RF TEST REPORT

SIEMIC
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Report No.: RF_SL14061701-STE-001_DF990_Rev1.0
Supersede Report No.: RF_SL14061701-STE-001_DF990

Applicant	ST Electronics (Satcom & Sensor Systems) Pte Ltd
Product Name	K-Band Bi-Static FMCW Transceiver Module
Model No.	DF990
Test Standard	47 CFR 15.245: 2013
Test Method	ANSI C63.4: 2009
FCC ID	VEC-DF990
Date of test	07/07/2014 - 07/17/2014
Issue Date	07/25/2014
Test Result	Pass Fail
Equipment complied with the specification	[x]
Equipment did not comply with the specification	[ ]

Angel Escamilla	Nima Molaei
Test Engineer	Engineer Reviewer

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

Issued By:
SIEMIC Laboratories
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ilac-MRA
A2LA ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

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

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

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	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
Hong Kong	OFTA (US002)	RF, Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
RF_SL14061701-STE-001_DF990	-	Original	07/18/2014
RF_SL14061701-STE-001_DF990_Rev1.0	Rev1.0	- The correct operating frequency is added on page 6. - The data is corrected on page 18 based on correct input voltage.	07/25/2014

2 Executive Summary

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

Company: ST Electronics (Satcom & Sensor Systems) Pte Ltd
Product: K-Band Bi-Static FMCW Transceiver Module
Model: DF990

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	ST Electronics (Satcom & Sensor Systems) Pte Ltd
Applicant Address	1 Ang Mo Kio Electronics Park Road #06-02, Singapore 567710
Manufacturer Name	ST Electronics (Satcom & Sensor Systems) Pte Ltd
Manufacturer Address	1 Ang Mo Kio Electronics Park Road #06-02, Singapore 567710

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	K-band Bi-Static FMCW Transceiver Module
Model No.	DF990
Trade Name	ST Electronics (Satcom & Sensor Systems) Pte Ltd
Serial No.	51310280008
Input Power	5VDC
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Date of EUT received	07/04/2014
Equipment Class/ Category	Radio
Operating Frequency	24.107 GHz – 24.169 GHz
Port/Connectors	N/A

6.2 Radio Description

Spec for Radio -

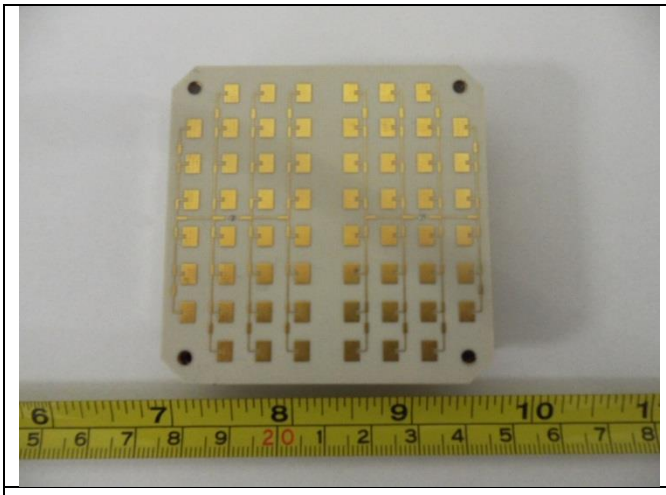
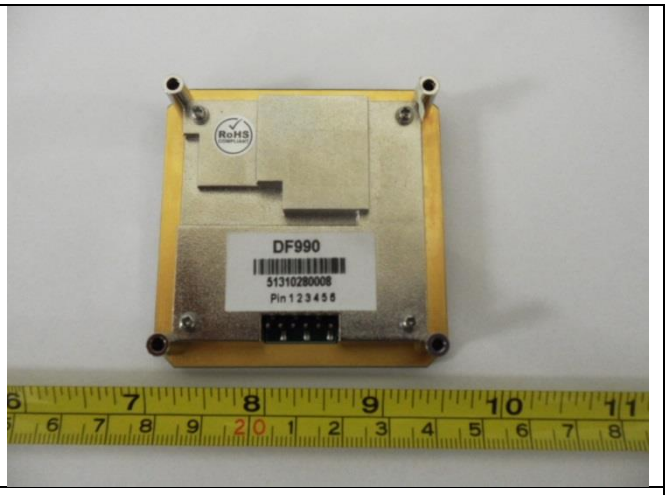
Radio Type	
Operating Frequency	24.107 GHz – 24.169 GHz
Modulation	No Modulation
Channel Spacing	N/A
Number of Channels	1
Antenna Type	Patch array
Antenna Connector Type	N/A

6.3 EUT test modes/configuration Description

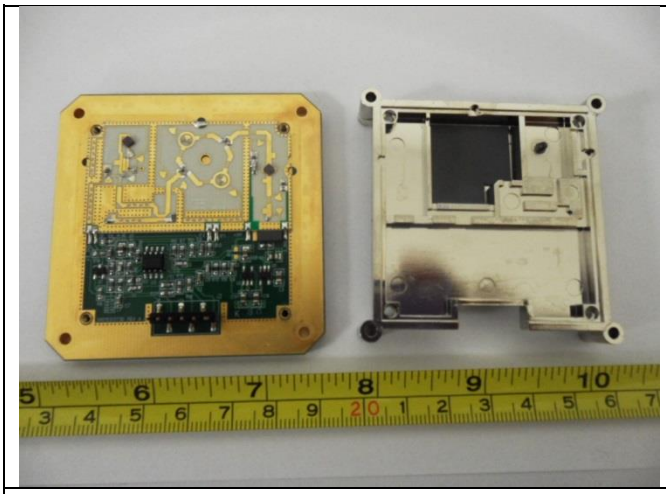
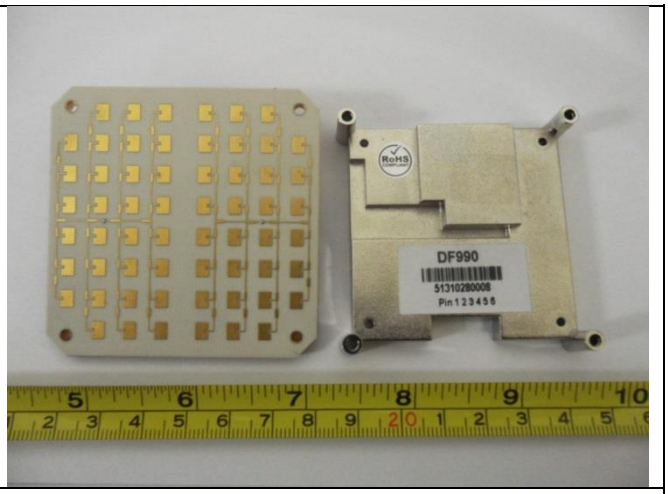
Test mode

Test Mode		Note
Pre_test_mode_1	Continuous Transmit	-
Pre_test_mode_2	-	-
Pre_test_mode_3	-	-
Remark:		

6.4 EUT Photos - External

	
EUT – Top View	**EUT – Bottom View**

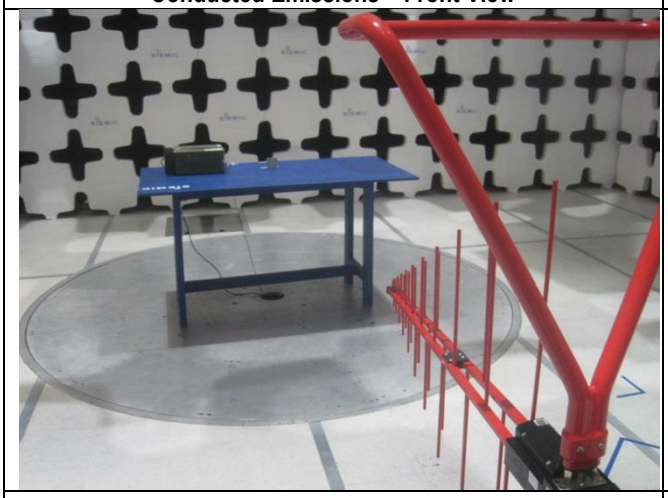
6.5 EUT Photos - Internal

	
EUT – Top Cover off View 1	**EUT – Top Cover off View 2**

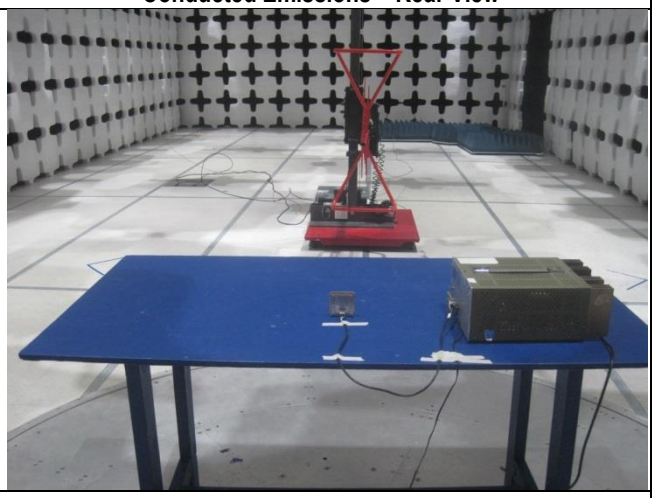
6.6 EUT Test Setup Photos

Conducted Emissions – Front View

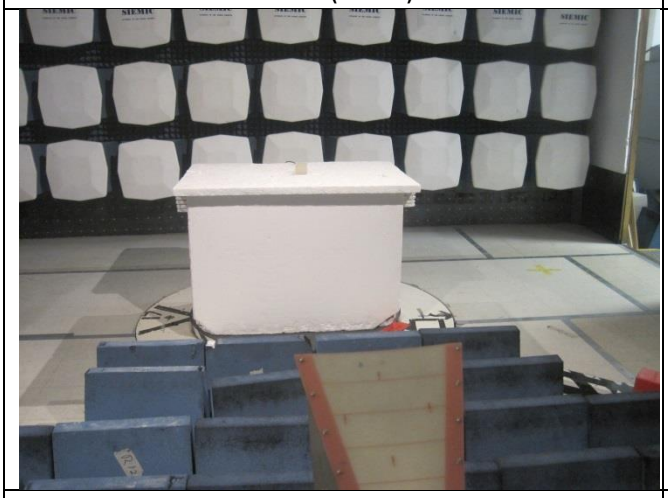
Conducted Emissions – Rear View



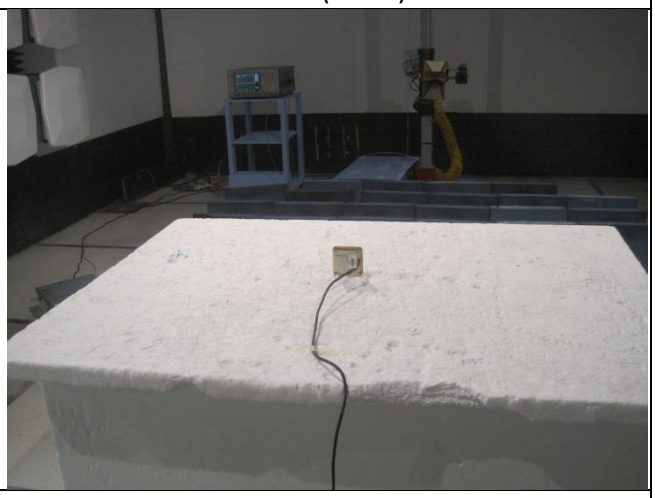
Radiated Emissions (<1GHz) – Front View



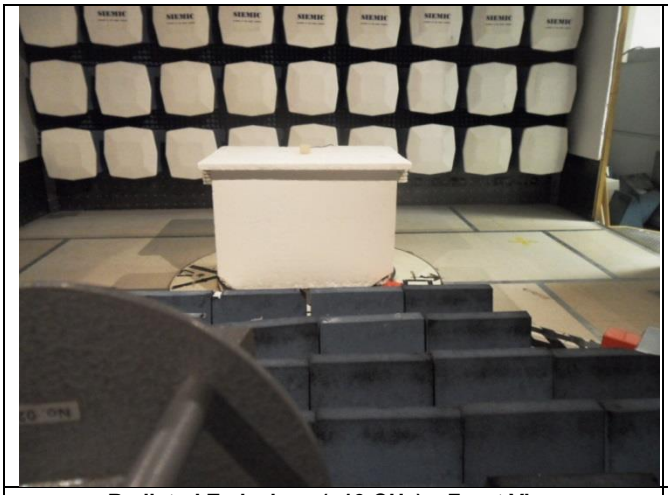
Radiated Emissions (<1GHz) – Rear View



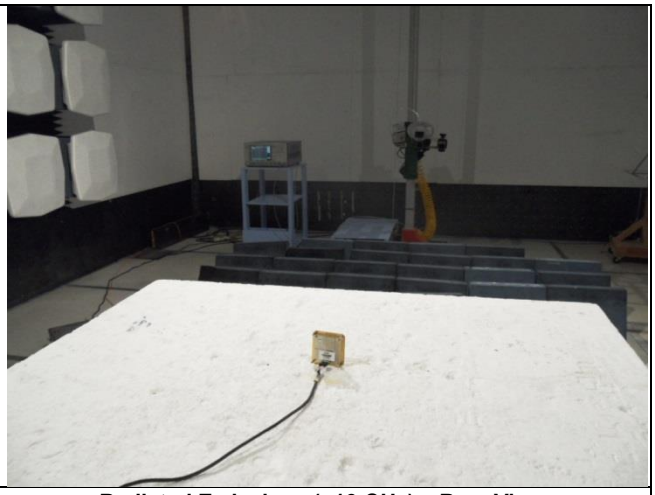
Radiated Emissions (1-18GHz) – Front View



Radiated Emissions (1-18GHz) – Rear View



Radiated Emissions (>18 GHz) – Front View



Radiated Emissions (>18 GHz) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	DC Power Supply	TPS-2000	920027	Topward Electric Instruments	

7.2 Test Software Description

Test Item	Software	Description
RF Testing	N/A	N/A

8 Test Summary

Test Item	Test standard	Test Method/Procedure	Pass / Fail
Antenna Requirement	FCC 15.203	-	☒ Pass ☐ N/A
AC Line Conducted Emissions	FCC 15.207 (a)	ANSI C63.4: 2009	☒ Pass ☐ N/A
Restricted Band of Operation	FCC 15.205 (a)	ANSI C63.4: 2009	☒ Pass ☐ N/A
Fundamental Field Strength	FCC 15.245 (b)	ANSI C63.4: 2009	☒ Pass ☐ N/A
Outside Band Emissions	FCC 15.245 (b)(3)	ANSI C63.4: 2009	☒ Pass ☐ N/A
Remark	1. All measurement uncertainties are not taken into consideration for all presented test results. 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.		

9 Measurement Uncertainty

Emissions			
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	1GHz – 50GHz	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

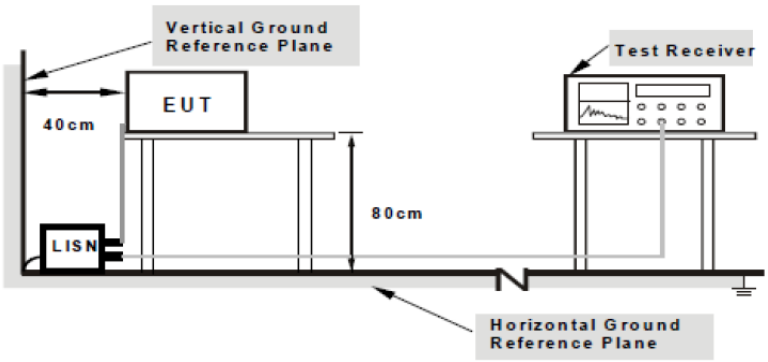
10.1 Antenna Requirement

Spec	Item	Requirement	Applicable
47CFR§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 Antenna permanently attached to the device which meets the requirement		
Result	☒ PASS ☐ FAIL		

10.2 Conducted Emissions

Conducted Emissions Limit

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

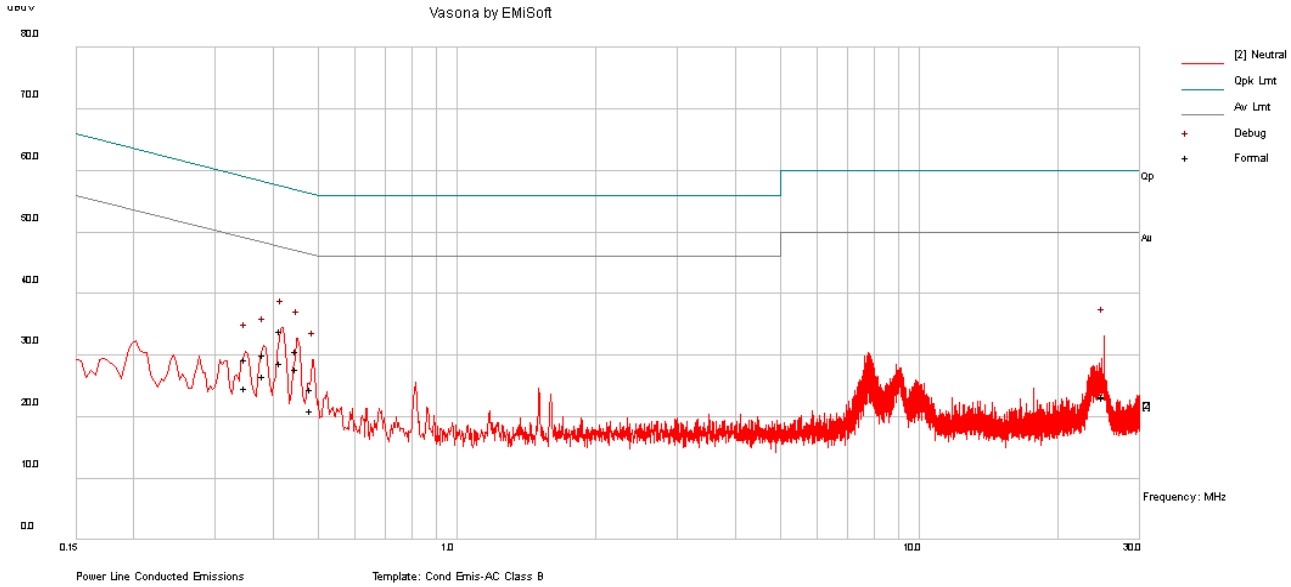
Spec	Item	Requirement	Applicable
47CFR§15.207	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	☒
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 equipment was powered separately from another main supply.		
Remark	-		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

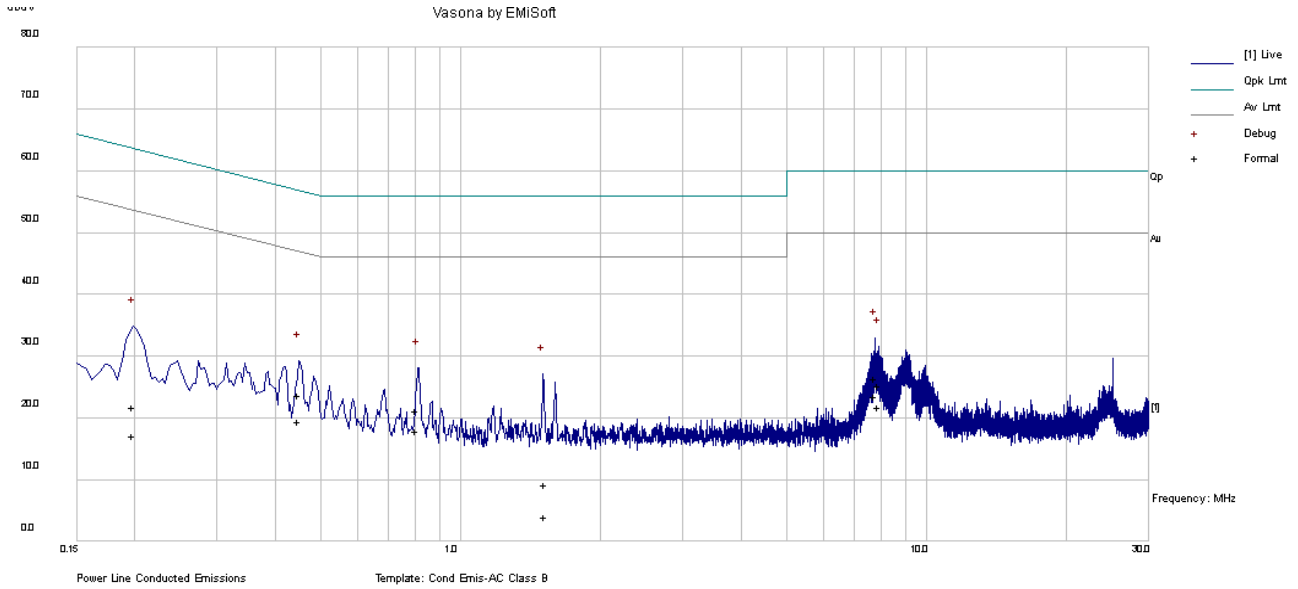
10.2.1 Conducted Emission Test Results (AC Line Test Result)

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	23°C	Result:	☒ Pass ☐ Fail
	Humidity (%):	42%		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Angel Escamilla			
Test Date:	07/14/2014			
Remarks:	Neutral Line			



Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail
0.35	18.63	10.01	0.72	29.35	Quasi Peak	Neutral	59.01	-29.66	Pass
0.38	19.38	10.01	0.72	30.12	Quasi Peak	Neutral	58.24	-28.12	Pass
0.42	23.16	10.01	0.73	33.90	Quasi Peak	Neutral	57.52	-23.62	Pass
0.45	19.96	10.01	0.73	30.70	Quasi Peak	Neutral	56.87	-26.17	Pass
0.49	13.77	10.01	0.74	24.51	Quasi Peak	Neutral	56.25	-31.74	Pass
25.06	10.96	10.08	2.27	23.30	Quasi Peak	Neutral	60.00	-36.70	Pass
0.35	13.97	10.01	0.72	24.69	Average	Neutral	49.01	-24.32	Pass
0.38	15.99	10.01	0.72	26.72	Average	Neutral	48.24	-21.51	Pass
0.42	17.95	10.01	0.73	28.69	Average	Neutral	47.52	-18.83	Pass
0.45	17.05	10.01	0.73	27.79	Average	Neutral	46.87	-19.08	Pass
0.49	10.19	10.01	0.74	20.93	Average	Neutral	46.25	-25.31	Pass
25.06	10.73	10.08	2.27	23.08	Average	Neutral	50.00	-26.92	Pass

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	23ºC	Result:	☒ Pass ☐ Fail
	Humidity (%):	42%		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Angel Escamilla			
Test Date:	07/14/2014			
Remarks:	Phase Line			



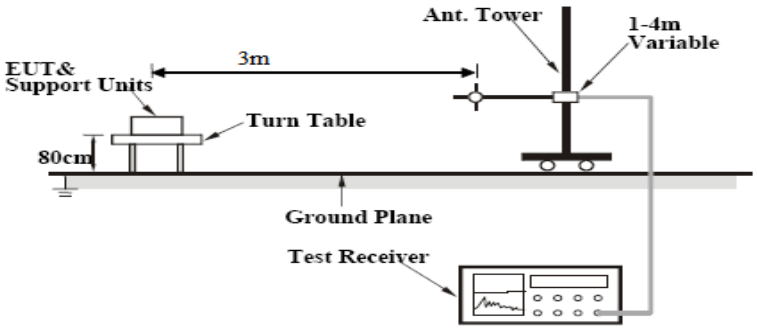
Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail
0.20	10.96	10.00	0.74	21.71	Quasi Peak	Live	63.65	-41.94	Pass
0.45	12.98	10.01	0.73	23.71	Quasi Peak	Live	56.85	-33.14	Pass
0.81	10.52	10.01	0.76	21.30	Quasi Peak	Live	56.00	-34.70	Pass
1.50	14.18	10.02	0.87	25.08	Quasi Peak	Live	56.00	-30.92	Pass
7.76	15.23	10.04	1.23	26.50	Quasi Peak	Live	60.00	-33.50	Pass
7.90	14.07	10.04	1.24	25.36	Quasi Peak	Live	60.00	-34.64	Pass
0.20	6.39	10.00	0.74	17.14	Average	Live	53.65	-36.51	Pass
0.45	8.83	10.01	0.73	19.57	Average	Live	46.85	-27.29	Pass
0.81	7.20	10.01	0.76	17.98	Average	Live	46.00	-28.02	Pass
1.50	10.08	10.02	0.87	20.97	Average	Live	46.00	-25.03	Pass
7.76	12.24	10.04	1.23	23.51	Average	Live	50.00	-26.49	Pass
7.90	10.46	10.04	1.24	21.75	Average	Live	50.00	-28.25	Pass

10.3 Radiated Fundamental and Harmonics Field Strength

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.245(b)	a)	The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:	☒

Fundamental frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
02-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

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. Peak maximization and average measurements were then made for that frequency point with the following Receiver/Spectrum analyser setting: - Peak: RBW = 1MHz, VBW = 3MHz, Detector = Peak - Average: RBW = 1MHz, VBW = 10Hz, Detector = Peak 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	Note1: All 3 axes have been investigated. Only the worst case is presented in the test report. Note2: The peak reading of EUT emissions were verified by using a spectrum analyser.
Result	☒ Pass ☐ Fail

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Radiated Fundamental Field Strength Measurements @ 3 Meter

Freq (MHz)	Corrected Measurement @ 3m (dBuV/m)	Polarity (H/V)	Hgt (cm)	Azt (Deg)	Limit @ 3m (dBuV/m)	Margin (dB)	Detector (pk/avg)
24107.61	114.02	V	100	0	148	-33.98	Peak
24107.61	113.88	V	100	0	128	-14.12	Average
24140.36	113.49	V	100	0	148	-34.51	Peak
24140.36	113.31	V	100	0	128	-14.69	Average
24169.08	114.18	V	100	0	148	-33.82	Peak
24169.08	114.31	V	100	0	128	-13.69	Average
Remark	1. Both horizontal and vertical polarization had been verified and vertical polarity is worst case. 2. Measurement was made at 0.5m distance and data was converted to 3m data. 3. Correction distance factor formula = 20 * log (3 meter / 0.5 meter) = 15.56 dB						

Harmonic Spurious Emissions (40GHz-100GHz) Measurements @ 3 Meter

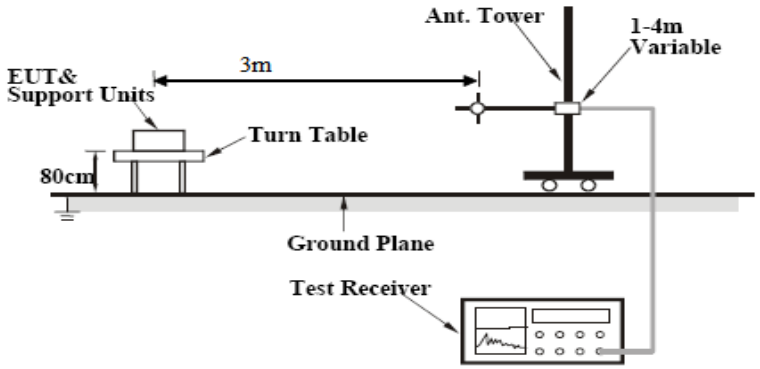
Freq (MHz)	Level (dBuV/m)	Detector (pk/avg)	Polarity (H/V)	Hgt (cm)	Azt (Deg)	Limit @ 3m (dBuV/m)	Margin (dB)	Pass /Fail
48206.84	54.54	Peak	V	100.00	0	108	-53.46	Pass
48206.84	47.04	Average	V	100.00	0	88	-40.96	Pass
48281.45	55.21	Peak	V	100.00	0	108	-52.79	Pass
48281.45	49.71	Average	V	100.00	0	88	-38.29	Pass
48238.14	57.28	Peak	V	100.00	0	108	-50.72	Pass
48238.14	52.71	Average	V	100.00	0	88	-35.29	Pass
Remark	1. Emission was scanned up to 100GHz; 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. 2. Measurement was made at 0.5m distance and data was converted to 3m data. 3. Correction distance factor formula = 20 * log (3 meter / 0.5 meter) = 15.56 dB							

10.4 Radiated Emissions below 1GHz

Requirement(s):

Spec	Requirement	Applicable
47CFR§15.245(b)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges	☒

Frequency range (MHz)	Field Strength (uV/m)
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

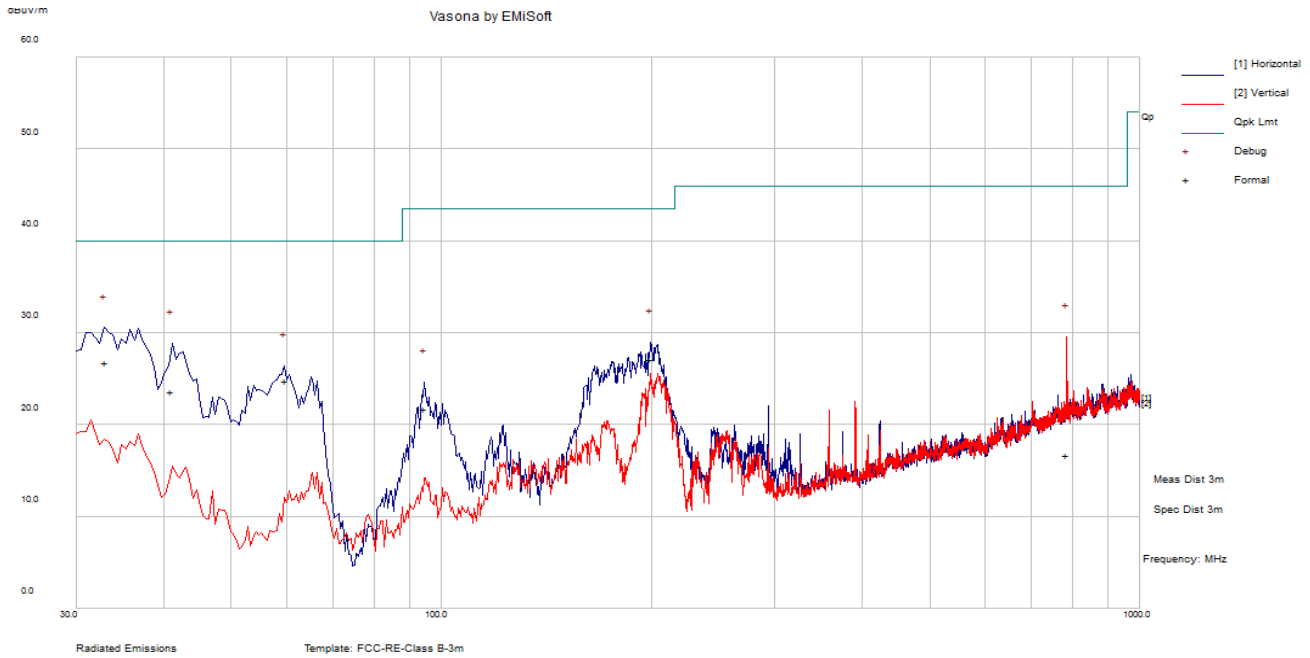
Test Setup	
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, 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.
Remark	Note1: All 3 axes have been investigated. Only the worst case is presented in the test report. Note2: The peak reading of EUT emissions were verified by using a spectrum analyser.
Result	☒ Pass ☐ Fail

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Radiated Emission Test Results (Below 1GHz)

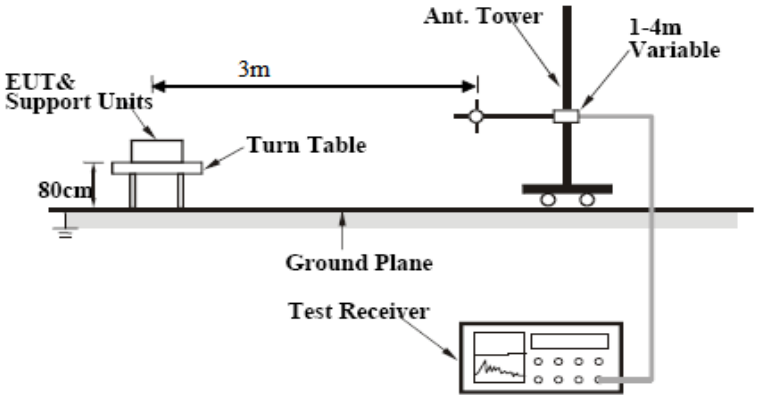
Test specification:	Radiated Emissions			
Environmental Conditions:	Temp(°C):	22ºC	Result:	☒ Pass ☐ Fail
	Humidity (%):	44%		
	Atmospheric(mbar):	1020		
Mains Power:	5VDC			
Tested by:	Angel Escamilla			
Test Date:	07/07/2014			
Remarks:	30 – 1000 MHz			



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
33.14	44.34	1.16	-18.75	26.76	Quasi Max	H	131.00	57.00	40.00	-13.24	Pass
41.06	47.46	1.16	-24.96	23.66	Quasi Max	H	102.00	43.00	40.00	-16.34	Pass
59.80	55.24	1.29	-31.77	24.76	Quasi Max	H	125.00	281.00	40.00	-15.24	Pass
94.75	51.16	1.75	-31.20	21.71	Quasi Max	H	126.00	206.00	43.50	-21.79	Pass
199.33	52.60	2.50	-28.00	27.10	Quasi Max	H	126.00	242.00	43.50	-16.40	Pass
785.86	31.16	4.79	-19.21	16.74	Quasi Max	V	391.00	21.00	46.00	-29.26	Pass

10.5 Radiated Spurious Emissions above 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.245(b)	a)	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental.	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. Peak maximization and average measurements were then made for that frequency point with the following Receiver/Spectrum analyser setting: - Peak: RBW = 1MHz, VBW = 3MHz, Detector = Peak - Average: RBW = 1MHz, VBW = 10Hz, Detector = Peak 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	Note1: All 3 axes have been investigated. Only the worst case is presented in the test report. Note2: The peak reading of EUT emissions were verified by using a spectrum analyser.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Radiated Spurious Emissions Test Results Above 1GHz

Test specification:	Radiated Emissions			
Environmental Conditions:	Temp(°C):	21ºC	Result:	☒ Pass ☐ Fail
	Humidity (%):	44%		
	Atmospheric(mbar):	1020		
Mains Power:	5VDC			
Tested by:	Angel Escamilla			
Test Date:	07/14/2014			
Remarks:	-			

Spurious Emissions (1GHz-18GHz) Measurements @ 3 Meter

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (H/V)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
4020.04	41.49	9.34	1.57	52.40	Peak	V	304.00	109.00	74.00	-21.60	Pass
15269.34	41.22	5.50	9.58	56.30	Peak	V	199.00	3.00	74.00	-17.70	Pass
4020.04	28.29	9.34	1.57	39.19	Average	V	224.00	276.00	54.00	-14.81	Pass
15269.34	25.57	5.50	9.58	40.65	Average	V	199.00	3.00	54.00	-13.35	Pass
Remark	Emission was scanned up to 18GHz; 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.										

Spurious Emissions (above 18GHz) Measurements @ 3 Meter

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (H/V)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
27398.51	29.47	7.99	6.44	43.90	Peak	V	194.00	29.00	74.00	-30.10	Pass
32225.01	32.23	9.45	8.70	50.38	Peak	V	102.00	332.00	74.00	-23.62	Pass
27398.51	22.10	7.99	6.44	36.53	Average	V	194.00	29.00	54.00	-17.47	Pass
32225.01	16.53	9.45	8.70	34.68	Average	V	102.00	332.00	54.00	-19.32	Pass
Remark	1. Emission was scanned up to 100GHz; 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.										

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☑
R&S LISN	ESH2-Z5	861741/013	05/18/2014	1 Year	05/18/2015	☑
CHASE LISN	MN2050B	1018	07/24/2013	1 Year	07/24/2014	☑
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☑
Radiated Emissions						
R & S Receiver	ESL6	100178	03/01/2014	1 Year	03/01/2015	☑
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☑
ETS-Lingren Loop Antenna	6512	00049120	05/13/2014	1 Year	05/13/2015	☐
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	02/09/2014	1 Year	02/09/2015	☑
Horn Antenna (1-26.5GHz)	3115	10SL0059	04/26/2014	1 Year	04/26/2015	☑
Horn Antenna (18-40 GHz)	AH-840	101013	04/23/2014	1 Year	04/23/2015	☑
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	05/30/2014	1 Year	05/30/2015	☑
Microwave Preamplifier (18-40 GHz)	PA-840	181251	05/30/2014	1 Year	05/30/2015	☑
Harmonic Mixer	11970 Q	3003A01197	06/13/2014	1 Year	06/13/2015	☑
Horn Antenna	261B	10SL0185	04/26/2014	1 Year	04/26/2015	☑
3 Meters SAC	3M	N/A	10/13/2013	1 Year	10/13/2014	☑
10 Meters SAC	10M	N/A	06/05/2014	1 Year	06/05/2015	☑
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☑
RF Conducted Measurement						
Spectrum Analyzer	N9010A	MY50210206	05/30/2014	1 Year	05/30/2015	☐
Spectrum Analyzer	E4407B	US88441016	05/31/2014	1 Year	05/31/2015	☐
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☐

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
Hong Kong OFCA		**(Phase II)** OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		**Radio:** Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

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