SILEX TECHNOLOGY, INC.

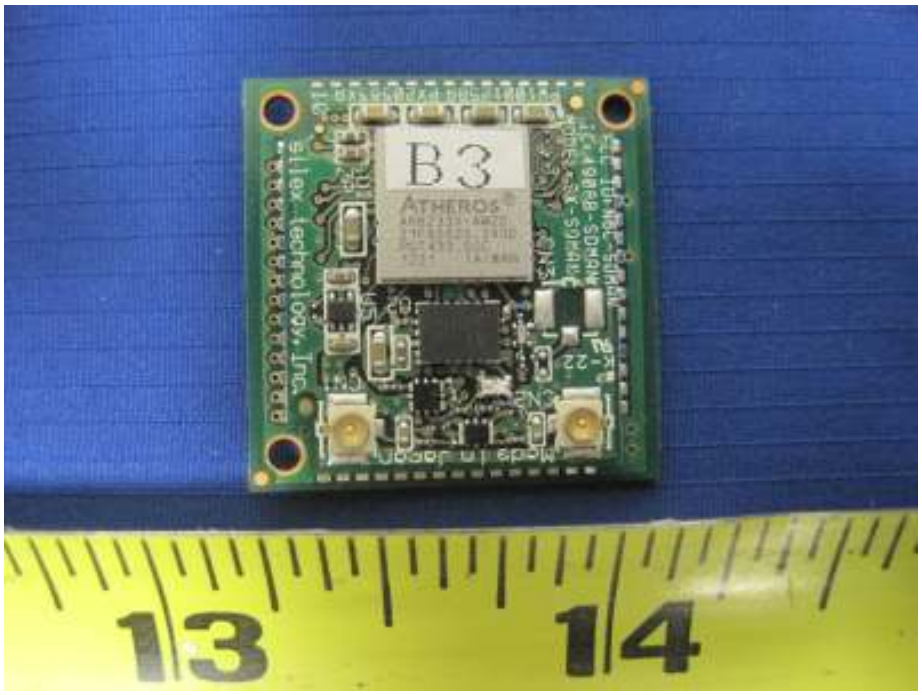
SDIO WIRELESS MODULE

Model: SX-SDMAN

May 16th, 2013

Report No.: SL13032601-SLX--003_ (FCC_15.407)_RF Rev1.0

(This report supersedes: SL13032601-SLX--003_ (FCC_15.407)_RF)



Modifications made to the product : None

This Test Report is Issued Under the Authority of:	
David Zhang	
David Zhang Compliance Engineer	Choon Sian Ooi Engineering Reviewer

This test report may be reproduced in full only.
Test result presented in this test report is applicable to the representative sample only.

RF Test Report

To: FCC 15.407: 2012; RSS 210 Issue 8

SIEMIC, INC.
Accessing global markets

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 through out 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

This page has been left blank intentionally.

CONTENTS

This page has been left blank intentionally.

1 Executive Summary & EUT information

The purpose of this test programme was to demonstrate compliance of the FCC certified radio module, SDIO Wireless Module (FCC ID: N6C-SDMAN), from Silex Technology, Inc., and Model: SX-SDMAN, with operation at additional 5470-5725MHz band, against the current Stipulated Standards. The SDIO Wireless Module operating at 5470-5725MHz band has demonstrated compliance with the FCC 15.407:2012 and RSS 210 Issue 8:2010.

Customer information

Applicant Name	:	Silex Technology, Inc.
Applicant Address	:	SDIO Wireless Module
Manufacturer Name	:	Silex Technology, Inc.
Manufacturer Address	:	2-3-1 Hikaridai, Seika-cho, Kyoto, Japan 619-0237

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

2 EUT INFO & TECHNICAL DETAILS

EUT Information

EUT Description

Product Name	:	SDIO Wireless Module
Model No.	:	SX-SDMAN
Trade Name	:	Silex
Serial No.	:	**012F91**
Input Power	:	3.3VDC
Power Adapter Manu/Model	:	N/A
Power Adapter SN	:	N/A
Hardware version	:	N/A
Software version	:	N/A
Date of EUT received	:	Apr 23rd, 2013
Equipment Class/ Category	:	UNII
Clock Frequencies	:	26 MHz
Port/Connectors	:	SDIO
FCC ID	:	N6C-SDMAN
IC ID	:	4908B-SDMAN
Measured conducted RF output Power	:	802.11a: 12.315dBm 802.11n-20MHz: 13.123dBm 802.11n-40MHz: 10.844dBm

Radio Description

Radio Manu	Silex Technologies, Inc.
Radio Model	SX-SDMAN
Radio Module SN	012F91

Spec for Radio -

Radio Type	802.11b	802.11g	802.11a	802.11n-20M	802.11n-40M
Operating Frequency	2412-2462MHz	2412-2462MHz	5180-5320MHz 5470-5725MHz 5725-5825MHz	2412-2462MHz 5180-5320MHz 5470-5725MHz 5725-5825MHz	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	Embedded antenna: Ethertronics Sleeve antenna: Sansei				
Antenna Gain	Embedded antenna: 2.0 dBi (2.4GHz), 2.5 dBi (5GHz) Sleeve antenna: 1.0 dBi (2.4GHz), 1.1 dBi (5GHz)				
Antenna Connector Type	U.FL connector				

Radio Type	Bluetooth (Ver4.0+EDR/LE dual mode)
Operating Frequency	2402MHz-2480MHz
Modulation	FHSS
Channel Spacing	1MHz (BDR, EDR), 2MHz (LE)
Antenna Type	Embedded antenna: Ethertronics
Antenna Gain	Embedded antenna: 2.0 dBi (2.4GHz), 2.5 dBi (5GHz)
Antenna Connector Type	U.FL connector

EUT test modes/configuration Description

Mode	Note
802.11a (11a)	24Mbps, PN9
802.11n-20MHz (11n-20)	MCS1 (Long GI), PN9
802.11n-40MHz (11n-40)	MCS3 (Long GI), PN9

Note:

1. Testing purpose for current report is PCII to add the 5.4GHz band only. The worst case test modes were reference to original FCC test report (report number: 32IE0154-HO-01-C-R1).
2. Power setting for 5.4GHz band are:

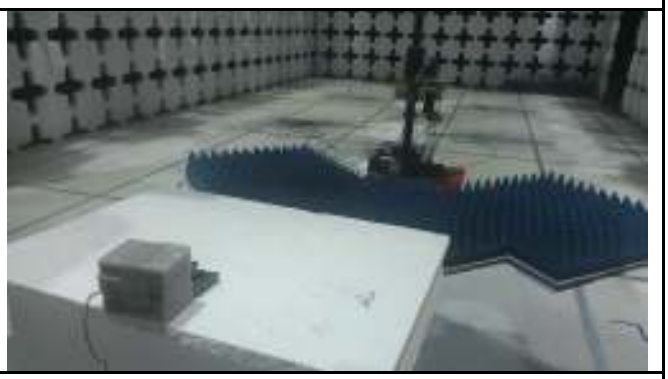
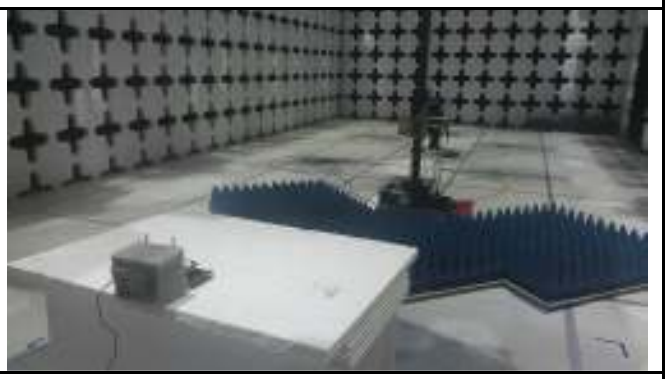
   802.11a : 14 dBm
   802.11n-20MHz: 14 dBm
   802.11n-40MHz: 14 dBm

Test Item	Operating mode	Tested antenna port	Test Date	Test frequencies
AC Conducted Emissions Voltage	802.11n-20	CN2 port	04/24/2013	5580MHz*
26 dB & 99% Bandwidth	802.11a, 802.11n-20, 802.11n-40	CN2 port	04/24/2013	5500, 5580, 5700MHz (802.11a, 802.11n-20) 5510, 5550, 5670MHz (802.11n-40)
Maximum conducted output power	802.11a, 802.11n-20, 802.11n-40	CN2 port	04/24/2013	
Maximum peak spectral density	802.11a, 802.11n-20, 802.11n-40	CN2 port	04/24/2013	
Peak Excursion Ratio	802.11a, 802.11n-20, 802.11n-40	CN2 port	04/24/2013	
Band Edge and Radiated Spurious Emissions	802.11n-20, 802.11n-40	-	04/26/2013	

Note:

1. Testing purpose for current report is PCII to add the 5.4GHz band only. The test port selection was reference to original FCC test report (report number: 32IE0154-HO-01-C-R1). The port CN2 was used for measurement due to higher output power (CN2 is TX1 port)
2. EUT has 2 TX ports but they're TX diversity, only one port will be chosen at single moment. They don't transmit simultaneously.
3. For conducted emission, only the mid channel was tested as representative.

EUT Test Setup Photos

	
Test setup with Embedded antenna (<1GHz) - Front	**Test setup with Embedded antenna (<1GHz) - Rear**
	
Test setup with Embedded antenna (>1GHz) - Front	**Test setup with Embedded antenna (>1GHz) - Rear**
	
Test setup with Sleeve antenna (<1GHz) - Front	**Test setup with Sleeve antenna (<1GHz) – Rear**
	
Test setup with Sleeve antenna (>1GHz) - Front	**Test setup with Sleeve antenna (>1GHz) – Rear**

Supporting Equipment/Software and cabling Description

Supporting Equipment

Index	Supporting Equipment Description	Model	Serial No.	Manu	Note
1	SDIO Wireless Module	SX-SDMAN	012F91	Silex	EUT
2	Embedded antenna	1000418	001	Ethertronics	EUT
3	Embedded antenna	1000418	002	Ethertronics	EUT
4	Sleeve antenna	ANTB98-061A0	001	Sansei Denki	EUT
5	Sleeve antenna	ANTB98-061A0	002	Sansei Denki	EUT
6	Jig board	-	-	Silex	-
7	AC Adaptor	US115-05	B06-0024850	Unifive	-
8	Wireless AP	AIR-AP1142N-A-K9 v08	FTX1708K8MM	Cisco	-

Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
RF cable1	Embedded Ant	Ant port	EUT	Ant port (CN1)	0.1	Yes	-
RF cable2	Embedded Ant	Ant port	EUT	Ant port (CN2)	0.1	Yes	-
RF cable3	Sleeve Ant	Ant port	EUT	Ant port (CN1)	0.12	Yes	-
RF cable4	Sleeve Ant	Ant port	EUT	Ant port (CN2)	0.12	Yes	-

Test Software Description

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

3 REPORT REVISION HISTORY

Report No.	Report Version	Description	Issue Date
SL13032601-SLX--003_ (FCC_15.407)_RF Rev1.0	Original	None	04/24/2013

4 TEST SUMMARY

The product was tested in accordance with the following specifications.
All Testing has been performed according to below product classification:

UNII Device

Test Results Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Restricted Band of Operation	FCC	15.205	FCC	ANSI C63.4 – 2009 789033 D01 General UNII Test Procedures v01r03	☒ Pass ☐ N/A
	IC	RSS 210 (2.2)	IC	N/A	
AC Conducted Emissions Voltage	FCC	15.207(a)	FCC	ANSI C63.4 – 2009 (7.3)	☒ Pass ☐ N/A
	IC	RSS Gen (7.2.4)	IC	RSS Gen (7.2.4)	

Test Item	Test standard		Test Method/Procedure		Pass / Fail
26 dB Emission Bandwidth	FCC	15.407 (a) (2)	FCC	789033 D01 General UNII Test Procedures v01r03	☒ Pass ☐ N/A
	IC	RSS 210 (A9.2) (2)	IC	-	
99% Bandwidth	FCC	-	FCC	789033 D01 General UNII Test Procedures v01r03	☐ Pass ☒ N/A
	IC	RSS 210 (A9.2) (2)	IC	RSS Gen (4.6.1)	
Maximum conducted Output Power	FCC	15.407 (a) (2)	FCC	789033 D01 General UNII Test Procedures v01r03	☒ Pass ☐ N/A
	IC	RSS 210 (A9.2) (1)	IC	-	
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a) (2)	FCC	-	☐ Pass ☒ N/A
	IC	-	IC	-	
Band Edge and Radiated Spurious Emissions	FCC	15.407(b)(2), 15.407(b)(6)	FCC	ANSI C63.4 – 2009 789033 D01 General UNII Test Procedures v01r03	☒ Pass ☐ N/A
	IC	RSS210(A9.3)(1)	IC	-	
Power Spectral Density	FCC	15.407 (a) (2)	FCC	789033 D01 General UNII Test Procedures v01r03	☒ Pass ☐ N/A
	IC	RSS 210 (A9.2) (1)	IC	-	
Peak Excursion Ratio	FCC	15.407(a)(6)	FCC	789033 D01 General UNII Test Procedures v01r03	☒ Pass ☐ N/A
	IC	-	IC	-	
RF Exposure	FCC	15.407 (f)	FCC	OET65C - 2001	☒ Pass ☐ N/A
	IC	RSS Gen (5.5)	IC	-	
Frequency Stability	FCC	15.407 (g)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 (A9.5) (e)	IC	-	
Transmit Power Control (TPC)	FCC	15.407 (h)(1)	FCC	-	☐ Pass ☒ N/A
	IC	RSS 210 (A9.2) (3)	IC	-	
User Manual	FCC	-	FCC	-	☒ Pass ☐ N/A
	IC	RSS 210 (A9.5) (g)	IC	-	
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.				

5 Measurement Uncertainty

Test Item	Frequency Range	Description	Uncertainty
AC Conducted Emissions Voltage	150KHz – 30MHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±3.5dB
26 dB & 99% Bandwidth	30MHz – 40GHz		±1.5dB
Maximum conducted output power	30MHz – 40GHz		±1.5dB
Maximum peak spectral density	30MHz – 40GHz		±1.5dB
Peak Excursion Ratio	30MHz – 40GHz		±1.5dB
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	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

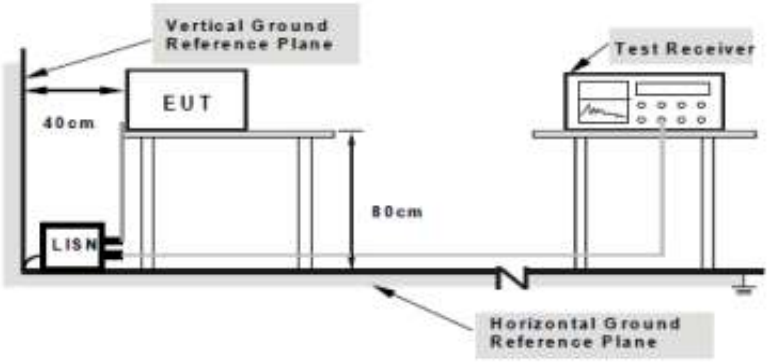
6 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

6.1 Conducted Emissions Voltage

Conducted Emission Limit

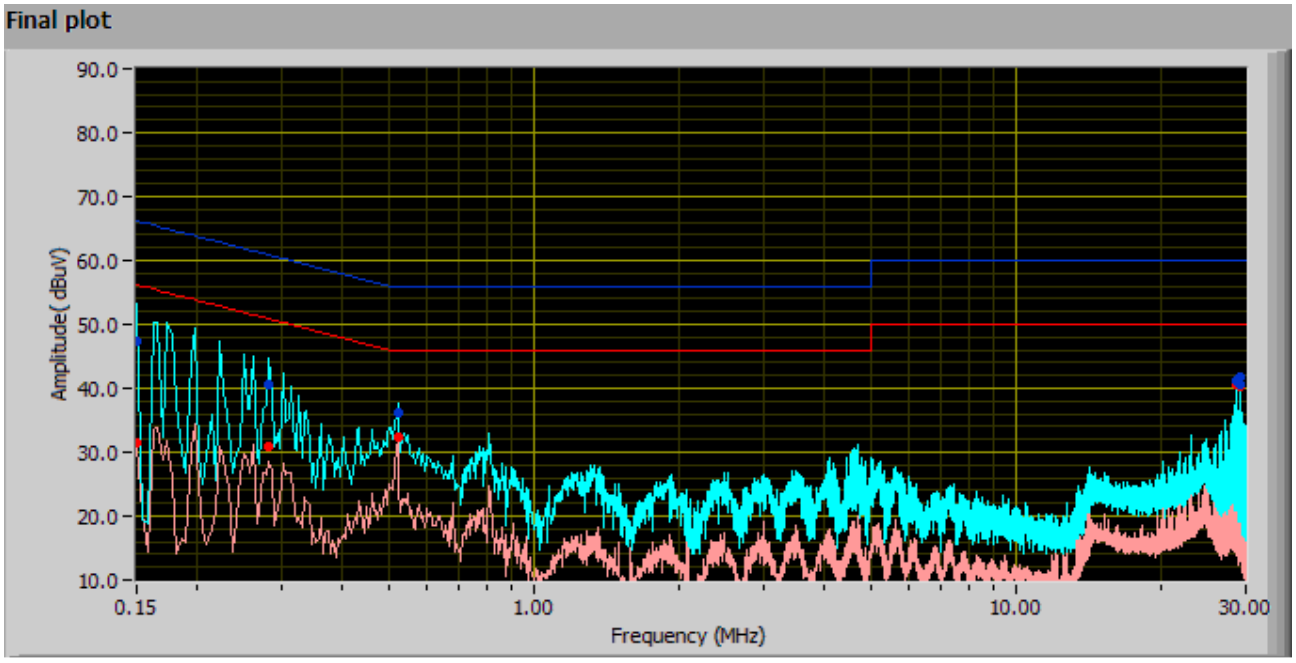
Section	Frequency ranges (MHz)	Limit (dBuV)	
		QP	Average
Class B devices	0.15 ~ 0.5	66 – 56	56 – 46
	0.5 ~ 5	56	46
	5 ~ 30	60	50

Spec	Item	Requirement	Applicable
§ 15.207, RSS Gen (7.2.4)	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 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, 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	04/24/2013	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	21oC 46% 1019mbar
Remark				
Result	☒ Pass ☐ Fail			

Test Data ☒ Yes ☐ N/A

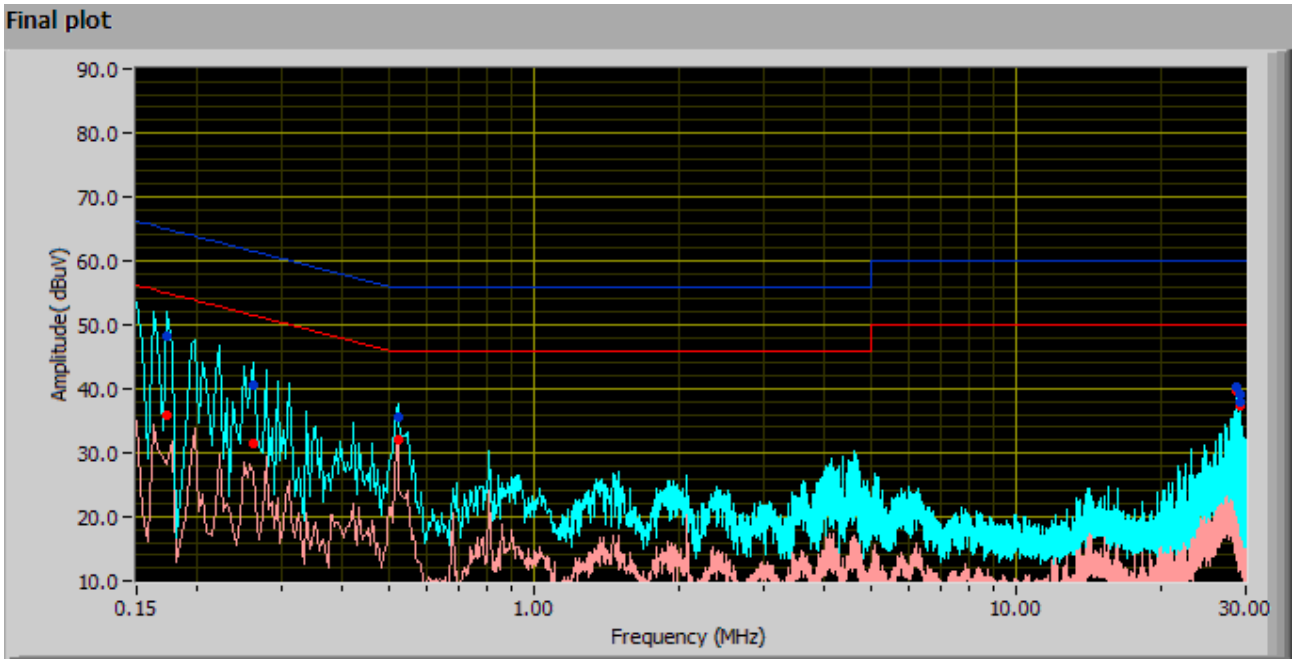
Test Plot ☒ Yes (See below) ☐ N/A



Quasi-Peak Limit Average Limit

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	QP Value (dBµV)	Class B Limit (dB)	Margin (dB)	Avg Value (dBµV)	Class B Limit (dB)	Margin (dB)	Line
0.15	47.43	66.19	-18.76	31.54	56.19	-24.65	Phase
0.28	40.72	60.85	-20.12	30.76	50.85	-20.08	Phase
29.23	40.64	60.00	-19.36	40.42	50.00	-9.58	Phase
0.52	36.07	56.00	-19.93	32.35	46.00	-13.65	Phase
28.68	41.31	60.00	-18.70	40.59	50.00	-9.42	Phase
29.24	41.82	60.00	-18.18	41.66	50.00	-8.34	Phase



Quasi-Peak Limit Average Limit

Neutral Line Plot at 120Vac, 60Hz

Frequency (MHz)	QP Value (dBµV)	Class B Limit (dB)	Margin (dB)	Avg Value (dBµV)	Class B Limit (dB)	Margin (dB)	Line
0.17	48.25	64.93	-16.69	35.94	54.93	-19.00	Neutral
0.26	40.45	61.47	-21.02	31.38	51.47	-20.09	Neutral
0.52	35.73	56.00	-20.27	32.07	46.00	-13.93	Neutral
28.68	40.23	60.00	-19.78	39.70	50.00	-10.31	Neutral
29.23	39.20	60.00	-20.80	39.08	50.00	-10.92	Neutral
29.11	37.83	60.00	-22.17	37.27	50.00	-12.73	Neutral

6.2 26dB & 99% Occupied Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407 (a) (2)	a)	26 dB Emission BW: Report only for power level calculation.	☒
RSS 210 (A9.2) (2)	b)	99% BW: For FCC reference only; required by IC.	☒

Test Setup				
Test Procedure	26dB Emission bandwidth measurement procedure - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 26dB BW. - Capture the plot. - Repeat above steps for different test channel and other modulation type. 99% bandwidth measurement procedure - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 99% BW. - Capture the plot. - Repeat above steps for different test channel and other modulation type.			
Test Date	04/24/2013	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	21oC 46% 1019mbar
Remark	NONE			
Result	☒ Pass ☐ Fail			

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
26 dB Emission Bandwidth	1% of 26 dB EBW	>RBW	>EBW	PK	Auto	Maxhold	-
99% Bandwidth	Close to 1% of SPAN	≥3MHz	1.5 - 5 times of OBW	PK	Auto	Maxhold	-

Test Data ☒ Yes ☐ N/A

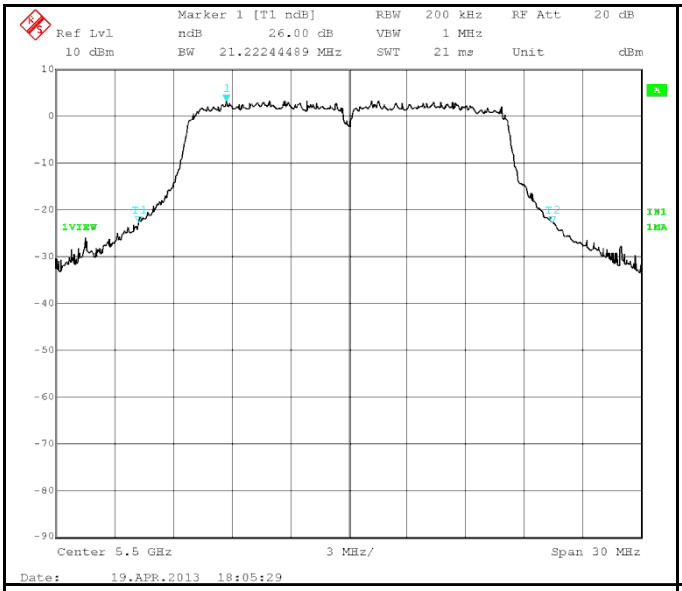
26dB Bandwidth measurement result

Type	Freq (MHz)	Test mode	CH	Result (MHz)	Limit (MHz)	Result
26dB BW	5500	802.11a	Low	21.2224	-	-
26dB BW	5580	802.11a	Mid	21.1022	-	-
26dB BW	5700	802.11a	High	21.3427	-	-
26dB BW	5500	802.11n-20	Low	22.2445	-	-
26dB BW	5580	802.11n-20	Mid	22.1242	-	-
26dB BW	5700	802.11n-20	High	22.6653	-	-
26dB BW	5510	802.11n-40	Low	44.7295	-	-
26dB BW	5550	802.11n-40	Mid	44.4890	-	-
26dB BW	5670	802.11n-40	High	45.5711	-	-

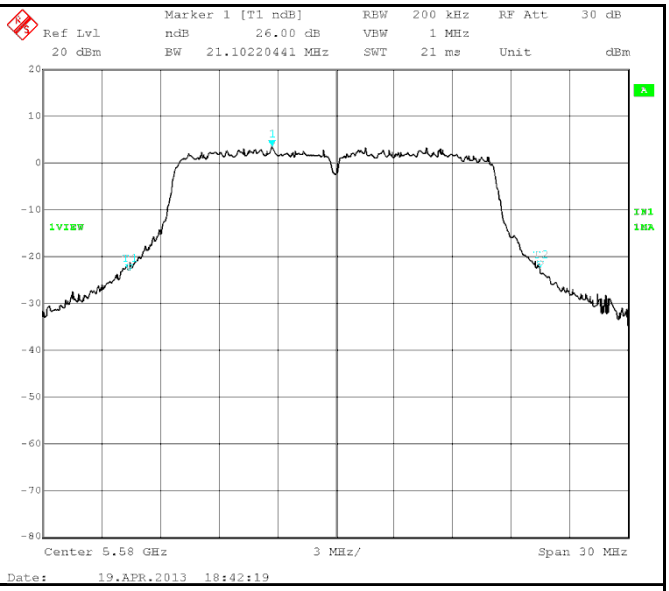
99% Bandwidth measurement result

Type	Freq (MHz)	Test mode	CH	Result (MHz)	Limit (MHz)	Result
99% OBW	5500	802.11a	Low	16.834	-	-
99% OBW	5580	802.11a	Mid	16.774	-	-
99% OBW	5700	802.11a	High	16.774	-	-
99% OBW	5500	802.11n-20	Low	17.916	-	-
99% OBW	5580	802.11n-20	Mid	17.916	-	-
99% OBW	5700	802.11n-20	High	17.916	-	-
99% OBW	5510	802.11n-40	Low	36.473	-	-
99% OBW	5550	802.11n-40	Mid	36.473	-	-
99% OBW	5670	802.11n-40	High	36.473	-	-

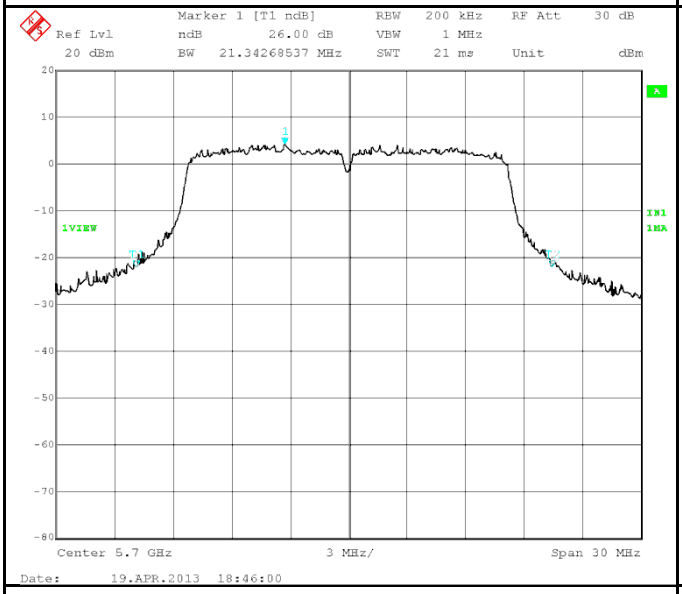
Test Plot ☒ Yes (See below) ☐ N/A



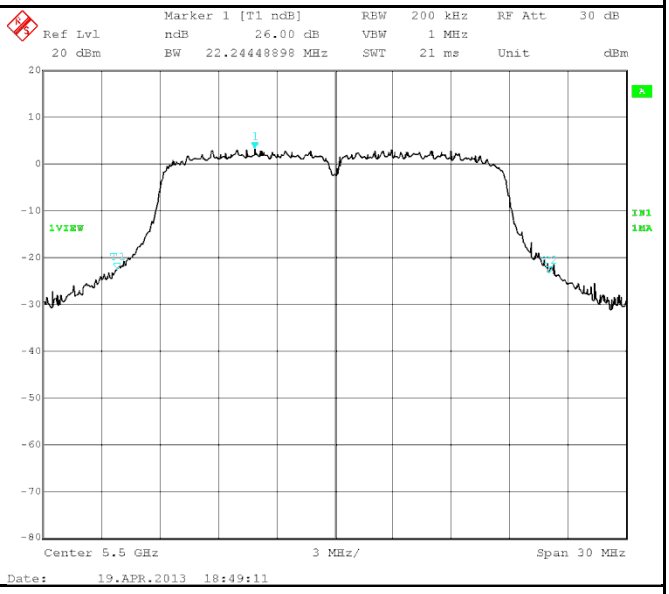
26dB BW-TX-Low-802.11a-5500-CN2 port



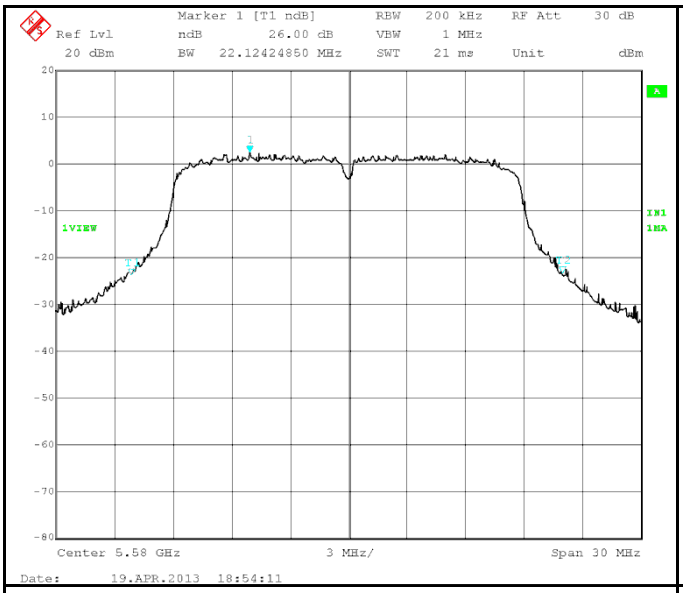
26 dB BW-TX-Low-802.11a-5580-CN2 port



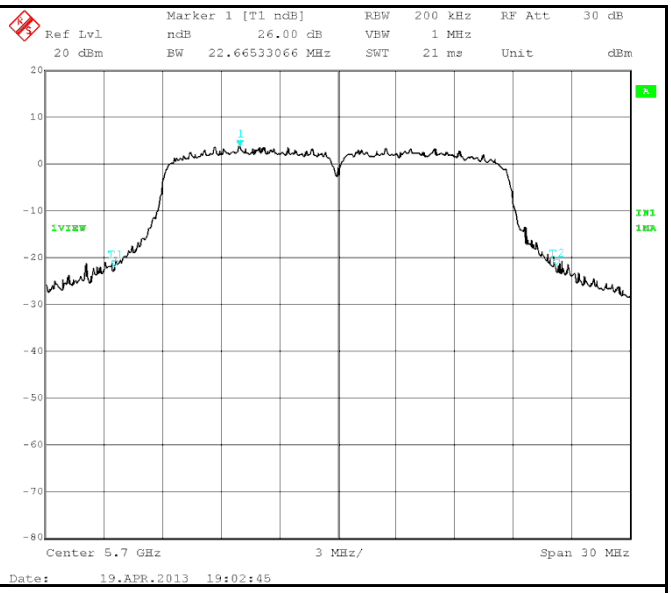
26dB BW-TX-Low-802.11a-5700-CN2 port



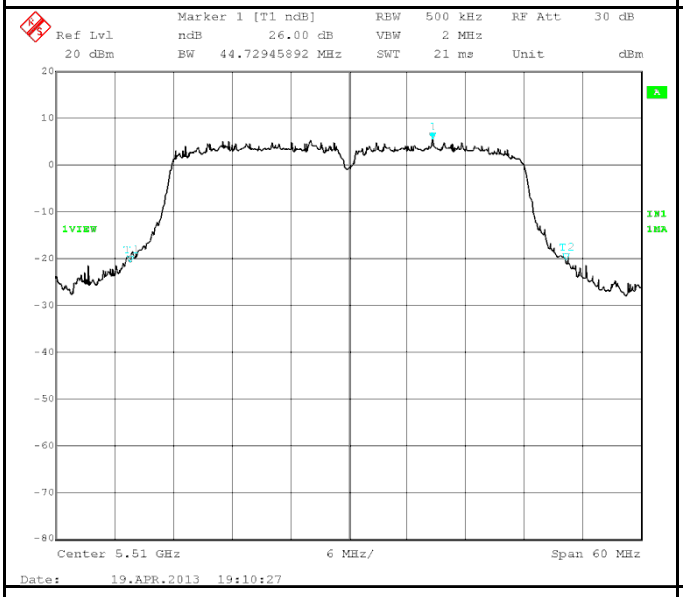
26dB BW-TX-Low-802.11n-20MHz-5500-CN2 port



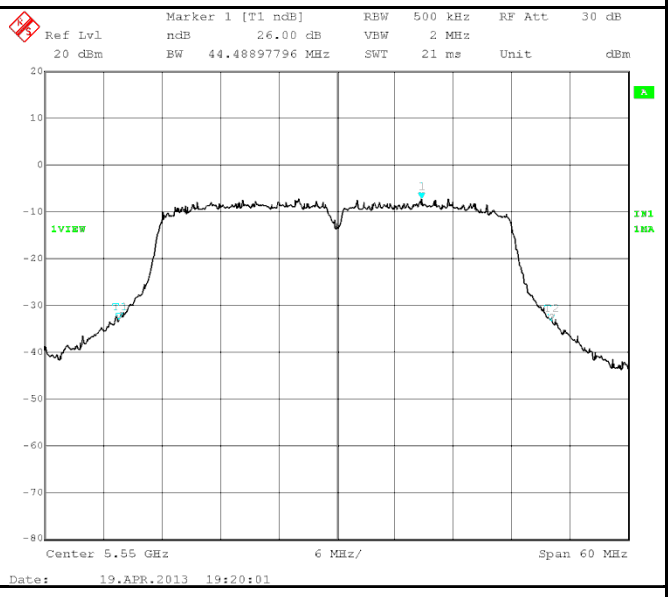
26dB BW-TX-Low-802.11n-20MHz-5580-CN2 port



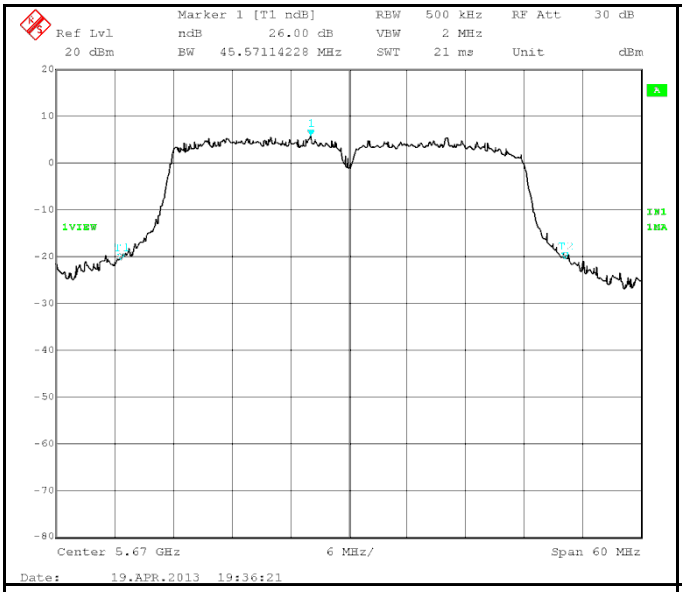
26dB BW-TX-Low-802.11n-20MHz-5700-CN2 port



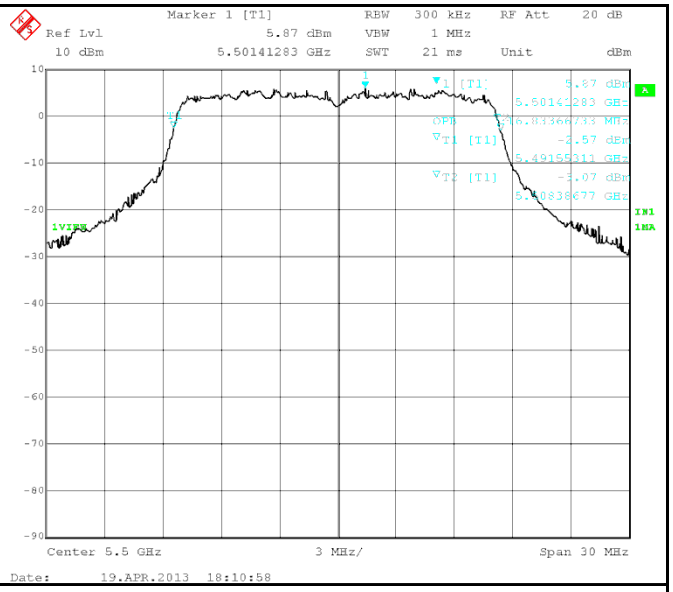
26dB BW-TX-Low-802.11n-40MHz-5510-CN2 port



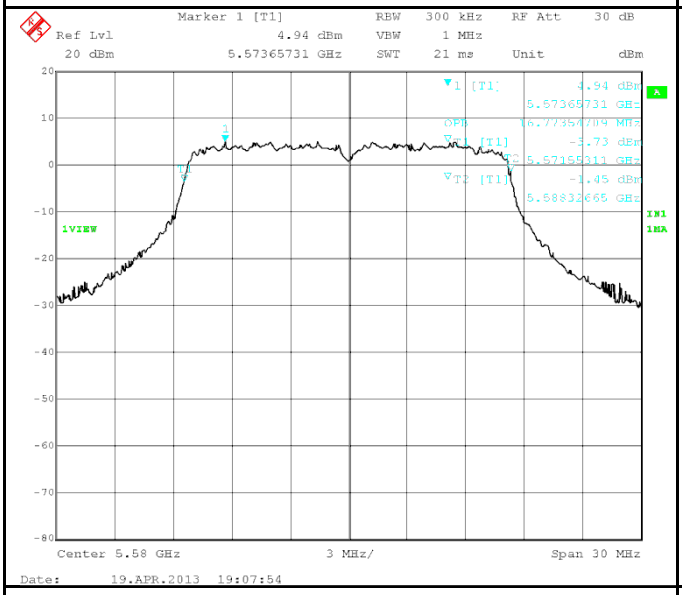
26dB BW-TX-Low-802.11n-40MHz-5550-CN2 port



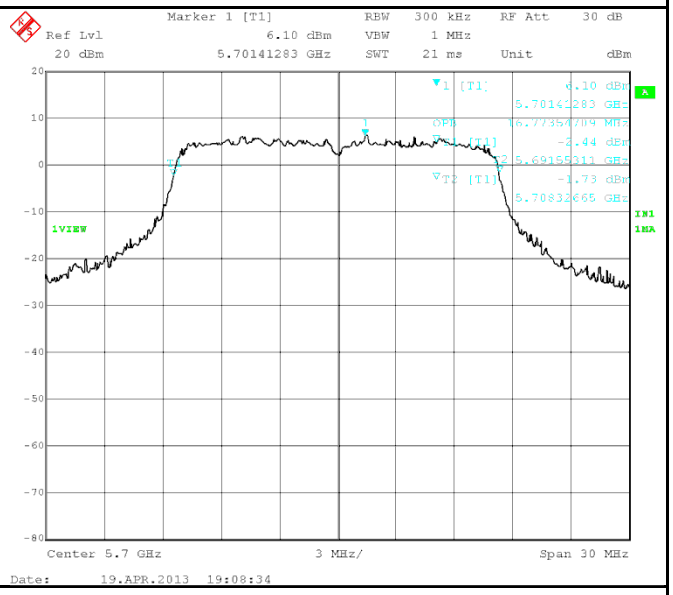
26dB BW-TX-Low-802.11n-40MHz-5670-CN2 port



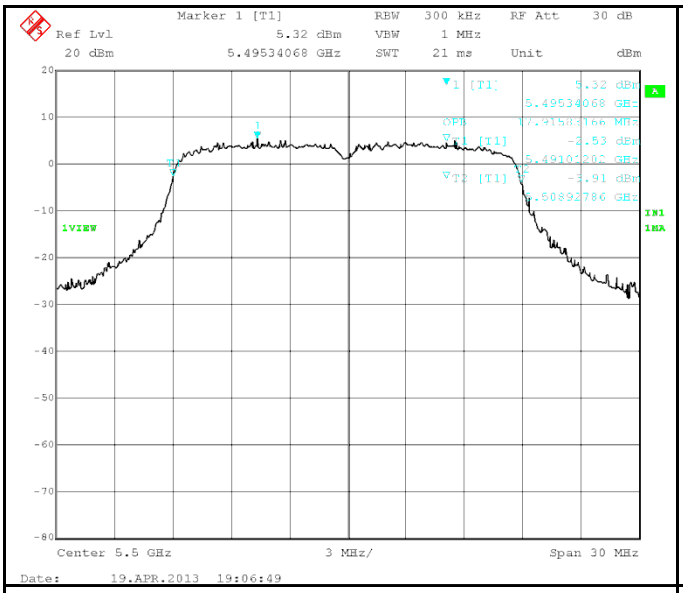
99% BW-TX-Low-802.11a-5500-CN2 port



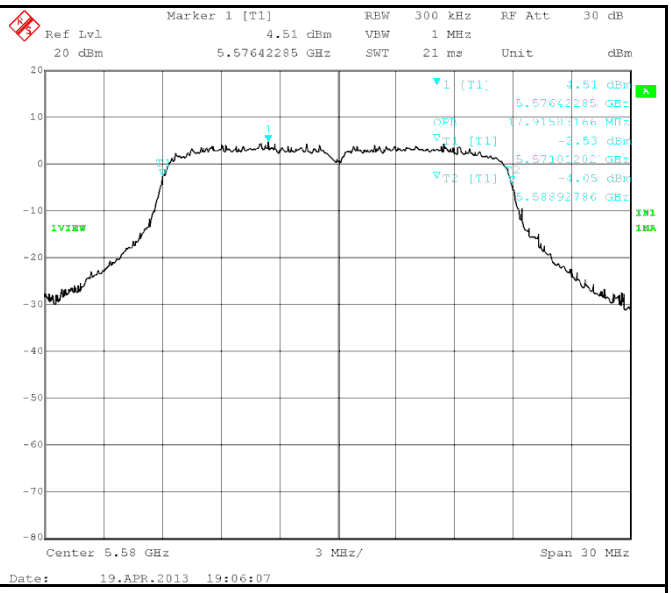
99% BW-TX-Low-802.11a-5580-CN2 port



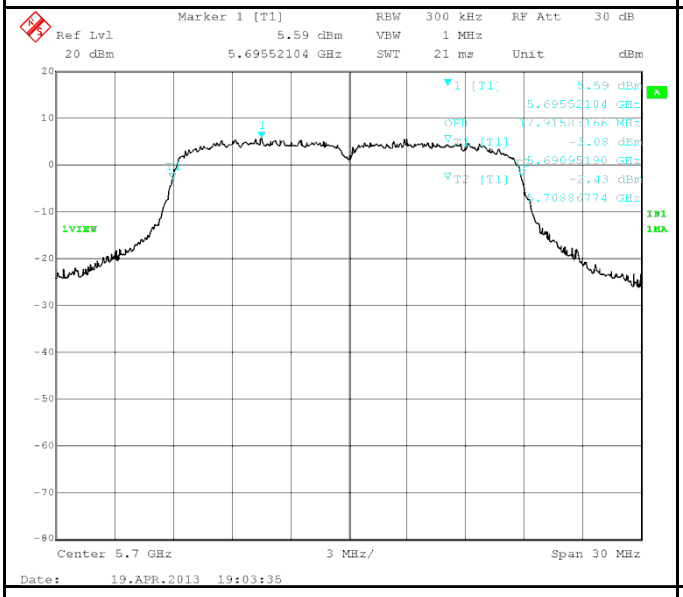
99% BW-TX-Low-802.11a-5700-CN2 port



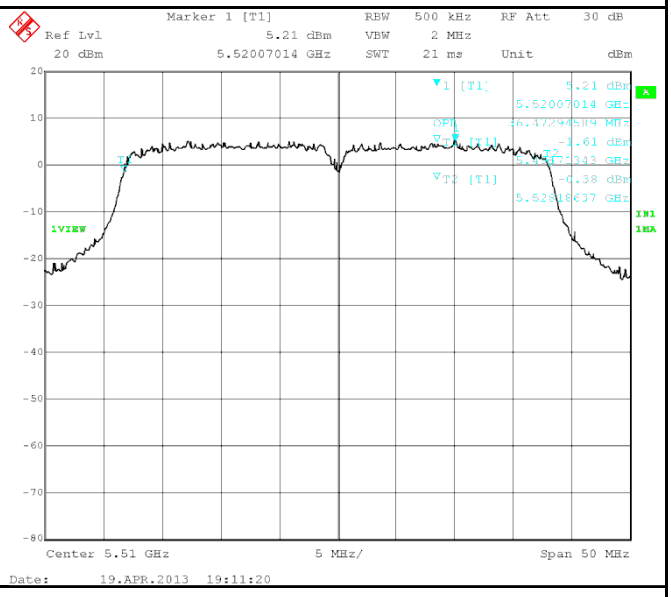
99% BW-TX-Low-802.11n-20MHz-5500-CN2 port



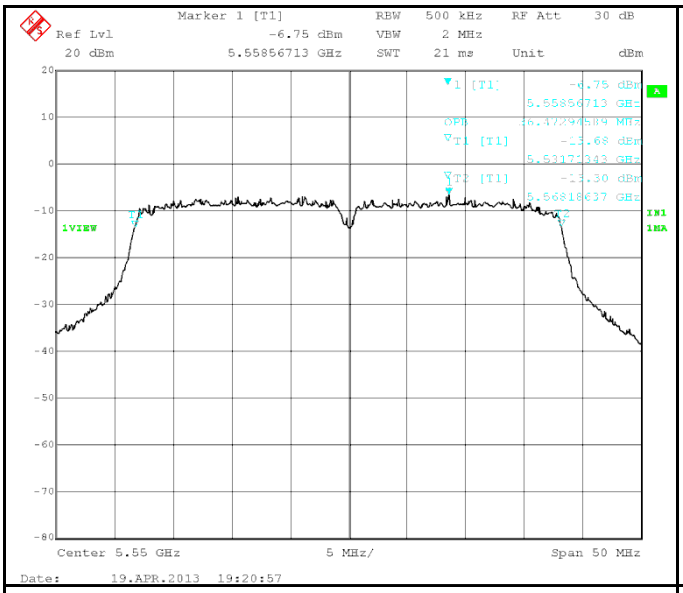
99% BW-TX-Low-802.11n-20MHz-5580-CN2 port



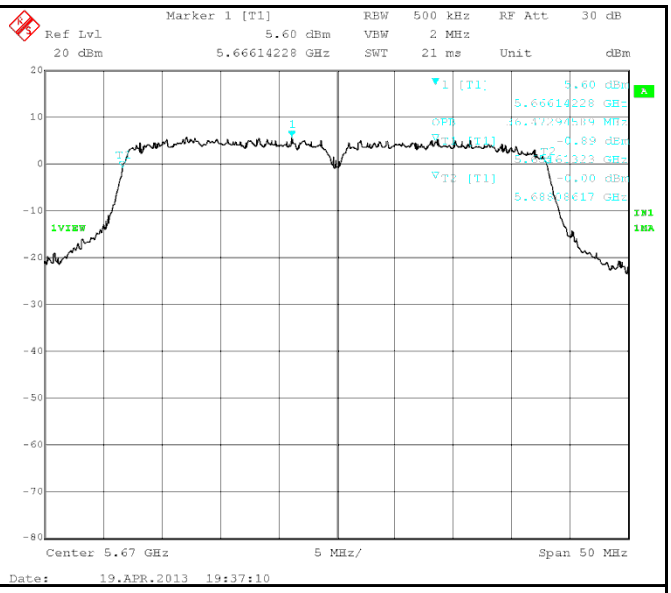
99% BW-TX-Low-802.11n-20MHz-5700-CN2 port



99% BW-TX-Low-802.11n-40MHz-5510-CN2 port



99% BW-TX-Low-802.11n-40MHz-5550-CN2 port



99% BW-TX-Low-802.11n-40MHz-5670-CN2 port

6.3 Peak Power Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407 (a) (2), RSS 210 (A9.2) (1)	a)	For 5.15-5.25GHz: ≤ 4 dBm/MHz	☐
	b)	For 5.25-5.35GHz and 5.47-5.725GHz: ≤ 11 dBm/MHz	☒
	c)	For 5.725-5.825GHz: ≤ 17 dBm/MHz	☐
	d)	Power reduction (antenna gain > 6dBi)	☐
Test Setup			
Test Procedure	FCC UNII Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep)		
Test Date	04/24/2013	Environmental condition	Temperature 21oC Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
PSD	1MHz	≥3MHz	≥EBW or 99% OBW	RMS	Auto	Average on 100 traces	-

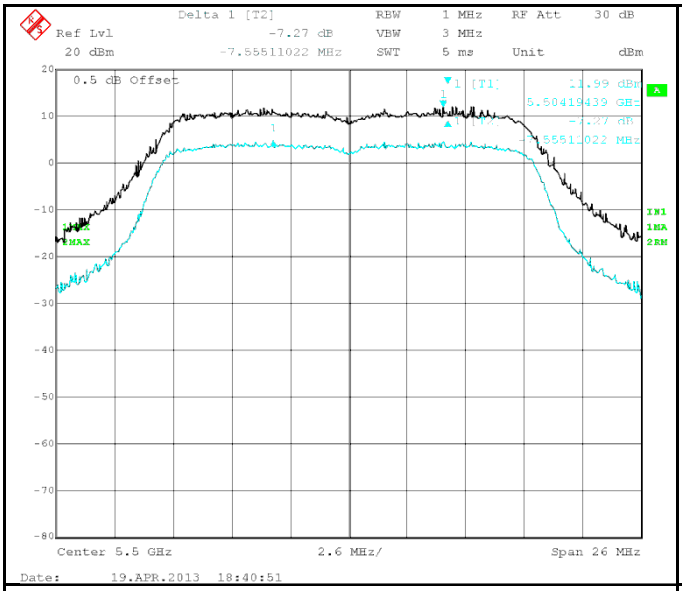
Test Data ☒ Yes ☐ N/A

PSD measurement result

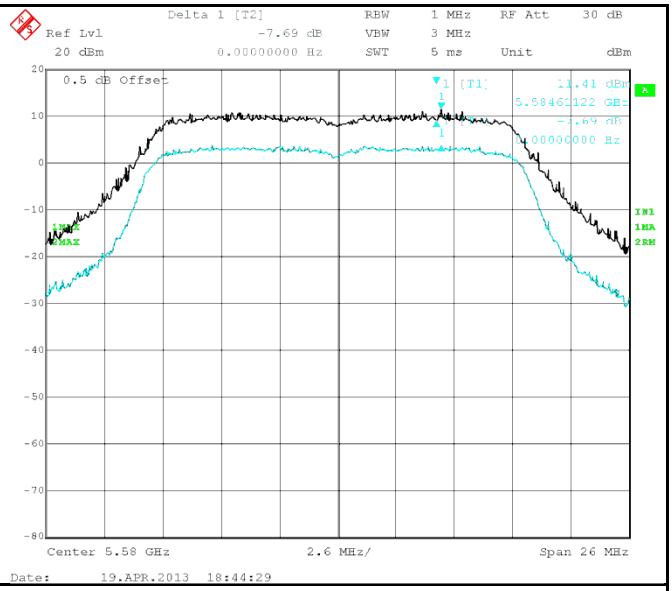
Type	CH	Freq (MHz)	Test mode	Conducted PSD (dBm/MHz)	Limit (dBm/MHz)	Result
PSD	Low	5500	802.11a	4.72	11	Pass
PSD	Mid	5580	802.11a	3.72	11	Pass
PSD	High	5700	802.11a	5.24	11	Pass
PSD	Low	5500	802.11n20	4.24	11	Pass
PSD	Mid	5580	802.11n20	3.27	11	Pass
PSD	High	5700	802.11n20	3.93	11	Pass
PSD	Low	5510	802.11n40	1.14	11	Pass
PSD	Mid	5550	802.11n40	1.48	11	Pass
PSD	High	5670	802.11n40	1.30	11	Pass

Test Plot ☒ Yes (See below) ☐ N/A

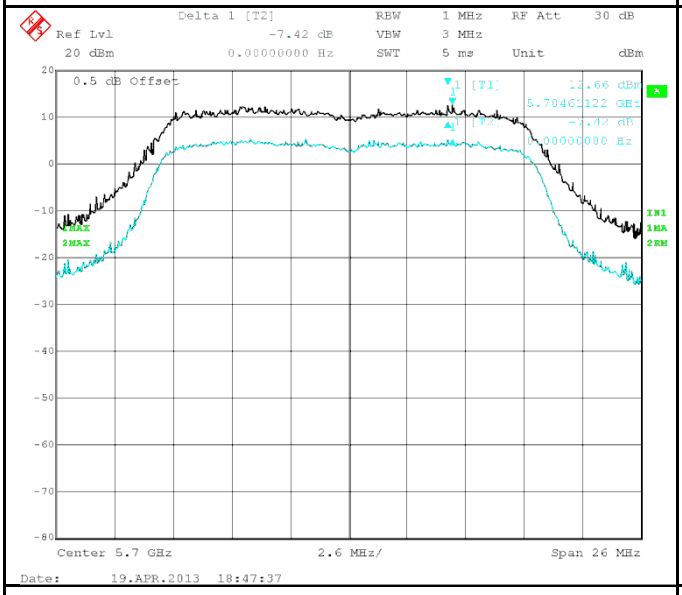
PSD & Peak Excursion Ratio Test Plots



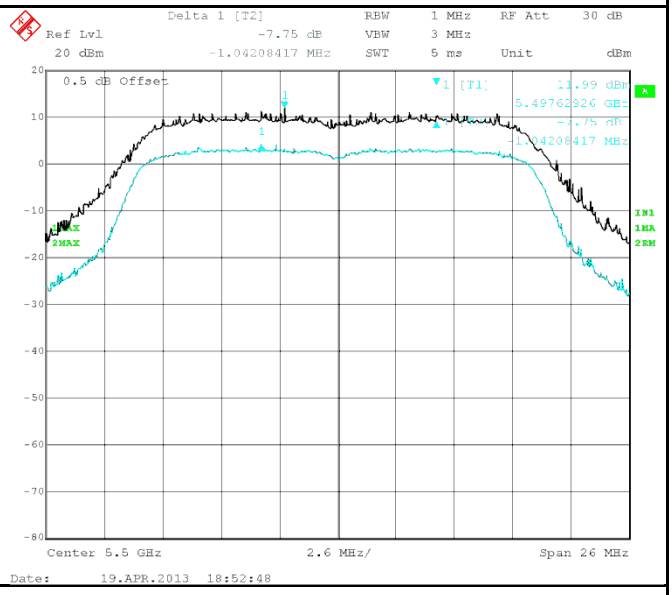
PSD & Peak Excursion Ratio TX-802.11a-5500MHz-CN2 port



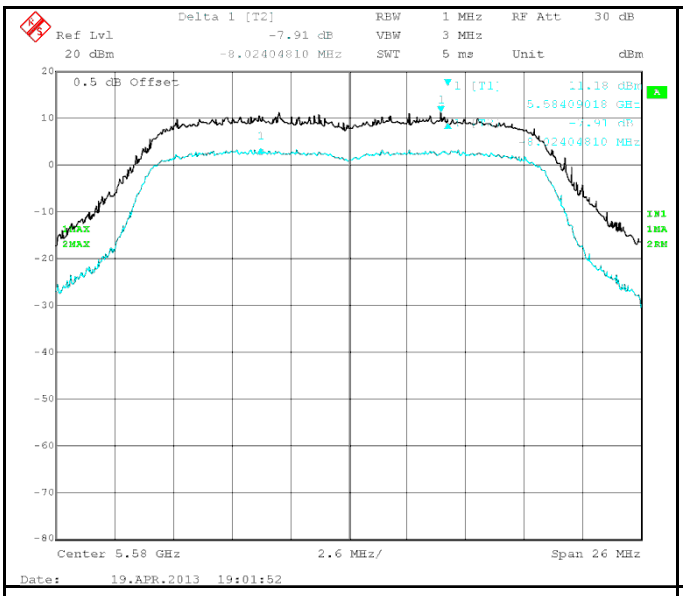
PSD & Peak Excursion Ratio TX-802.11a-5580MHz-CN2 port



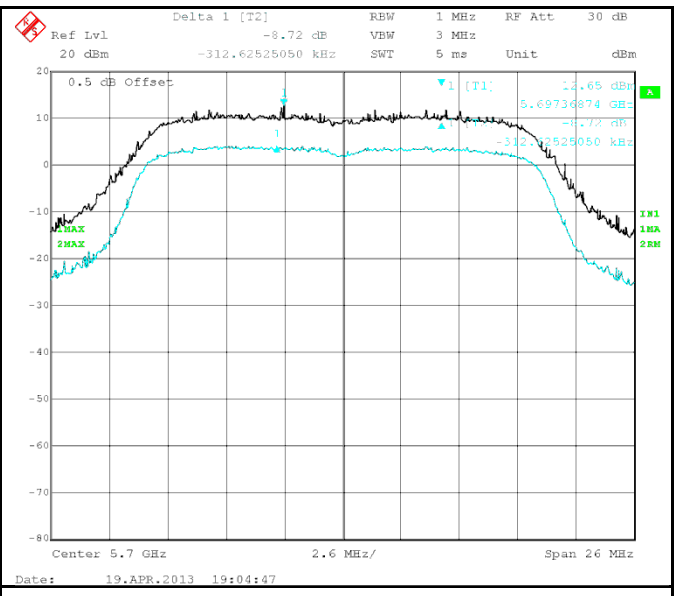
PSD & Peak Excursion Ratio TX-802.11a-5700MHz-CN2 port



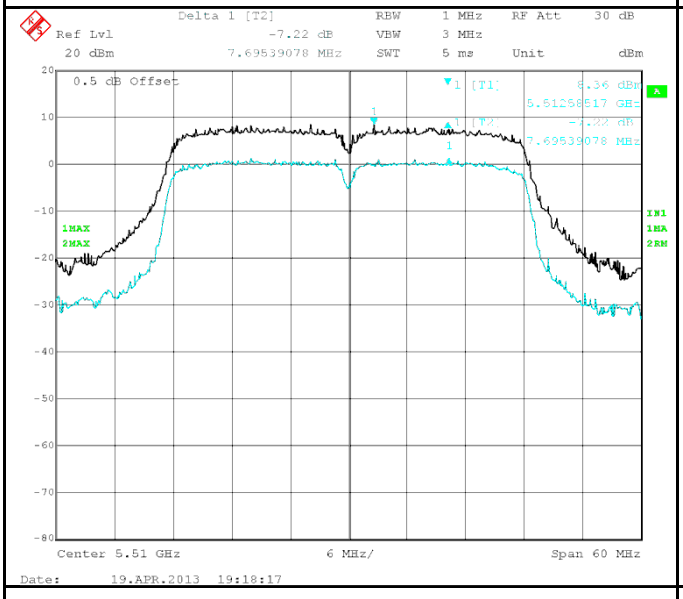
PSD & Peak Excursion Ratio TX-802.11n-20MHz-5500MHz-CN2 port



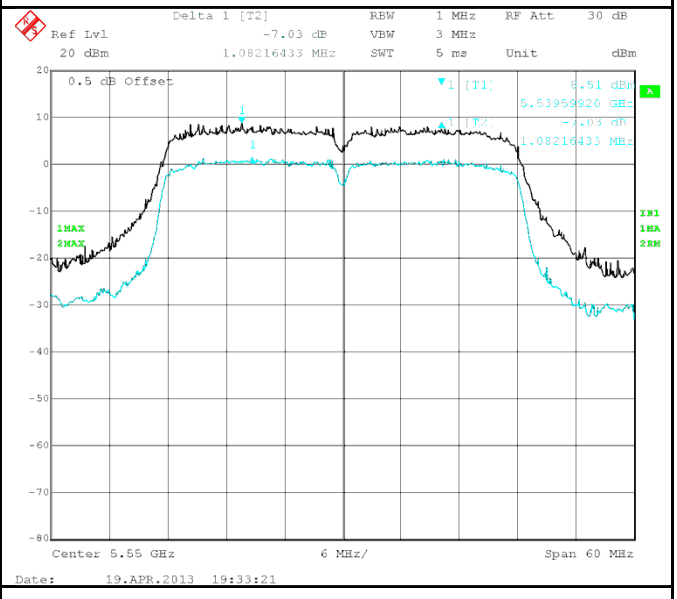
PSD & Peak Excursion Ratio TX-802.11n-20MHz-5580MHz-CN2 port



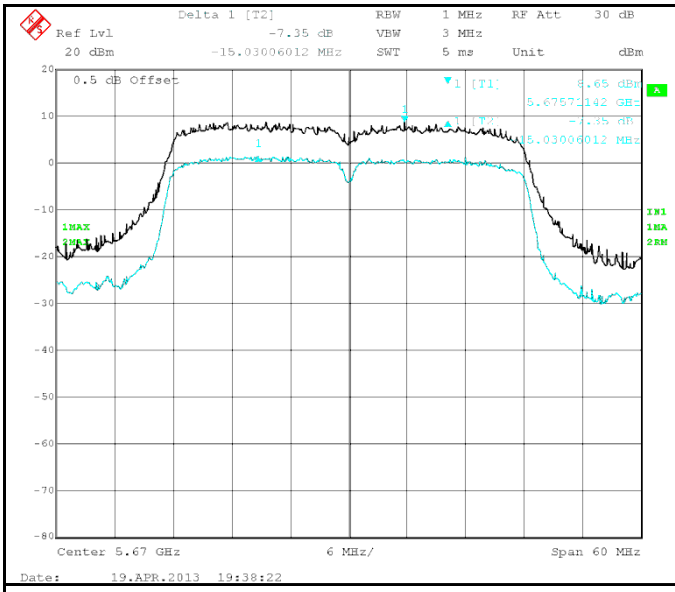
PSD & Peak Excursion Ratio TX-802.11n-20MHz-5700MHz-CN2 port



PSD & Peak Excursion Ratio TX-802.11n-40MHz-5510MHz-CN2 port



PSD & Peak Excursion Ratio TX-802.11n-40MHz-5550MHz-CN2 port



PSD & Peak Excursion Ratio TX-802.11n-40MHz-5670MHz-CN2 port

6.4 Peak Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407 (a) (2), RSS 210 (A9.2) (1)	a)	For 5.15-5.25GHz: the lesser of 50mW or 4 dBm + 10 log B	☐
	b)	For 5.25-5.35GHz and 5.47-5.725GHz: the lesser of 250mW or 11dBm + 10 log B	☒
	c)	For 5.725-5.825GHz: the lesser of 1W or 17 dBm + 10 log B	☐
	d)	Power reduction (antenna gain > 6dBi)	☐
Test Setup			
Test Procedure	FCC UNII Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep)		
Test Date	04/24/2013	Environmental condition	Temperature 21oC Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	1. For FCC, B in the power limit calculation is 26 dB EBW; for IC, B is 99% OBW. 2.Duty cycle factor 802.11a-5580MHz: 95.4% factor = 10 log (1/x) = 0.205 802.11n-5580MHz: 97.646% factor = 10 log (1/x) = 0.1034 802.11n-40-5550MHz: 90.705% factor = 10 log (1/x) = 0.4237		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
PK output power	1MHz	≥3MHz	≥EBW or 99% OBW	RMS	Auto	Average on 100 traces	CH PW on 26 dB EBW or 99% OBW

Test Data ☒ Yes ☐ N/A

Limit calculation/determination

FCC conducted power limit calculation

Type	Freq (MHz)	Test mode	CH	Result (MHz)	Power calculation formula	Calculated value (dBm)	Limit in dBm (Lesser of 250mW or 11 + 10 log B)
26dB BW	5500	802.11a	Low	21.2224	11 + 10 log B	24.27	24
26dB BW	5580	802.11a	Mid	21.1022		24.24	24
26dB BW	5700	802.11a	High	21.3427		24.29	24
26dB BW	5500	802.11n-20	Low	22.2445		24.47	24
26dB BW	5580	802.11n-20	Mid	22.1242		24.45	24
26dB BW	5700	802.11n-20	High	22.6653		24.55	24
26dB BW	5510	802.11n-40	Low	44.7295		27.51	24
26dB BW	5550	802.11n-40	Mid	44.4890		27.48	24
26dB BW	5670	802.11n-40	High	45.5711		27.59	24

Note: B is 26dB bandwidth here for FCC limit.

IC conducted power limit calculation

Type	Freq (MHz)	Test mode	CH	Result (MHz)	Power calculation formula	Calculated Power Limit (dBm)	Limit in dBm (Lesser of 250mW or 11 + 10 log B)
99% OBW	5500	802.11a	Low	16.834	11 + 10 log B	23.26	23.26
99% OBW	5580	802.11a	Mid	16.774		23.25	23.25
99% OBW	5700	802.11a	High	16.774		23.25	23.25
99% OBW	5500	802.11n-20	Low	17.916		23.53	23.53
99% OBW	5580	802.11n-20	Mid	17.916		23.53	23.53
99% OBW	5700	802.11n-20	High	17.916		23.53	23.53
99% OBW	5510	802.11n-40	Low	36.473		26.62	24.00
99% OBW	5550	802.11n-40	Mid	36.473		26.62	24.00
99% OBW	5670	802.11n-40	High	36.473		26.62	24.00

Note: B is 99%dB bandwidth here for IC limit.

IC EIRP power limit calculation

Type	Freq (MHz)	Test mode	CH	Result (MHz)	Power calculation formula	Calculated Power Limit (dBm)	Limit in dBm (Lesser of 1W or 17 + 10 log B)
99% OBW	5500	802.11a	Low	16.834	17 + 10 log B	29.26	29.26
99% OBW	5580	802.11a	Mid	16.774		29.25	29.25
99% OBW	5700	802.11a	High	16.774		29.25	29.25
99% OBW	5500	802.11n-20	Low	17.916		29.53	29.53
99% OBW	5580	802.11n-20	Mid	17.916		29.53	29.53
99% OBW	5700	802.11n-20	High	17.916		29.53	29.53
99% OBW	5510	802.11n-40	Low	36.473		32.62	30.00
99% OBW	5550	802.11n-40	Mid	36.473		32.62	30.00
99% OBW	5670	802.11n-40	High	36.473		32.62	30.00

Note: B is 99%dB bandwidth here for IC limit.

Output Power measurement result

Test Result for FCC conducted power

Type	CH	Freq (MHz)	Test mode	Raw data (dBm)	Duty cycle factor	Cable loss (dB)	Output Power (dBm)	FCC Limit (dBm/MHz)	Result
Output power	Low	5500	802.11a	10.48	0.205	0.61	11.295	24.00	Pass
Output power	Mid	5580	802.11a	10.43	0.205	0.62	11.255	24.00	Pass
Output power	High	5700	802.11a	11.48	0.205	0.63	12.315	24.00	Pass
Output power	Low	5500	802.11n20	11.81	0.1034	0.61	12.523	24.00	Pass
Output power	Mid	5580	802.11n20	11.49	0.1034	0.62	12.213	24.00	Pass
Output power	High	5700	802.11n20	12.39	0.1034	0.63	13.123	24.00	Pass
Output power	Low	5510	802.11n40	9.00	0.4237	0.61	10.034	24.00	Pass
Output power	Mid	5550	802.11n40	9.46	0.4237	0.62	10.504	24.00	Pass
Output power	High	5670	802.11n40	9.79	0.4237	0.63	10.844	24.00	Pass

Test Result for IC conducted power

Type	CH	Freq (MHz)	Test mode	Raw data (dBm)	Duty cycle factor	Cable loss (dB)	Output Power (dBm)	IC Limit (dBm/MHz)	Result
Output power	Low	5500	802.11a	10.48	0.205	0.61	11.295	23.26	Pass
Output power	Mid	5580	802.11a	10.43	0.205	0.62	11.255	23.25	Pass
Output power	High	5700	802.11a	11.48	0.205	0.63	12.315	23.25	Pass
Output power	Low	5500	802.11n20	11.81	0.1034	0.61	12.523	23.53	Pass
Output power	Mid	5580	802.11n20	11.49	0.1034	0.62	12.213	23.53	Pass
Output power	High	5700	802.11n20	12.39	0.1034	0.63	13.123	23.53	Pass
Output power	Low	5510	802.11n40	9.00	0.4237	0.61	10.034	24.00	Pass
Output power	Mid	5550	802.11n40	9.46	0.4237	0.62	10.504	24.00	Pass
Output power	High	5670	802.11n40	9.79	0.4237	0.63	10.844	24.00	Pass

Test Result for IC E.I.R.P (with Embedded antenna – Ethertronics)

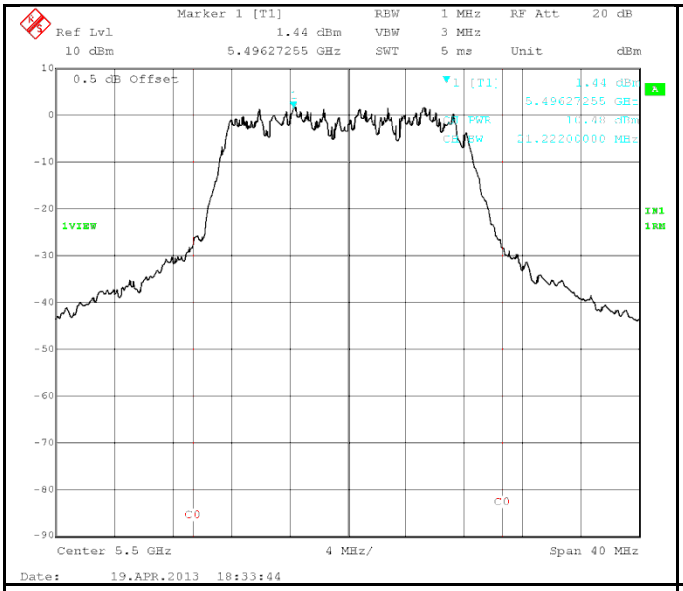
Type	CH	Freq (MHz)	Test mode	Output Power (dBm)	Antenna Gain	E.I.R.P (dBm)	IC Limit (dBm/MHz)	Result
E.I.R.P	Low	5500	802.11a	11.295	2.5	13.795	29.26	Pass
E.I.R.P	Mid	5580	802.11a	11.255	2.5	13.755	29.25	Pass
E.I.R.P	High	5700	802.11a	12.315	2.5	14.815	29.25	Pass
E.I.R.P	Low	5500	802.11n20	12.523	2.5	15.023	29.53	Pass
E.I.R.P	Mid	5580	802.11n20	12.213	2.5	14.713	29.53	Pass
E.I.R.P	High	5700	802.11n20	13.123	2.5	15.623	29.53	Pass
E.I.R.P	Low	5510	802.11n40	10.034	2.5	12.534	30.00	Pass
E.I.R.P	Mid	5550	802.11n40	10.504	2.5	13.004	30.00	Pass
E.I.R.P	High	5670	802.11n40	10.844	2.5	13.344	30.00	Pass

Test Result for IC E.I.R.P (with Sleeve antenna –Sansei)

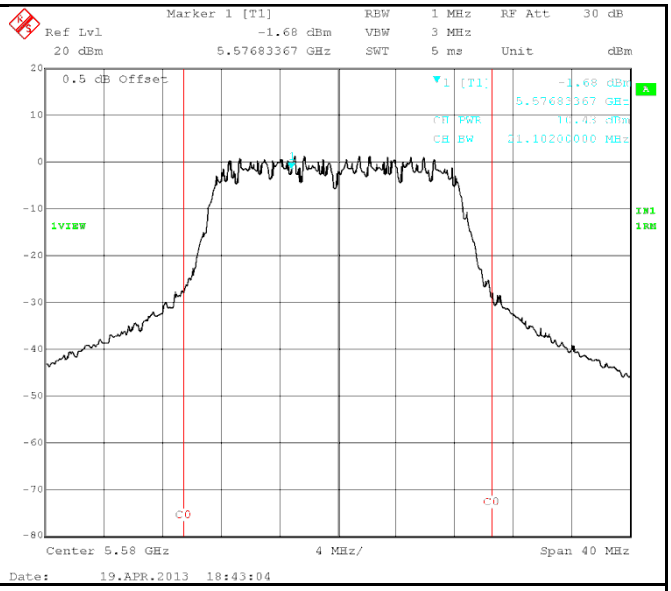
Type	CH	Freq (MHz)	Test mode	Output Power (dBm)	Antenna Gain	E.I.R.P (dBm)	IC Limit (dBm/MHz)	Result
E.I.R.P	Low	5500	802.11a	11.295	1.1	12.395	29.26	Pass
E.I.R.P	Mid	5580	802.11a	11.255	1.1	12.355	29.25	Pass
E.I.R.P	High	5700	802.11a	12.315	1.1	13.415	29.25	Pass
E.I.R.P	Low	5500	802.11n20	12.523	1.1	13.623	29.53	Pass
E.I.R.P	Mid	5580	802.11n20	12.213	1.1	13.313	29.53	Pass
E.I.R.P	High	5700	802.11n20	13.123	1.1	14.223	29.53	Pass
E.I.R.P	Low	5510	802.11n40	10.034	1.1	11.134	30.00	Pass
E.I.R.P	Mid	5550	802.11n40	10.504	1.1	11.604	30.00	Pass
E.I.R.P	High	5670	802.11n40	10.844	1.1	11.944	30.00	Pass

Test Plot ☒ Yes (See below) ☐ N/A

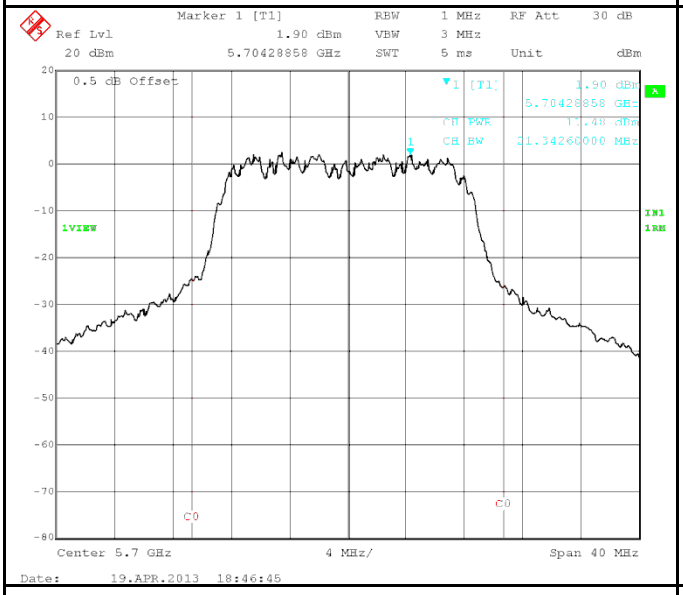
Peak Output Power Test Plots



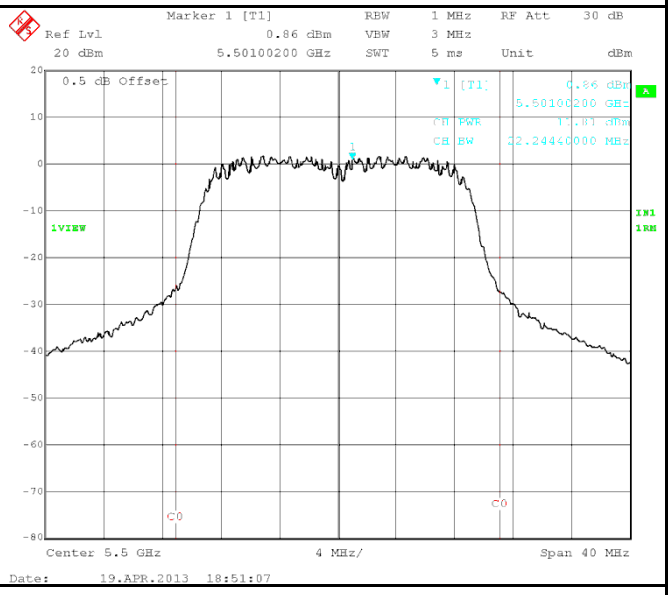
Output Power -802.11a-5500MHz-CN2 Port



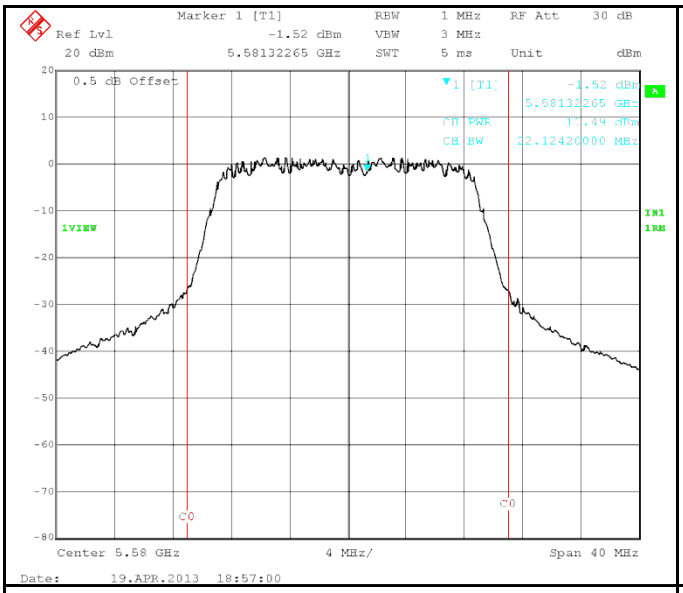
Output Power -802.11a-5580MHz-CN2 Port



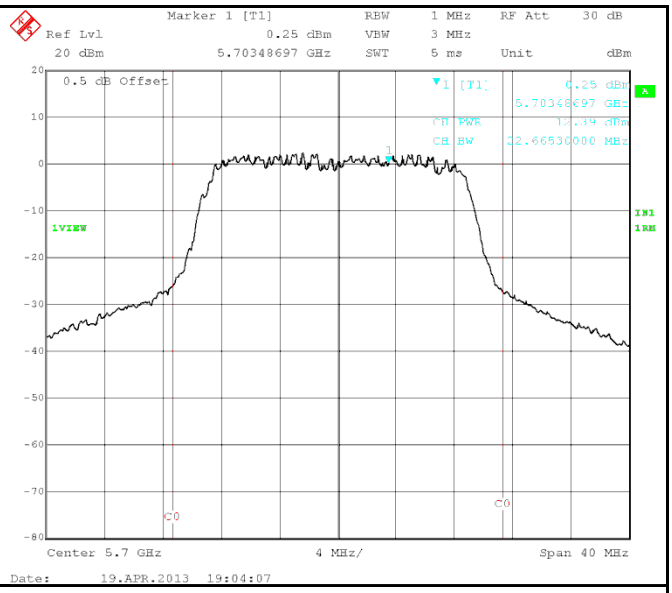
Output Power -802.11a-5700MHz-CN2 Port



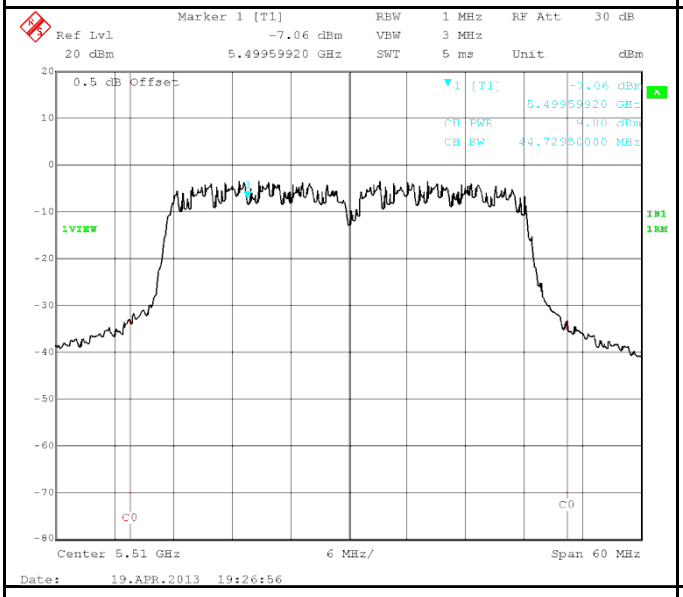
Output Power -802.11n-20MHz-5500MHz-CN2 Port



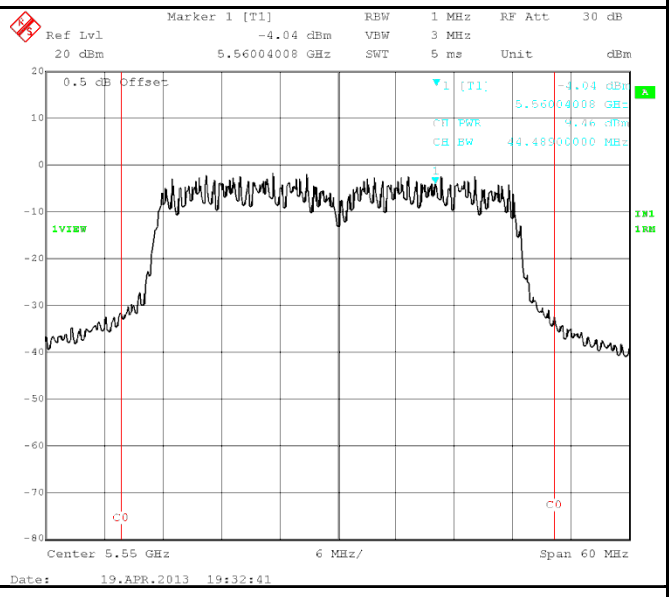
Output Power -802.11n-20MHz-5580MHz-CN2 Port



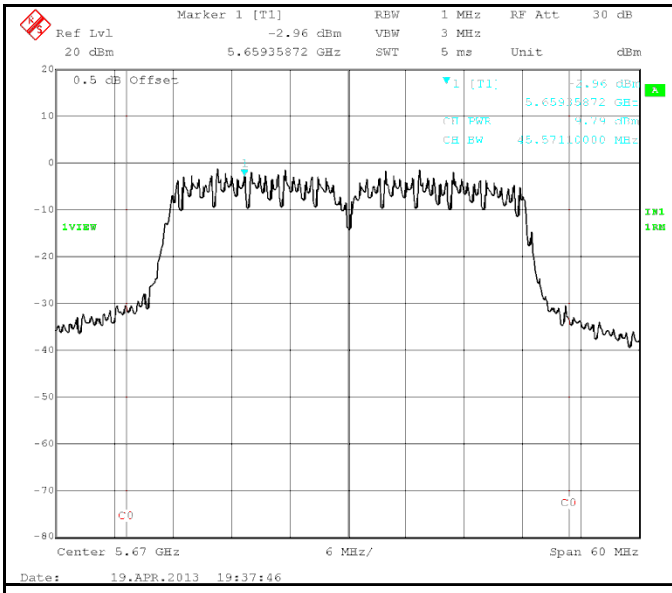
Output Power -802.11n-20MHz-5700MHz-CN2 Port



Output Power -802.11n-40MHz-5510MHz-CN2 Port



Output Power -802.11n-20MHz-5500MHz-CN2 Port



Output Power -802.11n-40MHz-5670MHz-CN2 Port

6.5 Peak Excursion Ratio

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407(a)(6)	a)	≤ 13 dB /MHz bandwidth or the emission bandwidth whichever is less.	☒

Test Setup			
Test Procedure	FCC UNII Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep)		
Test Date	04/24/2013	Environmental condition	Temperature 21oC Relative Humidity 46% Atmospheric Pressure 1019mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
PK Excursion Ratio	1MHz	≥3MHz	≥EBW or 99% OBW	PK	Auto	Maxhold	-
PSD	1MHz	≥3MHz	≥EBW or 99% OBW	RMS	Auto	Average on 100 traces	-

Test Data ☒ Yes ☐ N/A

Peak Excursion Ratio measurement result

Type	CH	Freq (MHz)	Test mode	Measured Peak Excursion	Limit (dB)	Result
PK Excursion Ratio	Low	5500	802.11a	7.27	13	Pass
PK Excursion Ratio	Mid	5580	802.11a	7.69	13	Pass
PK Excursion Ratio	High	5700	802.11a	7.42	13	Pass
PK Excursion Ratio	Low	5500	802.11n20	7.75	13	Pass
PK Excursion Ratio	Mid	5580	802.11n20	7.91	13	Pass
PK Excursion Ratio	High	5700	802.11n20	8.72	13	Pass
PK Excursion Ratio	Low	5510	802.11n40	7.22	13	Pass
PK Excursion Ratio	Mid	5550	802.11n40	7.03	13	Pass
PK Excursion Ratio	High	5670	802.11n40	7.35	13	Pass

Test Plot ☒ Yes (See below) ☐ N/A

Note: The test plots please refer to the maximum peak spectral density measurement plots.

6.6 Transmit Power Control

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(h)(1), RSS210 (A9.2)(3)	a)	U-NII devices operating in the 5.25-5.35 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm.	☐
	b)	U-NII devices operating in the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm.	☐
	c)	A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.	☒

Test Setup	N/A		
Test Procedure	N/A		
Test Date	N/A	Environmental condition	Temperature N/A Relative Humidity N/A Atmospheric Pressure N/A
Remark	EUT has e.i.r.p not greater than 500mW, so the TPC mechanism is not required. EUT meets requirement.		
Result	☒ Pass ☐ Fail		

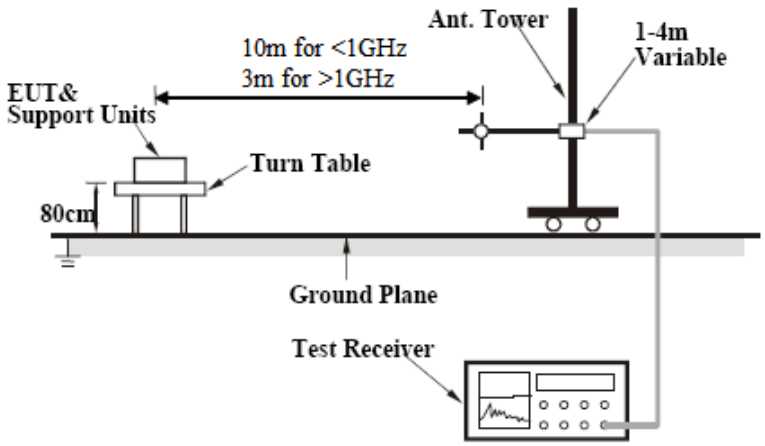
Equipment Setting: N/A

Test Data ☒ Yes ☒ N/A

6.7 Spurious Emission < 1GHz

Requirement(s):

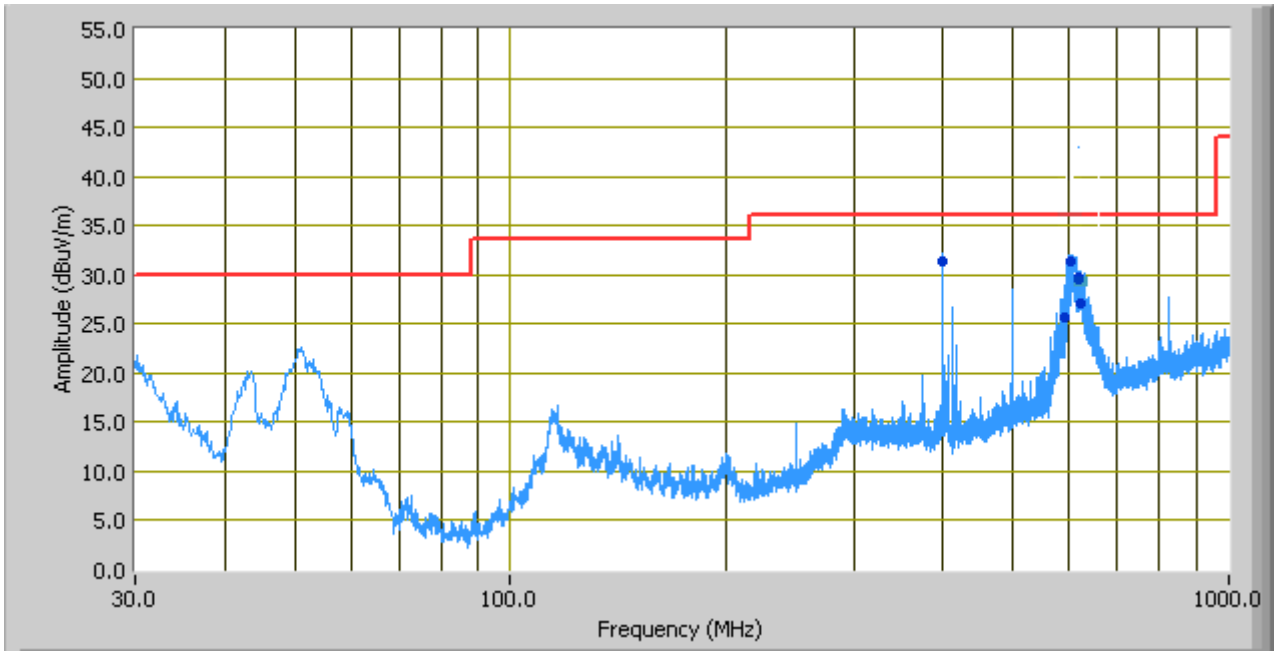
Spec	Item	Requirement	Applicable
§ 15.407(b)(2), 15.407(b)(6) , RSS210(A9.3)(1)	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional 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	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	04/26/2013	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	21oC 46% 1019mbar
Remark	NONE			
Result	☒ Pass ☐ Fail			

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Radiated Emission Plot with Embedded antenna: Ethertronics

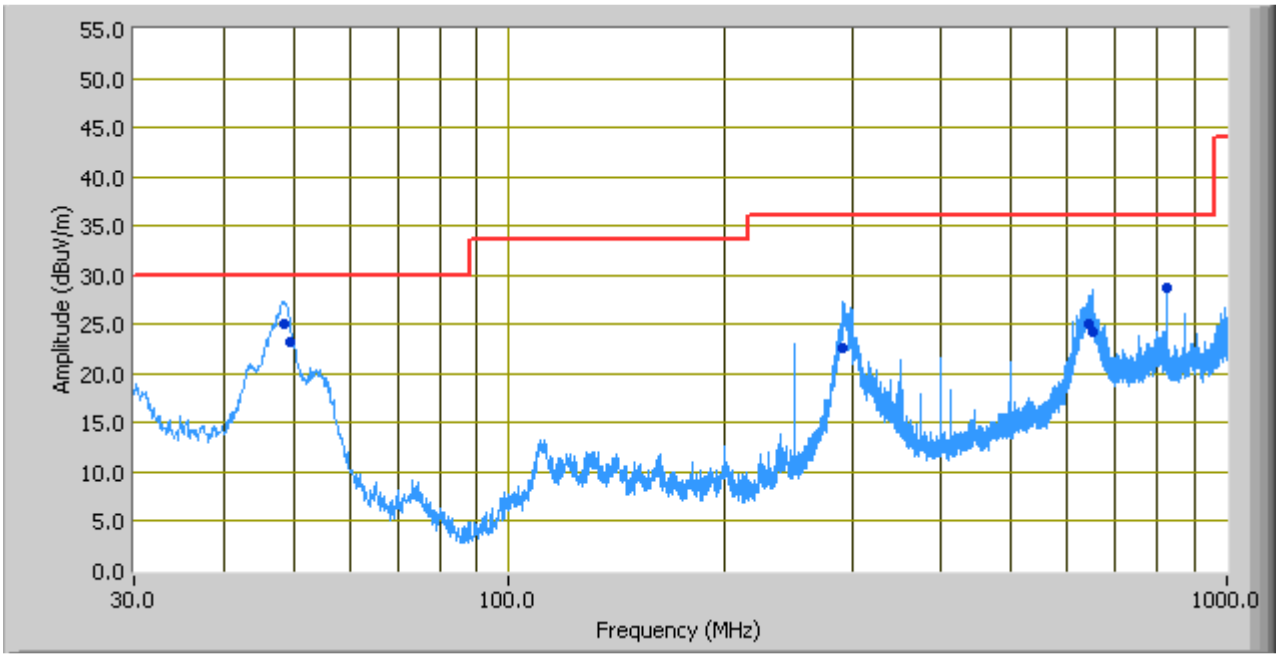


Limit

30MHz ~1000MHz Result @ 10m

Frequency (MHz)	Corrected Quasi-Peak (dBµV/m) @ 3m	Turntable position (deg)	Polarity	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)
617.12	29.95	246.00	V	180.00	36.00	-6.05
616.87	29.67	235.00	V	184.00	36.00	-6.33
601.00	31.31	250.00	V	137.00	36.00	-4.69
622.26	27.08	21.00	V	146.00	36.00	-8.92
399.98	31.30	45.00	H	274.00	36.00	-4.70
592.01	25.63	247.00	V	138.00	36.00	-10.37

Radiated Emission Plot with Sleeve antenna: Sansei



Limit

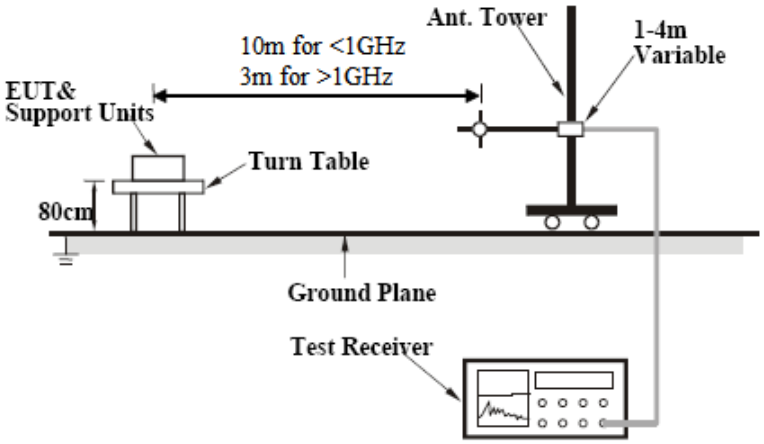
30MHz ~1000MHz Result @ 10m

Frequency (MHz)	Corrected Quasi-Peak (dBµV/m) @ 3m	Turntable position (deg)	Polarity	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)
48.38	25.13	193.00	V	112.00	30.00	-4.87
49.35	23.25	292.00	V	100.00	30.00	-6.75
822.80	28.63	345.00	V	156.00	36.00	-7.37
648.25	24.26	111.00	V	211.00	36.00	-11.74
640.54	24.99	111.00	V	243.00	36.00	-11.01
291.81	22.69	23.00	H	209.00	36.00	-13.31

6.8 Radiated Spurious Emissions > 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407(b)(2), 15.407(b)(6) , RSS210(A9.3)(1)	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	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	04/26/2013	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	21oC 46% 1019mbar
Remark	NONE			
Result	☐ Pass ☐ Fail			

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Radiated Spurious Emission Result with Embedded antenna: Ethertronics (>1GHz)

802.11a-5500MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11001.20	189.00	V	100.00	64.60	74.00	-9.40	49.36	54.00	-4.64
5470.00	135.00	V	112.00	55.00	74.00	-19.00	39.51	54.00	-14.49

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The vertical test result is worst case.

802.11a-5580MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11161.25	0.00	H	175.00	64.00	74.00	-10.00	47.62	54.00	-6.38

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The horizontal test result is worst case.

802.11a-5700MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11401.32	189.00	H	178.00	64.60	74.00	-9.40	46.83	54.00	-7.17
5725.00	156.00	H	125.00	56.50	74.00	-17.50	37.17	54.00	-16.83

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The horizontal test result is worst case.

802.11n-5500MHz-20MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11000.00	125.00	V	100.00	63.50	74.00	-10.50	48.26	54.00	-5.74
5470.00	183.00	V	10.00	54.50	74.00	-19.50	38.00	54.00	-16.00

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The vertical test result is worst case.

802.11n-5580MHz-20MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11160.00	0.00	H	162.00	62.50	74.00	-11.50	45.50	54.00	-8.50

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The horizontal test result is worst case.

802.11n-5700MHz-20MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11400.00	162.00	H	150.00	63.82	74.00	-10.18	44.87	54.00	-9.13
5725.00	156.00	H	104.00	54.92	74.00	-19.08	35.82	54.00	-18.18

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The horizontal test result is worst case

802.11n-5510MHz-40MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11021.22	35.00	V	139.00	63.70	74.00	-10.30	47.94	54.00	-6.06
5470.00	291.00	V	123.00	59.60	74.00	-14.40	38.36	54.00	-15.64

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The vertical test result is worst case.

802.11n-5560MHz-40MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11021.22	115.00	V	118.00	61.50	74.00	-12.50	45.64	54.00	-8.36

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The vertical test result is worst case.

802.11n-5670MHz-40MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11341.30	348.00	V	170.00	64.00	74.00	-10.00	47.11	54.00	-6.89
5725.00	197.00	V	101.00	62.50	74.00	-11.50	38.28	54.00	-15.72

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The vertical test result is worst case.

Radiated Spurious Emission Result with Sleeve antenna: Sansei (>1GHz)

802.11a-5500MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11000.32	33.00	V	155.00	64.00	74.00	-10.00	48.00	54.00	-6.00
5471.20	238.00	H	117.00	55.00	74.00	-19.00	41.17	54.00	-12.83

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. Only the worst case result was presented here.

802.11a-5580MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11160.90	262.00	V	137.00	64.20	74.00	-9.80	47.79	54.00	-6.21

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The vertical test result is worst case.

802.11a-5700MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11400.50	0.00	V	175.00	64.20	74.00	-9.80	47.17	54.00	-6.83
5725.00	221.00	H	137.00	57.50	74.00	-16.50	35.17	54.00	-18.83

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. Only the worst case result was presented here.

802.11n-5500MHz-20MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11000..00	0.00	V	112.00	62.87	74.00	-11.13	46.82	54.00	-7.18
5470.00	11.00	H	100.00	53.94	74.00	-20.06	40.92	54.00	-13.08

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. Only the worst case result was presented here.

802.11n-5580MHz-20MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11160.00	164.00	V	112.00	63.87	74.00	-10.13	47.92	54.00	-6.08

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The vertical test result is worst case.

802.11n-5700MHz-20MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11400.00	0.00	V	122.00	62.83	74.00	-11.17	45.98	54.00	-8.02
5725.00	0.00	H	114.00	56.44	74.00	-17.56	34.87	54.00	-19.13

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. Only the worst case result was presented here.

802.11n-5510MHz-40MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11019.21	0.00	H	101.00	64.10	74.00	-9.90	47.50	54.00	-6.50
5470.00	213.00	H	100.00	64.70	74.00	-9.30	46.83	54.00	-7.17

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The horizontal test result is worst case.

802.11n-5560MHz-40MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
11099.21	41.00	V	134.00	64.00	74.00	-10.00	47.83	54.00	-6.17

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. The vertical test result is worst case.

802.11n-5670MHz-40MHz @ 3 Meters

Frequency (MHz)	Azimute	Polarity	Height (cm)	Peak (dBuV/m)	Peak Limit (dBuV)	Margin (dB)	AV (dBuV/m)	AV Limit (dBuV)	Margin (dB)
10220.51	204.00	V	178.00	63.60	74.00	-10.40	47.83	54.00	-6.17
5725.00	209.00	H	180.00	46.88	74.00	-27.12	36.50	54.00	-17.50

Note: Emission was scanned up to 40GHz; no emissions were detected above the noise floor which was at least 20dB below the specification limit; both horizontal and vertical polarization had been verified. Only the worst case result was presented here.

Annex A. TEST INSTRUMENT & METHOD

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Model	Serial #	Calibration Date	Calibration Due	Calibrate Cycle
CONDUCTED EMISSIONS					
R & S Receiver	ESIB 40	100179	4/20/2013	4/20/2014	1year
R&S LISN	ESH2-Z5	861741/013	05/18/2012	05/18/2013	1year
CHASE LISN	MN2050B	1018	05/18/2012	05/18/2013	1year
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2012	05/25/2013	1year
Radiated Emissions					
R & S Receiver	ESIB 40	100179	4/20/2013	4/20/2014	1year
Sunol Sciences, Inc. antenna (30MHz~2GHz)	JB1	A030702	2/9/2013	2/9/2014	1year
10m Semi-Anechoic Chamber	10M	10SL0164	6/5/2012	6/5/2013	1 year
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2012	05/25/2013	1year
Spectrum Analyzer	8564E	3738A00962	05/19/2012	05/19/2013	1year
Antenna(1 ~18GHz)	3115	10SL0059	4/26/2012	4/26/2013	1year
Pre-Amplifier(1 ~ 26GHz)	8449	3008A00715	5/17/2012	5/17/2013	1year
Horn Antenna (18~40GHz)	AH-840	101013	4/23/2013	4/23/2014	1year
Microwave Preamplifier; 18-40 GHz	PA-840	181251	N/A	N/A	Every 2000hours
Signal Analyzer	FSIQ7	825555/013	5/10/2012	5/10/2013	1year

Note: Functional Verification

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 Regocnition		**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