

# **TEST REPORT**

Product Name : Tablet PC Model Number : SJM2102

FCC ID : 2A2SP-SJMB

Prepared for : Smart Communications Holding, Inc.

Address : 10491 72nd Street, Seminole, FL 33777, USA

Prepared by : EMTEK (SHENZHEN) CO., LTD.

Address : Building 69, Majialong Industry Zone, Nanshan District,

Shenzhen, Guangdong, China

Tel: (0755) 26954280 Fax: (0755) 26954282

Report Number : ENS2307100147W00202R

Date(s) of Tests : July 13, 2023 to August 8, 2023

Date of issue : August 9, 2023



## **TABLE OF CONTENTS**

1 TEST RESULT CERTIFICATION	4
2 EUT TECHNICAL DESCRIPTION	5
3 SUMMARY OF TEST RESULT	6
4 TEST METHODOLOGY	7
4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS	7
5 FACILITIES AND ACCREDITATIONS	9
5.1 FACILITIES5.2 LABORATORY ACCREDITATIONS AND LISTINGS	9
6 TEST SYSTEM UNCERTAINTY	
7 SETUP OF EQUIPMENT UNDER TEST	11
7.1 RADIO FREQUENCY TEST SETUP 1	11 13 14
8 TEST REQUIREMENTS	15
8.1 DTS 6DB BANDWIDTH	



## **Modified Information**

Version	Report No.	Revision Date	Summary
Ver.1.0	ENS2307100147W00202R	1	Original Report



## 1 TEST RESULT CERTIFICATION

Applicant : Smart Communications Holding, Inc.

Address: 10491 72nd Street, Seminole, FL 33777, USA

Manufacturer : Estone Technology LTD

Address: 2F,Building No.1, Jia'an Industrial Park,No.2 Long Chang Road, Bao'an,

Shenzhen 518101, China.

EUT : Tablet PC

Model Name : SJM2102

Trademark : Smart Communications

## **Measurement Procedure Used:**

APPLICABLE STANDARDS				
STANDARD	TEST RESULT			
FCC 47 CFR Part 2 , Subpart J FCC 47 CFR Part 15, Subpart C	PASS			

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

Date of Test :	July 13, 2023 to August 8, 2023
Prepared by :	Una yu
	Una Yu/Editor
Reviewer :	Tue Ha SHENZHEN,
	Joe Xia/Supervisor
Approved 9 Authorized Signer	The state of the s
Approved & Authorized Signer :	Lisa Wang/Manager ESTING
	3 0 111



## **2 EUT TECHNICAL DESCRIPTION**

Product	Tablet PC	
Model Number	SJM2102	
Device Type	Bluetooth with BLE mode	
Data Rate	1Mbps/2Mbps for GFSK modulation	
Modulation	GFSK	
Operating Frequency Range	2402-2480MHz	
Number of Channels	40 Channels	
Antenna Type	Integrated Antenna	
Antenna Gain	1.05 dBi	
Power Supply	Battery 3.7V, 3940mAh, 14.58Wh DC 5V by USB Port	
Temperature Range	0°C ~ 45°C	

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



## 3 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)	Unwanted Emission Into Non-Restricted Frequency Bands	PASS		
15.247(d) 15.209	Unwanted Emission Into Restricted Frequency Bands (conducted)	PASS		
15.247(d) 15.209	Radiated Spurious Emission	PASS		
15.207	Conducted Emission Test	PASS		
15.247(b)	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: 2A2SP-SJMB** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.



## 4 TEST METHODOLOGY

## 4.1 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

## 4.2 MEASUREMENT EQUIPMENT USED

## For Conducted Emission Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde & Schwarz	ESCI	101384	2023/5/13	1Year
AMN	Rohde & Schwarz	ENV216	101161	2023/5/13	1Year

For Spurious Emissions Test

Equipment	Manufacturer Model No. Serial No.		Last Cal.	Cal. Interval	
Pre-Amplifier	Bonn	BLMA 011001N	2213967A	2022/10/31	1Year
EMI Test Receiver	Rohde & Schwarz	ESR7	102551	2022/10/31	1Year
Bilog Antenna	Schwarzbeck	VULB9163	9163142	2022/7/24	2Year
Horn antenna	Schwarzbeck	BBHA9120D	9120D-1198	2023/6/2	2Year
Pre-Amplifier	Bonn	BLMA 0118-5G	2213967B-01	2022/10/31	1Year
Spectrum Analyzer	Rohde & Schwarz	FSV3044	101290	2022/10/31	1Year
Horn antenna	Schwarzbeck	BBHA9170	9170-399	2023/5/12	2Year
Pre-Amplifier	Lunar EM	LNA18G26-40	J1012131010 001	2023/5/10	1Year
Pre-Amplifier	Lunar EM	LNA26G40-40	J1013131028 001	2023/5/10	1Year
Loop Antenna	Schwarzbeck	FMZB1519	1519-012	2023/5/12	2Year

## **For Other Test**

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Wideband Radio Communication Tester	R&S	CMW500	171168	2022/11/2	1Year
Frequency Extender	R&S	CMW-Z800A	100430	2022/11/2	1Year
Spectrum Analyzer	R&S	FSV3044	MY60242456	2022/11/2	1Year
Analog Signal Generator	R&S	SMB100A	MY61252625	2022/11/2	1Year
Vector Signal Generator	R&S	SMM100A	MY61252674	2022/11/2	1Year
RF Control Unit	Tonscend	JS0806-2	22C8060567	2022/11/2	1Year
Temperature&Hum idity Chamber	ESPEC	EL-02KA	12107166	2023/5/10	1 Year



## 4.3 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 and 2Mbps) 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	/ A	
1	2404	20	2442	37	2476
2	2406	21	2444	38	2478
				39	2480
Note: fc=2402MHz+k×1MHz k=1 to 39					

## Test Frequency and channel for BLE:

Lowest I	Lowest Frequency		requency	Highe	st Frequency
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	19	2440	39	2480



## 5 FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

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

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

## 5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : Accredited by CNAS

The Certificate Registration Number is L2291

The Laboratory has been assessed and proved to be in compliance with

CNAS-CL01 (identical to ISO/IEC 17025:2017)

Accredited by FCC

Designation Number: CN1204

Test Firm Registration Number: 882943

Accredited by A2LA

The Certificate Number is 4321.01

**Accredited by Industry Canada** 

The Conformity Assessment Body Identifier is CN0008

Name of Firm : EMTEK (SHENZHEN) CO., LTD.

Site Location : Building 69, Majialong Industry Zone, Nanshan District, Shenzhen,

Guangdong, China



## **6 TEST SYSTEM UNCERTAINTY**

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

Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0dB
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5°C
Humidity	±3%

Measurement Uncertainty for a level of Confidence of 95%.

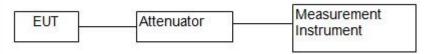




## 7 SETUP OF EQUIPMENT UNDER TEST

## 7.1 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.



## 7.2 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 C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

#### 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 specified distance from the EUT.

### 30MHz-1GHz:

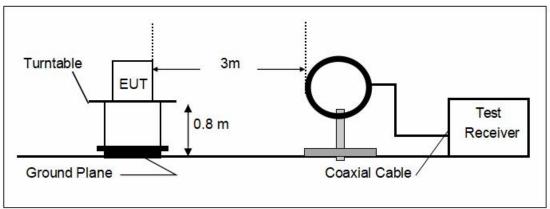
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is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

## Above 1GHz:

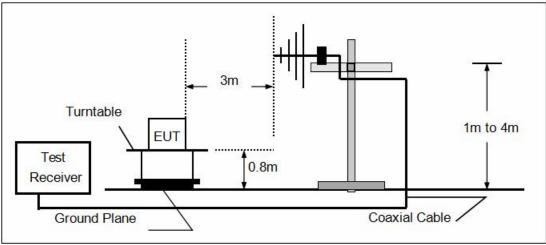
The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is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



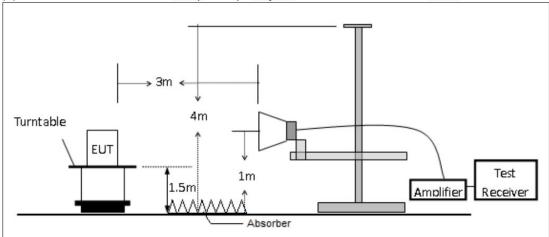
## (a) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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

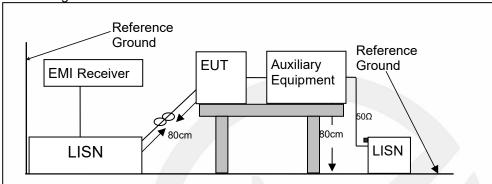




## 7.3 CONDUCTED EMISSION TEST SETUP

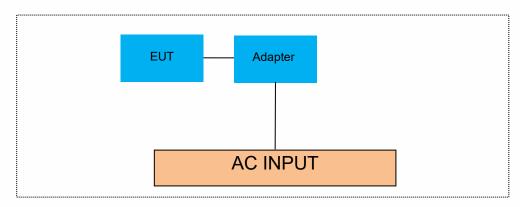
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All 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 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 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.





## 7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



## 7.5 SUPPORT EQUIPMENT

N/A





## 8 TEST REQUIREMENTS

### 8.1 DTS 6DB BANDWIDTH

## 8.1.1 Applicable Standard

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

#### 8.1.2 Conformance Limit

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

## 8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1.

## 8.1.4 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 = 100 kHz.

Set the video bandwidth (VBW) =300 kHz.

Set Span=2 times 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.

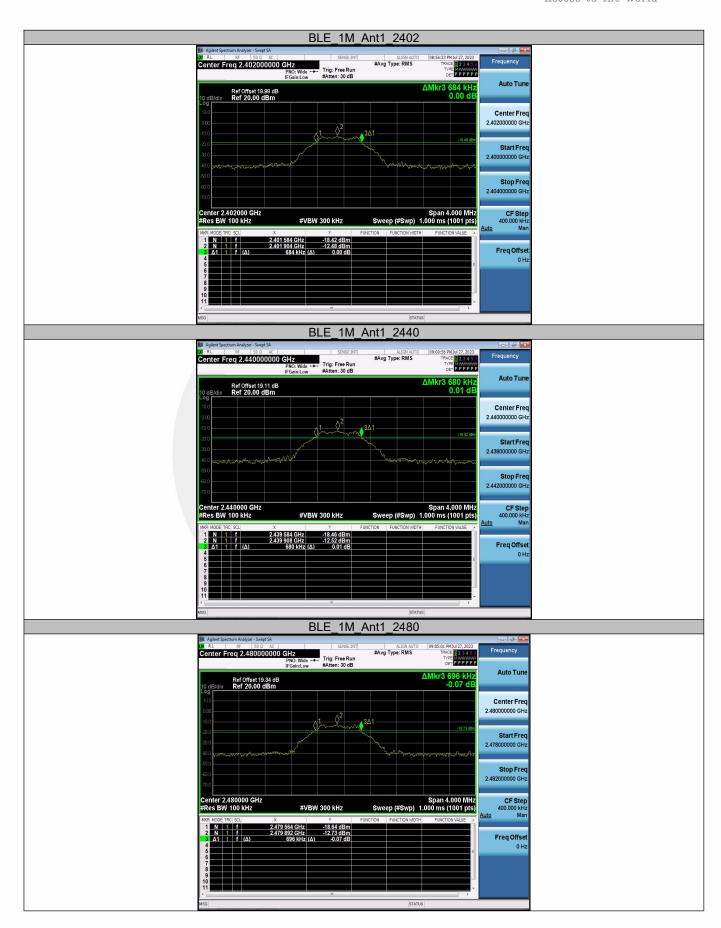
Measure and record the results in the test report.

#### **Test Results**

Temperature:	25° C
Relative Humidity:	45%
ATM Pressure:	1011 mbar

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2402	0.684	2401.584	2402.268	0.5	PASS
BLE_1M	Ant1	2440	0.680	2439.584	2440.264	0.5	PASS
		2480	0.696	2479.564	2480.260	0.5	PASS
		2402	1.216	2401.276	2402.492	0.5	PASS
BLE_2M	Ant1	2440	1.104	2439.368	2440.472	0.5	PASS
		2480	1.152	2479.332	2480.484	0.5	PASS











#### 8.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

## 8.2.1 Applicable Standard

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

### 8.2.2 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).

## 8.2.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1.

### 8.2.4 Test Procedure

## ■ According to FCC Part15.247(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 =3\*RBW(about 3MHz).

Set the span  $\geq 3*RBW$ .

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):

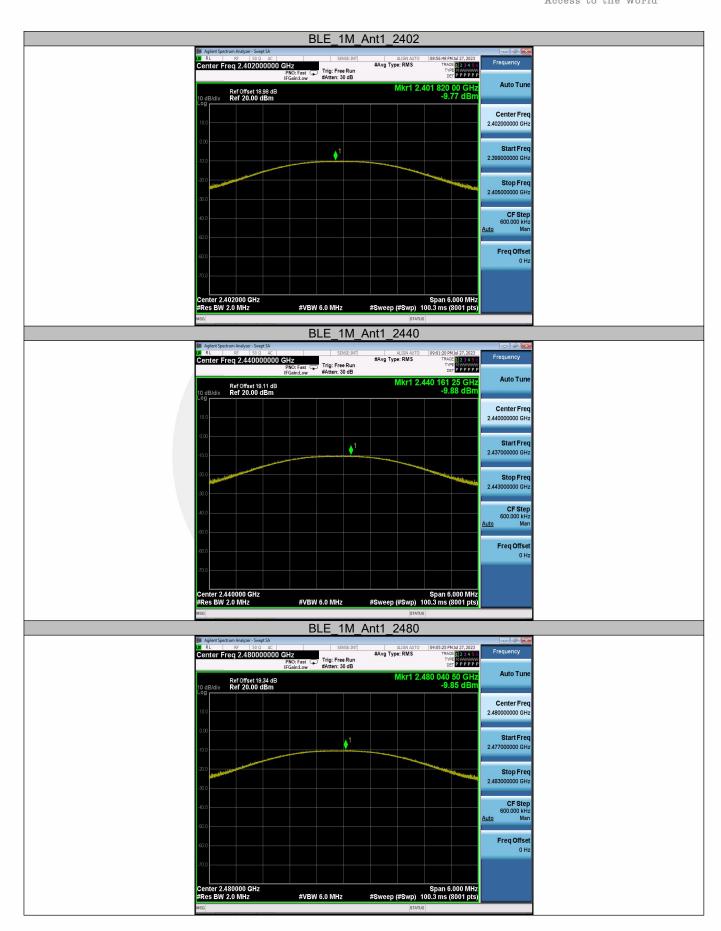
Conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced 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**

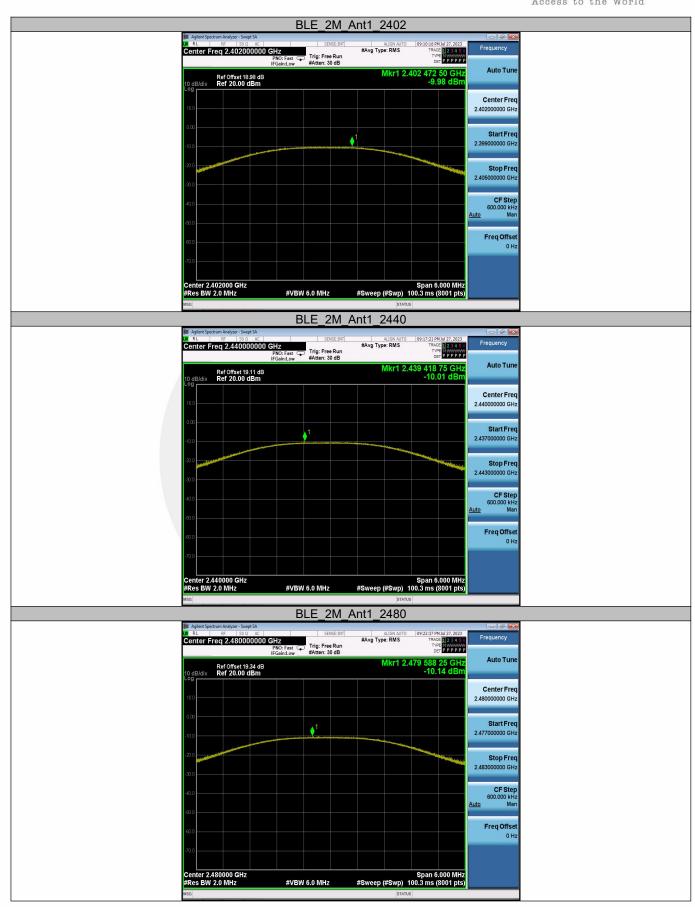
Temperature:	25° C
Relative Humidity:	45%
ATM Pressure:	1011 mbar

TestMode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
		2402	-9.77	≤30	-8.72	≤36	PASS
BLE_1M	Ant1	2440	-9.88	≤30	-8.83	≤36	PASS
		2480	-9.85	≤30	-8.8	≤36	PASS
		2402	-9.99	≤30	-8.94	≤36	PASS
BLE_2M	Ant1	2440	-10.01	≤30	-8.96	≤36	PASS
		2480	-10.14	≤30	-9.09	≤36	PASS











### 8.3 MAXIMUM POWER SPECTRAL DENSITY

## 8.3.1 Applicable Standard

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

#### 8.3.2 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.

## 8.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1.

#### 8.3.4 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 1.5 times the DTS bandwidth.

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.

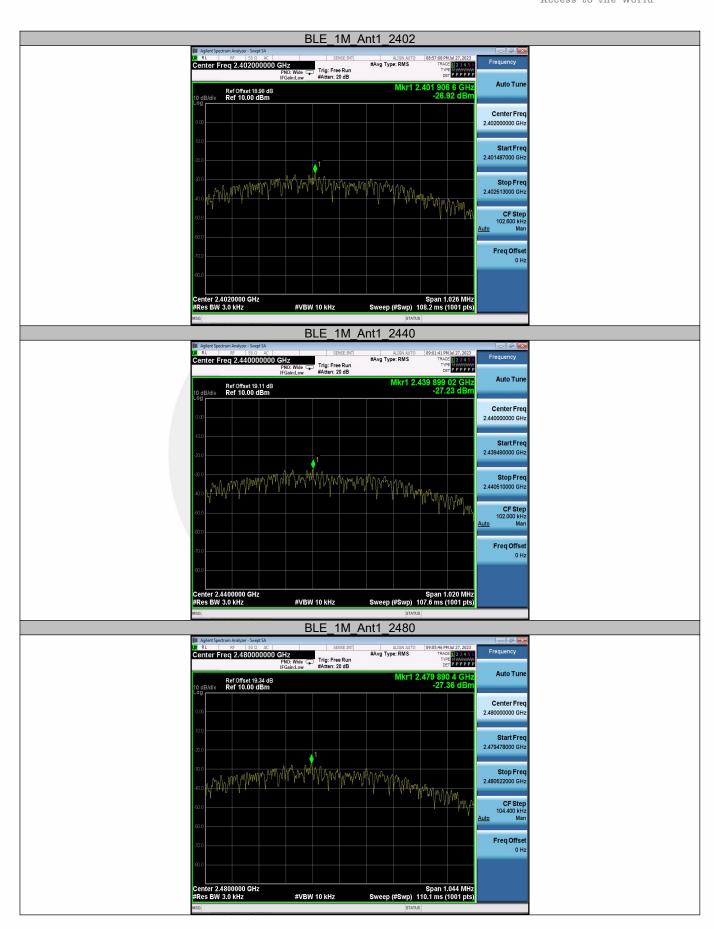
Use the peak marker function to determine the maximum amplitude level within the RBW.

### 8.3.5 Test Results

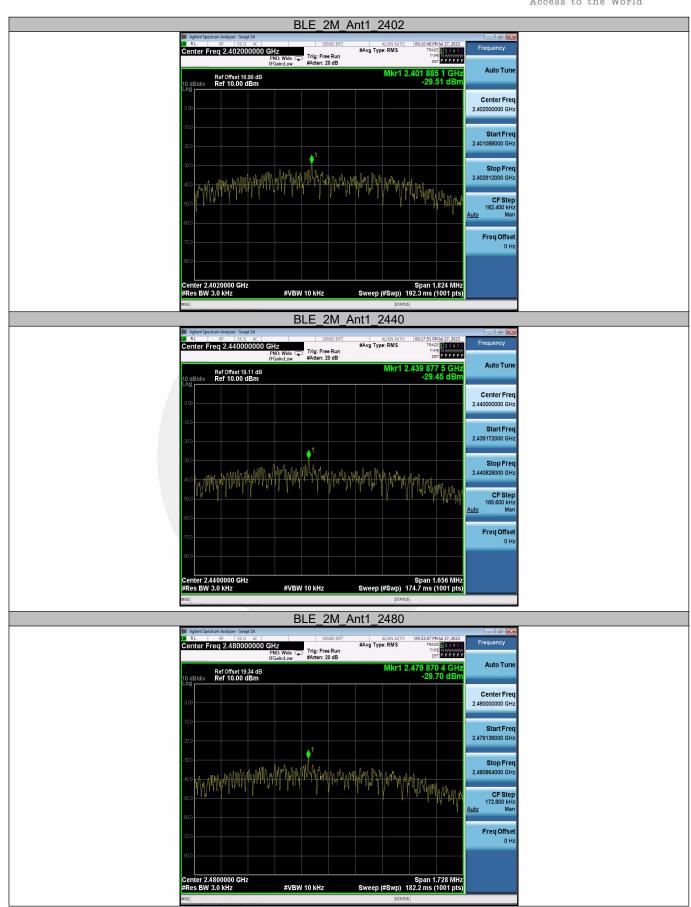
Temperature:	25° C
Relative Humidity:	45%
ATM Pressure:	1011 mbar

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M		2402	-26.92	≤8.00	PASS
	Ant1	2440	-27.23	≤8.00	PASS
		2480	-27.36	≤8.00	PASS
BLE_2M	2M Ant1	2402	-29.51	≤8.00	PASS
		2440	-29.45	≤8.00	PASS
		2480	-29.7	≤8.00	PASS











### 8.4 UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

## 8.4.1 Applicable Standard

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

#### 8.4.2 Conformance Limit

According to FCC Part 15.247(d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

### 8.4.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1.

## 8.4.4 Test Procedure

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

## ■ Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to = 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW  $\geq$  3 x RBW.

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 PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

## ■ Emission level measurement

Set the center frequency and span to encompass frequency range to be measured.

Set the RBW = 100 kHz.

Set the VBW =300 kHz.

Set Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

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

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements . Report the three highest emissions relative to the limit.

#### 8.4.5 Test Results

Temperature:	25° C
Relative Humidity:	45%
ATM Pressure:	1011 mbar



All the modes were tested and the data of the worst modes are attached the following pages.

## Reference level measurement

TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm]
BLE_1M	Ant1	2402	2401.92	-12.14
		2440	2439.92	-12.35
		2480	2479.90	-12.65
BLE_2M	1 Ant1	2402	2401.92	-12.83
		2440	2439.91	-13.00
		2480	2479.90	-13.24

Band edge measurements

Т	estMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
	DIE 4M	Ant1	Low	2402	-12.14	-36.43	≤-32.14	PASS
BLE_1M	Anti	High	2480	-12.65	-36.82	≤-32.65	PASS	
	BLE 2M	M Ant1	Low	2402	-12.83	-36.39	≤-32.83	PASS
		AIILI	High	2480	-13.24	-36.36	≤-33.24	PASS

**Conducted Spurious Emission** 

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict				
			2402	30~1000	-12.14	-69.44	≤-32.14	PASS			
		2402	1000~26500	-12.14	-39.91	≤-32.14	PASS				
BLE 1M	Ant1	2440	30~1000	-12.35	-68.71	≤-32.35	PASS				
DLE_TIVI		2440	1000~26500	-12.35	-39.81	≤-32.35	PASS				
		2480	30~1000	-12.65	-68.17	≤-32.65	PASS				
		2400	1000~26500	-12.65	-40.2	≤-32.65	PASS				
					2402	30~1000	-12.83	-69.01	≤-32.83	PASS	
		2402	1000~26500	-12.83	-40.14	≤-32.83	PASS				
DIE 2M	Ant1	2440	30~1000	-13.00	-68.14	≤-33	PASS				
BLE_2M			1000~26500	-13.00	-52.21	≤-33	PASS				
		2490	30~1000	-13.24	-69.16	≤-33.24	PASS				
							2480	1000~26500	-13.24	-39.78	≤-33.24







