FCC RF Test Report

Applicant:	Automotive Data Solutions Inc.
Address of Applicant:	8400 Bougainville Montreal Quebec Canada H4P 2G1
Equipment Under Test (EUT)	
Product Name:	CAR ALARM
Model No.:	TR1110AT
FCC ID:	2AEPJ-TR1110AT
Applicable Standards:	FCC CFR Title 47 Part 15C (§15.231(a))
Date of Sample Receipt:	09 Mar., 2022
Date of Test:	10 Mar., to 29 Mar., 2022
Date of Report Issue:	11 Apr., 2022
Test Result:	PASS

Tested by:	Mike.ou ***Test Engineer***	***Date:***	*11 Apr., 2022*
Reviewed by:	Vimen Zhang ***Project Engineer***	***Date:***	*11 Apr., 2022*
Approved by:	***Manager***	***Date:***	*11 Apr., 2022*

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

2 Version

Version No.	Date	Description
00	*30 Mar., 2022*	*Original*
01	*11 Apr., 2022*	*1. Updated Page 14.*

3 Contents

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4 General Information

4.1 Client Information

Applicant:	Automotive Data Solutions Inc.
Address:	8400 Bougainville Montreal Quebec Canada H4P 2G1
Manufacturer/ Factory:	DONGGUAN PORTMAN ELECTRONIC SCIENCE AND TECHNOLOGY CO., LTD.
Address:	NO.10, LUYI 2 ROAD, TANGXIA TOWN, DONGGUAN CITY GUANGDONG PROVINCE

4.2 General Description of E.U.T.

Product Name:	CAR ALARM
Model No.:	TR1110AT
Operation Frequency:	433.92 MHz
Channel Numbers:	1
Modulation Type:	FSK
Antenna Type:	Helix antenna
Antenna Gain:	0.71 dBi
Power Supply:	DC 6V (3V Lithium Battery(CR2016) *2)
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

4.3 Test Mode and Environment

Test Mode:			
Transmitting mode:	Keep the EUT in transmitting mode with modulation		
The EUT was placed on three different polar directions tested: i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:			
Axis	X	Y	Z
Field Strength(dBuV/m)	95.66	93.75	97.31
According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”: Y axis (see the test setup photo).			
Operating Environment:			
Temperature:	15℃ ~ 35℃		
Humidity:	20 % ~ 75 % RH		
Atmospheric Pressure:	1010 mbar		

4.4 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
N/A				

4.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Conducted Emission for LISN (9kHz ~ 150kHz)	±3.11 dB
Conducted Emission for LISN (150kHz ~ 30MHz)	±2.62 dB
Radiated Emission (9kHz ~ 30MHz) (3m SAC)	±3.13 dB
Radiated Emission (30MHz ~ 1GHz) (3m SAC)	±4.45 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	±5.34 dB
Radiated Emission (18GHz ~ 40GHz) (3m SAC)	±5.34 dB
Note: *All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.*	

4.6 Additions to, Deviations, or Exclusions From the Method

No

4.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

4.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.
Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info-JYTee@lets.com, Website: http://jyt.lets.com

4.9 Test Instruments List

Radiated Emission(3m SAC):

Test Equipment	Manufacturer	Model No.	Manage No.	Cal.Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	WXJ001-1	01-19-2021	01-18-2024
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	02-17-2022	02-16-2023
Biconical Antenna	Schwarzbeck	VUBA9117	WXJ002-1	06-20-2021	06-19-2022
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	02-17-2022	02-16-2023
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-3	06-18-2021	06-17-2022
Loop Antenna	Schwarzbeck	FMZB 1519 B	WXJ002-4	02-17-2022	02-16-2023
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXG001-7	02-17-2022	02-16-2023
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXG001-3	02-17-2022	02-16-2023
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXG001-9	02-17-2022	02-16-2023
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	02-17-2022	02-16-2023
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ004-2	11-27-2021	11-26-2022
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	02-17-2022	02-16-2023
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	02-17-2022	02-16-2023
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG001-7	02-17-2022	02-16-2023
Coaxial Cable (9kHz ~ 30MHz)	JYT	JYT3M-1G-BB-5M	WXG001-6	02-17-2022	02-16-2023
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

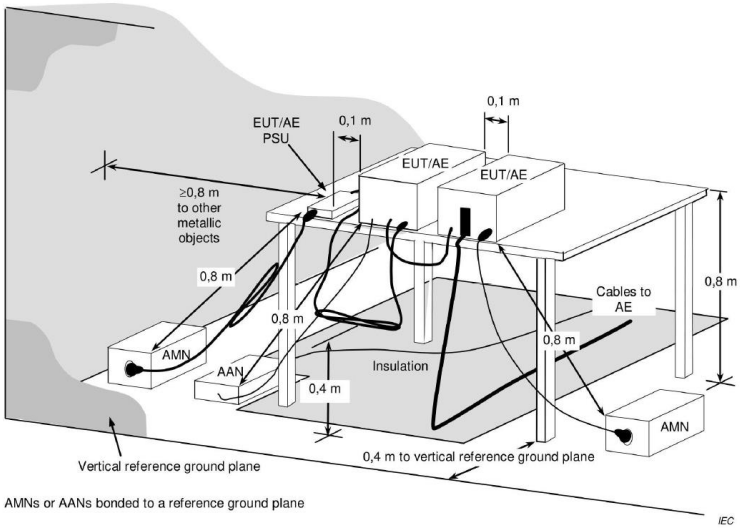
Conducted Emission:

Test Equipment	Manufacturer	Model No.	Manage No.	Cal.Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI 3	WXJ003	02-17-2022	02-16-2023

5 Measurement Setup and Procedure

5.1 Test Setup

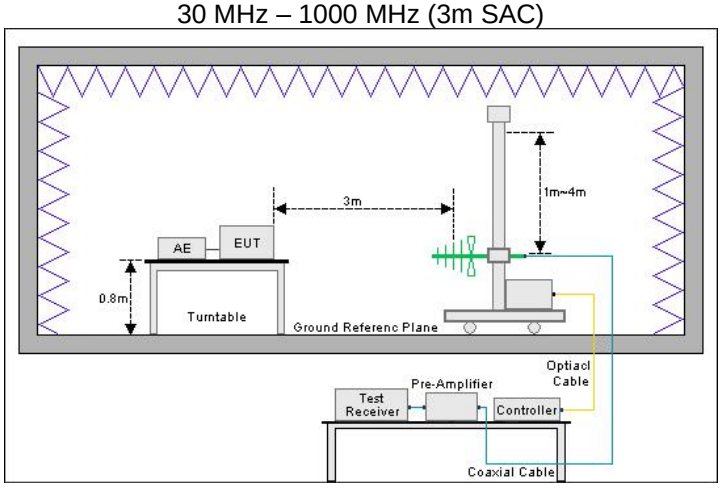
Conducted emission measurement:



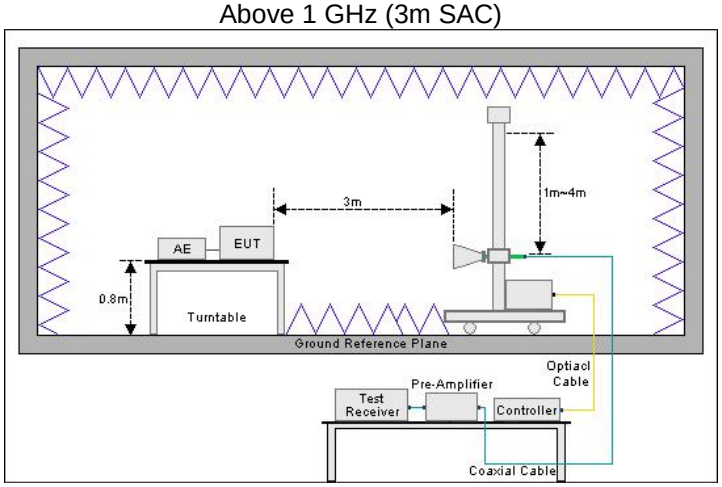
Note: The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

Radiated emission measurement:

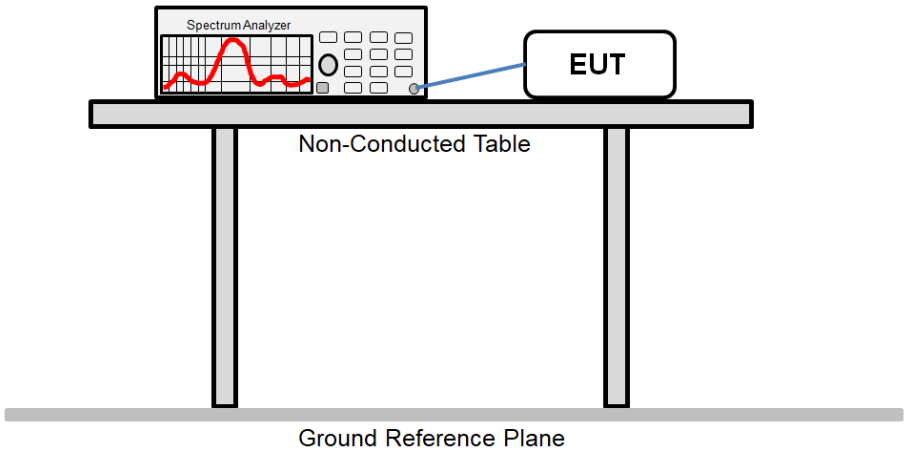
30 MHz – 1000 MHz (3m SAC)



Above 1 GHz (3m SAC)



Conducted test method:



5.2 Test Procedure

Test method	Test step
Conducted emission	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.
Radiated emission	1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested，and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.
Conducted test method	1. The antenna port of EUT was connected to the RF port of the spectrum analyzer through an RF cable. 2. The EUT is keeping in continuous transmission mode and tested in all modulation modes. 3. The test data is saved by the screenshot function of the spectrum analyzer.

6 Test Results

6.1 Summary

6.1.1 Clause and Data Summary

Test items	Standard clause	Test data	Result
Antenna Requirement	15.203	See Section 6.2	Pass
AC Power Line Conducted Emission	15.207	N/A	N/A
20dB Bandwidth	15.231 (c)	See Section 6.3	Pass
Field Strength of Fundamental	15.231 (b)	See Section 6.4	Pass
Field Strength of Spurious Emissions	15.209 15.231 (b)	See Section 6.5	Pass
Duration Time	15.231 (a)(1)	See Section 6.6	Pass
Remark: *1. Pass: The EUT complies with the essential requirements in the standard.* *2. N/A: Not Applicable.*			
Test Method:	*ANSI C63.4-2014* *ANSI C63.10-2013*		

6.1.2 Test Limit

<table>
<tr><th>Test items</th><th>Limit</th></tr>
<tr><td>AC Power Line Conducted Emission</td><td>
<table>
<tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Limit (dBµV)</th></tr>
<tr><th>Quasi-Peak</th><th>Average</th></tr>
<tr><td>0.15 – 0.5</td><td>66 to 56 Note 1</td><td>56 to 46 Note 1</td></tr>
<tr><td>0.5 – 5</td><td>56</td><td>46</td></tr>
<tr><td>5 – 30</td><td>60</td><td>50</td></tr>
<tr><td colspan="3">Note 1: The limit level in dBµV decreases linearly with the logarithm of frequency.
Note 2: The more stringent limit applies at transition frequencies.</td></tr>
</table>
</td></tr>
<tr><td>20dB Bandwidth</td><td>The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.</td></tr>
<tr><td>Field Strength of Fundamental

Field Strength of Spurious Emissions</td><td>
<table>
<tr><th>Fundamental Frequency (MHz)</th><th>Field strength of fundamental (microvolts/meter)</th><th>Field strength of spurious emissions (microvolts/meter)</th></tr>
<tr><td>40.66 – 40.70</td><td>2250</td><td>225</td></tr>
<tr><td>70.00 – 130.00</td><td>1250</td><td>125</td></tr>
<tr><td>130.00 – 174.00</td><td>[1]1250 to 3750</td><td>[1]125 to 375</td></tr>
<tr><td>174.00 – 260.00</td><td>3750</td><td>375</td></tr>
<tr><td>260.00 – 470.00</td><td>[1]3750 to 12500</td><td>[1]375 to 1250</td></tr>
<tr><td>Above 470.00</td><td>12500</td><td>1250</td></tr>
<tr><td colspan="3">[1]Linear interpolations.</td></tr>
</table>
(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.
(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in § 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of § 15.205 shall be demonstrated using the measurement instrumentation specified in that section.
(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength:
<table>
<tr><th>Frequency (MHz)</th><th>Limit (dBµV/m) @ 3m</th><th>Detector</th></tr>
<tr><td>30 – 88</td><td>40.0</td><td>Quasi-peak</td></tr>
<tr><td>88 – 216</td><td>43.5</td><td>Quasi-peak</td></tr>
<tr><td>216 – 960</td><td>46.0</td><td>Quasi-peak</td></tr>
<tr><td>960 – 1000</td><td>54.0</td><td>Quasi-peak</td></tr>
<tr><td colspan="3">Note: The more stringent limit applies at transition frequencies.</td></tr>
<tr><th rowspan="2">Frequency</th><th colspan="2">Limit (dBµV/m) @ 3m</th></tr>
<tr><th>Average</th><th>Peake</th></tr>
<tr><td>Above 1 GHz</td><td>54.0</td><td>74.0</td></tr>
<tr><td colspan="3">Note: The measurement bandwidth shall be 1 MHz or greater.</td></tr>
</table>
</td></tr>
<tr><td>Duration Time</td><td>A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.</td></tr>
</table>

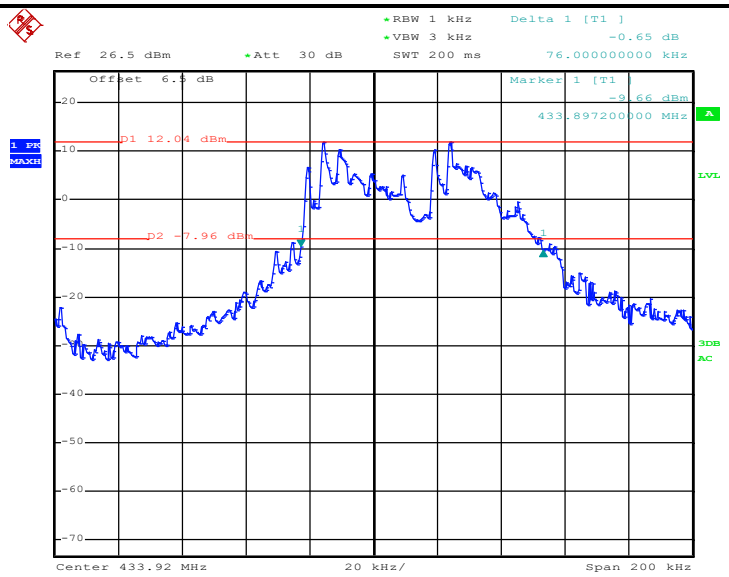
6.2 Antenna Requirement

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
E.U.T Antenna:	The EUT make use of an Helix antenna.

6.3 20dB Bandwidth

20dB bandwidth (MHz)	Limit (MHz)	Results
0.076	1.0848	Passed
Note: *Limit = Fundamental frequency×0.25%=433.92×0.25%=1.0848MHz.*		

Test plot as follows:



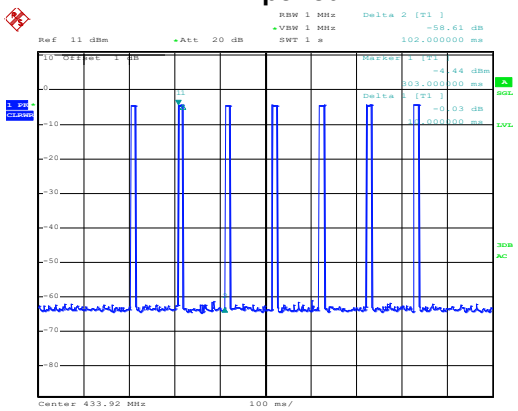
6.4 Field Strength of Fundamental

Peak value						
Frequency (MHz)	Read level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
433.92	91.31	-11.64	79.67	100.82	21.15	Vertical
433.92	108.95	-11.64	97.31	100.82	3.51	Horizontal

Average value						
Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
433.92	79.67	-19.11	60.56	80.82	20.26	Vertical
433.92	97.31	-19.11	78.20	80.82	2.62	Horizontal

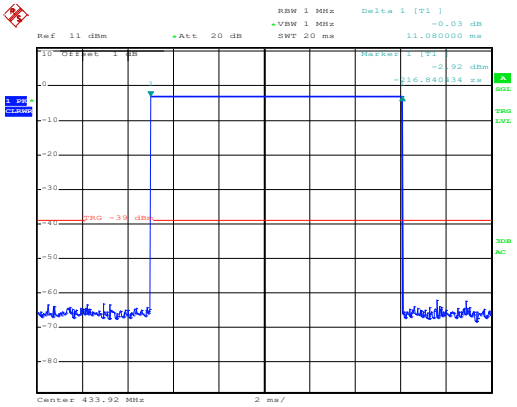
Duty Cycle Factor Calculate Formula:	Average value = Peak value + Duty Cycle Factor
	Duty cycle factor = 20log(Duty cycle)
	Duty cycle = on time/100 milliseconds or period, whichever is less
	T on time = (1*11.08)(ms) = 11.08(ms)
	T period = 102(ms) > 100(ms)
	Duty cycle = 11.08%
	Duty cycle factor = 20log(Duty cycle) = -19.11

T period:



Date: 28.MAR.2022 19:17:59

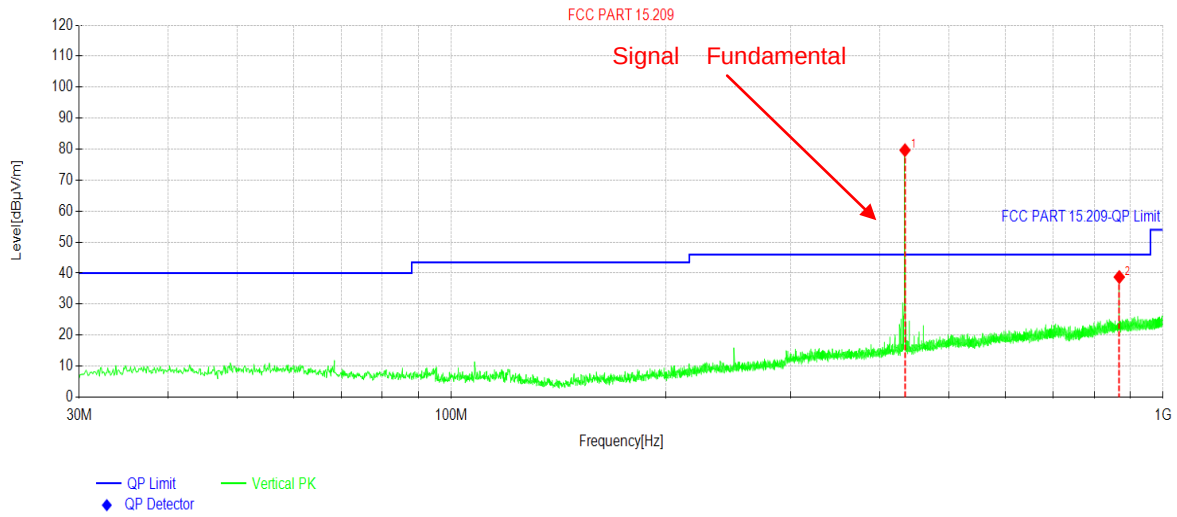
T on time slot-1:



Date: 28.MAR.2022 19:20:27

6.5 Spurious Emissions

Product Name:	CAR ALARM	Product Model:	TR1110AT
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	30 MHz – 1000 MHz	Polarization:	Vertical
Test Voltage:	DC 6V		



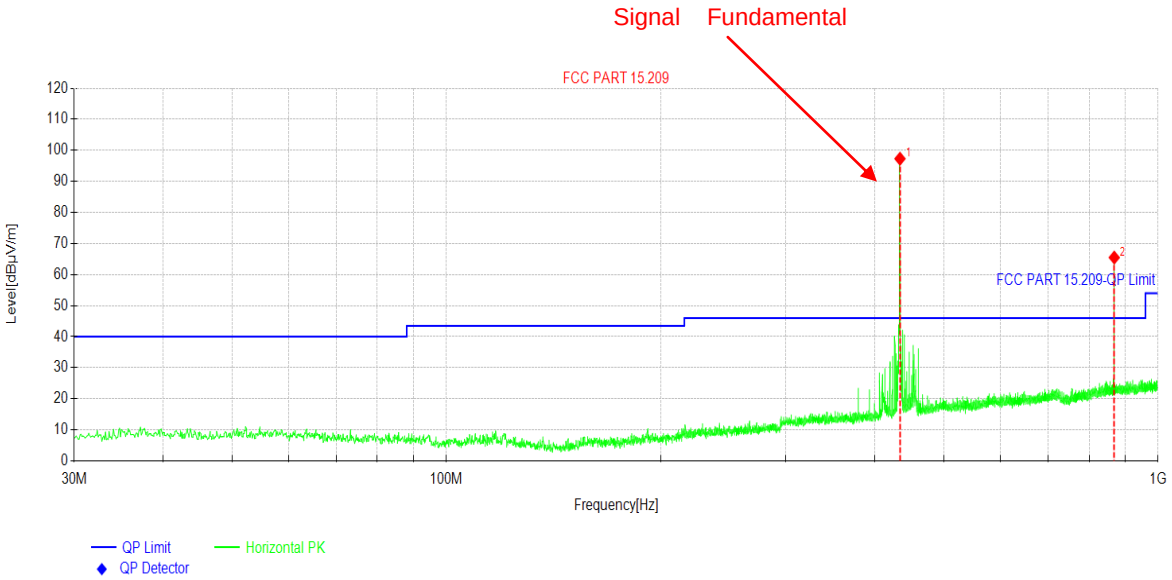
Suspected Data List								
NO.	Freq. [MHz]	Reading[dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	433.948	91.31	79.67	-11.64	100.82	21.15	PK	Vertical
2	867.969	42.85	38.74	-4.11	80.82	42.08	PK	Vertical

Suspected Data List								
NO.	Freq. [MHz]	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit [dBuV/m]	Margin [dB]	Trace	Polarity
1	433.92	79.67	-19.11	60.56	80.82	20.26	Av	Vertical
2	867.969	38.48	-19.11	19.63	60.82	41.19	Av	Vertical

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

Product Name:	CAR ALARM	Product Model:	TR1110AT
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	30 MHz – 1000 MHz	Polarization:	Horizontal
Test Voltage:	DC 6V		



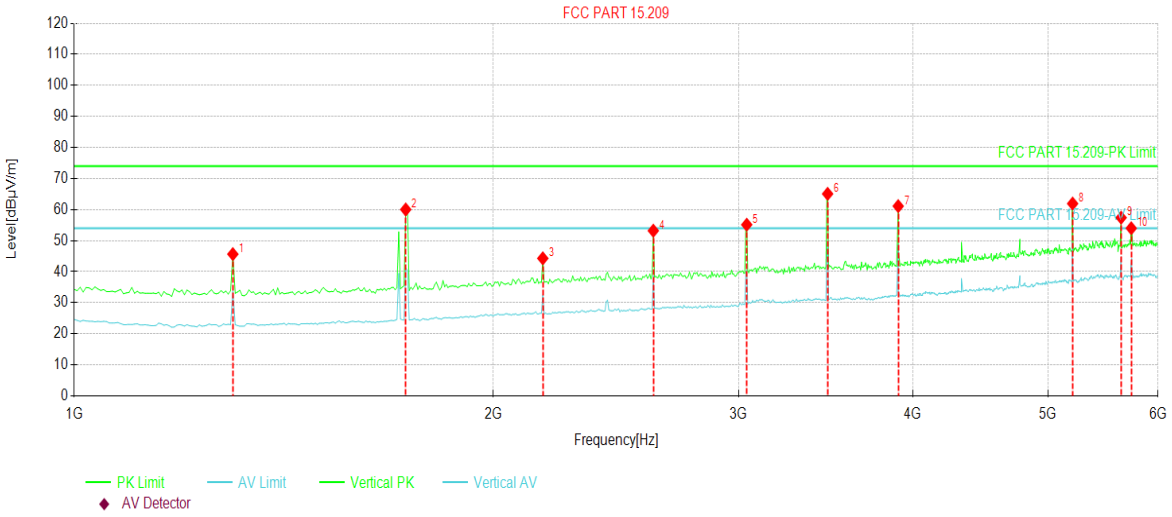
Suspected Data List								
NO.	Freq. [MHz]	Reading[dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	433.92	108.95	97.31	-11.64	100.82	3.51	PK	Horizontal
2	867.969	69.59	65.48	-4.11	80.82	15.34	PK	Horizontal

Suspected Data List								
NO.	Freq. [MHz]	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	433.92	97.31	-19.11	78.20	80.82	2.62	Av	Horizontal
2	867.96	65.48	-19.11	46.37	60.82	14.45	Av	Horizontal

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

Product Name:	CAR ALARM	Product Model:	TR1110AT
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	1000 MHz – 6000 MHz	Polarization:	Vertical
Test Voltage:	DC 6V		



Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	1300.00	68.81	45.65	-23.16	74.00	28.35	PK	Vertical
2	1730.00	81.70	60.01	-21.69	80.82	20.81	PK	Vertical
3	2170.00	63.92	44.29	-19.63	80.82	36.53	PK	Vertical
4	2605.00	71.23	53.19	-18.04	80.82	27.63	PK	Vertical
5	3040.00	71.64	55.13	-16.51	80.82	25.69	PK	Vertical
6	3475.00	80.02	65.06	-14.96	80.82	15.76	PK	Vertical
7	3905.00	74.60	61.11	-13.49	74.00	12.89	PK	Vertical
8	5210.00	69.23	61.92	-7.31	80.82	18.9	PK	Vertical
9	5645.00	63.09	57.39	-5.70	80.82	23.43	PK	Vertical
10	5740.00	59.20	53.98	-5.22	80.82	26.84	PK	Vertical

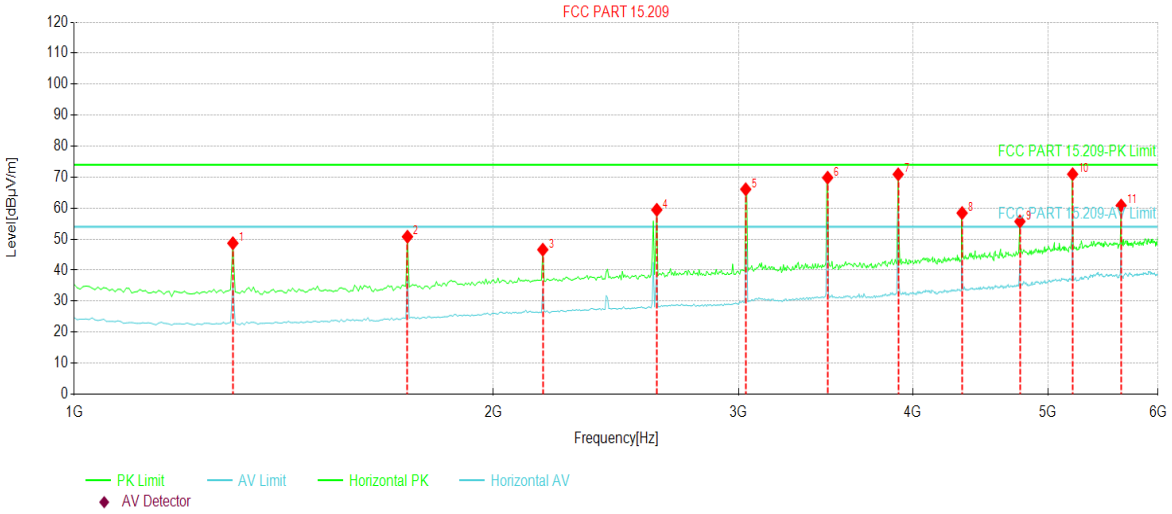
Suspected Data List(Average)

NO.	Freq. [MHz]	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	1730.00	60.01	-19.11	40.36	54.00	13.64	Av	Vertical
2	3040.00	55.13	-19.11	46.98	60.82	13.84	Av	Vertical
3	3475.00	65.06	-19.11	50.73	60.82	10.09	Av	Vertical
4	3905.00	61.11	-19.11	51.8	54.00	2.2	Av	Vertical
5	5210.00	61.92	-19.11	39.32	60.82	21.5	Av	Vertical
6	5645.00	57.39	-19.11	36.6	60.82	24.22	Av	Vertical
7	5740.00	53.98	-19.11	51.86	60.82	8.96	Av	Vertical

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

Product Name:	CAR ALARM	Product Model:	TR1110AT
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	1000 MHz – 6000 MHz	Polarization:	Horizontal
Test Voltage:	DC 6V		



Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	1300.00	71.84	48.68	-23.16	74.00	25.32	PK	Horizontal
2	1735.00	72.44	50.77	-21.67	80.82	30.05	PK	Horizontal
3	2170.00	66.23	46.60	-19.63	80.82	34.22	PK	Horizontal
4	2620.00	77.44	59.47	-17.97	80.82	21.35	PK	Horizontal
5	3035.00	82.64	66.09	-16.55	80.82	14.73	PK	Horizontal
6	3475.00	84.80	69.84	-14.96	80.82	10.98	PK	Horizontal
7	3905.00	84.40	70.91	-13.49	74.00	3.09	PK	Horizontal
8	4340.00	69.89	58.43	-11.46	74.00	15.57	PK	Horizontal
9	4775.00	65.06	55.71	-9.35	74.00	18.29	PK	Horizontal
10	5210.00	78.28	70.97	-7.31	80.82	9.85	PK	Horizontal
11	5645.00	66.54	60.84	-5.70	80.82	19.98	PK	Horizontal

Suspected Data List(Average)								
NO.	Freq. [MHz]	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	2620.00	59.47	-19.11	40.36	60.82	20.46	Av	Horizontal
2	3035.00	66.09	-19.11	46.98	60.82	13.84	Av	Horizontal
3	3475.00	69.84	-19.11	50.73	60.82	10.09	Av	Horizontal
4	3905.00	70.91	-19.11	51.8	54.00	2.2	Av	Horizontal
5	4340.00	58.43	-19.11	39.32	54.00	14.68	Av	Horizontal
6	4775.00	55.71	-19.11	36.6	54.00	17.4	Av	Horizontal
7	5210.00	70.97	-19.11	51.86	60.82	8.96	Av	Horizontal
8	5645.00	60.84	-19.11	41.73	60.82	19.09	Av	Horizontal

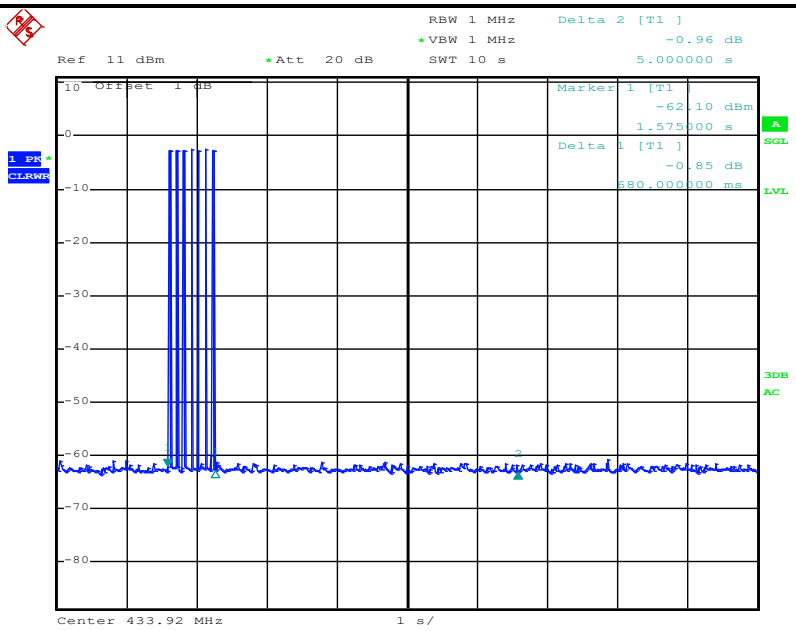
Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

6.6 Duration Time

Duration time (second)	Limit (second)	Result
0.58	<5.0	Pass

Test plot as follows:



------End of report------