RF TEST REPORT

SIEMIC
GLOBAL TESTING & CERTIFICATIONS
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Report No.: FCC_IC RF_SL16052501-ZBR-015 (ZT510)
Supersede Report No.:

Applicant	:	Zebra Technologies Corporation
Product Name	:	Label Printer
Host Model No.	:	ZT510
BT Module Model No.	:	ZBRBLE
Test Standard	:	47 CFR 15.247 RSS 247
Test Method	:	ANSI C63.10: 2013 RSS Gen Iss 4: Nov 2014
FCC ID	:	I28MD-ZBRBLE I28MD-FXLAN11AC
IC ID	:	3798B- ZBRBLE 3798B-FXLAN11AC
Dates of test	:	10/17/2016 – 11/16/2016
Issue Date	:	12/06/2016
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:	
Gary Chou	Chen Ge
Gary Chou	Chen Ge

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

ilac-MRA
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	Safety, EMC, RF/Wireless, Telecom
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 & R&TTE Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_IC RF_SL16052501-ZBR-015 (ZT510)	None	Original	12/06/2016

2 Executive Summary

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

Company: Zebra Technologies Corporation
Product: Label Printer
Host Model: ZT510

which is FCC certified radio module FCC certified radio module (FCC ID: I28MD-ZBRBLE, IC ID: 3798B-ZBRBLE), to be installed into a printer host (Printer Model: ZT510) and simultaneously transmission with FCC certified Radio (FCC ID: I28MD-FXLAN11AC, IC ID: 3798B-FXLAN11AC), against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

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.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	Zebra Technologies Corporation
Host Model No.	ZT510
AC Radio Module Model No.	WYSBHVGXG
BT Module Model No.	ZBRBLE
Trade Name	Zebra
Serial No.	34J163304855
Host Model No.	N/A
Input Power	100-240VAC 50-60Hz
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Date of EUT received	10//2016
Equipment Class/ Category	DTS, UNII
Port/Connectors	USB, RS232, RJ45, Parallel

6.2 Radio Description

BLE:

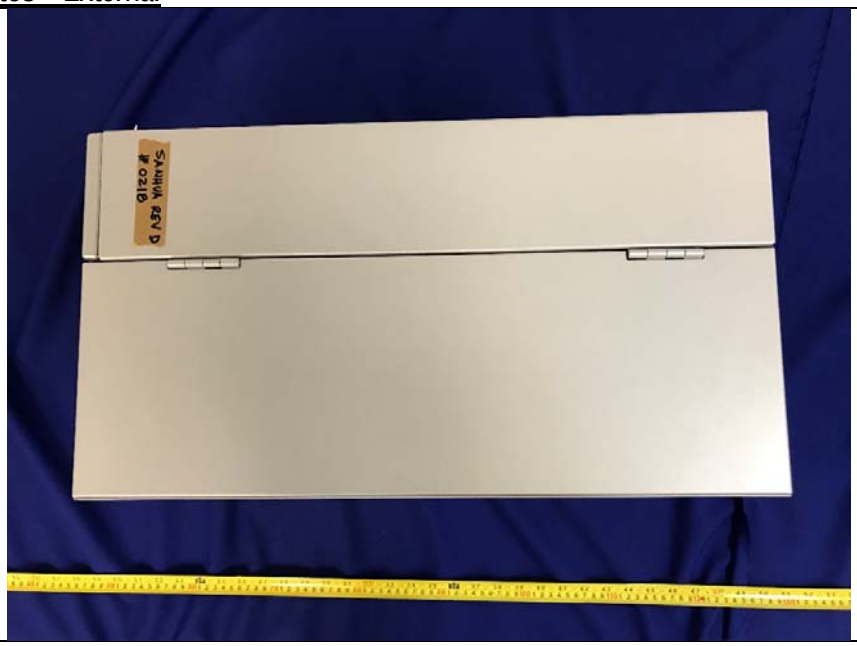
Radio Type	Bluetooth (Ver4.0)
Operating Frequency	2402MHz-2480MHz
Modulation	GFSK
Channel Spacing	2MHz
Antenna Type	Chip Antenna
Antenna Gain	1dBi
Antenna Connector Type	N/A

WLAN:

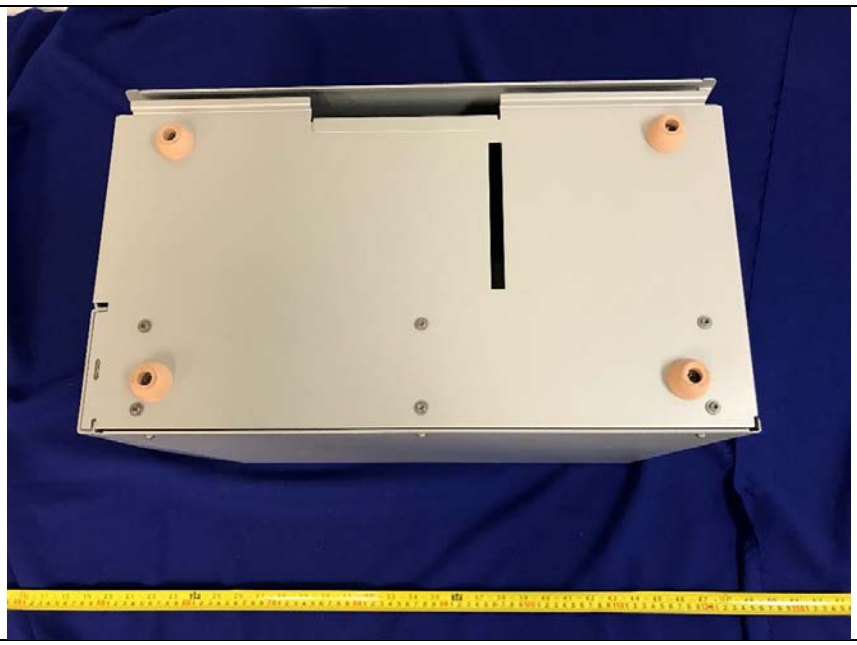
Radio Type	802.11b	802.11g	802.11n-20M
Operating Frequency	2412-2462MHz	2412-2462MHz	2412-2462MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM,64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	5MHz(2.4GHz)
Number of Channels	11	11	11(2.4GH)
Antenna Type	Omnidirectional Antenna		
Antenna Gain (Peak)	3.81dBi (for 2.4GHz)		
Antenna Connector Type	Reverse SMA		

Radio Type	802.11a	802.11n-20M	802.11n-40M	802.11ac-80M
Operating Frequency	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz	5190-5230MHz 5270-5310MHz 5510-5710MHz 5755-5795MHz	5210MHz, 5290MHz 5530MHZ, 5610MHz, 5690MHz,5775MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	20MHz	20MHz (5GHz)	40MHz	80MHz
Number of Channels	22	22 (5GHz)	10 (5GHz)	6 (5GHz)
Antenna Type	Omnidirectional Antenna			
Antenna Gain	5dBi (5GHz)			
Antenna Connector Type	Reverse SMA			

6.3 EUT Photos – External



Top View



Bottom View

Front View

Rear View

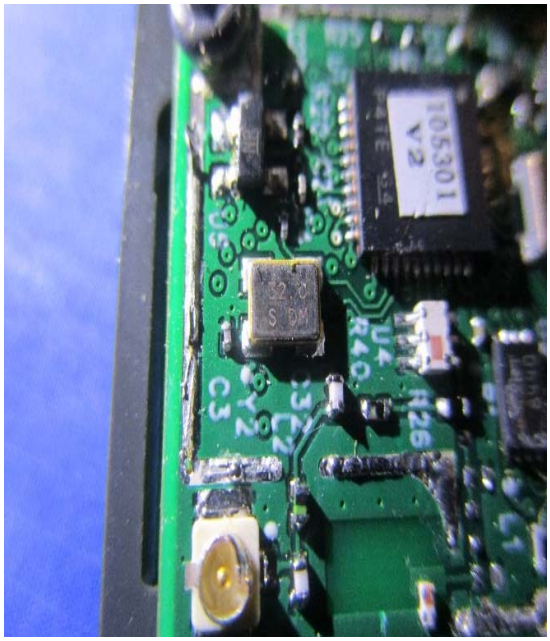
Left Side View

Right Side View

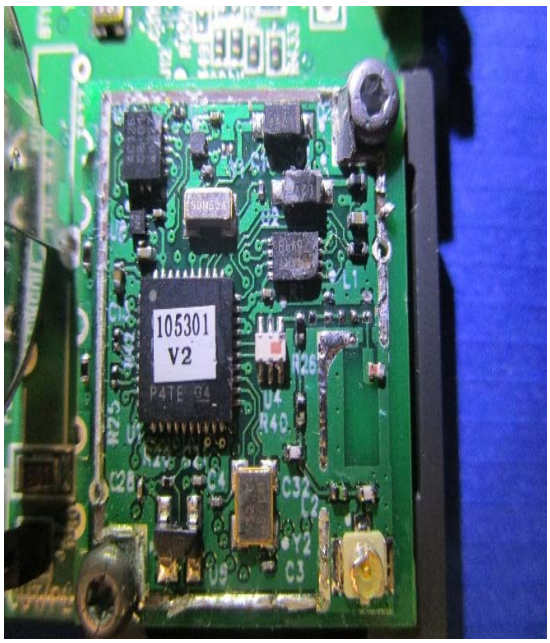
6.4 EUT Photos - Internal

EUT Open Case View 1

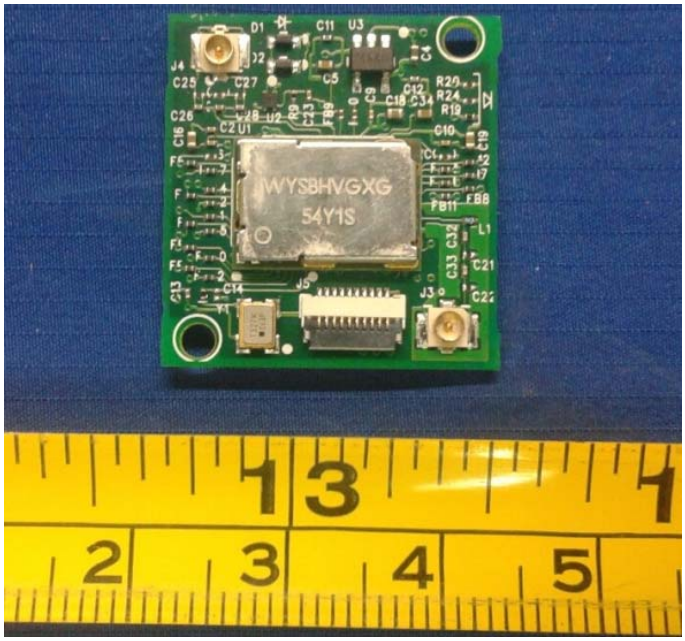
EUT Open Case View 2



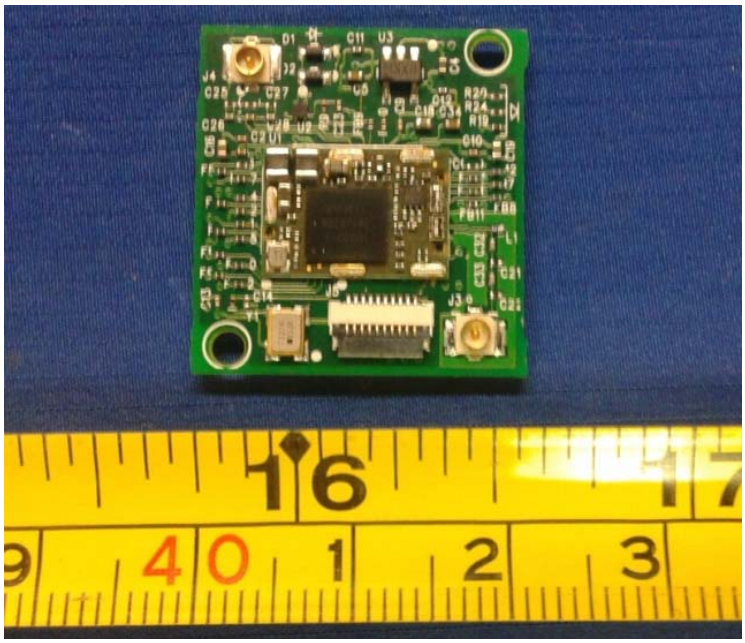
BLE module - Crystal



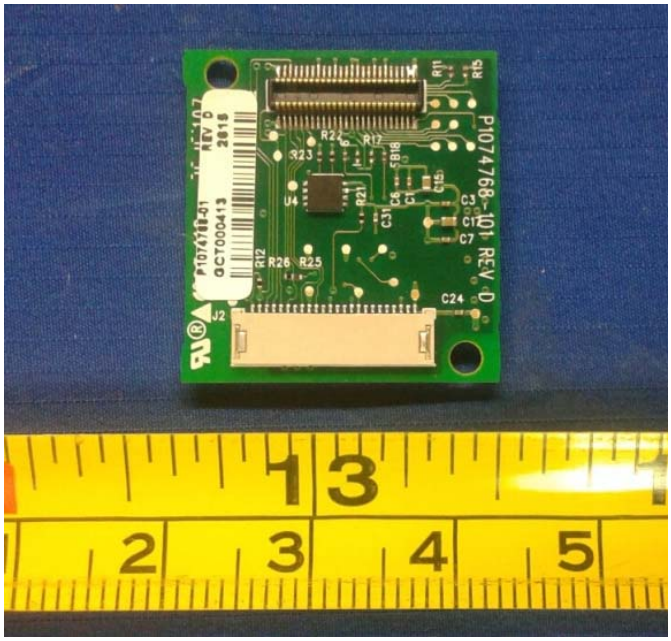
BLE module - Chip



EUT Radio with Shielding Top View

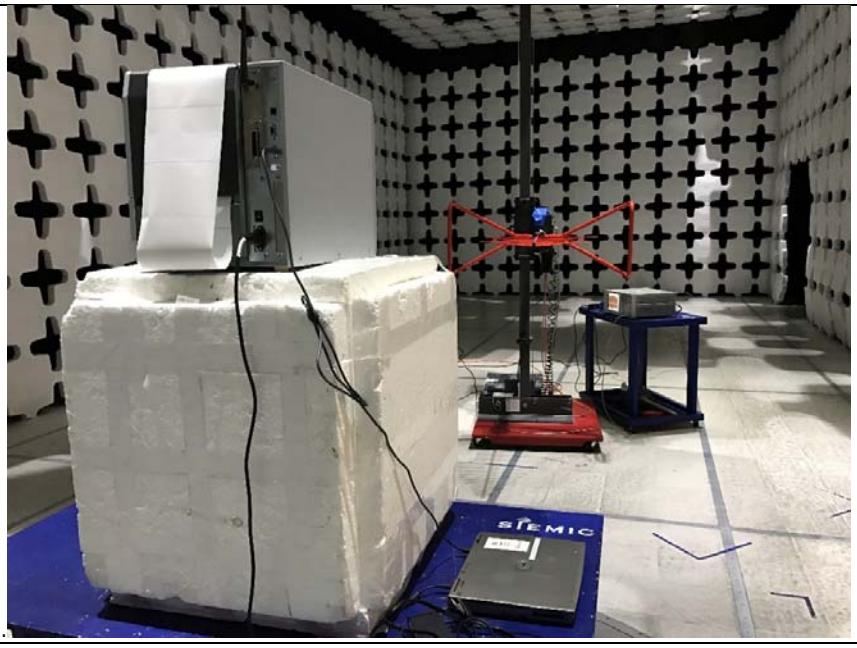


EUT Radio without Shielding Top View

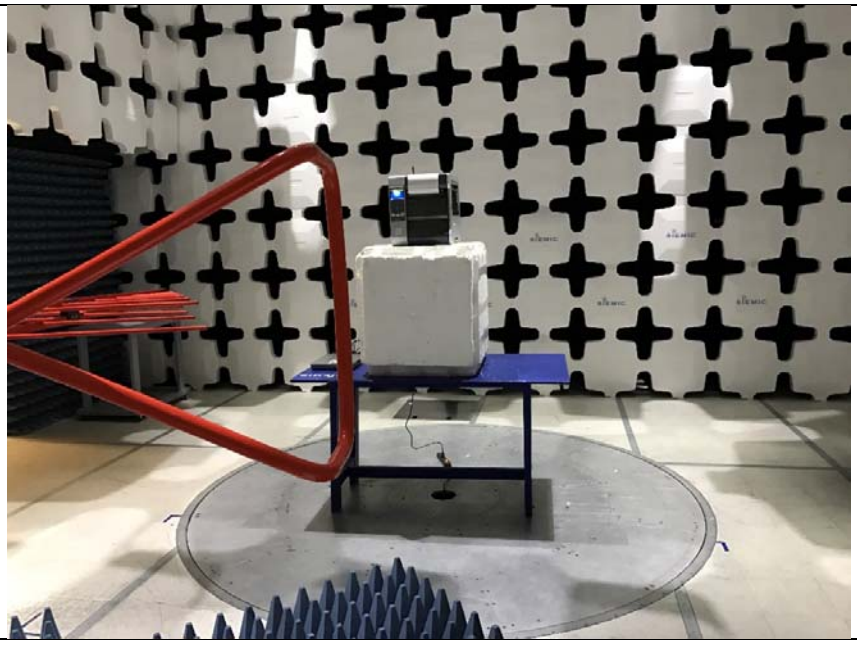


EUT Radio Bottom View

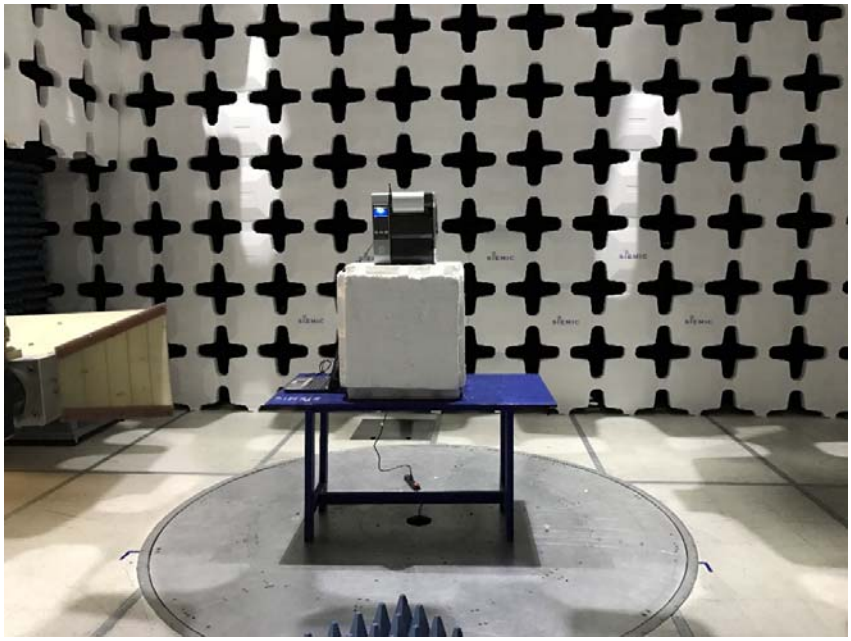
6.5 EUT Test Setup Photos



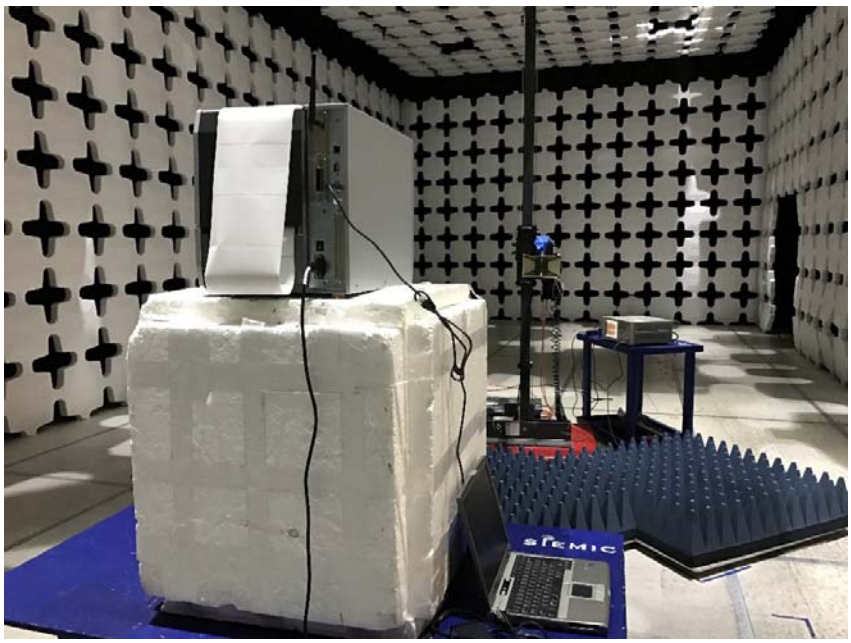
Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View



Radiated Emissions (>1GHz) – Front View



Radiated Emissions (>1GHz) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	Latitude D610	N/A	Dell	-

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	USB	Laptop	USB	2	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Command Line in windows	Set the EUT to transmit continuously in diferent test mode

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Radiated Spurious emissions	FCC	15.209	FCC	ANSI C63.10:2013 558074 D01 DTS Meas Guidance v03r05 789033 D02 General UNII Test Procedures New Rules v01r02	☒ Pass ☐ N/A
	IC	RSS Gen 8.10 RSS Gen 8.8	IC	RSS Gen Issue 4: 2014	

Note: For all other test items, please refer to reports with FCC ID I28MD-ZBRBLE and I28MD-FXLAN11AC

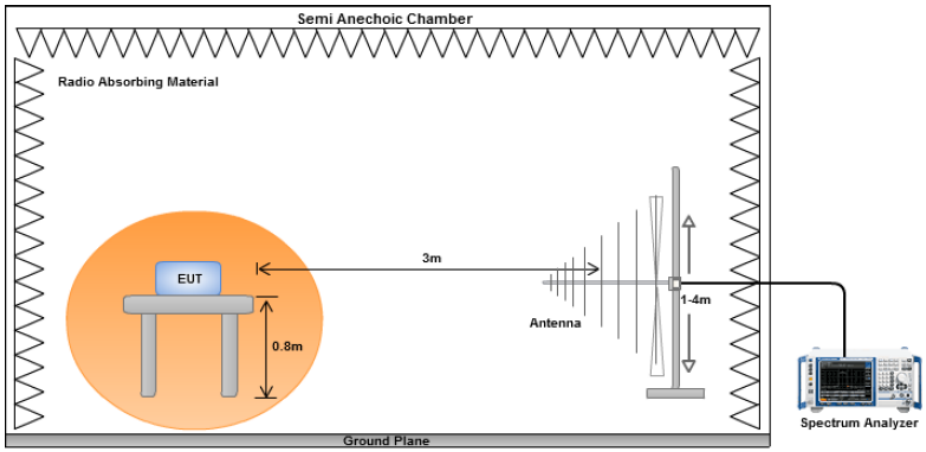
9 Measurement Uncertainty

Emissions			
Test Item	Frequency Range	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+4.3dB/-4.1dB

10 Measurements, Examination and Derived Results

10.1 Radiated Spurious Emissions below 1GHz

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.247(d)
RSS247 (5.5)</td><td>a)</td><td>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges
<table>
<tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr>
<tr><td>30 – 88</td><td>100</td></tr>
<tr><td>88 – 216</td><td>150</td></tr>
<tr><td>216 960</td><td>200</td></tr>
<tr><td>Above 960</td><td>500</td></tr>
</table></td><td>☒</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 
</td></tr>
<tr><td>Procedure</td><td colspan="3">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.</td></tr>
<tr><td>Remark</td><td colspan="3">The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.</td></tr>
<tr><td>Result</td><td colspan="3">☒ Pass ☐ Fail</td></tr>
</table>

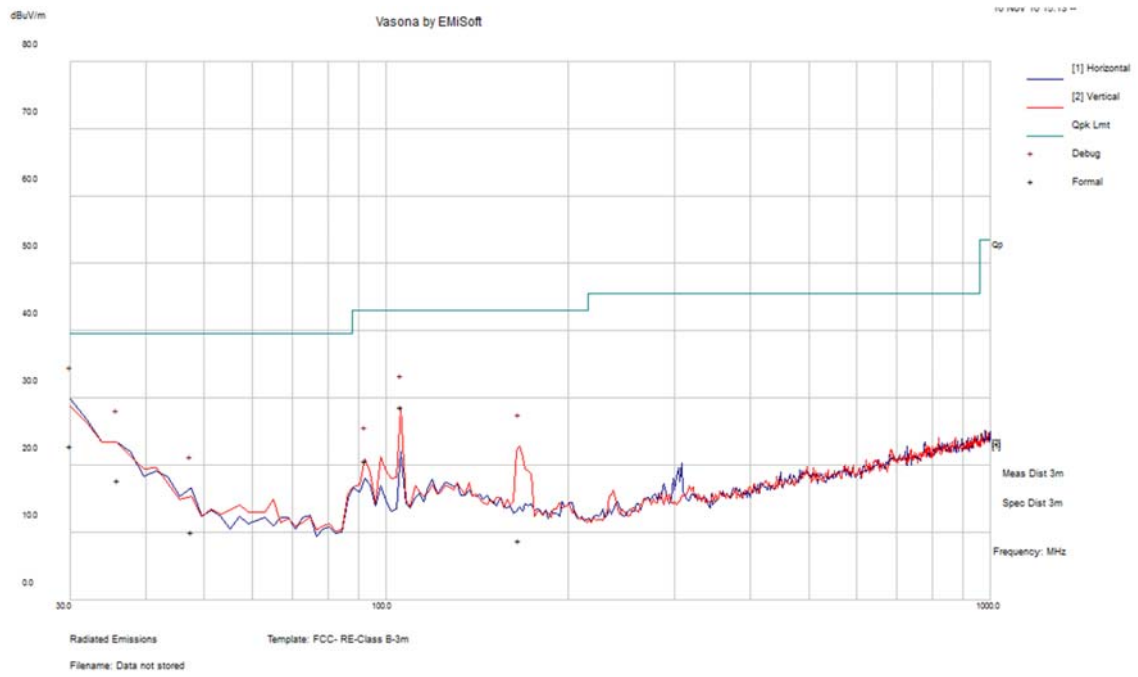
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

BLE co-location with WLAN:

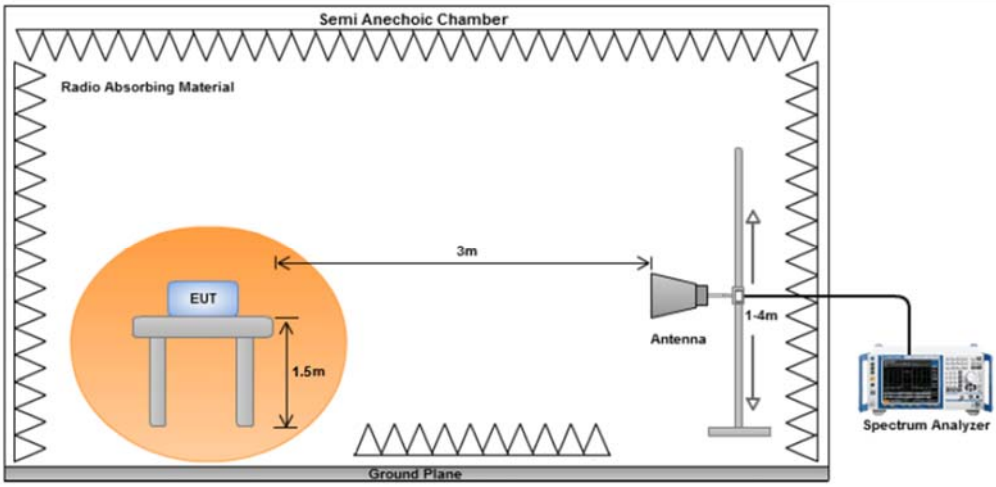


Frequency MHz	Raw dBuV /m	CL dB	AF dB	Level dBuV/ m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
30.00	38.15	0.99	-16.29	22.85	Quasi Max	H	336	112	39.5	-16.65	Pass
105.70	55.08	1.71	-28.19	28.6	Quasi Max	V	101	223	43	-14.4	Pass
36.05	38.12	1.1	-21.47	17.76	Quasi Max	V	128	115	39.5	-21.74	Pass
165.92	34.92	2.08	-28.13	8.86	Quasi Max	V	117	203	43	-34.14	Pass
92.34	50.17	1.6	-31.03	20.75	Quasi Max	V	295	16	43	-22.25	Pass
47.58	38.06	1.28	-29.28	10.07	Quasi Max	H	324	287	39.5	-29.43	Pass

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

10.2 Radiated Spurious Emissions between 1GHz – 40GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d) RSS247(A8.5)	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	☒
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. There isn't outstanding emission found at the edge of restricted frequency.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Gary Chou at 10m chamber.

BLE co-location with WLAN:

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
11509.77	41	7.59	1.82	50.41	Peak Max	H	244	3	74	-23.59	Pass
17266.14	39.32	8.99	6.3	54.61	Peak Max	H	377	3	74	-19.39	Pass
3099.27	44.68	3.98	-8.56	40.11	Peak Max	V	325	260	74	-33.89	Pass
11509.77	28.79	7.59	1.82	38.21	Average Max	H	244	3	54	-15.79	Pass
17266.14	27.42	8.99	6.3	42.71	Average Max	H	377	3	54	-11.29	Pass
3099.27	32.61	3.98	-8.56	28.03	Average Max	V	325	260	54	-25.97	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	06/08/2016	1 Year	06/08/2017	☑
CHASE LISN	MN2050B	1018	08/07/2016	1 Year	08/07/2017	☑
Radiated Emissions						
R & S Receiver	ESIB 40	1018	08/07/2016	1 Year	08/07/2017	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	08/12/2016	1 Year	08/12/2017	☑
Horn Antenna (1GHz~26GHz)	3115	100059	08/25/2016	1 Year	08/25/2017	☑
3 Meters SAC	3M	N/A	08/08/2016	1 Year	08/08/2017	☑
10 Meters SAC	10M	N/A	09/05/2016	1 Year	09/05/2017	☑
RF Conducted Measurement						
Spectrum Analyzer	N9010A	10SL0219	08/20/2016	1 Year	08/20/2017	☑
R & S Receiver	ESIB 40	100179	06/08/2016	1 Year	06/08/2017	☑
ETS-Lingren USB RF Power Sensor	7002-006	10SL0190	09/03/2016	1 Year	09/03/2017	☑

Annex B. 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 & Telecommunications Terminal Equipment: EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
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
		Radio communications: 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