FCC RF Test Report

APPLICANT : VeriFone, Inc.

EQUIPMENT : Point of Sale Terminal BRAND NAME : Verifone & VERIFONE MODEL NAME : V660p-A,V660p Plus-A

FCC ID : B32V660PA

STANDARD : FCC Part 15 Subpart C §15.247

CLASSIFICATION : (DTS) Digital Transmission System

TEST DATE(S) : May 09, 2024 ~ Jun. 02, 2024

We, Sporton International Inc. (Kunshan), 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. (Kunshan), the test report shall not be reproduced except in full.

JasonJia

Approved by: Jason Jia





Report No.: FR440202B

Sporton International Inc. (Kunshan)

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

Sporton International Inc.(Kunshan)

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REVISION HISTORY

Report No. : FR440202B

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR440202B	Rev. 01	Initial issue of report	Jul. 02, 2024

FCC ID: B32V660PA

Report Version : Rev. 01 Report Template No.: BU5-FR15CBT4.0 Version 2.0

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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 8.94 dB at 2483.68 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 9.75 dB at 0.461 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.

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1 General Description

1.1 Applicant

VeriFone, Inc.

1400 West Stanford Ranch Road Suite 150 Rocklin CA 95765 USA

1.2 Manufacturer

VeriFone, Inc.

1400 West Stanford Ranch Road Suite 150 Rocklin CA 95765 USA

1.3 Product Feature of Equipment Under Test

Product Feature				
Equipment	Point of Sale Terminal			
Brand Name	Verifone & VERIFONE			
Model Name V660p-A,V660p Plus-A				
FCC ID B32V660PA				
IMEI Code	Conducted: 356784410000664/356784410000672 Conduction: 355510160000062/355510160000070 Radiation: 356784410000144/356784410000151			
EUT Stage Identical Prototype				

Remark:

- 1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
- There are two samples under test, Sample 1 (V660p-A) is dual P-SIM sample, and Sample 2 (V660p Plus-A) is P-SIM + E-SIM sample. The difference does not affect RF features, full test Sample 1 for representative.

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	BLE 1Mbps: 7.59 dBm (0.0057 W)			
99% Occupied Bandwidth	BLE 1Mbps: 1.03 MHz			
Antenna Type / Gain	Monopole Antenna with gain 1.6 dBi			
Type of Modulation	Bluetooth LE : GFSK			

1.5 Modification of EUT

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

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1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)				
	No. 1098, Pengxi North Road, Kunshan Economic Development Zone				
Test Site Location	Jiangsu Province 215300 People's Republic of China				
	TEL: +86-512-57900158				
	Sporton Sito No	FCC Designation No.	FCC Test Firm		
Test Site No.			Registration No.		
rest one NO.	CO01-KS 03CH08-KS TH01-KS	CN1257	314309		

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	TH01-KS	SPORTON	FCC 15C-15E Test Tools Ver10.0_210607	10.0
2.	03CH08-KS	AUDIX	E3	210616
3.	CO01-KS	AUDIX	E3	6.2009-8-24

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.

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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	-	-

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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 (Z plane) were recorded in this report.
- 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				
Took Itom	Data Rate / Modulation				
Test Item	Bluetooth – LE / GFSK				
Conducted	Mode 1: Bluetooth Tx CH00_2402 MHz_BLE 1Mbps				
	Mode 2: Bluetooth Tx CH19_2440 MHz_BLE 1Mbps				
TCs	Mode 3: Bluetooth Tx CH39_2480 MHz_BLE 1Mbps				
Dadistad	Mode 1: Bluetooth Tx CH00_2402 MHz_BLE 1Mbps				
Radiated	Mode 2: Bluetooth Tx CH19_2440 MHz_BLE 1Mbps				
TCs	Mode 3: Bluetooth Tx CH39_2480 MHz_BLE 1Mbps				
AC	Made 4. COMOSO Idle - DT Link - W/LANT ink/2 4C) - Adentes 4 - Fembrus - Dettem -				
Conducted	Mode 1: GSM850 Idle + BT Link + WLAN Link(2.4G) + Adaptor 4 + Earphone + Battery +				
Emission	USB Cable				
Remark: For Ra	adiated Test Cases, The tests were performance with Adapter ,Earphone and USB Cable.				

RSE Co-location	
Bluetooth LE(1 Mbps) CH39_TX + LTE E	Band 13 link

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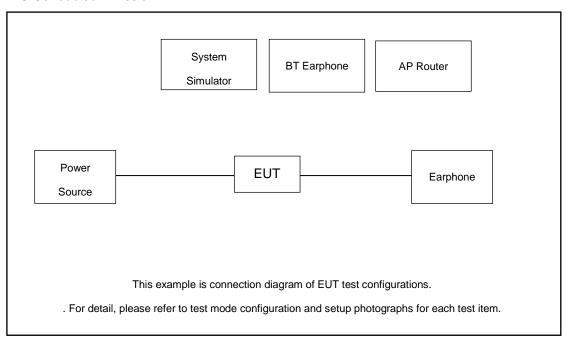
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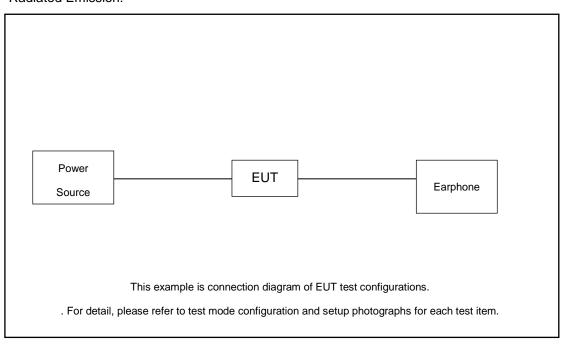
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2.3 Connection Diagram of Test System

AC Conducted Emission:



Radiated Emission:



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2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritus	MT8821C	N/A	N/A	Unshielded,1.8m
2.	Bluetooth Earphone	Lenovo	thinkplus-BH3	N/A	N/A	N/A
3.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	Unshielded AC I/P cable 1.8m
4.	WLAN AP	EDIMAX	EW-7679WAC	NDD9576791401	N/A	Unshielded,1.8m

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 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.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 5.80 dB.

 $Offset(dB) = RF \ cable \ loss(dB).$ = 5.80 (dB)

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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.

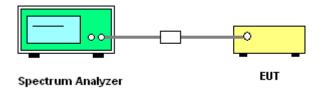
3.1.2 Measuring Instruments

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



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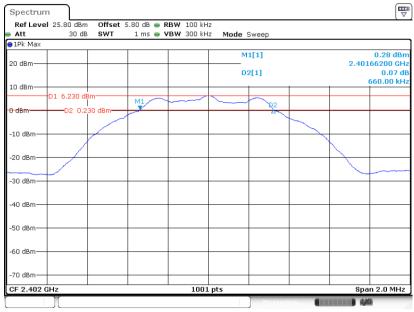
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3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

BLE 1Mbps

6 dB Bandwidth Plot on Channel 00



Date: 15.MAY.2024 01:51:24

6 dB Bandwidth Plot on Channel 19



Date: 15.MAY.2024 01:53:51

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6 dB Bandwidth Plot on Channel 39



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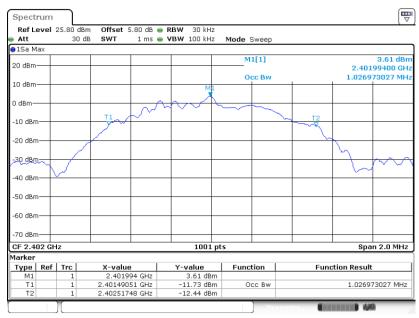
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3.1.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

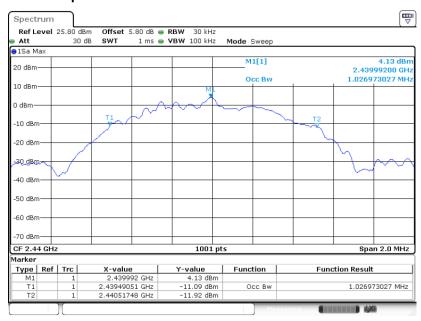
BLE 1Mbps

99% Occupied Bandwidth Plot on Channel 00



Date: 15.MAY.2024 01:53:12

99% Occupied Bandwidth Plot on Channel 19



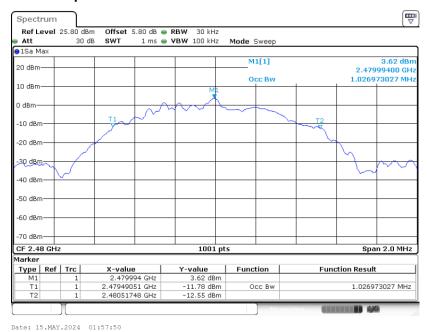
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99% Occupied Bandwidth Plot on Channel 39



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

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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.

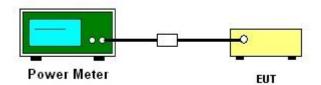
3.2.2 Measuring Instruments

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.

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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.

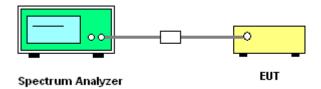
3.3.2 Measuring Instruments

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)
- 5. 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.

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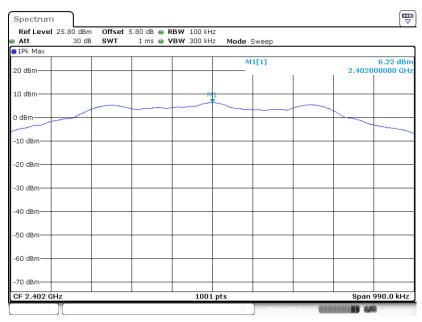
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3.3.6 Test Result of Power Spectral Density Plots (100kHz)

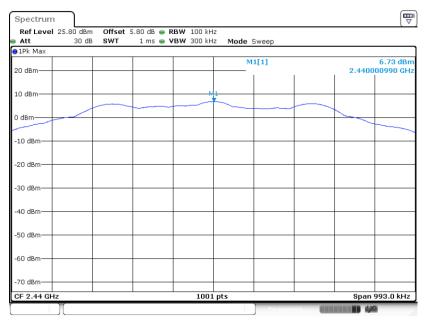
BLE 1Mbps

PSD 100kHz Plot on Channel 00



Date: 15.MAY.2024 01:52:03

PSD 100kHz Plot on Channel 19

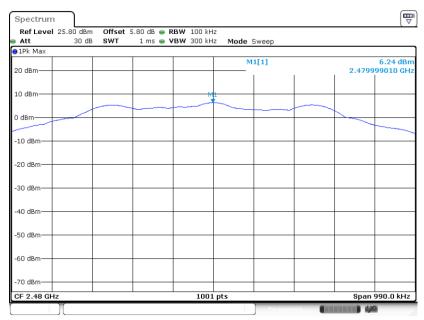


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PSD 100kHz Plot on Channel 39



Date: 15.MAY.2024 01:56:41

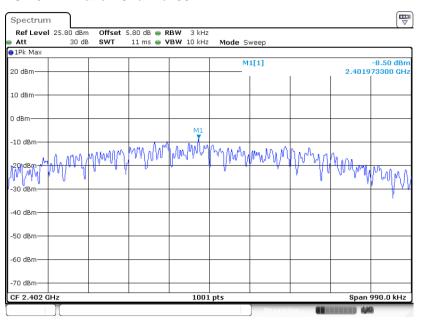
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3.3.7 Test Result of Power Spectral Density Plots (3kHz)

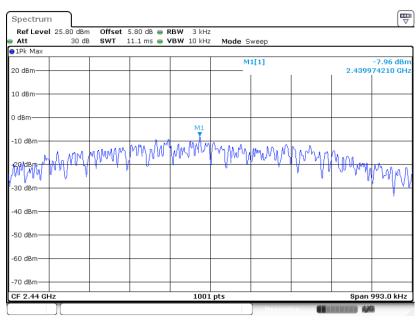
BLE 1Mbps

PSD 3kHz Plot on Channel 00



Date: 15.MAY.2024 01:51:44

PSD 3kHz Plot on Channel 19



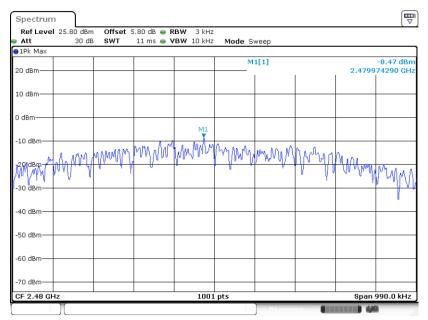
Date: 15.MAY.2024 01:54:10

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PSD 3kHz Plot on Channel 39



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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.

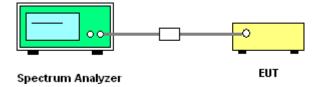
3.4.2 Measuring Instruments

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



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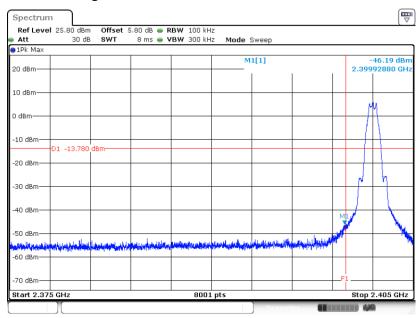
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3.4.5 Test Result of Conducted Band Edges Plots

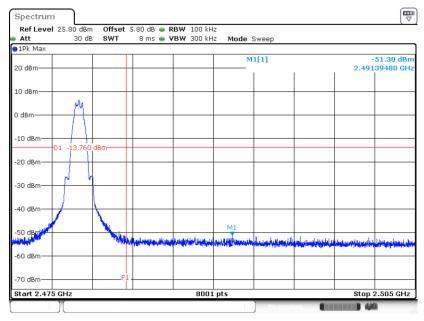
BLE 1Mbps

Low Band Edge Plot on Channel 00



Date: 15.MAY.2024 01:52:22

High Band Edge Plot on Channel 39



Date: 15.MAY.2024 01:57:00

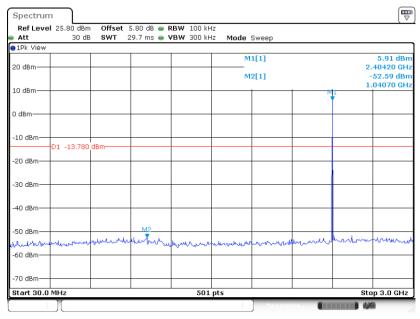
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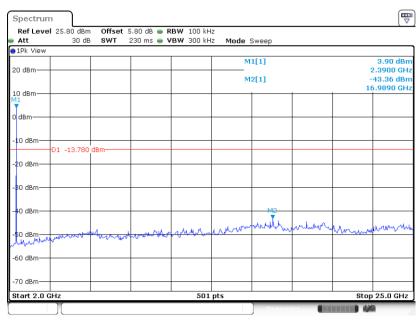
3.4.6 Test Result of Conducted Spurious Emission Plots

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 00



Date: 15.MAY.2024 01:52:43

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 00



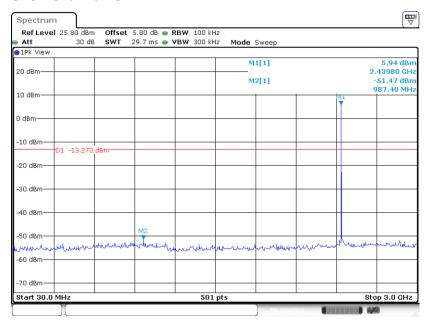
Date: 15.MAY.2024 01:53:03

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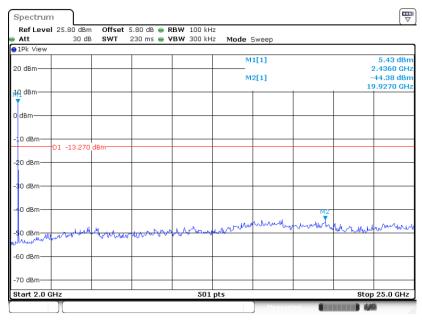
Report No.: FR440202B

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



Date: 15.MAY.2024 01:54:50

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 19



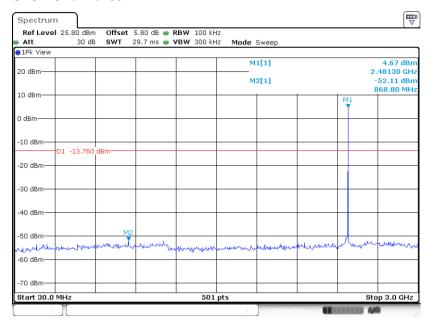
Date: 15.MAY.2024 01:55:11

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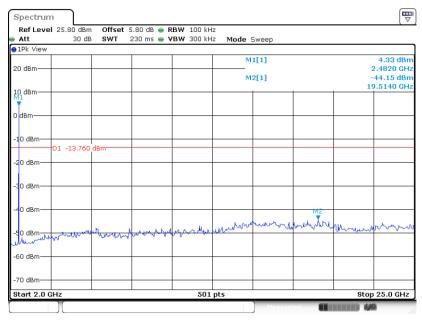
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Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 15.MAY.2024 01:57:21

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 15.MAY.2024 01:57:41

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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.

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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.
- 3. 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
- 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.

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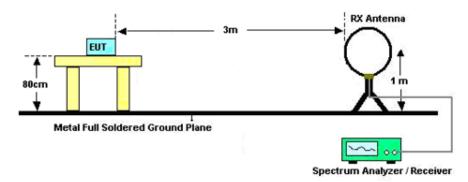
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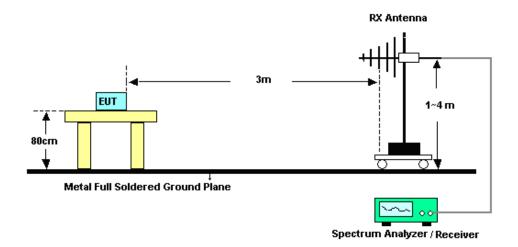
Report Template No.: BU5-FR15CBT4.0 Version 2.0

3.5.4 Test Setup

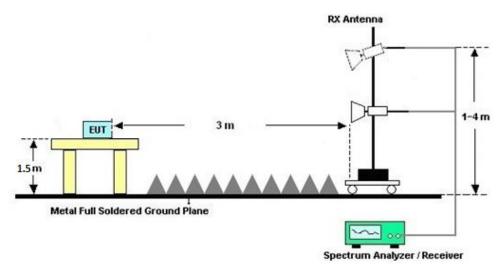
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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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.

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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.

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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		

^{*}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.

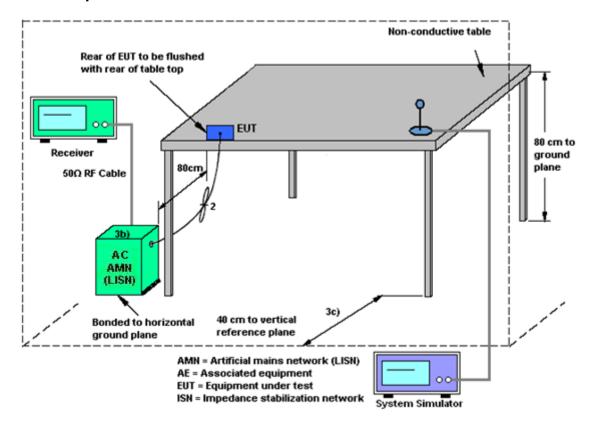
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3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

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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.

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List of Measuring Equipment 4

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	Keysight	N9038A	MY564000 23	3Hz~8.5GHz;M ax 30dBm	Jan. 04, 2024	May 09, 2024	Jan. 03, 2025	Radiation (03CH08-KS)
Spectrum Analyzer	R&S	FSV40	101932	10kHz~40GHz; Max 30dBm	Oct. 10, 2023	May 09, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Oct. 10, 2023	May 09, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Bilog Antenna	TESEQ& VGT	CBL 61110	59915	30MHz-1GHz	Aug. 12, 2023	May 09, 2024	Aug. 11, 2024	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Mar. 01, 2024	May 09, 2024	Feb. 28, 2025	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2024	May 09, 2024	Jan. 04, 2025	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 05, 2024	May 09, 2024	Jan. 04, 2025	Radiation (03CH08-KS)
Amplifier	EM	EM01G18GA	060834	1Ghz-18Ghz	Oct. 10, 2023	May 09, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
high gain Amplifier	EM	EM01G18GA	060845	1Ghz-18Ghz	Jan. 05, 2024	May 09, 2024	Jan. 04, 2025	Radiation (03CH08-KS)
Amplifier	MITEQ	EM18G40GG A	060728	18~40GHz	Jan. 04, 2024	May 09, 2024	Jan. 03, 2025	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002 473	N/A	NCR	May 09, 2024	NCR	Radiation (03CH08-KS)
Turn Table	EM	EM 1000-T	N/A	0~360 degree	NCR	May 09, 2024	NCR	Radiation (03CH08-KS)
Antenna Mast	EM	EM 1000-A	N/A	1 m~4 m	NCR	May 09, 2024	NCR	Radiation (03CH08-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 18, 2024	Jun. 02, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2023	Jun. 02, 2024	Oct. 10, 2024	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 18, 2024	Jun. 02, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2023	Jun. 02, 2024	Oct. 10, 2024	Conduction (CO01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	May 15, 2024	Oct. 10, 2024	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GH z	Jan. 02, 2024	May 15, 2024	Jan. 01, 2025	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2024	May 15, 2024	Jan. 01, 2025	Conducted (TH01-KS)

NCR: No Calibration Required

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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

Conducted Spurious Emission & Bandedge	±2.26 dB
Occupied Channel Bandwidth	±0.1%
Conducted Power	±0.46 dB
Conducted Power Spectral Density	±0.88 dB
Frequency	±0.4 Hz

Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	2.84 dB
of 95% (U = 2Uc(y))	2.04 UB

Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	2 20 AD
of 95% (U = 2Uc(y))	3.30 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.04 dB
---	---------

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.26 dB
---	---------

<u>Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)</u>

Measuring Uncertainty for a Level of Confidence	E 40 AD
of 95% (U = 2Uc(y))	5.40 dB

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

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Appendix A. Conducted Test Results

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Bluetooth Low Energy

Test Engineer:	Jacob Zhang	Temperature:	20~26	°C
Test Date:	2024/5/15	Relative Humidity:	40~51	%

BLE1M

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	1.03	0.66	0.50	Pass
BLE	1Mbps	1	19	2440	1.03	0.66	0.50	Pass
BLE	1Mbps	1	39	2480	1.03	0.66	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	7.26	30.00	1.60	8.86	36.00	Pass
BLE	1Mbps	1	19	2440	7.59	30.00	1.60	9.19	36.00	Pass
BLE	1Mbps	1	39	2480	7.10	30.00	1.60	8.70	36.00	Pass

TEST RESULTS DATA

<u>Average Power Table</u> (Reporting Only)

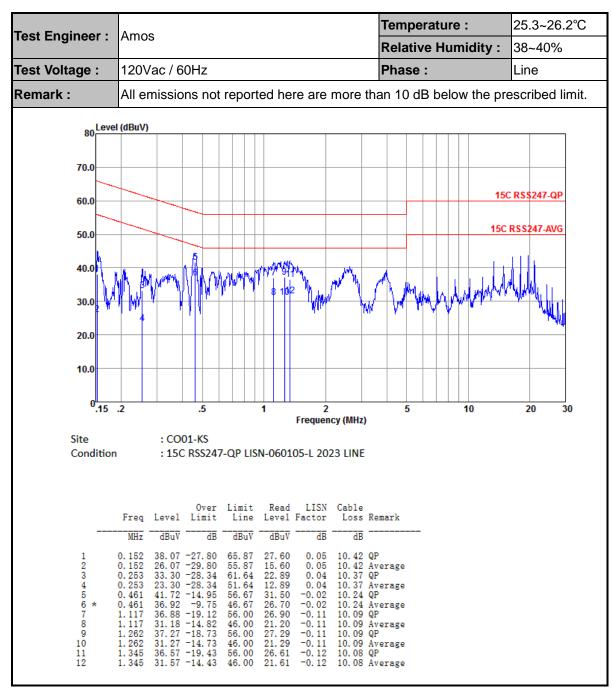
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	2.04	6.93
BLE	1Mbps	1	19	2440	2.04	7.14
BLE	1Mbps	1	39	2480	2.04	6.90

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	6.22	-8.50	1.60	8.00	Pass
BLE	1Mbps	1	19	2440	6.73	-7.96	1.60	8.00	Pass
BLE	1Mbps	1	39	2480	6.24	-8.47	1.60	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: +86-512-57900158 FCC ID: B32V660PA



Took Engineer	Amas	Temperature :	25.3~26.2°C
Test Engineer :	Amos	Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more	than 10 dB below the pr	escribed limit.
80 Level	(dBuV)		
80			
70.0			
60.0		15	C RS\$247-QP
50.0		15C	RSS247-AVG
h u			
40.0	M M B Mr. O. Mathematical Commencer of the Commencer of t	h . L	<u> </u>
30.0	10 12		
20.0			- White
10.0			
0.15	.2 .5 1 2 Frequency (MH.	5 10 r)	20 30
Site	: CO01-KS		
Condition	: 15C RSS247-QP LISN-060105-N 2023 NE	UTRAL	
	Over Limit Read LISN Cable Freq Level Limit Line Level Factor Loss	Remark	
	MHz dBuV dB dBuV dBuV dB dl	3	
	0. 259 34. 25 -27. 22 61. 47 23. 90 -0. 01 10. 36	? Average 5 QP 5 Average	
6 7 8 9 10	0.400 24.52 -23.34 47.86 14.30 -0.06 10.20 0.499 35.75 -20.26 56.01 25.60 -0.07 10.20 0.499 24.45 -21.56 46.01 14.30 -0.07 10.20 0.984 34.29 -21.71 56.00 24.30 -0.10 10.00 0.984 25.29 -20.71 46.00 15.30 -0.10 10.00	8 Average 2 QP 2 Average 9 QP 9 Average	
11 12 *	1. 249 34. 88 -21. 12 56. 00 24. 90 -0. 11 10. 09 1. 249 26. 58 -19. 42 46. 00 16. 60 -0. 11 10. 09		

Note:

- 1. Level(dB μ V) = Read Level(dB μ V) + LISN Factor(dB) + Cable Loss(dB)
- 2. Over Limit(dB) = Level(dB μ V) Limit Line(dB μ V)

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Appendix C. Radiated Spurious Emission Test Data

Test Engineer :	Koi Ji	Relative Humidity :	41~42%
rest Engineer .	TKO OF	Temperature :	22~23℃

Radiated Spurious Emission Test Modes

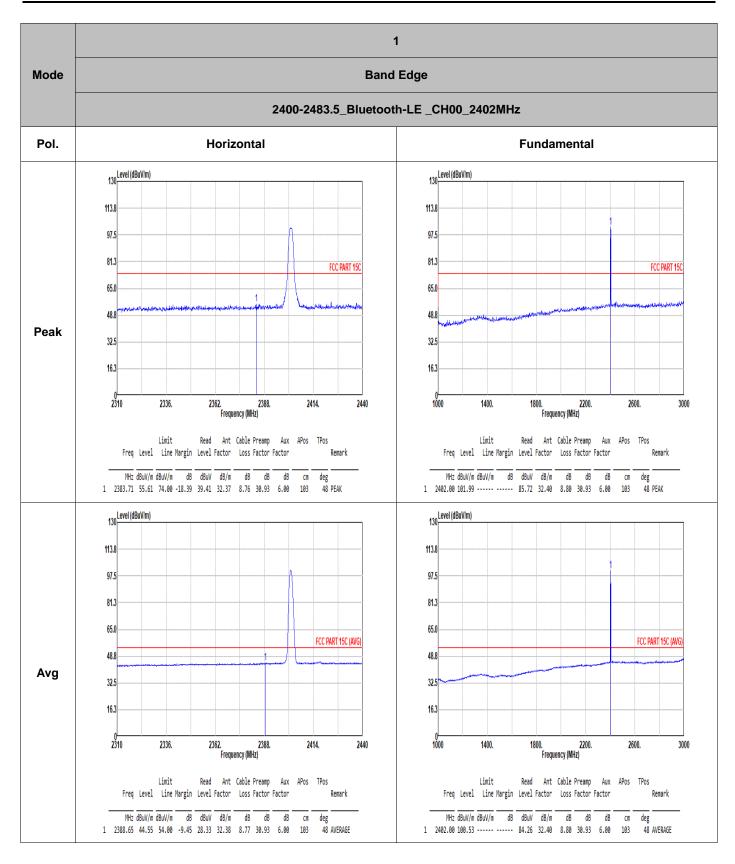
Mode	Band (MHz)	Modulation	Channel	Frequency	Data Rate	Remark
Mode 1	2400-2483.5	Bluetooth-LE	00	2402	1Mbps	-
Mode 2	2400-2483.5	Bluetooth-LE	19	2440	1Mbps	-
Mode 3	2400-2483.5	Bluetooth-LE	39	2480	1Mbps	-
Mode 4	2400-2483.5	Bluetooth-LE	39	2480	1Mbps	-
Mode 4	LTE Band 13 Link					

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	2389.04	44.61	54.00	-9.39	V	AVERAGE	Pass	Band Edge
1	Bluetooth-LE	00	4804.00	41.99	74.00	-32.01	Н	PEAK	Pass	Harmonic
2	Bluetooth-LE	19	-	-	-	-	-	-	-	Band Edge
2	Bluetooth-LE	19	7320.00	42.57	74.00	-31.43	V	PEAK	Pass	Harmonic
3	Bluetooth-LE	39	2483.80	44.74	54.00	-9.26	Н	AVERAGE	Pass	Band Edge
3	Bluetooth-LE	39	7440.00	43.42	74.00	-30.58	V	PEAK	Pass	Harmonic
4	Bluetooth-LE	39	2483.68	45.06	54.00	-8.94	Н	AVERAGE	Pass	Band Edge
4	Bluetooth-LE	39	7440.00	42.14	74.00	-31.86	V	PEAK	Pass	Harmonic

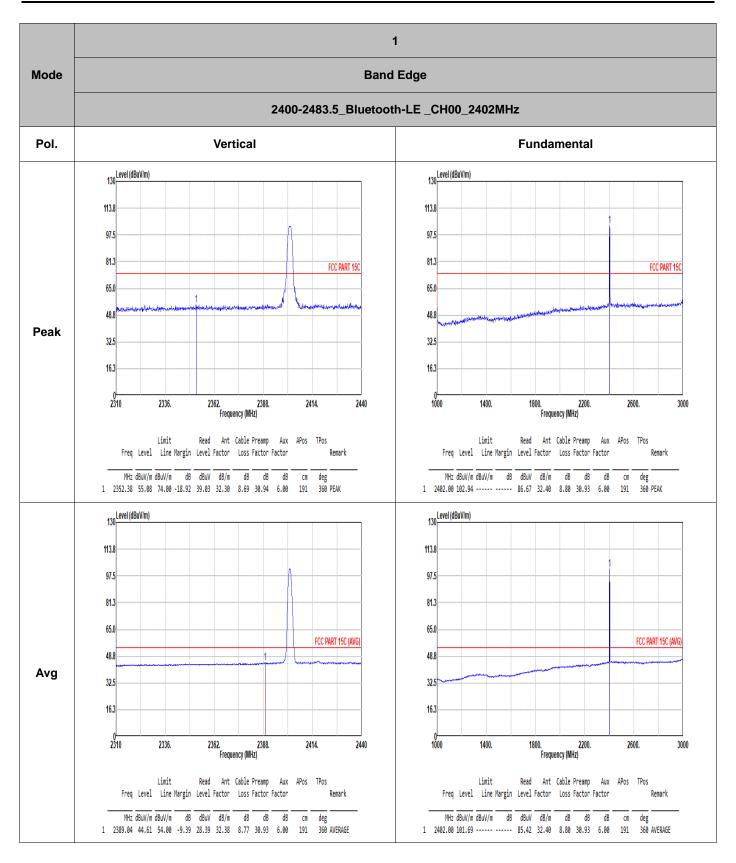
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FCC ID: B32V660PA





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FCC RF Test Report



Limit

Freq Level Line Margin Level Factor Loss Factor Factor

MHz dBuV/m dBuV/m dB dBuV dB/m dB dB

1 4804.00 41.99 74.00 -32.01 60.85 34.29 12.54 65.69 0.00

Read Ant Cable Preamp Aux APos TPos

dB

1 Mode Harmonic 2400-2483.5_Bluetooth-LE _CH00_2402MHz Pol. Horizontal Vertical 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 97.5 97.5 81.3 81.3 FCC PART 15C FCC PART 150 65.0 65.0 FCC PART 15C (AVG FCC PART 15C (AVG 48.8 48.8 Peak 32.5 32.5 Avg 16.3 16.3 6000. 12000. 15000. 18000 6000. 12000. 18000 Frequency (MHz) Frequency (MHz)

TEL: +86-512-57900158 FCC ID: B32V660PA Limit

Freq Level Line Margin Level Factor Loss Factor Factor

MHz dBuV/m dBuV/m dB dBuV dB/m dB dB

1 4804.00 40.48 74.00 -33.52 59.34 34.29 12.54 65.69 0.00

Read Ant Cable Preamp Aux APos TPos

dB

MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB

1 4880.00 42.00 74.00 -32.00 61.28 34.20 12.07 65.55 0.00

2 7320.00 41.68 74.00 -32.32 55.75 35.80 14.98 64.85 0.00

2 Mode Harmonic 2400-2483.5_Bluetooth-LE _CH19_2440MHz Pol. Horizontal Vertical 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 FCC PART 15C FCC PART 150 65.0 65.0 FCC PART 15C (AVG) FCC PART 15C (AVG Peak 32.5 Avg 16.3 16.3 9000. Frequency (MHz) 3000 9000. 12000. Frequency (MHz) 18000 6000. 12000. 15000. 18000 Limit Read Ant Cable Preamp Aux APos TPos Limit Read Ant Cable Preamp Aux APos TPos Freq Level Line Margin Level Factor Loss Factor Factor Remark Freq Level Line Margin Level Factor Loss Factor Factor Remark

deg

-- PEAK

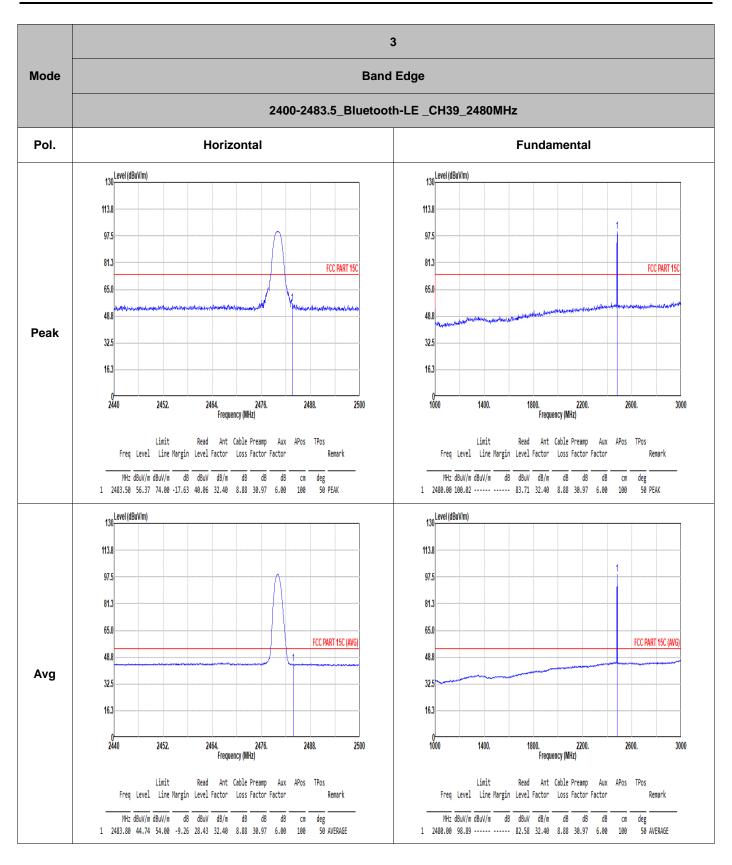
TEL: +86-512-57900158 FCC ID: B32V660PA MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB

1 4880.00 39.68 74.00 -34.32 58.96 34.20 12.07 65.55 0.00

2 7320.00 42.57 74.00 -31.43 56.64 35.80 14.98 64.85 0.00

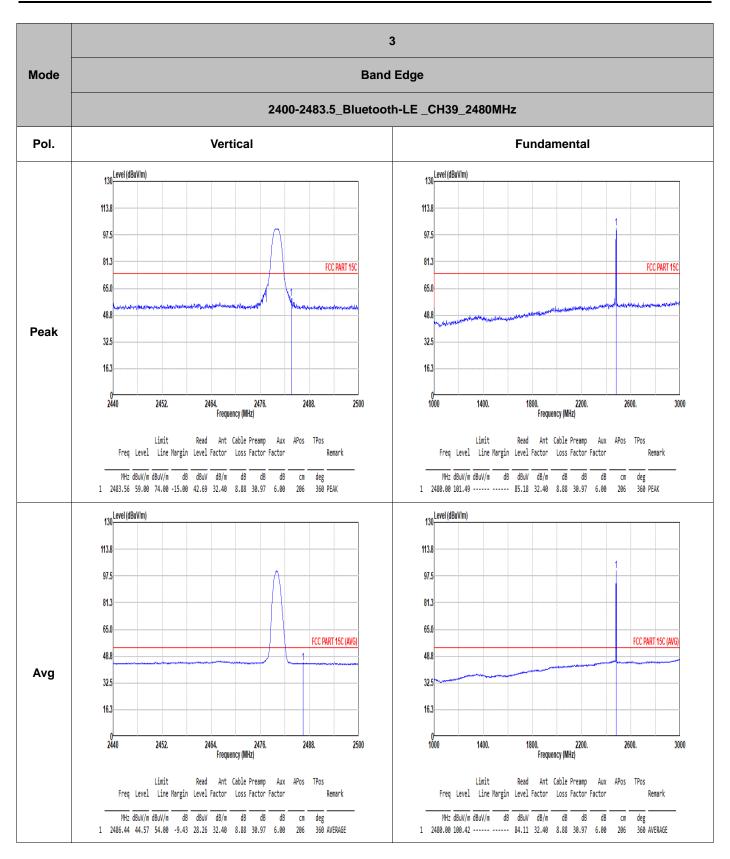
-- PEAK





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3 Mode Harmonic 2400-2483.5_Bluetooth-LE _CH39_2480MHz Pol. Horizontal Vertical 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 FCC PART 15C FCC PART 150 65.0 FCC PART 15C (AVG FCC PART 15C (AVG Peak 32.5 32.5 Avg 16.3 16.3 9000. Frequency (MHz) 9000. Frequency (MHz) 3000 18000 6000. 12000. 15000. 18000 Read Ant Cable Preamp Aux APos TPos Limit Read Ant Cable Preamp Aux APos TPos Limit Freq Level Line Margin Level Factor Loss Factor Factor Remark Freq Level Line Margin Level Factor Loss Factor Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB deg MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB 1 4960.00 40.68 74.00 -33.32 59.77 34.24 12.07 65.40 0.00 -- PEAK 1 4960.00 40.64 74.00 -33.36 59.73 34.24 12.07 65.40 0.00 -- PEAK 2 7440.00 42.47 74.00 -31.53 56.65 35.80 15.21 65.19 0.00 2 7440.00 43.42 74.00 -30.58 57.60 35.80 15.21 65.19 0.00 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 FCC PART 150 **Peak** 65.0 65.0 Avg 48.8 32.5 16.3 18000 19400. 20800. 22200. 23600. 25000 18000 19400. 22200. 23600. 25000 Frequency (MHz) Frequency (MHz)

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3 LF Mode 2400-2483.5_Bluetooth-LE _CH39_2480MHz Pol. Horizontal Vertical 80 Level (dBuV/m) 80 Level (dBuV/m) 71.7 71.7 63.3 63.3 55.0 FCC PART 150 55.0 46.7 38.3 38.3 30.0 30.0 21.7 21.7 13.3 Peak 5.0 QP -3.3 -3.3 -11.7 500. 600. 100. 400. 500. Frequency (MHz) Frequency (MHz) Limit Over ReadAntenna Cable Preamp A/Pos T/Pos
Freq Level Line Limit Level Factor Loss Factor Remark Limit Over ReadAntenna Cable Preamp A/Pos T/Pos
Freq Level Line Limit Level Factor Loss Factor Remark dB MHz dBuV/m dBuV/m dB dBuV dB/m dB MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm deg cm deg --- Peak
--- Peak
--- Peak
--- Peak
--- Peak
--- Peak
 31.94
 20.75
 40.00 -19.25
 28.40
 24.03
 52.20

 94.99
 19.32
 43.50 -24.18
 34.66
 15.26
 1.40
 32.20

 344.28
 19.76
 46.00 -26.24
 29.80
 20.16
 2.71
 32.39

 518.88
 22.60
 46.00 -23.40
 27.22
 24.42
 3.32
 32.36

 678.93
 25.82
 46.00 -20.18
 27.78
 26.43
 3.61
 32.20

 862.26
 29.21
 46.00 -16.79
 28.29
 29.00
 4.27
 32.35

 41.64
 21.34
 40.00 -18.66
 34.27
 18.54
 0.65
 32.12

 323.91
 19.68
 46.00 -26.32
 29.50
 19.70
 2.63
 32.15

 427.70
 21.47
 46.00 -24.53
 28.40
 22.30
 3.01
 32.24

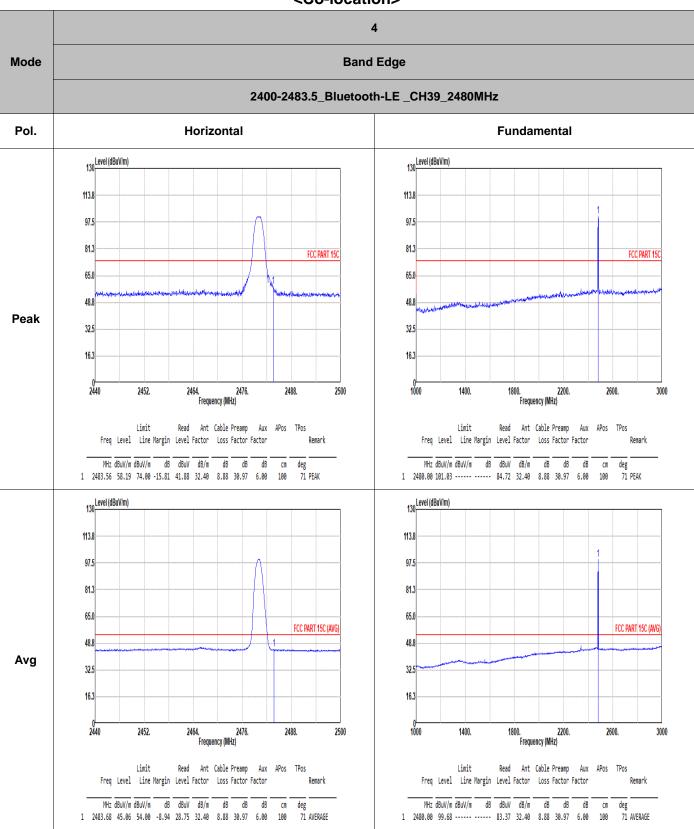
 566.41
 24.50
 46.00 -21.50
 27.88
 25.46
 3.46
 32.30

 741.01
 28.23
 46.00 -15.55
 28.39
 29.76
 4.49
 32.19

 954.41
 30.45
 46.00 -15.55
 28.39
 29.76
 4.49
 32.19

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<Co-location>



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Mode **Band Edge** 2400-2483.5_Bluetooth-LE _CH39_2480MHz Pol. Vertical **Fundamental** 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 81.3 81.3 FCC PART 150 FCC PART 150 65.0 65.0 48.8 48.8 **Peak** 32.5 32.5 16.3 16.3 2452. 2488. 1400. 3000 2464. 2476. 2200. Frequency (MHz) Frequency (MHz) Limit Read Ant Cable Preamp Aux APos TPos Limit Read Ant Cable Preamp Aux APos TPos Freq Level Line Margin Level Factor Loss Factor Factor Freq Level Line Margin Level Factor Loss Factor Factor MHz dBuV/m dBuV/m dB dBuV dB/m dB MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB dB dB 1 2483.56 56.91 74.00 -17.09 40.60 32.40 8.88 30.97 6.00 1 2480.00 99.83 ----- 83.52 32.40 8.88 30.97 6.00 137 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 65.0 65.0 FCC PART 15C (AVG FCC PART 15C (AVG 48.8 48.8 Avg 32.5 32.5 16.3 16.3 0<u>—</u> 2440 2452. 2488. 2500 1400. 2200. 3000 Frequency (MHz) Frequency (MHz) Read Ant Cable Preamp Aux APos TPos Limit Read Ant Cable Preamp Aux APos TPos Freq Level Line Margin Level Factor Loss Factor Factor Freq Level Line Margin Level Factor Loss Factor Factor Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 2484.70 44.60 54.00 -9.40 28.29 32.40 8.88 30.97 6.00 137 246 AVERAGE 1 2480.00 98.67 ----- 82.36 32.40 8.88 30.97 6.00 137 246 AVERAGE

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Limit

Freq Level Line Margin Level Factor Loss Factor Factor

MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB

1 4960.00 40.47 74.00 -33.53 59.56 34.24 12.07 65.40 0.00

2 7440.00 41.73 74.00 -32.27 55.91 35.80 15.21 65.19 0.00

Read Ant Cable Preamp Aux APos TPos

Mode Harmonic 2400-2483.5_Bluetooth-LE _CH39_2480MHz Pol. Horizontal Vertical 130 Level (dBuV/m) 130 Level (dBuV/m) 113.8 113.8 97.5 97.5 81.3 81.3 FCC PART 15C FCC PART 150 FCC PART 15C (AVG FCC PART 15C (AVG) Peak 32.5 32.5 Avg 16.3 16.3 0<u>—</u> 3000 9000. Frequency (MHz) 9000. 12000. Frequency (MHz) 18000 6000. 12000. 15000. 18000

Remark

deg

-- PEAK

TEL: +86-512-57900158 FCC ID: B32V660PA Limit

Freq Level Line Margin Level Factor Loss Factor Factor

MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB

1 4960.00 39.69 74.00 -34.31 58.78 34.24 12.07 65.40 0.00

2 7440.00 42.14 74.00 -31.86 56.32 35.80 15.21 65.19 0.00

Read Ant Cable Preamp Aux APos TPos

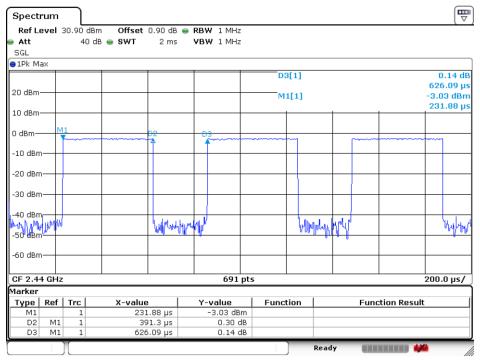
Remark

-- PEAK

Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth LE 1Mbps	62.499	0.391	2.556	2.7KHZ

Bluetooth LE 1Mbps



Date: 9.MAY.2024 14:57:29

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