RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: FCC_RF_SL19011002-ZBR-101A2-BT Rev 1.0
Supersede Report No.: FCC_RF_SL19011002-ZBR-101A2-BT

Applicant	:	Zebra Technologies Corporation
Host Product Name	:	Thermal Printer
Host Model No.	:	ZD220d, ZD220t, ZD230d, ZD230t, ZP230d
Module Model No.	:	ZQ3BT
FCC ID	:	I28-ZBRZQ3BT
IC	:	3798B-ZBRZQ3BT
Test Standard	:	FCC 15.247 RSS 247 Issue 2
Test Method	:	558074 D01 15.247 Meas Guidance v05r01 ANSI C63.10 2013 RSS Gen Issue 5
Dates of test	:	02/01/2019-03/26/2019
Issue Date	:	03/28/2019
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification		**[X]**
Equipment did not comply with the specification		**[ ]**

This Test Report is Issued Under the Authority of:

Deon Dai	**Chen Ge**
RF Test Engineer	Engineer Reviewer

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Test result presented in this test report is applicable to the tested sample only

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, CA 95035

ilac-MRA
A2LA ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	EMC, RF/Wireless, Telecom, Safety
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & RED Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

CONTENTS

1 REPORT REVISION HISTORY 4

2 EXECUTIVE SUMMARY 5

3 CUSTOMER INFORMATION 5

4 TEST SITE INFORMATION 5

5 MODIFICATION 5

6 EUT INFORMATION 6

6.1 EUT Description 6

6.2 Radio Description 6

6.3 EUT test modes/configuration Description 7

7 SUPPORTING EQUIPMENT/SOFTWARE AND CABLING DESCRIPTION 8

7.1 Supporting Equipment 8

7.2 Cabling Description 8

7.3 Test Software Description 8

8 TEST SUMMARY 9

9 MEASUREMENT UNCERTAINTY 10

9.1 Radiated Emissions (30MHz to 1GHz) 10

9.2 Radiated Emissions (1GHz to 40GHz) 10

9.3 RF conducted measurement 11

10 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS 12

10.1 Antenna Requirement 12

11 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS 13

11.1 Conducted emissions 13

11.2 Radiated Measurements 16

11.2.1 Radiated Measurements 30MHz to 1GHz 16

11.2.2 Radiated Spurious Emissions between 1GHz-25GHz 18

ANNEX A. TEST INSTRUMENT 22

ANNEX A. SIEMIC ACCREDITATION 23

1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_RF_SL19011002-ZBR-101A2-BT	None	Original	03/27/2019
FCC_RF_SL19011002-ZBR-101A2-BT Rev 1.0	1.0	Update	03/28/2019

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: Zebra Technologies Corporation
Host Product: Thermal Printer
Host Model: ZD220d, ZD220t, ZD230d, ZD230t, ZP230d

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page. This test report covers the radiated emissions requirements of the standards referenced in the report to allow system level approval of the modules in specified Hosts.

3 Customer information

Applicant Name	:	Zebra Technologies Corporation
Applicant Address	:	3 Overlook Point Lincolnshire, IL 60069, USA
Manufacturer Name	:	Zebra Technologies Corporation
Manufacturer Address	:	3 Overlook Point Lincolnshire, IL 60069, USA

4 Test site information

Lab performing tests	:	SIEMIC Laboratories
Lab Address	:	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	:	540430
IC Test Site No.	:	4842D-2
VCCI Test Site No.	:	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-
-	-	-	-

6 EUT Information

6.1 EUT Description

Host Product Name	Thermal Printer
Host Model No	ZD220d, ZD220t, ZD230d, ZD230t, ZP230d
Module Model No.	ZQ3BT
Trade Name	Zebra Technologies Corporation
Serial No	N/A
EUT Input Power	24Vdc, 2.5A
AC/DC Power Supply Output	24Vdc, 2.5A; 24Vdc, 3.125A, 100-240Vac
AC/DC Power Supply Manufacturer/Model	FSP: FSP060-RPAC, FSP075-RAAN2; Sanhua: SAWA-31-25024, SAWA-52-312524
AC/DC Power Supply SN	N/A
Date of EUT received	1/28/2019
Equipment Class/Category	Class B / ITE
Clock Frequencies	>100MHz
Port/Connectors	USB, RJ45
Remark	N/A

6.2 Radio Description

Specifications for Radio:

Bluetooth BDR/EDR:

Radio Type	Bluetooth
Operating Frequency	2402MHz-2480MHz
Modulation	FHSS
Channel Spacing	1MHz
Antenna Type	Chip Antenna
Antenna Gain	1.69 dBi (BT)

Bluetooth LE:

Radio Type	Bluetooth (Ver4.0)
Operating Frequency	2402MHz-2480MHz
Modulation	DSSS (LE)
Channel Spacing	2MHz (LE)
Antenna Type	Chip Antenna
Antenna Gain	1.69 dBi (BTLE)

6.3 EUT test modes/configuration Description

Mode	Note
RF test	EUT is set to continuously transmit
Note: None	

Test Item	Operating mode	Tested antenna port
Radiated Spurious Emission	Continuous Transmit	-
Note: -		

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	E7440	BJBON12	Dell	-
2	60 watt power supply	FSP060-RPAC	-	-	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
USB	EUT	I/O Port	Laptop	USB	2	Unshielded	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Tool Box	Set the Connection with Companion Device

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Radiated Spurious Emission	FCC IC	FCC 15.247 RSS 247	FCC IC	558074 D01 15.247 Meas Guidance v05r01 RSS Gen	☒ Pass ☐ N/A
AC Conducted Emission	FCC IC	FCC 15.207 RSS GEN	FCC IC	ANCI C63.10 RSS GEN	☒ Pass ☐ N/A
Remark	1. All measurement uncertainties are not taken into consideration for all presented test result. 2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. 3. Only Radiated Spurious Emission and AC line Conducted was testing for Host configuration.				

9 Measurement Uncertainty

9.1 Radiated Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:
- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
Expanded Uncertainty (K=2)					**6.0118262**

The total derived measurement uncertainty is +/- 6.00 dB.

9.2 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:
- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
Expanded Uncertainty (K=2)					**8.4726**

The total derived measurement uncertainty is +/- 8.47 dB.

9.3 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
Expanded Uncertainty (K=2)					**0.952174**

The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, examination and derived results

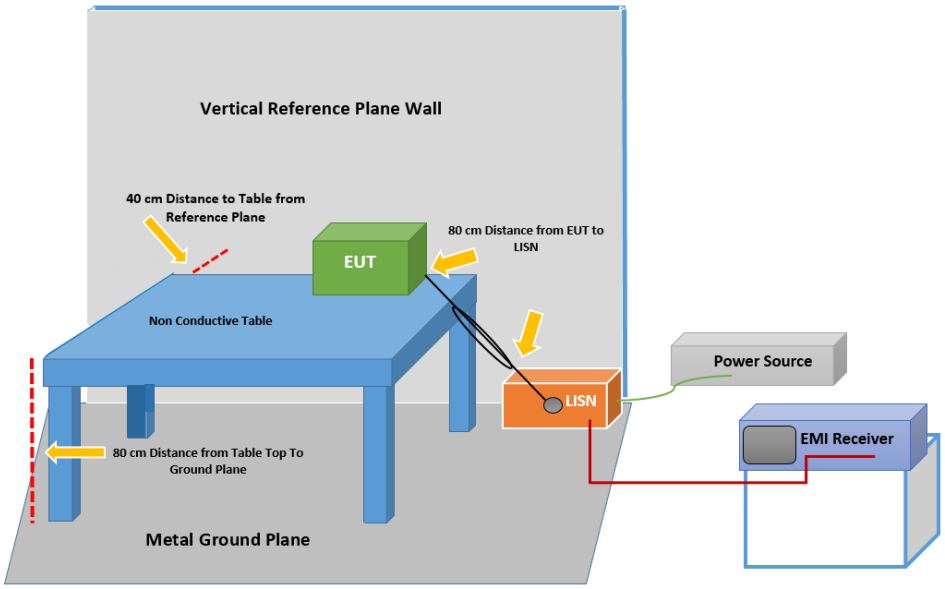
10.1 Antenna Requirement

Spec	Requirement	Applicable
§15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. Antenna requirement must meet at least one of the following: a) Antenna must be permanently attached to the device. b) The antenna must use a unique type of connector to attach to the device. c) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.	☒
Remark	The Bluetooth Module uses a Chip antenna that is permanently attached to the board which meets the requirement.	
Result	☒ PASS ☐ FAIL	

11 Measurements, examination and derived results

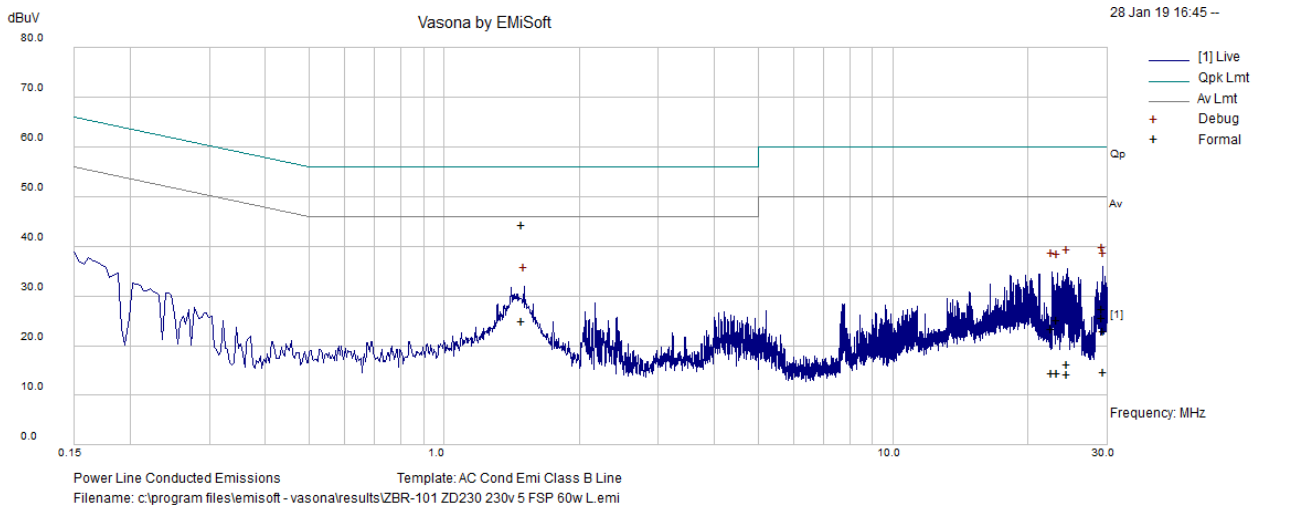
11.1 Conducted emissions

<table>
<tr><th>Spec</th><th>Requirement</th></tr>
<tr><td>FCC 15.207
RSS GEN</td><td>Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator 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, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Limits for Conducted Emissions at the Mains Ports:
<table>
<tr><th rowspan="2">Section</th><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBuV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<tr><td rowspan="3">15.209</td><td>0.15 ~ 0.5</td><td>66 – 56</td><td>56 – 46</td></tr>
<tr><td>0.5 ~ 5</td><td>56</td><td>46</td></tr>
<tr><td>5 ~ 30</td><td>60</td><td>50</td></tr>
</table>
</td></tr>
<tr><td>Test Setup</td><td> 
</td></tr>
<tr><td>Procedure</td><td>1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50Ω/50ΩH EUT LISN, connected to a EMI test receiver
3. All other supporting equipment was powered separately from another main supply.
4. The EUT was switched on and allowed to warm up to its normal operating condition.
5. High peaks, relative to the limit line, were then selected from to the EMI test receiver.
6. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. All possible modes of operation were investigated. Only the 6 worst case emissions were measured and reported. All other emissions were relatively insignificant.</td></tr>
</table>

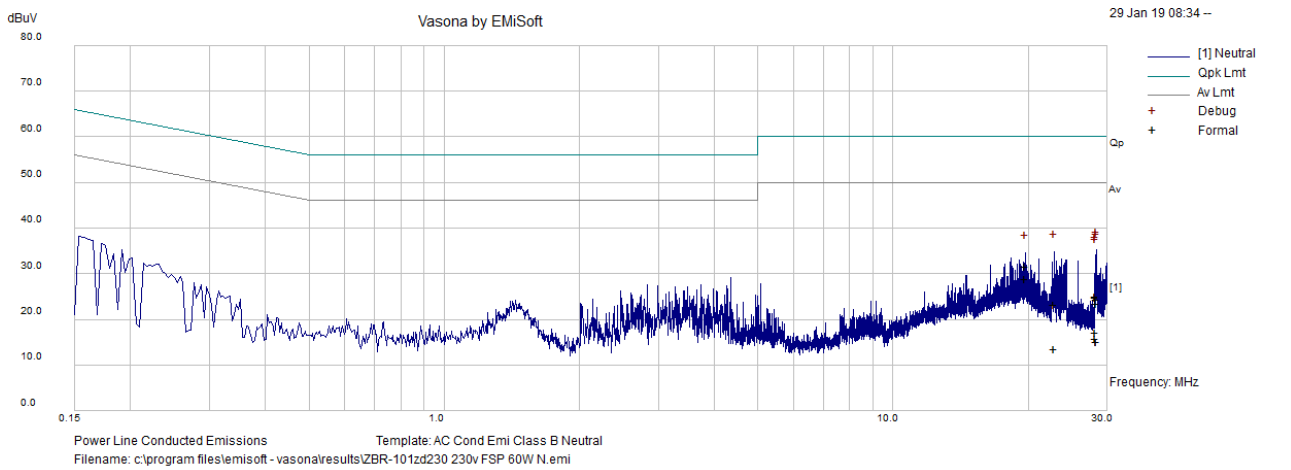
Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	23	Result:	PASS
	Humidity (%):	47		
	Atmospheric(mbar):	1018		
Mains Power:	120V 60Hz			
Tested by:	John Plotner			
Test Date:	1/28/19			
Remarks:	Ethernet Configuration, 60 Watt Adapter Line			



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line/ Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
1.490297	36.53	7.8	0.06	44.39	Quasi Peak	Line	56	-11.61	Pass
29.23513	17.7	9.05	0.6	27.35	Quasi Peak	Line	60	-32.65	Pass
24.39769	4.8	9.01	0.53	14.34	Quasi Peak	Line	60	-45.66	Pass
22.53016	13.89	9	0.5	23.4	Quasi Peak	Line	60	-36.6	Pass
29.37412	13.21	9.05	0.6	22.86	Quasi Peak	Line	60	-37.14	Pass
23.22221	15.71	9	0.52	25.22	Quasi Peak	Line	60	-34.78	Pass
1.490297	17.06	7.8	0.06	24.92	Average	Line	46	-21.08	Pass
29.23513	15.92	9.05	0.6	25.57	Average	Line	50	-24.43	Pass
24.39769	6.69	9.01	0.53	16.23	Average	Line	50	-33.77	Pass
22.53016	5.06	9	0.5	14.56	Average	Line	50	-35.44	Pass
29.37412	5.05	9.05	0.6	14.7	Average	Line	50	-35.3	Pass
23.22221	5.05	9	0.52	14.56	Average	Line	50	-35.44	Pass

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	23	Result:	PASS
	Humidity (%):	47		
	Atmospheric(mbar):	1018		
Mains Power:	120V 60Hz			
Tested by:	John Plotner			
Test Date:	1/28/2019			
Remarks:	Ethernet Configuration, 60 Watt Adapter Neutral			

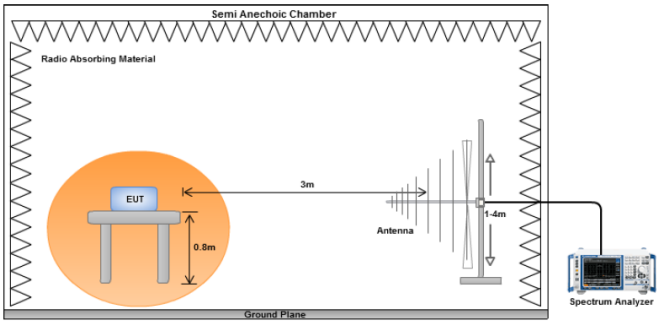


Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line/ Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
28.36099	14.56	9.05	0.81	24.42	Quasi Peak	Neutral	60	-35.58	Pass
28.39208	13.46	9.05	0.81	23.32	Quasi Peak	Neutral	60	-36.68	Pass
22.85627	13.62	9	0.57	23.2	Quasi Peak	Neutral	60	-36.8	Pass
19.70968	22.15	8.93	0.43	31.51	Quasi Peak	Neutral	60	-28.49	Pass
28.22031	14.82	9.06	0.8	24.68	Quasi Peak	Neutral	60	-35.32	Pass
28.28212	15.06	9.06	0.81	24.92	Quasi Peak	Neutral	60	-35.08	Pass
28.36099	5.1	9.05	0.81	14.96	Average	Neutral	50	-35.04	Pass
28.39208	5.1	9.05	0.81	14.96	Average	Neutral	50	-35.04	Pass
22.85627	3.99	9	0.57	13.56	Average	Neutral	50	-36.44	Pass
19.70968	19.53	8.93	0.43	28.89	Average	Neutral	50	-21.11	Pass
28.22031	7.14	9.06	0.8	17	Average	Neutral	50	-33	Pass
28.28212	5.84	9.06	0.81	15.7	Average	Neutral	50	-34.3	Pass

11.2 Radiated Measurements

11.2.1 Radiated Measurements 30MHz to 1GHz

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.209 RSS-247	**Frequency range (MHz)** / **Field Strength (uV/m)** 30 – 88 / 100 88 – 216 / 150 216 960 / 200 Above 960 / 500 **k**	☒
Test Setup		
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.	

Test Date	02/01/2018 – 02/08/2018	Environmental conditions	Temperature 20.1°C Relative Humidity 36% Atmospheric Pressure 1026mbar
Remark	-		
Result	☒ Pass ☐ Fail		

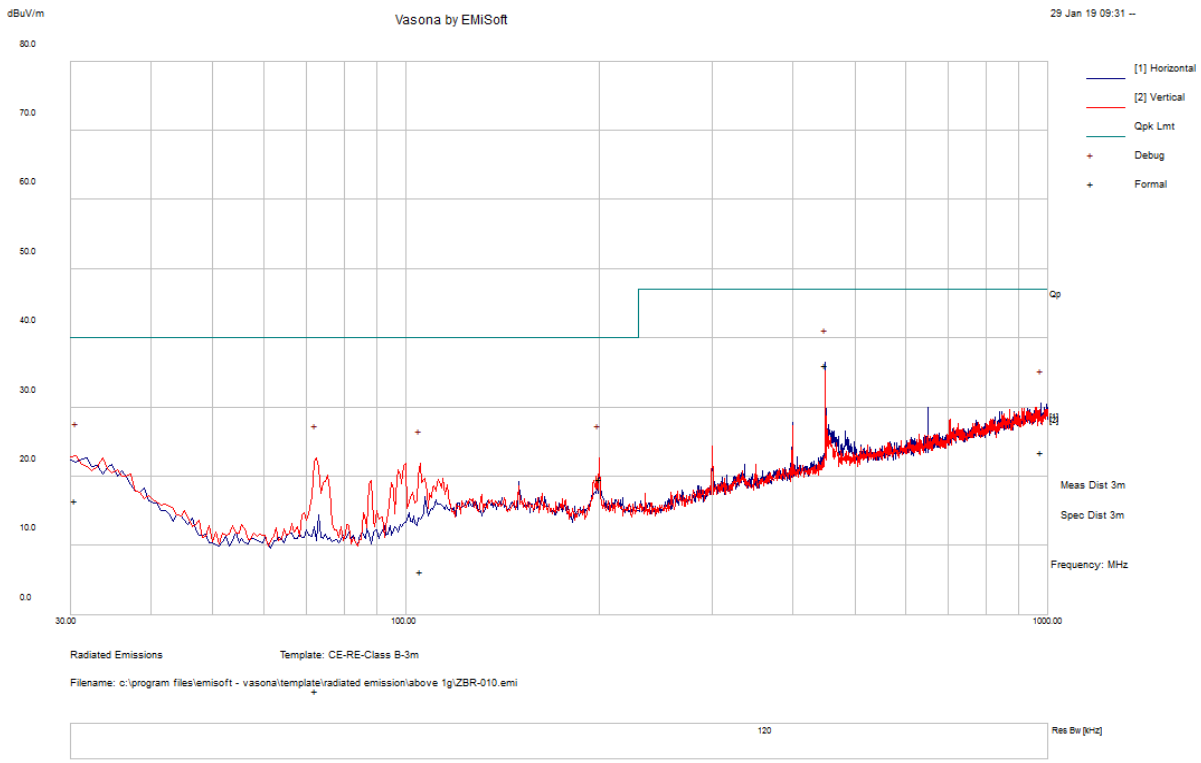
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Deon Dai at 10-meter chamber.

Test specification:	Radiated Emissions			
Mains Power:	120VAC, 60Hz		Result:	☒ Pass ☐ Fail
Tested by:	Deon Dai			
Test Date:	02/04/2018			
Remarks:	BLE, middle channel, worst case			

f=30MHz – 1000MHz plot and 3-meter distance

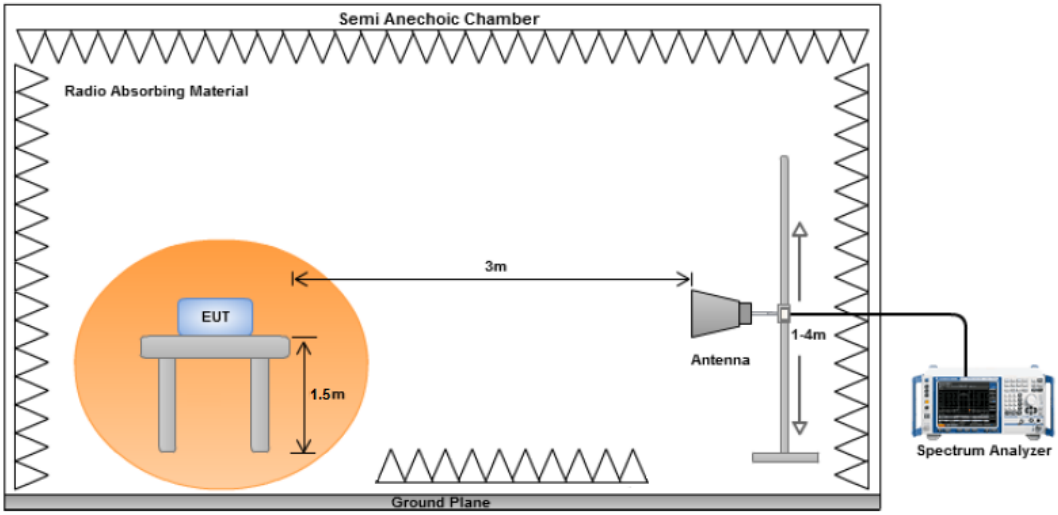


f=30MHz – 1000MHz Measurements

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
449.97	41.19	14.06	-19.1	36.15	Quasi Max	H	100	333	47	-10.85	Pass
975.00	19.29	16.02	-11.81	23.5	Quasi Max	H	244	100	47	-23.5	Pass
30.51	18.01	11.12	-12.57	16.56	Quasi Max	V	340	207	40	-23.45	Pass
199.99	30.69	12.62	-23.71	19.6	Quasi Max	V	107	307	40	-20.4	Pass
105.24	18.8	11.92	-24.39	6.33	Quasi Max	V	157	4	40	-33.67	Pass

11.2.2 Radiated Spurious Emissions between 1GHz-25GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS 247	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☐ 20 dB down ☒ 30 dB down	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☐
Test Setup			
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. An average measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.		
Result	☒ Pass		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Deon Dai at 10-meter chamber.

BDR, low channel:

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
3587.52	46.98	3.58	-13.56	37	Peak Max	H	213	296	74	-37	Pass
4804.74	49.16	4.1	-10.91	42.35	Peak Max	H	224	26	74	-31.65	Pass
7818.33	49.48	5.28	-7.19	47.57	Peak Max	H	161	150	74	-26.43	Pass
3587.52	32.44	3.58	-13.56	22.46	Average Max	H	213	296	54	-31.54	Pass
4804.74	35.01	4.1	-10.91	28.2	Average Max	V	224	26	54	-25.8	Pass
7818.33	35.24	5.28	-7.19	33.33	Average Max	H	161	150	54	-20.67	Pass

BDR, middle channel:

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
3656.00	47.91	3.57	-13.37	38.11	Peak Max	H	205	294	74	-35.89	Pass
4881.97	48.24	4.18	-11.03	41.39	Peak Max	V	215	25	74	-32.61	Pass
7557.32	49.91	5.15	-7.49	47.57	Peak Max	V	163	152	74	-26.43	Pass
3656.00	33.87	3.57	-13.37	24.07	Average Max	H	205	294	54	-29.93	Pass
4881.97	34.16	4.18	-11.03	27.31	Average Max	H	215	25	54	-26.69	Pass
7557.32	35.23	5.15	-7.49	32.89	Average Max	H	163	152	54	-21.11	Pass

BDR, high channel:

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
3549.66	47.23	3.58	-13.67	37.14	Peak Max	V	205	297	74	-36.86	Pass
4960.97	48.27	4.25	-11.16	41.36	Peak Max	V	215	33	74	-32.64	Pass
7835.16	49.82	5.29	-7.18	47.93	Peak Max	V	168	148	74	-26.07	Pass
3549.66	33.03	3.58	-13.67	22.94	Average Max	H	205	297	54	-31.06	Pass
4960.97	33.52	4.25	-11.16	26.61	Average Max	H	215	33	54	-27.39	Pass
7835.16	35.31	5.29	-7.18	33.42	Average Max	H	168	148	54	-20.58	Pass

EDR, low channel:

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
3205.83	47.67	3.43	-13.78	37.32	Peak Max	H	211	292	74	-36.68	Pass
4804.07	48.77	4.11	-10.91	41.97	Peak Max	V	222	25	74	-32.03	Pass
7336.42	49.78	5.15	-7.65	47.28	Peak Max	H	166	146	74	-26.72	Pass
3205.83	32.85	3.43	-13.78	22.5	Average Max	H	211	292	54	-31.5	Pass
4804.07	34.39	4.11	-10.91	27.59	Average Max	V	222	25	54	-26.41	Pass
7336.42	35.6	5.15	-7.65	33.1	Average Max	H	166	146	54	-20.9	Pass

EDR, middle channel:

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
3008.40	47.75	3.28	-14.16	36.87	Peak Max	H	212	300	74	-37.13	Pass
4882.00	48.27	4.17	-11.03	41.41	Peak Max	V	222	34	74	-32.59	Pass
7783.75	51.06	5.25	-7.22	49.09	Peak Max	H	163	148	74	-24.91	Pass
3008.40	33.67	3.28	-14.16	22.79	Average Max	V	212	300	54	-31.21	Pass
4882.00	33.8	4.17	-11.03	26.94	Average Max	V	222	34	54	-27.06	Pass
7783.75	36.72	5.25	-7.22	34.75	Average Max	H	163	148	54	-19.25	Pass

EDR, high channel:

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
3044.81	47.31	3.31	-13.99	36.63	Peak Max	H	206	296	74	-37.37	Pass
4960.31	48.21	4.25	-11.16	41.3	Peak Max	V	216	34	74	-32.7	Pass
7776.92	50.12	5.24	-7.23	48.13	Peak Max	H	162	147	74	-25.87	Pass
3044.81	32.68	3.31	-13.99	22	Average Max	V	206	296	54	-32	Pass
4960.31	33.44	4.25	-11.16	26.53	Average Max	V	216	34	54	-27.47	Pass
7776.92	35.95	5.24	-7.23	33.96	Average Max	V	162	147	54	-20.04	Pass

BLE, low channel:

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
3456.60	54.34	3.56	-13.73	44.17	Peak Max	H	213	300	74	-29.83	Pass
4804.62	56.17	4.1	-10.91	49.36	Peak Max	V	219	32	74	-24.64	Pass
7880.97	57.79	5.33	-7.13	55.99	Peak Max	V	163	151	74	-18.01	Pass
3456.60	49.08	3.56	-13.73	38.91	Average Max	V	213	300	54	-15.09	Pass
4804.62	45.15	4.1	-10.91	38.34	Average Max	V	219	32	54	-15.66	Pass
7880.97	46.59	5.33	-7.13	44.79	Average Max	V	163	151	54	-9.21	Pass

BLE, middle channel:

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
3088.95	54.34	3.34	-13.87	43.81	Peak Max	H	209	296	74	-30.19	Pass
4881.59	55.24	4.18	-11.03	48.39	Peak Max	H	220	32	74	-25.61	Pass
7194.26	56.4	5.14	-7.73	53.81	Peak Max	H	170	145	74	-20.19	Pass
3088.95	48.1	3.34	-13.87	37.57	Average Max	H	209	296	54	-16.43	Pass
4881.59	44.24	4.18	-11.03	37.39	Average Max	V	220	32	54	-16.61	Pass
7194.26	44.49	5.14	-7.73	41.9	Average Max	V	170	145	54	-12.1	Pass

BLE, high channel:

Frequency MHz	Raw dBµV/m	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
3277.98	54.98	3.48	-13.75	44.71	Peak Max	V	204	300	74	-29.29	Pass
4960.04	55.18	4.25	-11.16	48.27	Peak Max	H	219	34	74	-25.73	Pass
7087.30	56.8	5.11	-7.78	54.13	Peak Max	H	169	151	74	-19.87	Pass
3277.98	48.92	3.48	-13.75	38.65	Average Max	H	204	300	54	-15.35	Pass
4960.04	43.43	4.25	-11.16	36.52	Average Max	V	219	34	54	-17.48	Pass
7087.30	45.76	5.11	-7.78	43.09	Average Max	H	169	151	54	-10.91	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Radiated Emissions						
Spectrum Analyzer	N9030B	10SL0289	09/06/2018	1 Year	09/06/2019	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	07/13/2018	1 Year	07/13/2019	☑
Horn Antenna (1-26.5GHz)	3115	10SL0059	11/09/2018	1 Year	11/09/2019	☑

AC Line Conducted Instrument	Model	Serial #	Cal Due	In use
EMI Test Receiver	ESIB 40	100179	8/28/2019	YES
Transient Limiter (9 kHz - 100 MHz)	EM-7600-5	106	12/31/2019	YES
LISN	3816/2NM	214372	1/10/2020	YES

Annex A. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		A1, A2, A3, A4, B1, B2, B3, B4, C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		**Radio Equipment: EN45011:** EN ISO/IEC 17065
		Electromagnetic Compatibility: EN45011 – EN ISO/IEC 17065
Singapore iDA CB(Certification Body)		Phase I, Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		**(Phase II)** OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		**Radio:** Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		**Radio**: A1. Terminal equipment for purpose of calling **Telecom**: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		**EMI:** KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI **EMS:** KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS
		Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68
		Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
Taiwan NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measurement
Australia CAB Recognition		**EMC:** AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4
		Radiocommunications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771
		Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06 AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016,AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2