



www.nemko.com



Test Report: 89967-1TRFWL

Applicant: Xmark Corporation
309 Legget Drive
Kanata, Ontario
K2K 3A3

Apparatus: Exciter (M/N: 600-000302-000)

FCC ID: ISEXCR

In Accordance With: FCC Part 15 Subpart C, 15.207 and 15.209
Intentional Radiators

Tested By: Nemko Canada Inc.
303 River Road
Ottawa, Ontario
K1V 1H2

Authorized By: 
Roman Kuleba, Wireless Specialist

Date: September 19, 2007

Total Number of Pages: 21

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	Exciter (M/N: 600-000302-000)
Specification:	FCC Part 15 Subpart C, 15.207 and 15.209
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release

Author: Jason Nixon, Telecom Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

Nemko Canada Inc. authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

TABLE OF CONTENTS

Report Summary.....	2
Section 1 : Equipment Under Test.....	4
1.1 Product Identification	4
1.2 Samples Submitted for Assessment.....	4
1.3 Theory of Operation	4
1.4 Technical Specifications of the EUT	5
1.5 Block Diagram of the EUT.....	5
Section 2 : Test Conditions.....	6
2.1 Specifications	6
2.2 Deviations From Laboratory Test Procedures	6
2.3 Test Environment	6
2.4 Test Equipment.....	6
2.5 Measurement Uncertainty.....	6
Section 3 : Observations	7
3.1 Modifications Performed During Assessment	7
3.2 Record Of Technical Judgements	7
3.3 EUT Parameters Affecting Compliance	7
3.4 Test Deleted.....	7
3.5 Additional Observations.....	7
Section 4 : Results Summary	8
4.1 FCC Part 15 Subpart C : Test Results	9
Appendix A : Test Results.....	10
Clause 15.207(a) Conducted Emissions	10
Clause 15.209(a) Radiated Emissions, General Limits.....	14
Clause 15.215(c) 20dB Bandwidth.....	18
Appendix B : Setup Photographs	19
Appendix C : Block Diagram of Test Setups.....	21

Section 1 : Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

Exciter (M/N: 600-000302-000)

1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
1	eAC Transceiver	None
2	Exciter	725168
3	DC power supply (M/N: DV-1280)	None

The first samples were received on: September 13, 2007

1.3 Theory of Operation

The EUT is designed for use with the eAC Transceiver to extend the exciter field to low coverage areas.

1.4 Technical Specifications of the EUT

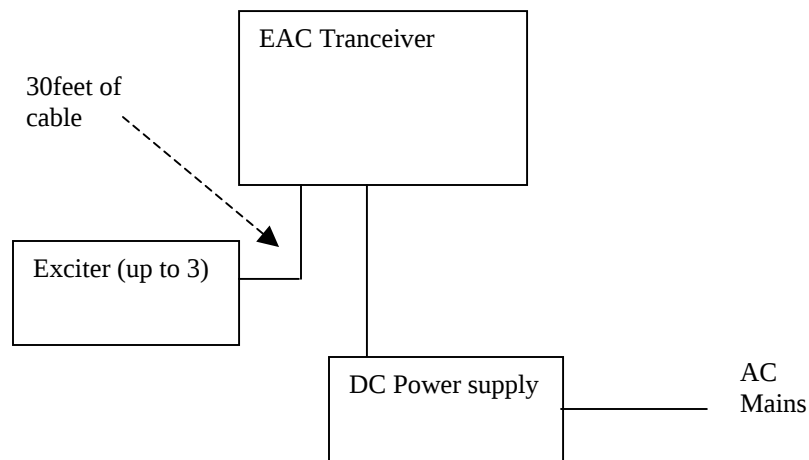
Transmitter Frequency: 307.2kHz

Modulation: Pulse modulated

Antenna Data: Integral antenna

Power Source: Power is delivered from the Host eAC transceiver

1.5 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.207 and 15.209
Intentional Radiators

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 °C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Spectrum Analyzer	HP	8565E	FA00981	Oct 06/07
Transient Limiter	HP	11947A	FA000975	Sept 11/08
Cable set 1	—	—	—	Sept 11/08
LISN	EMCO	4825/2	FA001545	Aug 29/08
Receiver	Rohde & Schwarz	ESHS 10	FA001918	Sept 5/08
Spectrum Analyzer	Rohde & Schwarz	FSP40	FA001920	Mar 19/08
Active Loop Antenna	EMCO	6502	FA001686	July 27/08

COU – Calibrate on Use

NCR – No Calibration Required

2.5 Measurement Uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95% and can be found in Nemko Canada document MU-003.

Section 3 : Observations

3.1 Modifications Performed During Assessment

The following modification was performed during this assessment:

3.1.1 Modification State 1

As originally submitted the EUT was found to be noncompliant with the requirements of 15.207. Jumper J2 was installed, which connects the 120ohm terminating resistor R23. This is required to properly terminate the Quad Differential Line Receiver U5. Following this modification the EUT was found to comply in full with the requirements of 15.207 and 15.209.

3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart C : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No : not applicable / not relevant.
- Y Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 15 Subpart C : Test Results

Part 15	Test Description	Required	Result
15.207(a)	Conducted Emissions	Y	PASS
15.209(a)	Radiated Emissions, general requirements	Y	PASS
15.215(c)	20dB Bandwidth	Y	PASS

Notes:

Appendix A : Test Results

Clause 15.207(a) Conducted Emissions

Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 mH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
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 Conditions:

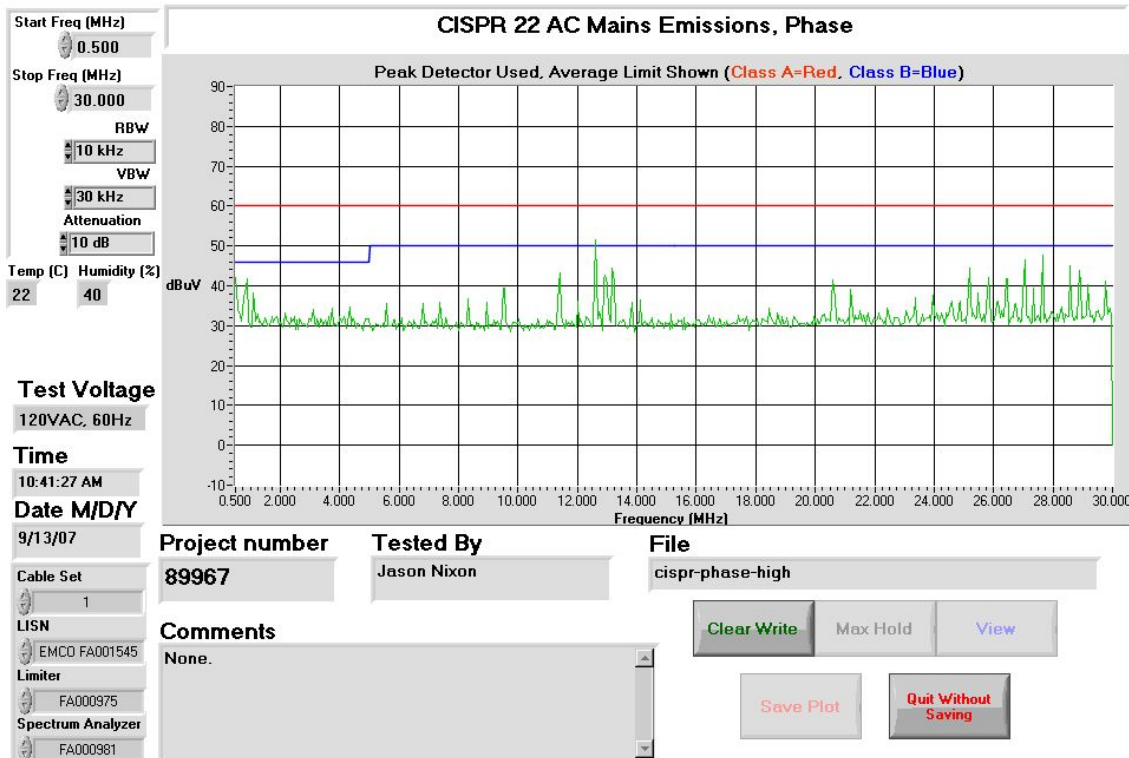
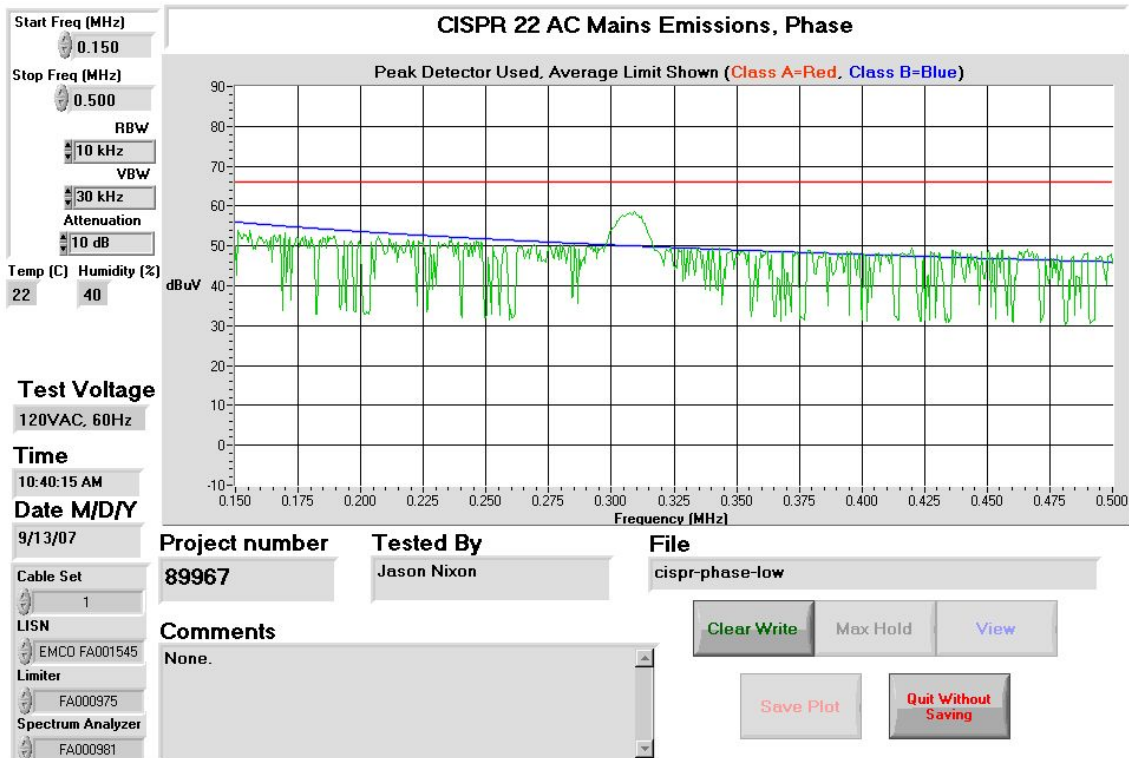
Sample Number:	2	Temperature (°C):	22
Date:	September 13, 2007	Humidity (%):	40
Modification State:	1	Tester:	Jason Nixon
		Laboratory:	Small Shielded Room

Test Results: See Attached Plots and Tabulated Data.

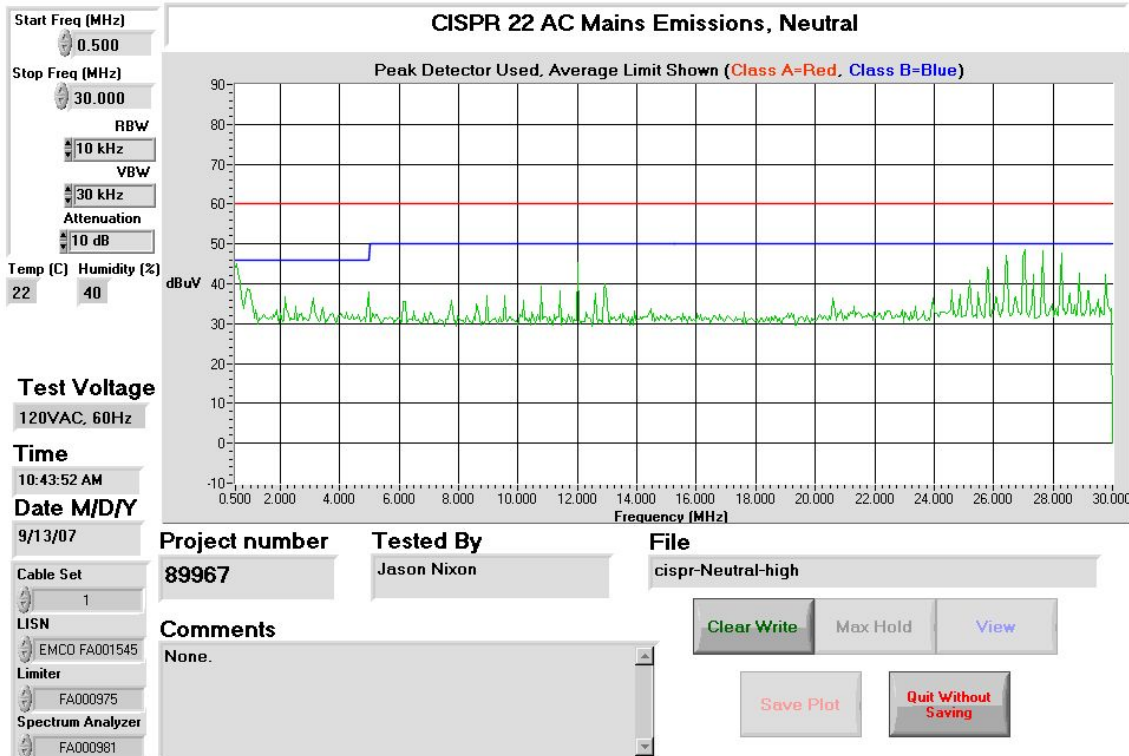
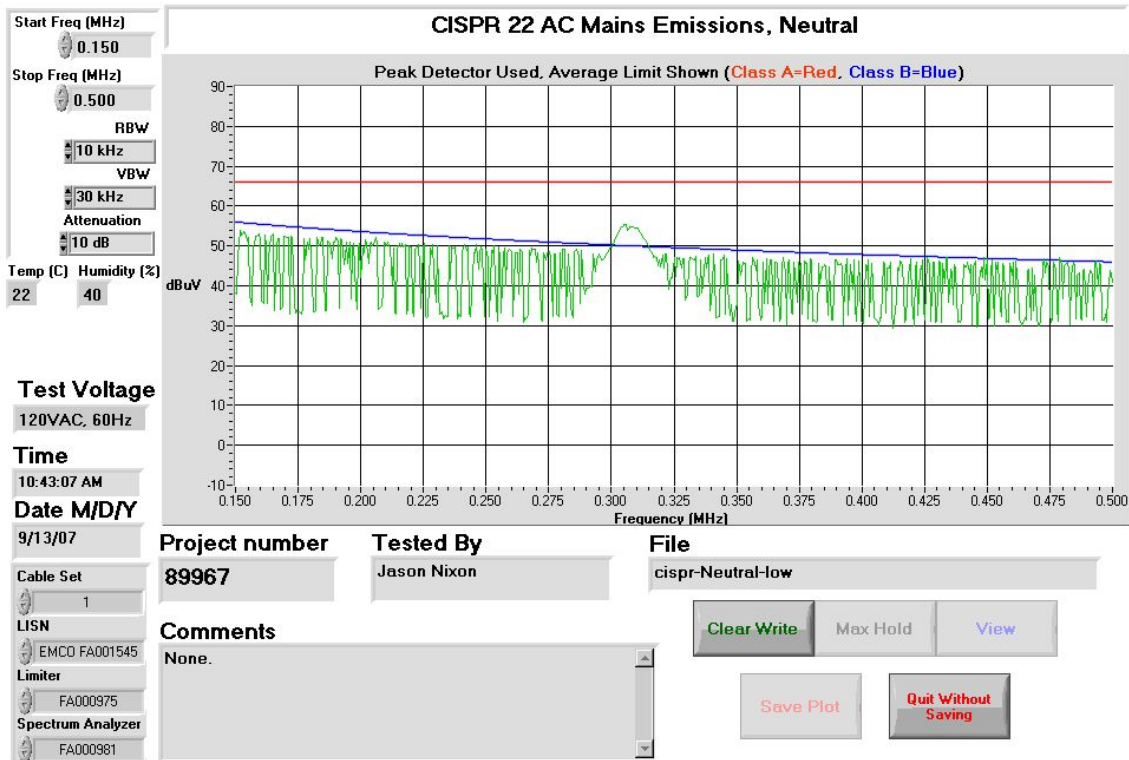
Additional Observations:

All plots are measured using a 10kHz RBW/30kHz VBW using a Peak detector and show against the Average limit. The plots were all corrected to contain the LISN, cable and transient limiter.

Phase Conductor



Neutral Conductor



Conductor		Frequency (MHz)	Detector	Emission Level (dBuV)	LISN Loss (dB)	Cable Loss (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	Neutral	0.3072	Quasi Peak	53.7	0.1	0.1	53.9	60.0	6.1
			Average	30.3	0.1	0.1	30.5	50.0	19.5
2	Neutral	0.1523	Quasi Peak	41.3	0.1	0.1	41.5	65.9	24.4
			Average	26.0	0.1	0.1	26.2	55.9	29.7
3	Neutral	0.1634	Quasi Peak	40.9	0.1	0.1	41.1	65.3	24.2
			Average	10.9	0.1	0.1	11.1	55.3	44.2
4	Neutral	0.4201	Quasi Peak	34.6	0.1	0.1	34.8	57.4	22.6
			Average	5.8	0.1	0.1	6.0	47.4	41.4
5	Neutral	0.4895	Quasi Peak	33.5	0.1	0.1	33.7	56.2	22.4
			Average	4.7	0.1	0.1	4.9	46.2	41.2
6	Neutral	12.5952	Quasi Peak	49.2	0.4	0.4	50.0	60.0	10.0
			Average	29.2	0.4	0.4	30.0	50.0	20.0
7	Neutral	27.6438	Quasi Peak	44.7	1.6	0.5	46.8	60.0	13.2
			Average	31.5	1.6	0.5	33.6	50.0	16.4
8	Phase	0.3072	Quasi Peak	56.3	0.1	0.1	56.5	60.0	3.5
			Average	30.0	0.1	0.1	30.2	50.0	19.8
9	Phase	0.1523	Quasi Peak	41.4	0.1	0.1	41.6	65.9	24.3
			Average	26.1	0.1	0.1	26.3	55.9	29.6
10	Phase	0.1634	Quasi Peak	40.9	0.1	0.1	41.1	65.3	24.2
			Average	10.8	0.1	0.1	11.0	55.3	44.3
11	Phase	0.4201	Quasi Peak	35.7	0.1	0.1	35.9	57.4	21.5
			Average	6.3	0.1	0.1	6.5	47.4	40.9
12	Phase	0.4895	Quasi Peak	35.1	0.1	0.1	35.3	56.2	20.8
			Average	5.4	0.1	0.1	5.6	46.2	40.5
13	Phase	12.5951	Quasi Peak	51.1	0.4	0.4	51.9	60.0	8.1
			Average	31.2	0.4	0.4	32.0	50.0	18.0
14	Phase	27.6479	Quasi Peak	45.2	1.7	0.5	47.4	60.0	12.6
			Average	31.3	1.7	0.5	33.5	50.0	16.5

Clause 15.209(a) Radiated Emissions, General Limits

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Conditions:

Sample Number:	2	Temperature (°C):	24
Date:	September 13, 2007	Humidity (%):	45
Modification State:	1	Tester:	Jason Nixon
		Laboratory:	OATS

Test Results:

See Attached Table for Results

Additional Observations:

The Spectrum was searched from 9kHz to 3.072MHz.

The EUT was measured on three orthogonal axis.

Measurement equipment setup was 10kHz Quasi-peak detector for measurements outside of the 9-90 kHz, 110-490 kHz and below 30MHz. Within the 9-90kHz and 110-490kHz bands the detector was a 10kHz Peak detector with a duty cycle correction added to the measurement to produce an average reading.

All Measurements were performed at 3 meters. Extrapolation factors were measured at 5 and 7meters to apply to the measurements.

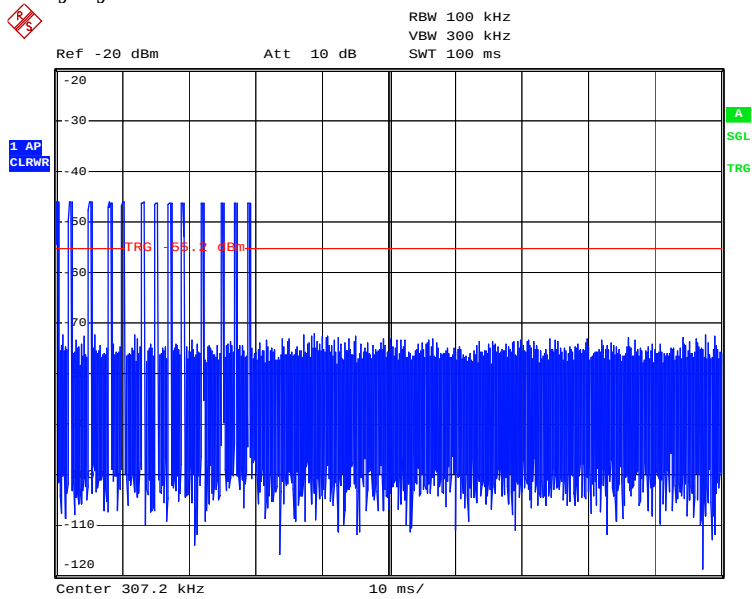
Measurements at 300m

Freq. (kHz)	RCVD Signal (dBμV)	Ant. Factor (dB)	Duty Cycle Corr. (dB)	Distance Corr. (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)
307.2	91.8	11	12.4	122.28	-31.88	17.86	49.74

Measurements at 30m

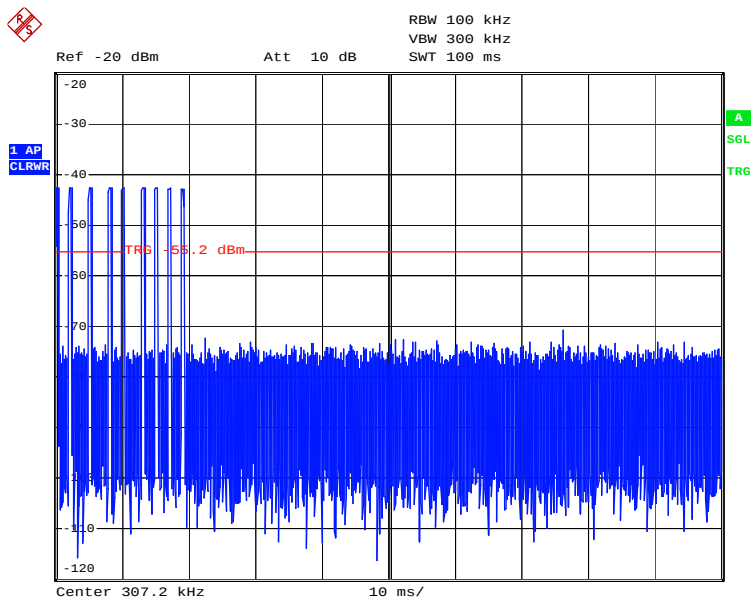
Freq. (kHz)	RCVD Signal (dBμV)	Ant. Factor (dB)	Duty Cycle Corr. (dB)	Distance Corr. (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)
614.4	42.2	10.5	N/A	40	12.7	31.8	19.1
921.6	46.5	10.9	N/A	40	17.4	28.3	10.9
1228.8	33.0	10.7	N/A	40	3.7	25.8	22.1
1536.0	35.8	10.7	N/A	40	6.5	23.9	17.4
1843.2	27.8	10.7	N/A	40	-1.5	29.5	31.0
2150.4	28.4	10.6	N/A	40	-1.0	29.5	30.5

Duty cycle correction:



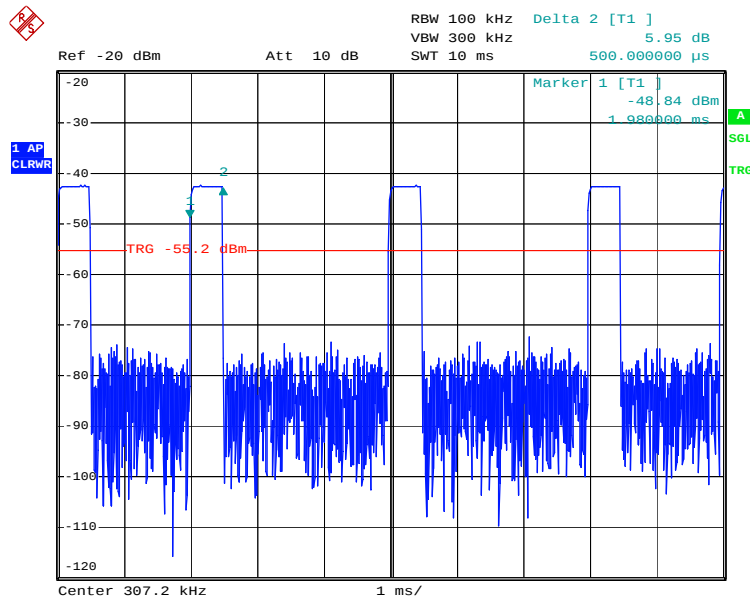
13 pulses in 100msec

Date: 13.SEP.2007 12:40:39



9 pulses in 100msec

Date: 13.SEP.2007 12:40:03



single pulse width

Date: 13.SEP.2007 12:23:36

Actual worst-case number of transmissions during 100msec is 48. This occurs once when a baby tag first enters the exciter field.

$$\text{Duty cycle} = 20\log((48 \times 0.5\text{msec})/100\text{msec}) = -12.4\text{dB}$$

Extrapolation factors:

Measurement @ 3m = 102.8dBuV/m

Measurement @ 5m = 89dBuV/m

Measurement @ 7m = 80.3dBuV/m

5m extrapolation

difference = 13.8dB

number of decades = $\log(5/3) = 0.222$

Decrease/decade = 62.16dB

7m extrapolation

difference = 22.5dB

number of decades = $\log(7/3) = 0.368$

decrease/decade = 61.14dB

Therefore, extrapolation for 3m to 300m = 122.28dB (using 7m, 61.14dB)

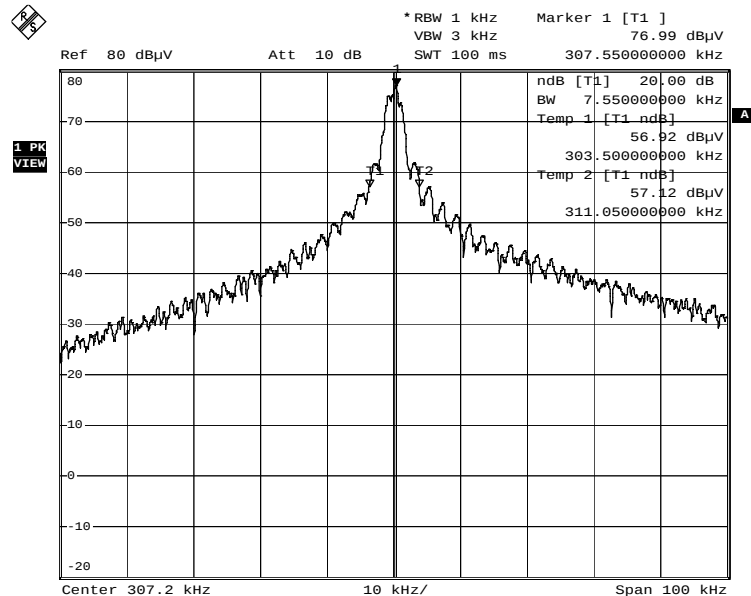
Clause 15.215(c) 20dB Bandwidth

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Conditions:

Sample Number:	2	Temperature (°C):	22
Date:	September 13, 2007	Humidity (%):	40
Modification State:	1	Tester:	Jason Nixon
		Laboratory:	Wireless

Test Results: See Attached Plots.

20dB Bandwidth:

20dB Occupied Bandwidth

Date: 13.SEP.2007 12:11:34

Appendix B : Setup Photographs

Conducted Emissions Setup:

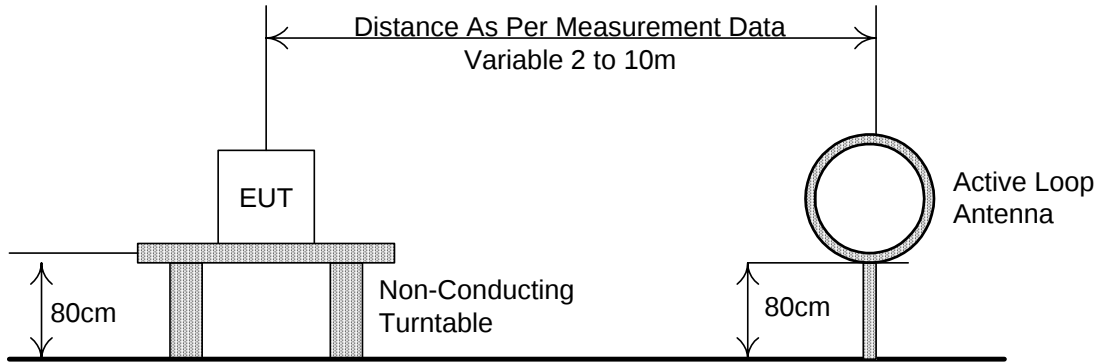


Spurious Emissions Setup:



Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions Below 30MHz



Conducted Emissions

