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COMPLIANCE TEST REPORT

PER FCC PT 15.249

UNLICENSED INTENTIONAL RADIATOR

Applicant	Tattle-Trail LLC
Address	7887 Bryan Dairy Road Largo FL 33377
FCC ID	VNE000TTK550
Model Number	TTT 550, TTR 550
Product Description	Towing Monitor
Date Sample Received	9/14/2007
Date Tested	9/14/2007
Tested By	Mario de Aranzeta
Approved By	Mario de Aranzeta
Report Number	3044BUT7TestReport.pdf
Test Results	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

TABLE OF CONTENT

ATTESTATION

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

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.

ACCREDITED
Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

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

Authorized Signatory Name: *Mario de Aranzeta*

Mario de Aranzeta C.E.T.
Compliance Engineer/ Lab. Supervisor

Date: September 19, 2007

Signature: On file

REPORT SUMMARY

Disclaimer	The test results relate only to the items tested.
Purpose of Test	To show the DUT in compliance with FCC CFR 47, Part 15.249 requirements for a low power transmitter
Test Standards	ANSI/TIA 603-C: 2004, FCC CFR 47 Part 15.249, ANSI C63.4: 2003
Related Report(s)/Approval(s)	3044AUT7TestReport.pdf – Digital interface portion was verified.

TEST ENVIRONMENT AND TEST SETUP

Test Facility	All tests were conducted by Timco Engineering Inc. located at 849 NW State Road 45, Newberry, FL 32669 USA
Laboratory Test Condition	Temperature: 26ºC Relative humidity: 50%
Deviation from the standards	No deviation
Modification to the DUT	No modification was made.
Test Exercise (software etc.)	The DUT was placed in continuous transmitting mode of operation.
System Setup	Stand alone device.

DUT SPECIFICATION

DUT Description	Towing monitor
FCC ID	VNE000TTK550
Model Number	TTT 550, TTR 550
Serial Number	N/A
Operating Frequency	2410 – 2475 MHz
No. of Channels	14
Modulations	ZigBee
DUT Power Source	Battery Operated Exclusively
Test Item	Pre-production
Type of Equipment	Portable
Antenna	Printed Circuit Board F
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 3/20/07	3/19/10
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
Antenna: Biconnical	Eaton	94455-1	1057	CAL 12/12/05	12/12/07
Antenna: Biconnical	Eaton	94455-1	1096	CAL 10/11/06	10/11/08
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 7/18/07	7/18/09
Analyzer Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 5/17/07	5/17/09
Analyzer Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 5/17/07	5/17/09
Analyzer Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 5/17/07	5/17/09
LISN	Electro-Metrics	ANS-25/2	2604	CAL 10/5/06	10/5/08
LISN	Electro-Metrics	EM-7820	2682	CAL 7/23/07	7/23/09
Antenna: Log-Periodic	Eaton	96005	1243	CAL 12/14/05	12/14/07

TEST PROCEDURES

Radiation Interference: ANSI C63.4-2003 using an Agilent Model 8566B spectrum analyzer, an Agilent Model 85685A preselector, an Agilent Model 85650A Quasi-Peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

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	+ 0.5	= 30.86 dBuV/m @ 3m

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003 using a 50uH LISN. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

Band Edge: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

ANSI C63.4-2003 Measurement Procedures: The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The DUT was placed in the center of the table (1.5m side). 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.

RADIATION INTERFERENCE

Rules Part No.: 15.249, 15.209

Requirements:

Frequency	Limits
Part 15.209	
9 to 490 kHz	2400/F (kHz) µV/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) µV/m @ 30 meters
1705 kHz to 30 MHz	29.54 dBµV/m @ 30 meters
30 – 88	40.0 dBµV/m @ 3 meters
80 – 216	43.5 dBµV/m @ 3 meters
216 – 960	46.0 dBµV/m @ 3 meters
Above 960	54.0 dBµV/m @ 3 meters
Part 15.249	
Fundamental 902 – 928 MHz	94.0 dBµV/m @ 3 meters
Fundamental 2.4 – 2.4835 MHz	94.0 dBµV/m @ 3 meters
Harmonics	54.0 dBµV/m @ 3 meters

Test Data:

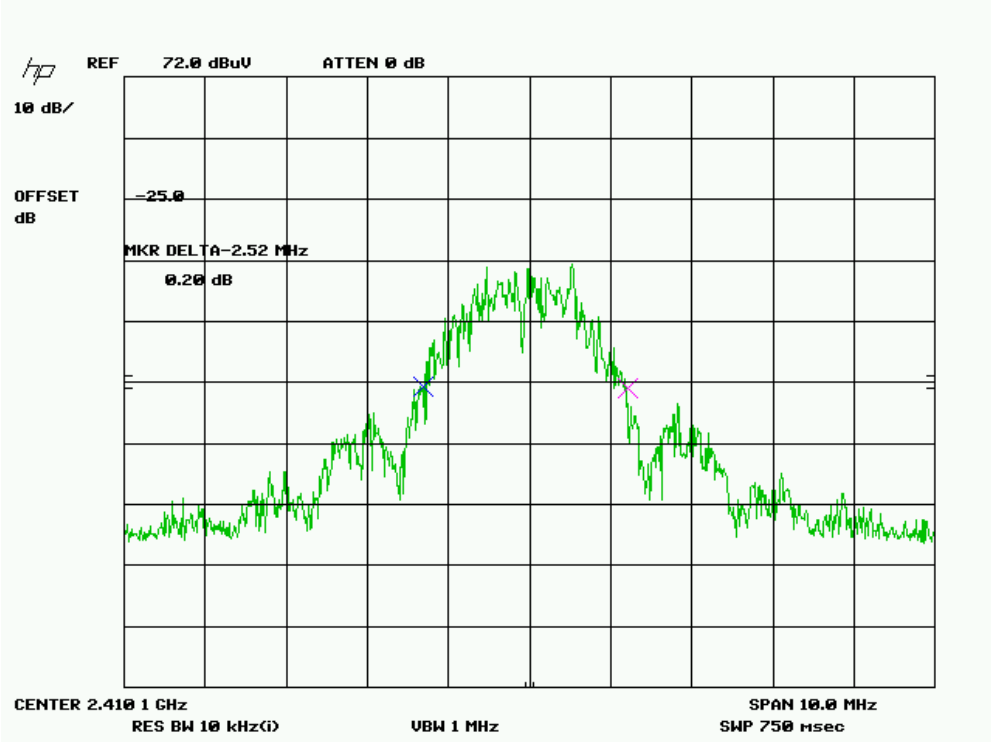
Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Duty Cycle CF dB	Field Strength dBuV/m	Margin dB
2,410.0	48.00	6.0	H	0.49	11.20		17.69	22.31
2,410.0	48.00	11.8	V	0.49	10.70		22.99	17.01
2,410.0	2,410.00	63.0	V	3.19	33.74	16	83.93	10.07
2,410.0	2,410.00	62.0	H	3.19	33.74	16	82.93	11.07
2,410.0	7,227.00	12.0	V	5.74	36.05	16	37.79	16.21
2,410.0	7,228.00	14.0	H	5.74	36.05	16	39.79	14.21
2,440.0	48.00	6.0	H	0.49	11.20		17.69	22.31
2,440.0	48.00	11.7	V	0.49	10.70		22.89	17.11
2,440.0	2,440.00	61.0	V	3.21	32.34	16	80.55	13.45
2,440.0	2,440.00	61.5	H	3.21	32.34	16	81.05	12.95
2,440.0	7,320.00	14.0	V	5.79	36.06	16	39.85	14.15
2,440.0	7,322.00	17.2	H	5.79	36.06	16	43.05	10.95
2,475.0	48.00	6.0	H	0.49	11.20		17.69	22.31
2,475.0	48.00	12.0	V	0.49	10.70		23.19	16.81
2,475.0	2,475.00	60.0	H	3.23	32.44	16	79.67	14.33
2,475.0	2,475.00	60.0	V	3.23	32.44	16	79.67	14.33
2,475.0	7,426.00	14.7	V	5.86	36.09	16	40.65	13.35
2,475.0	7,426.00	9.2	H	5.86	36.09	16	35.15	18.85

OCCUPIED BANDWIDTH

Rules Part No.: 15.249 (d)

Requirements: The field strength of any emissions appearing outside the bandedges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.209.

Test Data:



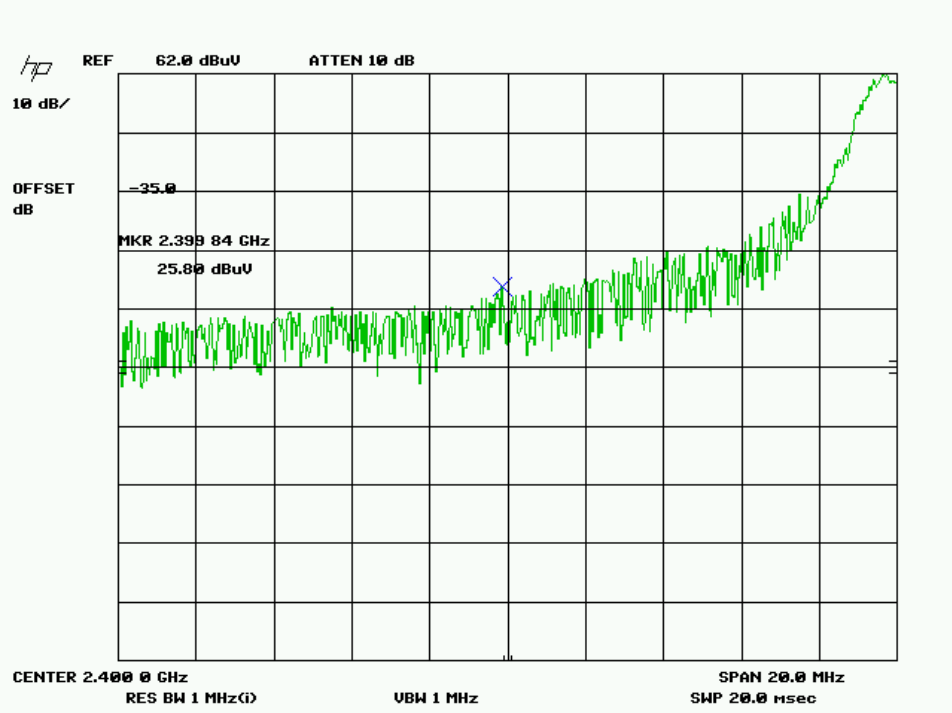
BAND EDGE COMPLIANCE

Rules Part No.: 15.249 (d)

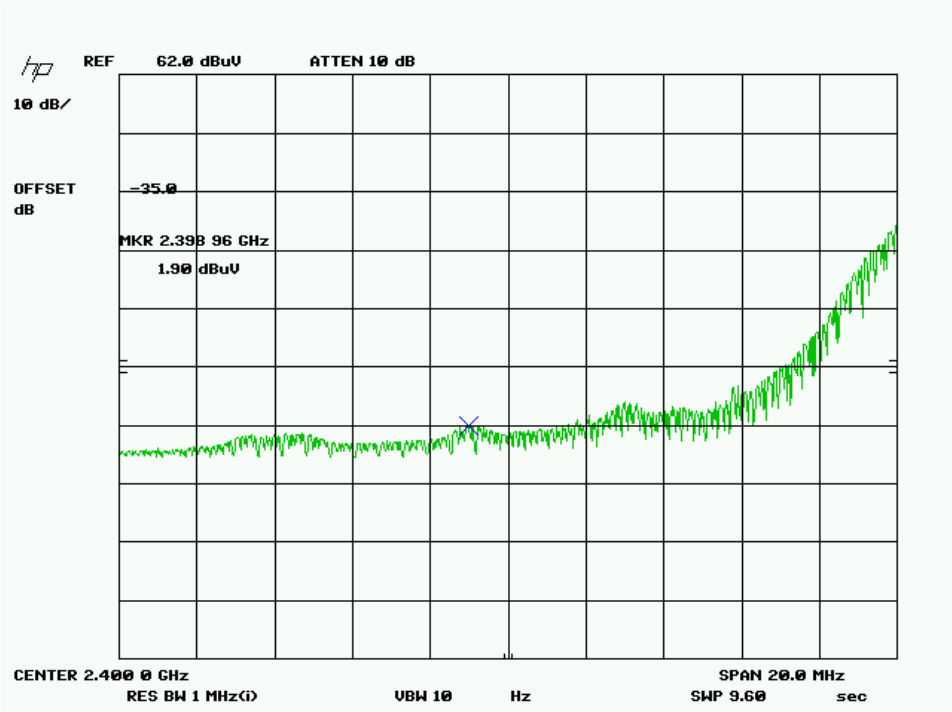
Requirements: Field strength limits are specified at a distance of 3 meters. Emissions radiated outside of the specified frequency bands, except for harmonic, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

Test Data: Please see the following plots. P – Peak. A - Average

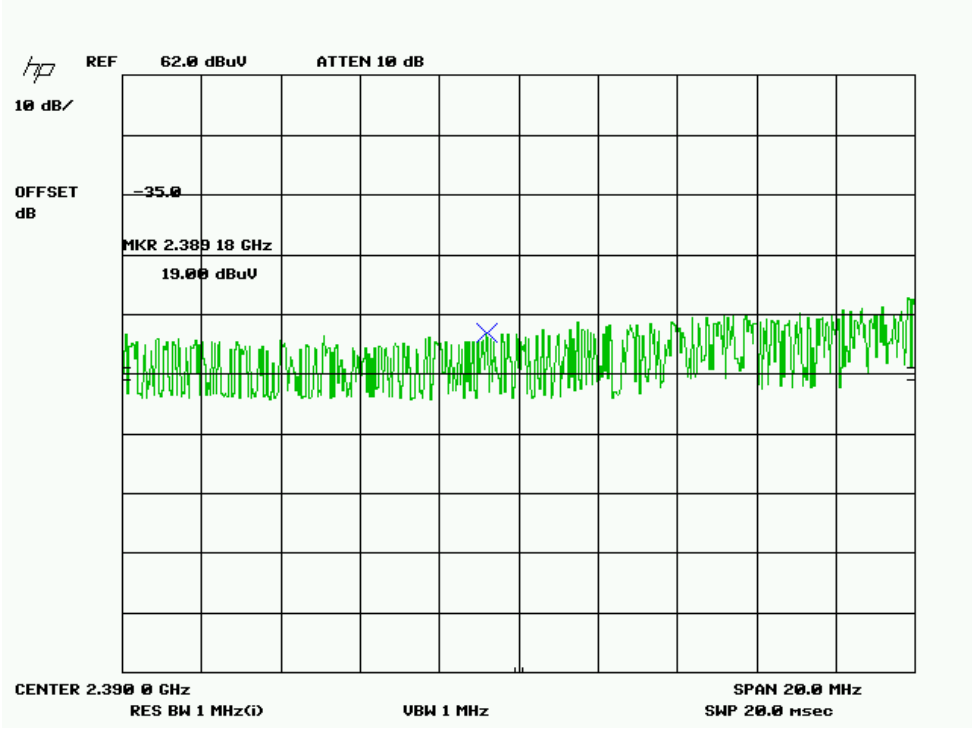
Lower bandedge



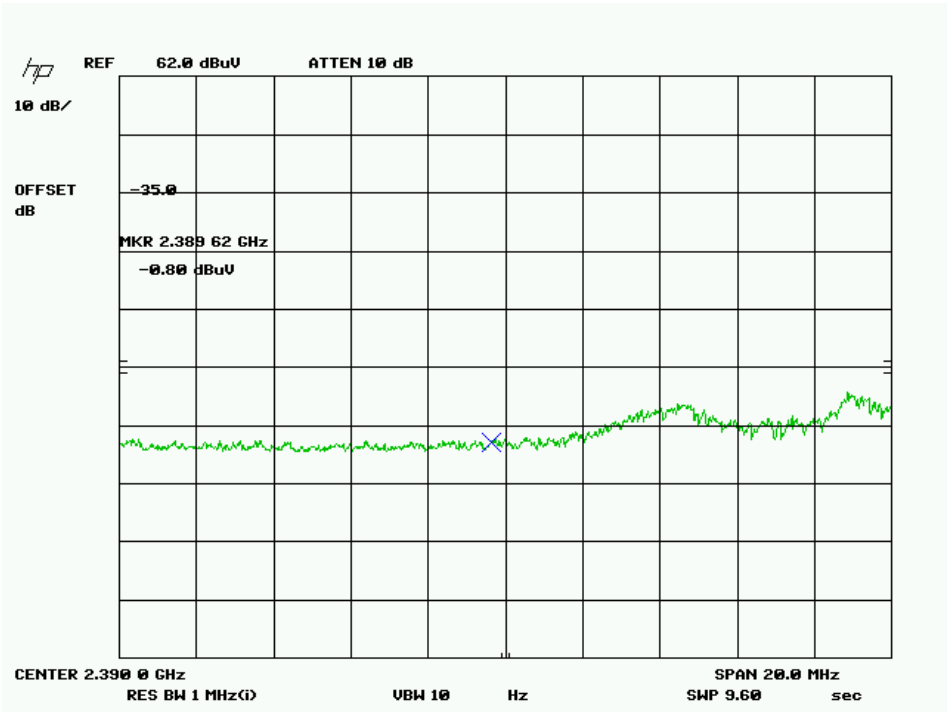
2,410.0	2,400.00	25.8 (P)	V	3.18	32.24	61.22	12.78
2,410.0	2,400.00	1.9 (A)	V	3.18	32.24	37.32	16.68



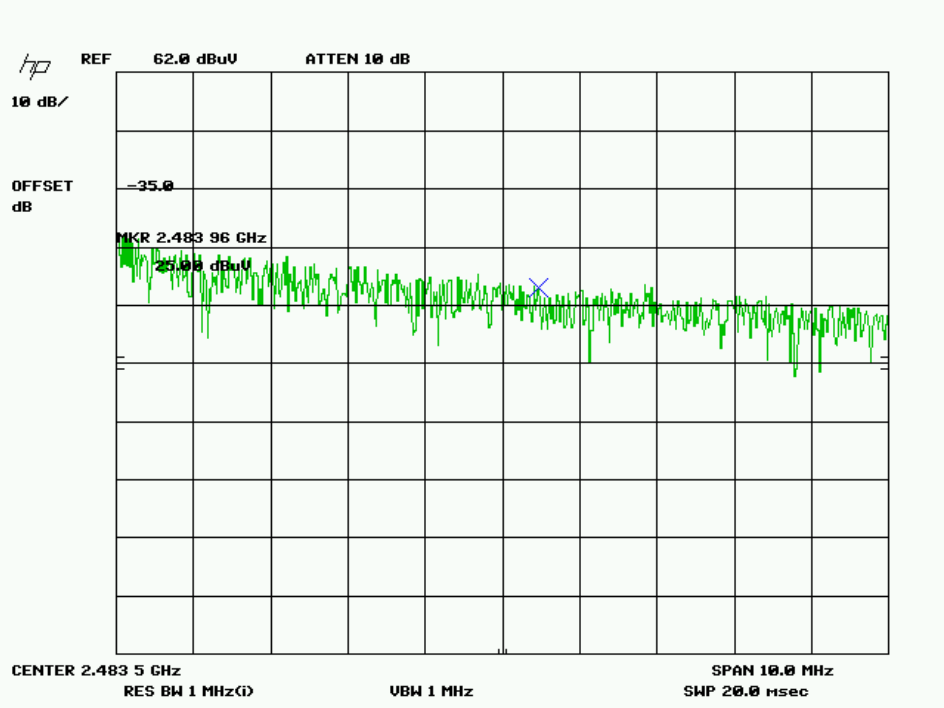
Lower non-adjacent restricted band



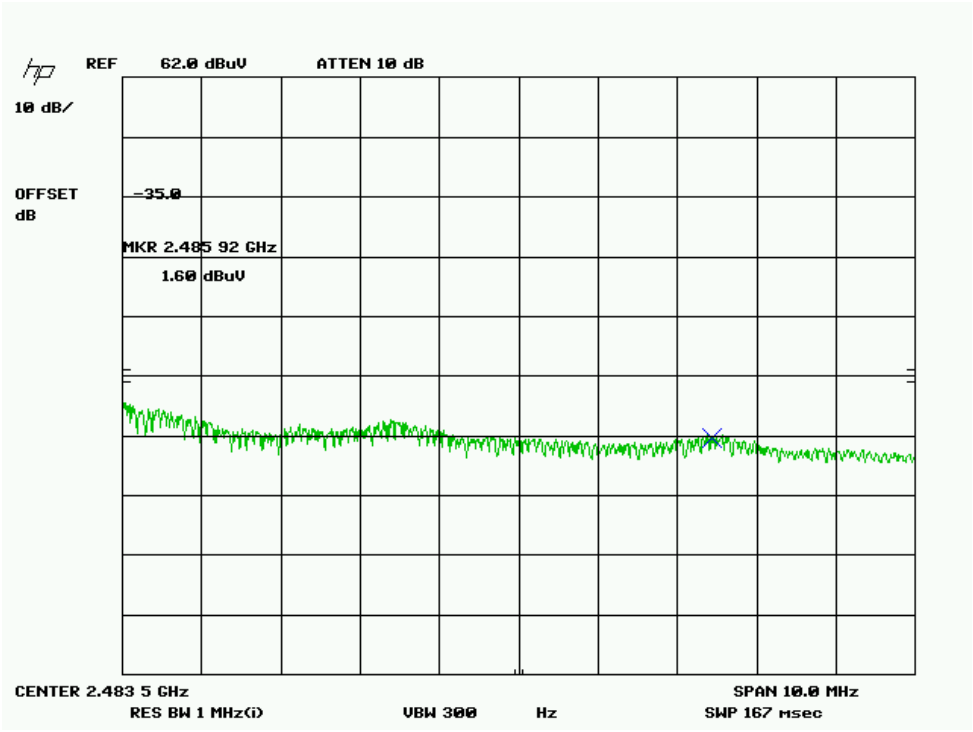
2,410.0	2,389.00	19.0 (P)	V	3.17	32.21	54.38	19.62
2,410.0	2,389.00	-0.8 (A)	V	3.17	32.21	34.58	19.42



Upper bandedge

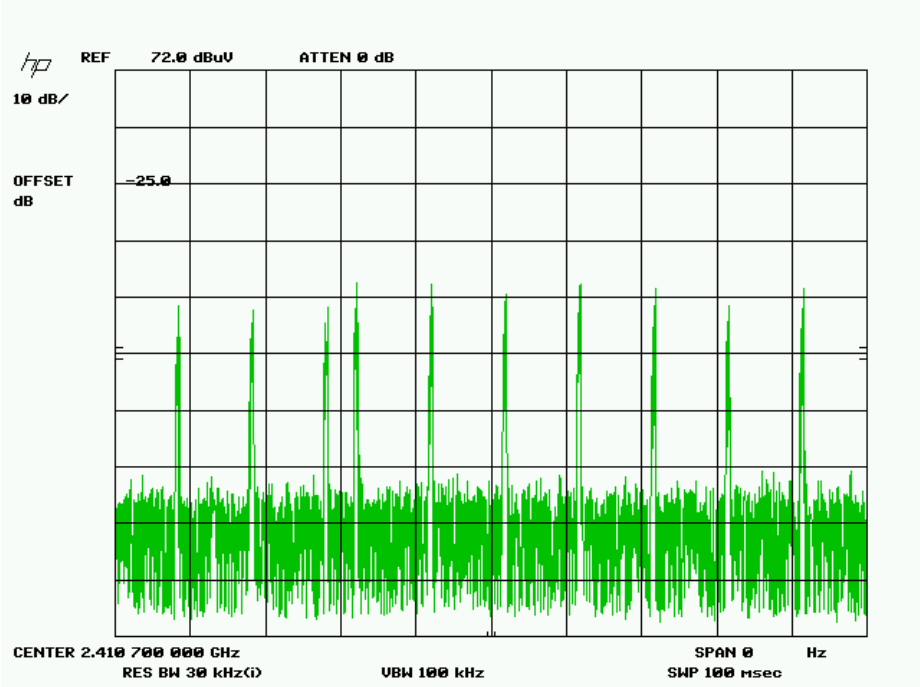


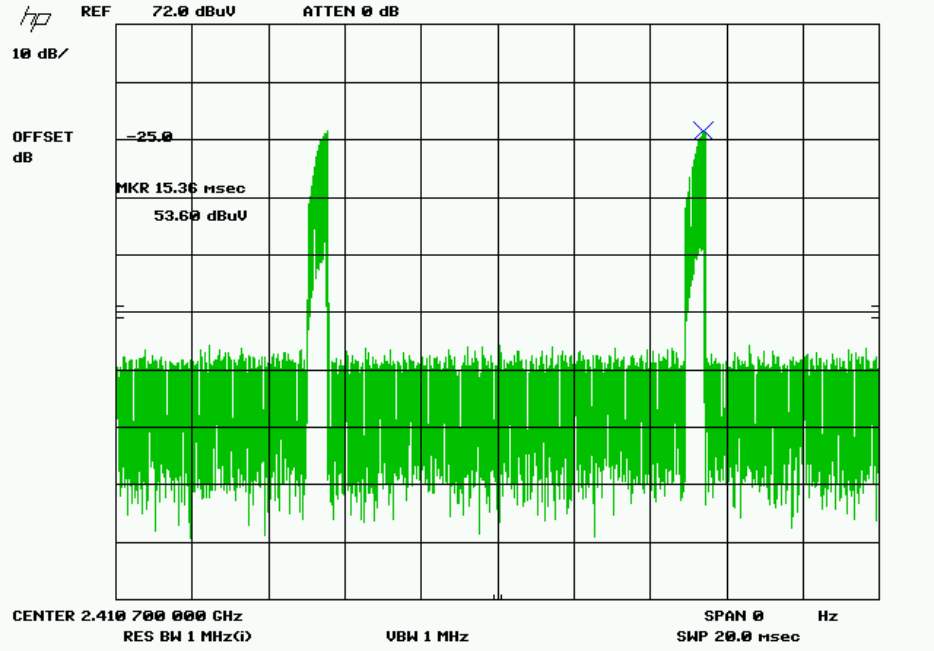
2,475.0	2,483.50	25.0 (P)	H	3.24	32.46	60.70	13.3
2,475.0	2,486.00	1.6 (A)	H	3.24	32.46	37.30	16.70



DUTY CYCLE

Total # of pulses: 10 in 100 ms
Duration of pulse: 1.5 ms maximum duration of pulse according to manufacturer.
20*log ((10*1.5)/100)=20*log (0.15)=16 dB





POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207

Requirements:

Frequency (MHz)	Quasi Peak Limits (dBuv)	Average Limits (dBuV)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50
* Decrease with the logarithm of frequency		

Test Data: N/A. The DUT is battery or vehicle powered.