TIMCO ENGINEERING, Inc.

An IIA Company

Test Report - FCC PART 15.247 / DTS
Applicant: COBRA ELECTRONICS CORPORATION

Approved for Release By:

Signature: Bruno Clavier

Name & Title: Bruno Clavier, General Manager

Date of Signature 12/6/2021

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1. Customer Information

Applicant: COBRA ELECTRONICS CORPORATION
Address: 6500 WEST CORTLAND STREET
CHICAGO IL 60707
United States

1.1 Test Result Summary

The following test procedure and guidance were used for measuring Digital Transmission System (DTS); FCC KDB 558074 D01 DTS Measurement Guidance and ANSI C63.10-2013. Full test results are available in this report.

No additions to the test methods were needed. There were no deviations, or exclusions from the test methods. No test results are from external providers or from the customer. The test results relate only to the items tested. Timco does not offer opinions and interpretations, only a pass/fail statement.

Applicable Clauses from Part 2 and Part 15 Subpart C		
FCC Clauses	Description of the requirements	Result: (Pass, Fail, N/A)
15.209	Radiated Emissions in Restricted bands	Pass

2. Location of Testing

2.1 Test Laboratory

Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA").
Testing was performed at Timco's permanent laboratory located at 849 NW State Road 45, Newberry, Florida 32669

FCC test firm # 578780
FCC Designation # US1070
FCC site registration is under A2LA certificate # 0955.01
ISED Canada test site registration # 2056A
EU Notified Body # 1177
For all designations see A2LA scope # 0955.01

2.2 Testing was performed, reviewed by

Dates of Testing: 11/18/2021

Signature:  Sr. EMC Engineer EMC-003838-NE

Name & Title: Tim Royer, EMC Engineer

Date of Signature 12/6/2021

3. Test Sample(s) (EUT/DUT)

The test sample was received: 11/18/2021

3.1 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

Identification	
FCC ID:	BBOIRADD5
Brief Description	Radar Detector with Bluetooth
Model(s) #	iRAD480i

Antenna Characteristics			
Frequency Range (MHz)	Mode / BW	Ant Gain 1	Ant Gain 2
2400 – 2483.5	n/a	0 dBi	n/a

3.2 Configuration of EUT

Band (MHz)	Mode	Number of Ant.
	Transmit	1

Operating conditions during Testing:

No modifications of the device under test (including firmware, specific software settings, and input/output signal levels to the EUT).

Peripherals used during Testing:

Software provided by the manufacturer was used to program the EUT.

3.3 Test Setup of EUT

Equipment, antenna, and cable arrangement. The setup of the equipment and cable or wire placement on the test site that produces the highest radiated and the highest ac power line conducted emissions shall be shown clearly and described. Information on the orientation of portable equipment during testing shall be included. Drawings or photographs may be used for this purpose.

Test Setups are included in the test report.

4. Test methods & Applicable Regulatory Limits

4.1 Test methods/Standards/Guidance:

Test procedures and guidance for measuring Digital Transmission System (DTS) are provided in the FCC KDB 558074 D01 DTS Measurement Guidance and in Clause 11 of ANSI C63.10-2013.

1) ANSI C63.10-2013
2) FCC KDB 558074 D01

4.2 Applied Limits and Regulatory Limits:

3) FCC CFR 47 Part 15.247

5. Measurement Uncertainty

Parameter	Uncertainty (dB)
Conducted Emissions	± 3.14 dB
Radiated Emissions (9kHz – 30 MHz)	± 3.08 dB
Radiated Emissions (30 – 200 MHz)	± 2.16 dB
Radiated Emissions (200 – 1000 MHz)	± 2.15 dB
Radiated Emissions (1 GHz – 18 GHz)	± 2.14 dB
Radiated Emissions (18 GHz – 40 GHz)	± 2.31 dB
Note: The uncertainties provided in this table represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of K=2.	

6. Environmental Conditions

6.1 Temperature & Humidity

Measurements performed at the test site did not exceed the following:

Temperature	23 C +/- 5%
Humidity	55% +/- 5%
Barametric pressure	30.05 inHg
Note: Specific environmental conditions that are applicable to a specific test are available in the test result section.	

7. List of Test Equipment and Test Facility

The test equipment used identified by type, manufacturer, serial number, or other identification and the date on which the next calibration or service check is due.

Description of the firmware or software used to operate EUT for testing purposes.

A complete list of all test equipment used shall be included with the test report. The manufacturer's model and serial numbers, and date of last calibration, and calibration interval shall be included. Measurement cable loss, measuring instrument bandwidth and detector function, video bandwidth, if appropriate, and antenna factors shall also be included where applicable.

7.1 List of Test Equipment

Test Equipment						
Type	Device	Manufacturer	Model	SN#	Current Cal	Cal Due
Antenna	Biconical 1057	Eaton	94455-1	1057	10/16/20	10/16/2023
Antenna, NSA	Log-Periodic 1243	Eaton	96005	1243	5/4/21	5/3/2024
Antenna	Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	2/25/20	2/24/2023
CHAMBER	CHAMBER	Panashield	3M	N/A	3/12/19	3/11/2022
Pre-amp	Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	2/27/19	2/26/2022
Receiver	EMI Test Receiver R&S ESU 40	Rohde & Schwarz	ESU 40	100320	5/27/21	5/26/2024

Software			
Software	Author	Version	Validation on
ESU Firmware	Rohde & Schwarz	4.43 SP3; BIOS v5.1-24-3	2018
RSCommander	Rohde & Schwarz	1.6.4	2014
ScopeExplorer	LeCroy	v2.25.0.0	2009
Field Strength	Timco	v4.10.7.0	2016

8. Test Results

The results of the test are usually indicated in the form of tables, spectrum analyzer plots, charts, sample calculations, as appropriate for each test procedure.

A description and/or a block diagram of the test setup is usually provided.

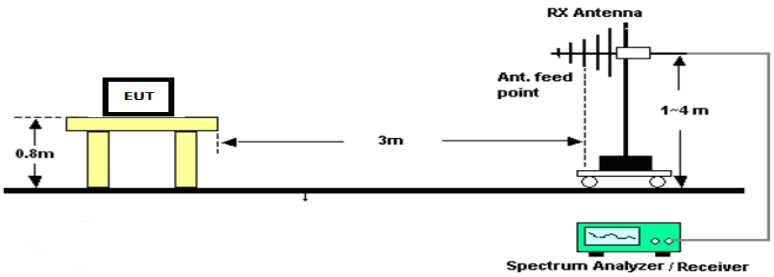
The measurement results, along with the appropriate limits for comparison, may be presented in tabular or graphical form. In addition, any variation in the measurement environment may be reported if applicable (e.g., a significant change of temperature that could affect the cable loss and amplifier response).

Unless noted otherwise in the referenced standard, the measurements of ac power-line conducted emissions and conducted power output will be reported in units of dBµV. Unless noted otherwise in the referenced standard, the measurements of radiated emissions will be reported in units of decibels, referenced to one microvolt per meter (dBµV/m) for electric fields, or to one ampere per meter (dBA/m) for magnetic fields, at the distance specified in the appropriate standards or requirements. The measurements of antenna-conducted power for receivers may be reported in units of dBµV if the impedance of the measuring instrument is also reported. Otherwise, antenna-conducted power will be reported in units of decibels referenced to one milliwatt (dBm). All formulas for data conversions and conversion factors, if used, will be included in this measurement report.

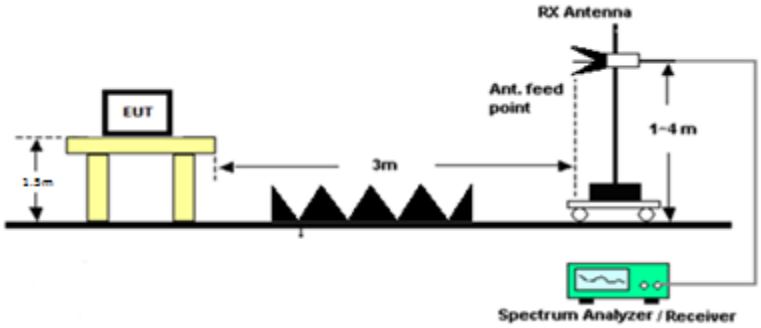
8.1 Radiated Emissions

Restricted Bands from FCC Part 15.205; Limits from FCC Part 15.209

Radiated Test Setup, 30 – 1000 MHz



Radiated Test Setup, Above 1000 MHz



Radiated Emissions in Restricted Bands, Tabular Data

8.1.1 Radiated Emissions Test Data, Fundamental

Tuned Frequency (MHz)	Detector	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)
2402.00	PK	40.04	H	5.62	31.88	3.00	77.53
2402.00	PK	30.06	V	5.62	31.88	3.00	67.55
2440.00	PK	33.80	H	5.61	31.85	3.00	71.26
2440.00	PK	37.90	V	5.61	31.85	3.00	75.36
2480.00	PK	33.50	H	5.62	32.10	3.00	71.22
2480.00	PK	31.90	V	5.62	32.10	3.00	69.62

8.1.2 Radiated Emissions Test Data, 2402 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2402.00	4804.00	X	PK	6.90	H	7.10	0.00	33.93	3.00	47.93	73.98	26.05
2402.00	4804.00	X	PK	4.60	V	7.10	0.00	33.93	3.00	45.63	73.98	28.35
2402.00	4804.00	X	AVG	6.90	H	7.10	0.00	33.93	3.00	47.93	53.98	6.05
2402.00	4804.00	X	AVG	4.60	V	7.10	0.00	33.93	3.00	45.63	53.98	8.35
2402.00	7206.00		PK	10.60	H	9.54	0.00	36.39	3.00	56.53	57.53	1.00
2402.00	7206.00		PK	9.50	V	9.54	0.00	36.39	3.00	55.43	57.53	2.10
2402.00	9608.00		PK	4.30	H	10.70	0.00	36.62	3.00	51.62	57.53	5.91
2402.00	9608.00		PK	4.10	V	10.70	0.00	36.62	3.00	51.42	57.53	6.11
2402.00	12010.00	X	PK	4.90	H	12.40	0.00	39.08	3.00	56.38	73.98	17.60
2402.00	12010.00	X	PK	4.70	V	12.40	0.00	39.08	3.00	56.18	73.98	17.80
2402.00	12010.00	X	AVG	-6.20	H	12.40	0.00	39.08	3.00	45.28	53.98	8.70
2402.00	12010.00	X	AVG	-6.20	V	12.40	0.00	39.08	3.00	45.28	53.98	8.70
2402.00	14412.00		PK	4.80	H	13.35	0.00	39.75	3.00	57.90	57.53	-0.37
2402.00	14412.00		PK	4.60	V	13.35	0.00	39.75	3.00	57.70	57.53	-0.17
2402.00	16814.00		PK	-7.60	H	14.60	0.00	42.34	3.00	49.34	57.53	8.19
2402.00	16814.00		PK	-7.00	V	14.60	0.00	42.34	3.00	49.94	57.53	7.59

8.1.3 Radiated Emissions Test Data, 2440 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2440.00	4880.00	X	PK	4.30	H	7.33	0.00	33.93	3.00	45.56	73.98	28.42
2440.00	4880.00	X	PK	3.40	V	7.33	0.00	33.93	3.00	44.66	73.98	29.32
2440.00	4880.00	X	AVG	4.30	H	7.33	0.00	33.93	3.00	45.56	53.98	8.42
2440.00	4880.00	X	AVG	3.40	V	7.33	0.00	33.93	3.00	44.66	53.98	9.32
2440.00	7320.00	X	PK	8.25	H	9.61	0.00	36.24	3.00	54.10	73.98	19.88
2440.00	7320.00	X	PK	8.40	V	9.61	0.00	36.24	3.00	54.25	73.98	19.73
2440.00	7320.00	X	AVG	-8.25	H	9.61	0.00	36.24	3.00	37.60	53.98	16.38
2440.00	7320.00	X	AVG	-8.40	V	9.61	0.00	36.24	3.00	37.45	53.98	16.53
2440.00	9760.00		PK	2.80	H	10.98	0.00	36.83	3.00	50.60	57.53	6.93
2440.00	9760.00		PK	2.01	V	10.98	0.00	36.83	3.00	49.81	57.53	7.72
2440.00	12200.00	X	PK	4.40	H	12.52	0.00	39.23	3.00	56.15	73.98	17.83
2440.00	12200.00	X	PK	4.33	V	12.52	0.00	39.23	3.00	56.08	73.98	17.90
2440.00	12200.00	X	AVG	-4.40	H	12.52	0.00	39.23	3.00	47.35	53.98	6.63
2440.00	12200.00	X	AVG	-4.33	V	12.52	0.00	39.23	3.00	47.42	53.98	6.56
2440.00	14640.00		PK	3.40	H	13.68	0.00	40.27	3.00	57.35	57.53	0.19
2440.00	14640.00		PK	3.00	V	13.68	0.00	40.27	3.00	56.95	57.53	0.59
2440.00	17080.00		PK	-3.40	H	14.72	0.00	42.43	3.00	53.75	57.53	3.78
2440.00	17080.00		PK	-3.20	V	14.72	0.00	42.43	3.00	53.95	57.53	3.58

8.1.1 Radiated Emissions Test Data, 2480 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBµV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2480.00	4960.00	X	PK	6.50	H	7.72	0.00	33.96	3.00	48.18	73.98	25.80
2480.00	4960.00	X	PK	6.40	V	7.72	0.00	33.96	3.00	48.08	73.98	25.90
2480.00	4960.00	X	AVG	-6.04	H	7.72	0.00	33.96	3.00	35.64	53.98	18.34
2480.00	4960.00	X	AVG	-6.02	V	7.72	0.00	33.96	3.00	35.66	53.98	18.32
2480.00	7440.00	X	PK	8.06	H	9.56	0.00	36.01	3.00	53.64	73.98	20.34
2480.00	7440.00	X	PK	9.02	V	9.56	0.00	36.01	3.00	54.60	73.98	19.38
2480.00	7440.00	X	AVG	-3.40	H	9.56	0.00	36.01	3.00	42.18	53.98	11.80
2480.00	7440.00	X	AVG	-3.40	V	9.56	0.00	36.01	3.00	42.18	53.98	11.80
2480.00	9920.00		PK	2.40	H	11.15	0.00	37.08	3.00	50.63	57.53	6.91
2480.00	9920.00		PK	2.70	V	11.15	0.00	37.08	3.00	50.93	57.53	6.61
2480.00	12400.00	X	PK	4.10	H	12.54	0.00	39.23	3.00	55.87	73.98	18.11
2480.00	12400.00	X	PK	4.02	V	12.54	0.00	39.23	3.00	55.79	73.98	18.19
2480.00	12400.00	X	AVG	-7.40	H	12.54	0.00	39.23	3.00	44.37	53.98	9.61
2480.00	12400.00	X	AVG	-7.45	V	12.54	0.00	39.23	3.00	44.32	53.98	9.66
2480.00	14880.00		PK	3.50	H	13.44	0.00	40.29	3.00	57.24	57.53	0.30
2480.00	14880.00		PK	3.36	V	13.44	0.00	40.29	3.00	57.10	57.53	0.44

9. History of Test Report Changes

Test Report #	Revision #	Description	Date of Issue
TR_4926-21_FCC_15.247_	1	Initial release	11/23/2021

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END OF TEST REPORT