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FCC PART 15.249 AND IC RSS-210 TEST REPORT

UNLICENSED INTENTIONAL RADIATOR

Applicant	VERDANT ENVIRONMENTAL TECHNOLOGIES
Address	5667 ROYALMOUNT AVENUE
	MONTREAL QUEBEC H4P 2P9 CANADA
FCC ID	XEYV8OLWR
IC Certification	8410A-V8OLWR
Model Number	V8-OL-WR, 051-513025
Product Description	TRANSCEIVER
Date Sample Received	4/6/2009
Date Tested	4/9/2009
Tested By	Richard Block
Approved By	Mario de Aranzeta
Report Number	1284AUT9TestReport.doc
Test Results	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

TABLE OF CONTENT

GENERAL REMARKS

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.

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 C.E.T.
Compliance Engineer/ Lab. Supervisor

Date: 4/21/2009

GENERAL INFORMATION

DUT Specification

The test results relate only to the items tested.			
Applicable Standard	Part 15.249, IC RSS-210 and RSS-GEN		
DUT Description	WIRELESS TRANSCEIVER		
FCC ID	XEYV8OLWR		
IC Certification	8410A-V8OLWR		
Model	V8-OL-WR, 051-513025		
Operating Frequency	TX: 902.4 – 927.6 MHz	RX: Same	
DUT Power Source	☐ 110–120Vac/50– 60Hz		
	☐ DC Power		
	☒ Battery Operated Exclusively		
Test Item	☐ Prototype	☒ Pre-Production	☐ Production
Type of Equipment	☒ Fixed	☐ Mobile	☐ Portable
Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.		
Test Conditions	Temperature: 26°C Relative humidity: 50%		
Test Exercise	The DUT was placed in continuous transmit mode of operation.		
Modifications	None		

Test Supporting Equipment

Supporting Device	Manufacturer	Model / FCC ID	Serial Number
Laptop computer	DELL	PP01L	

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 2/5/09	2/5/12
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 5/11/07	5/11/10
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 11/30/07	11/30/09
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 11/30/07	11/30/09
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 11/30/07	11/30/09
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 11/30/07	11/30/09
Frequency Counter	HP	5385A	3242A07460	CAL 5/26/09	5/26/11
Hygro-Thermometer	Extech	445703	0602	CAL 11/15/07	11/15/09
Antenna: Log-Periodic	Eaton	96005	1243	CAL 12/13/07	12/13/09
Measuring Tape-7.5M	Kraftixx	7.5M PROFI		CHAR 11/13/07	11/13/09
Modulation Analyzer	HP	8901A	3435A06868	CAL 5/26/09	5/26/11
Digital Multimeter	Fluke	FLUKE-77-3	79510405	CAL 5/18/09	5/18/11
System One	Audio Precision	System One	SYS1-45868	CHAR 2/27/08	2/27/10
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 4/25/08	4/25/10

TEST PROCEDURES

Radiation Interference: ANSI C63.4-2003 using a spectrum analyzer, a preselector, a 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. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

Occupied Bandwidth: 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 10.1 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. Emissions attenuated more than 20 dB below the permissible value are not reported.

RX RADIATION INTERFERENCE

Rules Part No.: 15.109, RSS-210

Requirements:

Frequency MHz	Limits
30 – 88	40.0 dBµV/m measured @ 3 meters
88 – 216	43.5 dBµV/m measured @ 3 meters
216 – 960	46.0 dBµV/m measured @ 3 meters
Above 960	54.0 dBµV/m measured @ 3 meters

TEST DATA:

Emission Frequency MHz	Meter Reading dBµV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Field Strength dBµV/m	Margin dB
903.80	**3.2**	**V**	**1.96**	**22.66**	**27.82**	**18.18**
903.80	**3.3**	**H**	**1.96**	**23.34**	**28.60**	**17.40**
914.10	**3.3**	**V**	**1.97**	**22.60**	**27.87**	**18.13**
914.10	**3.4**	**H**	**1.97**	**23.36**	**28.73**	**17.27**
927.70	**3.1**	**V**	**1.99**	**22.68**	**27.77**	**18.23**
927.70	**3.2**	**H**	**1.99**	**23.45**	**28.64**	**17.36**

RADIATION INTERFERENCE

Rules Part No.: 15.249, 15.209, RSS-210, RSS-GEN

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:

Part 15.209

Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBuV/m	Margin dB
37.14	16.1	V	0.44	10.13	20	6.67	33.33
79.66	15.5	V	0.6	7.49	20	3.59	36.41
99.46	15.8	V	0.65	11.57	20	8.02	35.48
299.76	15	H	1.1	14.39	20	10.49	35.51
451.21	32.5	V	1.25	16.64	20	30.39	15.61
453.06	34.7	V	1.25	16.69	20	32.64	13.36
454.87	40.5	V	1.25	16.75	20	38.50	7.50
459.4	25.2	V	1.26	16.88	20	23.34	22.66
894.48	23.6	V	1.95	22.64	20	28.19	17.81
899.36	33.2	V	1.95	22.69	20	37.84	8.16
930.76	22.8	V	2	22.69	20	27.49	18.51
940.9	20.9	V	2.01	22.59	20	25.50	20.50

Part 15.249

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBµV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBµV/m	Margin dB
902.4	902.4	71.1	H	1.95	22.68	20	75.73	18.27
902.4	902.4	79.6	V	1.95	23.32	20	84.87	9.13
902.4	1804.8	27.3	H	2.74	29.95	20	39.99	14.01
902.4	1804.8	29.3	V	2.74	29.95	20	41.99	12.01
902.4	2707.2	19.7	V	3.4	32.54	20	35.64	18.36
902.4	2707.2	20.4	H	3.4	32.54	20	36.34	17.66
902.4	3609.6	20.3	V	4.15	32.98	20	37.43	16.57
902.4	3609.6	22.1	H	4.15	32.98	20	39.23	14.77
902.4	4512.0	7.0	V	4.76	34.10	20	25.86	28.14
902.4	4512.0	7.5	H	4.76	34.10	20	26.36	27.64
902.4	5414.0	6.5	V	5.12	34.60	20	26.22	27.78
902.4	5415.4	6.7	H	5.12	34.60	20	26.42	27.58
902.4	6316.8	6.4	V	5.4	35.65	20	27.45	26.55
902.4	6316.8	5.6	H	5.4	35.65	20	26.65	27.35
902.4	7219.2	5.2	H	5.73	36.04	20	26.97	27.03
902.4	7219.2	5.4	V	5.73	36.04	20	27.17	26.83
902.4	8121.6	5.0	V	6.25	36.00	20	27.25	26.75
902.4	8121.6	5.6	H	6.25	36.00	20	27.85	26.15
902.4	9024.0	5.1	H	6.61	36.31	20	28.02	25.98
902.4	9024.0	5.9	V	6.61	36.31	20	28.82	25.18
915.0	915.0	71.9	H	1.97	23.35	20	77.22	16.78
915.0	915.0	78.1	V	1.97	22.60	20	82.67	11.33
915.0	1830.0	25.3	V	2.76	30.11	20	38.17	15.83
915.0	1830.0	28.8	H	2.76	30.11	20	41.67	12.33
915.0	2745.0	18.0	V	3.42	32.55	20	33.97	20.03
915.0	2745.0	20.9	H	3.42	32.55	20	36.87	17.13
915.0	3660.0	16.0	V	4.19	33.06	20	33.25	20.75
915.0	3660.0	19.5	H	4.19	33.06	20	36.75	17.25
915.0	4575.0	4.9	V	4.79	34.10	20	23.79	30.21
915.0	4575.0	5.4	H	4.79	34.10	20	24.29	29.71
915.0	5490.0	4.5	V	5.15	34.69	20	24.34	29.66

TEST DATA CONTD.

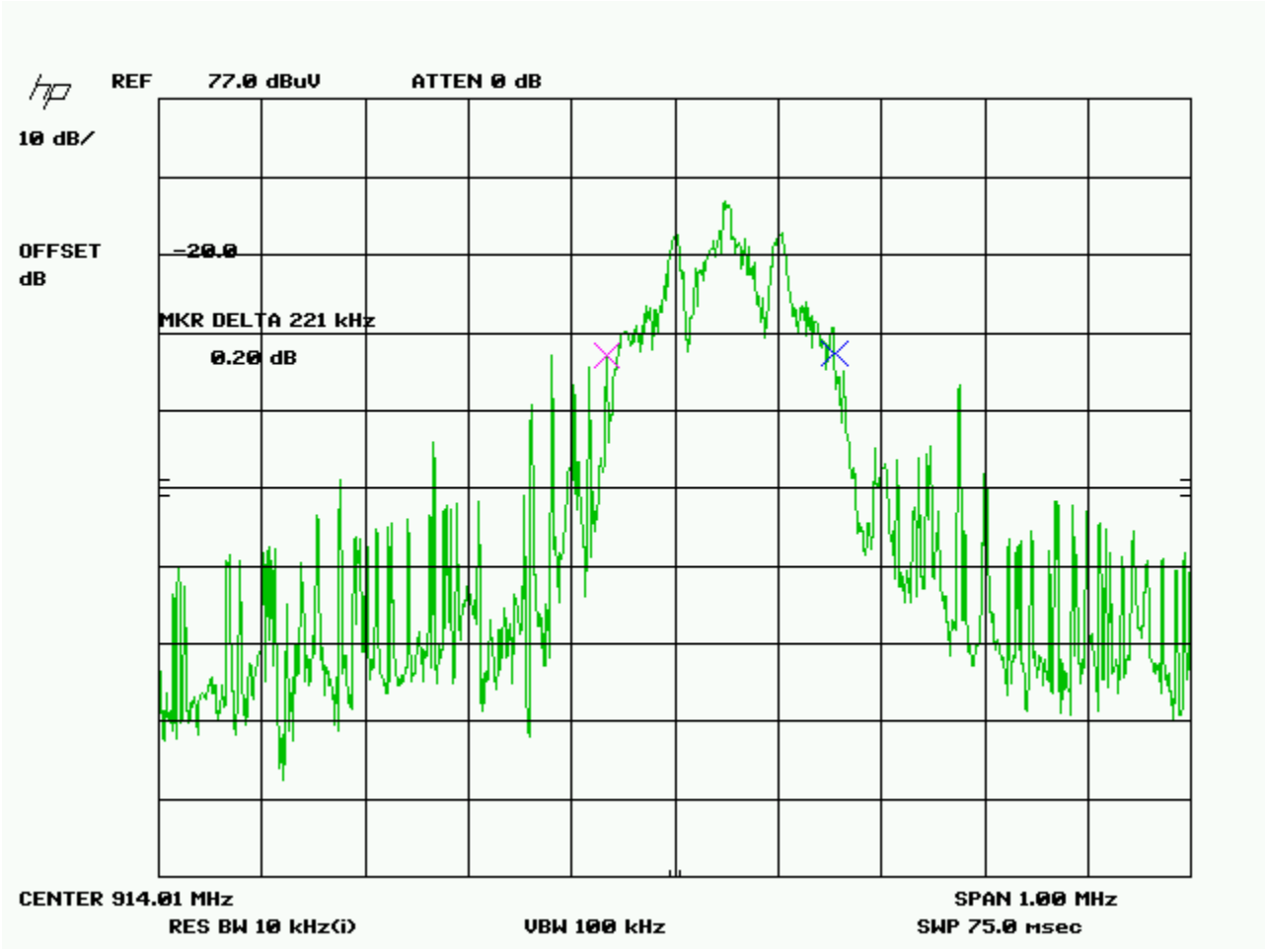
Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBµV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBµV/m	Margin dB
915.0	5490.0	6.2	H	5.15	34.69	20	26.04	27.96
915.0	6405.0	4.7	H	5.42	35.72	20	25.84	28.16
915.0	6405.0	5.2	V	5.42	35.72	20	26.34	27.66
915.0	7320.0	5.6	H	5.79	36.06	20	27.45	26.55
915.0	7320.0	6.0	V	5.79	36.06	20	27.85	26.15
915.0	8235.0	5.1	V	6.29	36.00	20	27.39	26.61
915.0	8235.0	5.3	H	6.29	36.00	20	27.59	26.41
915.0	9150.0	6.2	H	6.65	36.39	20	29.24	24.76
915.0	9150.0	7.1	V	6.65	36.39	20	30.14	23.86
927.6	927.6	70.1	H	1.99	23.45	20	75.54	18.46
927.6	927.6	78.3	V	1.99	22.68	20	82.97	11.03
927.6	1855.2	28.8	V	2.78	30.27	20	41.85	12.15
927.6	1855.2	30.9	H	2.78	30.27	20	43.95	10.05
927.6	2782.8	22.5	V	3.45	32.56	20	38.51	15.49
927.6	2782.8	26.0	H	3.45	32.56	20	42.01	11.99
927.6	3710.4	19.9	V	4.24	33.14	20	37.28	16.72
927.6	3710.4	24.4	H	4.24	33.14	20	41.78	12.22
927.6	4638.0	8.2	V	4.82	34.10	20	27.12	26.88
927.6	4638.0	10.2	H	4.82	34.10	20	29.12	24.88
927.6	5565.6	5.4	H	5.17	34.79	20	25.36	28.64
927.6	5565.6	6.6	V	5.17	34.79	20	26.56	27.44
927.6	6493.2	3.9	V	5.45	35.79	20	25.14	28.86
927.6	6493.2	5.2	H	5.45	35.79	20	26.44	27.56
927.6	7420.8	6.3	H	5.85	36.08	20	28.23	25.77
927.6	7420.8	6.8	V	5.85	36.08	20	28.73	25.27
927.6	8348.4	5.2	H	6.34	36.00	20	27.54	26.46
927.6	8348.4	5.6	V	6.34	36.00	20	27.94	26.06
927.6	9276.0	4.9	V	6.68	36.47	20	28.05	25.95
927.6	9276.0	6.9	H	6.68	36.47	20	30.05	23.95

OCCUPIED BANDWIDTH

Rules Part No.: 15.249 (d), RSS-GEN

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 15.249.

Test Data:



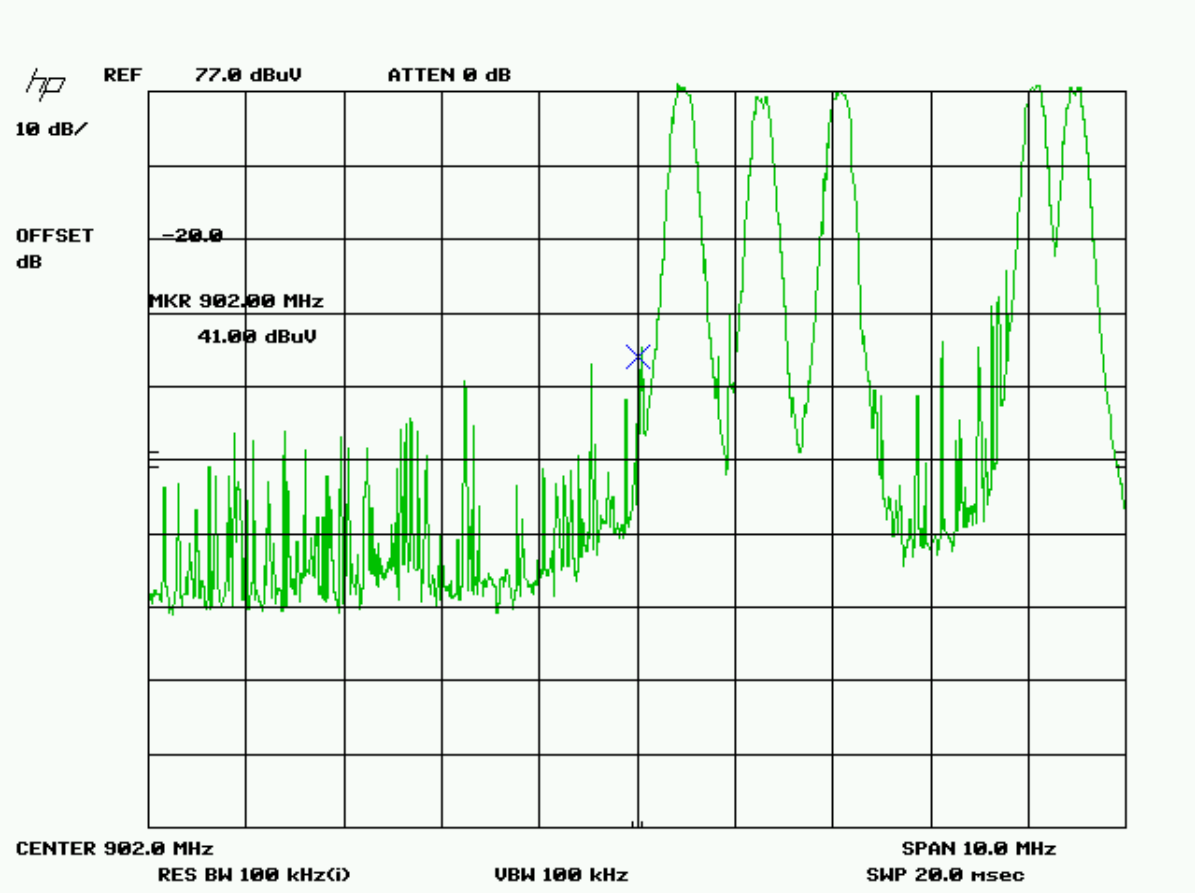
BAND EDGE COMPLIANCE

Rules Part No.: 15.249 (d), RSS-GEN

Requirements: 40 dBc or in the case of restricted bands 54 dBuV/m.

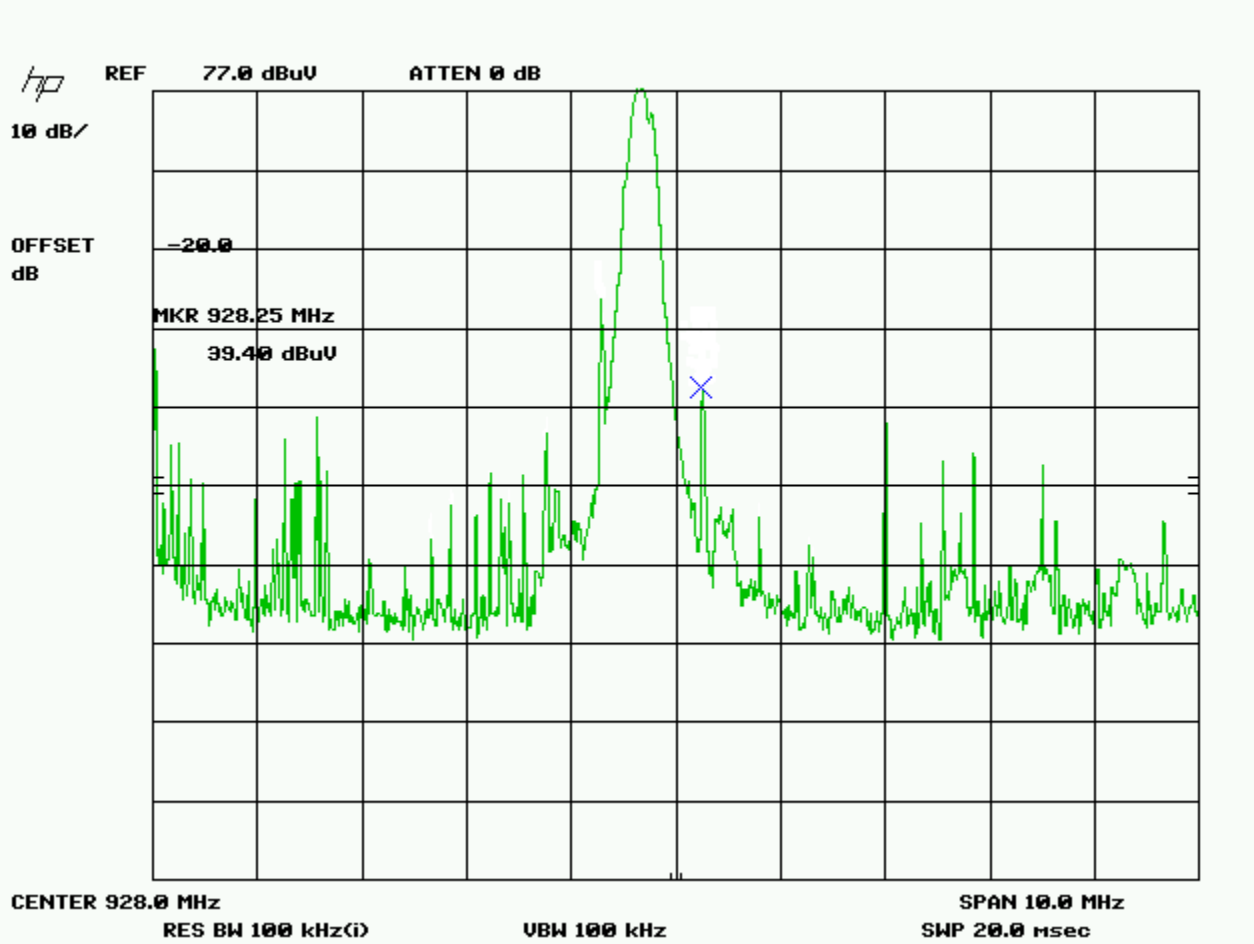
Test Data:

Lower bandedge



Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBuV/m	Margin dB
902.4	902	41	V	1.95	22.68	20	45.63	8.37

Upper bandedge



Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Duty Cycle dB	Field Strength dBuV/m
92.7.8	928.25	39.4	V	1.99	22.68	20	44.07

DUTY CYCLE

From manufacturer:

1. In normal operating mode root node sends one message each 2 seconds, Thermostat node sends one message each 15 seconds and PTAC controller boards sends an acknowledgment to thermostat with the same 15 seconds rate.
2. One message takes 7,0 ms 'on-air' time.

CF = 20 dB

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207, RSS-GEN

Requirements:

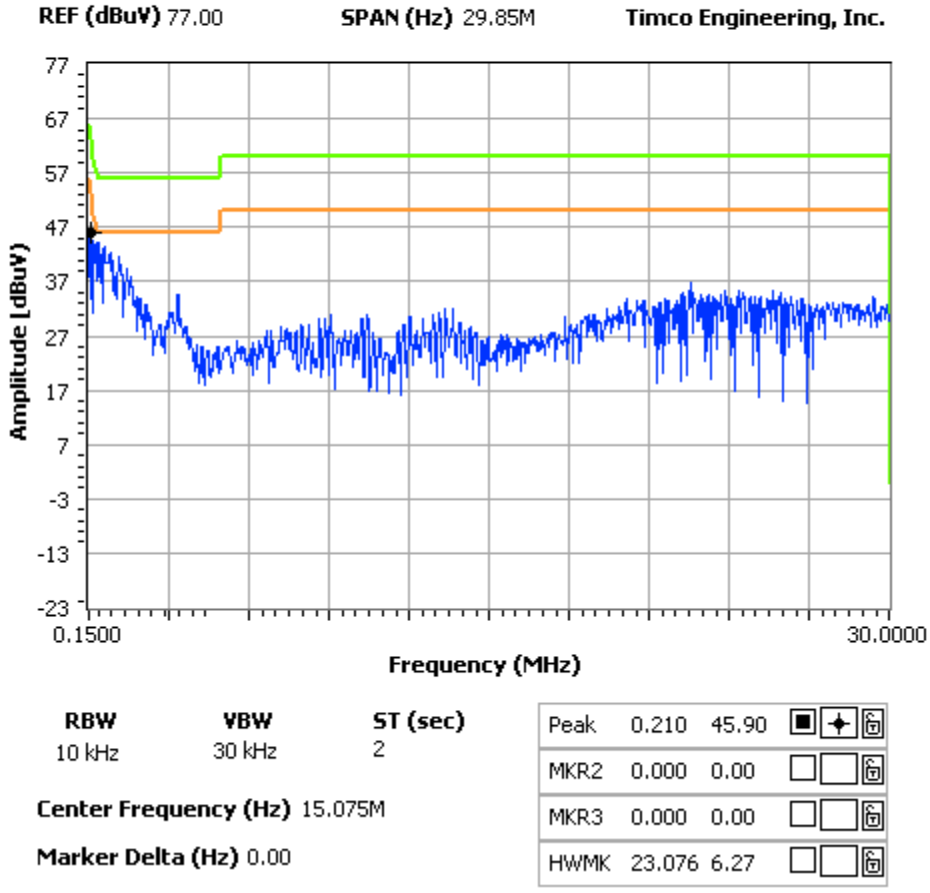
Frequency (MHz)	Quasi Peak Limits (dBµV)	Average Limits (dBuV)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

Test Data: **Test Data:** The following plots represent the emissions read for power line conducted. Both lines were observed.

POWERLINE CONDUCTED EMISSIONS – LINE 1

NOTES:
ac line conducted line 1

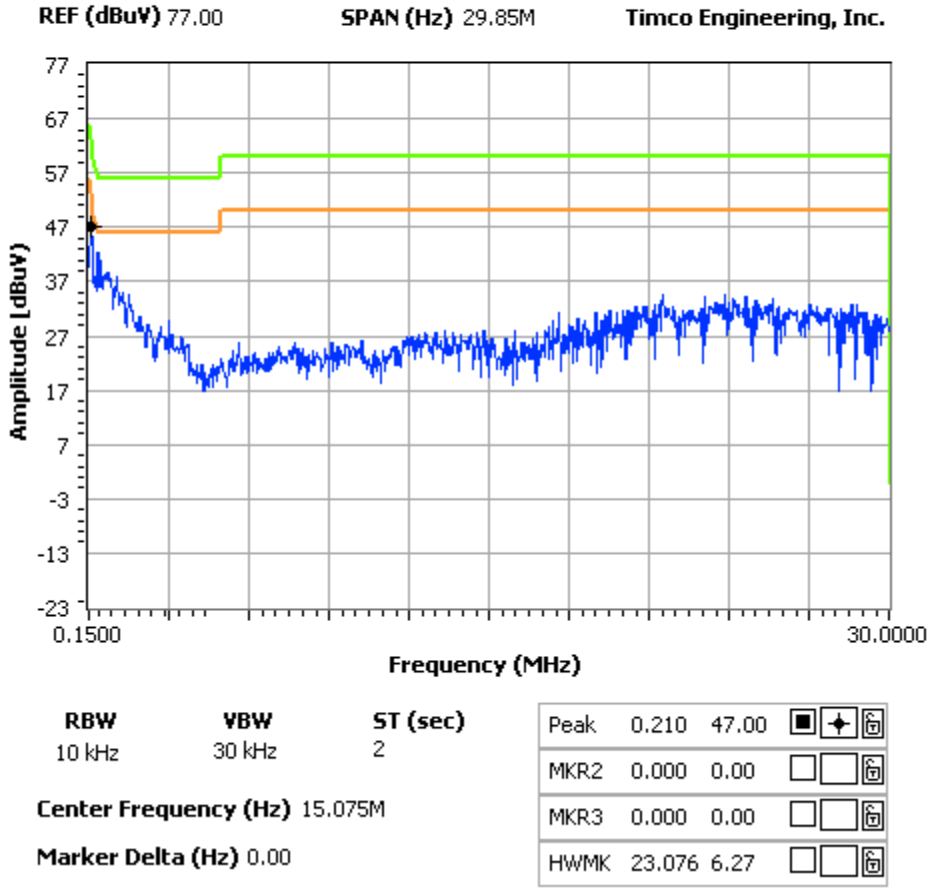
FCC 15.107 Mask Class B



POWERLINE CONDUCTED EMISSIONS – LINE 2

NOTES:
ac line conducted line 2

FCC 15.107 Mask Class B



RADIATED EMISSIONS TEST SET UP PHOTO

POWERLINE CONDUCTED EMISSIONS TEST SET UP PHOTO