

RF TEST REPORT

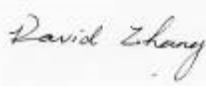


Report No.: **SL13080801-ZBR-047-N Radio-FCC**

Supersede Report No.: **NONE**

Applicant	:	Zebra Technologies Corporation
Product Name	:	N Radio Module
Model No.	:	WYSBMVGXB
Test Standard	:	FCC 15.247: 2012 FCC 15.407:2012 RSS 210 Issue8: 2010
Test Method	:	ANSI C63.4:2009 FCC Public Notice DA 00-705 558074 D01 DTS Meas Guidance v03r01
FCC ID	:	I28MD-EXLAN11N
IC ID	:	3798B-EXLAN11N
Dates of test	:	Agust 18th - August 23th , 2013
Issue Date	:	9/19/2013
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:

	
Nima Molaei	David Zhang
Test Engineer	Engineer Reviewer

Issued By:

SIEMIC Laboratories

775 Montague Expressway, Milpitas, 95035 CA



TESTING CERT # 2742-01

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

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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

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
HongKong	OFTA (US002)	RF , Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
SL13080801-ZBR-047-N Radio-FCC	Original	-	9/17/2013
SL13080801-ZBR-047-N Radio-FCC	1.0	Change Photos label	9/19/2013

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2 Executive Summary

The purpose of this test program was to demonstrate compliance of the Zebra Technologies Corporation, N Radio Module, and model: WYSBMVGXB to be installed into a printer host (Printer Model: ZD500R) against the current Stipulated Standards. It's FCC certified with FCC ID: 128MD-EXLAN11N and transmitting simultaneously with the RFID radio module with FCC ID: I28-RFIDM6EM. The WYSBMVGXB has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	:	Zebra Technologies Corporation
Applicant Address	:	333 Corporate Woods Parkway, Vernon Hills, IL 60061 USA
Manufacturer Name	:	Zebra Technologies Corporation
Manufacturer Address	:	333 Corporate Woods Parkway, Vernon Hills, IL 60061 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	:	N Radio Module
Model No.	:	WYSBMVGXB
Trade Name	:	Zebra
Serial No.	:	100-240VAC
Host Input Power	:	24VDC
Power Adapter Manu/Model	:	Zebra/FSP100-RDB
Power Adapter SN	:	H00005819
Host	:	Mobile Printer
Host Model	:	ZD500R
Date of EUT received	:	August16th, 2013
Equipment Class/ Category	:	FHSS
Clock Frequencies	:	N/A
Port/Connectors	:	N Radio (WLAN , BT)

6.2 Radio Description

Spec for WLAN –

Radio Type	802.11b	802.11g	802.11a	802.11n-20M	802.11n-40M
Operating Frequency	2412-2462MHz	2412-2462MHz	5180-5320MHz 5500-5700MHz 5745-5825MHz	2412-2462MHz 5180-5320MHz 5500-5700MHz 5745-5825MHz	5190-5310MHz 5510-5670MHz 5755-5795MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	20MHz	5MHz(2.4GHz), 20MHz (5GHz)	40MHz
Number of Channels	11	11	21	11(2.4GH) 21 (5GHz)	7 (2.4GH) 9 (5GHz)
Antenna Type	Patch Antenna				
Antenna Gain	3.81 dBi (2.4GHz), 5.0 dBi (5GHz)				
Antenna Connector Type	U. FL connector				

Spec for Bluetooth Radio –

Radio Type	Blue Tooth
Operating Frequency	2402-2480MHz
Modulation	FHSS (GFSK , $\pi/4$ -DQPSK, 8-DPSK)
Channel Spacing	1MHz
Number of Channels	79
Antenna Type	Patch Antenna
Antenna Gain	3.81 dBi (2.4GHz)
Antenna Connector Type	U. FL connector

WLAN Channel list

Type		Channel No.	Frequency (MHz)	Available (Y/N)
802.11b/g/n-HT20	2412-2462	1	2412	Y
		2	2417	Y
		3	2422	Y
		4	2427	Y
		5	2432	Y
		6	2437	Y
		7	2442	Y
		8	2447	Y
		9	2452	Y
		10	2457	Y
		11	2462	Y
	2467-2472	12	2467	-
		13	2472	-
	2484	14	2484	-
802.11a/n-HT20	5150-5250MHz	36	5180	Y
		40	5200	Y
		44	5220	Y
		48	5240	Y
	5250-5350MHz	52	5260	Y
		56	5280	Y
		60	5300	Y
		64	5320	Y
	5470-5725MHz	100	5500	Y
		104	5520	Y
		108	5540	Y
		112	5560	Y
		116	5580	Y
		132	5660	Y
		136	5680	Y
		140	5700	Y
	5725-5825MHz	149	5745	Y
		153	5765	Y
		157	5785	Y
		161	5805	Y
		165	5825	Y
802.11n-HT40	5150-5250MHz	36,40	5190	Y
		40,44	5210	Y
		44,48	5230	Y
	5250-5350MHz	52,56	5270	Y
		56,60	5290	Y
		60,64	5310	Y
	5470-5725MHz	100,104	5510	Y
		104,108	5530	Y
		108,112	5550	Y
		112,116	5570	Y
		132,136	5670	Y
	5725-5825MHz	149,153	5755	Y
		153,157	5775	Y
		157,161	5795	Y

Bluetooth Channel list

Type		Channel No.	Frequency (MHz)	Available (Y/N)
Blue Tooth	2402-2480MHz	0	2402	Y
		.	.	Y
		.	.	Y
		.	.	Y
		.	.	Y
		39	2441	Y
		.	.	Y
		.	.	Y
		.	.	Y
		.	.	Y
		78	2480	Y

6.3 EUT test modes/configuration for Spurious Emission

Frequency	Mode	Note
Below 1 GHz	RFID at Hopping mode N Radio at 2412MHz at 802.11b-11Mbps	-
	RFID at Hopping mode N Radio at BT Hopping mode at GFSK	-
Above 1GHz	RFID at Hopping mode N Radio at 2412MHz at 802.11b-11Mbps	-
	RFID at Hopping mode N Radio at 5785MHz at 802.11a-6Mbps	-
	RFID at Hopping mode N Radio at BT hopping mode at GFSK	-
Note: - The test mode based on original grant test data and also prescan. - N Radio (WLAN or BT) to be transmitting simultaneously with an RFID module with printer. 5785MHz at 802.11a-6Mbps is the worst case in both DTS and UNII 5GHz band		

6.4 Host Photos – External



Top



Bottom



Front



Rear



Left Side



Right Side

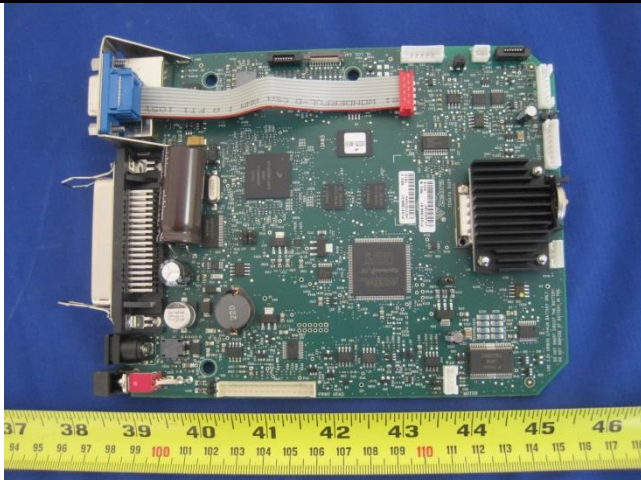
6.5 Host Photos – Internal



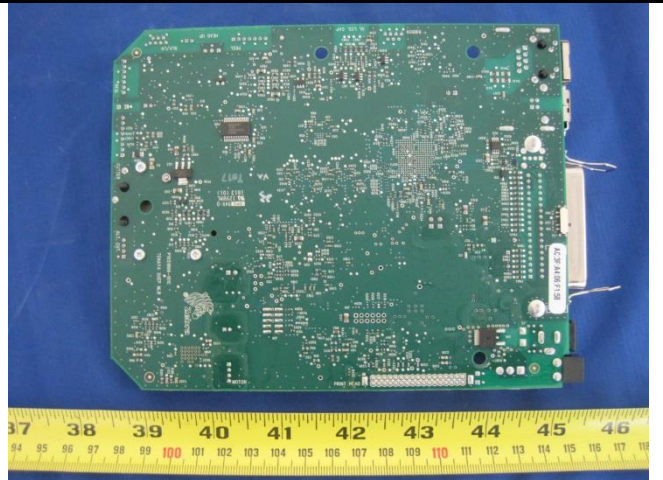
EUT - Cover off-1



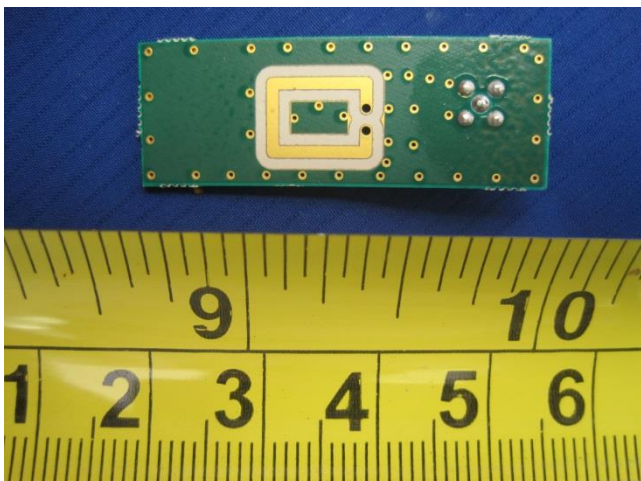
EUT - Cover off-2



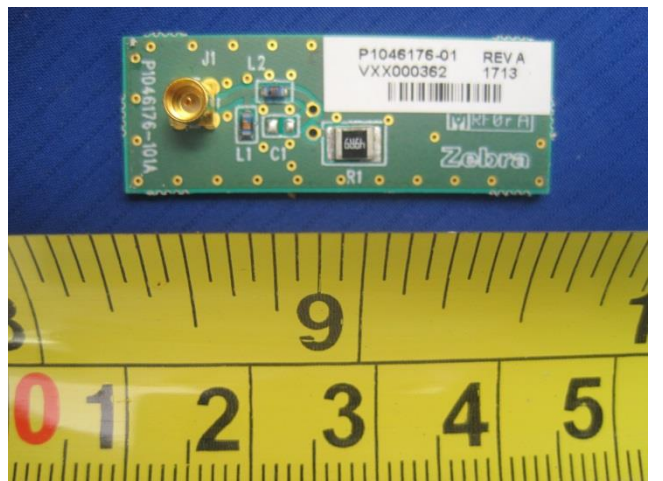
Main Board – top view



Main Board – bottom view



RFID Antenna – Top view

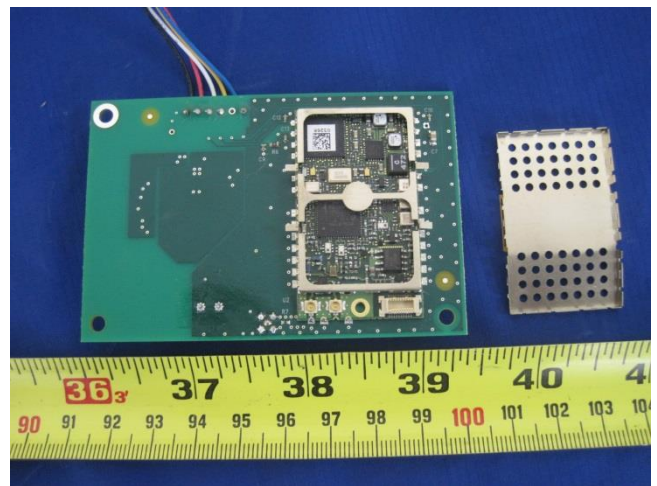


RFID Antenna – Bottom view

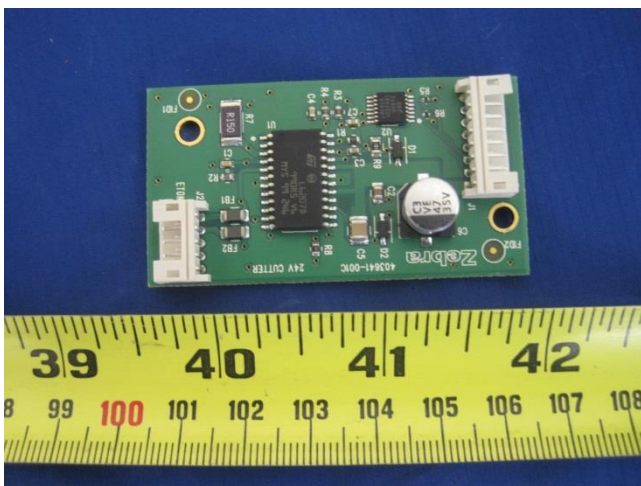
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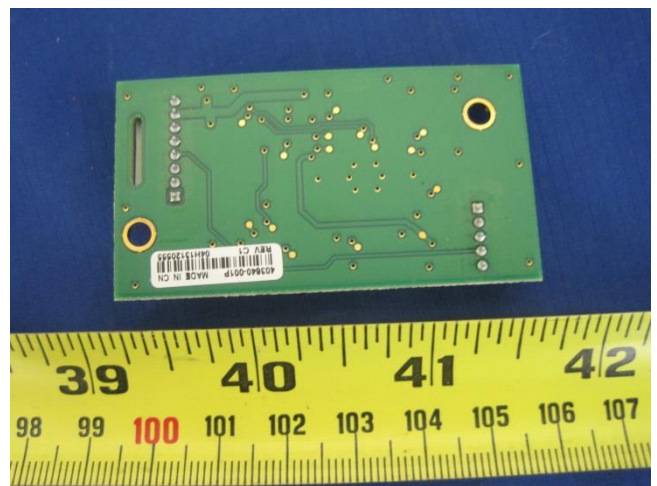
RFID Radio Module – Top view



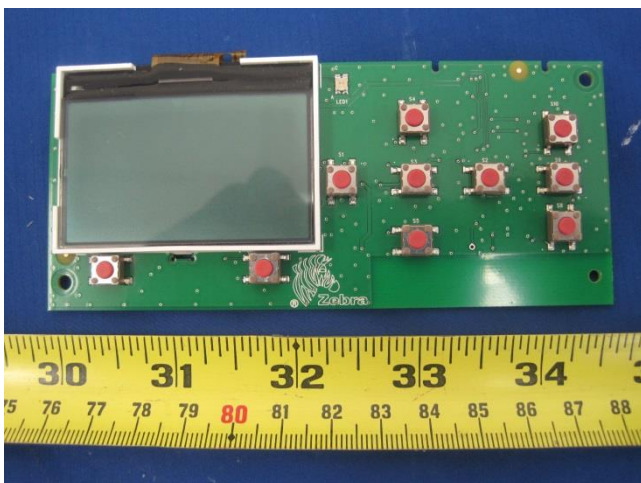
RFID Radio Module – Bottom view



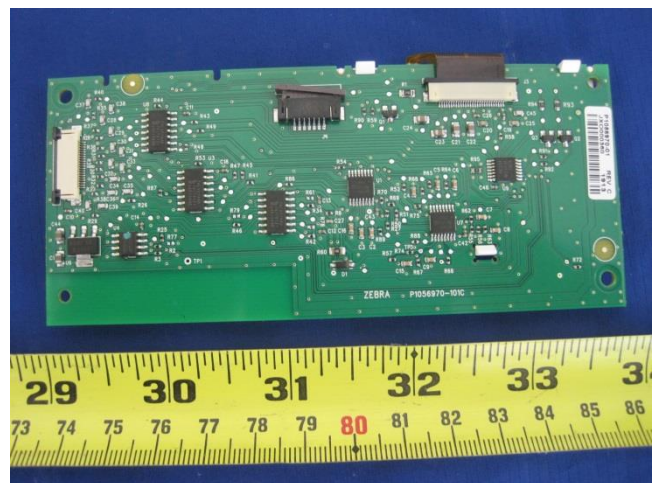
PCB 1 – Top view



PCB 1 – Bottom view

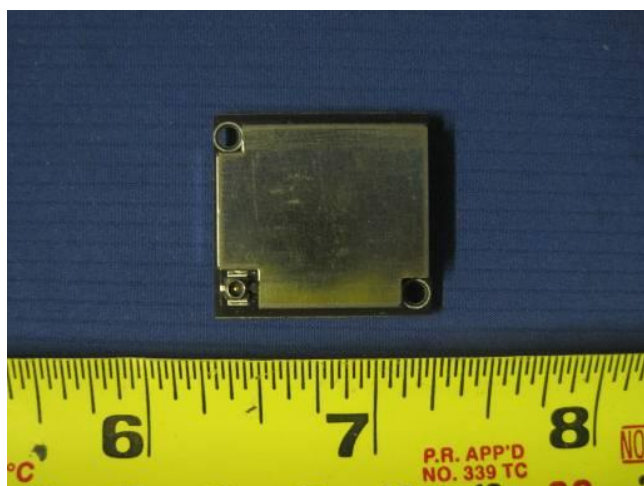


LCD board – Top view



LCD board – Bottom view

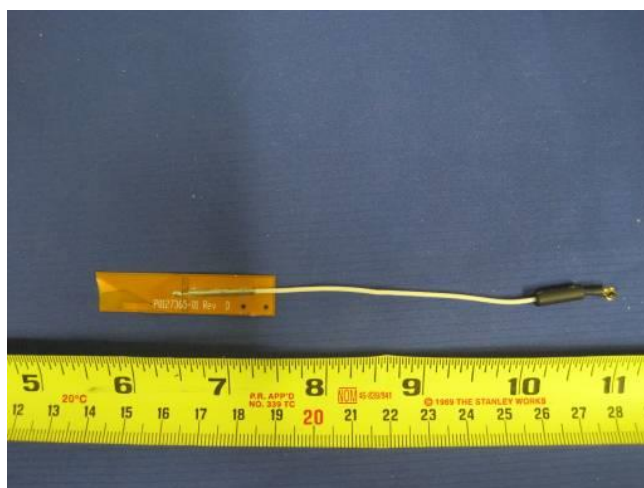
6.6 EUT Photos



Radio Module – Top view



Radio Module – Bottom view



N Radio Patch Antenna-Top view



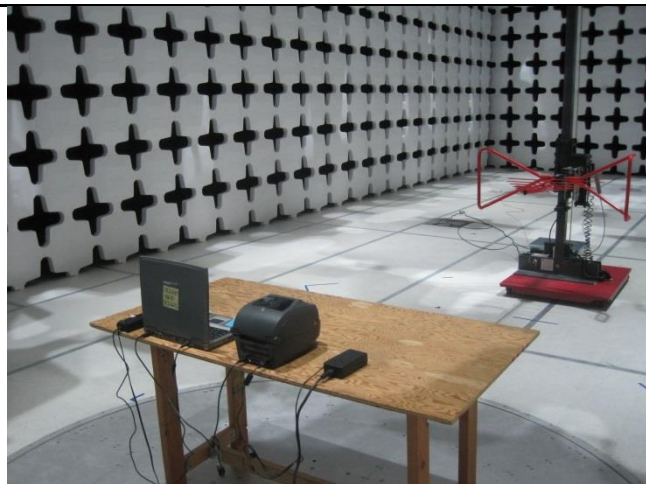
N Radio Patch Antenna- Bottom view

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6.7 EUT Test Setup Photos



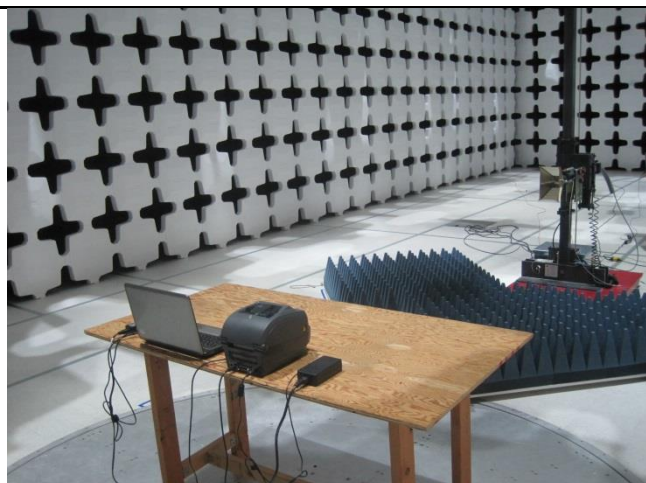
Test setup at 3 meter distance (<1GHz) - Front



Test setup at 3 meter distance (<1GHz) - Rear



Test setup at 3 meter distance (>1GHz) - Front



Test setup at 3 meter distance (>1GHz) - Rear

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Index	Supporting Equipment Description	Model	Serial No.	Manu	Note
1	Laptop	T60	6371E5U	Lenovo	-
2	Laptop adapter	92P1109	N/A	Lenovo	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
Cable	EUT	USB	Laptop	USB	1	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
Radiated & Conducted Testing	Splat test software	Set the EUT to different modulation and channel

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Restricted Band of Operation	FCC	15.205	FCC	-	☐ Pass
	IC	RSS 210 (2.2)	IC	-	☒ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	FCC	--	☐ Pass
	IC	RSS Gen (7.2.2)	IC	-	☒ N/A

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Channel Separation	FCC	15.247 (a)(1)	FCC	-	☐ Pass
	IC	RSS210 (A8.1)	IC	-	☒ N/A
Occupied Bandwidth	FCC	15.247(a)(1)	FCC	-	☐ Pass
	IC	RSS210(A8.1)	IC	-	☒ N/A
Bandwidth	FCC	15.247(a)(2)	FCC	-	☐ Pass
	IC	RSS210 (A8.2)	IC	-	☒ N/A
Number of Hopping Channels	FCC	15.247(a)(1)	FCC	-	☐ Pass
	IC	RSS210(A8.1)	IC	-	☒ N/A
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	FCC Public Notice DA 00-705 558074 D01 DTS Meas Guidance v03r01	☒ Pass
	IC	RSS210(A8.5)	IC	-	☐ N/A
Time of Occupancy	FCC	15.247(a)(1)	FCC	-	☐ Pass
	IC	RSS210(A8.1)	IC	-	☒ N/A
Output Power	FCC	15.247(b)	FCC	-	☐ Pass
	IC	RSS210 (A8.4)	IC	-	☒ N/A
Receiver Spurious Emissions	FCC	15.247(d)		FCC Public Notice DA 00-705 558074 D01 DTS Meas Guidance v03r01	☒ Pass
	IC	RSS Gen (4.8)		-	☐ N/A
Antenna Gain > 6 dBi	FCC	15.247(e)	FCC	-	☐ Pass
	IC	RSS210(A8.4)	IC	-	☒ N/A
Power Spectral Density	FCC	15.247(e)	FCC	-	☐ Pass
	IC	RSS210(A8.3)	IC	-	☒ N/A
Hybrid System Requirement	FCC	15.247(f)	FCC	-	☐ Pass
	IC	RSS210(A8.3)	IC	-	☒ N/A
Hopping Capability	FCC	15.247(g)	FCC	-	☐ Pass
	IC	RSS210(A8.1)	IC	-	☒ N/A
Hopping Coordination Requirement	FCC	15.247(h)	FCC	-	☐ Pass
	IC	RSS210(A8.1)	IC	-	☒ N/A
RF Exposure requirement	FCC	15.247(i)	FCC	-	☐ Pass
	IC	RSS Gen(5.5)	IC	-	☒ N/A
Remark	- All measurement uncertainties do not take into consideration for all presented test results. - 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.				

9 Measurement Uncertainty

Test Item	Frequency Range	Description	Uncertainty
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
Radiated Spurious Emissions	1Hz – 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

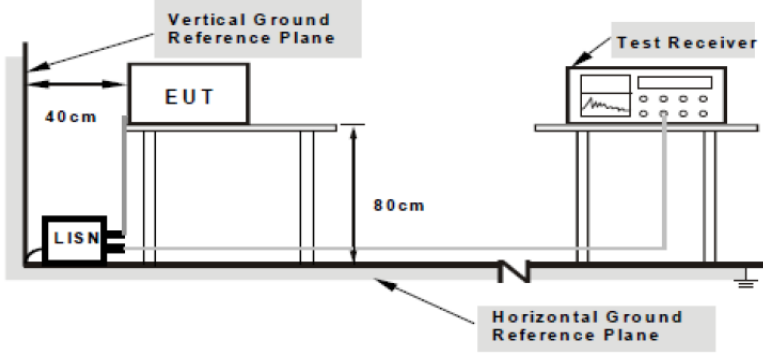
10.1 Antenna Requirement

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) Antenna must use a unique type of connector to attach to the device. c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.	☒
Remark	The N Radio antenna is integral to the PCB board permanently to the device which meets the requirement (See Internal Photographs submitted as another Exhibit).	
Result	☒ PASS ☐ FAIL	

10.2 Conducted Emission Test Result

Conducted Emission Limit

Section	Frequency ranges (MHz)	Limit (dBuV)	
		QP	Average
Class B devices	0.15 ~ 0.5	66 – 56	56 – 46
	0.5 ~ 5	56	46
	5 ~ 30	60	50

Spec	Item	Requirement	Applicable
§ 15.207, RSS210(A8.1)	a)	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 set in § 15.207, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). AC Line conducted emission within the band 150KHz to 30MHz	☐
Test Setup	 Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.		
Procedure	- The EUT and supporting equipment was 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, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50µH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipments were powered separately from another main supply.		
Test Date	N/A	Environmental condition	Temperature N/A Relative Humidity N/A Atmospheric Pressure N/A
Remark	-		
Result	☐ Pass ☐ Fail		

Test Data ☐ Yes ☒ N/A

Test Plot ☐ Yes ☒ N/A

10.3 Channel Separation

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 (e) RSS-210 (A2.6)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	☐
Test Setup		
Procedure	1. EUT was set for low, mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal.	
Test Date	N/A	Environmental condition Temperature N/A Relative Humidity N/A Atmospheric Pressure N/A
Remark	-	
Result	☐ Pass ☐ Fail	

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

10.4 Occupied Bandwidth

Requirement(s):

Spec	Requirement	Applicable
RSS Gen 4.6.1	The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual. The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth	☐
Test Setup		
Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal.	
Test Date	N/A	Environmental condition Temperature N/A Relative Humidity N/A Atmospheric Pressure N/A
Remark	-	
Result	☐ Pass ☐ Fail	

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

10.5 20dB Occupied Bandwidth

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 (a) RSS-210 (A2.6)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or 20 dB bandwidth of the hopping channel, whichever is greater.	☐
Test Setup		
Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal.	
Test Date	N/A	Environmental condition Temperature N/A Relative Humidity N/A Atmospheric Pressure N/A
Remark	-	
Result	☐ Pass ☐ Fail	

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

10.6 Number of Hopping Channel

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 RSS-210 (A2.6)	For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz	☐
Test Setup		
Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal. 3. RBW=100 KHz, VBW > RBW	
Test Date	N/A	Environmental condition Temperature N/A Relative Humidity N/A Atmospheric Pressure N/A
Remark	-	
Result	☐ Pass ☐ Fail	

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

10.7 Time of Occupancy

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 RSS-210 (A2.6)	For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.	☐
Test Setup		
Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal.	
Test Date	N/A	Environmental condition Temperature N/A Relative Humidity N/A Atmospheric Pressure N/A
Remark	-	
Result	☐ Pass ☐ Fail	

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

10.8 Peak Spectral Density

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 RSS-210 (A2.6)	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission	☐
Test Setup		
Procedure	1. EUT was set for low , mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal. 3. RBW=3 KHz, VBW > RBW, Sweep time: auto	
Test Date	N/A	Environmental condition Temperature N/A Relative Humidity N/A Atmospheric Pressure N/A
Remark	-	
Result	☐ Pass ☐ Fail	

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Note: Peak Spectral Density only applied to digital modulated devices.

10.9 Peak Output Power

Requirement(s):

Spec	Requirement	Applicable									
47 CFR §15.247 (b) RSS-210 (A2.6)	For all other frequency hopping systems in the 902-928 MHz band: 1 Watt. The power is converted from watt to dBm, therefore, 1 watt = 30 dBm.	☐									
Test Setup											
Procedure	The peak output power was measured conducted using a spectrum analyzer at low, mid, and hi channels. Peak detector was set to measure the power output. The power is converted from watt to dBm, therefore, 1 watt = 30 dBm. The highest antenna gain that will be used is -28dBi.										
Test Date	N/A	<table border="1"> <tr> <td>Environmental condition</td> <td>Temperature</td> <td>N/A</td> </tr> <tr> <td></td> <td>Relative Humidity</td> <td>N/A</td> </tr> <tr> <td></td> <td>Atmospheric Pressure</td> <td>N/A</td> </tr> </table>	Environmental condition	Temperature	N/A		Relative Humidity	N/A		Atmospheric Pressure	N/A
Environmental condition	Temperature	N/A									
	Relative Humidity	N/A									
	Atmospheric Pressure	N/A									
Remark	-										
Result	☐ Pass ☐ Fail										

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

10.10 100 KHz Bandwidth of Frequency Band Edge

Requirement(s):

Spec	Requirement	Applicable
47 CFR §15.247 (b) RSS-210 (A2.6)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required	☐
Test Setup		
Procedure	1. EUT was set for low, mid, high channel with modulated mode and highest RF output power. 2. The spectrum analyzer was connected to the antenna terminal. 3. RBW=3 KHz, VBW > RBW, Sweep time: auto	
Test Date	N/A	Environmental condition Temperature N/A Relative Humidity N/A Atmospheric Pressure N/A
Remark	-	
Result	☐ Pass ☐ Fail	

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☐ Yes (See below) ☒ N/A

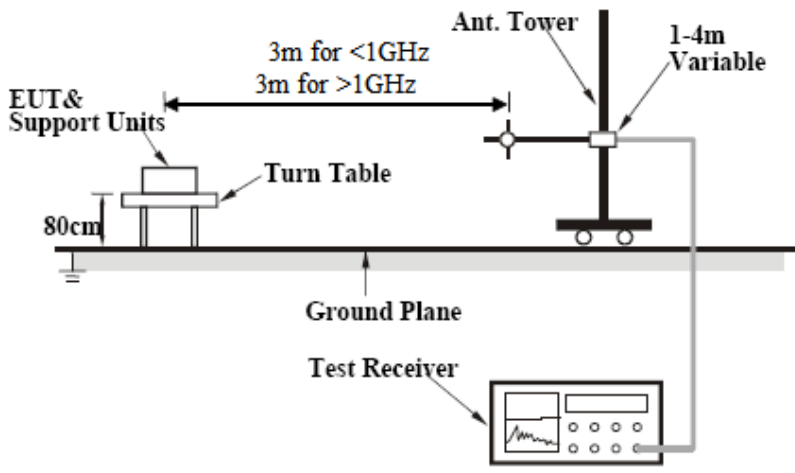
10.11 Radiated Measurement

Receiver/Spectrum analyzer setting

TEST	Detector	RBW	VBW	Test Distance	NOTES
Radiated Emission < 1GHz (30MHz – 1GHz)	PK/QP	100 KHz	300 KHz	3m	-
Radiated Emission > 1GHz (1GHz – 40GHz)	PK/AV	1 MHz	3 MHz / 10 Hz	3m	-

10.11.1 Radiated Measurement below 1GHz

Requirement(s):

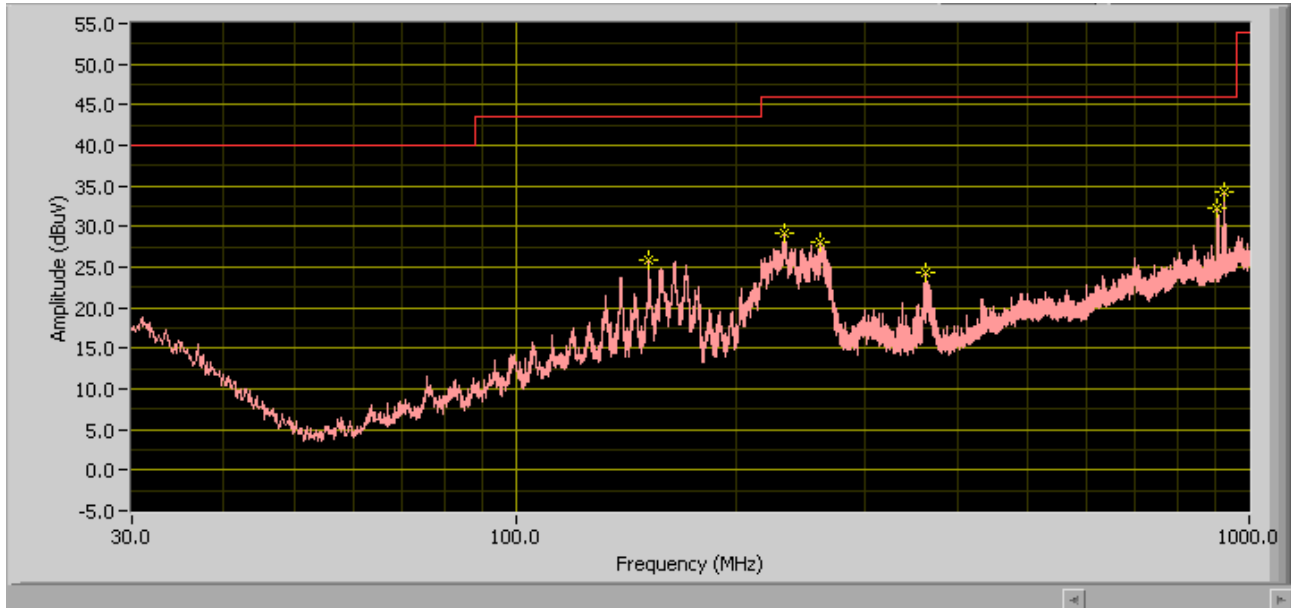
Spec	Item	Requirement	Applicable
§ 15.247(d), RSS210(A8.5)	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall 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	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in § 15.209(a)	☒
Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - 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: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - A Quasi-peak measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Test Date	08/21/2013	Environmental condition	Temperature 22°C Relative Humidity 49% Atmospheric Pressure 1019mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Mode: RFID at Hopping mode + N Radio (Bluetooth) at Hopping mode @ GFSK

Graph-

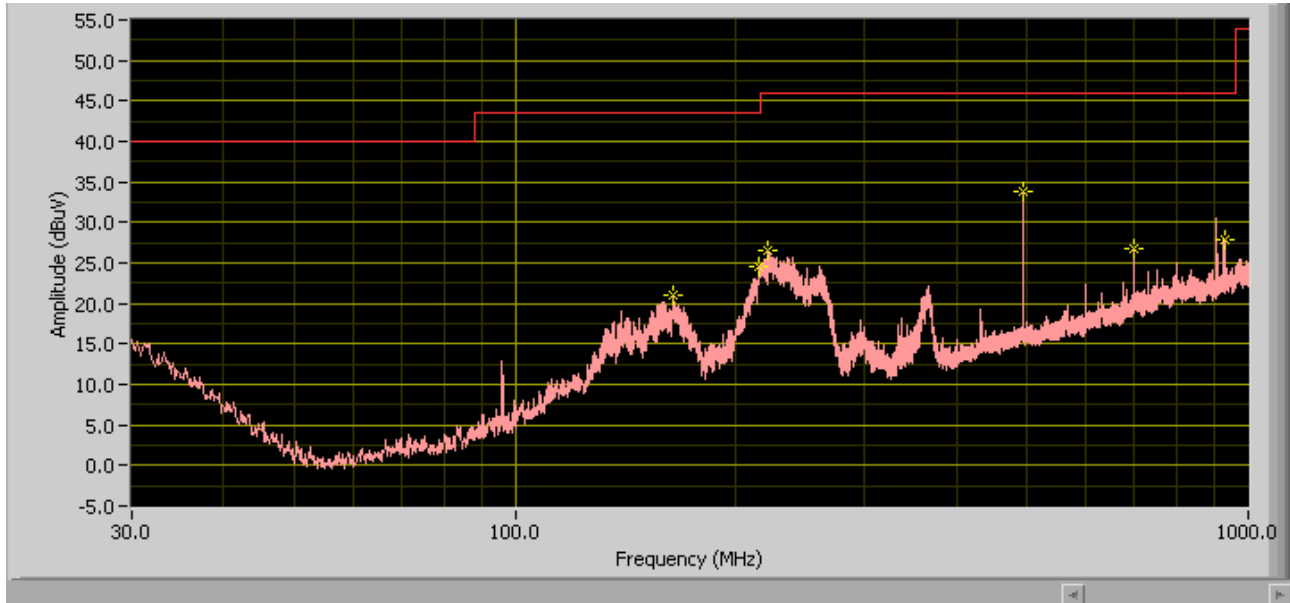


Test Data

Frequency (MHz)	Reading (dBuV)	Azimuth	Polarit y (H/V)	Height (cm)	Cable Loss(dB)	Antenna Factor (dB)	Amplifi er (dB)	Correcte d (dBuV/m)	Limit (dBuV/m)	Margin (dB)
926.27	31.87	137	V	135	5.6	21.7	31.1	27.87	46	-18.12
904.20	31.56	34	V	400	5.5	21.5	31.3	27.26	46	-18.73
362.20	31.068	333	H	395	3.1	14.8	31.7	17.27	46	-28.73
259.38	39.93	267	H	110	2.6	12.0	31.8	24.27	46	-23.27
232.01	43.25	236	H	137	2.5	10.9	31.8	24.81	46	-21.18
152.20	38.89	208	H	208	1.9	12.2	31.9	21.09	43.52	-22.43

Mode: RFID at Hopping mode + N Radio at 2412MHz (802.11b-11Mbps)

Graph-

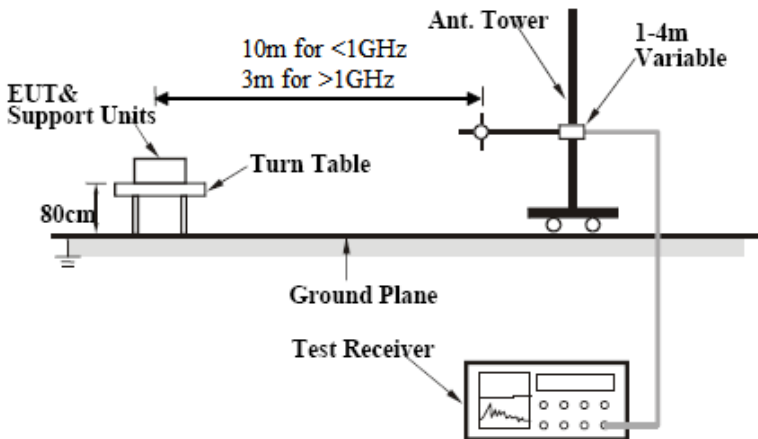


Test Data

Frequency (MHz)	Reading (dBuV)	Azimuth	Polarit y (H/V)	Height (cm)	Cable Loss(dB)	Antenna Factor (dB)	Amplifi er (dB)	Correcte d (dBuV/m)	Limit (dBuV/m)	Margin (dB)
492.09	30.57	51	H	162	3.6	17.4	31.6	19.95	46	-26.05
221.49	37.73	233	H	209	2.4	10.5	31.8	18.83	46	-27.17
164.63	33.90	298	H	280	2.0	11.8	31.9	15.80	43.52	-27.72
927.24	32.91	217	V	160	5.6	21.7	31.3	28.91	46	-17.09
699.30	33.28	100	H	100	4.8	19.9	31.4	26.58	46	-19.42
217.88	38.17	250	H	183	0.2	10.5	32.0	16.87	43.52	-26.65

10.11.2 Radiated Spurious Emissions > 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(d), RSS210(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	☒
	b)	Or restricted band, emission must also comply with the radiated emission limits specified in § 15.209(a)	☒
Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - A Quasi-peak measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Test Date	08/06/2013	Environmental condition	Temperature 24°C Relative Humidity 48% Atmospheric Pressure 1019mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Radiated Spurious Emissions

RFID at Hopping mode + N Radio at 2412MHz @ 802.11b-11Mbps @ 3 Meter

Frequency (MHz)	Direction (degree)	Height (m)	Polarity (H/V)	Antenna Loss (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading @ 3m (dBuV/m)	15.247 AV Limit @ 3m (dBuV/m)	Margin (dB)	Detector (pk/avg)
1325.8	-	-	H	24.77	0.88	31.98	47.18	54	-6.82	PK
1728.1	-	-	H	26.05	1.03	32.01	46.62	54	-7.38	PK
4789.1	-	-	H	32.67	1.84	32.52	49.72	54	-4.28	PK
5618.4	-	-	H	33.52	1.97	32.45	51.14	54	-2.86	PK
1578.8	-	-	V	25.53	1.00	31.99	48.90	54	-5.1	PK
1723.6	-	-	V	26.03	1.03	32.01	45.64	54	-8.36	PK
4833.1	-	-	V	32.72	1.85	32.53	51.21	54	-2.79	PK
5618.4	-	-	V	33.52	1.97	32.45	50.14	54	-3.86	PK
Remark	Emission was scanned up to 25GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit. If the emission PK level is within Average limit, then the maximization and average measurement are not performed.; both horizontal and vertical polarization had been verified.									

RFID at Hopping mode + N Radio at 5785MHz @ 802.11a-6Mbps @ 3 Meter

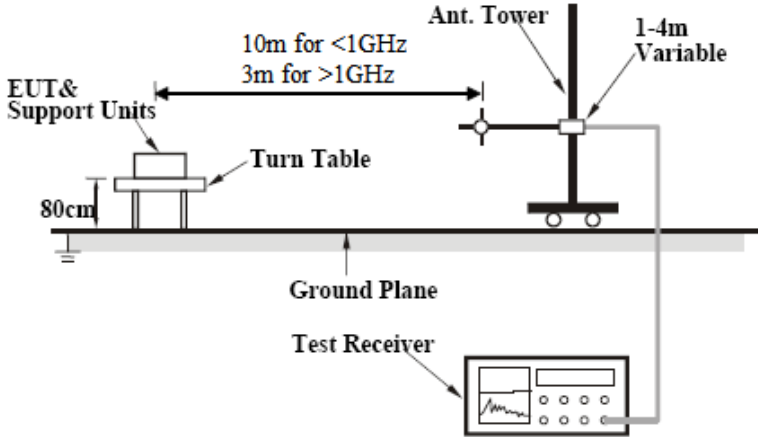
Frequency (MHz)	Direction (degree)	Height (m)	Polarity (H/V)	Antenna Loss (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading @ 3m (dBuV/m)	15.247 AV Limit @ 3m (dBuV/m)	Margin (dB)	Detector (pk/avg)
1801.4	-	-	H	26.30	1.05	32.02	49.16	54	-4.84	PK
1997.7	-	-	H	26.98	1.09	32.04	45.86	54	-8.14	PK
4017.8	-	-	H	32.40	1.70	32.38	48.84	54	-5.16	PK
5112.0	-	-	H	33.01	1.90	32.53	49.60	54	-4.4	PK
1590.9	-	-	V	25.58	1.00	31.99	47.58	54	-6.42	PK
1731.2	-	-	V	26.06	1.03	32.01	45.76	54	-8.24	PK
4172.1	-	-	V	32.39	1.73	32.42	49.52	54	-4.48	PK
5645.0	-	-	V	33.55	1.98	32.45	50.81	54	-3.19	PK
Remark	Emission was scanned up to 25GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit. If the emission PK level is within Average limit, then the maximization and average measurement are not performed.; both horizontal and vertical polarization had been verified.									

RFID at Hopping mode + N Radio at Bluetooth hopping mode @ GFSK @ 3 Meter

Frequency (MHz)	Direction (degree)	Height (m)	Polarity (H/V)	Antenna Loss (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading @ 3m (dBuV/m)	15.247 AV Limit @ 3m (dBuV/m)	Margin (dB)	Detector (pk/avg)
1589.1	-	-	H	25.57	1.00	31.99	49.18	54	-4.82	PK
1729.4	-	-	H	26.05	1.03	32.01	45.63	54	-8.37	PK
3468.9	-	-	H	31.07	1.53	32.37	48.11	54	-5.89	PK
5404.8	-	-	H	33.30	1.94	32.49	50.76	54	-3.24	PK
1591.1	-	-	V	25.58	1.00	31.99	46.58	54	-7.42	PK
1799.5	-	-	V	26.29	1.05	32.02	47.15	54	-6.85	PK
4201.7	-	-	V	32.38	1.74	32.42	46.52	54	-7.48	PK
6081.6	-	-	V	34.00	2.03	32.36	51.42	54	-2.58	PK
Remark	Emission was scanned up to 25GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit. If the emission PK level is within Average limit, then the maximization and average measurement are not performed.; both horizontal and vertical polarization had been verified.									

10.11.3 Receiver Spurious Emissions

Requirement(s):

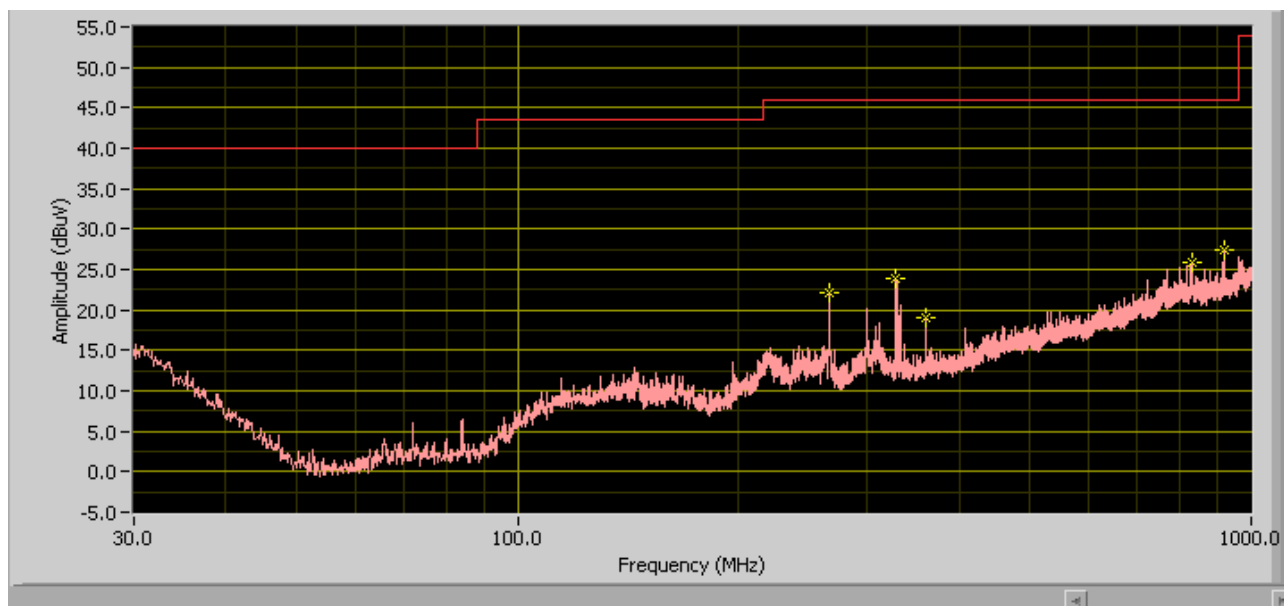
Spec	Item	Requirement	Applicable
§ 15.247(d), RSS210(A8.5)	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall 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	☒
	b)	Or restricted band, emission must also comply with the radiated emission limits specified in § 15.209(a)	☒
Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - 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: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - A Quasi-peak measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Test Date	08/23/2013	Environmental condition	Temperature 24°C Relative Humidity 49% Atmospheric Pressure 1019mbar
Remark	None		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Note: For above 1 GHz only noise floor was detected.

Receiver Spurious Emissions Below 1 GHz



Test Data

Frequency (MHz)	Reading (dBuV)	Azimuth (degree)	Polarity	Height (cm)	Antenna Factor	Cable Loss	Amplifier	Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)
917.31	32.52	159	H	181	21.8	5.5	31.3	28.52	46	-17.48
328.410	35.90	17	V	227	13.8	2.9	31.8	20.80	46	-25.20
831.14	31.47	79	V	276	21.3	5.3	31.3	26.77	46	-19.225
265.97	32.96	104	V	100	12.6	2.6	31.8	16.36	46	-29.63
328.44	33.90	16	V	227	13.8	2.9	31.8	18.86	46	-27.19
360.40	34.20	303	V	230	14.7	3	31.7	20.20	46	-25.80

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	04/20/2013	1 Year	04/20/2014	☐
R&S LISN	ESH2-Z5	861741/013	05/18/2013	1 Year	05/18/2014	☐
CHASE LISN	MN2050B	1018	07/24/2013	1 Year	07/24/2014	☐
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2013	1 Year	05/25/2014	☐
Radiated Emissions						
R & S Receiver	ESL6	100178	03/01/2013	1 Year	03/01/2014	☒
R & S Receiver	ESIB 40	100179	04/20/2013	1 Year	04/20/2014	☒
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	02/09/2013	1 Year	02/09/2014	☒
Horn Antenna (1-26.5GHz)	3115	10SL0059	04/26/2013	1 Year	04/26/2014	☒
Horn Antenna (18-40 GHz)	AH-840	101013	04/23/2013	1 Year	04/23/2014	☒
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	05/30/2013	1 Year	05/30/2014	☒
Microwave Preamplifier (18-40 GHz)	PA-840	181251	05/30/2013	1 Year	05/30/2014	☒
3 Meters SAC	3M	N/A	10/13/2011	1 Year	10/13/2012	☐
10 Meters SAC	10M	N/A	06/05/2013	1 Year	06/05/2014	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2013	1 Year	05/25/2014	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2013	1 Year	05/25/2014	☒
Power Analyzer	PACS-1	72394	5/19/2013	1 Year	05/19/2014	☐
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2013	1 Year	05/25/2014	☒

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Annex B. USER MANUAL, BLOCK & CIRCUIT DIAGRAM

Please see attachment

Annex C. 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
HongKong 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 Measuremet
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

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