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RFA22A-WR2204TX
Issued: **March 21, 2022**

EMC Test Report

regarding

USA: CFR Title 47, Part 15.519 (Emissions)
Canada: ISED RSS-220 i1+A1 (Emissions)

for

SAT CTO

Category: UWB Transceiver

Judgments:
Aligns with FCC Part 15.519, ISED RSS-220
Testing Completed: March 10, 2022

TESTING
NVLAP LAB CODE 200129-0

Prepared for:

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Revision History

Rev. No.	Date	Details	Revised By
r0	March 21, 2022	Initial Release.	J. Brunett
r1	April 4, 2022	Update GNSS Plots.	J. Brunett

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1 Test Report Scope and Limitations

1.1 Laboratory Authorization

Test Facility description and attenuation characteristics are on file with the FCC Laboratory, Columbia, Maryland (FCC Reg. No: US5348 and US5356) and with ISED Canada, Ottawa, ON (File Ref. No: 3161A and 24249). Amber Helm Development L.C. holds accreditation under NVLAP Lab Code 200129-0.

1.2 Report Retention

For equipment verified to comply with the regulations herein, the manufacturer is obliged to retain this report with the product records for the life of the product, and no less than ten years. A copy of this Report will remain on file with this laboratory until April 2032.

1.3 Subcontracted Testing

This report does not contain data produced under subcontract.

1.4 Test Data

This test report contains data included within the laboratory's scope of accreditation. Any data in this report that is not covered under the laboratory's scope is clearly identified.

1.5 Limitation of Results

The test results contained in this report relate only to the item(s) tested. Any electrical or mechanical modification made to the test item subsequent to the test date shall invalidate the data presented in this report. Any electrical or mechanical modification made to the test item subsequent to this test date shall require reevaluation.

1.6 Copyright

This report shall not be reproduced, except in full, without the written approval of Amber Helm Development L.C.

1.7 Endorsements

This report shall not be used to claim product endorsement by any accrediting, regulatory, or governmental agency.

1.8 Test Location

The EUT was fully tested by **Amber Helm Development L.C.**, headquartered at 92723 Michigan Hwy-152, Sister Lakes, Michigan 49047 USA. Table 1 lists all sites employed herein. Specific test sites utilized are also listed in the test results sections of this report where needed.

Table 1: Test Site List.

Description	Location	Quality Num.
OATS (3 meter)	3615 E Grand River Rd., Williamston, Michigan 48895	OATSC

1.9 Traceability and Equipment Used

Pertinent test equipment used for measurements at this facility is listed in Table 2. The quality system employed at Amber Helm Development L.C. has been established to ensure all equipment has a clearly identifiable classification, calibration expiry date, and that all calibrations are traceable to the SI through NIST, other recognized national laboratories, accepted fundamental or natural physical constants, ratio type of calibration, or by comparison to consensus standards.

Table 2: Equipment List.

Description	Manufacturer/Model	SN	Quality Num.	Cal/Ver By / Date Due
Spectrum Analyzer	R & S / FSV30	101660	RSFSV30001	RS / Apr-2023
BNC-BNC Coax	WRTL / RG58/U	001	CAB001-BLACK	AHD / Sept-2022
3.5-3.5MM Coax	PhaseFlex / PhaseFlex	001	CAB015-PURP	AHD / Jul-2022
Shielded Loop Antenna	EMCO / 6502	9502-2926	EMCOLOOP1	Keysight / Aug-2022
Biconical	EMCO / 93110B	9802-3039	BICEMCO01	Keysight / Aug-2023
Log Periodic Antenna	EMCO / 3146	9305-3614	LOGEMCO01	Keysight / Aug-2023
Quad Ridge Horn	Singer / A6100	C35200	HQR1TO18S01	Keysight / Aug-2022
Harmonic Mixer	Hewlett Packard / 11970A	MY3003A1226	MIX26TO4001	AHD / Mar-2025
K-Band Horn	JEF / NRL Std.	001	HRNK01	AHD / Jul-2022
Ka-Band Horn	JEF / NRL Std.	001	HRNKA001	AHD / Jul-2022

2 Test Specifications and Procedures

2.1 Test Specification and General Procedures

The goal of Lear Corporation is to demonstrate that the Equipment Under Test (EUT) complies with the Rules and/or Directives below. Detailed in this report are the results of testing the Lear Corporation SAT CTO for compliance to:

Country/Region	Rules or Directive	Referenced Section(s)
United States	Code of Federal Regulations	CFR Title 47, Part 15.519
Canada	ISED Canada	ISED RSS-220 i1+A1

It has been determined that the equipment under test is subject to the rules and directives above at the date of this testing. In conjunction with these rules and directives, the following specifications and procedures are followed herein to demonstrate compliance (in whole or in part) with these regulations.

ANSI C63.4:2014	"Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
ANSI C63.10:2013	"American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
TP0102RA	"AHD Internal Document TP0102 - Radiated Emissions Test Procedure"
ISED Canada	"The Measurement of Occupied Bandwidth"

3 Configuration and Identification of the Equipment Under Test

3.1 Description and Declarations

The equipment under test is an automotive UWB Transceiver. The EUT is approximately 4 x 4 x 1.5 cm in dimension, and is depicted in Figure 1. It is powered by 13.4 VDC vehicle power system. In use, this device is permanently installed in a motor vehicle. Table 3 outlines provider declared EUT specifications.

Figure 1: Photos of EUT.

Table 3: EUT Declarations.

General Declarations	
Equipment Type:	UWB Transceiver
Country of Origin:	Spain
Nominal Supply:	13.4 VDC
Oper. Temp Range:	-40^oC to $+85^o$C
Frequency Range:	$3711 - 4432$ MHz
Antenna Dimension:	10 cm
Antenna Type:	Integral
Antenna Gain:	Integral
Number of Channels:	1
Channel Spacing:	None
Alignment Range:	Not Declared
Type of Modulation:	PPM
United States	
FCC ID Number:	KOBJYU22A
Classification:	UWB
Canada	
IC Number:	3521A-JYU22A
Classification:	Ultra-Wideband (UWB) Device

3.1.1 EUT Configuration

The EUT is configured for testing as depicted in Figure 2.

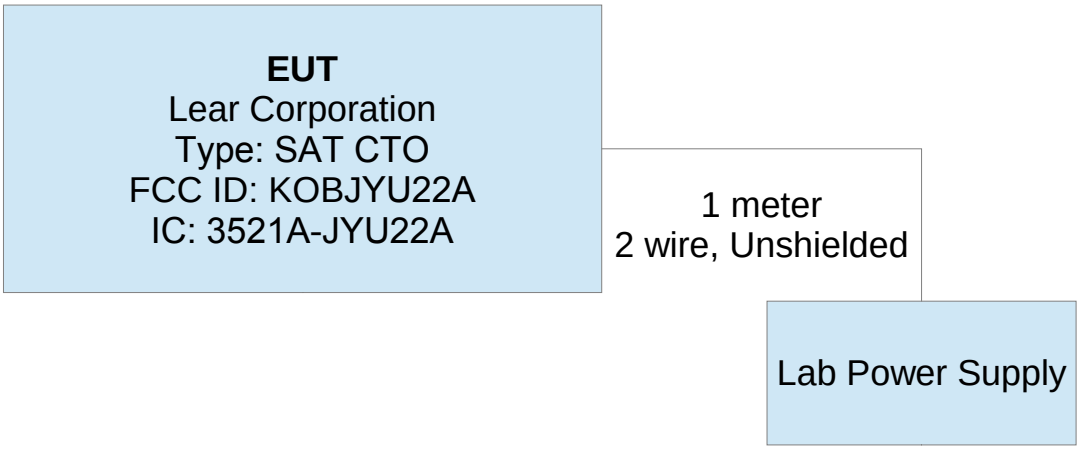


Figure 2: EUT Test Configuration Diagram.

3.1.2 Modes of Operation

There is only a single mode of operation for this device, as a UWB transceiver used to triangulate position of a paired keyfob. In normal operation the EUT will only send a single PPM UWB frame as an acknowledgement response to a paired UWB keyfob. When paired in normal operation, only two UWB acknowledgements transmissions occur spaced approximately 20 ms apart due to remote manual activated inquiry via the paired keyfob

3.1.3 Variants

There is only a single variant of the EUT, as tested.

3.1.4 Test Samples

Multiple samples of the EUT were provided for testing, including normal operating samples paired with a corresponding UWB keyfob for encoding testing, and software modified samples that transmitted repeatedly at a higher than normal rate (once every 10 ms) when power is applied.

3.1.5 Functional Exerciser

EUT functionality was verified by observation of transmitted signal.

3.1.6 Modifications Made

There were no modifications made to the EUT by this laboratory.

3.1.7 Production Intent

The EUT appears to be a production ready sample.

3.1.8 Declared Exemptions and Additional Product Notes

The EUT is permanently installed in a transportation vehicle. As such, digital emissions are exempt from US and Canadian digital emissions regulations (per FCC 15.103(a) and IC correspondence on ICES-003).

4 Emissions

4.1 General Test Procedures

4.1.1 Radiated Test Setup and Procedures

Radiated electromagnetic emissions from the EUT are first pre-scanned in our screen room. Spectrum and modulation characteristics of all emissions are recorded. Instrumentation, including spectrum analyzers and other test equipment as detailed in Section 1.8 are employed. After pre-scan, emission measurements are made on the test site of record. If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in relevant test standards are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 3. All intentionally radiating elements that are not fixed-mounted in use are placed on the test table lying flat, on their side, and on their end (3-axes) and the resulting worst case emissions are recorded. If the EUT is fixed-mounted in use, measurements are made with the device oriented in the manner consistent with installation and then emissions are recorded. If the EUT exhibits spurious emissions due to internal receiver circuitry, such emissions are measured with an appropriate carrier signal applied.

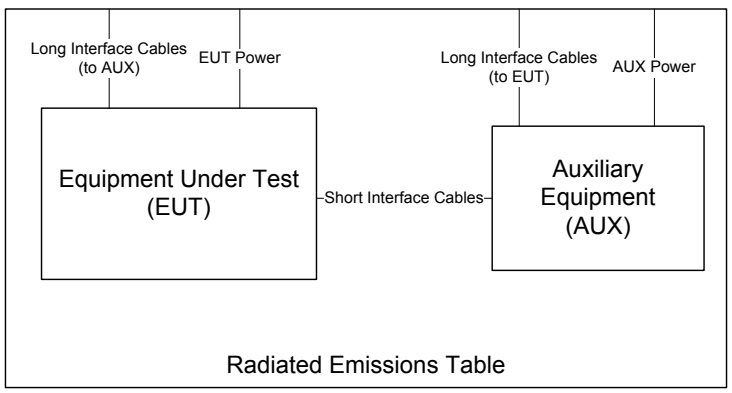


Figure 3: Radiated Emissions Diagram of the EUT.

For devices with intentional emissions below 30 MHz, a shielded loop antenna and/or E-field and H-Field broadband probes are used depending on the regulations. Shielded loops are placed at a 1 meter receive height at the desired measurement distance. For exposure in this band, the broadband probes employed are 10cm diameter single-axis shielded transducers and measurements are repeated and summed over three axes.

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. For both horizontal and vertical polarizations, the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected. The EUT is then rotated through 360° in azimuth until the highest emission is detected. The test antenna is then raised and lowered one last time from 1 to 4 m and the worst case value is recorded. Emissions above 1 GHz are characterized using standard gain or broadband ridge-horn antennas on our OATS with a 4×5 m rectangle of ECCOSORB absorber covering the OATS ground screen and a 1.5m table height. Care is taken to ensure that test receiver resolution and video bandwidths meet the regulatory requirements, and that the emission bandwidth of the EUT is not reduced. Photographs of the test setup employed are depicted in Figure 4.

Where regulations allow for direct measurement of field strength, power values (dBm) measured on the test receiver / analyzer are converted to dBμV/m at the regulatory distance, using

$$E_{dist} = 107 + P_R + K_A - K_G + K_E - C_F$$

where P_R is the power recorded on spectrum analyzer, in dBm, K_A is the test antenna factor in dB/m, K_G is the combined pre-amplifier gain and cable loss in dB, K_E is duty correction factor (when applicable) in dB, and C_F is a distance conversion (employed only if limits are specified at alternate distance) in dB. This field strength value is then compared with the regulatory limit. If effective isotropic radiated power (EIRP) is computed, it is computed as

$$EIRP(dBm) = E_{3m}(dB\mu V/m) - 95.2.$$

When presenting data at each frequency, the highest measured emission under all possible EUT orientations (3-axes) is reported.

When microwave measurements are made at a range different than the regulatory distance or made at close-range to improve receiver sensitivity, the reading is corrected back to the regulatory distance. This is done using a 20 dB/decade field behavior as dictated by the test procedures. When measurements are made in the near-field, the near-field/far-field boundary (N/F) is reported. It is computed as

$$N/F = 2D^2/\lambda$$

where D is the maximum dimension of the transmitter or receive antenna, and λ is the wavelength at the measurement frequency. Typically for high frequency measurements the receive antenna is connected to test receiver / analyzer through an external mixer. In this case, cable loss, IF amplifier gain, and mixer conversion losses are corrected for in the data table, or directly in the analyzer.

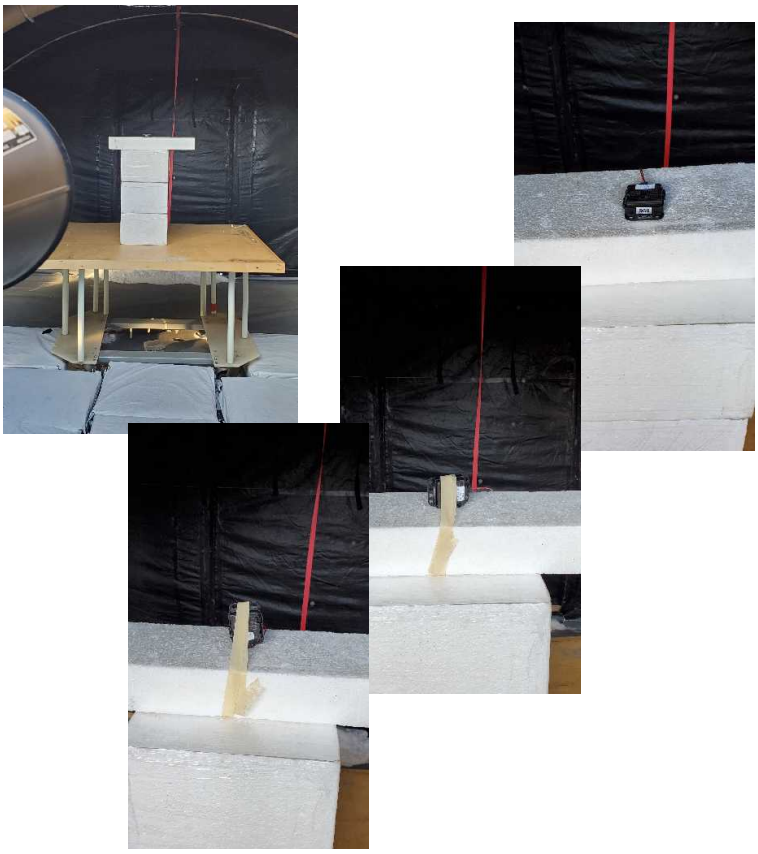


Figure 4: Radiated Emissions Test Setup Photograph(s).

4.1.2 Conducted Emissions Test Setup and Procedures

4.1.3 Power Supply Variation

Tests at extreme supply voltages are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report.

4.2 Intentional Emissions

4.2.1 Fundamental Emission Pulsed Operation

The details and results of testing the EUT for pulsed operation are summarized in Table 4.

Table 4: Pulsed Emission Characteristics (Duty Cycle).

Frequency Range	Det	IFBW	VBW
f > 1 000 MHz	Pk	28 MHz	28 MHz

Test Date: 3-Mar-22
Test Engineer: J. Nantz
EUT Normal Operating
Meas. Distance: 60 cm

Pulsed Operation / Duty Cycle									
Transmit Mode	Voltage (V)	Oper. Freq (MHz)	Min. Cycle Time (ms)	Total Off-Time/s* (ms)	EN 302-065 Total Off-Time/s Limit (ms)	Mean Off-Time Limit (ms)	On-Time** (ms)	EN 302-065 On-Time LDC Limit (ms)	Exposure Duty Correction*** (dB)
PPM (Normal)	13.4	3993.6	20.80	999.36	950.00	38.00	0.65	5.00	15.1

* Total Off-time/sec is equal to 1000ms – duration of the two frames observed due to a single manual activation per second (maximum possible repetition rate of system unlock response time observed by test laboratory > 1 sec).

** Maximum two-frame on-time measured.

*** Worst-case Exposure duty cycle correction (due to burst-modulated carrier) computed as 10*Log(On-Time/ Min Cycle-Time). Overestimate due to finite transmission length of only two frames in the actual paired use system.

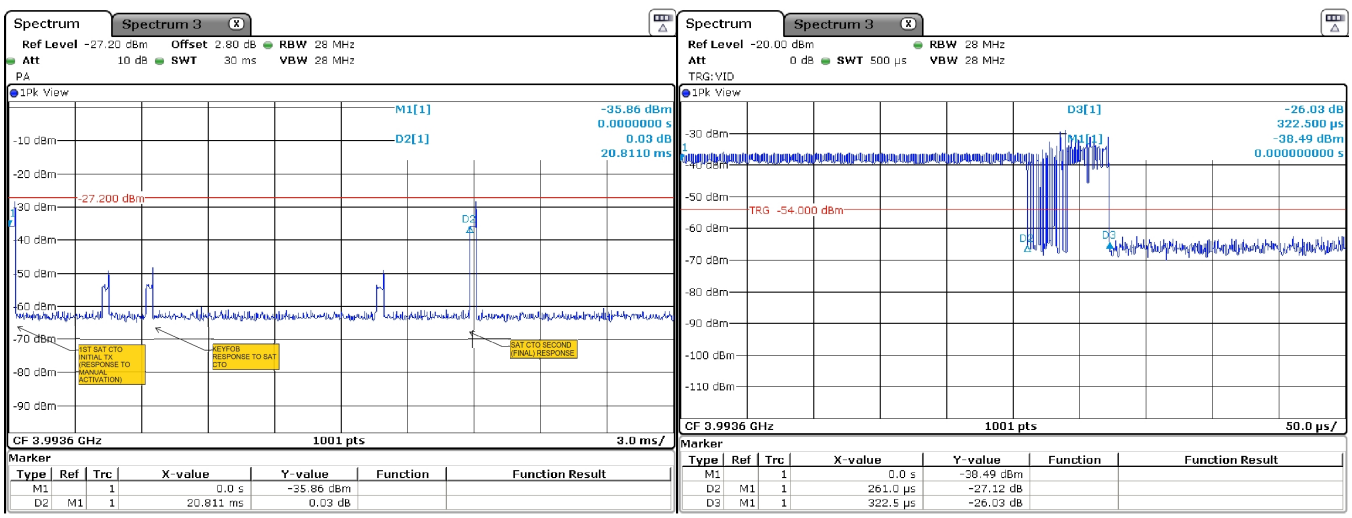


Figure 5: Pulsed Emission Characteristics (Duty Cycle).

4.2.2 Fundamental Emission Bandwidth

Emission bandwidth (EBW) of the EUT is measured with the device placed in the test mode(s) with the shortest available frame length and minimum frame spacing. Radiated emissions are recorded following the test procedures listed in Section 2.1. The 20 dB EBW is measured as the max-held peak-detected signal when the IF bandwidth is greater than or equal to 1% of the receiver span. For complex modulations other than ASK and FSK, the 99% emission bandwidth per IC test procedures has a different result, and is also separately reported.The results of EBW testing are summarized in Table 5. Plots showing measurements employed to obtain the emission bandwidth reported are provided in Figure 6.

Table 5: Intentional Emission Bandwidth.

Frequency Range	Det	IFBW	VBW	Span		
f > 1 000 MHz	Pk	1 MHz	3 MHz	1 GHz	**Test Date:**	2-Mar-22
					Test Engineer:	J. Nantz
					EUT	Lear SAT CTO
					Meas. Distance:	60 cm

Occupied Bandwidth											
Transmit Mode	Voltage (V)	Oper. Freq (MHz)	99% OBW (MHz)	10 dB EBW (MHz)	10 dB EBW Limit (MHz)	fL (MHz)	fL Limit (MHz)	fH (MHz)	fH Limit (MHz)	fmax (MHz)	Pass/Fail
Normal PPM	13.4	3993.6	735.1	721.4	500.0	3711.0	3100.0	4432.4	10600.0	4114.9	Pass

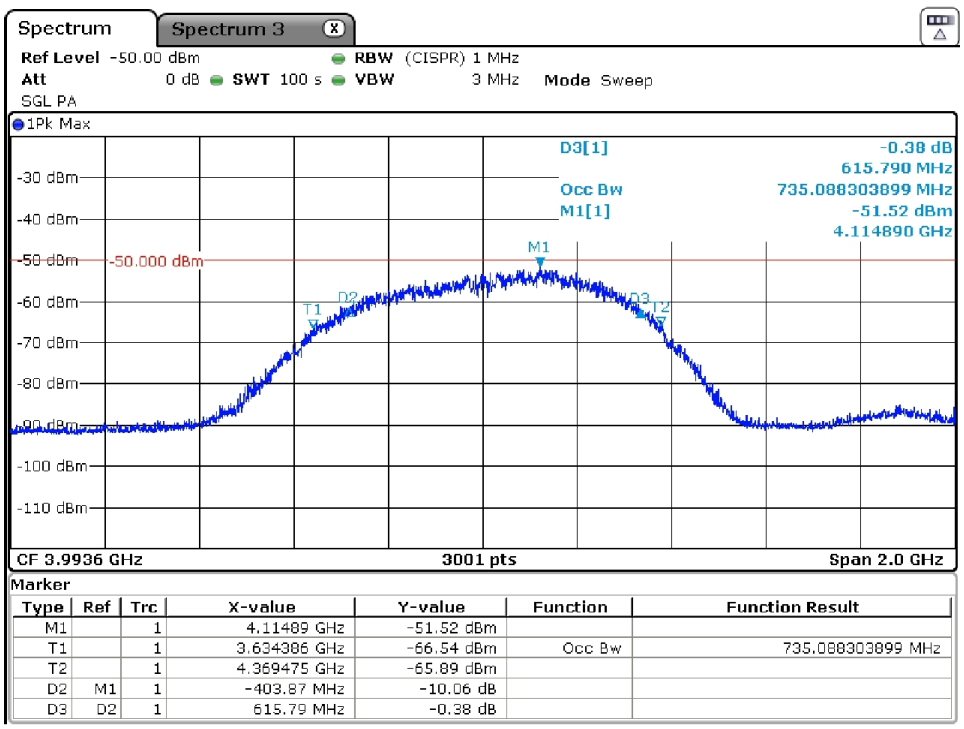


Figure 6: Intentional Emission Bandwidth.

4.2.3 Fundamental Emission

Following the test procedures listed in Section 2.1, field emissions measurements are made on the EUT for both Horizontal and Vertically polarized coupling fields. The EUT's loop antenna(s) are measured along all three axes, including when the EUT loop axes are aligned in the same axis as the test loop and aligned coplanar (in the same plane) with the test loop antenna. Table 6 details the results of these measurements.

Table 6: Fundamental Radiated Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth
f > 1 000 MHz	Pk/RMS	1 MHz	3 MHz

Test Date:	3-Mar-22
Test Engineer:	J. Nantz
EUT:	LEAR SAT CTO
Mode:	10ms Rep Pulses
Meas. Distance:	3m

FCC/IC

	RX BW		Frequency Band		Antenna + Cable***					Rx. Power		Range Correction*				E-Field @ DR		EIRP**						
	IFBW	VBW	Start	Stop	Quality	Pol.	Dim.	Ka	Kg	Pk	RMS	MR	DR	N/F	CF	Pk	RMS	Pk	RMS	50 MHz Pk Lim	FCC RMS Lim.	ISED RMS Lim.	Pass	
#	(MHz)	(MHz)	MHz	MHz	Number	H/V	cm	dB/m	dB	dBuV/m		m	m	m	dB	dBuV/m		dBm		dBm	dBm	dBm	dB	Comments
1	- PEAK Power (Pk Detector, 1 GHz Span, 1001 Freq Samples, 1 sec sweep, Max-Held)																							
2	28	28.0	4114.0	4114.0	HQR1TO18S01	H/V	22.0	46.6	17.3			3.0	3.0	1.3		**86.9**								
3	50	50.0	4114.0	4114.0	HQR1TO18S01	H/V	22.0	46.6	17.3			3.0	3.0	1.3				-3.3					**3.3**	max all
4																								
5	- RMS Power (RMS Detector, 1 GHz Span, 1001 Freq Samples, 1 sec sweep, Max Held)																							
6	20	13.4	4114.0	4114.0	HQR1TO18S01	H/V	22.0	46.6	17.3			3.0	3.0	1.3		65.8	52.25		-43.0		-41.3	-41.3****	**1.7**	max all
7																								

	Env.		Frequency Band		Antenna + Cable***					Rx. Power		Range Correction*				E-Field @ DR		EIRP**						
	Temp.	Volt.	Start	Stop	Quality	Pol.	Dim.	Ka	Kg	Pk	RMS	MR	DR	N/F	CF	Pk	RMS	Pk	RMS	50 MHz Pk Lim	FCC RMS Lim.	ISED RMS Lim.	Pass	
#	(C)	(V)	MHz	MHz	Number	H/V	cm	dB/m	dB	dBuV/m		m	m	m	dB	dBuV/m		dBm		dBm	dBm	dBm	dB	Comments
11	20	11.4	4114.0	4114.0	HQR1TO18S01	H/V	22.0	46.6	17.3			3.0	3.0	1.3		85.4								
12	20	13.4	4114.0	4114.0	HQR1TO18S01	H/V	22.0	46.6	17.3			3.0	3.0	1.3		85.3								
13	20	15.4	4114.0	4114.0	HQR1TO18S01	H/V	22.0	46.6	17.3			3.0	3.0	1.3		85.3								
14																								
15																								

* CF is computed assuming a 20 dB/decade Decay Rate. DR is the regulatory Desired Range measurement distance. MR is Measurement Range, which is reduced from DR to achieve necessary SNR.

** EIRP is computed from field strength at 3 meter distance.

*** Dimension of antenna is taken to be larger of the test antenna and the EUT antenna; EUT antenna is 3cm in dimension.

**** ISED Correspondence regarding this product was granted use at proposed avg power rating under RSS-220 Hand-Held Regulations. See correspondence included in this application.

Equipment Used: RSFSV30001

EIRP Peak (50 MHz) = EIRP Pk (28 MHz) + 20 Log10(50 Mhz / 28 MHz)

4.3 Unintentional Emissions

4.3.1 Transmit Chain Spurious Emissions

The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 7. Following the test procedures listed in Section 2.1, field emissions measurements are made on the EUT for both Horizontal and Vertically polarized coupling fields. The EUT's loop antenna(s) are measured when the EUT loop axes placed in all three axes, including when they are aligned along the same axis as the test loop antenna and are aligned coplanar with the test loop antenna. For all arrangements, test loop is rotated for maximum field. The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 7. Measurements are performed to 10 times the highest fundamental operating frequency.

Table 7(a): Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth
F < 960 MHz	Pk/QPk	120 kHz	300 kHz
F > 960 MHz	RMS Detector: 1 GHz Span / 1001 Freq Samples; 1 sec sweep/GHz Span (i.e. 1ms RMS integration time per bin); Max Held		
	Pk Detector: 1 GHz Span / 1001 Freq Samples; 1 sec sweep/GHz Span (i.e. 1ms RMS integration time per bin); Max Held		

Test Date:	22-Mar-17
Test Engineer:	J. Nantz
EUT:	LEAR SAT CTO
Mode:	10ms Rep Pulses
Meas. Distance:	As Noted

FCC/IC

#	Env. Temp. (C)	Env. Volt. (V)	Frequency Band Start MHz	Frequency Band Stop MHz	Antenna + Cable*** Quality Number	Pol. H/V	Dim. cm	Ka dB/m	Kg dB	Rx. Power Pk dBuV/m	Rx. Power RMS dBuV/m	MR m	DR m	N/F m	CF dB	E-Field @ DR***** Pk dBuV/m	E-Field @ DR***** Qpk dBuV/m				E-Field Limit Pk dBuV/m	E-Field Limit Qpk dBuV/m	Pass dB	Comments
1	7	13.4	30.0	88.0	BICEMCO01	H/V	22.0	16.9	35.0			3.0	3.0	0.0		33.4						40.0	6.6	background
2	7	13.4	88.0	216.0	BICEMCO01	H/V	22.0	16.9	35.0			3.0	3.0	0.1		31.7						43.5	11.8	background
3	7	13.4	216.0	960.0	LOGEMCO01	H/V	22.0	20.1	29.9			3.0	3.0	0.3		36.7						46.0	9.3	background
#	Env. Temp. (C)	Env. Volt. (V)	Frequency Band Start MHz	Frequency Band Stop MHz	Antenna + Cable*** Quality Number	Pol. H/V	Dim. cm	Ka dB/m	Kg dB	Rx. Power Pk dBuV/m	Rx. Power RMS dBuV/m	MR m	DR m	N/F m	CF dB	E-Field @ DR***** Pk dBuV/m	E-Field @ DR***** RMS dBuV/m	EIRP** Pk dBm	EIRP** RMS dBm	EIRP** 1MHz Pk Lim dBm	FCC RMS Lim. dBm	ISED RMS Lim. dBm	Pass dB	Comments
4	GPS Restricted Band Emissions																							
5	20	13.4	1164.0	1240.0	HQR1TO18S01	H/V	22.0	25.2	-0.4			0.6	3.0	0.4	14.0	-2.3		-97.5			-85.3	-85.3	12.2	max all, noise
6	20	13.4	1559.0	1610.0	HQR1TO18S01	H/V	22.0	21.9	-0.4			0.6	3.0	0.5	14.0	-1.5		-96.7			-85.3	-85.3	11.4	max all, noise
7																								
8	Harmonic / Spurious UWB Emissions																							
9	20	13.4	960.0	1610.0	HQR1TO18S01	H/V	22.0	27.6	19.3			0.6	3.0	0.5	14.0	11.4	2.4	-83.8	-92.8	-34.0	-75.3	-75.3	17.5	max all, noise
10	20	13.4	1610.0	1990.0	HQR1TO18S01	H/V	22.0	21.7	19.1			0.6	3.0	0.6	14.0	11.8	3.4	-83.4	-91.8	-34.0	-63.3	-70.0	21.8	max all, noise
11	20	13.4	1990.0	3100.0	HQR1TO18S01	H/V	22.0	20.6	18.2			0.6	3.0	1.0	14.0	13.4	4.1	-81.8	-91.1	-34.0	-61.3	-70.0	21.1	max all, noise
12	20	13.4	3100.0	3711.0	HQR1TO18S01	H/V	22.0	27.4	18.0			0.6	3.0	1.2	14.0	16.1	5.5	-79.1	-89.7	-34.0	-41.3	-41.3****	45.1	max all
13	20	13.4	4327.0	4750.0	HQR1TO18S01	H/V	22.0	52.3	17.3			0.6	3.0	1.5	14.0	28.7	17	-66.5	-78.2	-34.0	-41.3	-41.3****	32.5	max all
14	20	13.4	4750.0	10600.0	HQR1TO18S01	H/V	15.0	35.3	29.1			0.6	3.0	1.6	14.0	18.7	7.6	-76.5	-87.6	-34.0	-41.3	-41.3	42.5	max all, noise
15	20	13.4	10600.0	18000.0	HQR1TO18S01	H/V	15.0	34.3	23.5			0.6	3.0	2.7	14.0	23.1	12.4	-72.1	-82.8	-34.0	-61.3	-61.3	21.5	max all, noise
16	20	13.4	18000.0	26500.0	HRNK001	H/V	10.2	33.7	36.5			0.3	3.0	1.8	20.0	29.8	19.3	-65.4	-75.9	-34.0	-61.3	-61.3	14.6	max all, noise
17	20	13.4	26500.0	40000.0	HRNKA001	H/V	9.2	37.2	12.5			0.2	3.0	2.3	23.5	42.3	29.7	-52.9	-65.5	-34.0	-61.3	-61.3	**4.2**	max all, noise
18																								

* CF is computed assuming a 20 dB/decade Decay Rate. DR is the regulatory Desired Range measurement distance. MR is Measurement Range, which is reduced from DR to achieve necessary SNR.

** EIRP is computed from field strength at 3 meter distance.

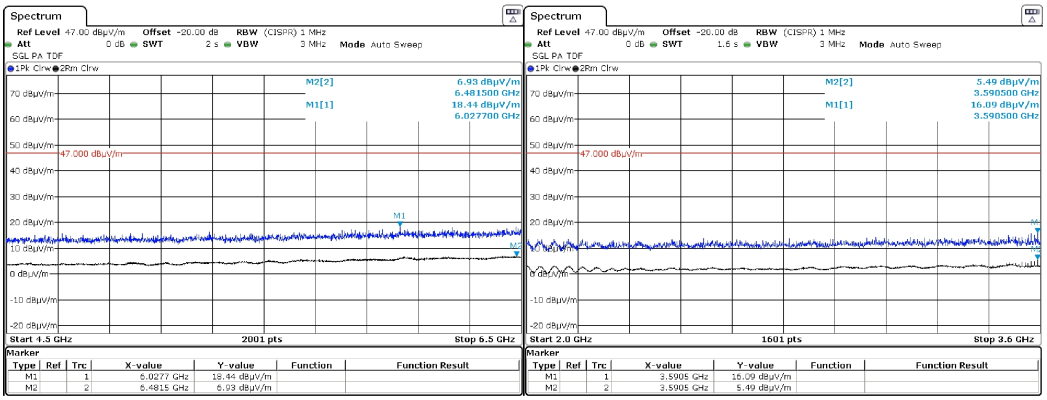
*** Dimension of antenna is taken to be larger of the test antenna and the EUT antenna; EUT antenna is 3cm in dimension.

**** ISED Correspondence regarding this particular product permitted use at proposed power rating under RSS-220 Hand-Held Regulations. See correspondence included in this application.

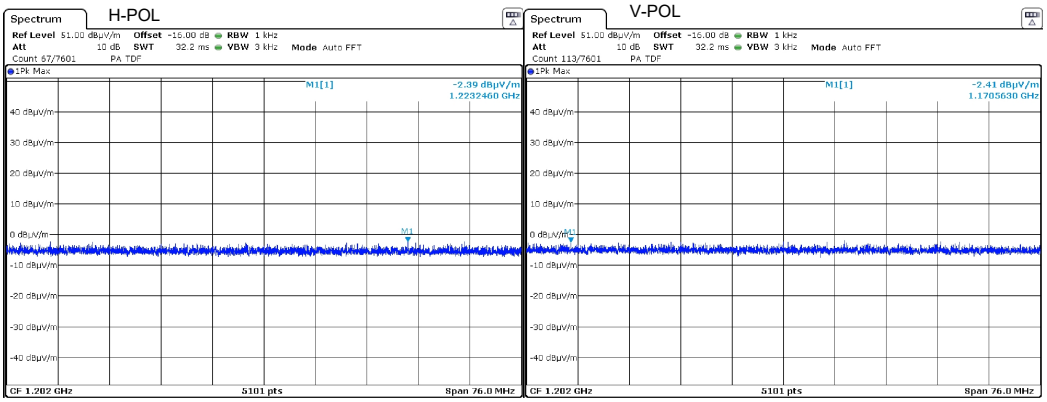
***** When E-field or EIRP is reported directly from Spectrum Analyzer, Antenna Factors and Cable losses are included directly in SA settings and Pr is not reported.

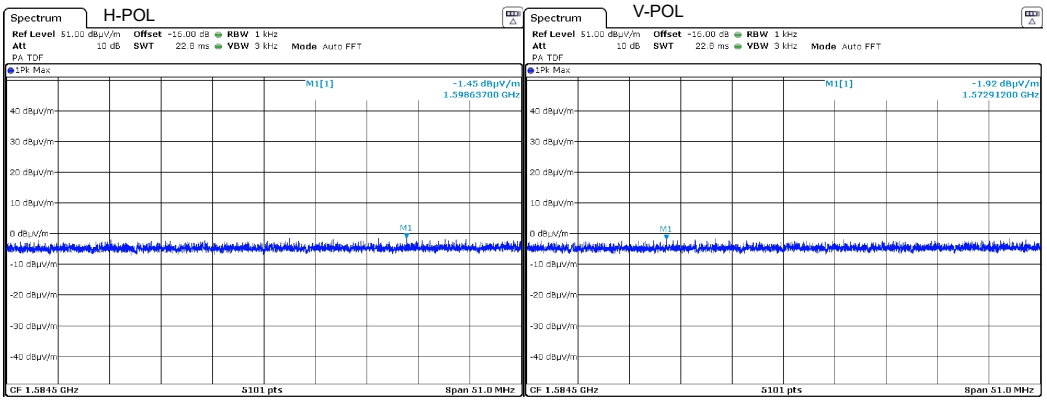
Table 7(b): Transmit Chain Spurious Emissions.

EXAMPLE PLOTS OF SPURIOUS IN ADJACENT BANDS



EXAMPLE PLOTS OF SPURIOUS IN GNSS BANDS





5 Measurement Uncertainty and Accreditation Documents

The maximum values of measurement uncertainty for the laboratory test equipment and facilities associated with each test are given in the table below. This uncertainty is computed for a 95.45% confidence level based on a coverage factor of $k = 2$.

Table 8: Measurement Uncertainty.

Measured Parameter	Measurement Uncertainty†
Radio Frequency	$\pm(f_{Mkr}/10^7 + RBW/10 + (SPN/(PTS-1))/2 + 1\,\text{Hz})$
Conducted Emm. Amplitude	$\pm 1.9\,\text{dB}$
Radiated Emm. Amplitude ($f < 30\,\text{MHz}$)	$\pm 3.1\,\text{dB}$
Radiated Emm. Amplitude ($30 - 200\,\text{MHz}$)	$\pm 4.0\,\text{dB}$
Radiated Emm. Amplitude ($200 - 1000\,\text{MHz}$)	$\pm 5.2\,\text{dB}$
Radiated Emm. Amplitude ($f > 1000\,\text{MHz}$)	$\pm 3.7\,\text{dB}$

†Ref: CISPR 16-4-2:2011+A1:2014

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200129-0

AHD (Amber Helm Development, L.C.)
Sister Lakes, MI

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2020-06-23 through 2021-06-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

Figure 7: Accreditation Documents