

Nemko Test Report: 107897-1TRFWL

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

Apparatus: Infant Tag

FCC ID: HE7ETG

In Accordance With: FCC Part 15 Subpart C, 15.231
Periodic operation in the band 40.66-40.70MHz and
above 70 MHz.

Authorized By: Heng Lin, EMC/Wireless Specialist

A handwritten signature in blue ink, appearing to read 'Heng Lin', is written over a light blue rectangular background.

Date: July 2, 2008

Total Number of Pages: 19

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Section 1 : 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.

The assessment summary is as follows:

Apparatus Assessed:	Infant Tag
Specification:	FCC Part 15 Subpart C, 15.231
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release
Test Location:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
FCC Test Site Registration No.:	90493
Tests Performed By:	Andrey Adelberg EMC/Wireless Specialist
Test Dates:	June 26, 2008

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. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 2 : Equipment Under Test

2.1 Identification of Equipment Under Test (EUT)

The following information identifies the EUT under test:

Type of Equipment:	RF Tags
Brand Name:	EXI Halo protection system
Model Name or Number:	600-000346-000, 600-000347-000
Serial Number:	F10089, F10064
Nemko Sample Number:	1, 2
FCC ID:	HE7ETG
Date of Receipt:	June 26, 2008

2.2 Accessories

The following information identifies accessories used to exercise the EUT during testing:

Description:	RFID Tag Reader
Brand Name:	VeriChip
Model Name or Number:	MTAG2
Serial Number:	100893
Nemko Sample Number:	3
Connection Port:	Wireless
Cable Length and Type:	N/A

2.3 EUT Description

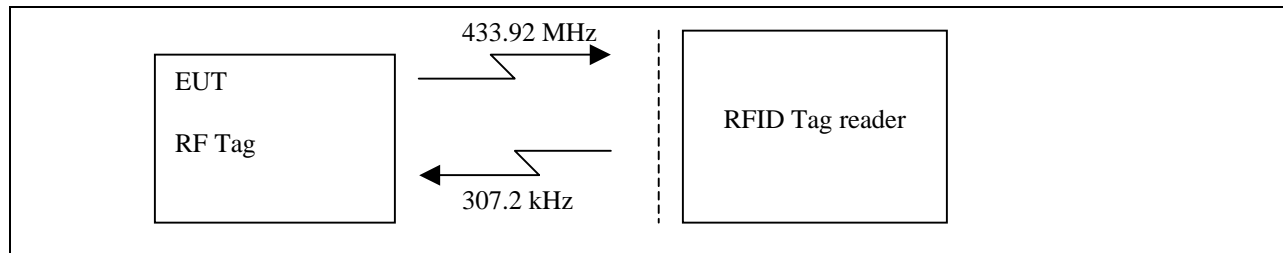
The tag comes in three forms, Infant (umbilical tag), the ECO (wrist strap) and SeCurAtag (cut resistant strap). The infant tag is intended to go onto an infant's umbilical cord and can be identified by the post protruding from the bottom side of the case. The other case is applied to a patient with a wrist strap and has a figure eight look to it. All three units are using the same electronics.

The tag is an RF transceiver that responds to a 307 kHz channel on a 433.92 MHz channel. The tag upon entering a 307 kHz field wakes up and communicates its serial number to the controller (base station). The controller, over the 307 kHz field (channel), transmits wakeup and respond commands to the tag and also initiates and controls the serial number interrogation.

2.4 Technical Specifications of the EUT

Operating Frequency:	Tx: 433.92 MHz Rx: 307.2 kHz
Modulation:	On/Off Keying
Occupied Bandwidth:	52 kHz
Emission Designator:	P1D
Antenna Data:	Integral
Power Source:	3V CR2032 Battery*
* - All tests were performed using new batteries.	

2.5 EUT Setup diagram



2.6 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

Section 3 : Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.231

Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

3.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

3.3 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

3.4 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.

3.5 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Cal. Date	Next Cal.
Spectrum Analyzer	Rohde & Schwarz	FSP40	FA001920	April 14/08	April 14/09
1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	Aug. 21/07	Aug. 21/08
2.0 – 4.0 GHz Amplifier	JCA	24-600	FA001496	Aug. 21/07	Aug. 21/08
4.0 – 8.0 GHz Amplifier	JCA	48-600	FA001497	Aug. 21/07	Aug. 21/08
50 Coax cable	HUBER + SUHNER	None	FA002022	Sept. 19/07	Sept. 19/08
50 Coax cable	HUBER + SUHNER	None	FA002015	Sept. 19/07	Sept. 19/08
Log Periodic Antenna #1	EMCO	LPA-25	FA000477	Sept. 27/07	Sept. 27/08
Horn Antenna #2	EMCO	3115	FA000825	Jan. 15/08	Jan. 15/09

COU – Calibrate on Use; NCR – No Calibration Required

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 Report Summary)

4.1 FCC Part 15 Subpart C : Test Results

Part 15	Test Description	Required	Result
15.31(e)	Variation of Power source	N	PASS
15.207(a)	Powerline Conducted Emissions	N	
15.209(a)	Radiated Emissions within Restricted Bands	Y	
15.231(a)(1)	Manually operated transmitter	N	
15.231(a)(2)	Automatically activated transmitter	N	
15.231(a)(3)	Periodic transmissions at regular predetermined intervals	N	PASS
15.231(a)(4)	Radiators used in cases of emergency	N	
15.231(a)(5)	Set-up information for security systems	N	
15.231(b)	Radiated Emissions	N	
15.231(c)	20dB Bandwidth	Y	
15.231(d)	Devices operating within the frequency band 40.66-40.70 MHz	N	PASS
15.231(e)	Radiated emissions for Periodic radiators	Y	

Notes for N's:

15.207(a) – Battery Powered

15.231(a) – Applicant meets 15.231(e) Requirements

15.231(b) – Applicant meets 15.231(e) Requirements

15.231(d) – Does not operate in 40.66 – 40.70 MHz Band

Appendix A : Test Results

Clause 15.209(a) Radiated Emissions within Restricted Bands

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 (microvoltsmeter)	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 Results: Pass, see results in 15.231(e)

Additional Observations:

The Spectrum was searched from 30 MHz to the 10th Harmonic.

These results apply to emissions found in the Restricted bands defined in FCC Part 15 Subpart C, 15.205.

The EUT was measured on three orthogonal axis.

All measurements were performed using a Peak Detector with 100 kHz RBW/VBW below 1 GHz and a 1MHz RBW/VBW above 1 GHz at a distance of 3 meters.

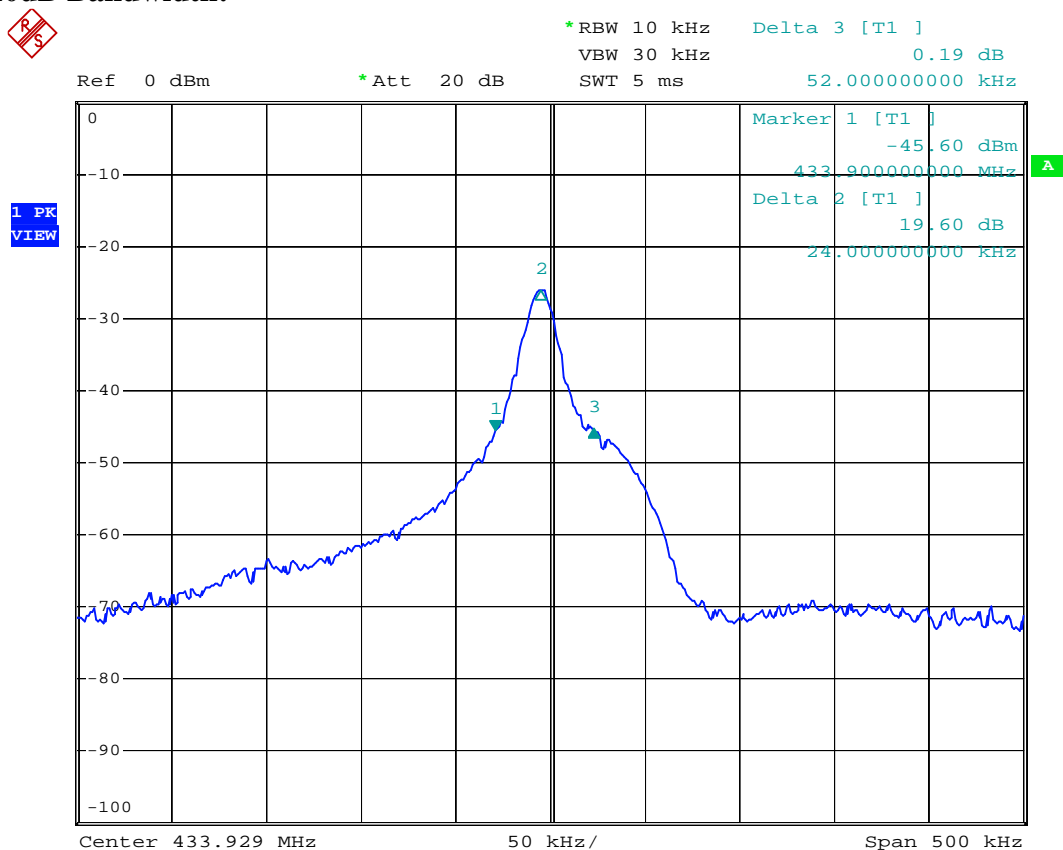
All harmonics were below the limits of 15.209(a)

Clause 15.231(c) 20dB Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Results: Pass

20dB Bandwidth:



Date: 26.JUN.2008 12:56:48

Limit calculation: 0.25% of 433.929 MHz is 1.0848225 MHz.

Frequency, MHz	20 dB Bandwidth, kHz	Limit, kHz	Margin, kHz
433.929	52.0000	1084.8225	1032.8225

Clause 15.231(e) Radiated emissions for Periodic radiators

Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500	50 to 150
174-260	1,500	150
260-470	1,500 to 5,000	150 to 500
Above 470	5,000	500

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Test Results: Pass

Additional Observations:

The Spectrum was searched from 30 MHz to the 10th Harmonic.

The EUT was measured on three orthogonal axis.

All measurements were performed using a Peak Detector with 100 kHz

RBW/VBW below 1 GHz and a 1MHz RBW/VBW above 1 GHz at a distance of 3 meters.

Supervision transmission:

Period time: 15.52 s

Burst count: 3

Short pulses count within 1 burst: 14

Short pulse duration: 272 µs

Long pulses count within 1 burst: 6

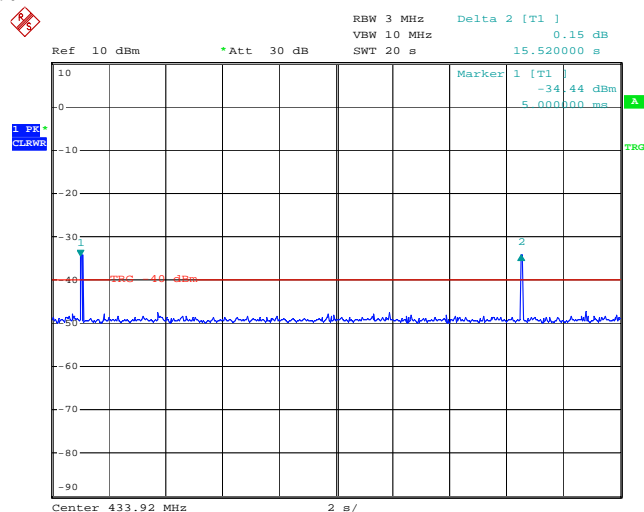
Long pulse duration: 510 µs

Total transmission duration: $3 \times (14 \cdot 272 \mu s + 6 \cdot 510 \mu s) = 20.604 ms$

The duration of transmission is less than 1 second.

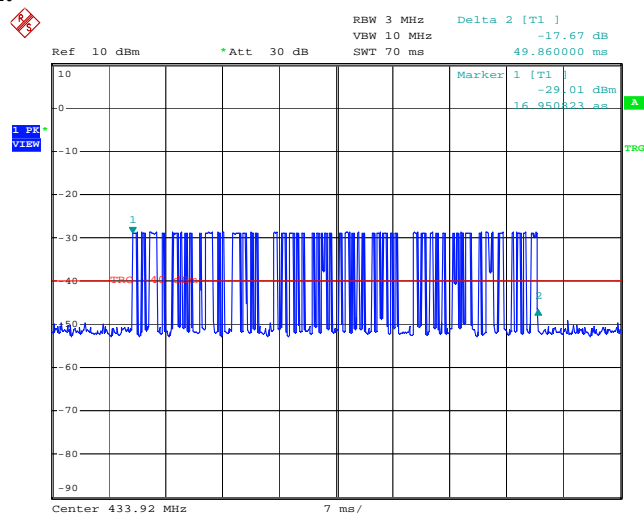
30 times the duration of transmission is 618.12 ms and therefore less than period time.

Supervision period:



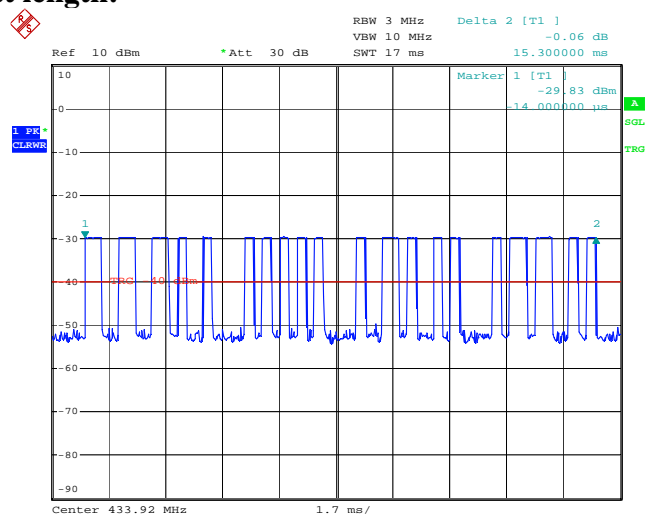
Date: 26.JUN.2008 11:03:54

Supervision length:



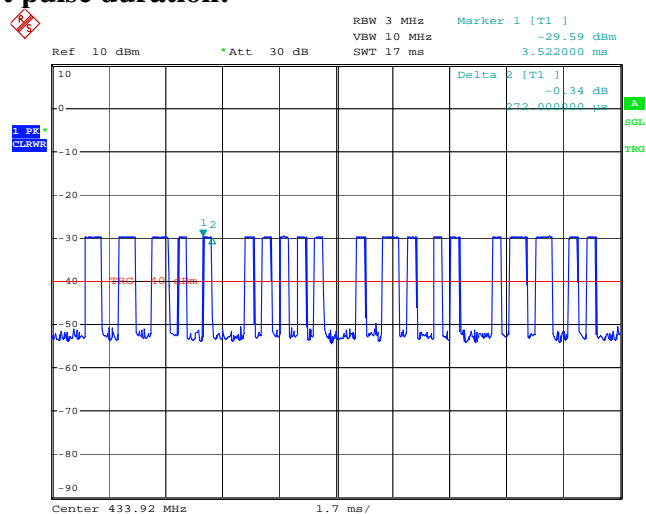
Date: 26.JUN.2008 10:40:31

Supervision's burst length:



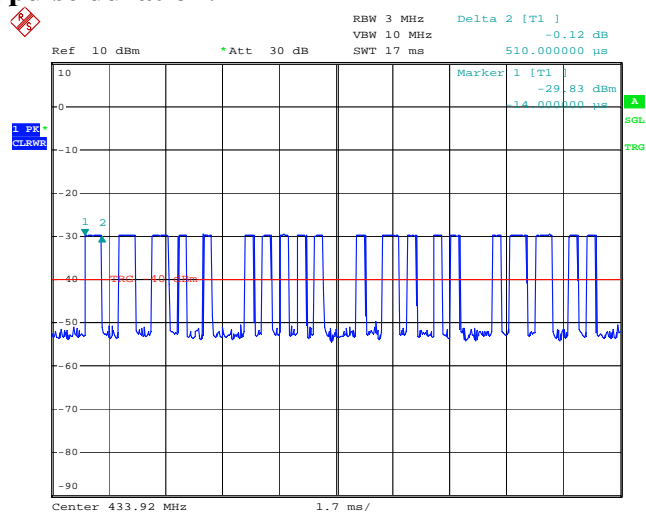
Date: 26.JUN.2008 10:43:26

Supervision's short pulse duration:



Date: 26.JUN.2008 10:44:38

Supervision's long pulse duration:



Date: 26.JUN.2008 10:43:53

Data transmission:

Burst count: 2

Single pulses count: 9

Short pulses count within 1 burst: 25

Short/single pulse duration: 241 μ s

Long pulses count within 1 burst: 5

Long pulse duration: 280 μ s

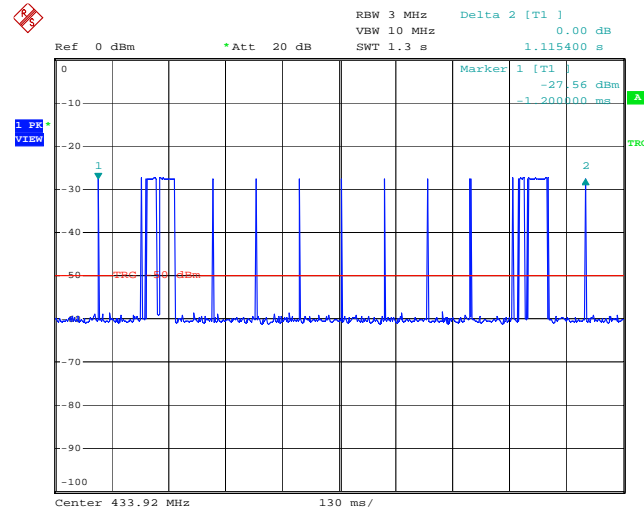
Total data transmission duration: $(9 \times 241 \mu s) + 2 \times (25 \times 241 \mu s + 5 \times 280 \mu s) = 17.02 ms$

The duration of data transmission is less than 1 second.

On-time within 100ms is 17.02 ms

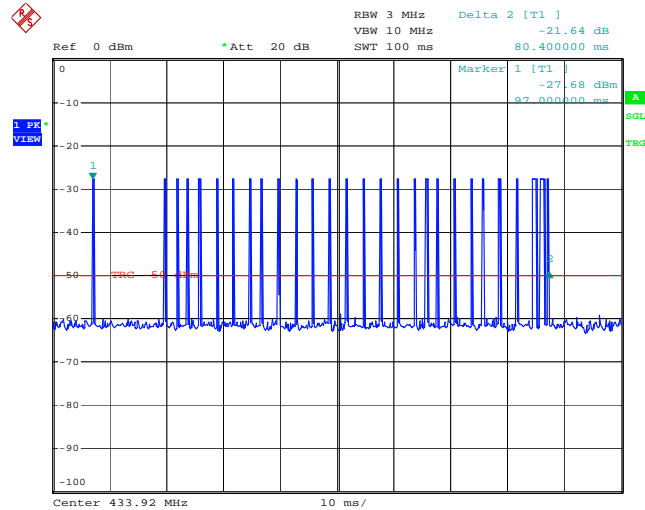
Duty Cycle correction: $20 \log \left(\frac{17.02 ms}{100 ms} \right) = -15.38 dB$

Data transmission:



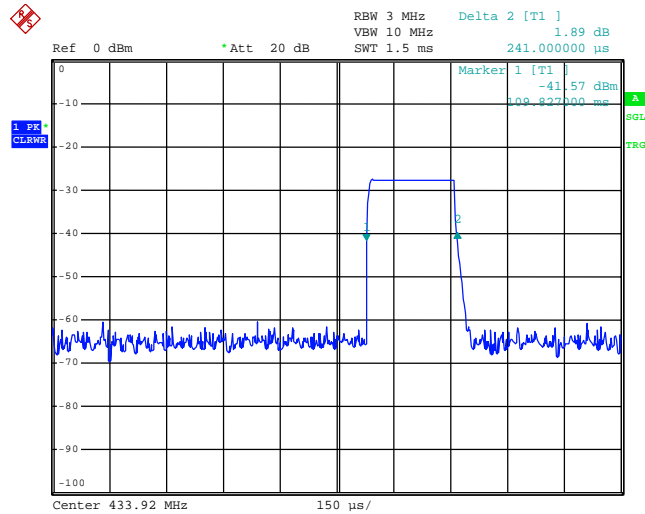
Date: 26.JUN.2008 11:29:25

Data's burst length:

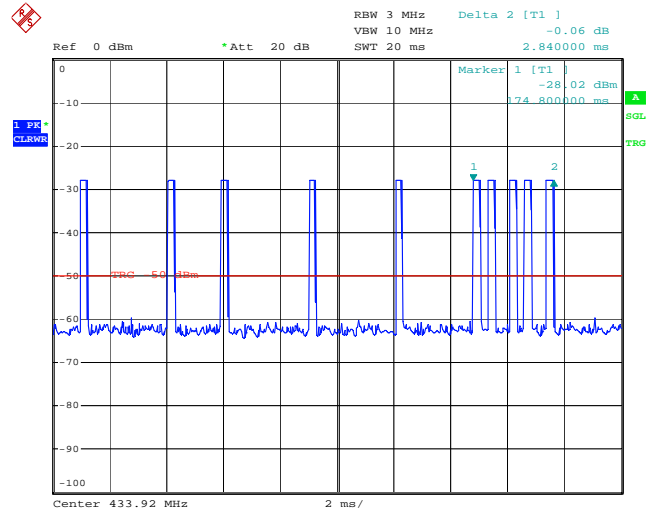


Date: 26.JUN.2008 11:32:46

Data's short pulse duration:

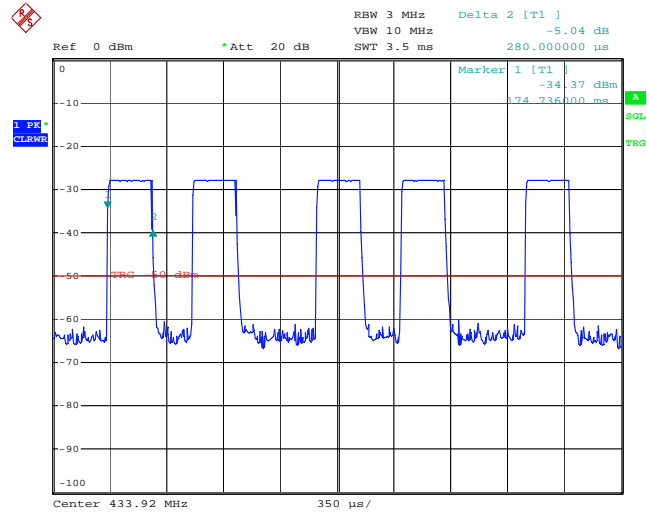


Data's end of the burst construction:



Date: 26.JUN.2008 11:43:24

Data's long pulse duration:



Date: 26.JUN.2008 11:45:25

Freq. (MHz)	Ant	Pol. V/H	RCVD Signal (dBμV)	Ant. Factor (dB)	Amp. Gain (dB)	Duty Cycle Corr. (dB)	Cable Loss (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)
Fundamental Frequency										
433.9020	LP1	V	47.2	16.1	N/A	-15.4	3.1	51.1	72.9	21.8
433.9800	LP1	H	53.5	16.8	N/A	-15.4	3.1	58.1	72.9	14.8
Harmonics										
867.8040	LP1	V	21.6	22.1	N/A	-15.4	4.3	32.6	52.9	20.3
867.8040	LP1	H	28.8	23.1	N/A	-15.4	4.3	40.8	52.9	12.1
1301.7060	Horn2	V	73.0	25.4	48.0	-15.4	3.4	38.5	54.0	15.5
1301.7060	Horn2	H	55.8	25.3	48.0	-15.4	3.4	21.1	54.0	32.9
1735.6080	Horn2	V	66.8	27.5	47.8	-15.4	4.0	35.2	54.0	18.8
1735.6080	Horn2	H	66.3	27.6	47.8	-15.4	4.0	34.8	54.0	19.2
2169.5100	Horn2	V	83.0	28.3	57.7	-15.4	4.7	43.0	54.0	11.0
2169.5100	Horn2	H	77.3	28.3	57.7	-15.4	4.7	37.2	54.0	16.8
2603.4120	Horn2	V	68.9	29.8	58.9	-15.4	5.3	29.7	54.0	24.3
2603.4120	Horn2	H	68.6	29.8	58.9	-15.4	5.3	29.4	54.0	24.6
3037.3140	Horn2	V	74.8	30.9	59.2	-15.4	5.8	36.9	54.0	17.1
3037.3140	Horn2	H	73.2	30.9	59.2	-15.4	5.8	35.3	54.0	18.7
3471.2160	Horn2	V	83.3	31.1	58.5	-15.4	6.4	46.8	54.0	7.2
3471.2160	Horn2	H	75.3	31.0	58.5	-15.4	6.4	38.8	54.0	15.2
3905.1180	Horn2	V	78.7	32.6	57.4	-15.4	7.1	45.6	54.0	8.4
3905.1180	Horn2	H	71.6	32.4	57.4	-15.4	7.1	38.3	54.0	15.7
4339.0200	Horn2	V	63.9	32.2	54.2	-15.4	7.9	34.5	54.0	19.5
4339.0200	Horn2	H	61.2	32.1	54.2	-15.4	7.9	31.6	54.0	22.4
Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole										

Appendix B : Setup Photographs

Spurious Emissions Setup:



Appendix C : Block Diagram of Test Setup

Radiated Emissions above 30MHz Test Site

