RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: FCC_IC_RF_SL18061901-LEC-007 Rev 3.0
Supersede Report No.: FCC_IC_RF_SL18061901-LEC-007 Rev 2.0

Applicant	Lectrosonics, Inc
Product Name	Active Antenna Combiner
Model No.	M2C
Test Standard	FCC part 74H RSS-210 Issue 9
Test Method	KDB 971168 v03r01 ANSI/TIA-603-E 2016 ANSI C63.10-2013 ANSI C63.26-2015
FCC ID	DBZM2C
IC	8024A-M2C
Date of test	08/18/2018 - 08/25/2018
Issue Date	09/25/2018
Test Result	Pass Fail
Equipment complied with the specification	[x]
Equipment did not comply with the specification	[ ]

Deon Dai	Chen Ge
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
775 Montague Expressway, Milpitas, 95035 CA

ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

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

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

Accreditations for Conformity Assessment

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

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF , Telecom
HongKong	OFTA (US002)	RF , Telecom

CONTENTS

1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_IC_RF_SL18061901-LEC-007	Original	NONE	08/31/2018
FCC_IC_RF_SL18061901-LEC-007 Rev 1.0	Rev 1.0	Updated per reviewer	09/07/2018
FCC_IC_RF_SL18061901-LEC-007 Rev 2.0	Rev 2.0	Updated per reviewer	09/11/2018
FCC_IC_RF_SL18061901-LEC-007 Rev 3.0	Rev 3.0	Updated per reviewer	09/25/2018

2 Executive Summary

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

Company: Lectrosonics, Inc.
Product: Active Antenna Combiner
Model: M2C

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	Lectrosonics, Inc.
Applicant Address	581 Laser Road, N.E., P.O. Box 15900, Rio Rancho, NM 87124, United States of America
Manufacturer Name	Lectrosonics, Inc.
Manufacturer Address	581 Laser Road, N.E., P.O. Box 15900, Rio Rancho, NM 87124, United States of America

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
1	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	Active Antenna Combiner
Model No.	M2C
Trade Name	Lectrosonic, Inc.
Serial No.	3
Input Power	100-240V 50/60Hz
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Date of EUT received	07/02/2018
Operating Frequencies	TX (470.100MHz-614.375MHz)
Port/Connectors	-
Remark	N/A

6.2 Radio Description

Item	UHF
Operating Band /Radio Type	UHF band
Modulation	N/A
Antenna Type	External dipole antenna
Antenna Gain	2.15 dBi
Frequency TX(MHz)	470.100z-614.375

6.3 EUT test modes/configuration Description

Final Test Mode		Note
Final_test_mode_1	Continuous transmission	-
Remark: NONE		

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Transmitter	DBU/E01	102	lectrosonics	-
2	Transmitter	DBU/E01	104	lectrosonics	-
3	Transmitter	DBU/E01	106	lectrosonics	-
4	Transmitter	DBU/E01	107	lectrosonics	-
5	Transmitter	DBU/E01	108	lectrosonics	-
6	Transmitter	DBU/E01	110	lectrosonics	-
7	Transmitter	DBU/E01	111	lectrosonics	-
8	Transmitter	DBU/E01	112	lectrosonics	-

7.2 Test Software Description

Test Item	Software	Description
RF testing	-	Set the EUT to transmit continuously in different test modes and channels

8 Test Summary

Emissions			
Test Item	Test standard	Test Method/Procedure	Pass / Fail
AC Conducted Emission	15.207(a), RSS Gen 8.8	ANSI C63.10-2013 RSS Gen Issue 4: 2014	Pass
Transmitter Power Output	FCC part74, RSS-210	KDB 971168 v03r01 ANSI/TIA-603-E 2016 ANSI C63.10-2013 ANSI C63.26-2015	Pass
Frequency Stability	FCC part74, RSS-210	KDB 971168 v03r01 ANSI/TIA-603-E 2016 ANSI C63.10-2013 ANSI C63.26-2015	Pass
Modulation Characteristics	FCC part74, RSS-210	KDB 971168 v03r01 ANSI/TIA-603-E 2016 ANSI C63.10-2013 ANSI C63.26-2015	Pass
Occupied Bandwidth and Emission Mask	FCC part74, RSS-210	KDB 971168 v03r01 ANSI/TIA-603-E 2016 ANSI C63.10-2013 ANSI C63.26-2015	N/A*
Spurious Emissions at Antenna Terminal	FCC part74, RSS-210	KDB 971168 v03r01 ANSI/TIA-603-E 2016 ANSI C63.10-2013 ANSI C63.26-2015	Pass
Field Strength of Spurious Radiated	FCC part74, RSS-210	KDB 971168 v03r01 ANSI/TIA-603-E 2016 ANSI C63.10-2013 ANSI C63.26-2015	Pass

9 Measurement Uncertainty

9.1 Radiated Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.
Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
Expanded Uncertainty (K=2)					6.0118262

The total derived measurement uncertainty is +/- 6.00 dB.

9.2 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
Expanded Uncertainty (K=2)					8.4726

The total derived measurement uncertainty is +/- 8.47 dB.

9.3 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
Expanded Uncertainty (K=2)					0.952174

The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, examination and derived results

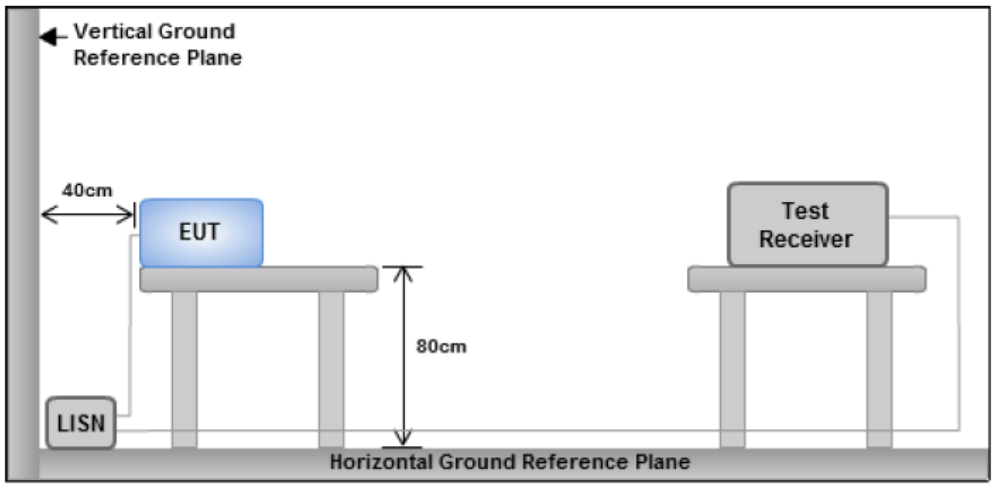
10.1 Conducted Emissions

Conducted Emission 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
FCC 15.207 RSS-GEN Section 8.8	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 µH/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 80 cm from EUT and at least 80 cm from other units and other metal planes

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	EUT was tested at 120VAC, 60Hz
Result	☒ Pass ☐ Fail

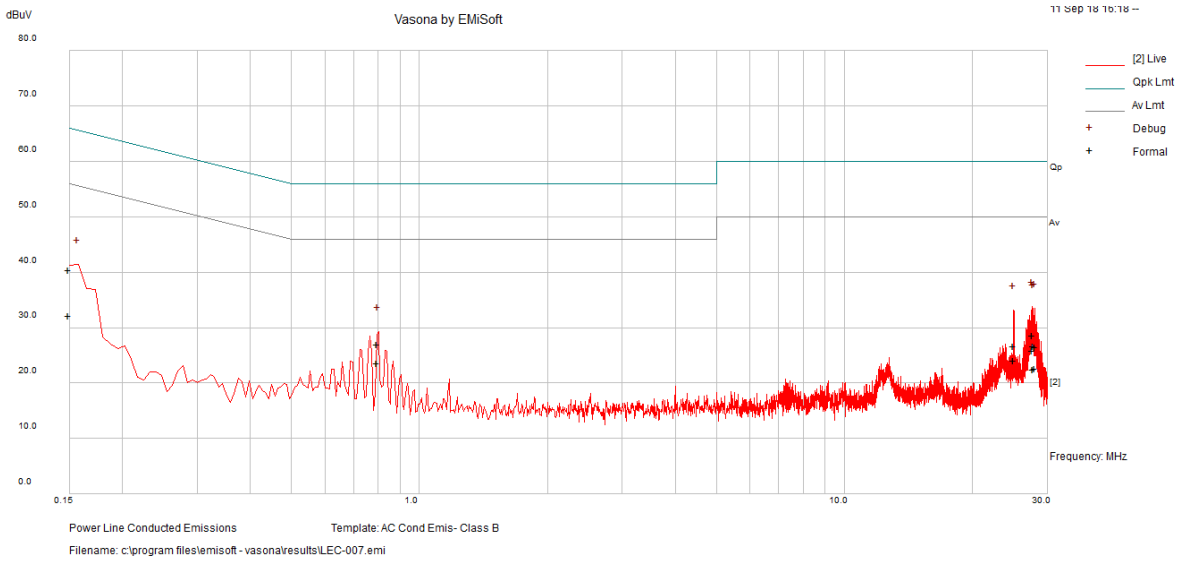
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Deon Dai at Conducted Emission test site.

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Deon Dai			
Test Date:	09/11/2018			
Remarks	AC Power Live			

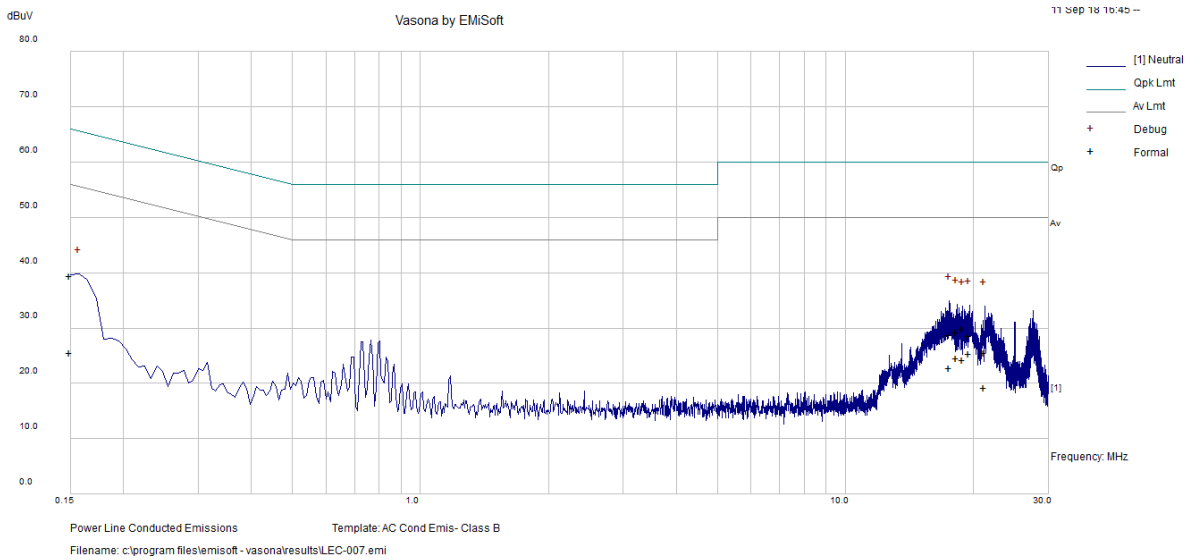


Live Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.15	31.03	9.33	0.05	40.41	Quasi Peak	Live	66	-25.59	Pass
27.71	18.68	9.42	0.58	28.68	Quasi Peak	Live	60	-31.32	Pass
28.12	16.45	9.42	0.59	26.46	Quasi Peak	Live	60	-33.54	Pass
27.85	16.72	9.42	0.58	26.72	Quasi Peak	Live	60	-33.28	Pass
0.80	17.7	9.32	0.04	27.06	Quasi Peak	Live	56	-28.94	Pass
25.06	16.73	9.41	0.54	26.68	Quasi Peak	Live	60	-33.32	Pass
0.15	22.82	9.33	0.05	32.2	Average	Live	56	-23.8	Pass
27.71	15.8	9.42	0.58	25.8	Average	Live	50	-24.2	Pass
28.12	12.61	9.42	0.59	22.62	Average	Live	50	-27.38	Pass
27.85	12.5	9.42	0.58	22.5	Average	Live	50	-27.5	Pass
0.80	14.3	9.32	0.04	23.66	Average	Live	46	-22.34	Pass
25.06	14.12	9.41	0.54	24.07	Average	Live	50	-25.93	Pass

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Deon Dai			
Test Date:	09/11/2018			
Remarks	AC Power, Neutral			

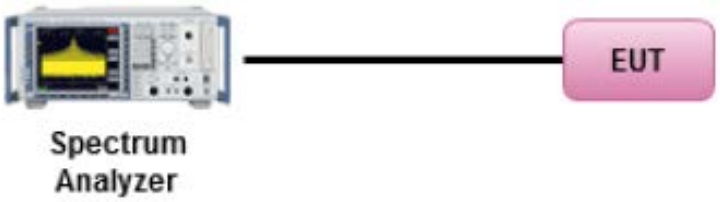


Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
17.59	18.98	9.43	0.42	28.83	Quasi Peak	Neutral	60	-31.17	Pass
18.32	19.43	9.44	0.43	29.3	Quasi Peak	Neutral	60	-30.7	Pass
0.15	30.15	9.33	0.05	39.53	Quasi Peak	Neutral	66	-26.47	Pass
19.60	18.71	9.45	0.45	28.62	Quasi Peak	Neutral	60	-31.38	Pass
18.91	20.04	9.44	0.44	29.92	Quasi Peak	Neutral	60	-30.08	Pass
21.27	15.53	9.47	0.48	25.48	Quasi Peak	Neutral	60	-34.52	Pass
17.59	12.91	9.43	0.42	22.75	Average	Neutral	50	-27.25	Pass
18.32	14.68	9.44	0.43	24.54	Average	Neutral	50	-25.46	Pass
0.15	16.18	9.33	0.05	25.56	Average	Neutral	56	-30.44	Pass
19.60	15.48	9.45	0.45	25.38	Average	Neutral	50	-24.62	Pass
18.91	14.33	9.44	0.44	24.21	Average	Neutral	50	-25.79	Pass
21.27	9.28	9.47	0.48	19.23	Average	Neutral	50	-30.77	Pass

10.2 Transmitter Power Output

Requirement(s):

<table>
<tr><td>Spec</td><td>Requirement</td><td>Applicable</td></tr>
<tr><td rowspan="2">FCC part74(e)
RSS-210</td><td>FCC §74.861 (e) :(1) The power may not exceed the following values.
(i) 54-72, 76-88, and 174-216 MHz bands: 50 mW EIRP
(ii) 470-608 and 614-698: 250 mW conducted power.</td><td>☒</td></tr>
<tr><td>RSS-210 Issue 9 August 2016 G3.1 Table G1
<table>
<tr><th>Freq Bands (MHz)</th><th>Transmit e.i.r.p (mW)</th><th>Authorized Bandwidth (kHz)</th><th>Freq Stability (ppm)</th></tr>
<tr><td>54-72
76-88
174-216</td><td>50</td><td>200</td><td>± 50</td></tr>
<tr><td>470-608
614-698</td><td>250</td><td>200</td><td>± 50</td></tr>
</table></td><td>☒</td></tr>
<tr><td>Test Setup</td><td colspan="2"> 
</td></tr>
<tr><td>Procedure</td><td colspan="2">Connect the EUT to spectrum analyzer and set the spectrum analyzer as follow:
-Center frequency: channel frequency under test;
- Resolution BandWidth (RBW): 1 MHz;
- Video BandWidth (VBW): ⩾1MHz;
- Detector: Peak hold;
- Span: 1MHz
Max hold the trace and record the peak value once the trace stabilized.</td></tr>
<tr><td>Test Date</td><td>08/31/2018</td><td>Environmental condition
Temperature 24°C
Relative Humidity 48%
Atmospheric Pressure 1009mbar</td></tr>
<tr><td>Remark</td><td colspan="2">NONE</td></tr>
<tr><td>Result</td><td colspan="2">☒ Pass ☐ Fail</td></tr>
</table>

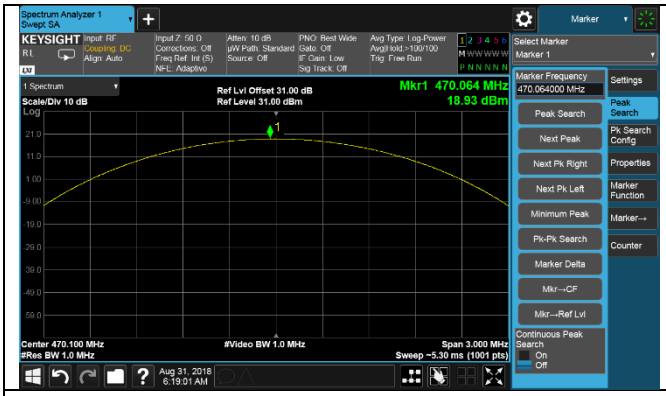
Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

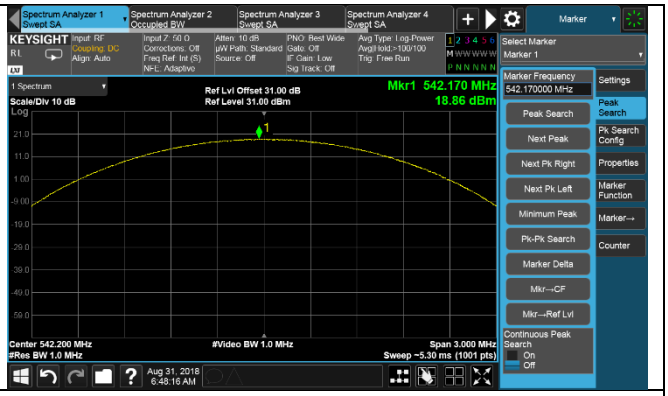
Test was done by *Deon Dai* at *RF test site*.

Output Power measurement results

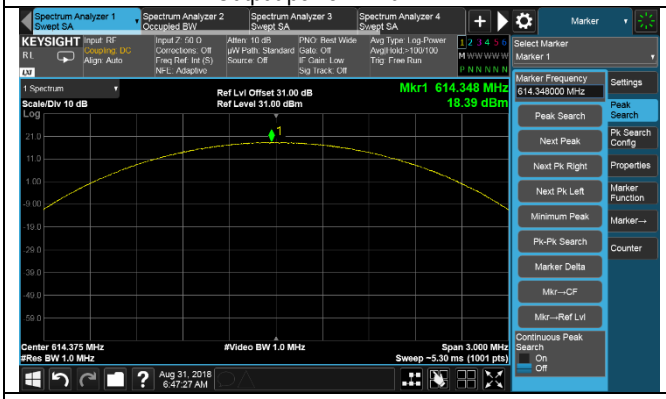
Type	Freq (MHz)	CH	Conducted power (dBm)	Limit (dBm)	Result
Output power	470.100	Low	18.93	24	Pass
	542.200	Mid	18.86	24	Pass
	614.375	High	18.39	24	Pass



Output power –470.1MHz



Output power – 542.2MHz



Output power - 614.375MHz

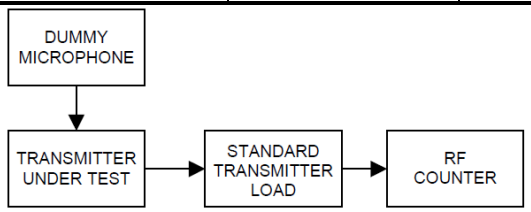
10.3 Frequency Stability

Requirement(s):

Spec	Requirement	Applicable
FCC part74(e) RSS-210	FCC §74.861(e) :(4) The frequency tolerance of the transmitter shall be 0.005 percent.	☒
	RSS-210 Issue 9 August 2016 G3.1 Table G1	☒

Freq Bands (MHz)	Transmit e.i.r.p (mW)	Authorized Bandwidth (kHz)	Freq Stability (ppm)
54-72 76-88 174-216	50	200	± 50
470-608 614-698	250	200	± 50

Test Setup



Procedure

According ANSI/TIA-603-E 2016 Section 2.2.2
-Connect the equipment as illustrated.
-Operate the equipment in standby conditions for 15 minutes before proceeding.
- Record the carrier frequency of the transmitter as MCF_{MHz}
-Calculate the ppm frequency error by the following:
ppm error =(MCF_{MHz} / ACF_{MHz}-1)*10^6
where
MCF_{MHz} is the Measured Carrier Frequency in MHz
ACF_{MHz} is the Assigned Carrier Frequency in MHz
-The value recorded in step d) is the carrier frequency stability.

According RSS GEN issue 5 April 2018 section 6.11:
-The reference temperature for radio transmitters is +20°C (+68°F).
-A hand-held device that is only capable of operating using internal batteries shall be tested at the battery's nominal voltage, and again at the battery's operating end-point voltage, which shall be specified by the equipment manufacturer. For this test, either a battery or an external power supply can be used.
-The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency-determining circuit element shall be made subsequent to this initial set-up.

Test Date	08/29/2018	Environmental condition	Temperature 24°C Relative Humidity 48% Atmospheric Pressure 1009mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

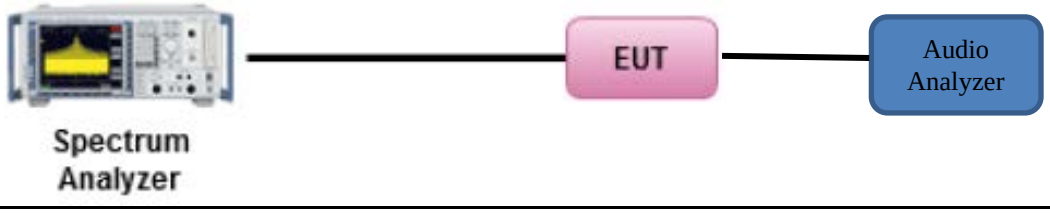
Test was done by *Deon Dai* at *RF test site*.

Type	Temperature	Voltage	Nominal Frequency (MHz)	Measured Frequency (MHz)	Measured frequency Error (PPM)	Limit (PPM)
Frequency Stability	-20	Vnorm	542.2	542.20009	0.16599	±50
	-10	Vnorm	542.2	542.20006	0.11066	±50
	0	Vnorm	542.2	542.19995	-0.09222	±50
	10	Vnorm	542.2	542.20007	0.12910	±50
	20	Vmin	542.2	542.19993	-0.12910	±50
		Vnorm	542.2	542.19991	-0.16599	±50
		Vmax	542.2	542.20007	0.12910	±50
	30	Vnorm	542.2	542.20006	0.11066	±50
	40	Vnorm	542.2	542.20005	0.09222	±50
	50	Vnorm	542.2	542.20009	0.16599	±50

10.4 Occupied Bandwidth and Emission Mask

Requirement(s):

<table>
<tr><th>Spec</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td rowspan="2">FCC part74H
RSS-210</td><td>FCC §74.861 (e) (5) The operating bandwidth shall not exceed 200 kHz.
FCC §74.861 (e) (6) The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:
(i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;
(ii) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;
(iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43 + 10log10 (mean output power in watts) dB.
FCC §74.861 (e) (7) Analog emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.1.2 of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Digital emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.2.2 (Figure 4) of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Beyond one megahertz below and above the carrier frequency, emissions shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08). The requirements of this paragraph (e)(7) shall not apply to applications for certification of equipment in these bands until nine months after release of the Commission's Channel Reassignment Public Notice, as defined in §73.3700(a)(2) of this chapter.</td><td>☒</td></tr>
<tr><td>RSS-210 Issue 9 August 2016 G3.1 Table G1 Occupied bandwidth:

<table><tr><th>Freq Bands (MHz)</th><th>Transmit e.i.r.p (mW)</th><th>Authorized Bandwidth (kHz)</th><th>Freq Stability (ppm)</th></tr><tr><td>54-72
76-88
174-216</td><td>50</td><td>200</td><td>± 50</td></tr><tr><td>470-608
614-698</td><td>250</td><td>200</td><td>± 50</td></tr></table>
The transmitter output spectrum shall be within the mask defined in EN 300 422 Clause 8.3.2.2.</td><td>☒</td></tr>
<tr><td>Test Setup</td><td colspan="2"> 
</td></tr>
<tr><td>Procedure</td><td colspan="2">KDB 971168 D01 Power Meas License Digital Systems v03r01 - Section4
Occupied Bandwidth
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency.
The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.</td></tr>
</table>

	e) Set the detection mode to peak, and the trace mode to max hold. f) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth. Emission Mask EN 300 422 Clause 8.3.2.1		
Test Date	09/06/2018	Environmental condition	Temperature 24°C Relative Humidity 48% Atmospheric Pressure 1009mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes (See below) ☒ N/A

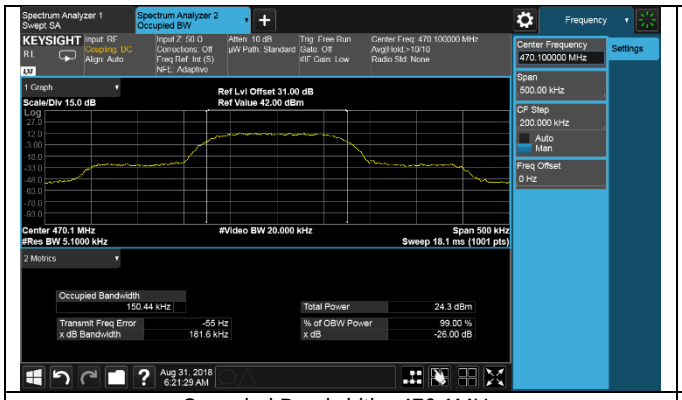
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by *Deon Dai* at *RF test site*.

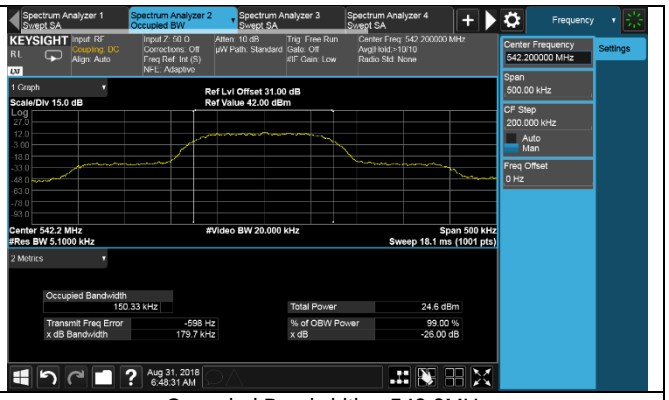
Bandwidth measurement results

Type	Frequency (MHz)	CH	99% bandwidth (kHz)	-26 dB Bandwidth (kHz)	Limit (kHz)
Occupied bandwidth	470.100	Low	150.44	181.6	200
	542.200	Mid	150.33	179.7	200
	614.375	High	151.86	181.5	200

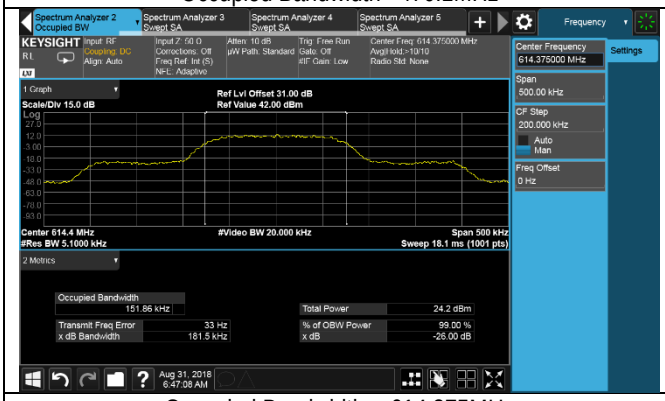
Bandwidth Measurement test plots



Occupied Bandwidth –470.1MHz

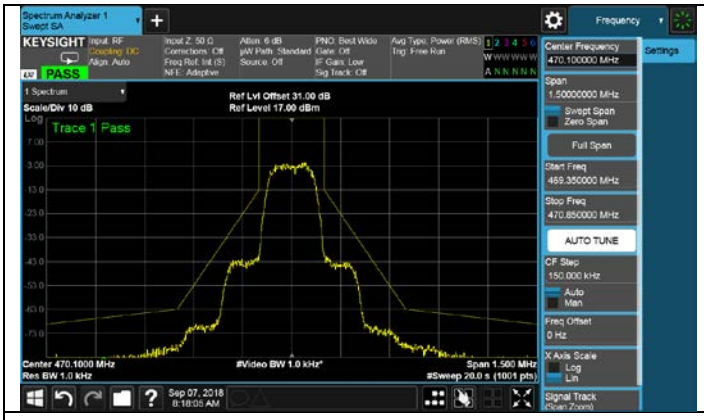
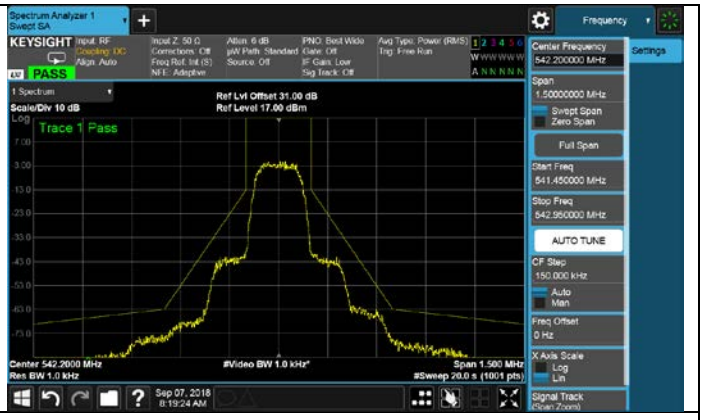


Occupied Bandwidth – 542.2MHz



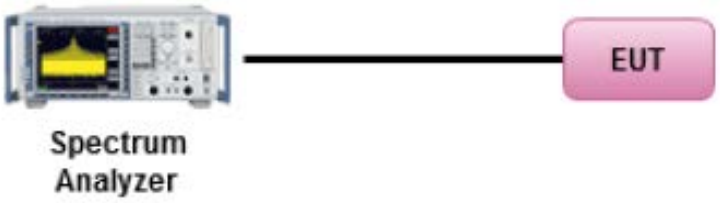
Occupied Bandwidth - 614.375MHz

Emission Mask Test Plots

	
Low Channel, Mask	Middle Channel, Mask
	
High Channel, Mask	-

10.5 Spurious Emissions at Antenna Terminal

Requirement(s):

Spec	Requirement	Applicable
FCC part74H RSS-210	FCC §74.861 (e) (6) (iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43 + 10log10 (mean output power in watts) dB. FCC §74.861 (e) (7) Analog emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.1.2 of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Digital emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.2.2 (Figure 4) of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Beyond one megahertz below and above the carrier frequency, emissions shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08). The requirements of this paragraph (e)(7) shall not apply to applications for certification of equipment in these bands until nine months after release of the Commission's Channel Reassignment Public Notice, as defined in §73.3700(a)(2) of this chapter.	☒
	Per RSS-210, Annex G, the transmitter unwanted emissions shall meet the requirements of ETSI EN 300 422-1 V1.4.2 (2011-08) section 8.4	☒
Test Setup		
Procedure	a) Connect the equipment as illustrated, with the notch filter by-passed. b) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line. c) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the Method of Measurement for Transmitters audio modulating circuit. d) Adjust the spectrum analyzer for the following settings: 1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz. 2) Video Bandwidth ≥3 times the resolution bandwidth. 3) Sweep Speed ≤2000 Hz per second. 4) Detector Mode = mean or average power. e) Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from: 1) The lowest radio frequency generated in the equipment to the carrier frequency minus the test bandwidth (see 1.3.4.4). 2) The carrier frequency plus the test bandwidth to a frequency less than 2 times the carrier frequency. f) Record the frequencies and levels of spurious emissions from step e). g) Unkey the transmitter. Replace the transmitter under test with the signal generator and adjust the signal level to reproduce the frequencies and levels of every spurious emission recorded in step f). Record the signal generator levels in dBm. h) Insert the notch filter. i) Adjust the spectrum analyzer for the following settings: 1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz. 2) Video Bandwidth ≥3 times the resolution bandwidth.	

	3) Sweep Speed ≤2000 Hz per second. 4) Detector Mode = mean or average power. j) Key the transmitter. Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from a frequency equal to 2 times the carrier frequency and to the tenth harmonic of the carrier frequency. k) Record the frequencies and levels of spurious emissions from step j). l) Unkey the transmitter. Replace the transmitter under test with the signal generator and adjust the signal level to reproduce the frequencies and levels of every spurious emission recorded in step k). Record the signal generator levels in dBm. m) The levels recorded in steps g) and l) are the absolute levels of conducted spurious emissions in dBm. The conducted spurious attenuation can be calculated by the following: Spurious attenuation (dB) =10 $\log_{10}$(TX Power in watts/0.001)-the levels in steps g) and l)			
Test Date	08/25/2018	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	24°C 48% 1009mbar
Remark	NONE			
Result	☒ Pass ☐ Fail			

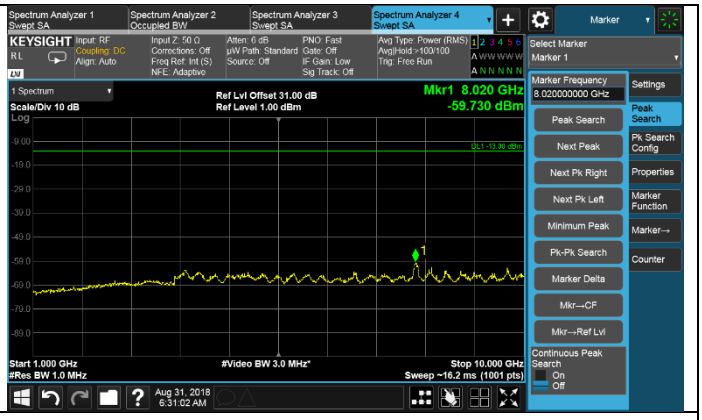
Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

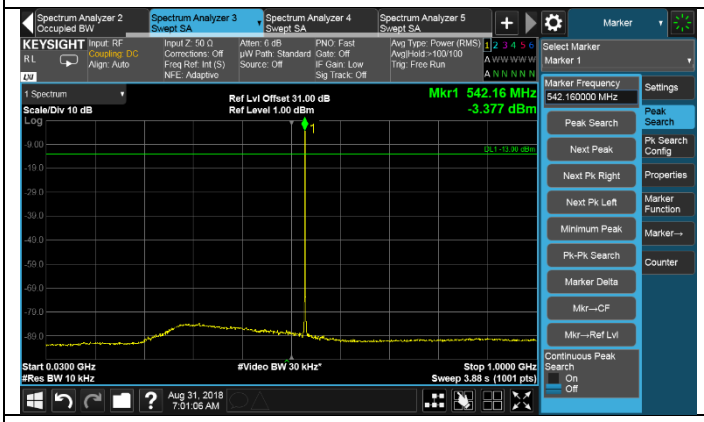
Test was done by *Deon Dai* at *RF test site*.

Test Plots

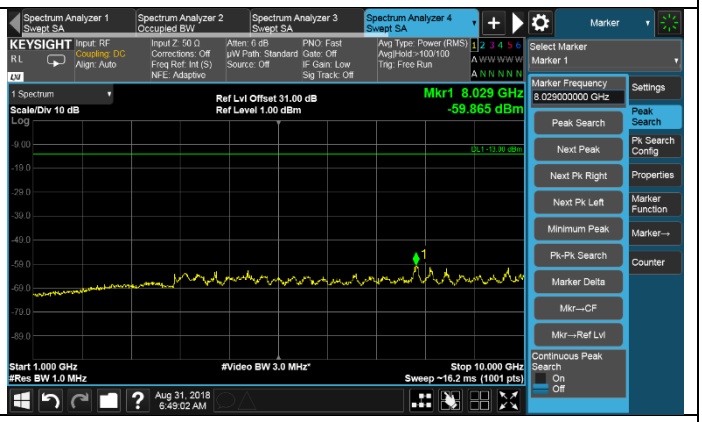
Low CH-Spurious Emission-Low



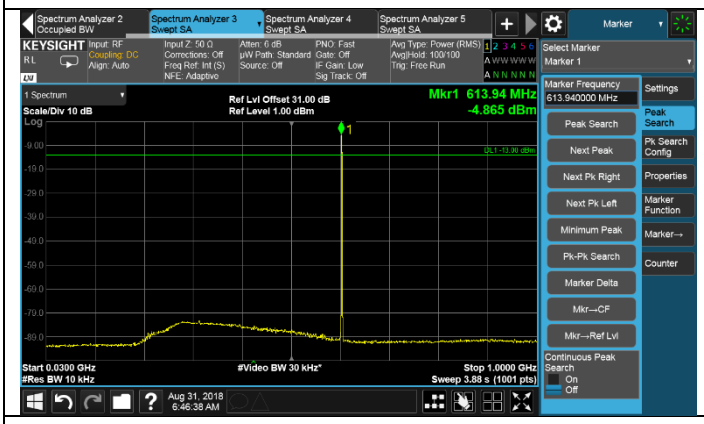
Low CH-Spurious Emission-High



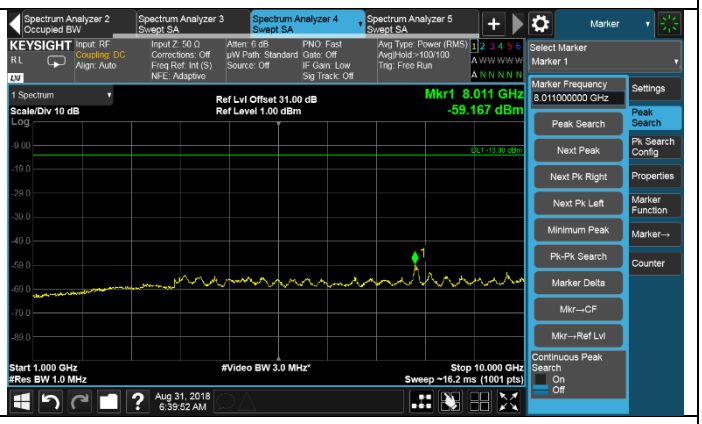
Mid CH-Spurious Emission-Low



Mid CH-Spurious Emission-High



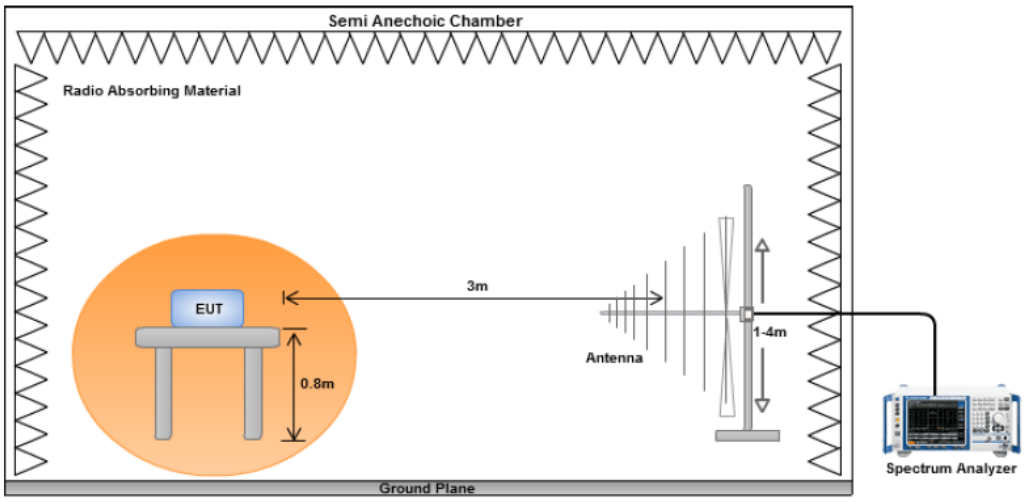
High CH-Spurious Emission-Low

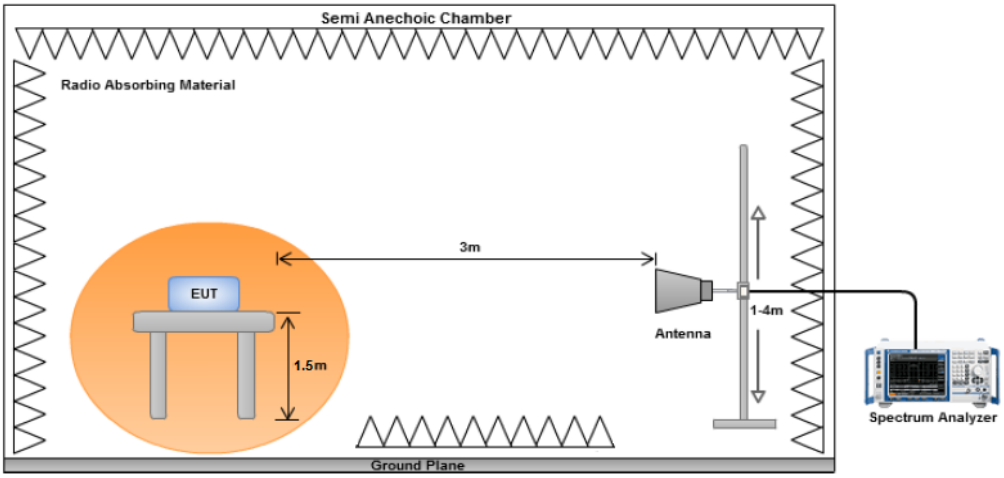


High CH-Spurious Emission-High

10.6 Field Strength of Spurious Radiated

Requirement(s):

Spec	Requirement	Applicable
FCC part74H RSS-210	FCC §74.861 (e) (6) (iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43 + 10log10 (mean output power in watts) dB. FCC §74.861 (e) (7) Analog emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.1.2 of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Digital emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.2.2 (Figure 4) of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Beyond one megahertz below and above the carrier frequency, emissions shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08). The requirements of this paragraph (e)(7) shall not apply to applications for certification of equipment in these bands until nine months after release of the Commission's Channel Reassignment Public Notice, as defined in §73.3700(a)(2) of this chapter.	☒
	Per RSS-210, Annex G, the transmitter unwanted emissions shall meet the requirements of ETSI EN 300 422-1 V1.4.2 (2011-08) section 8.4	☒
Test Setup	Below 1G set up  Above 1G set up	

<table>
<tr><td></td><td colspan="4"> 
</td></tr>
<tr><td>Procedure</td><td colspan="4">Substitution method:
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. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The centre of the substitution antenna should be approximately at the same location as the centre of the transmitter.
4. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained.
5. Steps 4 were repeated for the next frequency point, until all selected frequency points were measured.</td></tr>
<tr><td>Test Date</td><td>08/24/2018</td><td>Environmental condition</td><td>Temperature
Relative Humidity
Atmospheric Pressure</td><td>24°C
48%
1009mbar</td></tr>
<tr><td>Remark</td><td colspan="4">EUT was configured to high power setting</td></tr>
<tr><td>Result</td><td colspan="4">☒ Pass ☐ Fail</td></tr>
</table>

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by *Deon Dai* at *RF test site*.

Radiated Emission Test Results

Below 1G
Continue transmit mid channel

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
388.45	-59.75	149	102	V	388.45	-52.97	0	0.32	-53.29	-36	-17.29
584.77	-62.18	195	165	V	584.77	-56.22	0	0.45	-56.67	-36	-20.67
388.45	-71.37	244	159	H	388.45	-68.8	0	0.32	-69.12	-36	-33.12
584.77	-73.32	359	156	H	584.77	-66.37	0	0.45	-66.82	-36	-30.82

Note: Absolute Level (dBm) = Level (dBm) + Ant Gain (dBi) - Cable Loss (dB).

FCC limit is -13dBm, which is higher than RSS limit.

Above 1G

Low CH

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1410.3	-55.09	154	150	V	1410.3	-48.72	6.9	1.21	-43.03	-30	-13.03
1880.4	-58.98	197	155	V	1880.4	-52.99	8.6	1.59	-45.98	-30	-15.98
1410.3	-56.81	136	160	H	1410.3	-51.37	6.9	1.21	-45.68	-30	-15.68
1880.4	-61.07	198	156	H	1880.4	-54.15	8.6	1.59	-47.14	-30	-17.14

Mid CH

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1084.4	-52.84	214	165	V	1084.4	-48.18	5.27	1.15	-44.06	-30	-14.06
1626.6	-54.14	219	160	V	1626.6	-51.59	8.13	1.18	-44.64	-30	-14.64
1084.4	-55.88	184	158	H	1084.4	-50.48	5.27	1.15	-46.36	-30	-16.36
1626.6	-55.39	144	150	H	1626.6	-50.46	8.13	1.18	-43.51	-30	-13.51

High CH

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBm)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1228.75	-54.85	156	150	V	1228.75	-49.15	6.08	1.44	-44.51	-30	-14.51
1924.5	-61.44	147	150	V	1924.5	-54.79	7.82	1.76	-48.73	-30	-18.73
1228.75	-57.58	193	165	H	1228.75	-52.03	6.08	1.44	-47.39	-30	-17.39
1924.5	-61.47	322	164	H	1924.5	-56.07	7.82	1.76	-50.01	-30	-20.01

Note: Absolute Level (dBm) = Level (dBm) + Ant Gain (dBi) - Cable Loss (dB).

FCC limit is -13dBm, which is higher than RSS limit.

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Radiated Emissions						
EMI Test Receiver	ESIB 40	100179	06/03/2018	1 Year	06/03/2019	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	03/05/2018	1 Year	03/05/2020	☑
Horn Antenna (1-18GHz)	3115	10SL0059	11/09/2017	1 Year	11/09/2018	☑
Pre-Amplifier	LPA-6-30	11140711	02/19/2018	1 Year	07/19/2019	☑
RF Conducted Measurement						
Spectrum Analyzer	N9010A	MY51440112	10/27/2017	1 Year	10/27/2018	☑
Temperature/Humidity Chamber	1007H	61201	07/31/2018	1 Year	07/31/2019	☑
Waveform generator	33220A	MY50210206	09/22/2017	1 Year	09/22/2018	☑

Annex B. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		A1, A2, A3, A4, B1, B2, B3, B4, C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		Radio & Telecommunications Terminal Equipment: EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)		Phase I, Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
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 EMIEMS: 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