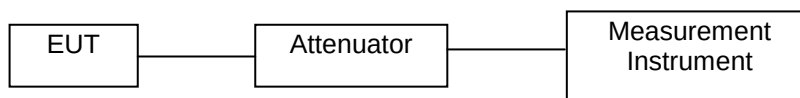
Parameter	Uncertainty
Radio Frequency	2×10^{-5}
Maximum Peak Output Power Test	$\pm 1.19\text{dB}$
Duty cycle	$\pm 2\%$
Power Spectral Density	$\pm 2.2\text{dB}$
Conducted Emissions Test	4.26dB
Radiated Emission(30MHz~1GHz)	6.10dB (Below 1GHz)
	6.28dB (Above 1GHz)
Occupied Bandwidth Test	$\pm 4.0\%$
Band Edge Test	$\pm 2.3\%$
Antenna Port Emission	$\pm 3\text{ dB}$
Temperature	0.5°C
Humidity	2%

Measurement Uncertainty for a level of Confidence of 95%

5 SETUP OF EQUIPMENT UNDER TEST

5.1 RADIO FREQUENCY TEST SETUP 1

The BLE component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



5.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 and CAN/CSA-CEI/IEC CISPR 32.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the the specified distance from the EUT.

30MHz-1GHz:

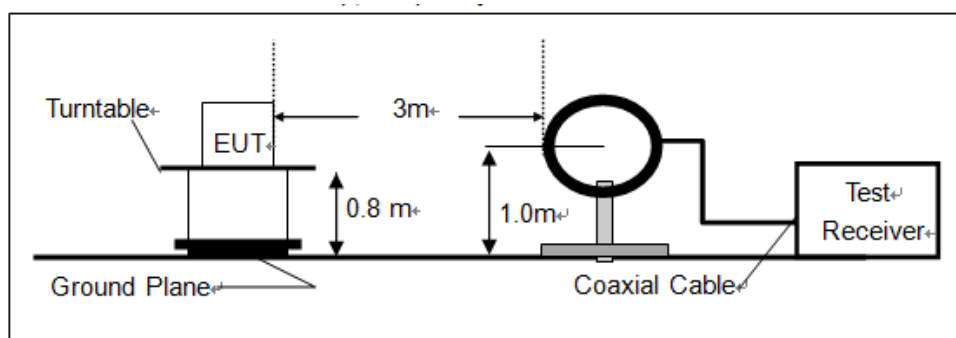
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

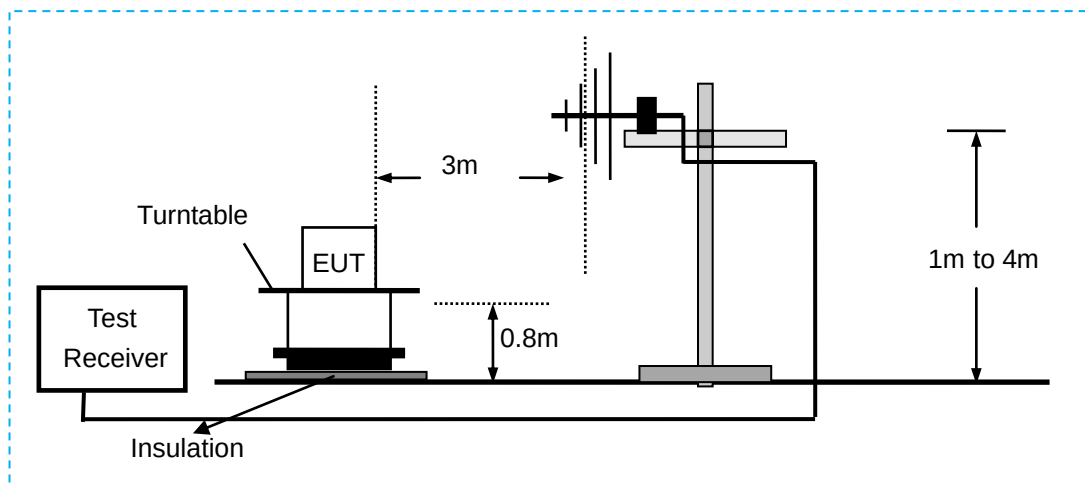
(Note: The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024.)

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

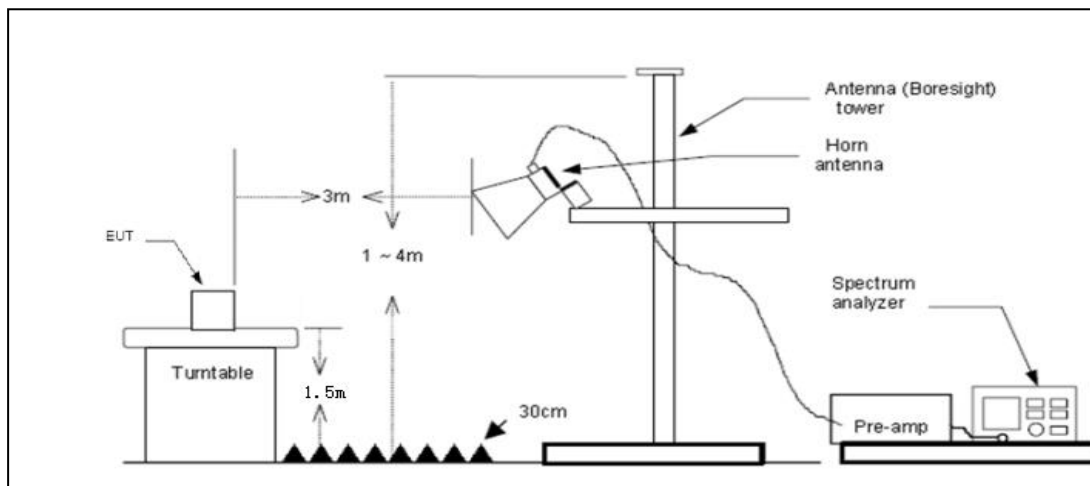
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

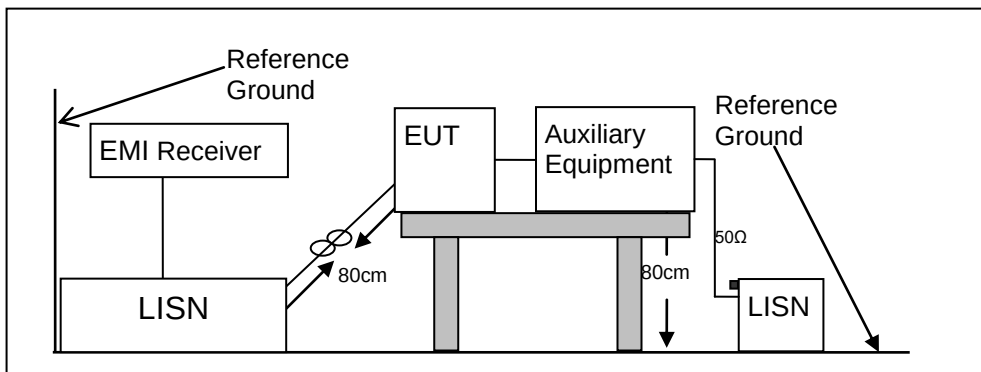


5.3 CONDUCTED EMISSION TEST SETUP

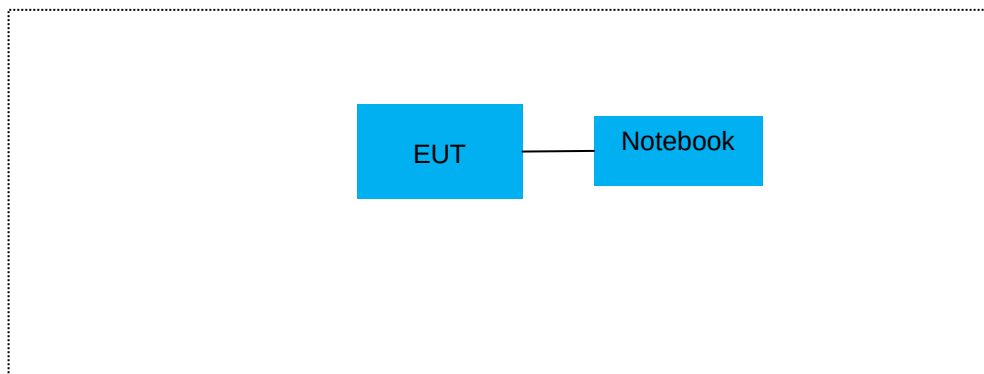
The mains cable of the EUT (Perfect Share Mini) must be connected to LISN. The LISN shall be placed 0.8m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.8m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024+Cor. 1-2023+C63.10a-2024 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



5.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



5.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	HUAWEI	MDG-16	2HGBB23A12802356

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6 TEST REQUIREMENTS

6.1 DTS 6DB BANDWIDTH

6.1.1 Applicable Standard

According to FCC Part 15.247(a)(2) and KDB 558074 D01 15.247 Meas Guidance v05r02

6.1.2 Conformance Limit

The minimum -6 dB bandwidth shall be at least 500 kHz.

6.1.3 Test Configuration

Test according to clause 5.1 radio frequency test setup 1

6.1.4 Test Procedure

The EUT was operating in BLE mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.

Set the VBW $\geq [3 \times \text{RBW}]$.

Set Span= approximately 1 to 3 times the OBW.

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

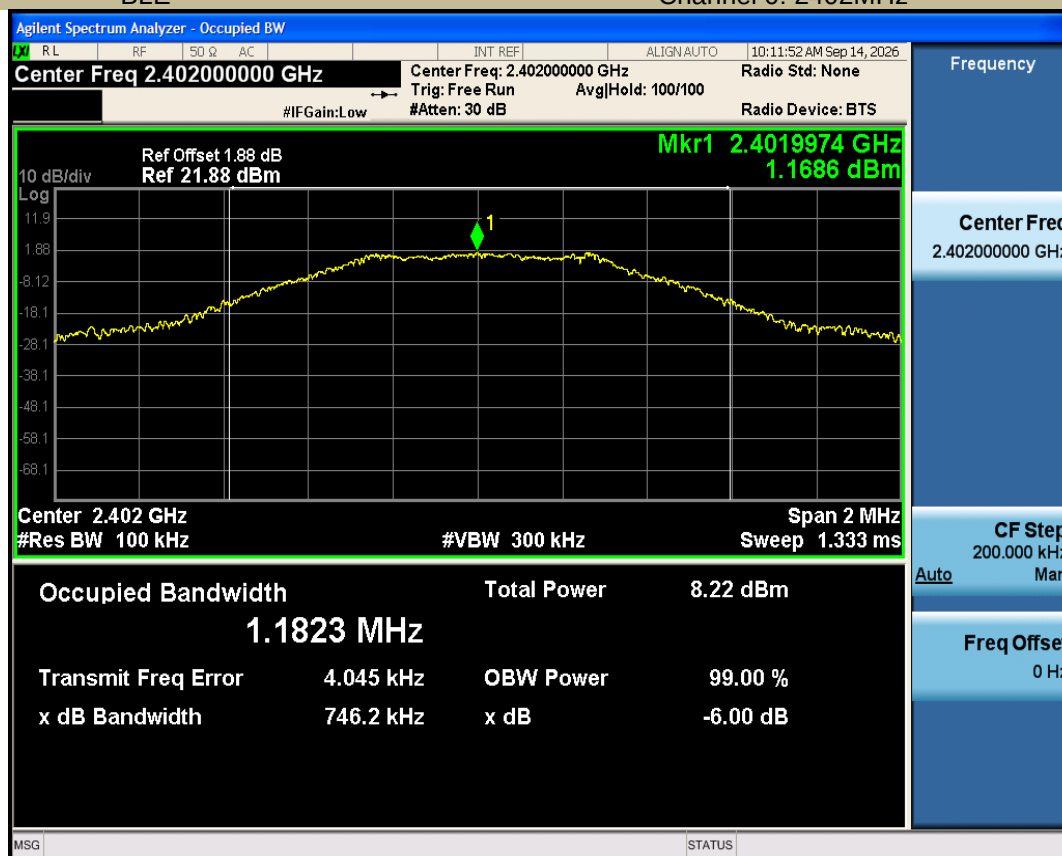
Measure and record the results in the test report.

Test Results

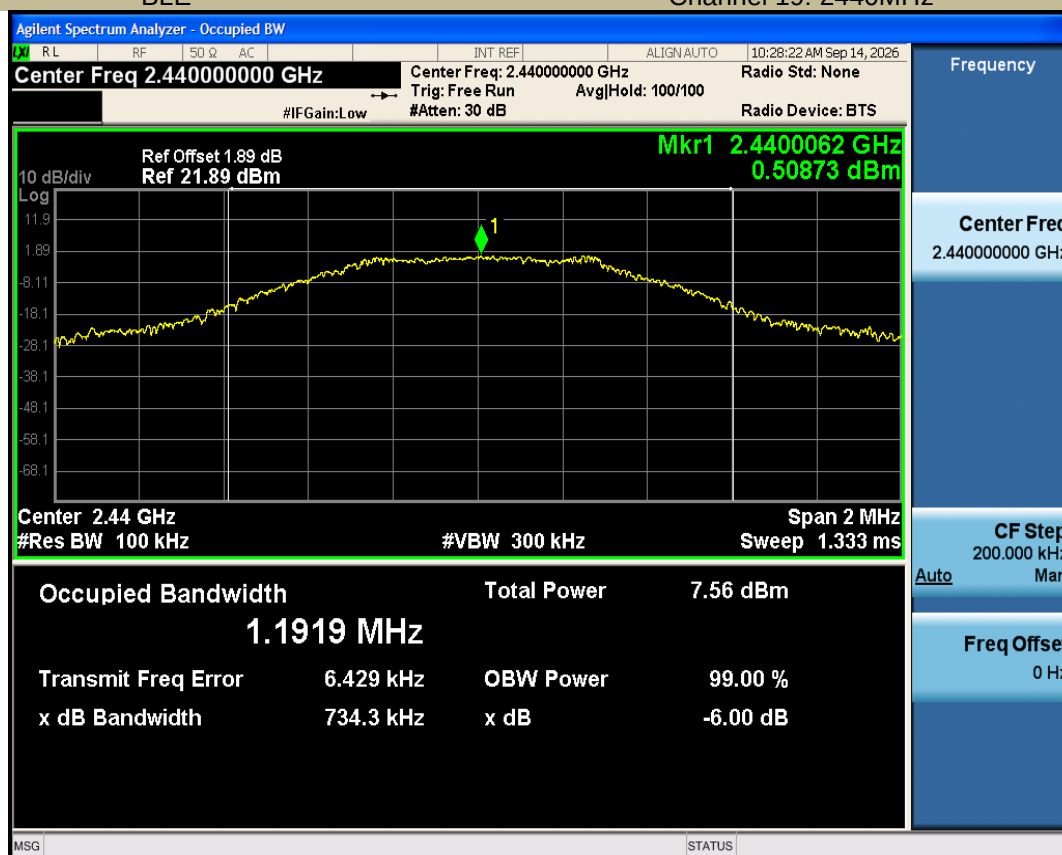
Temperature:	24° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (MHz)	Limit (kHz)	Verdict
BLE	0	2402	0.7462	>500	PASS
	19	2440	0.7343	>500	PASS
	39	2480	0.7276	>500	PASS

Test Mode DTS (6dB) Bandwidth
BLE Channel 0: 2402MHz



Test Mode DTS (6dB) Bandwidth
BLE Channel 19: 2440MHz



Test Mode

DTS (6dB) Bandwidth
BLE

Channel 39: 2480MHz



6.2 DUTY CYCLE

6.2.1 Applicable Standard

According to ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024 clause 11.6

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to help ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e. no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this subclause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than +2%; otherwise, the duty cycle is considered to be nonconstant.

The term "maximum power control level" is intended to distinguish between operating power levels of the EUT and differences in power levels of individual symbols that occur with some modulation types such as quadrature amplitude modulation (QAM). During testing, the EUT is not required to transmit continuously its highest possible symbol power level. Rather, it should transmit all the symbols and should do so at the highest power control level (i.e., highest operating power level) of the EUT.

Measurements of duty cycle and transmission duration shall be performed using one of the

- a) A diode detector and an oscilloscope that together have a sufficiently short response time to permit accurate measurements of the ON and OFF times of the transmitted signal.
- b) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:

- 1) Set the center frequency of the instrument to the center frequency of the transmission.
- 2) Set RBW > OBW if possible; otherwise, set RBW to the largest available value.
- 3) Set VBW > RBW. Set detector = peak or average.
- 4) The zero-span measurement method shall not be used unless both RBW and VBW are $>50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7 \mu s$.)

6.2.2 Test Results

The manufacturer claims that the duty cycle is greater than 98%.

6.3 MAXIMUM PEAK CONDUCTED OUTPUT POWER

6.3.1 Applicable Standard

According to FCC Part 15.247(b)(3) and KDB 558074 D01 15.247 Meas Guidance v05r02

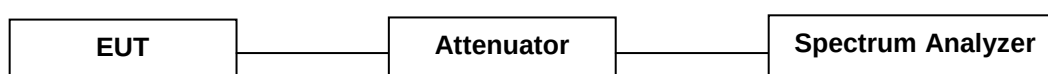
6.3.2 Conformance Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm).

6.3.3 Test Configuration

Test according to clause 5.1 radio frequency test setup 1

6.3.4 Test Procedure Spectrum Analyzer



■ According to FCC Part 15.247(b)(3)

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. For smart system, Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Set the RBW $\geq$ DTS bandwidth (about 1MHz).

Set VBW $\approx 3 \times$ RBW (about 3MHz)

Set the span $\geq 3 \times$ RBW

Set Sweep time = auto couple.

Set Detector = peak.

Set Trace mode = max hold.

Allow trace to fully stabilize. Use peak marker function to determine the peak amplitude level.

■ According to FCC Part 15.247(b)(4):

Conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Results

Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

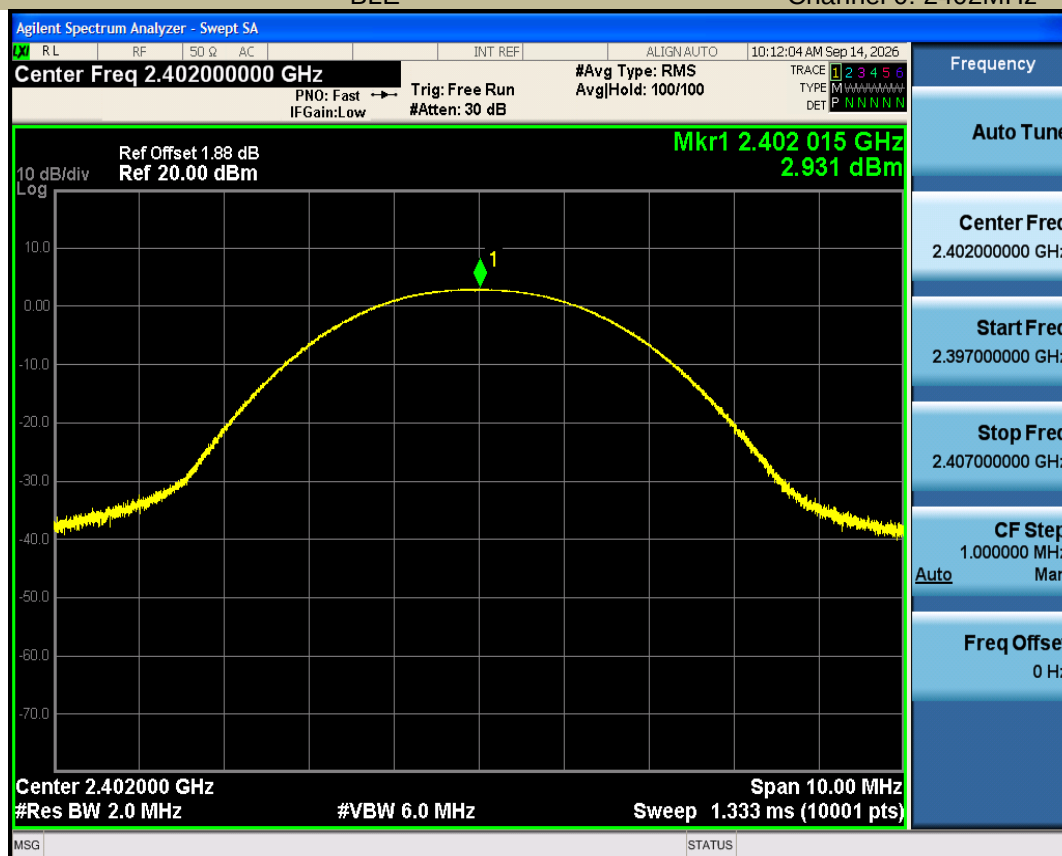
Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
Bluetooth DTS	0	2402	2.93	30	PASS
	19	2440	2.36	30	PASS
	39	2480	1.88	30	PASS

Test Mode

Peak Conducted Output Power

BLE

Channel 0: 2402MHz

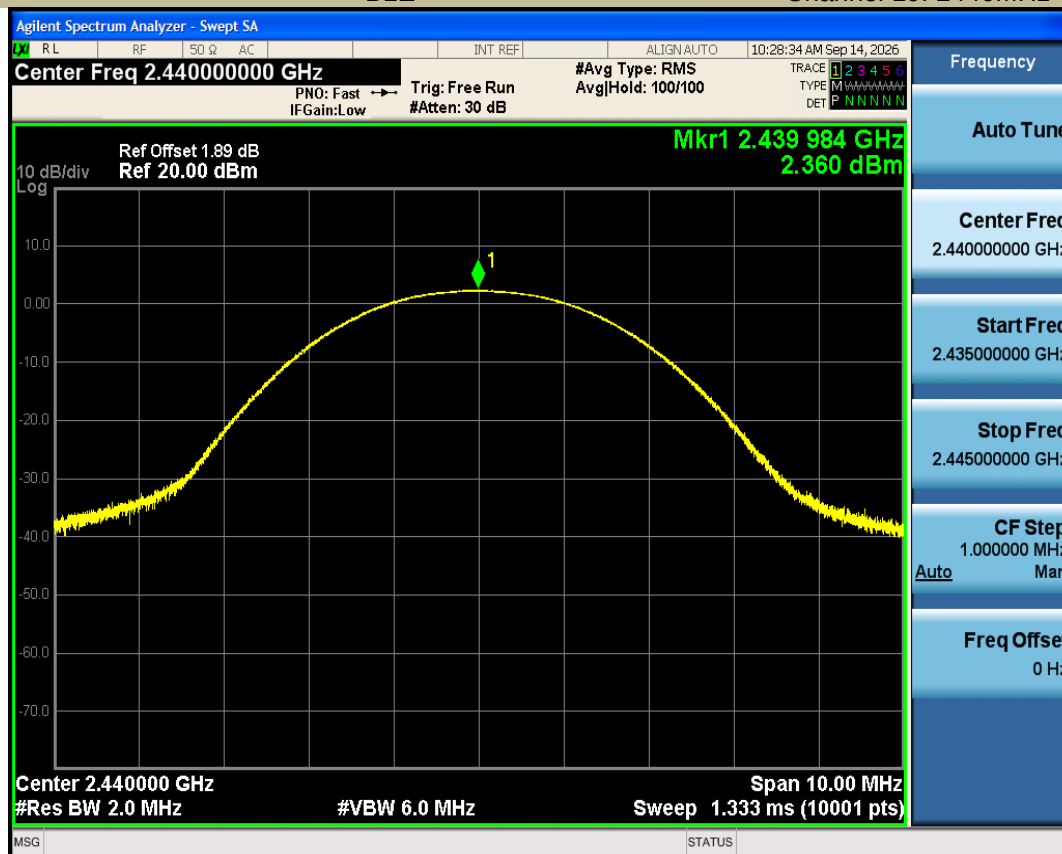


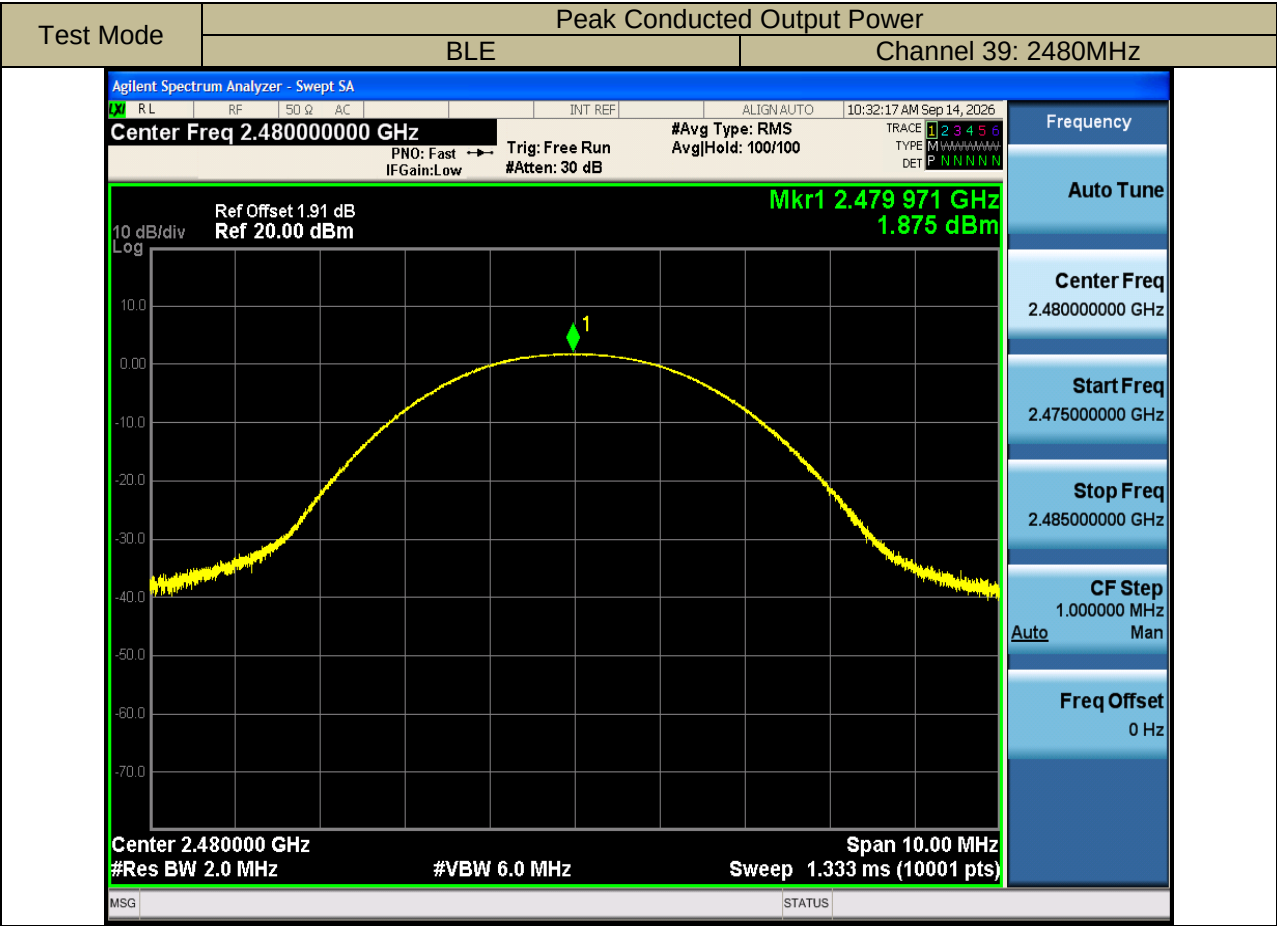
Test Mode

Peak Conducted Output Power

BLE

Channel 19: 2440MHz





6.4 MAXIMUM POWER SPECTRAL DENSITY

6.4.1 Applicable Standard

According to FCC Part 15.247(e) and KDB 558074 D01 15.247 Meas Guidance v05r02

6.4.2 Conformance Limit

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

6.4.3 Test Configuration

Test according to clause 5.1 radio frequency test setup 1

6.4.4 Test Procedure

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance

The transmitter output (antenna port) was connected to the spectrum analyzer

Set analyzer center frequency to DTS channel center frequency.

Set the span to 3MHz.

Set the RBW to: 3 kHz

Set the VBW to: 10 kHz.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

6.4.5 Test Results

Temperature:	23° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
Bluetooth V4.2 DTS	0	2402	-11.79	<8	PASS
	19	2440	-12.2	<8	PASS
	39	2480	-12.9	<8	PASS
Note: N/A					

Test Mode

BLE

Power Spectral Density

Channel 0: 2402MHz

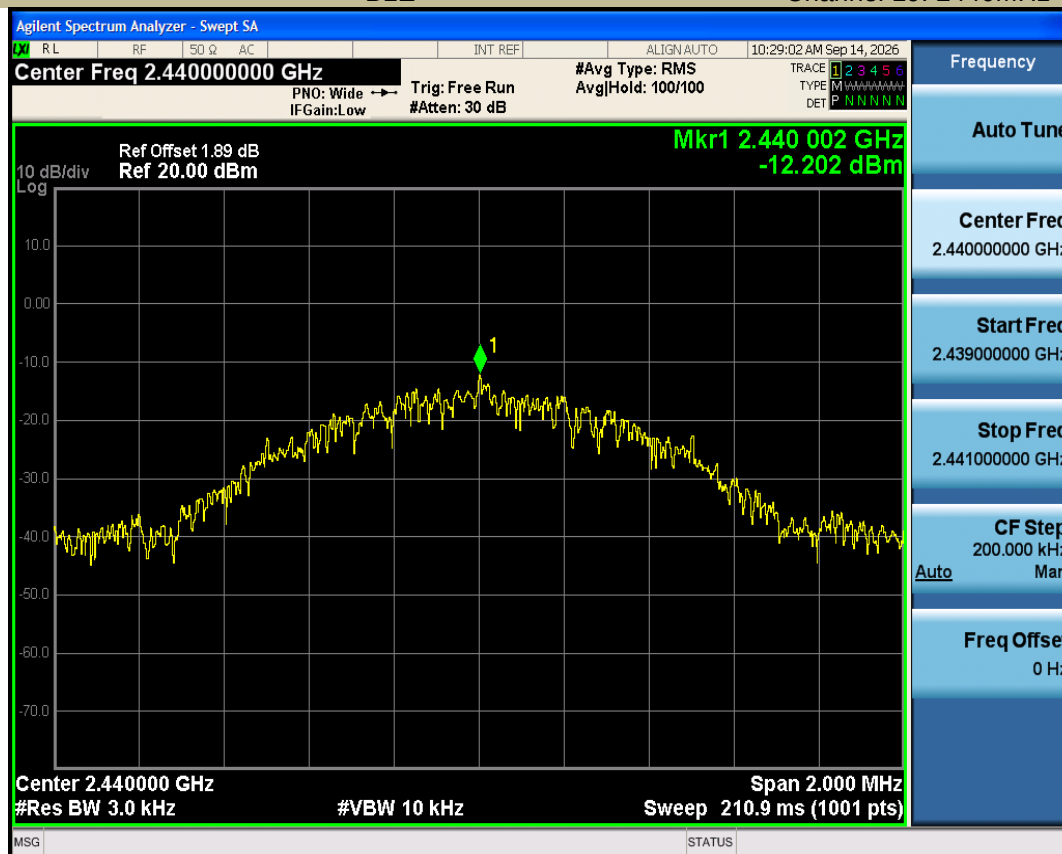


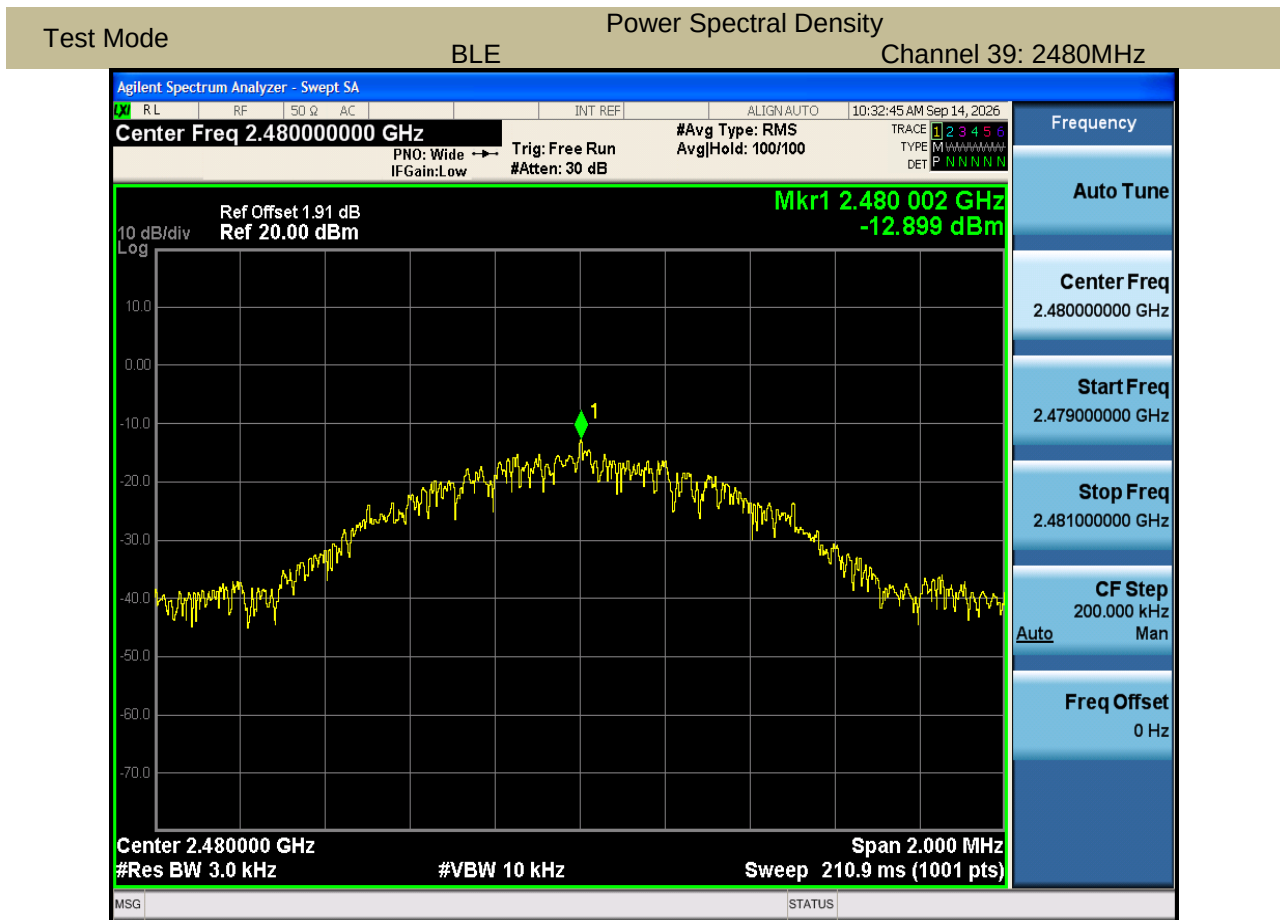
Test Mode

BLE

Power Spectral Density

Channel 19: 2440MHz





6.5 CONDUCT BAND EDGE AND SPURIOUS EMISSIONS MEASUREMENT

6.5.1 Applicable Standard

According to FCC Part 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02

6.5.2 Conformance Limit

According to FCC Part 15.247(d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted, provided the transmitter demonstrates compliance with the peak conducted power limits.

6.5.3 Test Configuration

Test according to clause 5.1 radio frequency test setup 1

6.5.4 Test Procedure

Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold.

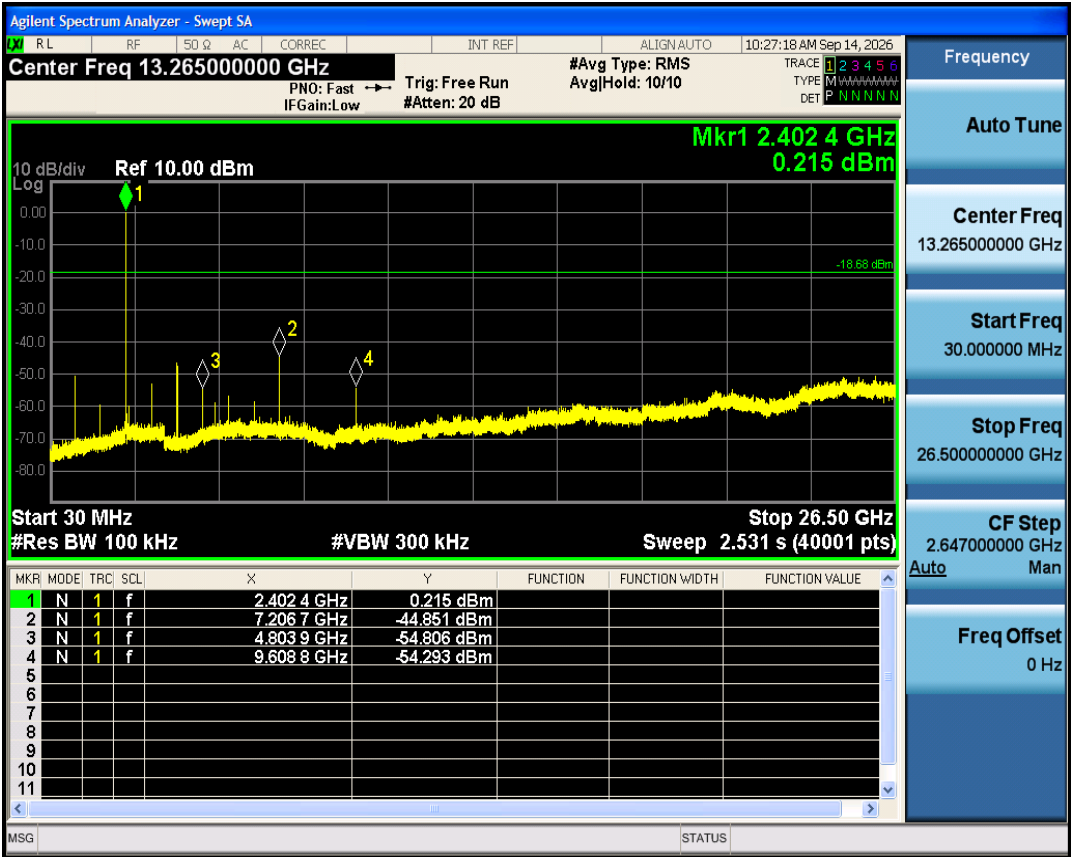
6.5.5 Test Results

Temperature:	23° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Test Model PSD(Power Spectral Density) RBW=100kHz
BLE Channel 0: 2402MHz



Test Model Unwanted Emissions in non-restricted frequency bands
BLE Channel 0: 2402MHz



Test Model

PSD(Power Spectral Density) RBW=100kHz
BLE

Channel 0: 2440MHz



Test Model

Unwanted Emissions in non-restricted frequency bands
BLE

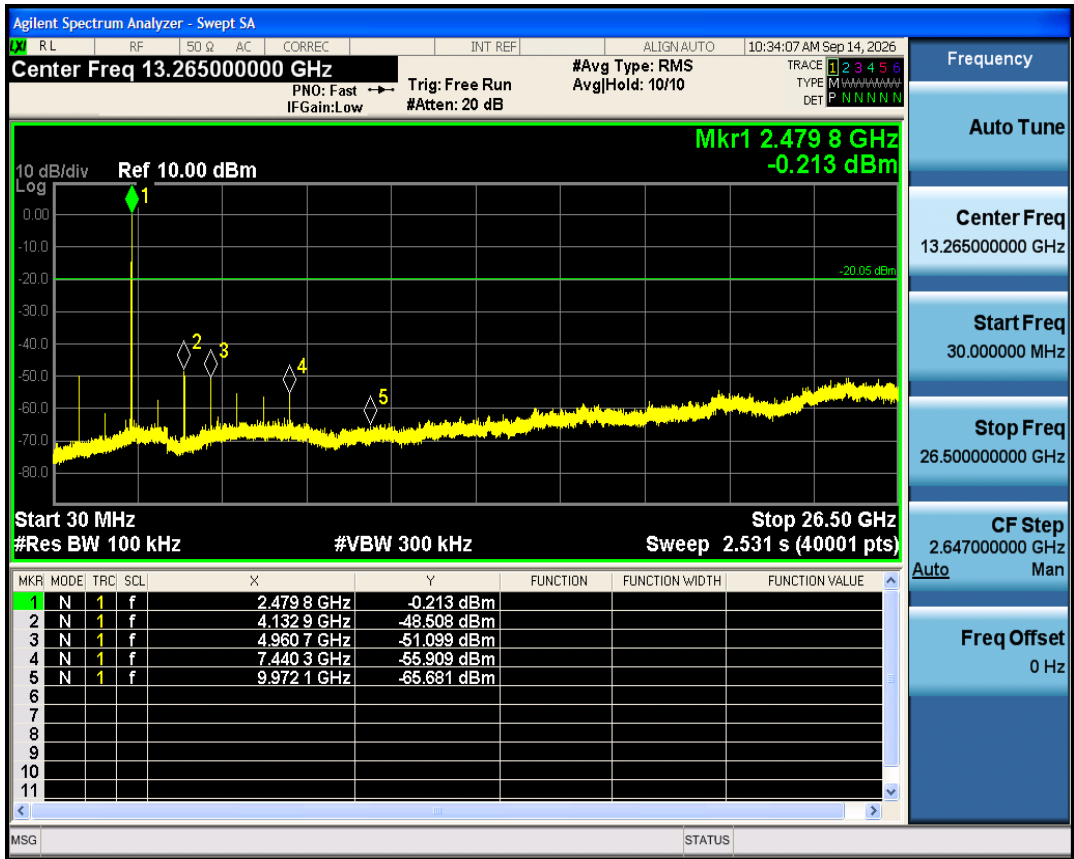
Channel 0: 2440MHz



Test Model PSD(Power Spectral Density) RBW=100kHz
BLE Channel 0: 2480MHz



Test Model Unwanted Emissions in non-restricted frequency bands
BLE Channel 0: 2480MHz







6.6 RADIATED SPURIOUS EMISSION

6.6.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and KDB 558074 D01 15.247 Meas Guidance v05r02

6.6.2 Conformance Limit

According to FCC Part 15.247(d): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part 15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	1718.8-1722.2	13.25-13.4
6.31175-6.31225	108-121.94	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

According to FCC Part 15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	2400/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

6.6.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

6.6.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz (1GHz to 25GHz), 100 kHz for $f < 1$ GHz (30MHz to 1GHz)

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in

three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Repeat above procedures until all frequency measured was complete.

6.6.5 Test Results

Temperature:	23° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

■ Spurious Emission below 30MHz (9KHz to 30MHz)

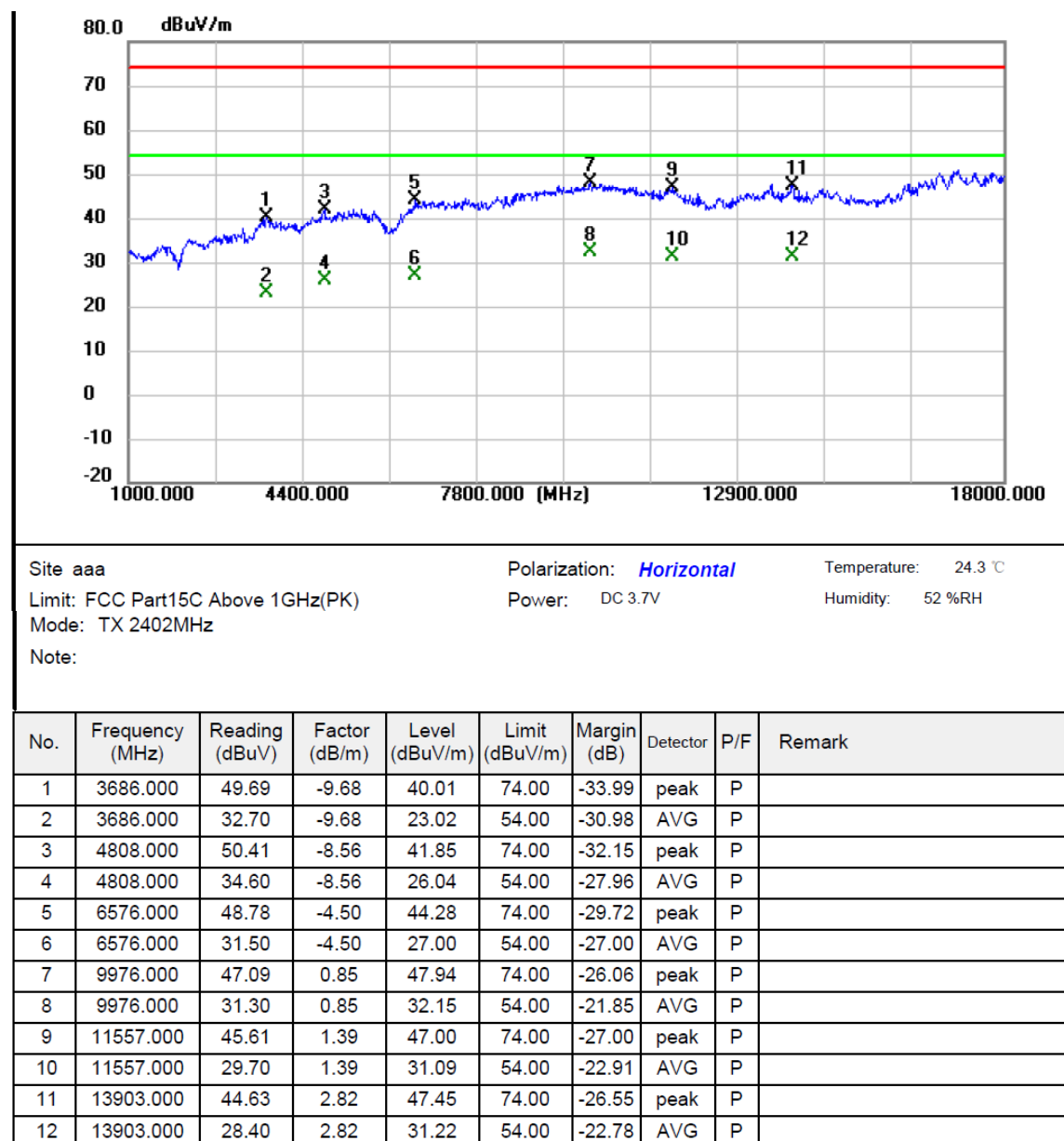
Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $40\log(\text{Specific distance}/\text{test distance})(\text{dB})$;

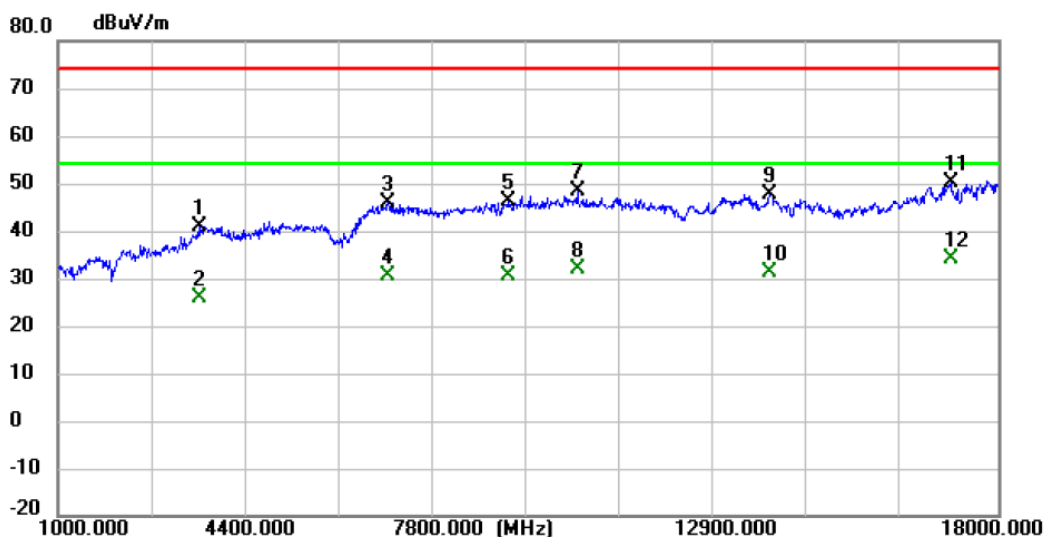
Limit line = Specific limits(dBuV) + distance extrapolation factor

■ Spurious Emission Above 1GHz (1GHz to 25GHz)

No frequency multiplication occurred during the test, so the evaluation was limited to 18 GHz.



*:Maximum data x:Over limit !:over margin



Site aaa

Polarization: **Vertical**

Temperature: 24.3 °C

Limit: FCC Part15C Above 1GHz(PK)

Power: DC 3.7V

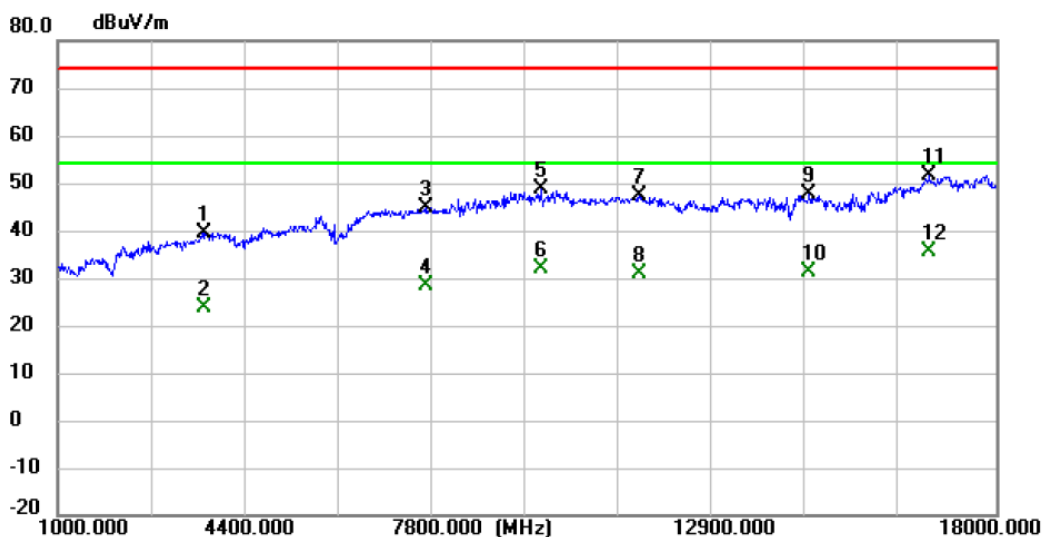
Humidity: 52 %RH

Mode: TX 2402MHz

Note:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	3550.000	51.42	-10.39	41.03	74.00	-32.97	peak	P	
2	3550.000	36.30	-10.39	25.91	54.00	-28.09	AVG	P	
3	6967.000	50.05	-4.14	45.91	74.00	-28.09	peak	P	
4	6967.000	34.50	-4.14	30.36	54.00	-23.64	AVG	P	
5	9143.000	47.14	-0.92	46.22	74.00	-27.78	peak	P	
6	9143.000	31.60	-0.92	30.68	54.00	-23.32	AVG	P	
7	10401.000	47.64	0.58	48.22	74.00	-25.78	peak	P	
8	10401.000	31.30	0.58	31.88	54.00	-22.12	AVG	P	
9	13886.000	44.98	2.87	47.85	74.00	-26.15	peak	P	
10	13886.000	28.30	2.87	31.17	54.00	-22.83	AVG	P	
11	17150.000	45.71	4.58	50.29	74.00	-23.71	peak	P	
12	17150.000	29.50	4.58	34.08	54.00	-19.92	AVG	P	

*:Maximum data x:Over limit !:over margin



Site aaa

Polarization: **Vertical**

Temperature: 23.8 °C

Limit: FCC Part15C Above 1GHz(PK)

Power: DC 3.7V

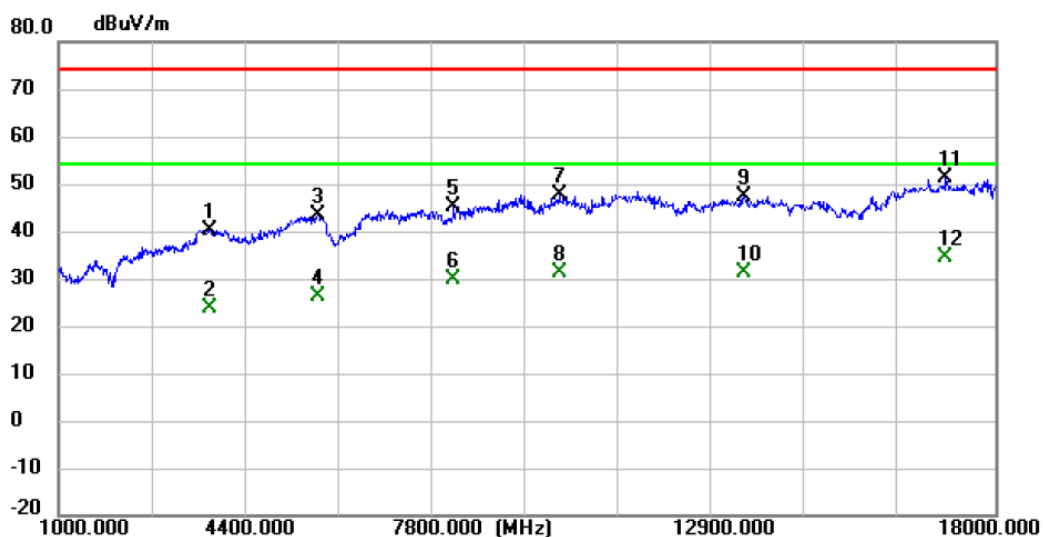
Humidity: 53 %RH

Mode: TX 2440MHz

Note:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	3652.000	49.26	-9.71	39.55	74.00	-34.45	peak	P	
2	3652.000	33.40	-9.71	23.69	54.00	-30.31	AVG	P	
3	7664.000	49.05	-4.23	44.82	74.00	-29.18	peak	P	
4	7664.000	32.70	-4.23	28.47	54.00	-25.53	AVG	P	
5	9755.000	48.13	0.47	48.60	74.00	-25.40	peak	P	
6	9755.000	31.50	0.47	31.97	54.00	-22.03	AVG	P	
7	11540.000	45.74	1.42	47.16	74.00	-26.84	peak	P	
8	11540.000	29.40	1.42	30.82	54.00	-23.18	AVG	P	
9	14617.000	46.61	0.98	47.59	74.00	-26.41	peak	P	
10	14617.000	30.30	0.98	31.28	54.00	-22.72	AVG	P	
11	16793.000	48.33	3.18	51.51	74.00	-22.49	peak	P	
12	16793.000	32.50	3.18	35.68	54.00	-18.32	AVG	P	

*:Maximum data x:Over limit !:over margin



Site aaa

Polarization: **Horizontal**

Temperature: 23.8 °C

Limit: FCC Part15C Above 1GHz(PK)

Power: DC 3.7V

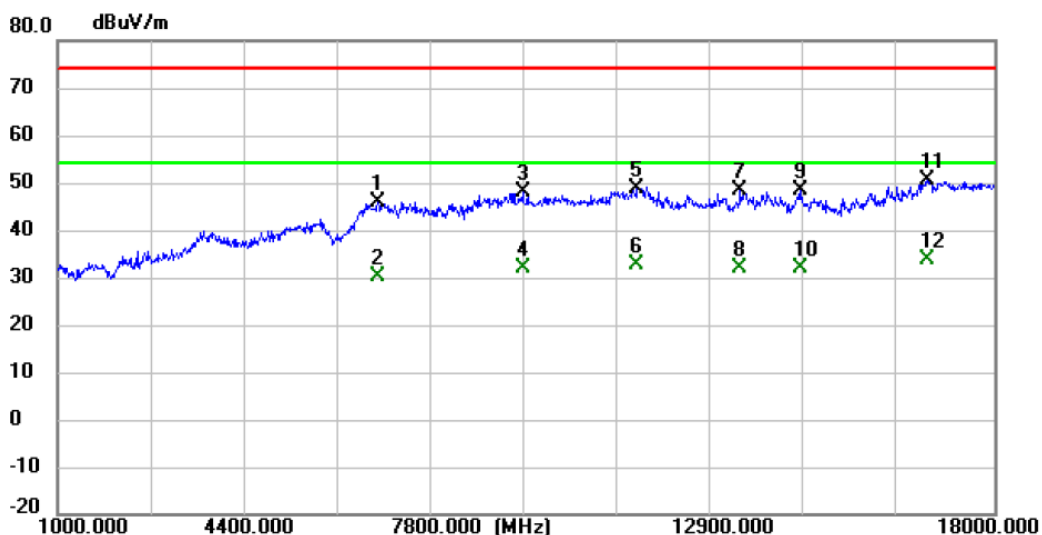
Humidity: 53 %RH

Mode: TX 2440MHz

Note:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	3737.000	49.94	-9.61	40.33	74.00	-33.67	peak	P	
2	3737.000	33.50	-9.61	23.89	54.00	-30.11	AVG	P	
3	5709.000	49.82	-6.55	43.27	74.00	-30.73	peak	P	
4	5709.000	32.70	-6.55	26.15	54.00	-27.85	AVG	P	
5	8174.000	48.11	-2.88	45.23	74.00	-28.77	peak	P	
6	8174.000	32.70	-2.88	29.82	54.00	-24.18	AVG	P	
7	10095.000	46.98	0.82	47.80	74.00	-26.20	peak	P	
8	10095.000	30.40	0.82	31.22	54.00	-22.78	AVG	P	
9	13444.000	43.66	3.61	47.27	74.00	-26.73	peak	P	
10	13444.000	27.50	3.61	31.11	54.00	-22.89	AVG	P	
11	17099.000	46.74	4.45	51.19	74.00	-22.81	peak	P	
12	17099.000	30.10	4.45	34.55	54.00	-19.45	AVG	P	

*:Maximum data x:Over limit !:over margin



Site aaa

Polarization: **Horizontal**

Temperature: 24.1 °C

Limit: FCC Part15C Above 1GHz(PK)

Power: DC 3.7V

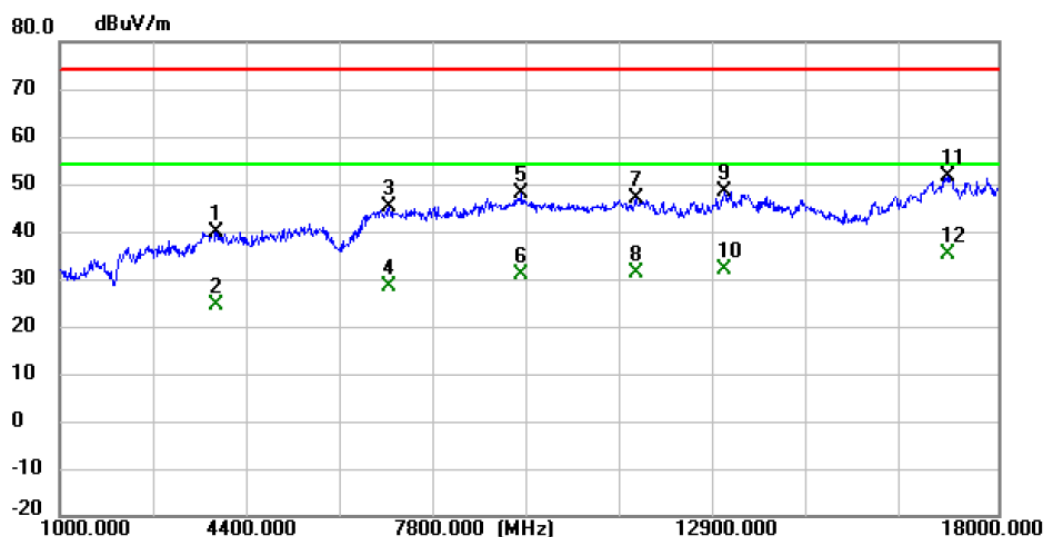
Humidity: 52 %RH

Mode: TX 2480MHz

Note:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	6814.000	50.36	-4.34	46.02	74.00	-27.98	peak	P	
2	6814.000	34.60	-4.34	30.26	54.00	-23.74	AVG	P	
3	9449.000	47.38	0.55	47.93	74.00	-26.07	peak	P	
4	9449.000	31.50	0.55	32.05	54.00	-21.95	AVG	P	
5	11523.000	47.45	1.46	48.91	74.00	-25.09	peak	P	
6	11523.000	31.30	1.46	32.76	54.00	-21.24	AVG	P	
7	13393.000	44.81	3.48	48.29	74.00	-25.71	peak	P	
8	13393.000	28.50	3.48	31.98	54.00	-22.02	AVG	P	
9	14498.000	47.06	1.25	48.31	74.00	-25.69	peak	P	
10	14498.000	30.60	1.25	31.85	54.00	-22.15	AVG	P	
11	16776.000	47.42	3.10	50.52	74.00	-23.48	peak	P	
12	16776.000	30.50	3.10	33.60	54.00	-20.40	AVG	P	

*:Maximum data x:Over limit !:over margin



Site aaa

Polarization: **Vertical**

Temperature: 24.1 °C

Limit: FCC Part15C Above 1GHz(PK)

Power: DC 3.7V

Humidity: 52 %RH

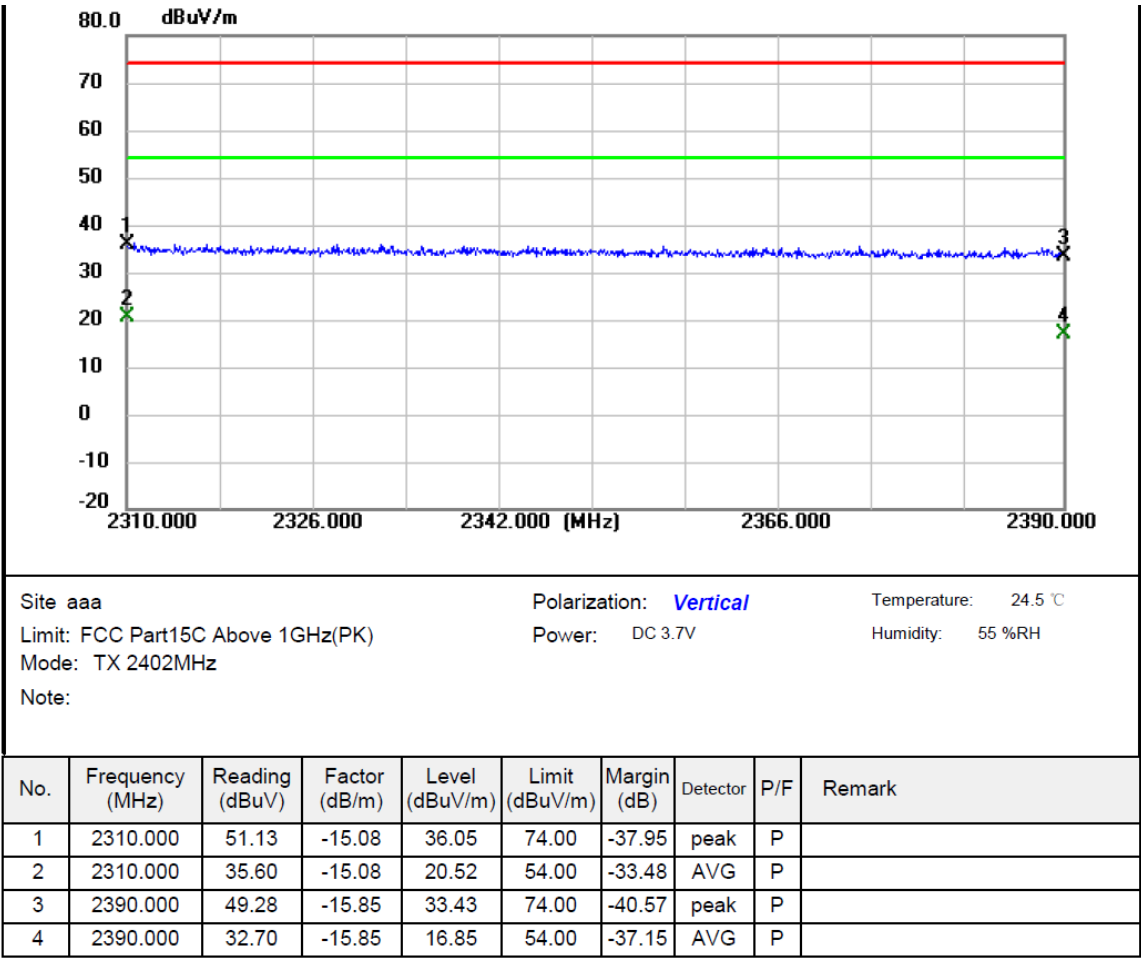
Mode: TX 2480MHz

Note:

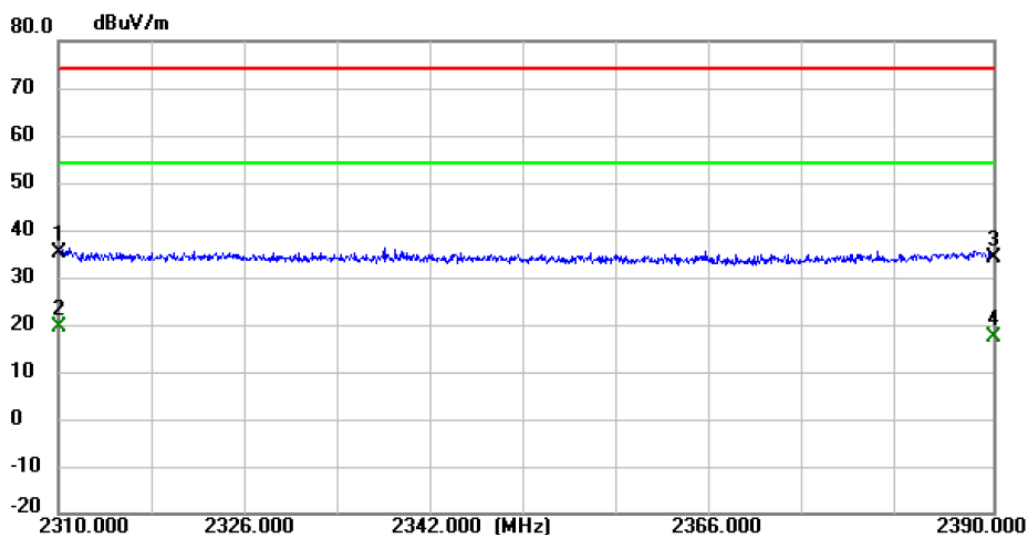
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	3839.000	49.53	-9.69	39.84	74.00	-34.16	peak	P	
2	3839.000	34.10	-9.69	24.41	54.00	-29.59	AVG	P	
3	6967.000	49.44	-4.14	45.30	74.00	-28.70	peak	P	
4	6967.000	32.70	-4.14	28.56	54.00	-25.44	AVG	P	
5	9364.000	47.60	0.39	47.99	74.00	-26.01	peak	P	
6	9364.000	30.60	0.39	30.99	54.00	-23.01	AVG	P	
7	11438.000	45.60	1.46	47.06	74.00	-26.94	peak	P	
8	11438.000	29.80	1.46	31.26	54.00	-22.74	AVG	P	
9	13053.000	45.83	2.64	48.47	74.00	-25.53	peak	P	
10	13053.000	29.30	2.64	31.94	54.00	-22.06	AVG	P	
11	17099.000	47.27	4.45	51.72	74.00	-22.28	peak	P	
12	17099.000	30.70	4.45	35.15	54.00	-18.85	AVG	P	

*:Maximum data x:Over limit !:over margin

■ Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz



*:Maximum data x:Over limit !:over margin



Site aaa

Polarization: **Horizontal**

Temperature: 24.5 °C

Limit: FCC Part15C Above 1GHz(PK)

Power: DC 3.7V

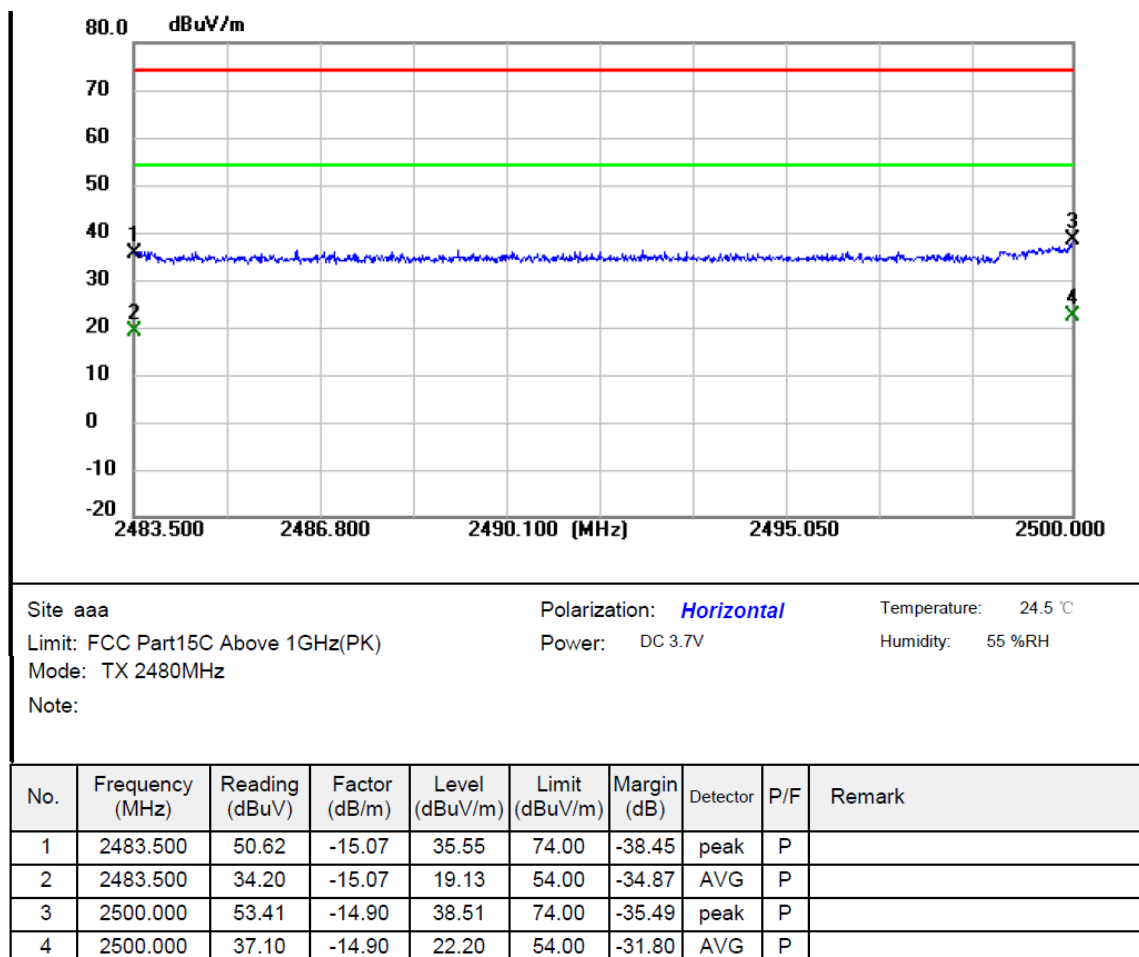
Humidity: 55 %RH

Mode: TX 2402MHz

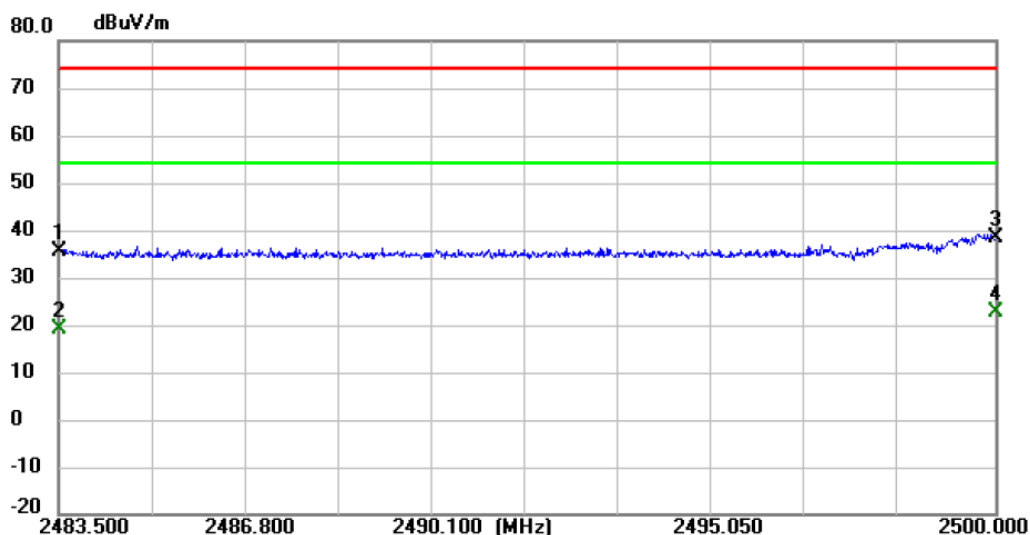
Note:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	2310.000	50.36	-15.08	35.28	74.00	-38.72	peak	P	
2	2310.000	34.50	-15.08	19.42	54.00	-34.58	AVG	P	
3	2390.000	49.80	-15.85	33.95	74.00	-40.05	peak	P	
4	2390.000	33.10	-15.85	17.25	54.00	-36.75	AVG	P	

*:Maximum data x:Over limit !:over margin



*:Maximum data x:Over limit !:over margin



Site aaa

Polarization: *Vertical*

Temperature: 24.5 °C

Limit: FCC Part15C Above 1GHz(PK)

Power: DC 3.7V

Humidity: 55 %RH

Mode: TX 2480MHz

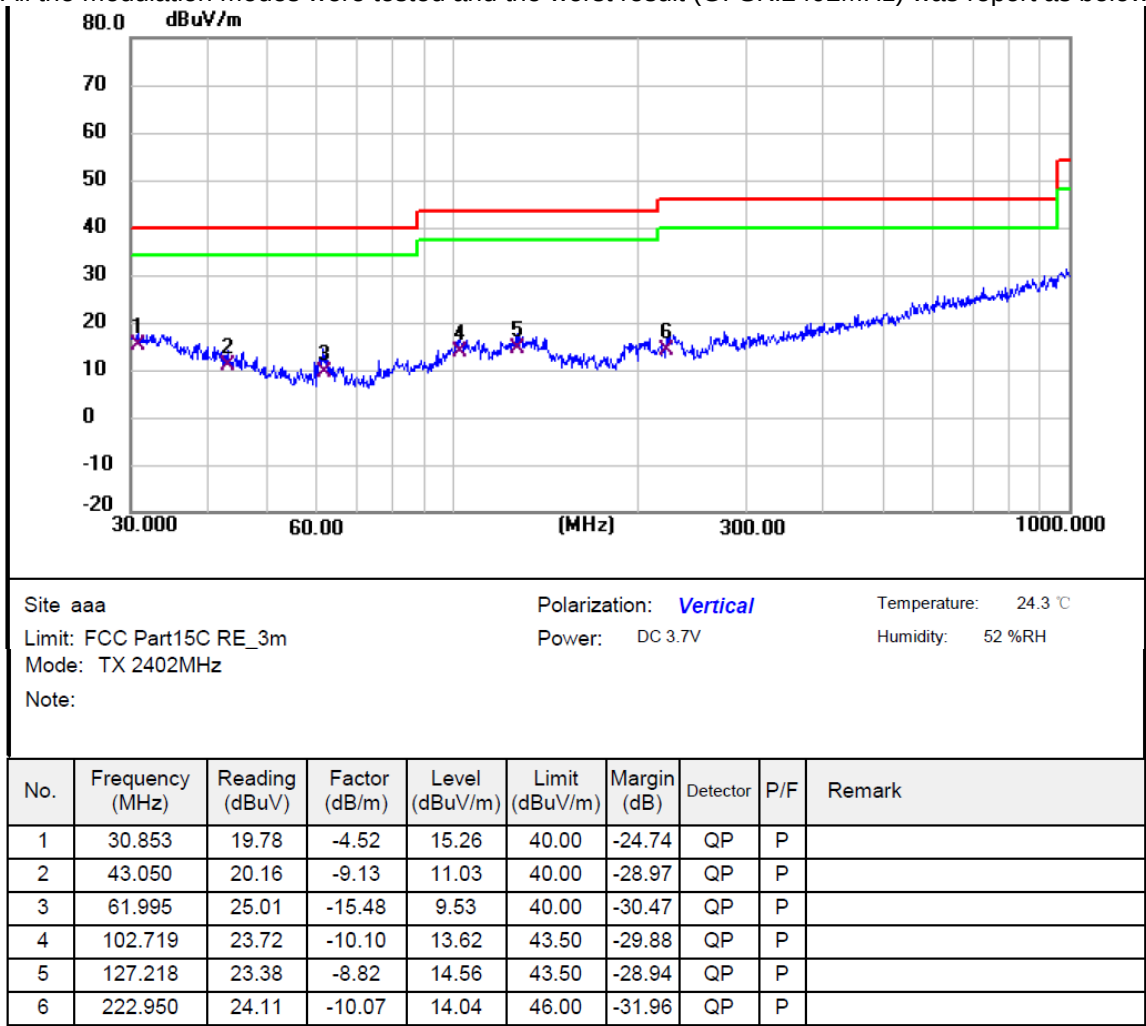
Note:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	2483.500	50.69	-15.07	35.62	74.00	-38.38	peak	P	
2	2483.500	34.00	-15.07	18.93	54.00	-35.07	AVG	P	
3	2500.000	53.37	-14.90	38.47	74.00	-35.53	peak	P	
4	2500.000	37.60	-14.90	22.70	54.00	-31.30	AVG	P	

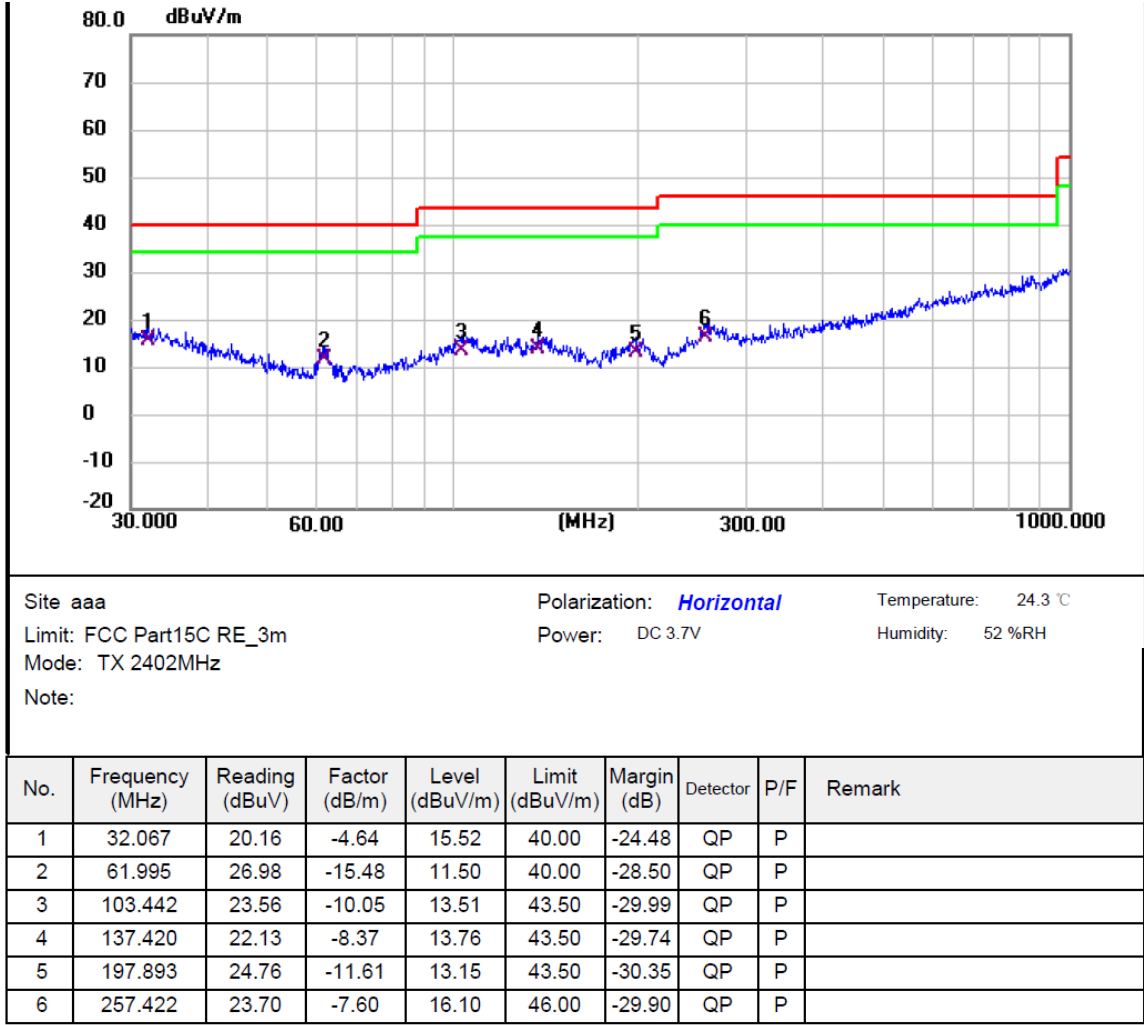
*:Maximum data x:Over limit !:over margin

■ Spurious Emission below 1GHz (30MHz to 1GHz)

All the modulation modes were tested and the worst result (GFSK:2402MHz) was report as below:



*:Maximum data x:Over limit !:over margin



*:Maximum data x:Over limit !:over margin

6.7 CONDUCTED EMISSION TEST

6.7.1 Applicable Standard

According to FCC Part 15.207(a)

6.7.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50
Note: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.		

Remark: Test results were obtained from the following equation:

$$\text{Measurement (dB}\mu\text{V)} = \text{LISN Factor (dB)} + \text{Cable Loss (dB)} + \text{Reading (dB}\mu\text{V)}$$

$$\text{Margin (dB)} = \text{Measurement (dB}\mu\text{V)} - \text{Limit (dB}\mu\text{V)}$$

6.7.3 Test Configuration

Test according to clause 6.3 conducted emission test setup

6.7.4 Test Procedure

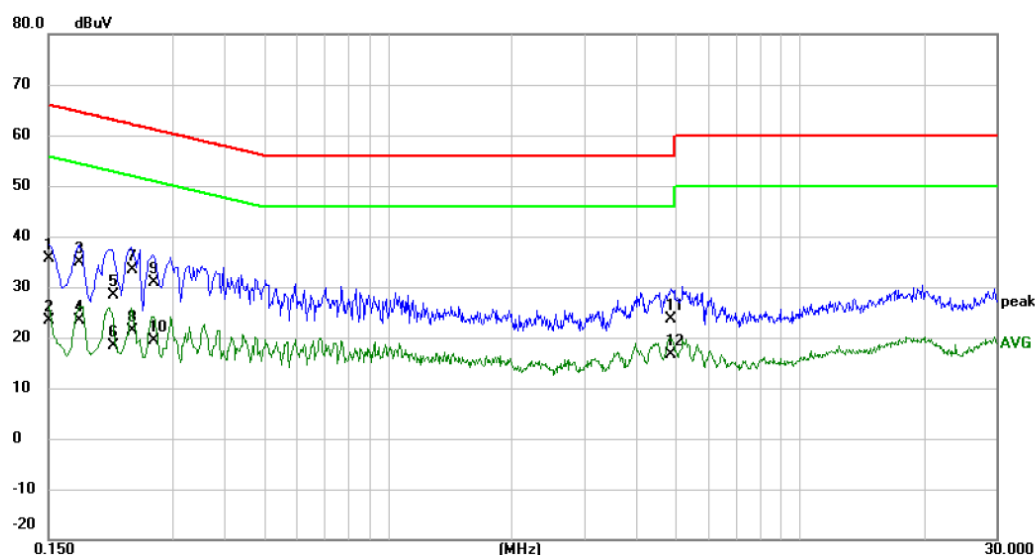
The EUT was placed on a table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Repeat above procedures until all frequency measured were complete.

6.7.5 Test Results

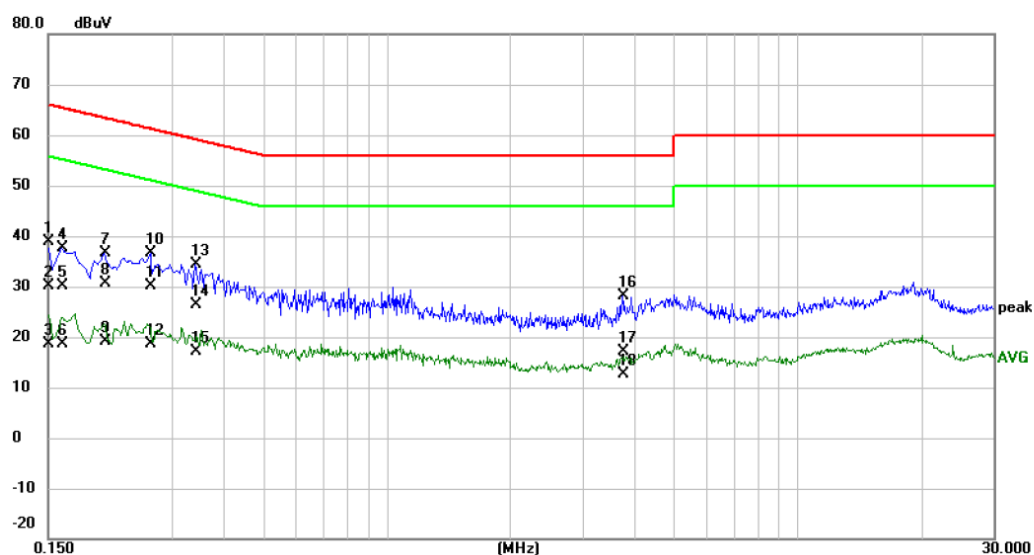
PASS.



Site: Phase: **N** Temperature: 24.5
 Limit: FCC Part 15C Conduction(OP) Power: AC120V/60Hz Humidity: 55 %
 M/N: F1
 Mode: Communication mode
 Note:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	16.15	19.55	35.70	66.00	-30.30	QP		
2	0.1500	3.90	19.55	23.45	56.00	-32.55	AVG		
3	0.1780	15.28	19.55	34.83	64.58	-29.75	QP		
4	0.1780	3.81	19.55	23.36	54.58	-31.22	AVG		
5	0.2140	8.82	19.55	28.37	63.05	-34.68	QP		
6	0.2140	-1.21	19.55	18.34	53.05	-34.71	AVG		
7	0.2380	13.91	19.54	33.45	62.17	-28.72	QP		
8	0.2380	1.75	19.54	21.29	52.17	-30.88	AVG		
9	0.2700	11.36	19.54	30.90	61.12	-30.22	QP		
10	0.2700	-0.23	19.54	19.31	51.12	-31.81	AVG		
11	4.8540	4.06	19.61	23.67	56.00	-32.33	QP		
12	4.8540	-3.05	19.61	16.56	46.00	-29.44	AVG		

*:Maximum data x:Over limit !:over margin



Site: Phase: **L1** Temperature: 24.5
 Limit: FCC Part 15C Conduction(QP) Power: AC120V/60Hz Humidity: 55 %
 M/N: F1
 Mode: Communication mode
 Note:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	19.36	19.53	38.89	66.00	-27.11	peak		
2	0.1500	10.48	19.53	30.01	66.00	-35.99	QP		
3	0.1500	-1.01	19.53	18.52	56.00	-37.48	AVG		
4	0.1620	18.16	19.53	37.69	65.36	-27.67	peak		
5	0.1620	10.63	19.53	30.16	65.36	-35.20	QP		
6	0.1620	-0.82	19.53	18.71	55.36	-36.65	AVG		
7	0.2060	17.00	19.54	36.54	63.37	-26.83	peak		
8	0.2060	11.00	19.54	30.54	63.37	-32.83	QP		
9	0.2060	-0.33	19.54	19.21	53.37	-34.16	AVG		
10	0.2660	17.21	19.53	36.74	61.24	-24.50	peak		
11	0.2660	10.69	19.53	30.22	61.24	-31.02	QP		
12	0.2660	-0.80	19.53	18.73	51.24	-32.51	AVG		
13	0.3420	14.72	19.54	34.26	59.15	-24.89	peak		
14	0.3420	6.88	19.54	26.42	59.15	-32.73	QP		

*:Maximum data x:Over limit !:over margin

6.8 ANTENNA APPLICATION

6.8.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

6.8.2 Result

PASS.

The EUT has 1 antenna: a PCB Antenna for BLE with classic mode, the gain is -0.93 dBi;

Note: ☒ Antenna use a permanently attached antenna which is not replaceable.
☐ Not using a standard antenna jack or electrical connector for antenna replacement
☐ The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.

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

免责声明

Legal Disclaimer

1. 报告无“检测报告专用章”或检验单位公章无效。

This report is invalid without "special seal for test report" or official seal of inspection unit.

2. 报告无主检、审核、批准人签名无效。

The report is invalid without the signature of the principal inspector, auditor and approver.

3. 报告如有涂改或页码缺失则无效。

Reports with corrections or missing page numbers are invalid.

4. 本检测报告以实测值进行符合性判定，未考虑不确定度所带来的风险，本实验室不承担相关责任，特别约定、标准或规范中有明确规定的除外；

The test results or observations are provided in accordance with measured value, without taking risks caused by uncertainty into account. Without explicit stipulation in special agreements, standards or regulations, Pubiao shall not assume any responsibility.

4. 对检验报告若有异议，应于收到报告之日起十五日内向检验单位提出，过期不予受理。

Any objection to the inspection report shall be submitted to the inspection unit within 15 days from the date of receipt of the report.

5. 本次检测结果仅对收到的客户样品负责。

The test results are only responsible to the samples received from customers.

6. 未经实验室批准不得部分复制报告

Partial reproduction of the report shall not be permitted without laboratory approval.

地 址：广东省东莞市石碣镇石碣铭华路30号1号楼101室

Address: Room 101, Building 1, No.30, Minghua Road, Shijie, Shijie Town, Dongguan, Guangdong, China.

电话总机/Tel.: +86 769-8181 3516

传 真/Fax.: +86 769-8181 3536