

RF TEST REPORT



Report No.: RF_SL14062001-SOL-002

Supersede Report No.: None

Applicant	Solectek Corporation
Product Name	Broadband Point to Point and Multipoint Radio Units
Model No.	XL100t and AS59
Test Standard	47 CFR Part 90 Subpart M
Test Procedure	47 CFR Part 90 Subpart M ASTM E2213-03 8.9.2
FCC ID	KA359WAN1
Date of test	09/09/2014 - 09/17/2014
Issue Date	09/22/2013
Test Result	<u>Pass</u> 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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Issued By:
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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/RRR, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	COM, 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_SL14062001-SOL-002	-	Original	09/22/2014

2 Executive Summary

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

Company: Solectek Corporation
Product: Broadband Point to Point and Multipoint Radio Units
Model: XL100t and AS59

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	Solectek Corporation
Applicant Address	8969 Kenamar Drive, Suite 113, San Diego, CA 92121
Manufacturer Name	Solectek Corporation
Manufacturer Address	8969 Kenamar Drive, Suite 113, San Diego, CA 92121

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	Broadband Point to Point and Multipoint Radio Units
Model No.	XL100t and AS59
Trade Name	Solectek
Serial No.	1142900007
Input Power via PoE	24VDC
Power Adapter Manu/Model	Solectek/1581401
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Date of EUT received	08/04/2014
Equipment Class/ Category	TNB
Highest Clock Frequency	266MHz
Port/Connectors	RJ45, N-Type

6.2 Radio Description

Spec for Radio -

Radio Type	
Operating Frequency	5860MHz – 5920MHz
Modulation	BPSK, QPSK, 16-QAM, 64-QAM
Channel Spacing	10MHz and 20MHz
Number of Channels	7 (10MHz), 2 (20MHz)
Antenna Gain	16dBi: Dual-pol antenna 20dBi: Dual-pol antenna 23dBi: Dual-pol antenna
Antenna Type	16dBi: External antenna 20dBi: Integrated antenna 23dBi: Integrated antenna
Antenna Connector Type	N-type, U.FL
Note:	The antenna with 23dBi gain will be used only in channels 172, 174, 176, 178 and 184.

6.3 EUT test modes/configuration Description

Test Mode	Note
Test_mode_1	Continuous Transmit
Test_mode_2	-
Remark:	

6.4 EUT Photos - External



EUT – Front View



EUT – Rear View



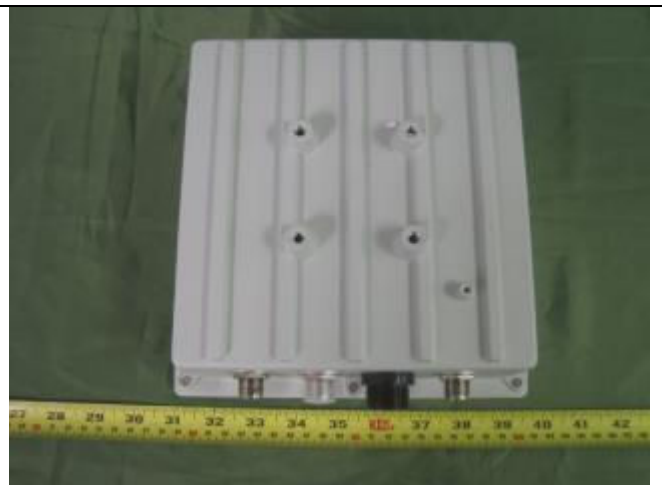
EUT – Left View



EUT – Right View



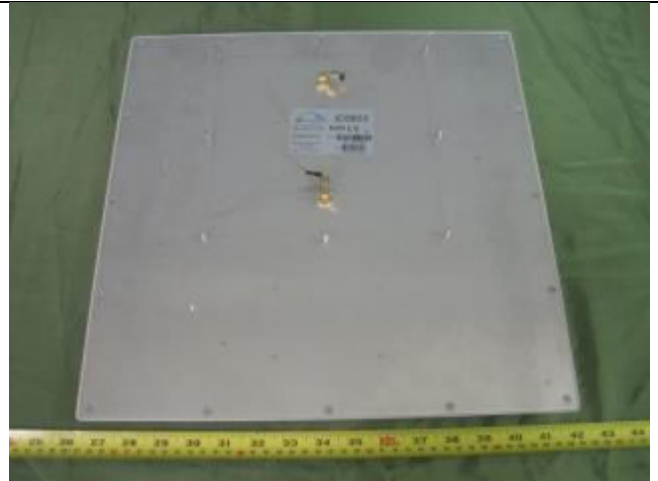
EUT – Top View



EUT – Bottom View



23dBi Antenna – Top View



23dBi Antenna – Bottom View



20dBi Antenna – Top View



20dBi Antenna – Bottom View



16dBi Antenna – Top View



16dBi Antenna – Bottom View



PoE Adapter – Top View



PoE Adapter – Bottom View

6.5 EUT Photos - Internal



EUT – Cover off View 1



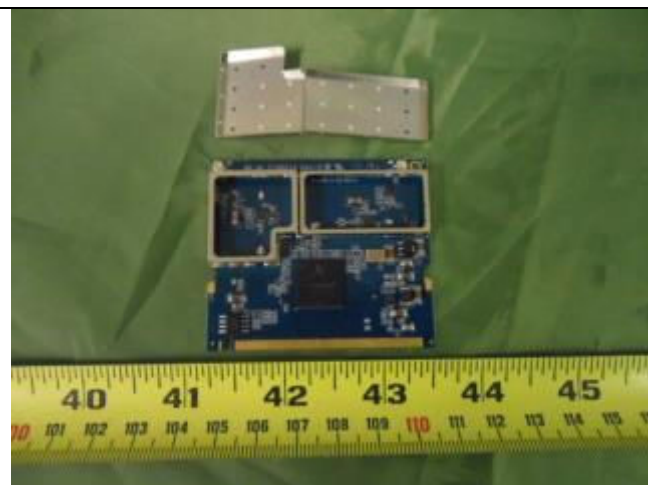
EUT – Main PCBA Top View



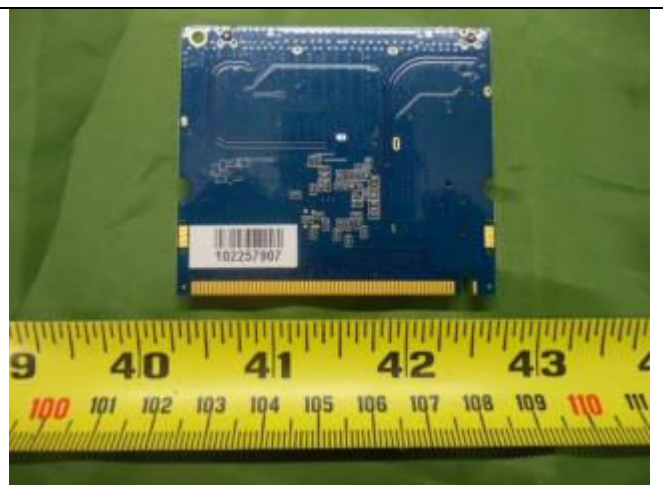
EUT – Main PCBA Bottom View



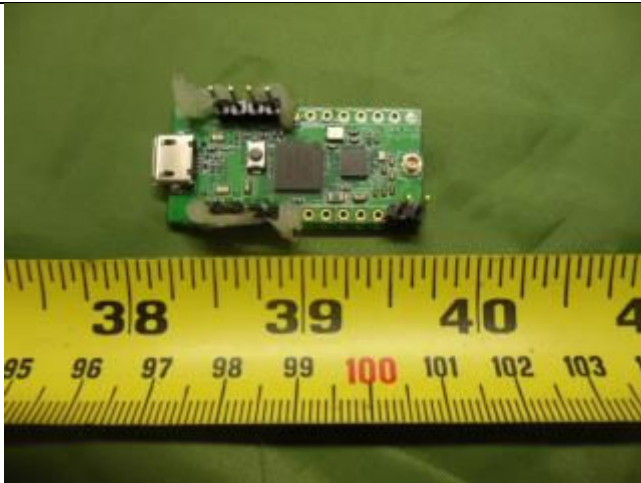
EUT – RF Module with Shielding Top View



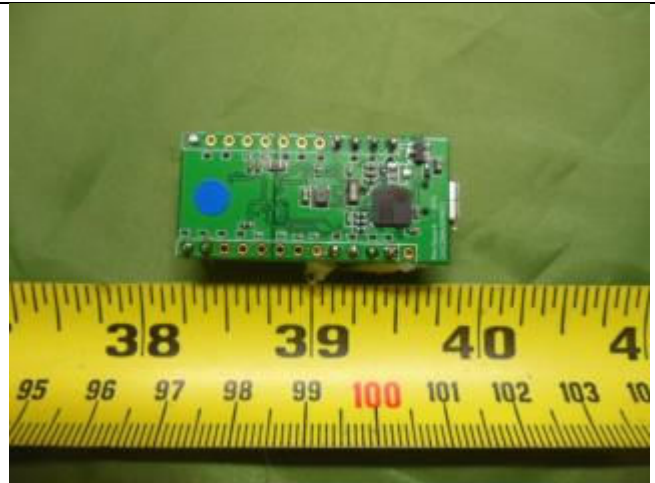
EUT – RF Module w/o Shielding Top View



EUT – RF Module Bottom View

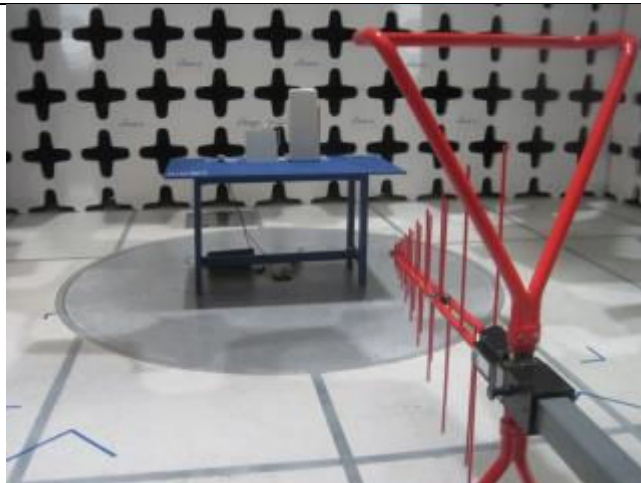


EUT – Sub PCBA Top View

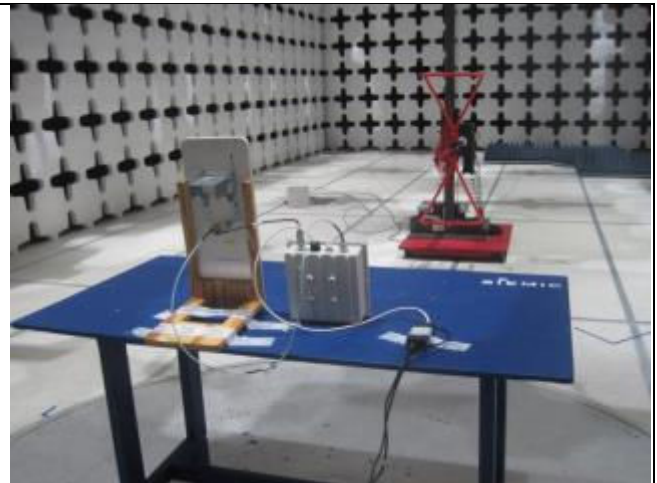


EUT – Sub PCBA Bottom View

6.6 EUT Test Setup Photos



Radiated Spurious Emissions <1GHz (16dBi Ant) – Front View



Radiated Spurious Emissions <1GHz (16dBi Ant) – Rear View



Radiated Spurious Emissions 1-18GHz (16dBi Ant) – Front View



Radiated Spurious Emissions 1-18GHz (16dBi Ant) – Rear View



Radiated Spurious Emissions 18-40GHz (16dBi Ant) – Front View



Radiated Spurious Emissions 18-40GHz (16dBi Ant) – Rear View



Radiated Spurious Emissions <1GHz (20dBi Ant) – Front View



Radiated Spurious Emissions <1GHz (20dBi Ant) – Rear View



Radiated Spurious Emissions 1-18GHz (20dBi Ant) – Front View



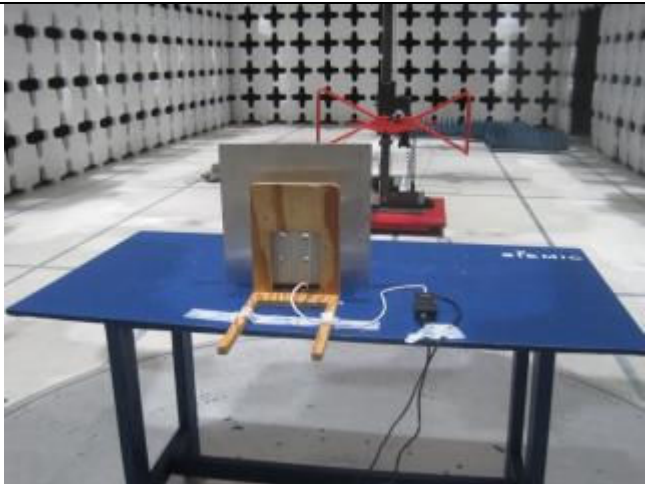
Radiated Spurious Emissions 1-18GHz (20dBi Ant) – Rear View



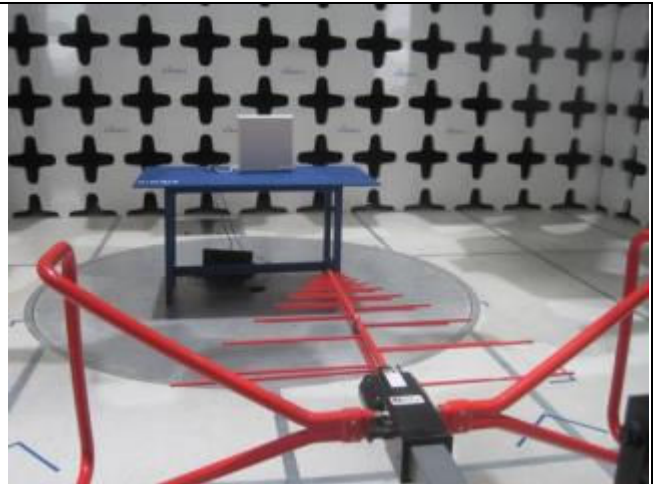
Radiated Spurious Emissions 18-40GHz (20dBi Ant) – Front View



Radiated Spurious Emissions 18-40GHz (20dBi Ant) – Rear View



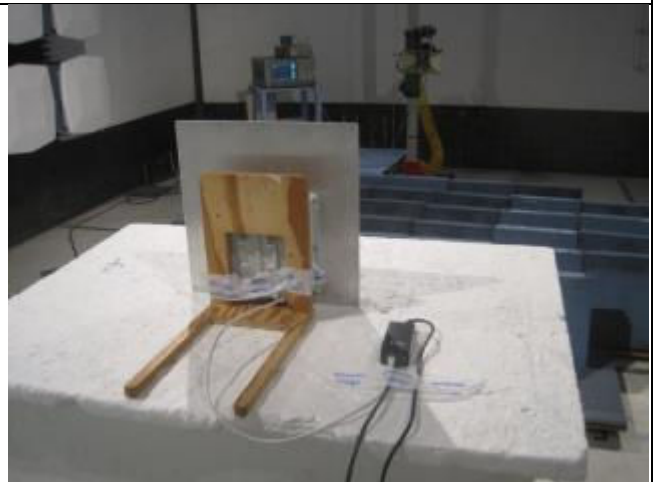
Radiated Spurious Emissions <1GHz (23dBi Ant) – Front View



Radiated Spurious Emissions <1GHz (23dBi Ant) – Rear View



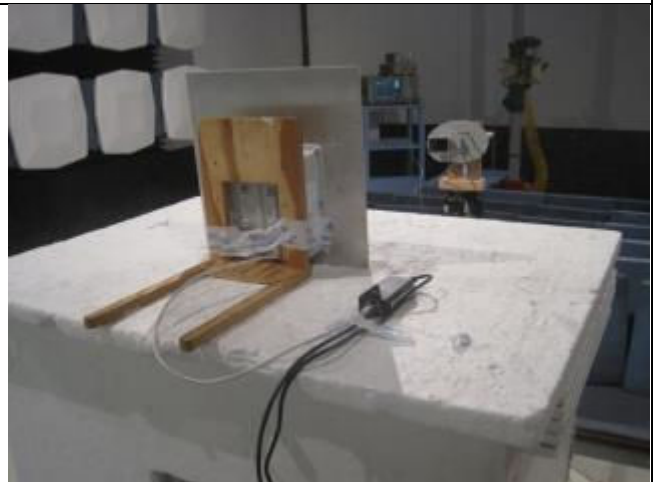
Radiated Spurious Emissions 1-18GHz (23dBi Ant) – Front View



Radiated Spurious Emissions 1-18GHz (23dBi Ant) – Rear View



Radiated Spurious Emissions 18-40GHz (23dBi Ant) – Front View



Radiated Spurious Emissions 18-40GHz (23dBi Ant) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	Pavilion g4	5CD2135VQM	HP	-
2	Laptop	T60	L3-AX990	Lenovo	-

7.2 Test Software Description

Test Item	Software	Description
RF Tests	Software provided by manufacturer	Set the EUT to different channels and modulations

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Modulation Characteristics	FCC	§90 Subpart M	FCC §2.1047, §90.207 ASTM E2213-03 Table 3	☒ Pass ☐ N/A
Emissions Bandwidth	FCC	§90 Subpart M	FCC §2.1049 ASTM E2213-03 8.9.2	☒ Pass ☐ N/A
Maximum Transmitter Power	FCC	§90 Subpart M	FCC §90.377 ASTM E2213-03 8.9.1	☒ Pass ☐ N/A
Transmit Spectrum Mask	FCC	§90 Subpart M	FCC §90.379 ASTM E2213-03 8.9.2	☒ Pass ☐ N/A
Transmitter Conducted Unwanted Emissions	FCC	§90 Subpart M	ASTM E2213-03 8.9.2	☒ Pass ☐ N/A
Transmitter Radiated Unwanted Emissions	FCC	§90 Subpart M	ASTM E2213-03 8.9.2	☒ Pass ☐ N/A
Frequency Stability	FCC	§90 Subpart M	FCC §2.1055 ASTM E2213-03 8.9.4	☒ Pass ☐ 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

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 – 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 Modulation characteristics

Requirement(s):

Spec	Requirement	Applicable																		
FCC §2.1047 FCC §90.207	Per FCC §2.1047 and §90.207 the modulation parameters dependent on the data rate used shall be set according to the below Table from ASTM E2213-03. <u>Modulation Characteristics</u> <table><tr><th>Data Rate</th><th>Modulation</th></tr><tr><td>3</td><td>BPSK</td></tr><tr><td>4.5</td><td>BPSK</td></tr><tr><td>6</td><td>QPSK</td></tr><tr><td>9</td><td>QPSK</td></tr><tr><td>12</td><td>16-QAM</td></tr><tr><td>18</td><td>16-QAM</td></tr><tr><td>24</td><td>64-QAM</td></tr><tr><td>27</td><td>64-QAM</td></tr></table>	Data Rate	Modulation	3	BPSK	4.5	BPSK	6	QPSK	9	QPSK	12	16-QAM	18	16-QAM	24	64-QAM	27	64-QAM	☒
Data Rate	Modulation																			
3	BPSK																			
4.5	BPSK																			
6	QPSK																			
9	QPSK																			
12	16-QAM																			
18	16-QAM																			
24	64-QAM																			
27	64-QAM																			
Test Procedure	N/A																			
Remark	-																			
Result	☒ Pass ☐ Fail																			

Test Data ☐ Yes ☒ N/A
Test Plot ☐ Yes ☒ N/A

10.2 Emissions Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
FCC §2.1049 ASTM E2213-03 8.9.2	a)	The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.	☒
Test Setup			
Test Procedure	<u>Emission bandwidth measurement procedure</u> - Set RBW = 1MHz. - Set the video bandwidth (VBW) $\geq 3 * RBW$. - Detector = Peak. - Trace mode = max hold. - Sweep = auto couple. - Allow the trace to stabilize.		
Remark	-		
Environmental conditions	Temperature (°C) Humidity (%) Atmospheric (mbar)	23 °C 42% 1019 mbar	
Test Date	09/11/2014		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes ☐ N/A

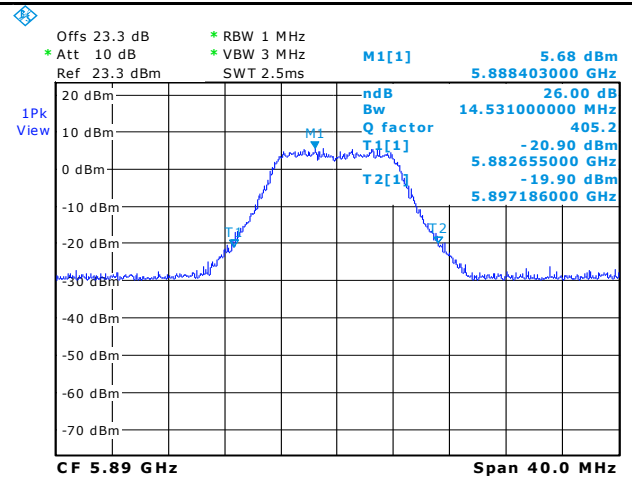
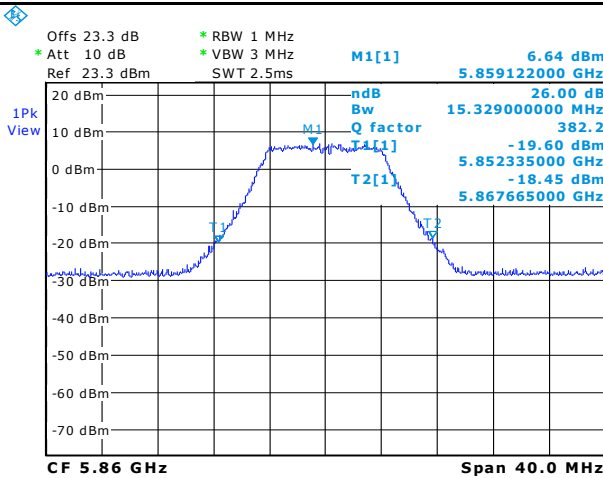
10MHz Bandwidth Measurement Results

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
5860	15.329	11.018
5890	14.531	11.018
5920	14.850	11.099

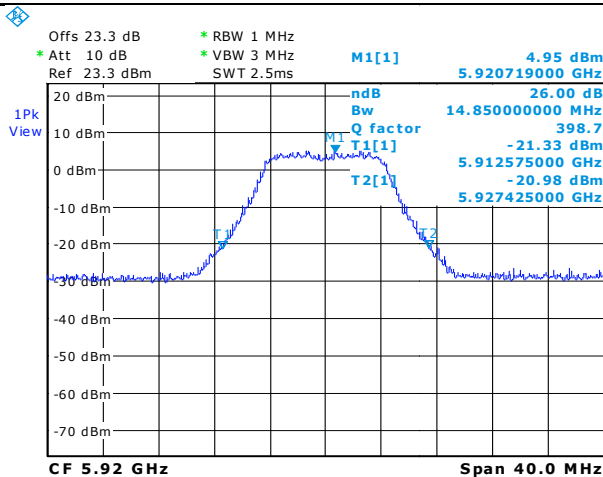
20MHz Bandwidth Measurement Results

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
5875	27.705	19.800
5905	27.158	19.960

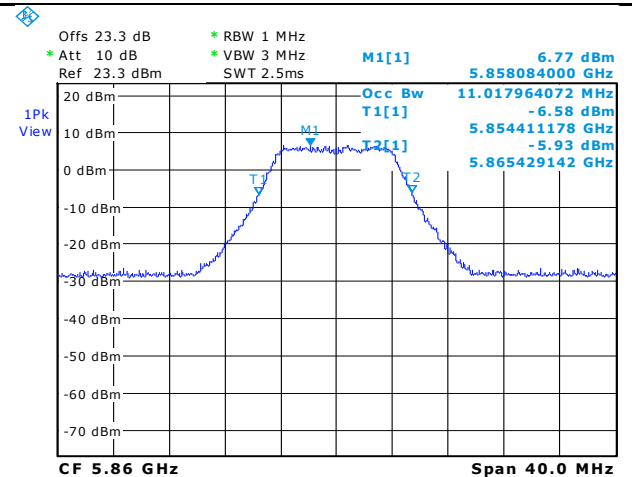
Test Plots



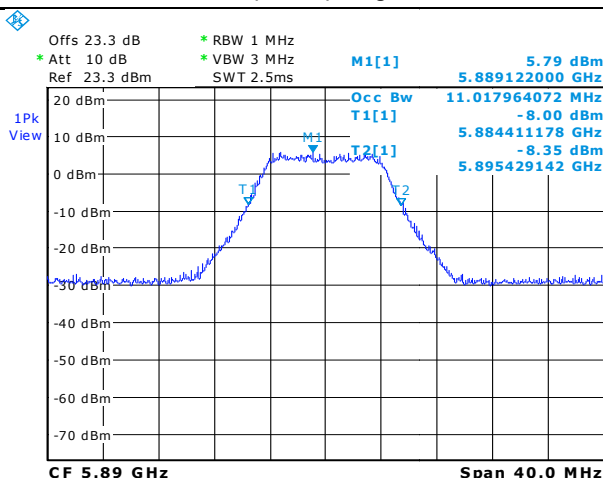
26dB Bandwidth (10MHz) - Low CH 5860MHz



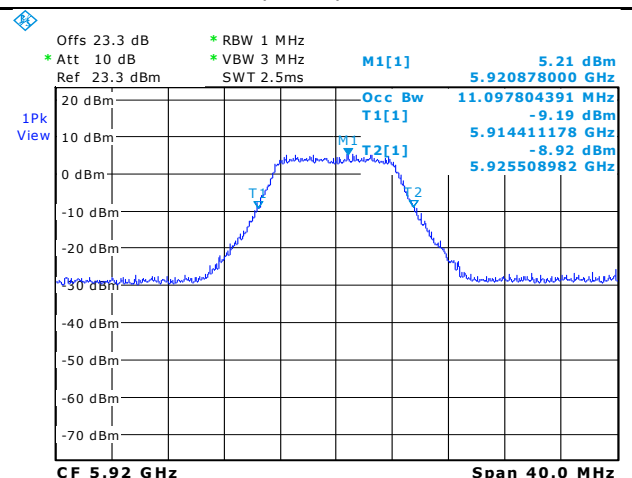
26dB Bandwidth (10MHz) - Mid CH 5890MHz



26dB Bandwidth (10MHz) - High CH 5920MHz

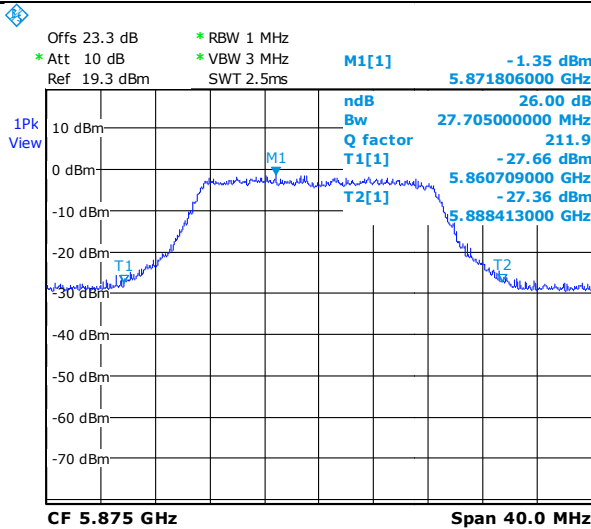


99% Bandwidth (10MHz) - Low CH 5860MHz

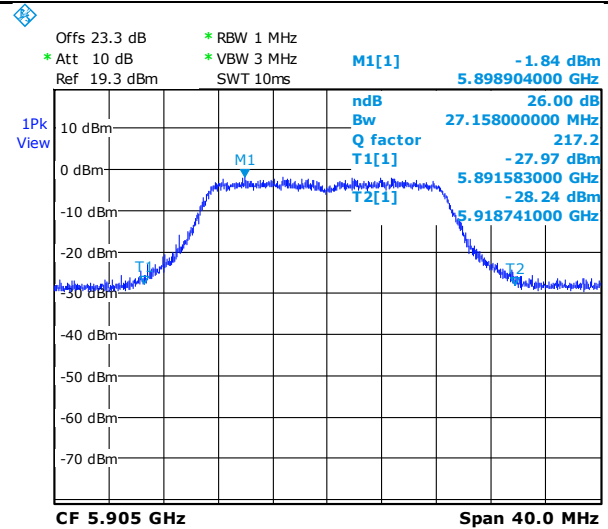


99% Bandwidth (10MHz) - Mid CH 5890MHz

99% Bandwidth (10MHz) - High CH 5920MHz

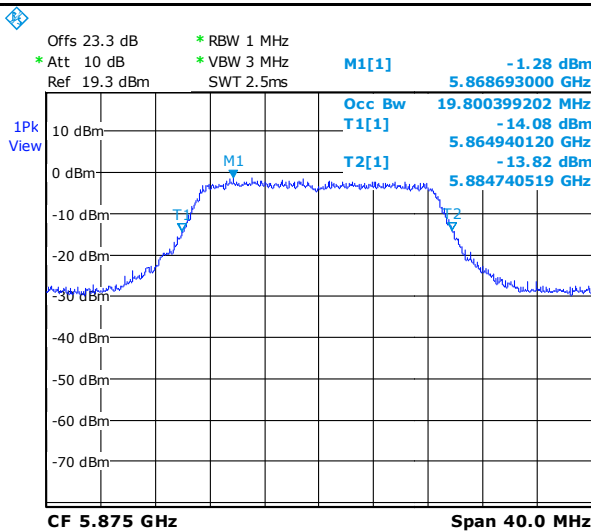


Date: 11.SEP.2014 18:48:38



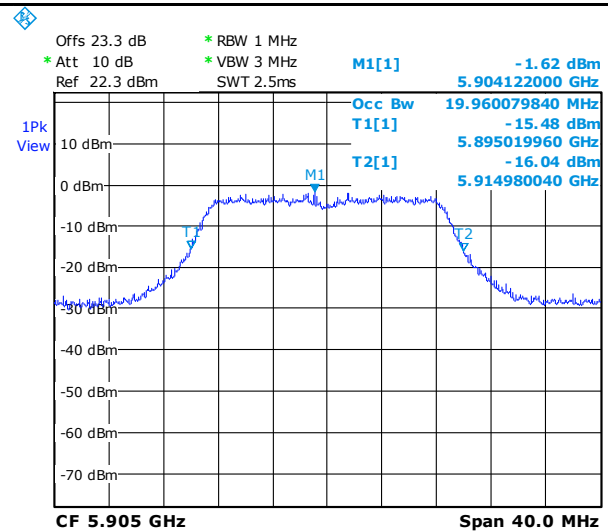
Date: 11.SEP.2014 18:21:27

26dB Bandwidth (20MHz) - Low CH 5875MHz



Date: 11.SEP.2014 18:51:07

26dB Bandwidth (20MHz) - High CH 5905MHz



Date: 11.SEP.2014 17:47:05

99% Bandwidth (20MHz) - Low CH 5875MHz

99% Bandwidth (10MHz) - High CH 5905MHz

10.3 Maximum Transmitter Power

Requirement(s):

Spec	Requirement	Applicable																																																
FCC §90.377 ASTM E2213-03 8.9.1	Per FCC §90.377, frequencies available for assignment to eligible applicants within the 5850-5925 MHz band for RSUs and the maximum EIRP permitted for an RSU with an antenna height not exceeding 8 meters above the roadway bed surface are specified in the table below. Where two EIRP limits are given, the higher limit is permitted only for state or local governmental entities. <table><thead><tr><th>Channel No.</th><th>Frequency range (MHz)</th><th>Max. EIRP (dBm)</th><th>¹Max. Conducted Power (dBm)</th></tr></thead><tbody><tr><td colspan="4">5850 – 5925 MHz Band (10MHz Bandwidth)</td></tr><tr><td>172</td><td>5855-5865</td><td>33</td><td>28.8</td></tr><tr><td>174</td><td>5865-5875</td><td>33</td><td>28.8</td></tr><tr><td>176</td><td>5875-5885</td><td>33</td><td>28.8</td></tr><tr><td>178</td><td>5885-5895</td><td>33</td><td>28.8</td></tr><tr><td>180</td><td>5895-5905</td><td>23</td><td>10.0</td></tr><tr><td>182</td><td>5905-5915</td><td>23</td><td>10.0</td></tr><tr><td>184</td><td>5915-5925</td><td>33</td><td>28.8</td></tr><tr><td colspan="4">5850 – 5925 MHz Band (20MHz Bandwidth)</td></tr><tr><td>175</td><td>5865-5885</td><td>23</td><td>10.0</td></tr><tr><td>181</td><td>5895-5915</td><td>23</td><td>10.0</td></tr></tbody></table> ¹Maximum conducted power per ASTM E2213-03 8.9.1	Channel No.	Frequency range (MHz)	Max. EIRP (dBm)	¹ Max. Conducted Power (dBm)	5850 – 5925 MHz Band (10MHz Bandwidth)				172	5855-5865	33	28.8	174	5865-5875	33	28.8	176	5875-5885	33	28.8	178	5885-5895	33	28.8	180	5895-5905	23	10.0	182	5905-5915	23	10.0	184	5915-5925	33	28.8	5850 – 5925 MHz Band (20MHz Bandwidth)				175	5865-5885	23	10.0	181	5895-5915	23	10.0	☒
Channel No.	Frequency range (MHz)	Max. EIRP (dBm)	¹ Max. Conducted Power (dBm)																																															
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178	5885-5895	33	28.8																																															
180	5895-5905	23	10.0																																															
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175	5865-5885	23	10.0																																															
181	5895-5915	23	10.0																																															
Test Setup	Laptop Power Sensor & attenuator EUT																																																	
Environmental conditions	Temperature (°C) Humidity (%) Atmospheric (mbar)	23 °C 42% 1019 mbar																																																
Test Date	09/09/2014																																																	
Remark	-																																																	
Result	☒ Pass ☐ Fail																																																	

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

10 MHz Bandwidth Maximum Transmit Power measurement results

Channel No.	Frequency (MHz)	EUT Power Setting (dBm)	Conducted Power (dBm)			Output Power Limit (dBm)	Result
			Chain 1	Chain 2	Combined Power or Highest Power		
172	5860	10	4.70	4.80	7.76	28.8	Pass
174	5870	10	4.20	4.80	7.52	28.8	Pass
176	5880	10	4.30	4.70	7.51	28.8	Pass
178	5890	10	4.30	4.70	7.51	28.8	Pass
180	5900	6	-1.60	0.00	2.34	10.0	Pass
182	5910	6	-1.70	-0.20	2.12	10.0	Pass
184	5920	10	3.70	4.30	7.02	28.8	Pass

10 MHz Bandwidth EIRP Measurement

Channel No.	Frequency (MHz)	EUT Power Setting (dBm)	Combined or Highest Conducted Power (dBm)	Antenna Gain (dBi)	Measured EIRP (dBm)	EIRP Limit (dBm)	Result
172	5860	10	7.76	16	23.76	33	Pass
				20	27.76	33	
				23	30.76	33	
174	5870	10	7.52	16	23.52	33	Pass
				20	27.52	33	
				23	30.52	33	
176	5880	10	7.51	16	23.51	33	Pass
				20	27.51	33	
				23	30.51	33	
178	5890	10	7.51	16	23.51	33	Pass
				20	27.51	33	
				23	30.51	33	
180	5900	6	2.34	16	18.34	23	Pass
				20	22.34	23	
				23	N/A	23	
182	5910	6	2.12	16	18.12	23	Pass
				20	22.12	23	
				23	N/A	23	
184	5920	10	30.52	16	23.02	33	Pass
				20	27.02	33	
				23	30.02	33	

20 MHz Bandwidth Maximum Transmit Power measurement results

Channel No.	Frequency (MHz)	EUT Power Setting (dBm)	Conducted Power (dBm)			Output Power Limit (dBm)	Result
			Chain 1	Chain 2	Combined Power or Highest Power		
175	5875	6	-1.90	-0.40	1.92	10	Pass
181	5905	6	-2.20	-0.70	1.62	10	Pass

20 MHz Bandwidth EIRP Measurement

Channel No.	Frequency (MHz)	EUT Power Setting (dBm)	Combined or Highest Conducted Power (dBm)	Antenna Gain (dBi)	Measured EIRP (dBm)	EIRP Limit (dBm)	Result
175	5875	6	1.92	16	17.92	23	Pass
				20	21.92	23	
				23	N/A	23	
181	5905	6	1.62	16	17.62	23	Pass
				20	21.62	23	
				23	N/A	23	

10.4 Transmit Spectrum Mask

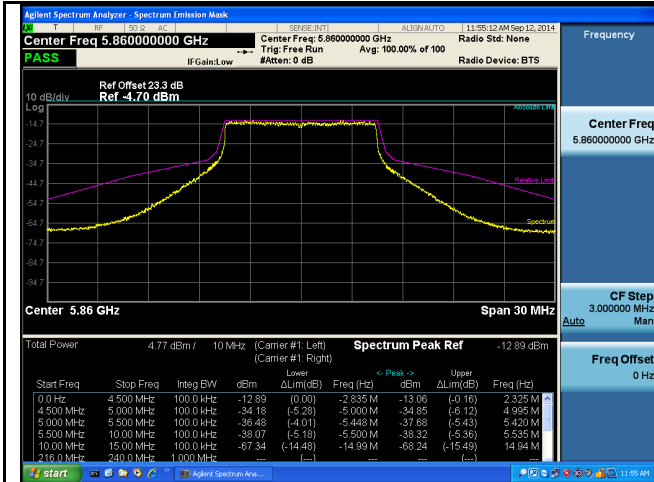
Requirement(s):

Spec	Item	Requirement	Applicable																														
FCC §90.379 ASTM E2213-03 8.9.2	a)	The DSRC transmitted spectrum mask is relative to the device class of operation. The power in the transmitted spectrum for all DSRC devices shall be -25 dBm or less within 100 kHz outside all channel and band edges. This will be accomplished by attenuating the transmitted signal 100 kHz outside the channel and band edges by $55 + 10\log(P)$ dB, where P is the total transmitted power in watts. The transmitted spectral density of the transmitted signal for all devices shall fall within the spectral mask, as detailed in Table 10. Table 10. DSRC Spectrum Mask <table><tr><th>Class</th><th>±4.5-MHz Offset</th><th>±5.0-MHz Offset</th><th>±5.5-MHz Offset</th><th>±10-MHz Offset</th><th>±15-MHz Offset</th></tr><tr><td>Class A</td><td>0</td><td>-10</td><td>-20</td><td>-28</td><td>-40</td></tr><tr><td>Class B</td><td>0</td><td>-16</td><td>-20</td><td>-28</td><td>-40</td></tr><tr><td>Class C</td><td>0</td><td>-26</td><td>-32</td><td>-40</td><td>-50</td></tr><tr><td>Class D</td><td>0</td><td>-35</td><td>-45</td><td>-55</td><td>-65</td></tr></table> Note: Reduction in Power Spectral Density, dB.	Class	±4.5-MHz Offset	±5.0-MHz Offset	±5.5-MHz Offset	±10-MHz Offset	±15-MHz Offset	Class A	0	-10	-20	-28	-40	Class B	0	-16	-20	-28	-40	Class C	0	-26	-32	-40	-50	Class D	0	-35	-45	-55	-65	☒
		Class	±4.5-MHz Offset	±5.0-MHz Offset	±5.5-MHz Offset	±10-MHz Offset	±15-MHz Offset																										
Class A	0	-10	-20	-28	-40																												
Class B	0	-16	-20	-28	-40																												
Class C	0	-26	-32	-40	-50																												
Class D	0	-35	-45	-55	-65																												
Test Setup	Spectrum Analyzer EUT																																
Test Procedure	The measurements shall be made using a 100 kHz resolution bandwidth and a 30 kHz video bandwidth.																																
Environmental conditions	Temperature (°C) Humidity (%) Atmospheric (mbar)	22°C 45% 1020 mbar																															
Test Date	09/12/2014																																
Remark	-																																
Result	☒ Pass ☐ Fail																																

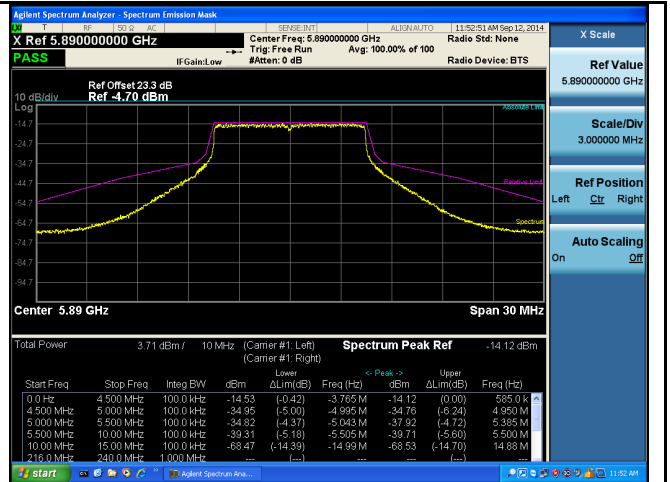
Test Data ☐ Yes ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

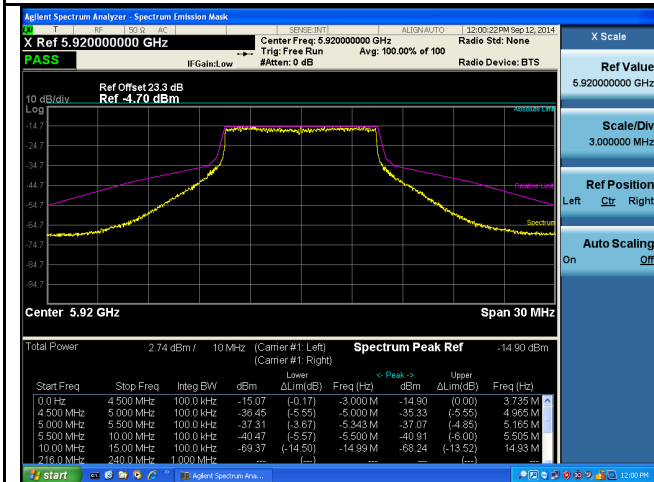
Class B Equipment Test Plots



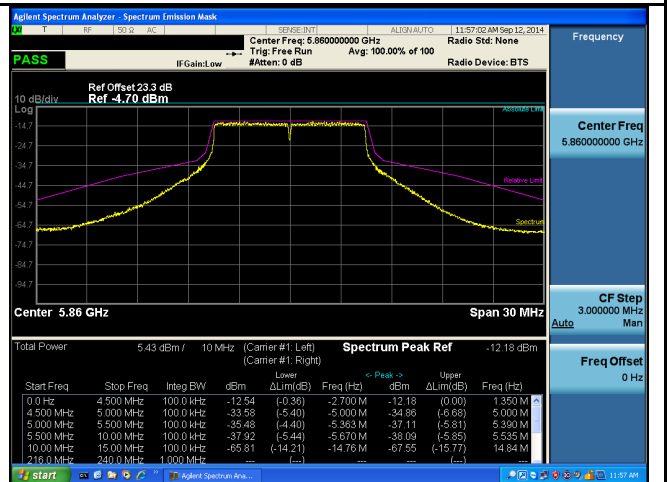
Emissions Mask (10MHz) - Low CH 5860MHz: Ant Port 1



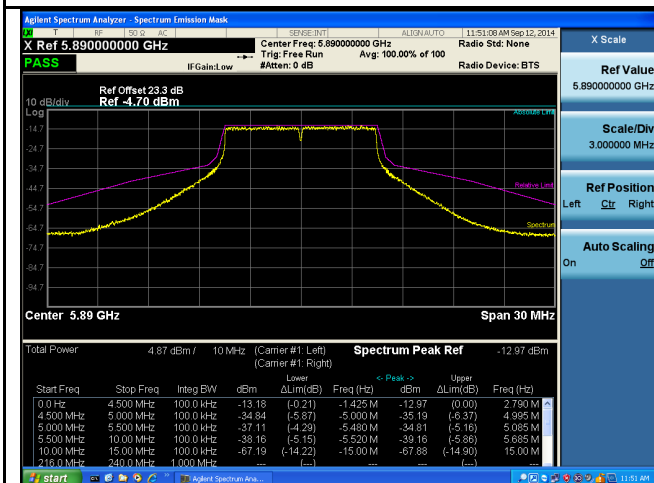
Emissions Mask (10MHz) - Mid CH 5890MHz: Ant Port 1



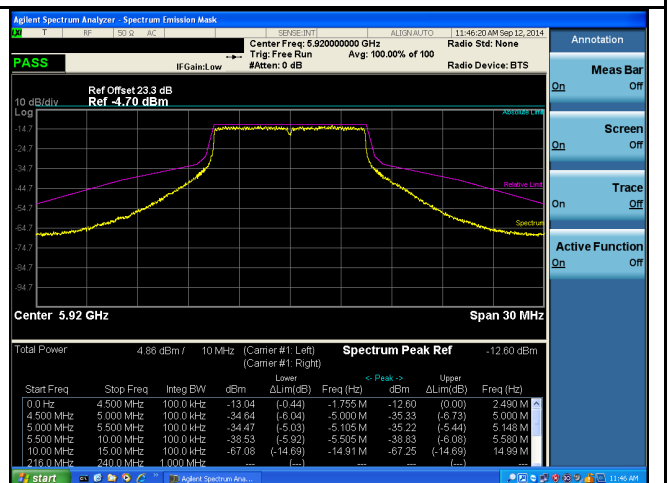
Emissions Mask (10MHz) - High CH 5920MHz: Ant Port 1



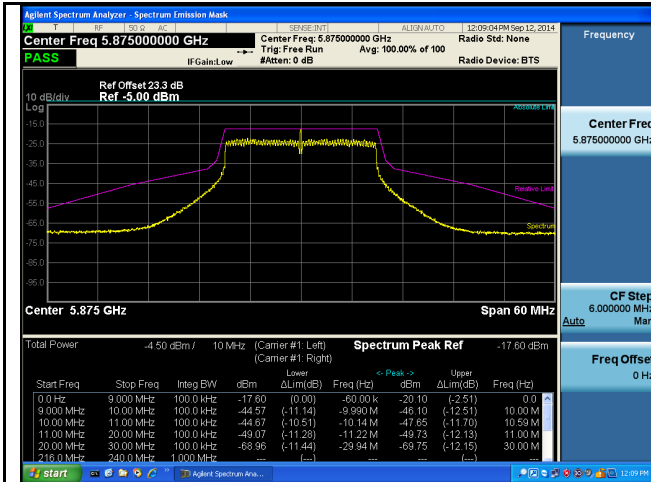
Emissions Mask (10MHz) - Low CH 5860MHz: Ant Port 2



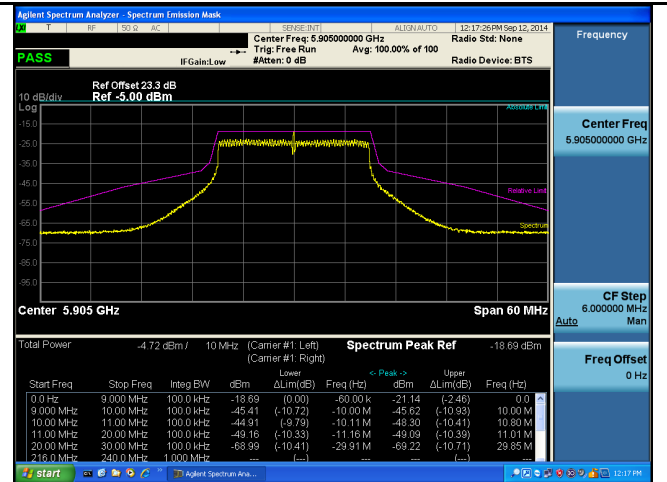
Emissions Mask (10MHz) - Mid CH 5890MHz: Ant Port 2



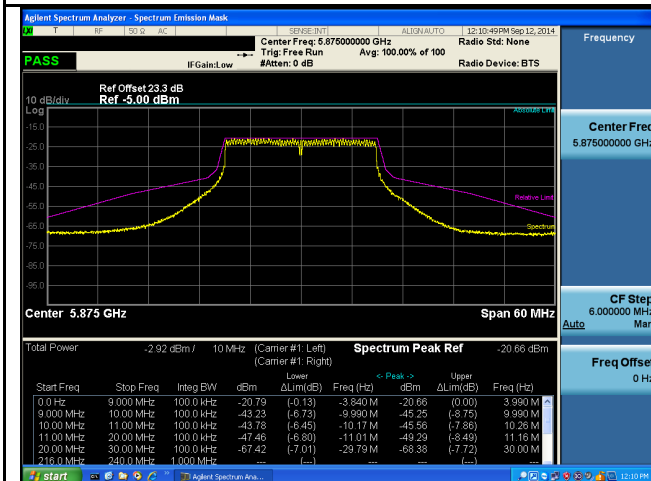
Emissions Mask (10MHz) - High CH 5920MHz: Ant Port 2



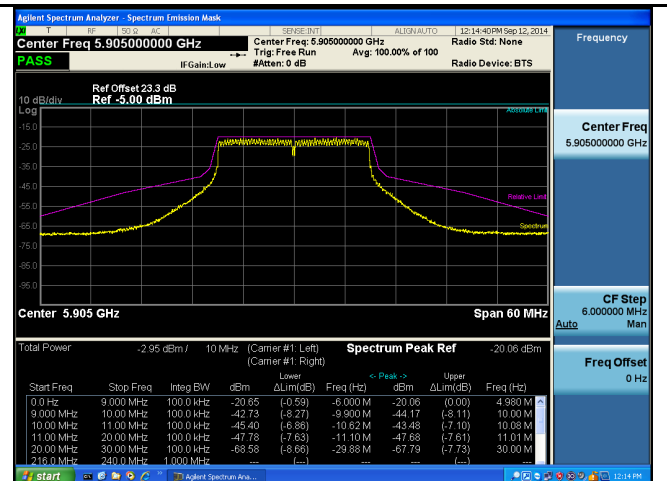
Emissions Mask (20MHz) - Low CH 5875MHz: Ant Port 1



Emissions Mask (20MHz) - High CH 5905MHz: Ant Port 1



Emissions Mask (20MHz) - Low CH 5875MHz: Ant Port 2



Emissions Mask (20MHz) - High CH 5905MHz: Ant Port 2

10.5 Transmitter Conducted Unwanted Emissions

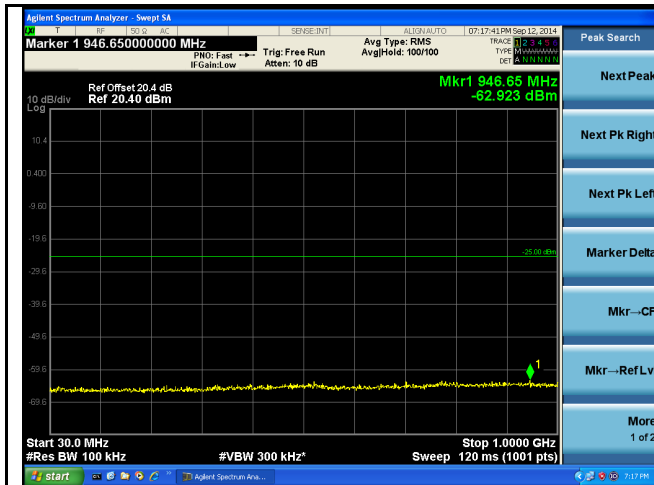
Requirement(s):

Spec	Requirement	Applicable
ASTM E2213-03 8.9.2	The power in the transmitted spectrum for all DSRC devices shall be -25 dBm or less within 100 kHz outside all channel and band edges. This will be accomplished by attenuating the transmitted signal 100 kHz outside the channel and band edges by $55 + 10\log(P)$ dB, where P is the total transmitted power in watts.	☒
Test Setup		
Test Procedure	The conducted measurement procedure shall be as per ASTM E2213-03 Clause 8.9.2.	
Environmental conditions	Temperature (°C) 21 °C Humidity (%) 46% Atmospheric (mbar) 1020 mbar	
Test Date	09/12/2014	
Remark	-	
Result	☒ Pass ☐ Fail	

Test Data ☐ Yes ☒ N/A

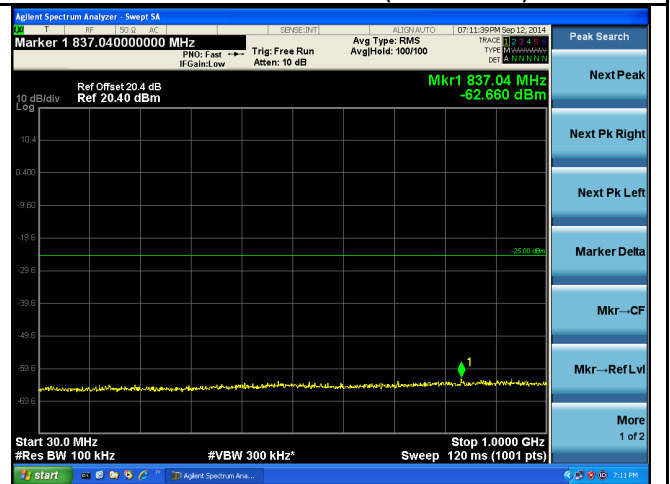
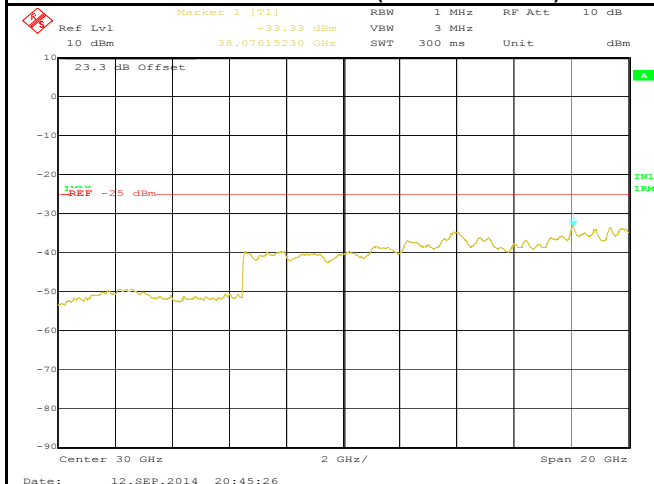
Test Plot ☒ Yes (See below) ☐ N/A

Conducted Spurious Emissions Test Plots (10MHz Bandwidth)



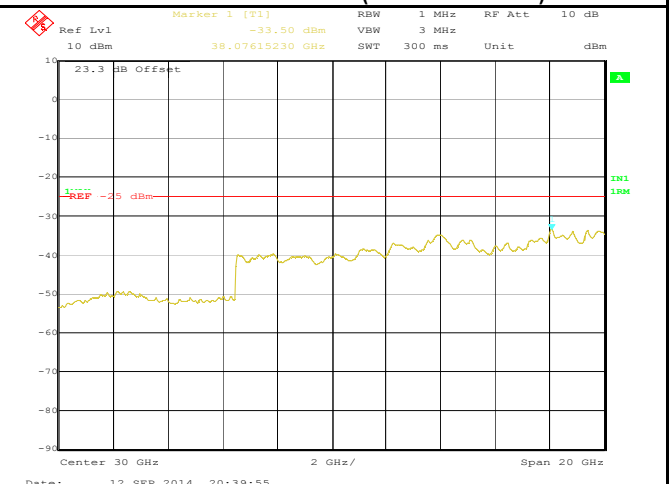
CSE - Low CH 5860MHz (30MHz-1000MHz)

CSE - Low CH 5860MHz (1GHz-20GHz)



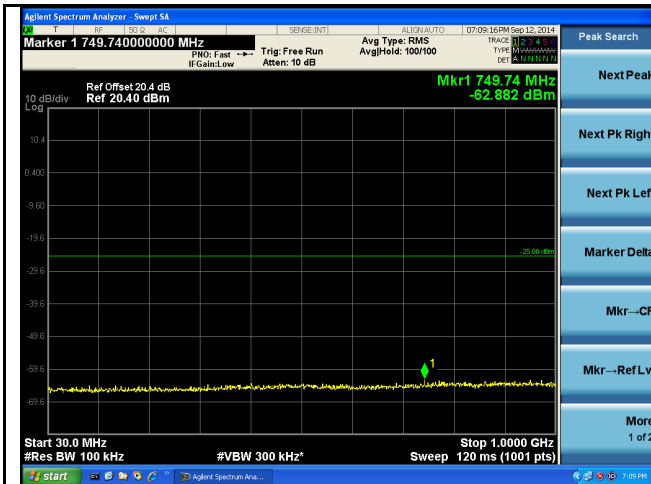
CSE - Low CH 5860MHz (20GHz-40GHz)

CSE - Mid CH 5890MHz (30MHz-1000MHz)

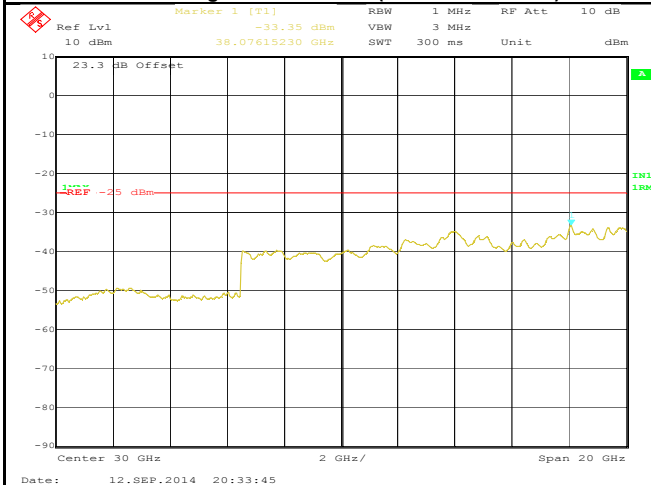


CSE - Mid CH 5890MHz (1GHz-20GHz)

CSE - Mid CH 5890MHz (20GHz-40GHz)

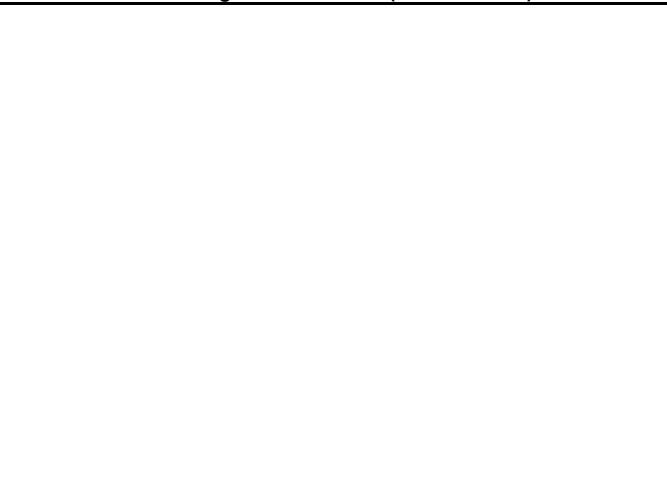


CSE - High CH 5920MHz (30MHz-1000MHz)

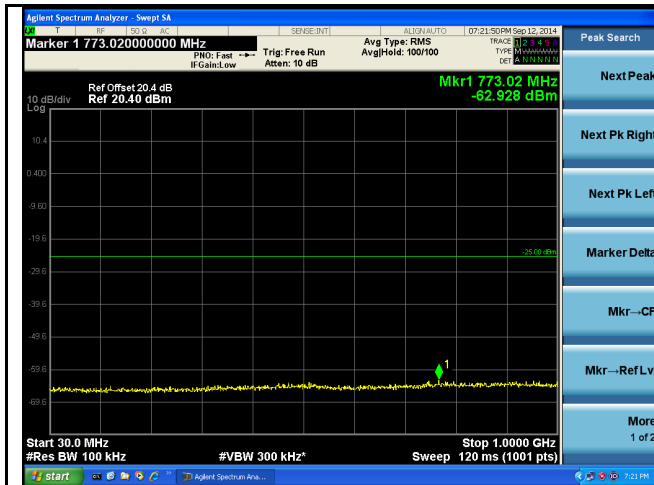


CSE - High CH 5920MHz (20GHz-40GHz)

CSE - High CH 5920MHz (1GHz-20GHz)



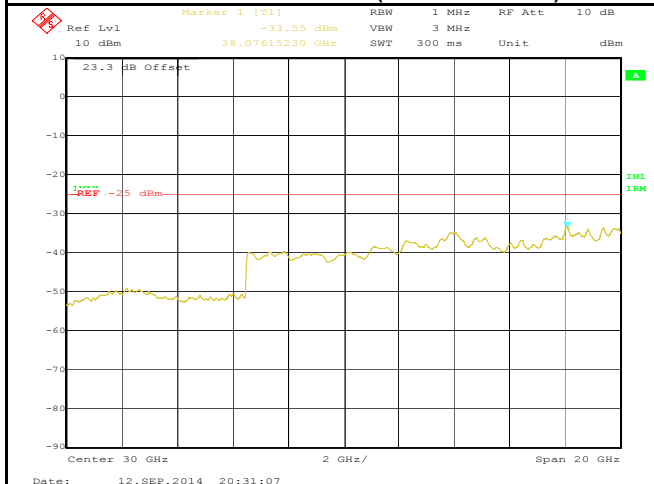
Conducted Spurious Emissions Test Plots (20MHz Bandwidth)



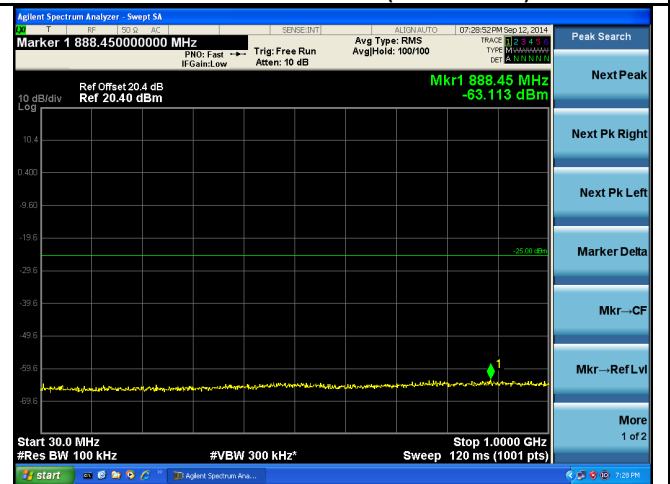
CSE - Low CH 5875MHz (30MHz-1000MHz)



CSE - Low CH 5875MHz (1GHz-20GHz)



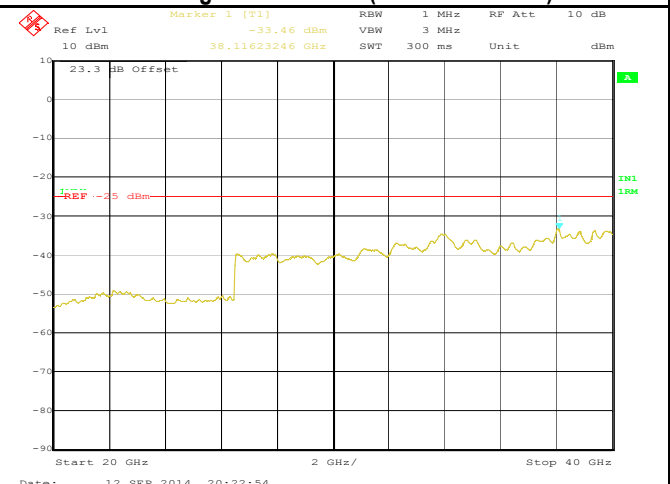
CSE - Low CH 5875MHz (20GHz-40GHz)



CSE - High CH 5905MHz (30MHz-1000MHz)



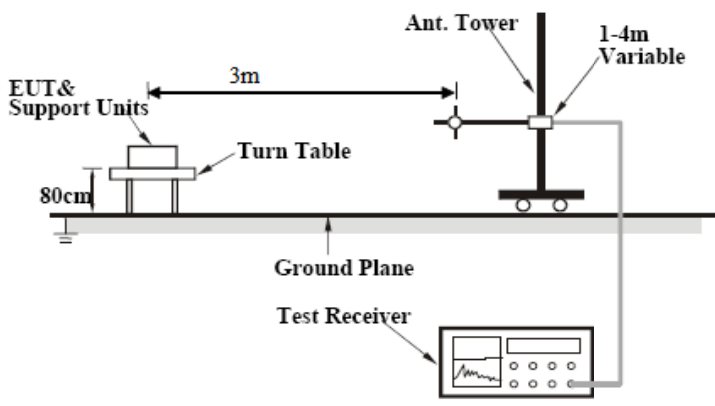
CSE - High CH 5905MHz (1GHz-20GHz)



CSE - High CH 5905MHz (20GHz-40GHz)

10.6 Transmitter Radiated Unwanted Emissions

Requirement(s):

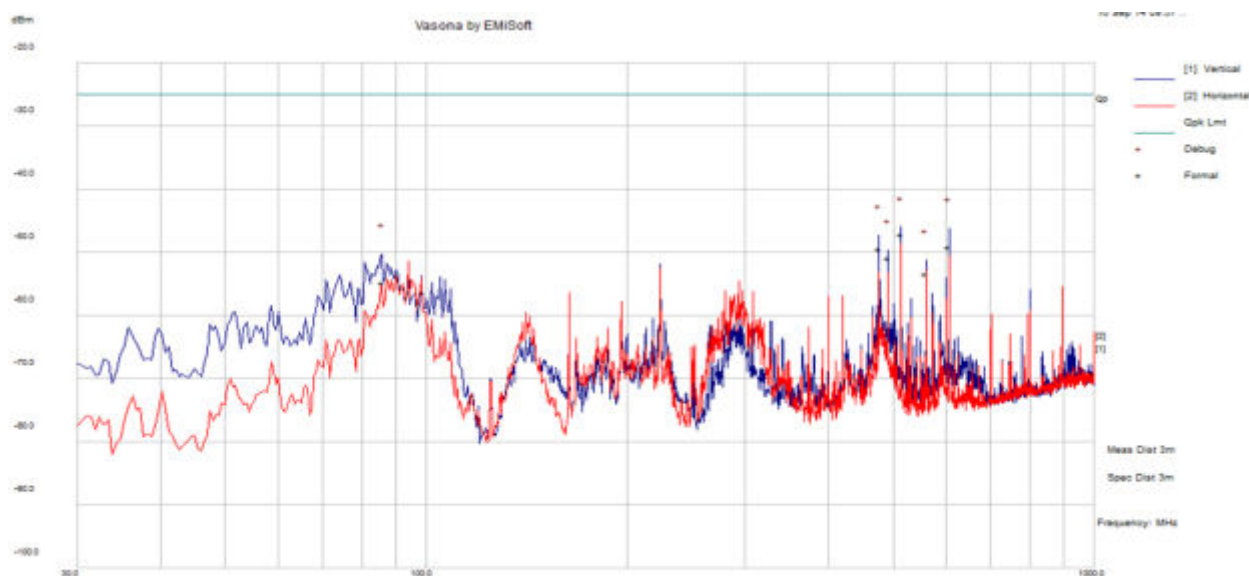
Spec	Requirement	Applicable
ASTM E2213-03 8.9.2	The power in the transmitted spectrum for all DSRC devices shall be -25 dBm or less within 100 kHz outside all channel and band edges. This will be accomplished by attenuating the transmitted signal 100 kHz outside the channel and band edges by $55 + 10\log(P)$ dB, where P is the total transmitted power in watts.	☒
Test Setup		
Test Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. Measurement was made at a distance of 3 m. 3. The measuring antenna was set to 1 meter away from the ground plain. 4. Maximization of the emissions was carried out by rotating the EUT, and adjusting the antenna azimuth. 5. The test was done in both horizontal and vertical antenna polarizations. 6. The measurement shall be made with the transmitter set to the lowest operating frequency and with the transmitter set to the highest operating frequency	
Remark	- Low, middle and high channels were verified. - Only the worst channel was selected for the final measurement below 1GHz. - The test distance from receiving antenna and EUT above 18GHz was 1m.	
Result	☒ Pass ☐ Fail	

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Radiated Emission Test Results (Below 1GHz)

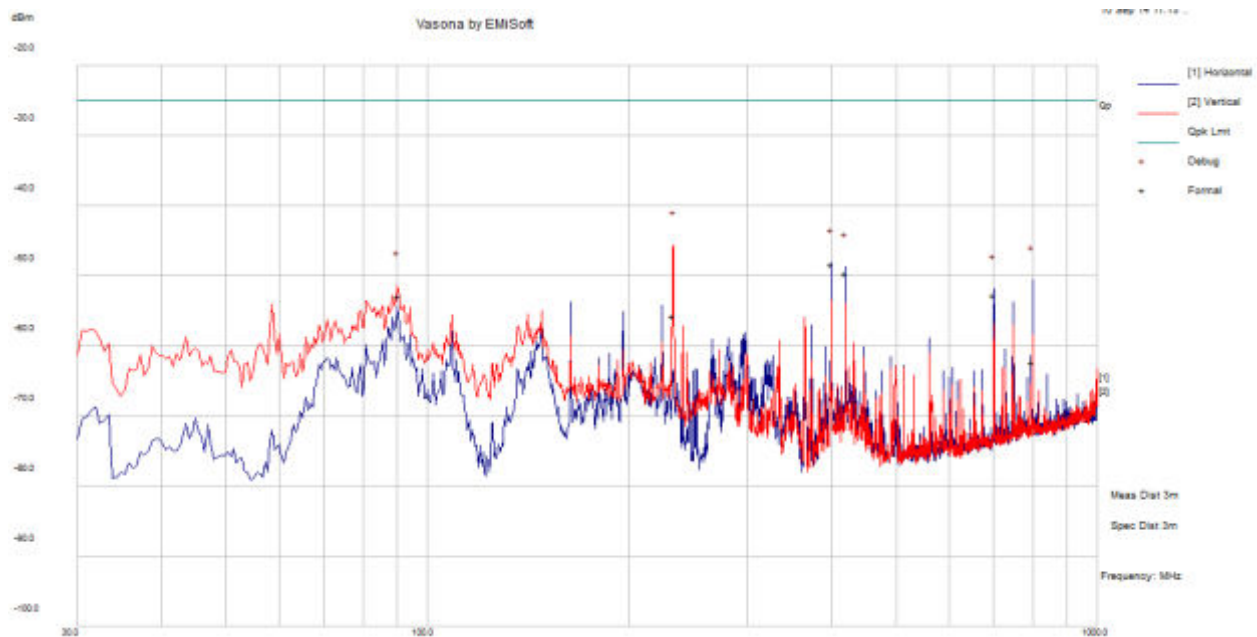
Test specification	Transmitter Radiated Unwanted Emissions			
Environmental Conditions:	Temp (°C):	21	Result	PASS
	Humidity (%)	44		
	Atmospheric (mbar):	1019		
Mains Power:	120VAC/60Hz			
Tested by:	Angel Escamilla			
Test Date:	09/10/2014			
Remarks:	Mid Ch: 5890MHz, 10MHz BW, 16dBi Antenna			



30MHz – 1000MHz at 3m distance

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
86.02	-36.09	13.38	-32.06	-54.77	Quasi Max	V	102.00	309.00	-25.00	-29.77	Pass
476.01	-42.93	15.75	-22.28	-49.46	Quasi Max	V	103.00	230.00	-25.00	-24.46	Pass
491.03	-44.92	15.86	-21.81	-50.87	Quasi Max	V	101.00	153.00	-25.00	-25.87	Pass
513.33	-41.17	15.93	-21.90	-47.13	Quasi Max	V	100.00	163.00	-25.00	-22.13	Pass
560.00	-48.04	15.94	-21.20	-53.30	Quasi Max	V	101.00	346.00	-25.00	-28.30	Pass
606.66	-44.34	15.96	-20.69	-49.07	Quasi Max	V	101.00	335.00	-25.00	-24.07	Pass
Note:	Both horizontal and vertical polarizations were verified. In this case vertical polarization was the worst case.										

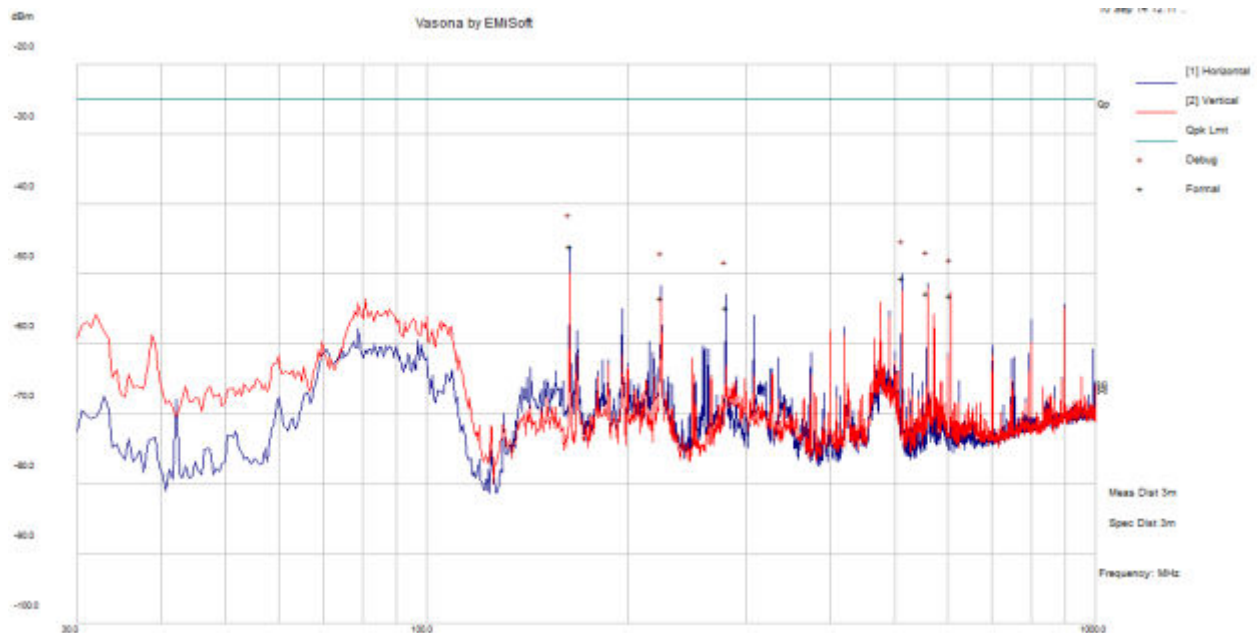
Test specification	Transmitter Radiated Unwanted Emissions			
Environmental Conditions:	Temp (°C):	23	Result	PASS
	Humidity (%)	46		
	Atmospheric (mPa):	1020		
Mains Power:	120VAC/60Hz			
Tested by:	Angel Escamilla			
Test Date:	09/10/2014			
Remarks:	Mid Ch: 5890MHz, 10MHz BW, 20dBi Antenna			



30MHz – 1000MHz at 3m distance

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
90.39	-34.42	13.45	-31.98	-52.95	Quasi Max	V	105.00	149.00	-25.00	-27.95	Pass
232.67	-41.82	14.46	-28.36	-55.73	Quasi Max	V	136.00	269.00	-25.00	-30.73	Pass
399.99	-39.47	15.10	-24.07	-48.44	Quasi Max	H	101.00	172.00	-25.00	-23.44	Pass
420.00	-41.44	15.28	-23.43	-49.59	Quasi Max	H	100.00	185.00	-25.00	-24.59	Pass
700.02	-49.80	16.27	-19.23	-52.76	Quasi Max	H	110.00	168.00	-25.00	-27.76	Pass
799.99	-61.05	16.61	-17.76	-62.20	Quasi Max	H	161.00	169.00	-25.00	-37.20	Pass

Test specification	Transmitter Radiated Unwanted Emissions			
Environmental Conditions:	Temp (°C):	22	Result	PASS
	Humidity (%)	44		
	Atmospheric (mbar):	1019		
Mains Power:	120VAC/60Hz			
Tested by:	Angel Escamilla			
Test Date:	09/10/2014			
Remarks:	Mid Ch: 5890MHz, 10MHz BW, 23dBi Antenna			



30MHz – 1000MHz at 3m distance

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
163.67	-32.23	14.08	-27.88	-46.03	Quasi Max	H	146.00	76.00	-25.00	-21.03	Pass
223.99	-39.11	14.41	-28.71	-53.41	Quasi Max	H	114.00	165.00	-25.00	-28.41	Pass
280.01	-43.11	14.68	-26.40	-54.83	Quasi Max	H	100.00	227.00	-25.00	-29.83	Pass
513.32	-44.51	15.93	-21.90	-50.47	Quasi Max	H	199.00	9.00	-25.00	-25.47	Pass
560.00	-47.45	15.94	-21.20	-52.72	Quasi Max	H	193.00	200.00	-25.00	-27.72	Pass
606.66	-48.25	15.96	-20.69	-52.98	Quasi Max	V	100.00	267.00	-25.00	-27.98	Pass

Radiated Emission Test Results (1GHz-40GHz) – 16dBi Antenna

Frequency range 1GHz-40GHz – Low CH (5860MHz) – 10MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14259.27	-76.91	16.96	10.51	-49.45	RMS Max	H	150	300	-25	-24.45	Pass
17853.15	-79.48	17.37	13.97	-48.14	RMS Max	H	255	165	-25	-23.14	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Mid CH (5890MHz) – 10MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14009.88	-75.97	16.86	10.02	-49.10	RMS Max	H	216.00	301.00	-25.00	-24.10	Pass
18001.33	-65.01	17.38	0.00	-47.63	RMS Max	H	149.00	220.00	-25.00	-22.63	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Low CH (5920MHz) – 10MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14115.50	-76.09	16.90	10.23	-48.96	RMS Max	H	132.00	52.00	-25.00	-23.96	Pass
17827.86	-79.36	17.36	13.89	-48.11	RMS Max	H	119.00	239.00	-25.00	-23.11	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Low CH (5875MHz) – 20MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14144.62	-74.12	16.91	10.28	-46.92	RMS Max	H	123.00	256.00	-25.00	-21.92	Pass
17875.08	-77.59	17.37	14.05	-46.18	RMS Max	V	103.00	276.00	-25.00	-21.18	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Low CH (5905MHz) – 20MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14536.41	-74.31	17.07	10.81	-46.43	RMS Max	H	134.00	302.00	-25.00	-21.43	Pass
17784.24	-76.72	17.36	13.74	-45.62	RMS Max	V	102.00	43.00	-25.00	-20.62	Pass
Remark	Emissions were 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 polarizations were verified.										

Radiated Emission Test Results (1GHz-40GHz) – 20dBi Antenna

Frequency range 1GHz-40GHz – Low CH (5860MHz) – 10MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14053.38	-76.02	16.87	10.10	-49.05	RMS Max	H	100.00	15.00	-25.00	-24.05	Pass
17933.89	-79.46	17.38	14.24	-47.84	RMS Max	H	270.00	46.00	-25.00	-22.84	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Mid CH (5890MHz) – 10MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14564.18	-76.52	17.09	10.69	-48.74	RMS Max	H	131.00	224.00	-25.00	-23.74	Pass
17962.60	-79.52	17.38	14.34	-47.80	RMS Max	H	103.00	155.00	-25.00	-22.80	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Low CH (5920MHz) – 10MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14529.63	-76.74	17.07	10.84	-48.83	RMS Max	H	286.00	104.00	-25.00	-23.83	Pass
18000.56	0.00	17.38	45.73	-47.64	RMS Max	H	168.00	357.00	-25.00	-22.64	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Low CH (5875MHz) – 20MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14107.07	-76.18	16.90	10.21	-49.07	RMS Max	H	167.00	71.00	-25.00	-24.07	Pass
17957.72	-79.48	17.38	14.32	-47.78	RMS Max	H	297.00	329.00	-25.00	-22.78	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Low CH (5905MHz) – 20MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14019.89	-76.03	16.86	10.04	-49.14	RMS Max	H	201.00	156.00	-25.00	-24.14	Pass
17994.91	-79.50	17.38	14.45	-47.67	RMS Max	H	258.00	189.00	-25.00	-22.67	Pass
Remark	Emissions were 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 polarizations were verified.										

Radiated Emission Test Results (1GHz-40GHz) – 23dBi Antenna

Frequency range 1GHz-40GHz – Low CH (5860MHz) – 10MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14156.44	-76.33	16.92	10.31	-49.11	RMS Max	H	197.00	240.00	-25.00	-24.11	Pass
17975.91	-79.62	17.38	14.38	-47.85	RMS Max	H	194.00	166.00	-25.00	-22.85	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Mid CH (5890MHz) – 10MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14110.92	-76.11	16.9	10.22	-48.99	RMS Max	H	204	149	-25	-23.99	Pass
17932.59	-79.47	17.38	14.24	-47.86	RMS Max	H	193	91	-25	-22.86	Pass
Remark	Emissions were 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 polarizations were verified.										

Frequency range 1GHz-40GHz – Low CH (5920MHz) – 10MHz Bandwidth

Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm/m	Margin dB	Pass /Fail
14584.12	-76.42	17.09	10.60	-48.72	RMS Max	H	101.00	219.00	-25.00	-23.72	Pass
17932.01	-79.48	17.38	14.24	-47.86	RMS Max	H	118.00	360.00	-25.00	-22.86	Pass
Remark	Emissions were 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 polarizations were verified.										

10.7 Frequency Stability

Requirement(s):

Spec	Requirement	Applicable
FCC §2.1055 ASTM E2213-03 8.9.4	The transmitted center frequency tolerance shall be ± 10 ppm maximum for RSUs and ± 10 ppm maximum for OBUs. The transmit center frequency and the symbol clock frequency shall be derived from the same reference oscillator. The test shall be performed at normal and extreme test conditions. From -30°C to $+50^{\circ}\text{C}$ and vary the primary supply voltage from 85% to 115% of the nominal value.	☒
Test Setup		
Test Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - An SMA cable was used to replace the EUT antenna during the measurements. - Normal and extreme test conditions were measured	
Test Data	09/15/2014	
Remark	-	
Result	☒ Pass ☐ Fail	

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test Results

Temperature Vs Frequency Stability: Center Frequency = 5860MHz

Temperature (°C)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
50	5859.95	0.05	8.53	±10	Pass
40	5859.97	0.03	5.12	±10	Pass
30	5859.99	0.01	1.71	±10	Pass
20	5860.00	0.00	0.00	±10	Pass
10	5860.00	0.00	0.00	±10	Pass
0	5860.03	-0.03	-5.12	±10	Pass
-10	5860.05	-0.05	-8.53	±10	Pass
-20	5860.02	-0.02	-3.41	±10	Pass
-30	5860.05	-0.05	-8.70	±10	Pass

Voltage Vs Frequency Stability: Center Frequency = 5860MHz

Voltage (AC)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
138	5859.98	0.02	3.41	±10	Pass
120	5860.00	0.00	0.00	±10	Pass
102	5859.99	0.01	1.71	±10	Pass

Temperature Vs Frequency Stability: Center Frequency = 5890MHz

Temperature (°C)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
50	5889.98	0.02	3.40	±10	Pass
40	5889.97	0.03	5.09	±10	Pass
30	5889.99	0.01	2.04	±10	Pass
20	5889.98	0.02	3.40	±10	Pass
10	5889.96	0.04	6.79	±10	Pass
0	5889.97	0.03	5.09	±10	Pass
-10	5890.04	-0.04	-6.26	±10	Pass
-20	5890.03	-0.03	-5.09	±10	Pass
-30	5890.04	-0.04	-6.79	±10	Pass

Voltage Vs Frequency Stability: Center Frequency = 5890MHz

Voltage (AC)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
138	5890.03	-0.03	-5.09	±10	Pass
120	5889.98	0.02	3.40	±10	Pass
102	5890.03	-0.03	-4.50	±10	Pass

Temperature Vs Frequency Stability: Center Frequency = 5920MHz

Temperature (°C)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
50	5919.98	0.02	3.38	±10	Pass
40	5919.95	0.05	8.45	±10	Pass
30	5919.96	0.04	6.76	±10	Pass
20	5919.96	0.04	6.76	±10	Pass
10	5919.98	0.02	3.38	±10	Pass
0	5919.99	0.01	1.69	±10	Pass
-10	5920.03	-0.03	-5.07	±10	Pass
-20	5920.04	-0.04	-6.76	±10	Pass
-30	5920.05	-0.05	-9.12	±10	Pass

Voltage Vs Frequency Stability: Center Frequency = 5920MHz

Voltage (AC)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
138	5919.98	0.02	2.87	±10	Pass
120	5919.96	0.04	6.76	±10	Pass
102	5920.02	-0.02	-3.95	±10	Pass

Temperature Vs Frequency Stability: Center Frequency = 5875MHz

Temperature (°C)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
50	5875.04	-0.04	-7.23	±10	Pass
40	5875.03	-0.03	-5.82	±10	Pass
30	5875.02	-0.02	-3.98	±10	Pass
20	5874.97	0.03	4.68	±10	Pass
10	5874.96	0.04	7.49	±10	Pass
0	5874.96	0.04	6.47	±10	Pass
-10	5875.02	-0.02	-2.72	±10	Pass
-20	5875.04	-0.04	-6.13	±10	Pass
-30	5875.05	-0.05	-7.66	±10	Pass

Voltage Vs Frequency Stability: Center Frequency = 5875MHz

Voltage (AC)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
138	5874.98	0.02	2.89	±10	Pass
120	5874.97	0.03	4.68	±10	Pass
102	5874.98	0.02	3.68	±10	Pass

Temperature Vs Frequency Stability: Center Frequency = 5905MHz

Temperature (°C)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
50	5905.043	-0.042	-7.197	±10	Pass
40	5905.025	-0.025	-4.234	±10	Pass
30	5905.010	-0.010	-1.693	±10	Pass
20	5904.983	0.017	2.964	±10	Pass
10	5905.023	-0.023	-3.912	±10	Pass
0	5905.026	-0.026	-4.471	±10	Pass
-10	5905.042	-0.042	-7.180	±10	Pass
-20	5905.013	-0.013	-2.218	±10	Pass
-30	5905.045	-0.045	-7.621	±10	Pass

Voltage Vs Frequency Stability: Center Frequency = 5905MHz

Voltage (AC)	Measured Frequency (MHz)	Deviation (MHz)	Deviation (ppm)	Limit (ppm)	Result
138	5905.014	-0.014	-2.371	±10	Pass
120	5904.983	0.017	2.964	±10	Pass
102	5904.992	0.008	1.355	±10	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Radiated Unwanted Emissions						
R & S Receiver	ESL6	100178	03/01/2014	1 Year	03/01/2015	☒
R & S Receiver	ESIB 40	100179	05/24/2014	1 Year	05/24/2015	☒
ETS-Lingren Loop Antenna	6512	00049120	08/22/2014	1 Year	08/22/2015	☐
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	08/12/2014	1 Year	08/12/2015	☒
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	☒
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 Measurements						
Spectrum Analyzer	N9010A	MY50210206	08/13/2014	1 Year	08/13/2015	☒
Spectrum Analyzer	E4407B	US88441016	05/31/2014	1 Year	05/31/2015	☐
R & S Receiver	ESIB 40	100179	05/24/2014	1 Year	05/24/2015	☒
RF Power Sensor	7002-006	13I00030SNO82	08/01/2014	1 Year	08/01/2015	☒
Frequency Stability Measurements						
Spectrum Analyzer	8564E	3738A00962	09/04/2013	1 Year	09/04/2015	☒
Test Equity Environment Chamber	1007H	61201	07/30/2014	1 Year	07/30/2015	☒

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