# **FCC RF Test Report**

APPLICANT: COOSEA GROUP (HK) COMPANY LIMITED

**EQUIPMENT**: Feature phone

MODEL NAME : SL006D

FCC ID : 2A28USL006D

STANDARD : FCC Part 15 Subpart C §15.247

CLASSIFICATION : (DTS) Digital Transmission System

TEST DATE(S) : Apr. 23, 2023 ~ Jun. 28, 2023

We, Sporton International Inc. (Shenzhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.

JasonJia

Approved by: Jason Jia





Report No.: FR340708B

## Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 1 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

## **TABLE OF CONTENTS**

RE\	/ISION	I HISTORY	.3
SUN	/MAR	Y OF TEST RESULT	. 4
1	GENE	RAL DESCRIPTION	.5
	1.1	Applicant	.5
	1.2	Manufacturer	.5
	1.3	Product Feature of Equipment Under Test	.5
	1.4	Product Specification of Equipment Under Test	.5
	1.5	Modification of EUT	.5
	1.6	Testing Location	.6
	1.7	Test Software	.6
	1.8	Applicable Standards	.6
2	TEST	CONFIGURATION OF EQUIPMENT UNDER TEST	.7
	2.1	Carrier Frequency Channel	.7
	2.2	Test Mode	.8
	2.3	Connection Diagram of Test System	.9
	2.4	Support Unit used in test configuration and system	10
	2.5	EUT Operation Test Setup	10
	2.6	Measurement Results Explanation Example	10
3	TEST	RESULT	11
	3.1	6dB and 99% Bandwidth Measurement	11
	3.2	Output Power Measurement	16
	3.3	Power Spectral Density Measurement	17
	3.4	Conducted Band Edges and Spurious Emission Measurement	22
	3.5	Radiated Band Edges and Spurious Emission Measurement	27
	3.6	AC Conducted Emission Measurement	31
	3.7	Antenna Requirements	33
4	LIST	OF MEASURING EQUIPMENT	34
5	MEAS	SUREMENT UNCERTAINTY	35
APF	PENDI	X A. CONDUCTED TEST RESULTS	
APF	PENDI	X B. AC CONDUCTED EMISSION TEST RESULT	
APF	PENDI	X C. RADIATED SPURIOUS EMISSION	
APF	PENDI	X D. DUTY CYCLE PLOTS	
APF	PENDI	X E. SETUP PHOTOGRAPHS	

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 2 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## **REVISION HISTORY**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR340708B	Rev. 01	Initial issue of report	Jul. 04, 2023

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 3 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report Template No.: BU5-FR15CBT4.0 Version 2.0

Report No.: FR340708B

## SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	•
3.1	-	99% Bandwidth	-	Report only	-
3.2	15.247(b)(3)	Peak Output Power	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	≤ 20dBc	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 4.28 dB at 50.37 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 4.07 dB at 2.81 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

#### **Conformity Assessment Condition:**

- The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or
  in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of
  non-compliance that may potentially occur if measurement uncertainty is taken into account.
- 2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty"

#### Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 4 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 1 General Description

## 1.1 Applicant

### **COOSEA GROUP (HK) COMPANY LIMITED**

UNIT 5-6 16/F MULTIFIELD PLAZA 3-7A PRAT AVENUE TSIMSHATSUI KL, HONG KONG, CHINA

Report No.: FR340708B

## 1.2 Manufacturer

## COOSEA GROUP (HK) COMPANY LIMITED

UNIT 5-6 16/F MULTIFIELD PLAZA 3-7A PRAT AVENUE TSIMSHATSUI KL, HONG KONG, CHINA

## 1.3 Product Feature of Equipment Under Test

Product Feature				
Equipment	Feature phone			
Model Name	SL006D			
FCC ID	2A28USL006D			
IMEI Code	Conducted: 358957940002503 Conduction: 358957940006314 Radiation: 358957940004483/358957940009706			
HW Version	1.0			
SW Version	SL006DD10008			
EUT Stage	Production Unit			

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

# 1.4 Product Specification of Equipment Under Test

Standards-related Product Specification				
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz			
Number of Channels	40			
Carrier Frequency of Each Channel	40 Channel (37 hopping + 3 advertising channel)			
Maximum Output Power to Antenna	7.25 dBm (0.0053 W)			
99% Occupied Bandwidth	1.025 MHz			
Antenna Type / Gain	IFA Antenna type with gain 1.56 dBi			
Type of Modulation	Bluetooth LE : GFSK			

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

 Sporton International Inc. (ShenZhen)
 Page Number
 : 5 of 35

 TEL: +86-755-8637-9589
 Report Issued Date
 : Jul. 04, 2023

 FAX: +86-755-8637-9595
 Report Version
 : Rev. 01

FCC ID: 2A28USL006D Report Template No.: BU5-FR15CBT4.0 Version 2.0

## 1.6 Testing Location

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Report No.: FR340708B

Test Firm	Sporton International Inc. (ShenZhen)					
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595					
Tool Cita No	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.			
Test Site No.	CO01-SZ TH01-SZ	CN1256	421272			

Test Firm	Sporton International Inc. (ShenZhen)				
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398				
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.		
1001 0110 1101	03CH01-SZ	CN1256	421272		

## 1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH01-SZ	AUDIX	E3	6.2009-8-24
2.	CO01-SZ	AUDIX	E3	6.120613b

## 1.8 Applicable Standards

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

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013

#### Remark:

- All test items were verified and recorded according to the standards and without any deviation during the test.
- 2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

 Sporton International Inc. (ShenZhen)
 Page Number
 : 6 of 35

 TEL: +86-755-8637-9589
 Report Issued Date
 : Jul. 04, 2023

 FAX: +86-755-8637-9595
 Report Version
 : Rev. 01

FCC ID: 2A28USL006D Report Template No.: BU5-FR15CBT4.0 Version 2.0

# 2 Test Configuration of Equipment Under Test

# 2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
2400-2483.5 MHz	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
[	18	2438	39	2480
[	19	2440	-	-
	20	2442	-	-

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 7 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

### 2.2 Test Mode

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

Report No.: FR340708B

b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

	Summary table of Test Cases				
Tool Hom	Data Rate / Modulation				
Test Item	Bluetooth – LE / GFSK				
Conducted	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps				
001100000	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps				
TCs	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps				
Radiated	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps				
710010100	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps				
TCs	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps				
AC					
Conducted	Mode 1: GSM 850 Idle + Bluetooth Link + Adaptor + USB Cable + Battery + Earphone				
Emission					

Co-location
BLE CH 39 TX + LTE Band30_BW_20M Link

#### Remark:

- 1. Radiated Test Cases were performance with Adapter, Battery, Earphone and USB Cable.
- 2. The RSE co-location mode is assessed from the worst BLE TX + WWAN Link mode.

 Sporton International Inc. (ShenZhen)
 Page Number
 : 8 of 35

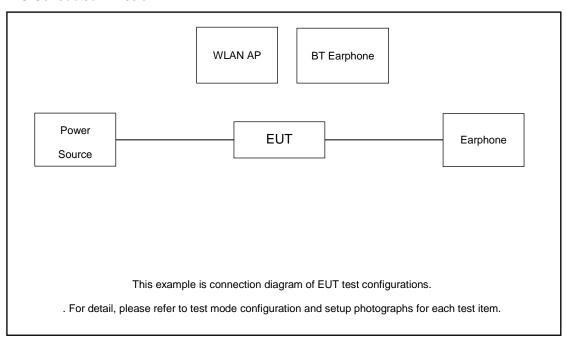
 TEL: +86-755-8637-9589
 Report Issued Date
 : Jul. 04, 2023

 FAX: +86-755-8637-9595
 Report Version
 : Rev. 01

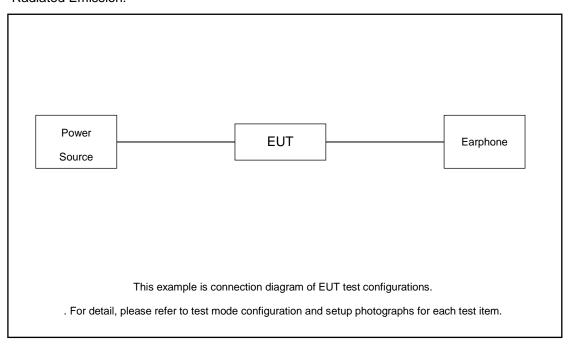
FCC ID: 2A28USL006D Report Template No.: BU5-FR15CBT4.0 Version 2.0

# 2.3 Connection Diagram of Test System

#### AC Conducted Emission:



### Radiated Emission:



Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 9 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
١.	Station(LTE)	Alliitsu	W10020C	IN/A	IV/A	Onshielded, r.om
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
	Bluetooth	Comouna	EO-MG900	PYAHS-107W	N/A	N/A
3.	Earphone	Samsung	EO-MG900	P 1AH5-107W	IN/A	N/A
4.	Earphone	Sony	MT755	N/A	Shielded, 0.7m	N/A
5.	Earphone	apple	DCAY1V-A900FZJW3-000	N/A	N/A	N/A

## 2.5 EUT Operation Test Setup

For BLE function, the engineering test program was provided and enabled to make EUT continuous transmit.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

## 2.6 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

#### Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 1.50 dB and 10dB attenuator.

 $Offset(dB) = RF \ cable \ loss(dB) + attenuator \ factor(dB).$ = 1.50 + 10 = 11.50 (dB)

Page Number : 10 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3 Test Result

## 3.1 6dB and 99% Bandwidth Measurement

#### 3.1.1 Limit of 6dB and 99% Bandwidth

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

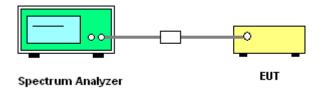
## 3.1.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

### 3.1.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 11.8
- 2. 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.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
- 5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1% to 5% of the 99% OBW and the VBW is set to 3 times of the RBW.
- Measure and record the results in the test report.

## 3.1.4 Test Setup



Sporton International Inc. (ShenZhen)

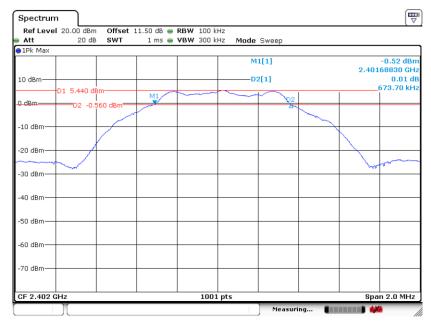
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 11 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

#### 6 dB Bandwidth Plot on Channel 00



Date: 24.APR.2023 13:48:34

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 12 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

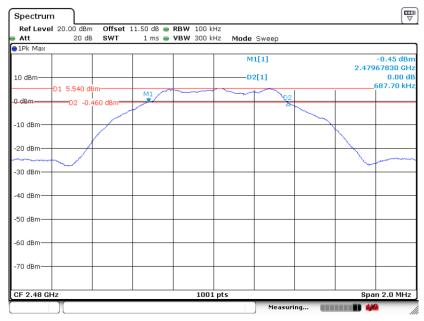
Report No.: FR340708B

#### 6 dB Bandwidth Plot on Channel 19



Date: 24.APR.2023 13:56:30

#### 6 dB Bandwidth Plot on Channel 39



Date: 24.APR.2023 13:59:38

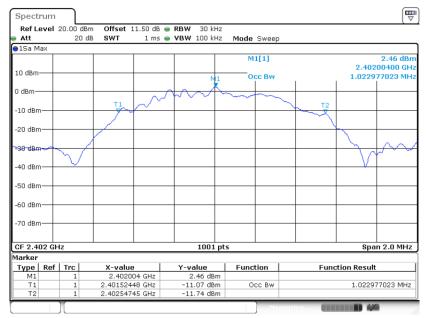
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 13 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

### 99% Occupied Bandwidth Plot on Channel 00



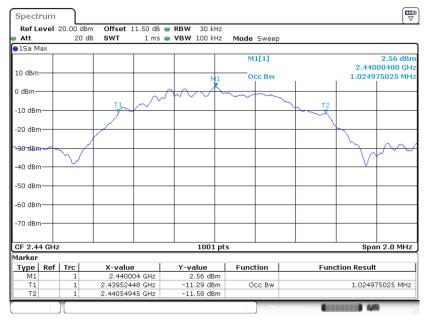
Date: 24.APR.2023 13:55:25

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 14 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

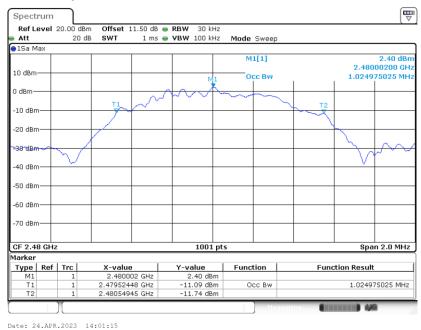
Report No.: FR340708B

### 99% Occupied Bandwidth Plot on Channel 19



Date: 24.APR.2023 13:58:34

#### 99% Occupied Bandwidth Plot on Channel 39



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 15 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3.2 Output Power Measurement

## 3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

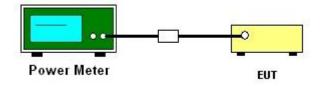
## 3.2.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

#### 3.2.3 Test Procedures

- The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1
   Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM method.
- 2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Measure the conducted output power and record the results in the test report.

### 3.2.4 Test Setup



## 3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

## 3.2.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 16 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3.3 Power Spectral Density Measurement

## 3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

## 3.3.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

#### 3.3.3 Test Procedures

- The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
- 2. 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.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
- Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
- 6. Measure and record the results in the test report.
- 7. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

## 3.3.4 Test Setup



### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

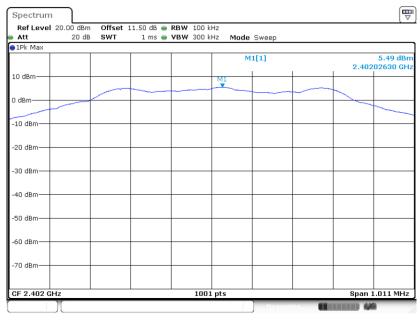
Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 17 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

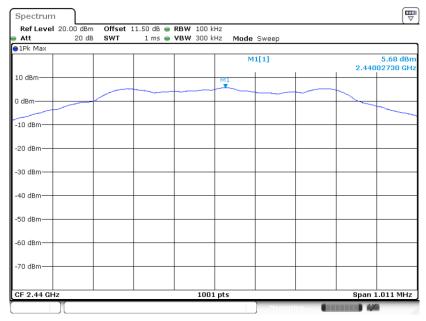
## 3.3.6 Test Result of Power Spectral Density Plots (100kHz)

## PSD 100kHz Plot on Channel 00



Date: 24.APR.2023 13:51:46

#### PSD 100kHz Plot on Channel 19



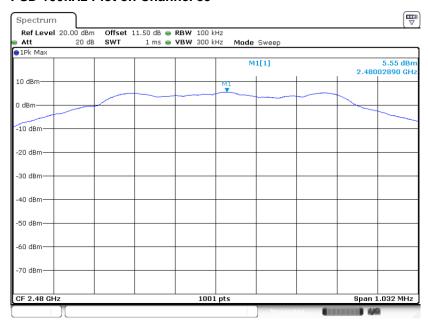
Date: 24.APR.2023 13:57:12

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 18 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

### PSD 100kHz Plot on Channel 39



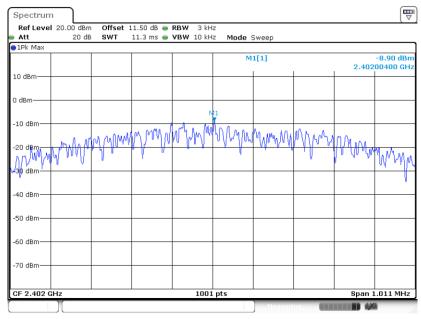
Date: 24.APR.2023 14:00:16

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 19 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

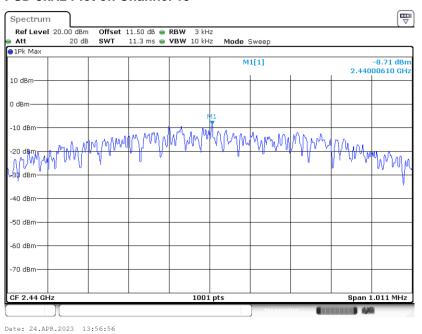
## 3.3.7 Test Result of Power Spectral Density Plots (3kHz)

#### PSD 3kHz Plot on Channel 00



#### Date: 24.APR.2023 13:49:34

#### PSD 3kHz Plot on Channel 19

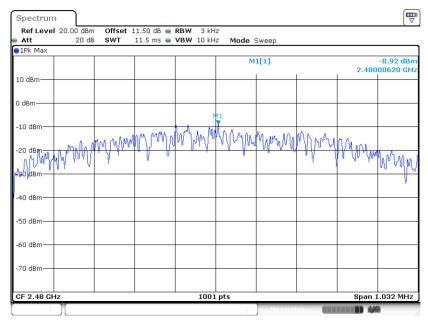


Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 20 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

### **PSD 3kHz Plot on Channel 39**



Date: 24.APR.2023 14:00:03

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 21 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3.4 Conducted Band Edges and Spurious Emission Measurement

## 3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

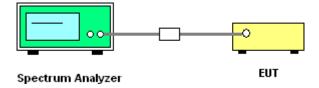
## 3.4.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

#### 3.4.3 Test Procedure

- 1. The testing follows ANSI C63.10-2013 clause 11.13
- 2. 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.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
- 5. Measure and record the results in the test report.
- 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

### 3.4.4 Test Setup



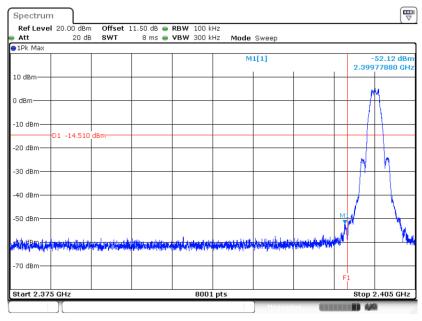
Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 22 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

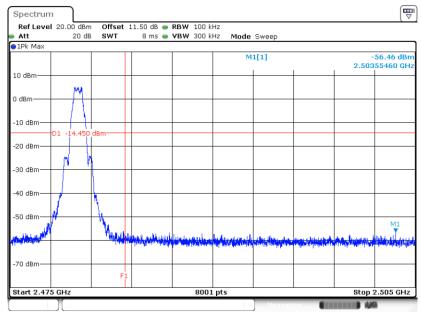
## 3.4.5 Test Result of Conducted Band Edges Plots

## Low Band Edge Plot on Channel 00



#### Date: 24.APR.2023 13:51:58

## **High Band Edge Plot on Channel 39**



Date: 24.APR.2023 14:00:28

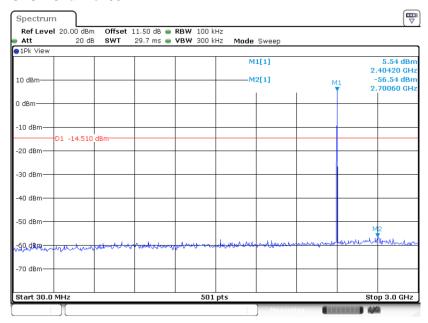
Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 23 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

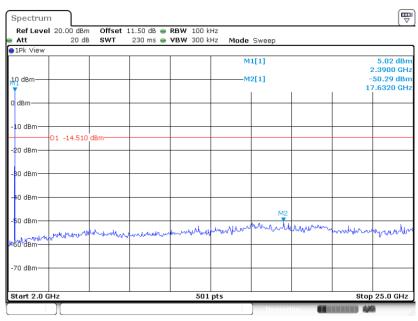
## 3.4.6 Test Result of Conducted Spurious Emission Plots

# Conducted Spurious Emission Plot on Bluetooth LE GFSK Channel 00



Date: 24.APR.2023 13:55:01

# Conducted Spurious Emission Plot on Bluetooth LE GFSK Channel 00



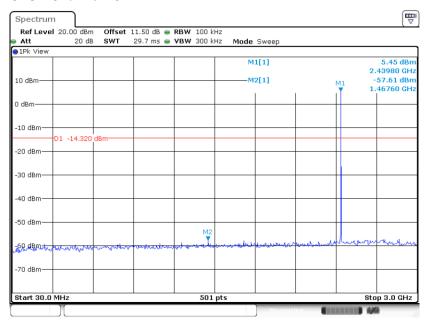
Date: 24.APR.2023 13:55:13

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 24 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

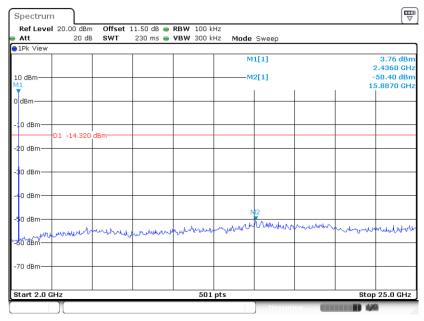
Report No.: FR340708B

# Conducted Spurious Emission Plot on Bluetooth LE GFSK Channel 19



Date: 24.APR.2023 13:58:10

# Conducted Spurious Emission Plot on Bluetooth LE GFSK Channel 19



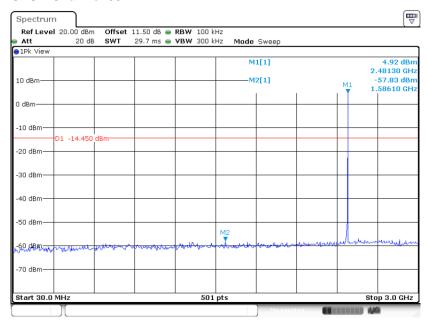
Date: 24.APR.2023 13:58:21

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 25 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

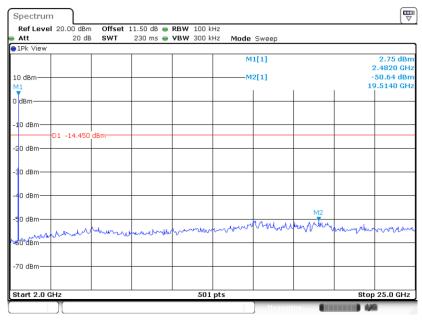
Report No.: FR340708B

# Conducted Spurious Emission Plot on Bluetooth LE GFSK Channel 39



Date: 24.APR.2023 14:00:45

# Conducted Spurious Emission Plot on Bluetooth LE GFSK Channel 39



Date: 24.APR.2023 14:00:57

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 26 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3.5 Radiated Band Edges and Spurious Emission Measurement

## 3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

## 3.5.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 27 of 35

Report Issued Date : Jul. 04, 2023

Report Version : Rev. 01

Report No.: FR340708B

#### 3.5.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
- 2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.

Report No.: FR340708B

- The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
- 4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 5. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level
- 6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
- 7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 8. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \ge 1$  GHz for peak measurement. For average measurement:
    - VBW = 10 Hz, when duty cycle is no less than 98 percent.
    - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

 Sporton International Inc. (ShenZhen)
 Page Number
 : 28 of 35

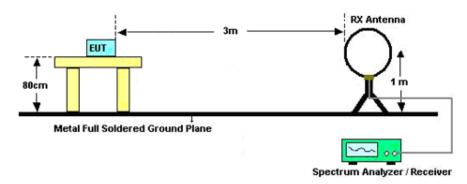
 TEL: +86-755-8637-9589
 Report Issued Date
 : Jul. 04, 2023

 FAX: +86-755-8637-9595
 Report Version
 : Rev. 01

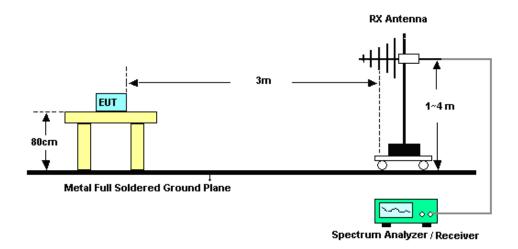
FCC ID: 2A28USL006D Report Template No.: BU5-FR15CBT4.0 Version 2.0

## 3.5.4 Test Setup

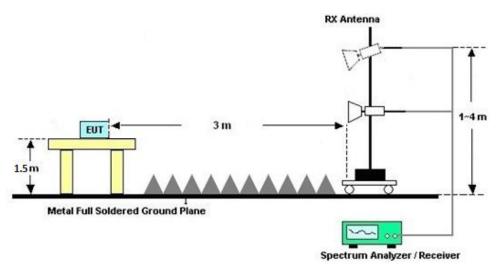
#### For radiated emissions below 30MHz



#### For radiated emissions from 30MHz to 1GHz



#### For radiated emissions above 1GHz



Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 29 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3.5.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Report No.: FR340708B

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

## 3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

## 3.5.7 Duty Cycle

Please refer to Appendix D.

# 3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix C.

Sporton International Inc. (ShenZhen)
TEL: +86-755-8637-9589

FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 30 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

## 3.6 AC Conducted Emission Measurement

#### 3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Eroquency of emission (MUz)	Conducted limit (dBµV)			
Frequency of emission (MHz)	Quasi-peak	Average		
0.15-0.5	66 to 56*	56 to 46*		
0.5-5	56	46		
5-30	60	50		

<sup>\*</sup>Decreases with the logarithm of the frequency.

## 3.6.2 Measuring Instruments

The section 4.0 of List of Measuring Equipment of this test report is used for test.

### 3.6.3 Test Procedures

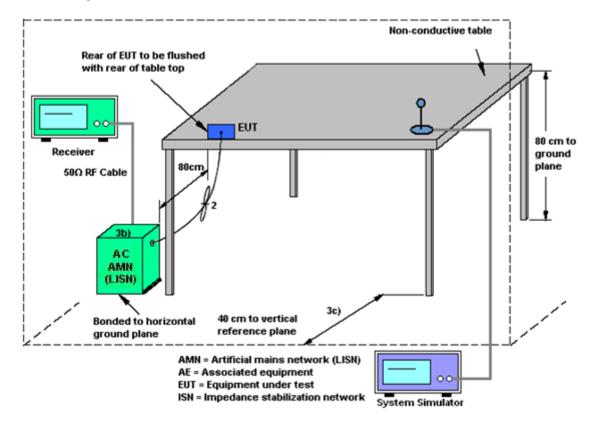
- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

Sporton International Inc. (ShenZhen)
TEL: +86-755-8637-9589

FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 31 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3.6.4 Test Setup



## 3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 32 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 3.7 Antenna Requirements

## 3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 rule.

## 3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

#### 3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 33 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report Template No.: BU5-FR15CBT4.0 Version 2.0

Report No.: FR340708B

# 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 06, 2023	Apr. 23, 2023~ Apr. 24, 2023	Apr. 05, 2024	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 27, 2022	Apr. 23, 2023~ Apr. 24, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 27, 2022	Apr. 23, 2023~ Apr. 24, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jul. 07, 2022	May 16, 2023	Jul. 06, 2023	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Sep. 15, 2022	May 16, 2023	Sep. 14, 2023	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 17, 2022	May 16, 2023	Oct. 16, 2023	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 07, 2022	May 16, 2023	Jul. 06, 2023	Conduction (CO01-SZ)
EMI Test Receiver&SA	Agilent	N9038A	MY52260185	20Hz~26.5GHz	Dec. 26, 2022	May 22, 2023~ Jun. 28, 2023	Dec. 25, 2023	Radiation (03CH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 07, 2022	May 22, 2023~ Jun. 28, 2023	Jul. 06, 2023	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	May 22, 2023~ Jun. 28, 2023	Jun. 27, 2024	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Sep. 28, 2021	May 22, 2023~ Jun. 28, 2023	Sep. 27, 2023	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 07, 2022	May 22, 2023~ Jun. 28, 2023	Jul. 06, 2023	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 08,2023	May 22, 2023~ Jun. 28, 2023	Apr. 07,2024	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 04, 2023	May 22, 2023~ Jun. 28, 2023	Apr. 03,2024	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P- R	1943528	1GHz~18GHz	Oct. 19,2022	May 22, 2023~ Jun. 28, 2023	Oct. 18,2023	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5Gh z	Oct. 19,2022	May 22, 2023~ Jun. 28, 2023	Oct. 18,2023	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35- HG	1871923	18GHz~40GHz	Jul. 06, 2022	May 22, 2023~ Jun. 28, 2023	Jul. 05, 2023	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	Nov. 10, 2022	May 22, 2023~ Jun. 28, 2023	Nov. 09, 2023	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	May 22, 2023~ Jun. 28, 2023	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	May 22, 2023~ Jun. 28, 2023	NCR	Radiation (03CH01-SZ)

NCR: No Calibration Required

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 34 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

## 5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

#### **Uncertainty of Conducted Measurement**

Test Item	Uncertainty
Conducted Power	±1.34 dB
Conducted Emissions	±1.34 dB
Occupied Channel Bandwidth	±0.012 %
Conducted Power Spectral Density	±1.32 dB

### <u>Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)</u>

Measuring Uncertainty for a Level of Confidence	2.7 dB
of 95% (U = 2Uc(y))	2.7 dB

#### **Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

Magaziring Uncertainty for a Level of Confidence	
Measuring Uncertainty for a Level of Confidence	4.2 dB
of 95% (U = 2Uc(y))	TIE UD

### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0 dB
---	--------

### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence	4.3 dB
of 95% (U = 2Uc(y))	4.3 dB

----- THE END -----

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number : 35 of 35
Report Issued Date : Jul. 04, 2023
Report Version : Rev. 01

Report No.: FR340708B

# **Appendix A. Conducted Test Results**

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D Page Number

: A1 of A1

Report No.: FR340708B

Report Number : FR340708B

### Appendix A. Test Result of Conducted Test Items

Test Engineer:	Guohong Zhang	Temperature:	21~25	°C
Test Date:	2023/4/23~2023/4/24	Relative Humidity:	51~54	%

#### TEST RESULTS DATA 6dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
BLE	1Mbps	1	0	2402	1.023	0.674	0.50	Pass
BLE	1Mbps	1	19	2440	1.025	0.674	0.50	Pass
BLE	1Mbps	1	39	2480	1.025	0.688	0.50	Pass

# TEST RESULTS DATA Peak Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	7.14	30.00	1.56	8.70	36.00	Pass
BLE	1Mbps	1	19	2440	7.25	30.00	1.56	8.81	36.00	Pass
BLE	1Mbps	1	39	2480	7.13	30.00	1.56	8.69	36.00	Pass

# TEST RESULTS DATA Average Power Table (Reporting Only)

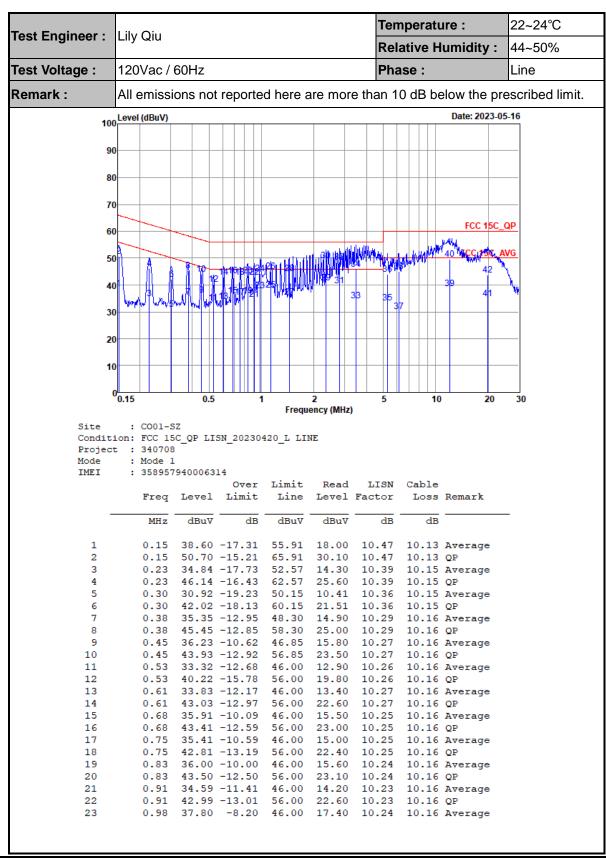
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	DG (dBi)	EIRP Power (dBm)
BLE	1Mbps	1	0	2402	2.13	7.00	1.56	8.56
BLE	1Mbps	1	19	2440	2.13	7.10	1.56	8.66
BLE	1Mbps	1	39	2480	2.13	7.00	1.56	8.56

# TEST RESULTS DATA Peak Power Density

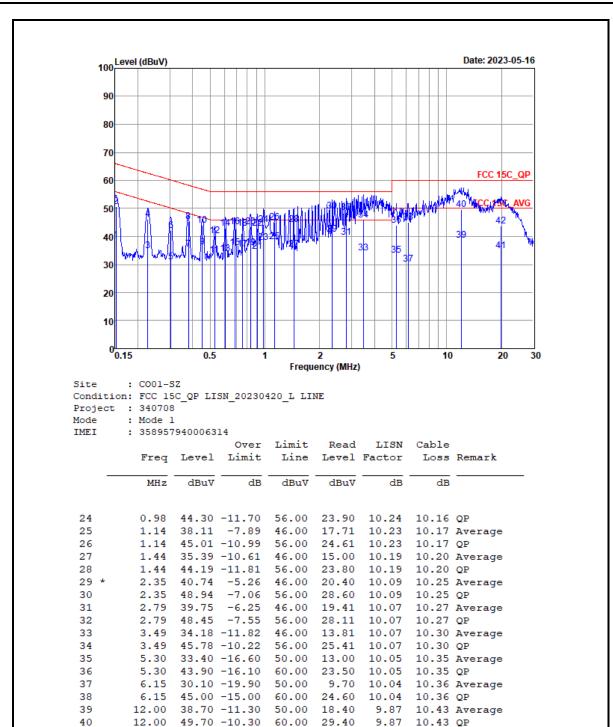
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
BLE	1Mbps	1	0	2402	5.49	-8.90	1.56	8.00	Pass
BLE	1Mbps	1	19	2440	5.68	-8.71	1.56	8.00	Pass
BLE	1Mbps	1	39	2480	5.55	-8.92	1.56	8.00	Pass

Note: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducted Spurious Emission 20dBc limit.

### **Appendix B. AC Conducted Emission Test Results**



TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D



19.95 34.97 -15.03 50.00 14.50

19.95 43.67 -16.33 60.00 23.20

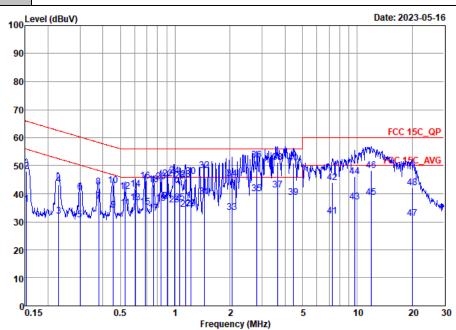
41

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D 9.91 10.56 Average

9.91 10.56 QP

Test Engineer :	Lily Oir	Temperature :	22~24°C
rest Engineer :		Relative Humidity :	44~50%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral

Remark: All emissions not reported here are more than 10 dB below the prescribed limit.



Site : CO01-SZ

Condition: FCC 15C\_QP LISN\_20230420\_N NEUTRAL

Project : 340708 Mode

: Mode 1 : 358957940006314 IMEI

			Over	Limit	Read	LISN	Cable	
	Freq	Level	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBu∀	dBuV	dB	dB	
1	0.15	36.19	-19.68	55.87	15.60	10.46	10.13	Average
2	0.15	47.99	-17.88	65.87	27.40	10.46	10.13	QP
3	0.23	32.08	-20.40	52.48	11.60	10.33	10.15	Average
4	0.23	43.08	-19.40	62.48	22.60	10.33	10.15	QP
5	0.30	30.56	-19.68	50.24	10.10	10.31	10.15	Average
6	0.30	40.46	-19.78	60.24	20.00	10.31	10.15	QP
7	0.38	37.21	-11.09	48.30	16.80	10.25	10.16	Average
8	0.38	42.41	-15.89	58.30	22.00	10.25	10.16	QP
9	0.46	34.09	-12.67	46.76	13.70	10.23	10.16	Average
10	0.46	42.99	-13.77	56.76	22.60	10.23	10.16	QP
11	0.53	34.98	-11.02	46.00	14.60	10.22	10.16	Average
12	0.53	40.88	-15.12	56.00	20.50	10.22	10.16	QP
13	0.61	36.89	-9.11	46.00	16.50	10.23	10.16	Average
14	0.61	41.49	-14.51	56.00	21.10	10.23	10.16	QP
15	0.68	35.13	-10.87	46.00	14.70	10.27	10.16	Average
16	0.68	44.63	-11.37	56.00	24.20	10.27	10.16	QP
17	0.76	33.11	-12.89	46.00	12.70	10.25	10.16	Average
18	0.76	43.31	-12.69	56.00	22.90	10.25	10.16	QP
19	0.83	36.59	-9.41	46.00	16.20	10.23	10.16	Average
20	0.83	44.39	-11.61	56.00	24.00	10.23	10.16	QP
21	0.91	37.28	-8.72	46.00	16.90	10.22	10.16	Average
22	0.91	45.38	-10.62	56.00	25.00	10.22	10.16	QP
23	0.99	36.10	-9.90	46.00	15.70	10.24	10.16	Average

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

100 Level (dBuV) Date: 2023-05-16 90 80 70 FCC 15C\_QP 60 50 40 20 10 0<mark>0.15</mark> 10 30 Frequency (MHz) : CO01-SZ Condition: FCC 15C\_QP LISN\_20230420\_N NEUTRAL Project : 340708 Mode : Mode 1 : 358957940006314 IMEI Over Limit Read LISN Cable Freq Level Limit Line Level Factor Loss Remark dBu∇ MHz dBuV dB dBuV dB 0.99 46.30 -9.70 56.00 25.90 10.24 10.16 QP 25 1.06 36.82 -9.18 46.00 16.40 10.25 10.17 Average 26 1.06 44.62 -11.38 56.00 24.20 10.25 10.17 QP 27 1.14 34.44 -11.56 46.00 14.00 10.27 10.17 Average 45.04 -10.96 28 1.14 56.00 24.60 10.27 10.17 QP 1.22 34.76 -11.24 46.00 14.30 10.28 10.18 Average 56.00 46.06 -9.94 30 25.60 10.28 10.18 OP 1.22 39.06 -6.94 31 1.44 46.00 18.60 10.26 10.20 Average 48.36 -7.64 56.00 27.90 10.26 32 1.44 10.20 QP 2.05 33.34 -12.66 46.00 12.91 10.20 10.23 Average 33 34 2.05 45.34 -10.66 56.00 24.91 10.20 10.23 QP 10.27 Average 2.81 40.03 -5.97 46.00 19.61 35 10.15 36 \* 2.81 51.93 -4.07 56.00 31.51 10.15 10.27 QP 37 3.64 41.46 -4.54 46.00 21.00 10.15 10.31 Average 51.26 -4.74 56.00 30.80 38 3.64 10.15 10.31 QP 4.48 38.57 -7.43 46.00 18.10 10.13 10.34 Average 39 4.48 51.07 -4.93 56.00 30.60 10.13 40 10.34 OP 41 7.29 31.91 -18.09 50.00 11.49 10.05 10.37 Average 42 7.29 43.91 -16.09 60.00 23.49 10.05 10.37 QP 9.71 37.01 -12.99 50.00 16.60 9.71 46.01 -13.99 60.00 25.60 43 10.03 10.38 Average 44 10.03 10.38 QP 11.93 38.69 -11.31 50.00 18.30 9.96 10.43 Average 45 46 11.93 48.29 -11.71 60.00 27.90 9.96 10.43 QP 47 20.06 31.32 -18.68 50.00 11.00 9.76 10.56 Average 42.22 -17.78 60.00 21.90 48 20.06 9.76 10.56 QP

#### Note:

- 1. Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
- 2. Over Limit(dB) = Level(dB $\mu$ V) Limit Line(dB $\mu$ V)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

# **Appendix C Radiated Spurious Emission Test Data**

Test Engineer :	Zhiohang Li	Relative Humidity :	48~49%
	Zhicheng Li	Temperature :	24~25℃

### **Radiated Spurious Emission Test Modes**

Mode	Band (MHz)	Modulation	Channel	Frequency	Data Rate	Remark
Mode 1	2400-2483.5	Bluetooth-LE	00	2402	1Mbps	-
Mode 2	2400-2483.5	Bluetooth-LE	19	2440	1Mbps	-
Mode 3	2400-2483.5	Bluetooth-LE	39	2480	1Mbps	-
Mode 4	2400-2483.5	Bluetooth-LE	39	2480	1Mbps	LF

### Summary of each worse mode

Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	Bluetooth-LE	00	2385.90	39.10	54.00	-14.90	Н	AVERAGE	Pass	Band Edge
1	Bluetooth-LE	00	4804.00	46.04	74.00	-27.96	Н	Peak	Pass	Harmonic
2	Bluetooth-LE	19	-	-	-	-	-	-	-	Band Edge
2	Bluetooth-LE	19	7320.00	45.75	54.00	-8.25	V	Average	Pass	Harmonic
3	Bluetooth-LE	39	2484.56	40.19	54.00	-13.81	Н	AVERAGE	Pass	Band Edge
3	Bluetooth-LE	39	7440.00	47.40	54.00	-6.60	V	Average	Pass	Harmonic
4	Bluetooth-LE	39	50.37	35.72	40	-4.28	V	Peak	Pass	LF

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

# **Co-location**

#### 2.4GHz 2400~2483.5MHz

### BLE CH39 TX + Band30 Link (Band Edge @ 3m)

BLE	Note	Frequency	Level	Margin	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	( dB/m )	(dB)	(dB)	( cm )	(deg)	(P/A)	(H/V)
	*	2480	101.65	-	-	74	32.46	7.88	32.09	108	309	Р	Н
	*	2480	101.16	-	-	54	32.46	7.88	32.09	108	309	Α	Н
BLE		2496.16	48.46	-25.54	40.19	74	32.49	7.88	32.1	108	309	Р	Н
CH 39													
TX + LTE		2483.72	39.46	-14.54	31.21	54	32.46	7.88	32.09	108	309	Α	Н
Band30	*	2480	98.7	-	-	74	32.46	7.88	32.09	329	284	Р	٧
Co-location	*	2480	98.11	-	-	54	32.46	7.88	32.09	329	284	Α	٧
		2486.72	47.47	-26.53	39.21	74	32.47	7.88	32.09	329	284	Р	٧
		2483.6	39.14	-14.86	30.89	54	32.46	7.88	32.09	329	284	Α	V

#### 2.4GHz 2400~2483.5MHz

### (Harmonic @ 3m)

BLE	Note	Frequency	Level	Margin	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	( dB/m )	(dB)	(dB)	( cm )	(deg)	(P/A)	(H/V)
BLE	-	4960	45.92	-28.08	51.41	74	34.88	11.14	51.51	-	-	Р	Н
CH 39	-	7440	47.18	-26.82	49	74	36.38	12.99	51.19	-	-	Р	Н
TX + LTE	-	4960	46.14	-27.86	51.63	74	34.88	11.14	51.51	-	-	Р	V
Band30 Co-location	-	7440	48.11	-25.89	49.93	74	36.38	12.99	51.19	-	-	Р	V

Sporton International Inc. (ShenZhen)

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

1 Mode **Band Edge** 2400-2483.5\_Bluetooth-LE \_CH00\_2402MHz Pol. Horizontal **Fundamental** Date: 2023-05-12 Date: 2023-05-12 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK\_74 70.0 70.0 52.5 52.5 35.0 35.0 17.5 17.5 **Peak** 2346.8 Z. Frequency (MHz) 1000 2310 2328.4 2365.2 2383.6 1400. 1800. 2200. Frequency (MHz) 2600. 3000 : 03CH01-SZ : 03CH01-SZ Condition: PEAK\_BE\_74 3m HF\_ANT(3117)\_22 HORIZONTAL Condition: PEAK\_74 3m HF\_ANT(3117)\_22 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz : RBW:1000.000kHz VBW:3000.000kHz : 5 Setting : 1M Plane : X with Accessories : 358957940004483 Setting : 1M Plane : X with Accessories : 358957940004483 Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor Read Ant Cable Preamp APos TPos Limit Freq Level Line Margin Level Factor Loss Factor | MHz dBuV/m dBuV/m | dBuV/m | dBuV | dB/m | dB | dB | cm | deg | 1 2389.03 51.10 74.00 -22.90 43.16 32.26 7.76 32.08 187 48 PEAK 
 MHz dBuV/m dBuV/m
 dBuV
 dB/m
 dB
 dB
 cm
 deg

 1 2402.00 101.60 ---- 93.61 32.28 7.79 32.08 187 48 PEAK
 140 Level (dBuV/m) Date: 2023-05-12 140 Level (dBuV/m) Date: 2023-05-12 122.5 122.5 105.0 105.0 87.5 87.5 70.0 70.0 AVG\_5 52.5 52.5 35.0 35.0 17.5 17.5 Avg 2310 1000 2328.4 2383.6 2600. 2346.8 2365.2 Frequency (MHz) 2402 1400. 1800. 2200. Frequency (MHz) 3000 Site : 03CH01-SZ Condition: AVG\_BE\_54 3m HF\_ANT(3117)\_22 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz Site : 03CH01-SZ Condition: AVG 54 3m HF ANT(3117) 22 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz Setting : 1M Plane : X with Accessories Setting : 1M Plane : X with Accessories : 358957940004483 : 358957940004483 Limit Read Ant Cable Preamp APos TPos
Freq Level Line Margin Level Factor Loss Factor Remark Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor MHz dBuV/m dBuV/m dBuV/m dBuV dB/m dB dB cm deg 1 2385.90 39.10 54.00 -14.90 31.18 32.25 7.75 32.08 187 48 AVERAGE | MHz dBuV/m dBuV/m | dBuV | dB/m | dB | dB | cm | deg | | 1 2402.00 100.58 ----- 92.59 | 32.28 | 7.79 | 32.08 | 187 | 48 AVERAGE

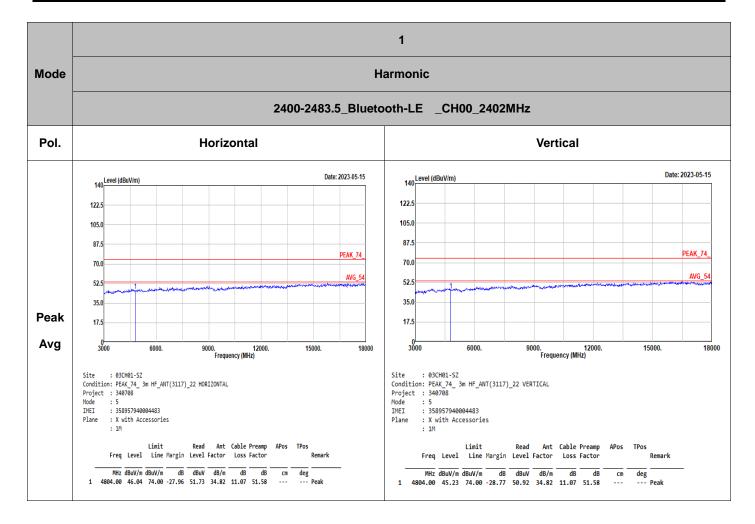
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D



1 Mode **Band Edge** 2400-2483.5\_Bluetooth-LE \_CH00\_2402MHz Pol. Vertical **Fundamental** 140 Level (dBuV/m) Date: 2023-05-12 Date: 2023-05-12 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK\_74 70.0 70.0 52.5 52.5 35.0 35.0 17.5 17.5 **Peak** 1000 2310 2328.4 2346.8 2 Frequency (MHz) 2365.2 2383.6 2402 1400. 1800. 2200. Frequency (MHz) 2600. 3000 : 03CH01-SZ : 03CH01-SZ Condition: PEAK\_BE\_74 3m HF\_ANT(3117)\_22 VERTICAL Condition: PEAK\_74 3m HF\_ANT(3117)\_22 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz : RBW:1000.000kHz VBW:3000.000kHz : 5 Setting : 1M Plane : X with Accessories : 358957940004483 Setting : 1M Plane : X with Accessories : 358957940004483 Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor Read Ant Cable Preamp APos TPos Limit Freq Level Line Margin Level Factor Loss Factor | MHz dBuV/m dBuV/m | dBuV/m | dBuV | dB/m | dB | dB | cm | deg | 1 2338.24 | 50.47 | 74.00 -23.53 | 42.79 | 32.14 | 7.61 | 32.07 | 100 | 243 | PEAK | MHz | dBuV/m | dBuV/m | dBuV | dB/m | dB | dB | cm | deg | 1 | 2402.00 | 96.89 | ---- | 88.90 | 32.28 | 7.79 | 32.08 | 100 | 243 | PEAK 140 Level (dBuV/m) Date: 2023-05-12 140 Level (dBuV/m) Date: 2023-05-12 122.5 122.5 105.0 105.0 87.5 87.5 70.0 70.0 AVG\_5 52.5 52.5 35.0 35.0 17.5 17.5 Avg 2310 1000 2328.4 2600. 2346.8 2365.2 Frequency (MHz) 2383.6 2402 1400. 1800. 2200. Frequency (MHz) 3000 Site : 03CH01-SZ Condition: AVG\_BE 54 3m HF\_ANT(3117)\_22 VERTICAL : RBW:1000.000kHz VBW:3.000kHz Site : 03CH01-SZ Condition: AVG 54 3m HF ANT(3117) 22 VERTICAL : RBW:1000.000kHz VBW:3.000kHz Setting : 1M Plane : X with Accessories Setting : 1M Plane : X with Accessories : 358957940004483 : 358957940004483 Limit Read Ant Cable Preamp APos TPos
Freq Level Line Margin Level Factor Loss Factor Remark Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor | MHz dBuV/m dBuV/m dBuV/m dBuV dB/m dB dB cm deg | 1 2402.00 95.63 ----- 87.64 32.28 7.79 32.08 100 243 AVERAGE

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D





TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

2 Mode Harmonic 2400-2483.5\_Bluetooth-LE \_CH19\_2440MHz Pol. Horizontal Vertical Date: 2023-05-15 Date: 2023-05-15 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK\_74 PEAK\_74 70.0 70.0 AVG\_5 52.5 52.5 35.0 35.0 17.5 17.5 **Peak** 3000 3000 6000. 15000. 18000 6000. 15000. 18000 9000. 12000. Frequency (MHz) 9000. 12000. Frequency (MHz) Avg Site : 03CH01-SZ Condition: PEAK\_74 3m HF\_ANT(3117)\_22 HORIZONTAL Project : 340708 Mode : 6 INEI : 5580957940004443 Plane : X with Accessories : 1M Site : 03CH01-5Z
Condition: PEAK 74 3m HF\_ANT(3117)\_22 VERTICAL
Project : 340708
Mode : 6
INEI : 558957940004483
Plane : X with Accessories
: 1M Limit Read Ant Cable Preamp APos TPos Limit Read Ant Cable Preamp APos TPos Freq Level Line Margin Level Factor Loss Factor | MHz dBuV/m dBuV/m dB dB dB dB dB 4880.00 46.51 74.00 -27.40 52.14 34.85 11.10 51.58 --7320.00 50.51 74.00 -23.49 52.25 36.33 13.09 51.16 100
7320.00 44.77 54.00 -9.23 46.51 36.33 13.09 51.16 100 deg --- Peak 68 Peak 68 Average

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D



3 Mode **Band Edge** 2400-2483.5\_Bluetooth-LE \_CH39\_2480MHz Pol. Horizontal **Fundamental** Date: 2023-05-12 Date: 2023-05-12 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK\_BE\_74 PEAK\_74 70.0 70.0 52.5 52.5 35.0 35.0 17.5 17.5 **Peak** 2488. Frequency (MHz) 1800. Frequency (MHz) 1000 2480 2484. 2496. 1400. 2600. 3000 2492. : 03CH01-SZ : 03CH01-SZ Condition: PEAK\_BE\_74 3m HF\_ANT(3117)\_22 HORIZONTAL Condition: PEAK\_74 3m HF\_ANT(3117)\_22 HORIZONTAL : RBW:1000.000kHz VBW:3000.000kHz : RBW:1000.000kHz VBW:3000.000kHz : 7 Setting : 1M Plane : X with Accessories : 358957940004483 Setting : 1M Plane : X with Accessories : 358957940004483 Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor 
 WHz
 dBuV/m
 dBuV/m
 dBuV/m
 dBuV/m
 dBuV
 dB
 dB
 cm
 deg

 1
 2483.56
 53.29
 74.00
 -20.71
 45.05
 32.46
 7.88
 32.10
 300
 38 PEAK
 MHz dBuV/m dBuV/m dBuV dB/m dB dB MHz dBuV/m dBuV/m dBuV dB/m dB dB cm deg 1 2480.00 101.44 ----- 93.21 32.46 7.87 32.10 300 38 PEAK 140 Level (dBuV/m) Date: 2023-05-12 140 Level (dBuV/m) Date: 2023-05-12 122.5 122.5 105.0 105.0 87.5 87.5 70.0 70.0 AVG\_5 52.5 52.5 35.0 35.0 17.5 17.5 Avg 2480 Frequency (MHz) 1000 2496. 2600. 2484. 2500 1400. 1800. 2200. Frequency (MHz) 3000 Site : 03CH01-SZ Condition: AVG\_BE\_54 3m HF\_ANT(3117)\_22 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz Site : 03CH01-SZ Condition: AVG 54 3m HF ANT(3117) 22 HORIZONTAL : RBW:1000.000kHz VBW:3.000kHz Setting : 1M Plane : X with Accessories Setting : 1M
Plane : X with Accessories : 358957940004483 : 358957940004483 Limit Margin Read Ant Cable Preamp APos TPos
Freq Level Line (dB) Level Factor Loss Factor Remark Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor | MHz dBuV/m dBuV/m | dBuV | dB/m | dB | dB | cm | deg | | 1 2480.00 100.74 ------ 92.51 | 32.46 | 7.87 | 32.10 | 300 | 38 AVERAGE

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

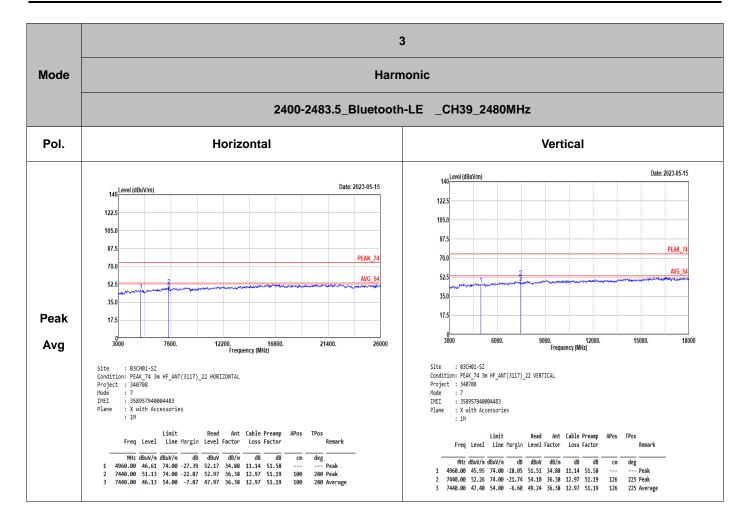


3 Mode **Band Edge** 2400-2483.5\_Bluetooth-LE \_CH39\_2480MHz Pol. Vertical **Fundamental** Date: 2023-05-12 Date: 2023-05-12 140 Level (dBuV/m) 140 Level (dBuV/m) 122.5 122.5 105.0 105.0 87.5 87.5 PEAK\_BE\_74 PEAK\_74 70.0 70.0 52.5 52.5 35.0 35.0 17.5 17.5 **Peak** 2488. Frequency (MHz) 1000 2480 2484. 2492. 2496. 1400. 1800. 2200. Frequency (MHz) 2600. 3000 : 03CH01-SZ : 03CH01-SZ Condition: PEAK\_BE\_74 3m HF\_ANT(3117)\_22 VERTICAL Condition: PEAK\_74 3m HF\_ANT(3117)\_22 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz : RBW:1000.000kHz VBW:3000.000kHz : 7 Setting : 1M Plane : X with Accessories : 358957940004483 Setting : 1M Plane : X with Accessories : 358957940004483 Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor Read Ant Cable Preamp APos TPos Limit Freq Level Line Margin Level Factor Loss Factor 
 WHz
 dBuV/m
 dBuV/m
 dBuV/m
 dBuV/m
 dBuV
 dB
 dB
 cm
 deg

 1
 2495.14
 51.13
 74.00
 -22.87
 42.85
 32.49
 7.89
 32.10
 376
 102
 PEAK
 | MHz | dBuV/m | dBuV/m | dBuV | dB/m | dB | dB | cm | deg | 1 | 2480.00 | 97.95 ----- | 89.72 | 32.46 | 7.87 | 32.10 | 376 | 102 | PEAK 140 Level (dBuV/m) Date: 2023-05-12 140 Level (dBuV/m) Date: 2023-05-12 122.5 122.5 105.0 105.0 87.5 87.5 70.0 70.0 AVG\_5 52.5 52.5 35.0 35.0 17.5 17.5 Avg 2480 Frequency (MHz) 1000 2496. 2600. 2484. 2500 1400. 1800. 2200. Frequency (MHz) 3000 Site : 03CH01-SZ Condition: AVG\_BE 54 3m HF\_ANT(3117)\_22 VERTICAL : RBB.1000.000kHz VBW:3.000kHz Site : 03CH01-SZ Condition: AVG 54 3m HF ANT(3117) 22 VERTICAL : RBW:1000.000kHz VBW:3.000kHz Setting : 1M Plane : X with Accessories Setting : 1M
Plane : X with Accessories : 358957940004483 : 358957940004483 Limit Read Ant Cable Preamp APos TPos
Freq Level Line Margin Level Factor Loss Factor Remark Limit Margin Read Ant Cable Preamp APos TPos Freq Level Line (dB) Level Factor Loss Factor | MHz dBuV/m dBuV/m dBuV/m dBuV/m dBuV dB/m dB dB cm deg | 1 2480.00 97.09 ----- 88.86 32.46 7.87 32.10 376 102 AVERAGE

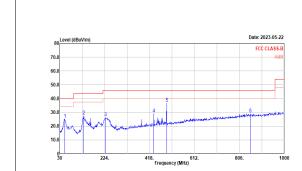
TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D





TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

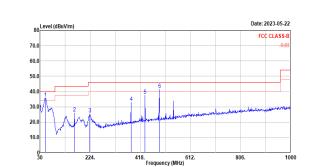
FCC RF Test Report Report No.: FR340708B Mode LF 2400-2483.5\_Bluetooth-LE \_CH39\_2480MHz Pol. Horizontal Vertical



Site : 03CH01-52 Condition: FCC CLASS-B 3m CBL6112D-47611 HORIZONTAL Project : 340788 Mode : 8 INEI : 358957940904483 Plane : X with Accessories

QP/ **Peak** 

	Freq	Level	Line	Margin	Level	Factor	Loss	Factor			Remark
-	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB .	cm	deg	
1	51.34	25.15	40.00	-14.85	40.79	14.12	1.45	31.21			Peak
2	133.79	27.36	43.50	-16.14	38.62	17.76	2.11	31.13			Peak
3	227.88	26.29	46.00	-19.71	38.61	16.18	2.40	30.90			Peak
4	436.43	28.91	46.00	-17.09	33.66	22.70	3.25	30.70			Peak
5	491.72	36.63	46.00	-9.37	40.30	23.58	3.45	30.70			Peak
6	852.56	29.09	46.00	-16.91	29.22	26.52	4.40	31.05			Peak

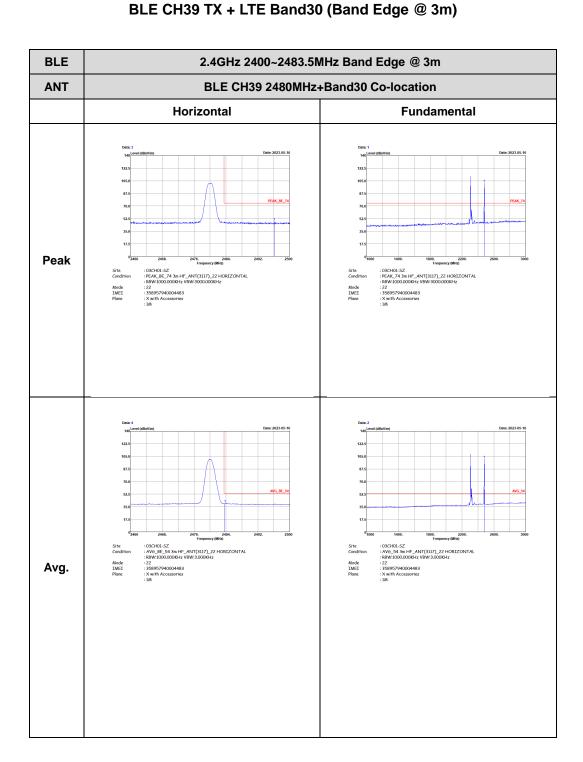


Site : 03CH01-SZ Condition: FCC CLASS-B 3m CBL6112D-47611 VERTICAL Project : 340708 Mode : 8 INEI : 358987940004483 Plane : X with Accessories

	Freq	Level	Line			Factor		Factor	 	Remark	
	MHz	dBuV/m	dBuV/m	——dB	dBuV	dB/m	——dB	——dB	 deg		_
1	50.37	35.72	40.00	-4.28	51.19	14.30	1.43	31.20	 	Peak	
2	163.86	26.09	43.50	-17.41	38.77	16.10	2.26	31.04	 	Peak	
3	223.03	25.25	46.00	-20.75	38.14	15.63	2.38	30.90	 	Peak	
4	382.11	32.75	46.00	-13.25	39.06	21.41	3.02	30.74	 	Peak	
5	436.43	37.29	46.00	-8.71	42.04	22.70	3.25	30.70	 	Peak	
-	401 72	44 35	46 00	-4 65	45 02	23 58	3 45	30 70	 	Deak	

### **Co-location**

# 2.4GHz 2400~2483.5MHz



TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

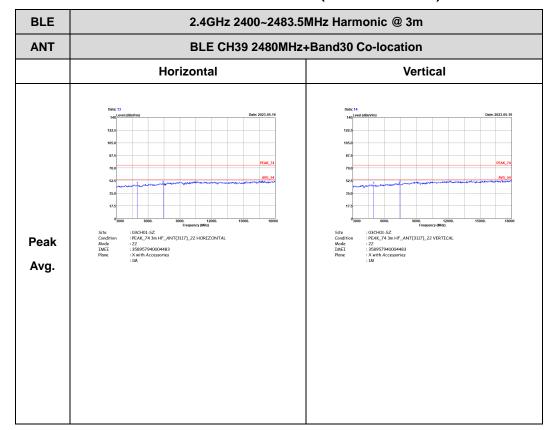
**BLE** 2.4GHz 2400~2483.5MHz Band Edge @ 3m ANT BLE CH39 2480MHz+Band30 Co-location Vertical **Fundamental** Peak | 103-H01-5Z | 103 : 03CH01-SZ : AV6\_BE\_54 3m HF\_ANT(3117)\_22 VERTICAL : RBW:1000.0000KHz VBW:3.000KHz : 22 : 388957940004483 : X with Accessories : JM Avg

**Note:** for co-location mode, the highest signals over limit are BLE + WWAN fundamental signals.

TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

### 2.4GHz 2400~2483.5MHz

#### BLE CH39 2480MHz+Band30 (Harmonic @ 3m)

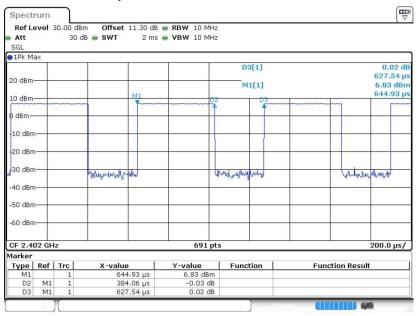


TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D

# Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE 1Mbps	61.20	0.384	2.604	3KHz

#### **Bluetooth LE 1Mbps**



TEL: +86-755-8637-9589 FAX: +86-755-8637-9595 FCC ID: 2A28USL006D