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FCC PART 15.109

RADAR DETECTOR REPORT

Applicant	COBRA ELECTRONICS CORPORATION
Address	6500 WEST CORTLAND STREET CHICAGO IL 60707
Product Model Number	iRAD
Product Description	RADAR DETECTOR W/ BT MODULE
FCC ID:	BBO2016D
Date Sample Received	6/23/2016
Date Tested	7/26/2016
Tested By	Tim Royer
Approved By	Sid Sanders

Report Number	Version Number	Description	Issue Date
66AUT16TestReport	Rev1	Initial Issue	7/26/2016

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

The test results relate only to the items tested.

Summary

The device under test does:

- ☒ Fulfill the general approval requirements as identified in this test report
☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669



Tested by:

Name and Title: Project Manager/Testing Engineer

Date: 7 / 26 / 2016



Reviewed and approved by:

Name and Title: S. S. Sanders , Engineer

Date: 7 / 26 / 2016

GENERAL INFORMATION

EUT Specification

EUT Description	RADAR DETECTOR W/ BT MODULE
FCC ID	BBO2016D
Model Number	iRAD
Operating Frequency	10.525GHz(X-Band), 24.150 GHz (K-Band), 33.4-36.0G Hz (KA Band)
EUT Power Source	<input type="checkbox"/> 110–120Vac/50– 60Hz
	<input checked="" type="checkbox"/> DC Power 12V
	<input type="checkbox"/> Battery Operated Exclusively
Test Item	<input type="checkbox"/> Prototype
	<input checked="" type="checkbox"/> Pre-Production
	<input type="checkbox"/> Production
Type of Equipment	<input type="checkbox"/> Fixed
	<input checked="" type="checkbox"/> Mobile
	<input type="checkbox"/> Portable
Test Conditions	Temperature: 24-26°C Relative humidity: 50-65% Barometric Pressure: 30.01 in
Modification to the EUT	None
Test Exercise	The EUT was powered with 12vDC and switched on.
Applicable Standards	FCC Pt 15.109
Test Procedure	ANSI C63.4: 2014

TEST RESULTS SUMMARY

The test results relate only to the items tested.	
FCC Rules Part No.	RESULTS Pass/ Fail/ NA
15.109 Radiated Emissions	Pass

RADIATED SPURIOUS EMISSIONS

Rules Part No.: 15.109

Requirements:

Frequency	Limits
11.7 to 12.2GHz	54.0 dB μ V/m measured @ 3 meters

Test Procedure: A search was made of the spectrum from 30 to 1000MHz and from 11.7 to 12.2GHz. Measurements in the 11.7 to 12.2GHz band were made with a Standard Gain Horn. The measurements in the 11.7 to 12.2GHz band represent the ambient noise levels. The attached plots were made with peak detector with the analyzer in a maximum hold for 2 minutes.

Testing was done in accordance with ANSI C63.4 & 15.35(b) specifies the use of an average detector in this band. In addition, the peak level of an emission shall not exceed the average limit by more than 20 dB using a minimum Resolution Bandwidth (RBW) of 1 MHz and minimum Video Bandwidth (VBW) OF 1 MHz. The following procedure is designed to determine if there are any spurious emissions from the local oscillator within the band of interest along with any additional spurious emissions caused by other circuitry within the device.

- 1) Determine the frequency of the peak emission:

Start Frequency 11.7 GHz

Stop Frequency 12.2 GHz

RBW equal to or greater than 1 MHz

VBW equal to or greater than 1 MHz

Detector Function Peak

Maximize the emissions with regards to device orientation, antenna polarization, and antenna height. Sweep the band using Max Hold for a minimum of 2 minutes. Record this frequency for measuring the peak emission. In addition record the frequency of other spurious emissions noted.

RADIATED SPURIOUS EMISSIONS

Test Procedure (Cont.):

- 2) Determine the peak level of the emission:
Center Frequency Set to the frequency determined in Step 1 RBW Equal to or greater than 1 MHz VBW Equal to or greater than 1 MHz Detector Function Peak Measure the value of the peak emission using Max Hold for a minimum of 2 minutes. This can be done at zero spans or a frequency span where the analyzer does not show a "Measurement Uncalibrated" message. Record the peak value. If the peak measurement is compliant with the average limit an average measurement is not necessary. If the peak value exceeds the average limit by less than 20 dB proceed to Step 3.
- 3) Determine the average level of the emission:
Center Frequency Set to the frequency determined in Step 1
Span Zero
RBW Equal to or greater than 1 MHz
VBW Equal to or greater than 10 Hz
Detector Function Peak
This measurement uses video averaging and must be done in linear mode. The analyzer Reference Level is adjusted so that a signal is clearly visible on the screen. Measure the value of the emission using Max Hold for a minimum of 2 minutes. Record this as the average value. Step 2 and Step 3 should be repeated for other spurious emissions.

Formula of Conversion Factors: The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:

Freq (MHz)	Meter Reading	+ ACF	+ CL	= FS
33	20 dBuV	+ 10.36 dB/m	+ 0.40 dB	= 30.36
dBuV/m @ 3m				

MEASUREMENT PROCEDURES: The unit under test was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

RADIATED SPURIOUS EMISSIONS

TEST DATA: 11.7 – 12.2 GHZ 3 METER FIELD STRENGTH

3 Meter Field Strength Table:

Emission Frequency MHz	Detector	Meter Reading dBu V	Antenna Polarity	Coax Loss dB	Correction Factor dB/M	Field Strength dBu V/M	Margin
11835.27	PK	2.88	H	12.92	38.97	54.77	19.23
11835.27	AV	-9.54	H	12.92	38.97	42.35	11.65
12120.84	PK	4.51	H	13.10	39.30	56.91	17.09
12120.84	AV	-9.65	H	13.10	39.30	42.75	11.25
11993.59	PK	4.43	V	13.04	39.29	56.76	17.24
11993.59	AV	-10.14	V	13.04	39.29	42.19	11.81
11790.18	PK	4.29	V	12.89	38.88	56.06	17.94
11790.18	AV	-9.64	V	12.89	38.88	42.13	11.87

Results - Meets Requirements

TEST EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren Chamber	3117	00041534	02/25/15	02/25/17
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Coaxial Cable - Chamber 3 cable set (Primary)	Micro-Coax	Chamber 3 cable set (Primary)	KMKM-0244-00; KMKM-0670-00; KFKF-0198-00	12/05/15	12/05/17
Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	01/04/16	01/04/18

* EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

END OF REPORT