TIMCO ENGINEERING, Inc.

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FCC PART 15.247

INDUSTRY CANADA RSS-210

FHSS TEST REPORT

APPLICANT	TELERADIO AB
	DATAVAGAN 21
	GOTEBORG S043632 - SWEDEN
FCC ID	ONFT860TX-12
IC	4807-T860TX12
MODEL NUMBER	T860TX-12
PRODUCT DESCRIPTION	902 – 928 MHz FHSS Transceiver
DATE SAMPLE RECEIVED	JUN 21, 2006
DATE TESTED	JULY 10, 2006
TESTED BY	Nam Nguyen
APPROVED BY	Mario de Aranzeta
TIMCO REPORT NO.	1034UT6TestReport
TEST RESULTS	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

TABLE OF CONTENTS

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.

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.

Authorized by: Mario de Aranzeta

Signature:

Function: Engineer

Date: July 14, 2006

Tested by: Nam Nguyen

Signature: on file

GENERAL INFORMATION

DUT Specification

The test results relate only to the items tested.			
Applicable Standard	Pt 15.247		
FCC ID	ONFT860TX-12		
IC Label	IC: 4807A-T860TX-12		
Model Number	860TX-12		
Serial Number	31790		
Product Description	Frequency Hopping Transceiver		
Operating Frequency	902 – 928 MHz		
Max. output power	1.0 mW EIRP		
Type of Modulation	FM		
Power Supply	*Primary Power*	110-120Vac/50-60Hz	
	Secondary Power	N/A	
Test Item	☒ Prototype	☐ Pre-Production	☐ Production
Type of Equipment	☐ Fixed	☐ Mobile	☒ Portable
Antenna	N/A		
Antenna Connector	None (integral antenna)		

Modification to the EUT: No modification was made to the DUT during testing.

Test Exercise (e.g software description, test signal, etc.): The EUT was set in a continuous transmit mode of operation.

Test Conditions: The tests were preformed at a normal temperature of 78°F and a relative humidity of 55%.

Test Facility: 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.

Test Standards: ANSI C63.4: 2003, FCC Part 15.247

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	Eaton	94455-1	1096	CAL 8/17/04	8/17/06
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/13/05	4/13/07
Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 9/5/05	9/5/07
Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/13/05	4/13/07
LISN	Electro-Metrics	ANS-25/2	2604	CAL 8/27/04	8/27/06
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 PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC.

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-2003 using a 50uH LISN. Both lines were observed with the UUT transmitting. The 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.

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.

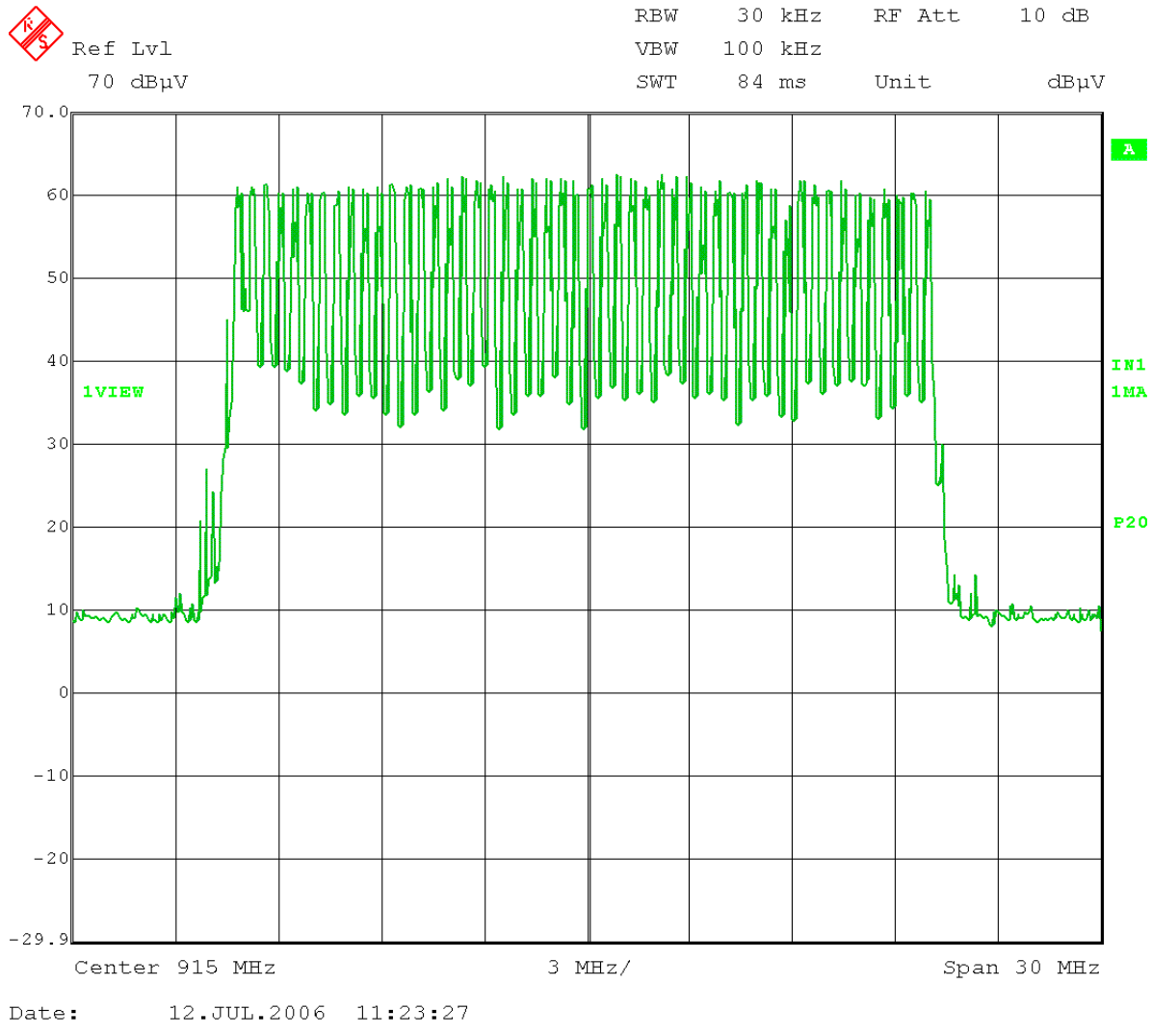
RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 using an Agilent spectrum receiver with pre-selector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was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

NUMBER OF HOPPING CHANNELS

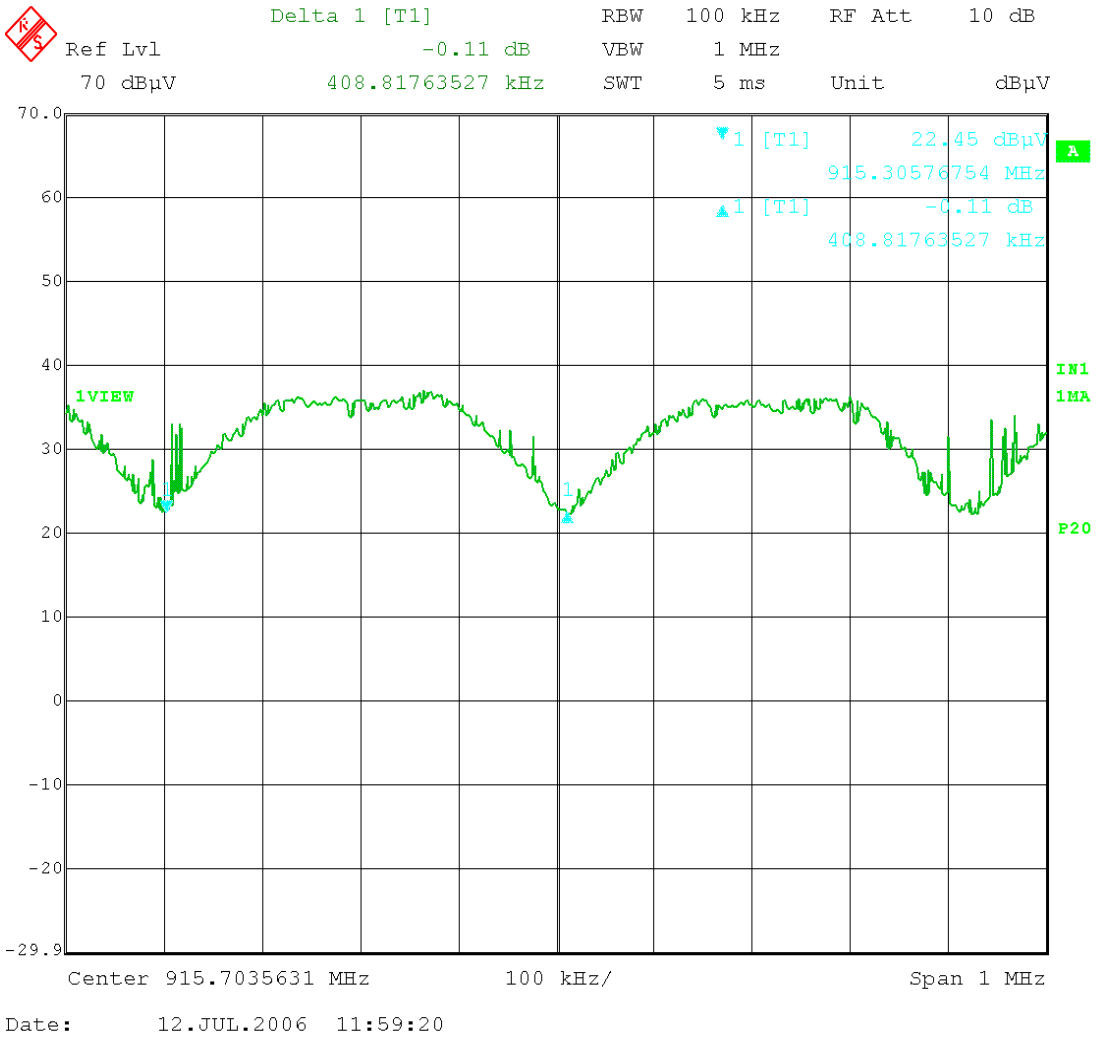
Rules Part No.: 15.247(a)(1), RSS-210

Requirements: The number of hops is 50 hops at a separation of 450 kHz. the requirement in the 902 – 928 MHz band is a minimum of 50 hops for the device less than 1W output power.

NUMBER OF HOPPING CHANNELS



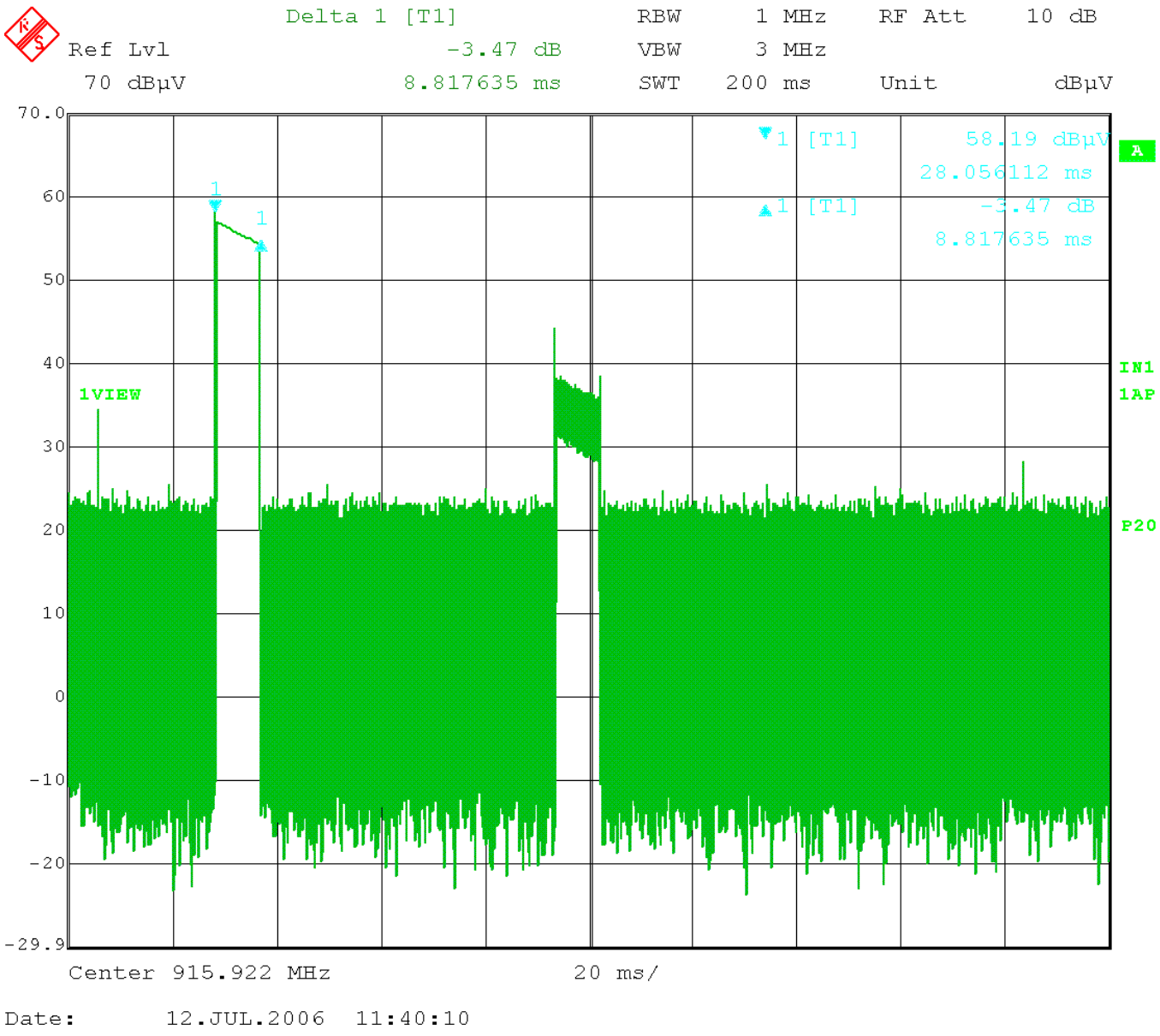
CHANNEL/CARRIER SPACING



DWELL TIME OF A HOPPING CHANNEL

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

Requirements: The dwell time is 28 mseconds.



ANTENNA GAIN

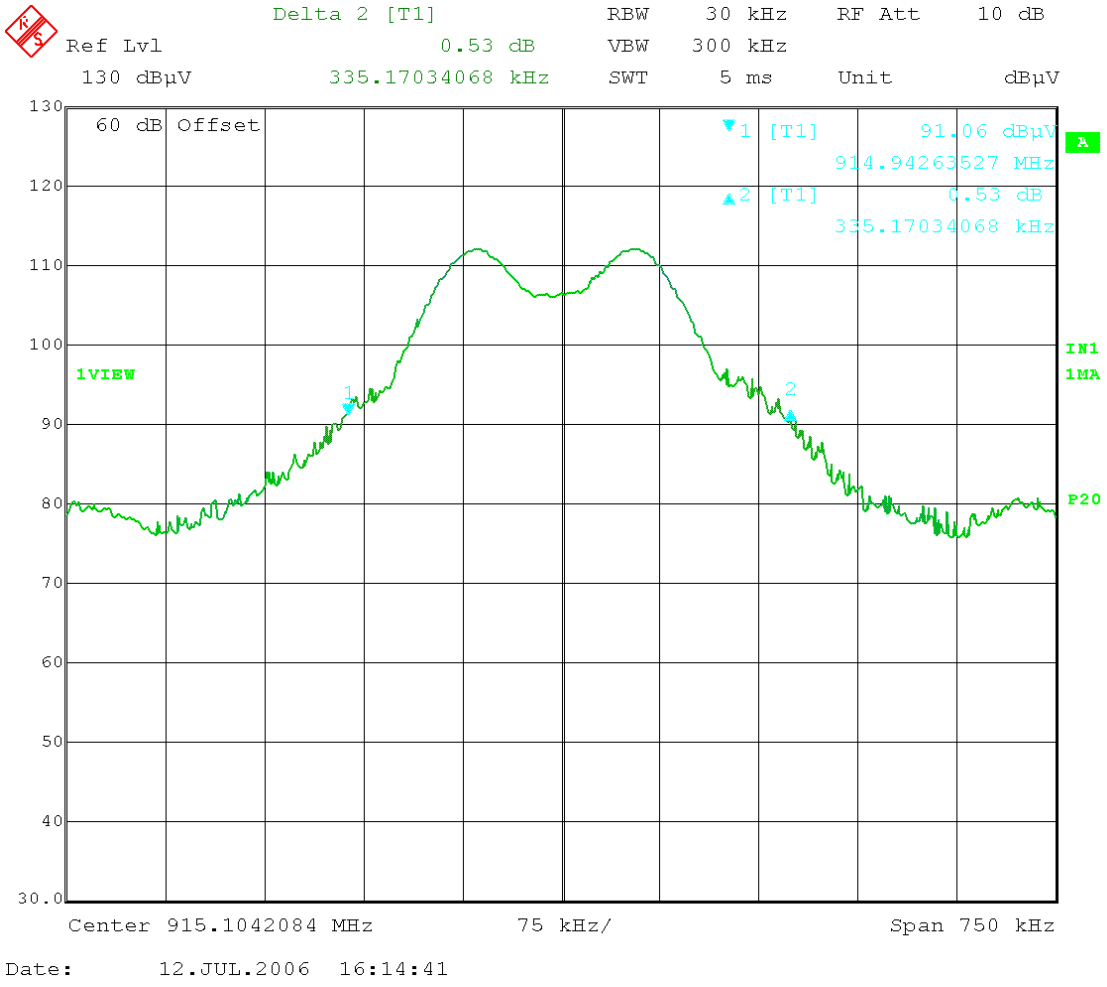
Rule Part No.: 15.247(b)(3)

Requirements: The antenna's gain is a negative number. This is described in the circuit description.

20DB BANDWIDTH

Rule Part No.: 15.247(a)(1)(i)

Requirements: The 20 dB bandwidth measured was 335 kHz.



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

POWER OUTPUT

Rule Part No.: 15.247(b)(2)

Requirements: 1.0 Watt or +30 dBm

Measurement:

902 MHz	0.5 mW or 0.0005 Watts EIRP
915 MHz	1.0 mW or 0.0010 Watts EIRP
924 MHz	0.7 mW or 0.0007 Watts EIRP

FIELD STRENGTH OF SPURIOUS EMISSIONS

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

Requirements:

Frequency	Fundamental Limits	Field Strength Limits
902 – 928 MHz	127.37dBuV/m @3M	54 dBuV/m @3M
2.4 GHz	127.37 dBuV/m @3M	54 dBuV/m @3M

Frequency (MHz)	Limits
30 - 88 MHz	40 dBuV/m @3M
88 - 216 MHz	43 dBuV/m @3M
216 – 960 MHz	46 dBuV/m @3M
Above 960 MHz	54 dBuV/m @3M

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

Test Data: Please refer to the following table.

Fundamental, and above 1 GHz, scanned to the tenth harmonic.

Emissions attenuated more than 20 dB below the permissible value are not reported.

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBuV)	Ant. Polarity (V/H)	Coax Loss (dB)	Correction Factor (dB)	Field Strength (dBuV/m)	Margin (dB)
904.8	904.82	67.9	V	1.96	22.65	92.51	34.87
904.8	904.82	68.7	H	1.96	23.35	94.01	33.37
904.8	1,809.64	20.3	H	2.75	30.06	53.11	0.89
904.8	2,714.46	14.9	H	3.40	32.86	51.16	2.84
904.8	3,619.28	11.6	H	4.16	33.40	49.16	4.84
904.8	4,524.10	10.7	H	4.76	34.12	49.58	4.42
904.8	5,428.92	6.4	H	5.13	35.01	46.54	7.46
904.8	6,333.74	9.4	H	5.40	35.97	50.77	3.23
904.8	7,238.56	7.4	H	5.74	36.19	49.33	4.67
904.8	8,143.38	7.2	H	6.26	36.30	49.76	4.24
915.1	915.05	71.9	V	1.97	22.60	96.47	30.91
915.1	915.05	72.2	H	1.97	23.35	97.52	29.86
915.1	1,830.10	19.3	H	2.76	30.18	52.24	1.76
915.1	2,745.15	12.6	H	3.42	32.89	48.91	5.09
915.1	3,660.20	13.0	H	4.19	33.43	50.62	3.38
915.1	4,575.25	9.7	H	4.79	34.16	48.65	5.35
915.1	5,490.30	9.0	H	5.15	35.09	49.24	4.76
915.1	6,405.35	11.3	H	5.42	36.02	52.74	1.26
924.9	924.88	68.6	V	1.99	22.65	93.24	34.14
924.9	924.88	70.2	H	1.99	23.40	95.59	31.79
924.9	1,849.76	17.4	H	2.78	30.30	50.48	3.52
924.9	2,774.64	12.9	H	3.44	32.93	49.27	4.73
924.9	3,699.52	10.8	H	4.23	33.46	48.49	5.51
924.9	4,624.40	8.6	H	4.81	34.20	47.61	6.39
924.9	5,549.28	8.5	H	5.16	35.16	48.82	5.18
924.9	6,474.16	8.9	H	5.44	36.08	50.42	3.58

FIELD STRENGTH OF SPURIOUS EMISSIONS (CONTINUED)

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

Requirements:

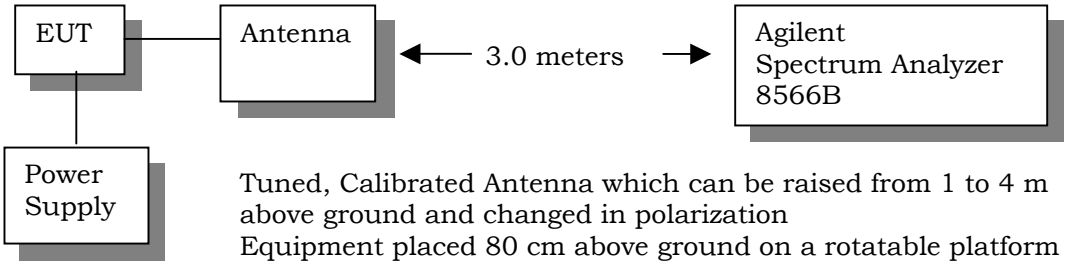
Frequency	Fundamental Limits	Field Strength Limits
902 – 928 MHz	127.37dBuV/m @3M	54 dBuV/m @3M
2.4 GHz	127.37 dBuV/m @3M	54 dBuV/m @3M

Frequency (MHz)	Limits
30 - 88 MHz	40 dBuV/m @3M
88 - 216 MHz	43 dBuV/m @3M
216 – 960 MHz	46 dBuV/m @3M
Above 960 MHz	54 dBuV/m @3M

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20 db below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dBc.

Test setup:



Tuned, Calibrated Antenna which can be raised from 1 to 4 m above ground and changed in polarization
Equipment placed 80 cm above ground on a rotatable platform

Test Data: Please refer to the following table

Notes: Frequency was scanned from 30 MHz to 1 GHz.

Emission Frequency (MHz)	Meter Reading (dBuV)	Ant. Polarity (V/H)	Coax Loss (dB)	Correction Factor (dB)	Field Strength (dBuV/m)
65.01	6.6	V	0.55	9.4	16.55
65.02	6.8	H	0.55	10.19	17.54
85.78	6.9	V	0.61	8.07	15.58
121.66	8.9	V	0.67	13.87	23.44
121.66	9.7	H	0.67	13.47	23.84
132.72	13.4	H	0.68	13.1	27.18
132.73	12.7	V	0.68	13.18	26.56
143.77	14.5	V	0.69	13.03	28.22
143.77	17.5	H	0.69	13.4	31.59
210.13	9.5	V	0.92	11.69	22.11
210.14	15.2	H	0.92	11.89	28.01
221.19	13.5	V	0.94	11.2	25.64
221.2	18.6	H	0.94	11.5	31.04
232.25	14.2	V	0.96	11.36	26.52
232.27	21	H	0.96	11.61	33.57
243.32	11.5	V	0.99	12.1	24.59
243.33	16.8	H	0.99	12.17	29.96
254.36	16.4	H	1.01	12.67	30.08
254.37	8.7	V	1.01	12.67	22.38
348.36	8.6	V	1.15	14.6	24.35
348.36	15.3	H	1.15	14.97	31.42
359.42	7.8	V	1.16	14.79	23.75
359.44	12	H	1.16	15	28.16
364.98	6.8	V	1.16	14.95	22.91
364.99	8.5	H	1.16	15.1	24.76
419.52	10	V	1.22	16	27.22
738.1	10.5	H	1.78	21.3	33.58
738.12	6.2	V	1.78	20.78	28.76
757.76	10.2	V	1.82	20.68	32.7
757.78	13.6	H	1.82	21.6	37.02
777.41	9.7	V	1.85	20.8	32.35
777.43	13.4	H	1.85	21.5	36.75
797.1	9.6	V	1.89	20.97	32.46
797.1	10.8	H	1.89	21.6	34.29

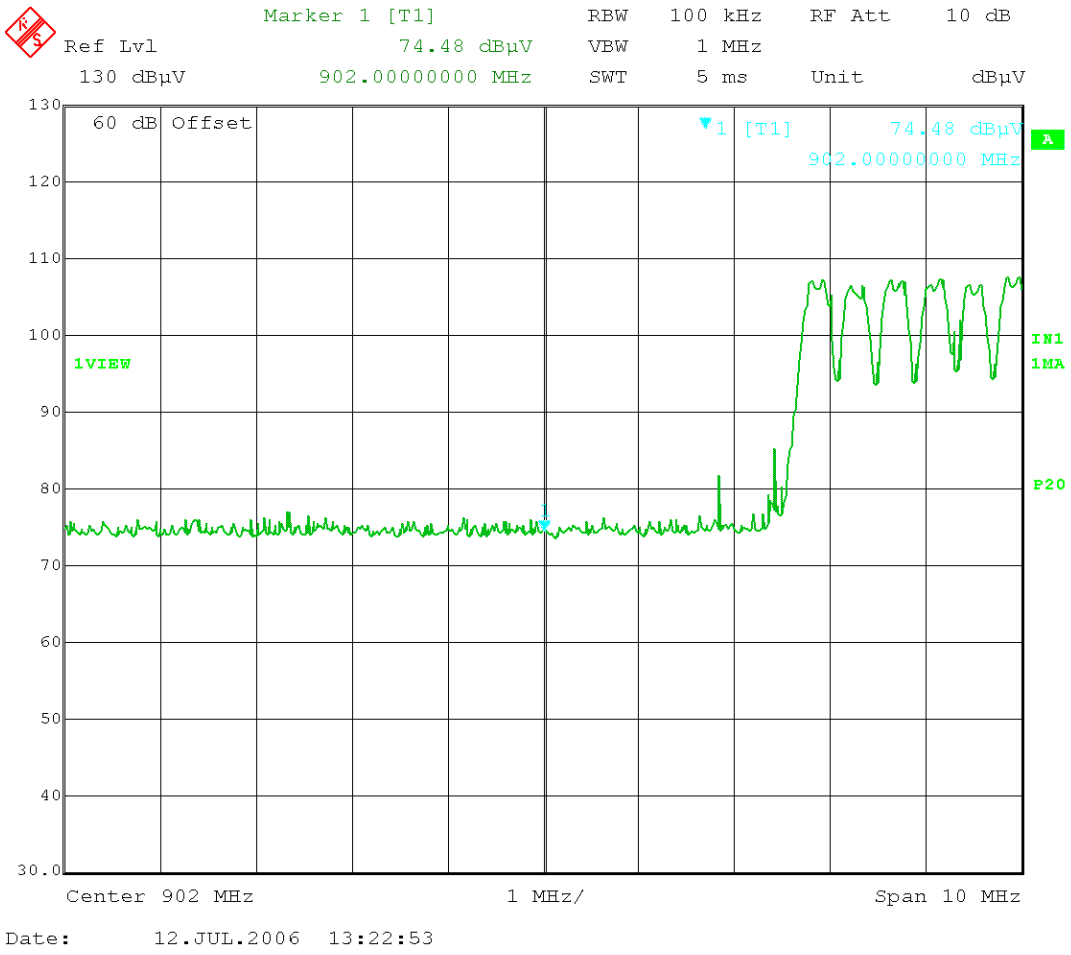
BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

Rule Part No.: 15.247(c)

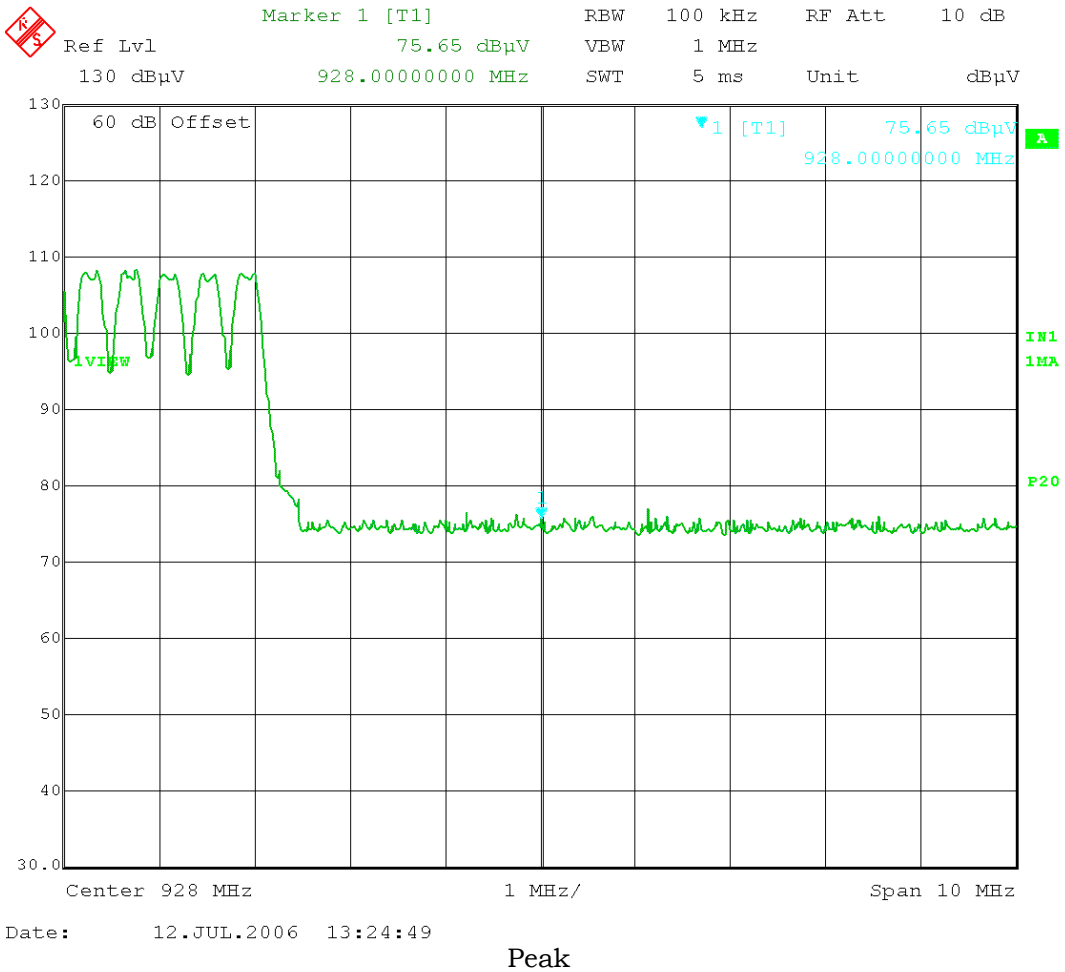
Requirements: **Requirements**: The emissions must be less than or equal to 500 uV/m (54 dBuV/m).

Test Data:

Lower Band edge



Upper band edge



Peak