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FCC PART 15.247 FHSS

TEST REPORT

APPLICANT	COBRA ELECTRONICS CORPORATION
ADDRESS	6500 WEST CORTLAND STREET CHICAGO, IL 60707 USA
PROPOSED FCC ID	BBOXRSR7-MDU
MODEL NUMBER	XRSR7-MDU
PRODUCT DESCRIPTION	RF Link with Radar Detector
DATE SAMPLE RECEIVED	March 1, 2007
DATE TESTED	March 2, 2007
TESTED BY	Richard Block
APPROVED BY	Mario de Aranzeta C.E.T.
TIMCO REPORT NO	309ZUT7TestReport.PDF
TEST RESULTS	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

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STATEMENT OF COMPLIANCE

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

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 by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

ACCREDITED
Certificate #0955-01

Authorized by: Mario de Aranzeta

Signature: On File

Function: Engineer

Date: March 7, 2007

Tested By: Richard Block

Date: March 5, 2007

REPORT SUMMARY

Disclaimer:	The test results relate only to the items tested.
Purpose of Test:	To show the DUT in compliant with FCC Part 15.247 requirements for 2.4 GHz FHSS radio.
Applicable Standards:	ANSI C63.4: 2003, ANSI/TIA – 603: 2004, Pt 15.247, Pt 15.209, Pt 15.204
Related Report/Approvals:	Pt 15 Subpart B Digital Interface Portion Emission verified

TEST ENVIRONMENT

Test Facilities:	All measurements were made at one or more of the test sites of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669.
Laboratory Test Conditions:	Temperature: 26°C, Humidity: 55%

TEST SETUP

Test Exercise (software, etc.):	The DUT was set in continuous transmit mode of operation.
Deviation to the Standards:	No deviation.
Modification to the DUT:	No modification
Supporting Equipment:	The DUT has a GPS connector. During the testing, the DUT was connected to a Cobra GPS receiver. (M/N: XRS-R96 GPSL, S/N: 701000005)

DUT DESCRIPTION

Product Description:	RF Link with Radar Detector
FCC ID:	BBOXRSR7-MDU
Model Number:	XRSR7-MDU
Brand Name:	Cobra
Operating Frequency:	2.4 GHz
Number of Channels:	16
Occupied Bandwidth:	900 kHz
Max. Output Pwr:	0.002 Watt
Type of Modulation:	GFSK
EUT Power Source:	Vehicle Mounted Device
Test Item:	Pre-production
Type of Equipment:	Mobile
Antennas:	Permanently attached
Antenna Connector:	None

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
Biconnical Antenna	Eaton	94455-1	1057	CAL 12/12/05	12/12/07
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303a01690	CAL 12/8/05	12/8/07
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
Analyzer Tan Tower Spectrum Analyzer	HP	8566B OPT 462	3188A07786 3144A20661	CAL 12/7/05	12/7/07
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/05	12/8/07
LISN	Electro-Metrics	EM-7820	2682	CAL 4/28/05	4/28/07
Log-Periodic Antenna	Eaton	96005	1243	CAL 12/14/05	12/14/07

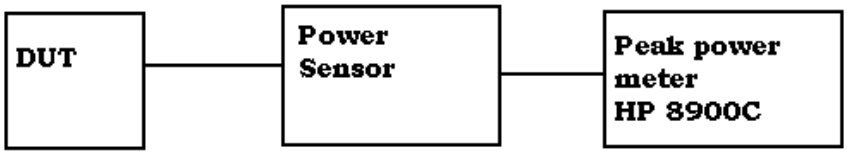
TEST PROCEDURES

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003 using a 50uH LISN. The resolution bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

Bandwidth 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Power Output:
With antenna connector:
Power was measured by disconnecting the antenna and measuring across a 50 ohm load using a HP peak power meter Model 8900C.

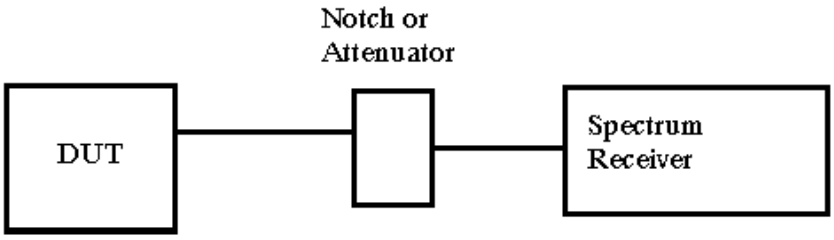
Output Power Test Setup Diagram



Without antenna connected:
The power is measured is conducted.

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

RF Conducted Spurious Emissions Test Setup Diagram

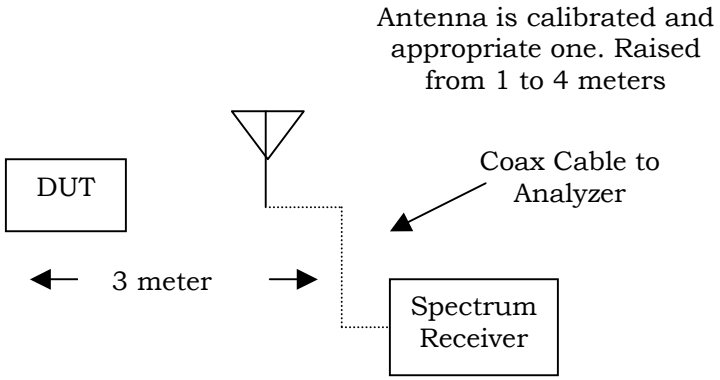


Note: The spectrum was scanned to the tenth harmonic.

Radiation Interference: The test procedure used was ANSI C63.4-2003 using an Agilent spectrum receiver with preselector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

Radiated Spurious Emissions Into Adjacent Restricted Band: An inband field strength measurement of the fundamental emission at the lowest and highest frequencies was made using the RBW and detector function required by C63.4-2003 and FCC Rules.

Radiated Spurious Emissions: The procedure used was ANSI standard C63.4-2003 & the FCC/OET Guidance on Measurements.



DUT is placed 80 cm above groundplane on a rotatable platform

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207(a)

Requirements:

Emission Frequency (MHz)	Conducted Limit (dBμV)	
	Quasi-peak (QP)	Average (AV)
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50
* Decreases with the logarithm of the frequency.		

Test Data: Not applicable. The device is battery operated exclusively.

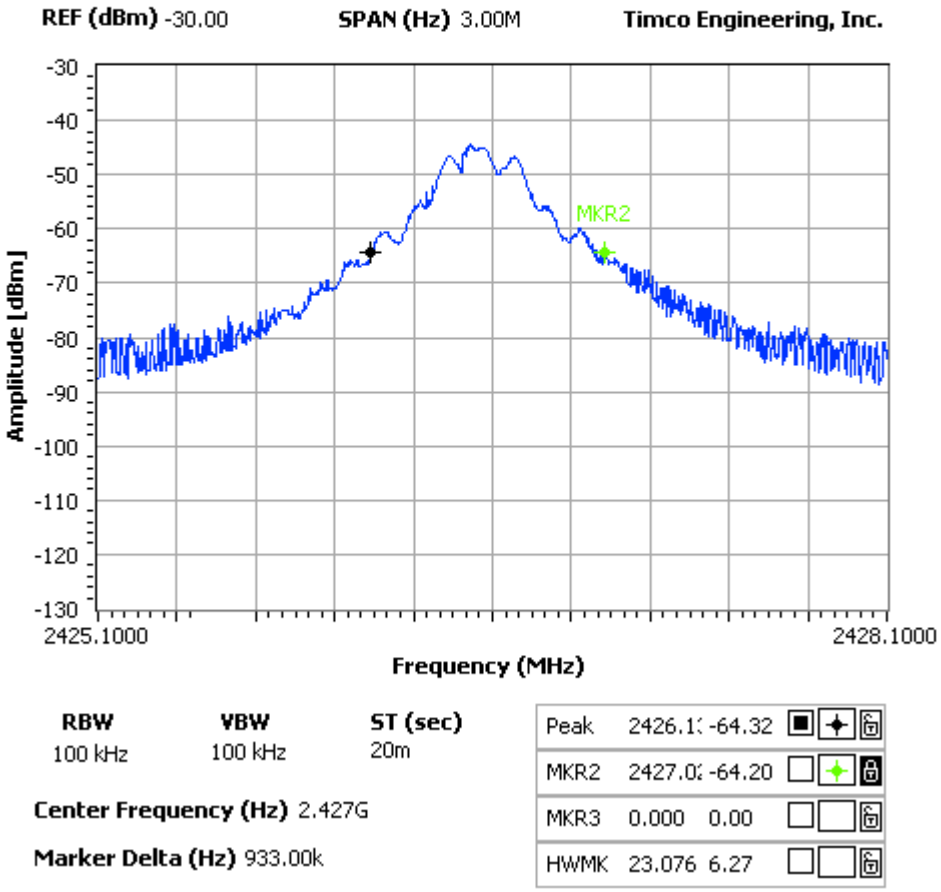
20 dB BANDWIDTH

RULES PART NO.: 15.247(a)(2)

REQUIREMENTS: N/A

TEST DATA: The 20 dB bandwidth is 900 kHz.

NOTES:
COBRA ELECTRONICS CORPORATION - FCC ID: BBOXRSR7 MDU
20 dB BANDWIDTH - MAIN UNIT



Three places in the band were measured and the worst case presented above.

NUMBER OF HOPPING CHANNELS

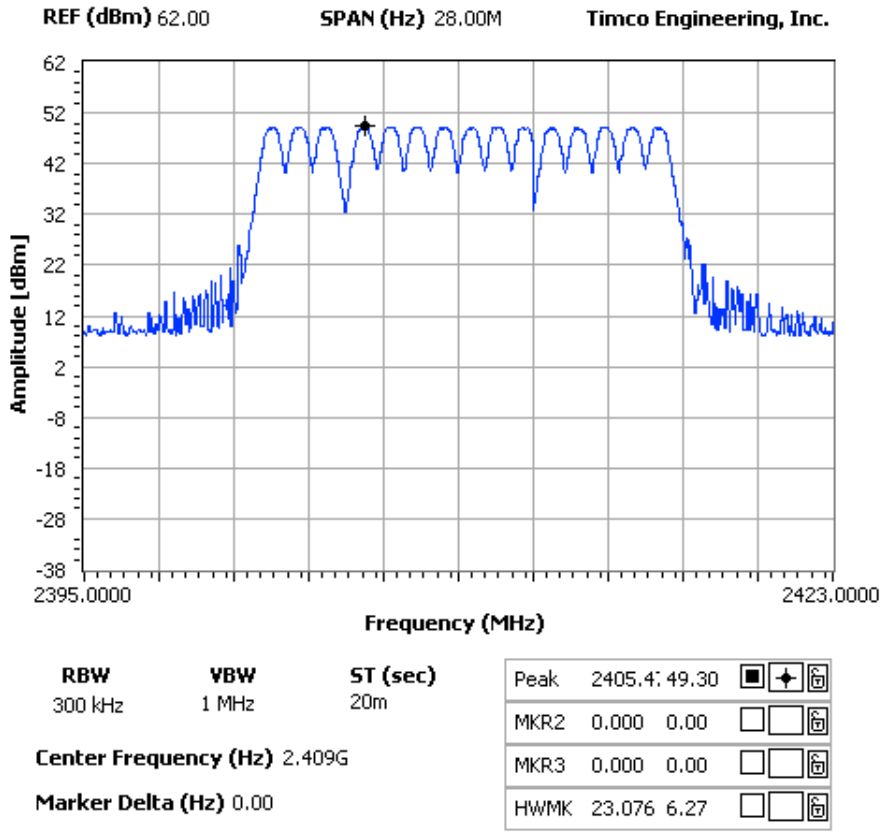
Rules Part No.: 15.247(a)(1)

Requirements:

902-928 MHz	If the 20 dB bandwidth is less than 250 kHz, the system shall use at least 50 hopping frequencies.
	If the 20 dB bandwidth is 250 kHz or greater, the system shall use at least 25 hopping frequencies.
2400-2483.5 MHz	At least 15 channels
5725-5850 MHz	At least 75 channels

Test Data: The number of hops is 16 hops at a separation of 1 MHz. It meets the requirements.

NOTES:
COBRA ELECTRONICS CORPORATION - FCC ID: BBOXRSR7 MDU
NUMBER OF HOPPING CHANNEL - MAIN UNIT



DWELL TIME OF A HOPPING CHANNEL

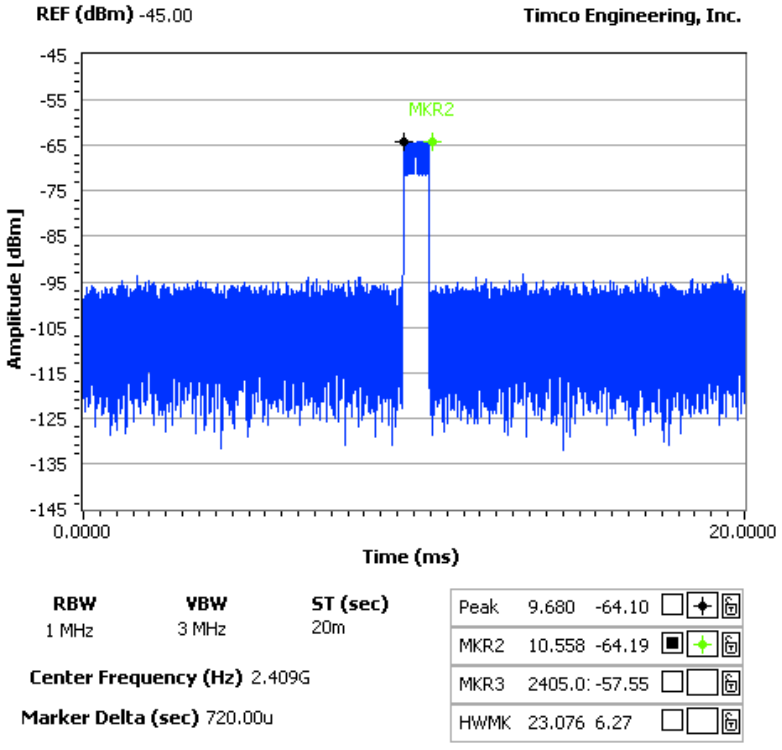
Rules Part No.: 15.247(a)(1)(i), (ii), (iii)

Requirements:

902-928 MHz	If 20 dB bandwidth is less than 250 kHz, Dwell time < = 0.4 seconds in a 20 second period.
	If 20 dB bandwidth is 250 kHz or greater, Dwell time < = 0.4 seconds in a 10 second period.
2400-2483.5 MHz	< = 0.4 seconds in a 0.4 seconds multiplied the number of hopping channels employed.
5725-5850 MHz	< = 0.4 seconds in a 30 second period.

Test Data: The dwell time is a maximum of 45 milliseconds with maximal length packets. See the enclosed exhibit on packet length. Presented is a plot of a minimal length packet (1 millisecond).

NOTES:
COBRA ELECTRONICS CORPORATION - FCC ID: BBOXRSR7 MDU
DWELL TIME - MAIN UNIT



Three places in the band were measured and the worst case presented above.

CARRIER FREQUENCY SEPARATION

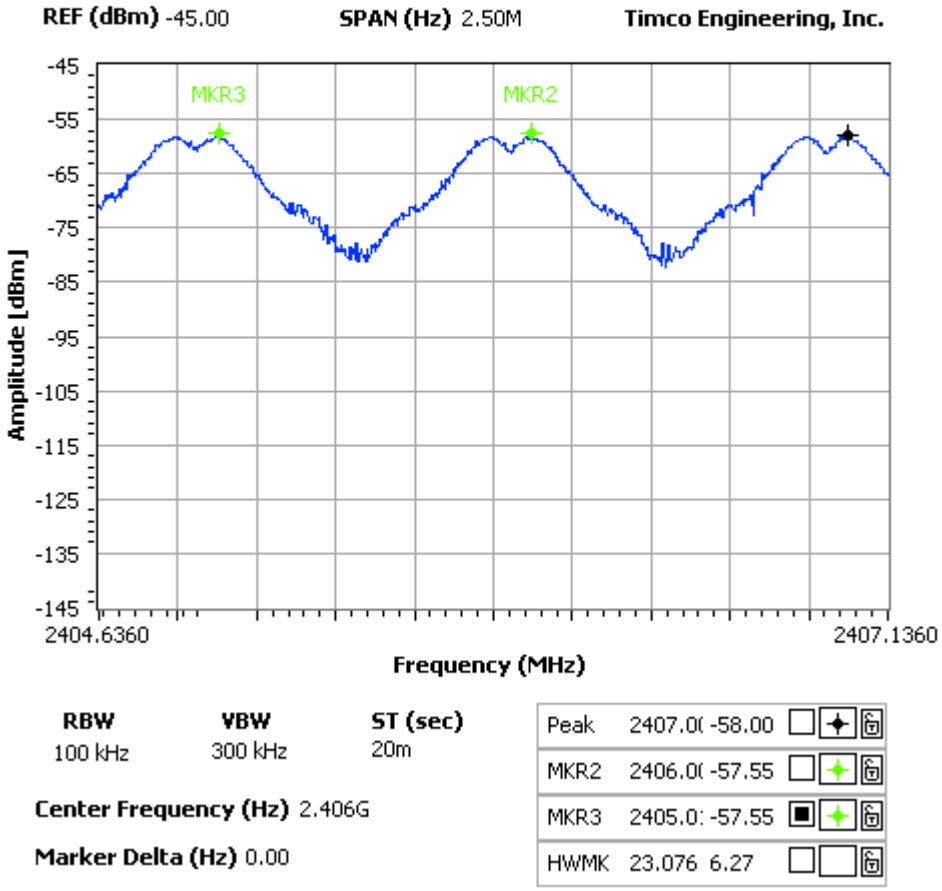
Rules Part No.: 15.247(a)(2)

Requirements: The hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Test Data: Frequency separation is 1000 kHz. The DUT meets the requirement.

NOTES:

COBRA ELECTRONICS CORPORATION - FCC ID: BBOXRSR7 MDU
CARRIER FREQUENCY SEPARATION - MAIN UNIT



POWER OUTPUT

Rules Part No.: 15.247(b)

Requirements: The maximum peak output power shall not exceed 1 watt (30 dBm). If directional transmitting antennas with a gain of more than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For frequency hopping systems operating in the 2400 – 2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all hopping systems in the 5725 – 5850 MHz band: 1 Watt. For all other frequency hopping systems in the 2400 – 2483.5 MHz band: 0.125 watts.

Test Data:

Channel No.	Frequency MHz	Output Power mW
Low	2401.0	2.0
Mid	2426.7	1.4
High	2452.0	1.1

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Rules Part No.: 15.247(c)

Requirements: Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

Test Data: N/A as the antennas is permanently attached.

FIELD STRENGTH OF SPURIOUS EMISSIONS

Rules Part No.: 15.247(c), 15.205 &15.209(b)

Requirements:

(Fundamental) Frequency	Limits
902 – 928MHz 2.4 – 2.4835GHz	127.37dBuV/m
Harmonics (restricted)	54 dBuV/m @3m

Unwanted Emissions Frequency	Limits dBuV/m @ 3m
30 - 88	40
88 - 216	43.5
216 - 960	46
Above 960 MHz	54

Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54 dBuV/m). Spurious not in a restricted band must be 20 dBc.

Test Data: The data was presented in the following tables.

Harmonics were measured to the 10th harmonic.

All emissions measured using a peak detector. Except as noted.

Emissions attenuated more than 20 dB below the limit are not reported

Spurious emissions from 30 to 1000 MHz

Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
44.68	14.8	H	0.47	11.21	26.48	13.52
44.82	19.5	V	0.47	10.09	30.06	9.94
49.29	27.7	H	0.50	11.20	39.40	0.60
52.63	20.3	V	0.51	11.47	32.28	7.72
59.01	19.7	H	0.53	11.12	31.35	8.65
62.47	19.4	V	0.54	10.46	30.40	9.60
66.38	20.1	V	0.55	8.88	29.53	10.47
73.80	16.9	H	0.58	7.36	24.84	15.16
78.68	19.7	H	0.60	6.71	27.01	12.99
83.64	24.7	V	0.61	7.50	32.81	7.19
91.95	23.5	H	0.63	8.67	32.80	10.70
93.48	25.5	V	0.63	10.34	36.47	7.03
97.12	27.0	V	0.64	11.08	38.72	4.78
100.18	24.1	H	0.65	11.50	36.25	7.25
105.26	17.6	H	0.66	11.65	29.91	13.59
105.70	20.8	V	0.66	11.94	33.40	10.10
118.02	16.3	V	0.67	14.51	31.48	12.02
122.97	20.7	H	0.67	13.36	34.73	8.77
127.87	13.9	H	0.68	13.14	27.72	15.78
192.19	17.1	H	0.87	17.44	35.41	8.09
288.29	15.2	H	1.08	13.97	30.25	15.75

[Continued]

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Duty Cycle Factor dB	Field Strength dBuV/m	Margin dB
2,401.00	2,401.00	66.7	V	3.4	28.84	-7	91.94	35.44
2,401.00	2,401.00	68.3	H	3.4	28.68	-7	93.38	34
2,401.00	4,802.00*	13	H	5.06	33.1	-7	44.16	9.84
2,401.00	4,802.00*	15.1	V	5.06	33	-7	46.16	7.84
2,401.00	7,203.00	12.1	V	7.46	35.83	-7	48.39	25.61
2,401.00	7,203.00	12.6	H	7.46	35.85	-7	48.91	25.09
2,401.00	9,604.00	12.7	H	8.26	38.04	-7	52	22.00
2,401.00	9,604.00	12.7	V	8.26	38.02	-7	51.98	22.02
2,401.00	12,005.00*	10.3	V	10.11	39.09	-7	52.5	1.5
2,401.00	12,005.00*	10.8	H	10.11	39.19	-7	53.1	0.9
2,401.00	14,406.00	9.7	V	11.87	42.17	-7	56.74	17.26
2,401.00	14,406.00	10.8	H	11.87	42.27	-7	57.94	16.06
2,426.70	2,426.70	60.2	V	3.45	28.82	-7	85.47	41.91
2,426.70	2,426.70	66.6	H	3.45	28.74	-7	91.79	35.59
2,426.70	4,853.20*	13.3	H	5.1	33.21	-7	44.61	9.39
2,426.70	4,853.20*	15.7	V	5.1	33.11	-7	46.91	7.09
2,426.70	7,279.90*	11.1	V	7.48	36.03	-7	47.61	6.39
2,426.70	7,279.90*	12.4	H	7.48	36.02	-7	48.9	5.1
2,426.70	9,706.60	12.8	H	8.32	38.08	-7	52.2	21.8
2,426.70	9,706.60	12.9	V	8.32	38.04	-7	52.26	21.74
2,426.70	12,133.30*	11.2	V	10.23	38.91	-7	53.34	0.66
2,426.70	12,133.30*	10.5	H	10.23	39.04	-7	52.77	1.23
2,426.70	14,560.00	9.7	V	12	42.22	-7	56.92	17.08
2,426.70	14,560.00	10.4	H	12	42.32	-7	57.72	16.28

* = Restricted Band

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Duty Cycle Factor dB	Field Strength dBuV/m	Margin dB
2,452.00	2,452.00	59.5	V	3.45	28.82	-7	84.77	42.61
2,452.00	2,452.00	65.8	H	3.45	28.74	-7	90.99	36.39
2,452.00	4,904.00*	14.8	H	5.13	33.31	-7	46.24	7.76
2,452.00	4,904.00*	17.9	V	5.13	33.21	-7	49.24	4.76
2,452.00	7,356.00*	11.3	V	7.51	36.23	-7	48.04	5.96
2,452.00	7,356.00*	12.7	H	7.56	36.52	-7	49.78	4.22
2,452.00	9,808.00	11.1	H	8.38	38.12	-7	50.6	23.4
2,452.00	9,808.00	12.2	V	8.38	38.06	-7	51.64	22.36
2,452.00	12,260.00*	10.4	H	10.36	38.89	-7	52.65	1.35
2,452.00	12,260.00*	10.9	V	10.36	38.74	-7	53.0	1.0
2,452.00	14,712.00	9.3	V	12.14	41.76	-7	56.2	17.8
2,452.00	14,712.00	10.8	H	12.14	41.86	-7	57.8	16.2

* Restricted Band

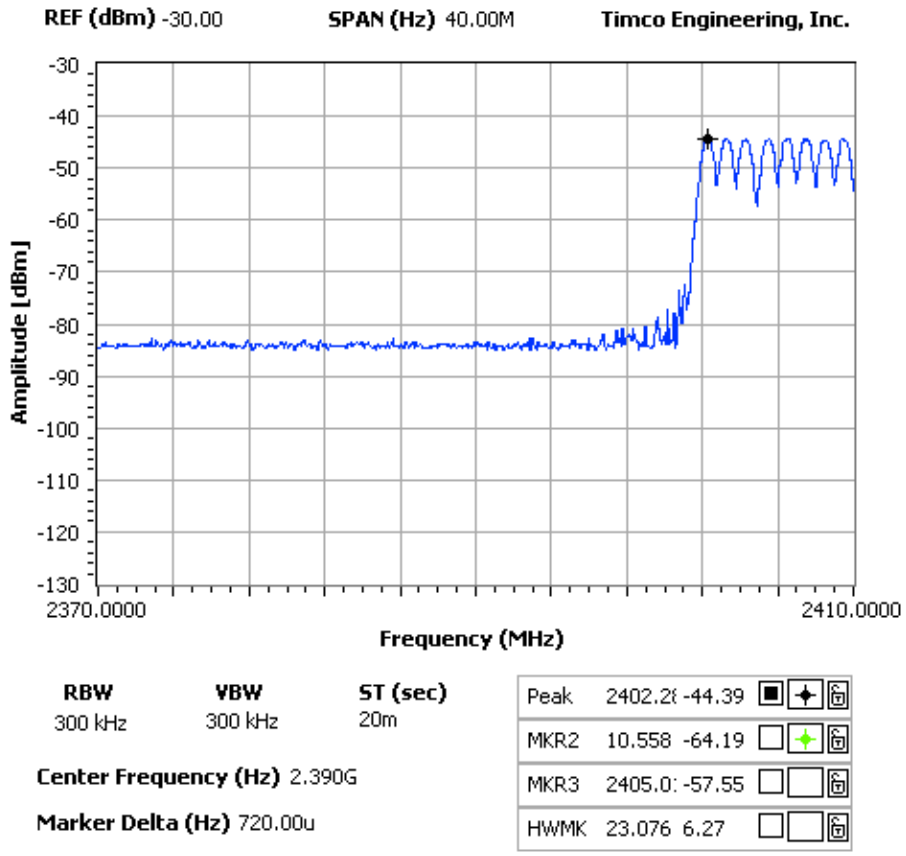
RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

Rule Parts No.: Pt 15.247 (c)

Requirements: Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54dBuV/m). Emissions not in the restricted band must be 20 dBc.

Test Data: Lower restricted band

NOTES:
COBRA ELECTRONICS CORPORATION - FCC ID: BBOXRSR7 MDU
LOWER BAND EDGE - MAIN UNIT



NOTES:

COBRA ELECTRONICS CORPORATION - FCC ID: BBOXRSR7 MDU
UPPER BAND EDGE - MAIN UNIT