

TEST REPORT

Report Number: 3084244-37-1-1

Project Number: 3084244

January 20, 2006

Testing performed on the

WR Predator

Model Number: WR-01

to

FCC Part 15.231

For GRE North America

Test Performed by:

Intertek ETL Semko

1950 Evergreen Blvd, Suite 100

Duluth, GA 30096

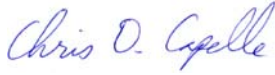
Test Authorized by:

GRE North America

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1 Summary of Tests

MODEL: WR-01

FCC ID: TQB-WR-01CALLER

TEST	FCC REFERENCE	RESULTS
Radiated Emission	15.231(b)	Complies
Out of Band Radiated Emission	15.231(b)	Complies
AC Conducted Emission	15.207	Not Required
20 dB Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	Not Required
Antenna Requirement	15.203	Complies

2 General Description

2.1 Product Description

The test results in this report pertain only to the item(s) tested.

The following description of the WR Predator was supplied by Intertek:

Overview of the EUT

Applicant	GRE North America 3030 McEver Road, Bldg. 1, Suite 100 Gainesville, GA 30504
Trade Name & Model No.	WR Predator / WR-01
FCC Identifier	TQB-WR-01CALLER
Use of product	Remote Control
Transmitter activation	[x] Manual and automatically deactivate within 5 seconds of being released [] Periodic transmissions
Frequency Range (MHz)	433
Antenna Requirement	The EUT uses a permanently connected antenna.
Manufacturer name & address	GRE North America 3030 McEver Road, Bldg. 1, Suite 100 Gainesville, GA 30504
EUT type	Production
EUT received date:	September 20, 2005
Operating condition:	Good

2.2 Related Submittal(s) Grants

This report is for use with an application for certification of a low power transmitter. One transmitter is included in the application.

2.3 Test Methodology

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4 (2003). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Data Sheet**" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Duluth 10-meter chamber site is located at 1950 Evergreen Blvd., Suite 100, Duluth, Georgia. The test site is a 10-meter semi-anechoic chamber. The site meets the characteristics of CISPR 16-1: 1993 and ANSI C63.4: 2003. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters.

The A2LA accreditation code for this site is 121624 under certificate number 1455.01.

3 System Test Configuration

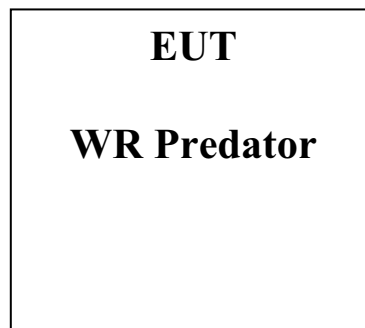
3.1 Support Equipment

No support equipment was needed for this evaluation.

3.2 Cabling

No cables were needed for this evaluation.

3.3 Block Diagram of Test Setup



3.4 Justification

For emissions testing, the test procedures described in American National Standards Institute C63.4-2003 were employed. The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it).

The EUT was configured to transmit full power.

3.5 Software Exercise Program

No special software was required. For emissions testing, a sample was provided that would transmit continuously while the button was depressed.

3.6 Mode of Operation during Test

The EUT was set to transmit continuously during testing.

3.7 Modifications Required for Compliance

No modifications were installed by Intertek during compliance testing in order to bring the product into compliance (Please note that this does not include changes made specifically by GRE North America prior to compliance testing)

3.8 Additions, deviations and exclusions from standards

No additions, deviations or exclusions from the standard were made.

4 Measurement Results

4.1 Radiated Emission

FCC Rule 15.231(b)

4.1.1 Procedure

For radiated emission measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. The signal is maximized through rotation and placement in the three orthogonal axes.

During the test the EUT is rotated and the antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

Radiated emission measurements were performed from 30 MHz to 2500 MHz.

Analyzer resolution is:

100 kHz or greater for frequencies 1000 MHz and below,

1 MHz for frequencies above 1000 MHz.

The Peak value of the Field Strength was measured. The Average value was obtained from the Peak by subtracting the Duty Cycle Correction Factor.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

4.1.2 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follows:

$$FS = RA + AF + CF - AG - DC$$

Where FS = Field Strength in dB (μ V/m)

RA = Receiver Amplitude (including preamplifier) in dB (μ V)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(1/m)

AG = Amplifier Gain in dB

DC = Duty Cycle (Average Factor)

4.1.3 Test Result

The following data list the significant emission frequencies, the limit and the margin of compliance. The EUT was scanned from 30 MHz to 2.5 GHz. There were no other radiated emissions within 20 dB of the limit.

Table 4-1: Radiated Emissions – Fundamental & Spurious Emissions

Date: 10/10/05		Limit: FCC15 Class B-3m							
Frequency Range (MHz): 30 to 1000		Test Distance (m): 3 m							
Input power: battery		Modifications for compliance (y/n): y							
A	B	C	D	E	F	G	H	I	
Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Average Factor dB	Net dB(uV/m)	3m Limit dB(uV/m)	Margin dB	
Fundamental measurements									
Z	V	433.851	59.7	17.1	3.6	4.7	75.8	80.8	-5.1
Z	H	433.851	52.9	16.9	3.6	4.7	68.8	80.8	-12.0
Y	V	433.851	47.6	17.1	3.6	4.7	63.7	80.8	-17.1
Y	H	433.851	55.6	16.9	3.6	4.7	71.4	80.8	-9.4
X	V	433.851	47.6	17.1	3.6	4.7	63.7	80.8	-17.1
X	H	433.851	56.2	16.9	3.6	4.7	72.1	80.8	-8.7
Spurious Emissions									
*	H	867.698	17.0	21.4	5.5	4.7	39.2	60.8	-21.6
*	V	867.698	21.9	20.6	5.5	4.7	43.3	60.8	-17.5
Calculations		G=C+D+E-F			I=G-H				

* Spurious Emissions measurements taken at worst-case orientation, Z-axis, in which the EUT is 'standing' up on it's end

Date: 10/10/05		Limit: FCC15 Class B-3m							
Frequency Range (MHz): 1000 to 2500		Test Distance (m): 3 m							
Input power: battery		Modifications for compliance (y/n): n							
A	B	C	D	E	F	G	H	I	
Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Average Factor dB	Pre-amp Factor dB	Net dB(uV/m)	3m Limit dB(uV/m)	Margin dB
*	V	1301.490	51.5	24.4	7.0	4.7	37.4	40.8	54.0
*	H	1301.490	46.6	24.5	7.0	4.7	37.4	36.1	54.0
	V	1735.550	40.3	25.6	7.0	4.7	36.5	31.8	60.8
Calculations		G=C+D+E-F			I=G-H				

*** RESTRICTED BAND**

Note: Testing performed in "Z" orientation (transmitter "standing" relative to the plane) as determined to be worst case at the frequency of the fundamental.

4.2 AC Line Conducted Emission

FCC Rule 15.207

4.2.1 Measurement Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4: 2003

4.2.2 Test Result

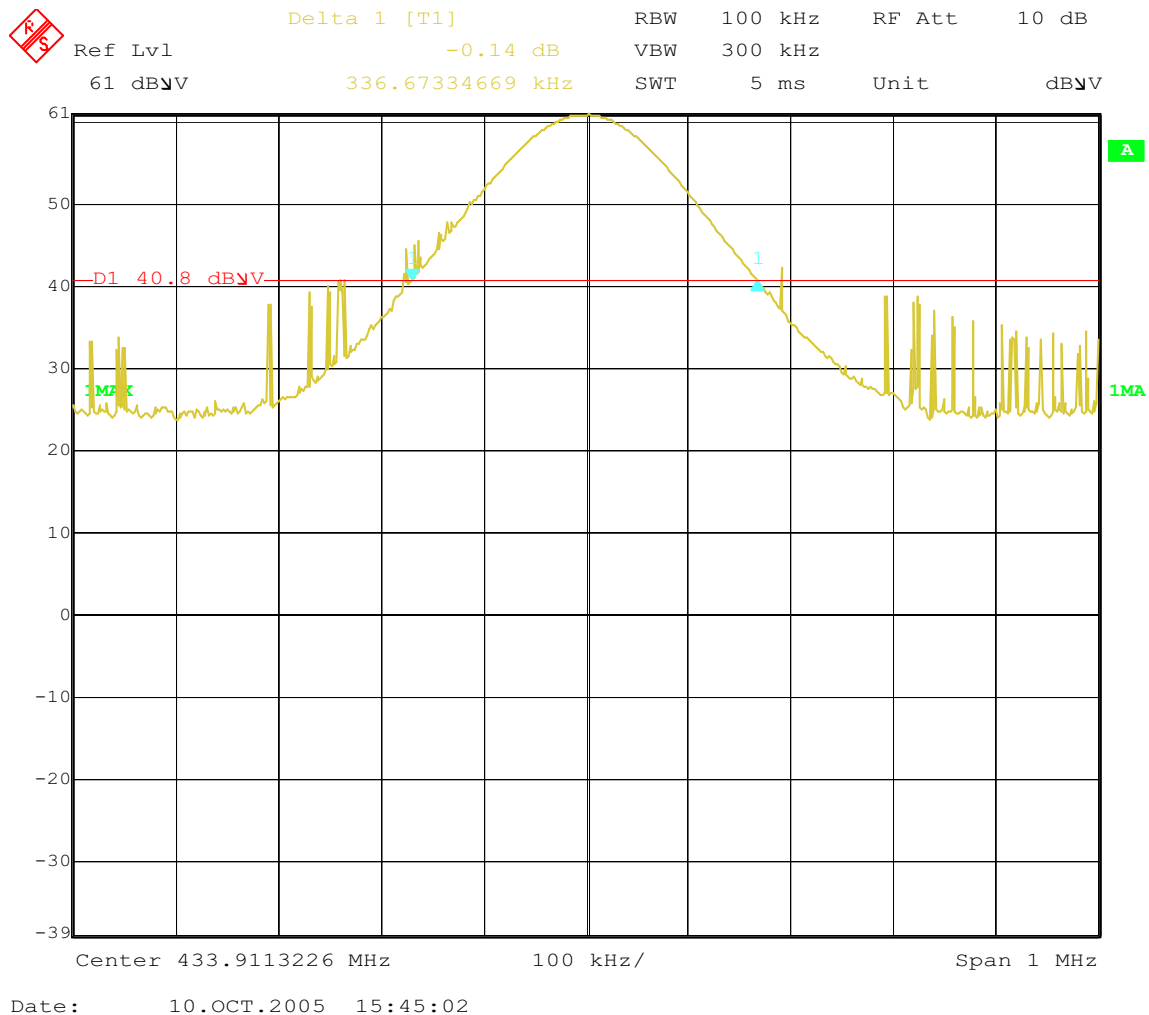
This test was not required as the EUT is battery powered and does not connect to the ac mains.

4.3 Occupied Bandwidth Plot

FCC Rule 15.231(c)

The following plots show the occupied bandwidth the transmitter. The widest occupied bandwidth at 20 dBc is 336 kHz, which is 0.08% of the fundamental frequency.

Figure 4-1: Bandwidth plot



4.4 Transmitter Duty Cycle Calculation and Measurements

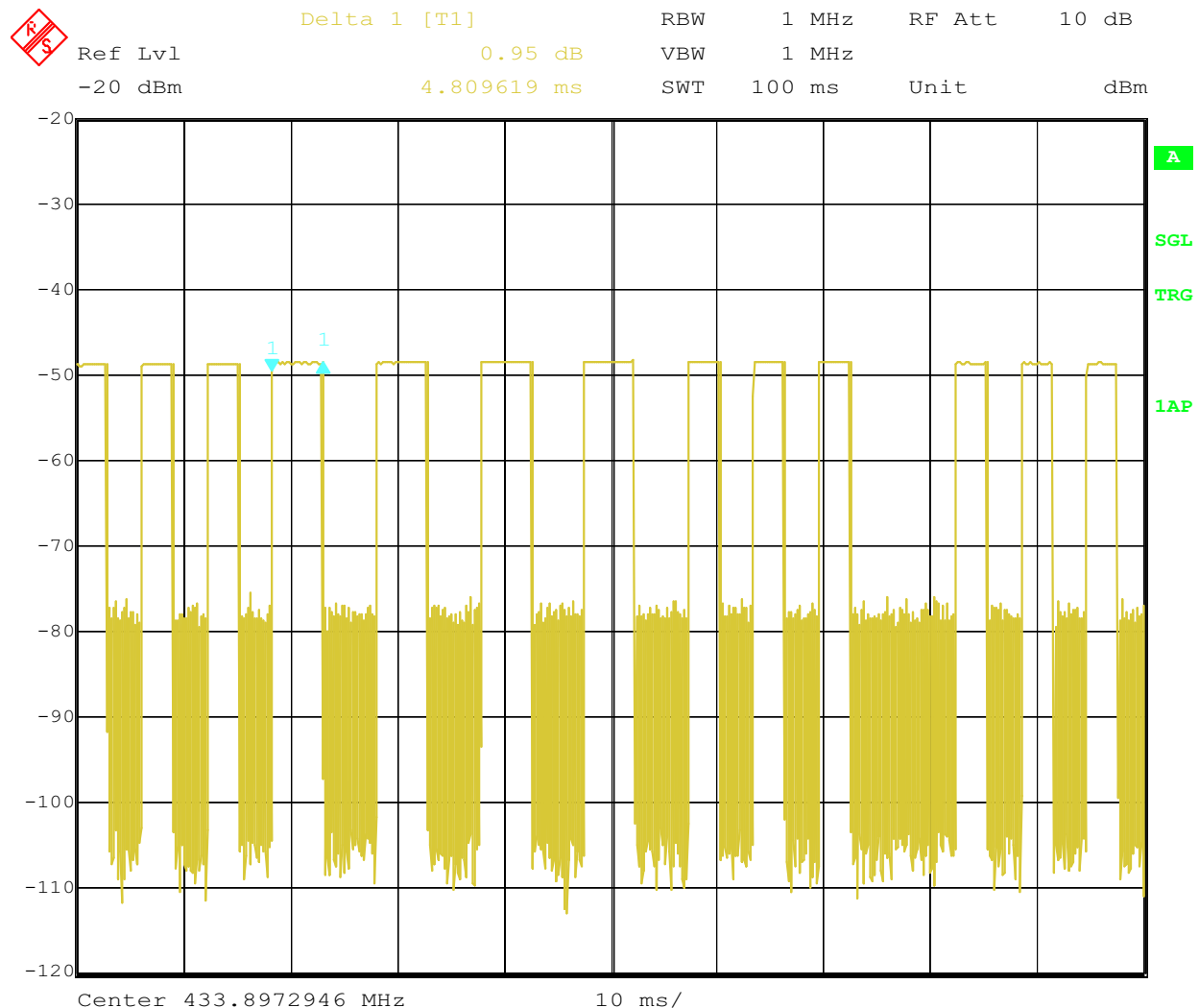
The following plots show the Duty Cycle (DC) of the transmission signal. The Duty Cycle Correction Factor is 4.65 dB.

Duty Cycle is defined as the maximum 'ON' time within the total sequence period divided by that period (milliseconds).

The number of 'ON' pulses within the 82.16 ms pulse sequence cycle is 10 as shown in Figure 4-5. Of the 10 pulses in the sequence, the largest 'ON' pulse width is 4.81 ms as shown in Figure 4-2. Therefore, the Duty Cycle Correction Factor was calculated as follows:

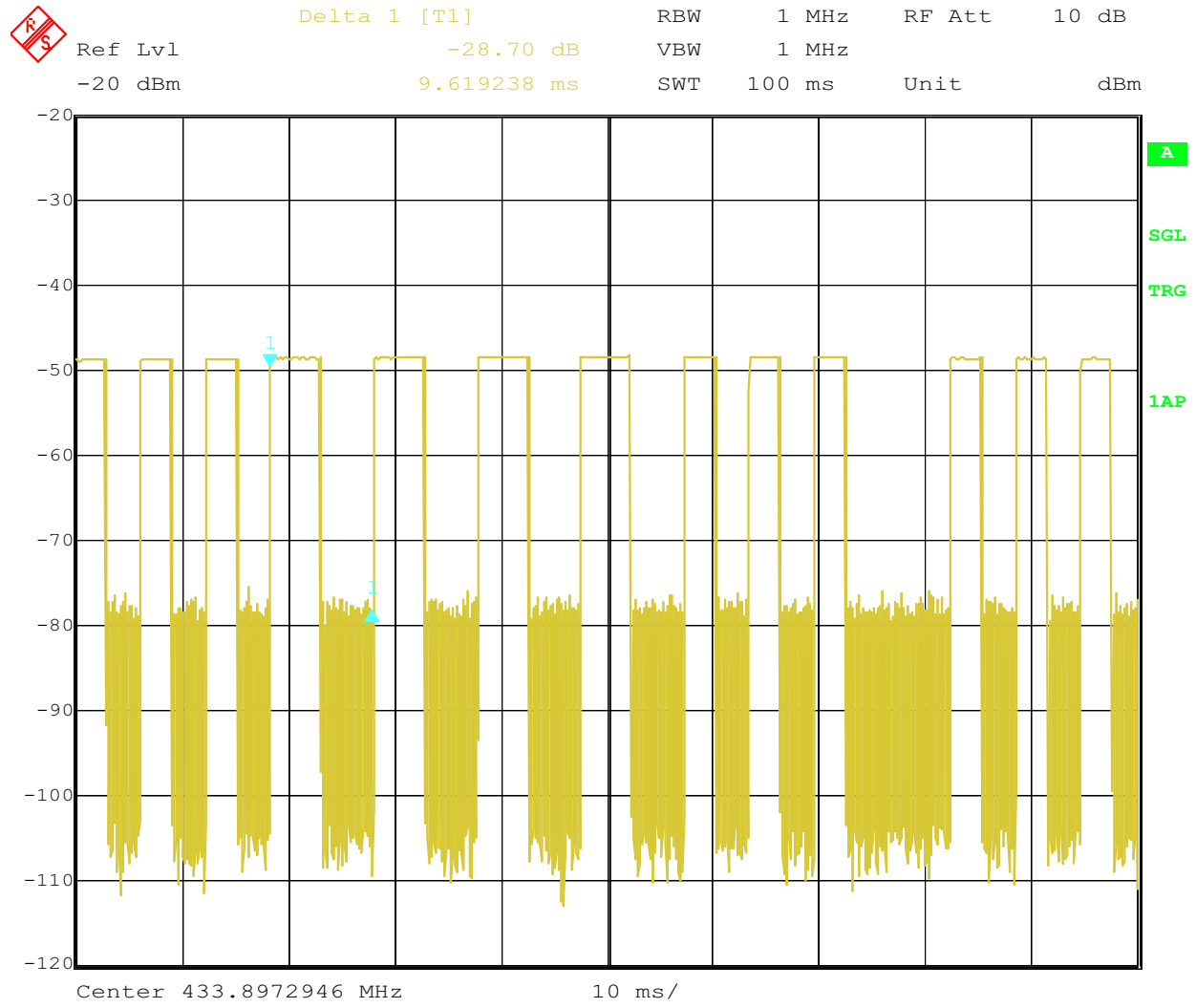
$$\text{Duty Cycle Correction Factor} = 20 * \text{Log} (\text{Duty Cycle}) = 20 * \text{Log} (10 * 4.81 \text{ ms} / 82.16 \text{ ms}) = 4.65 \text{ dB}$$

Figure 4-2: Output – Pulse ON Width



Date: 13.JAN.2006 12:31:29

Figure 4-3: Output – Pulse ON Cycle Width



Date: 13.JAN.2006 12:32:09

Figure 4-4: Output – Pulse Sequence Width

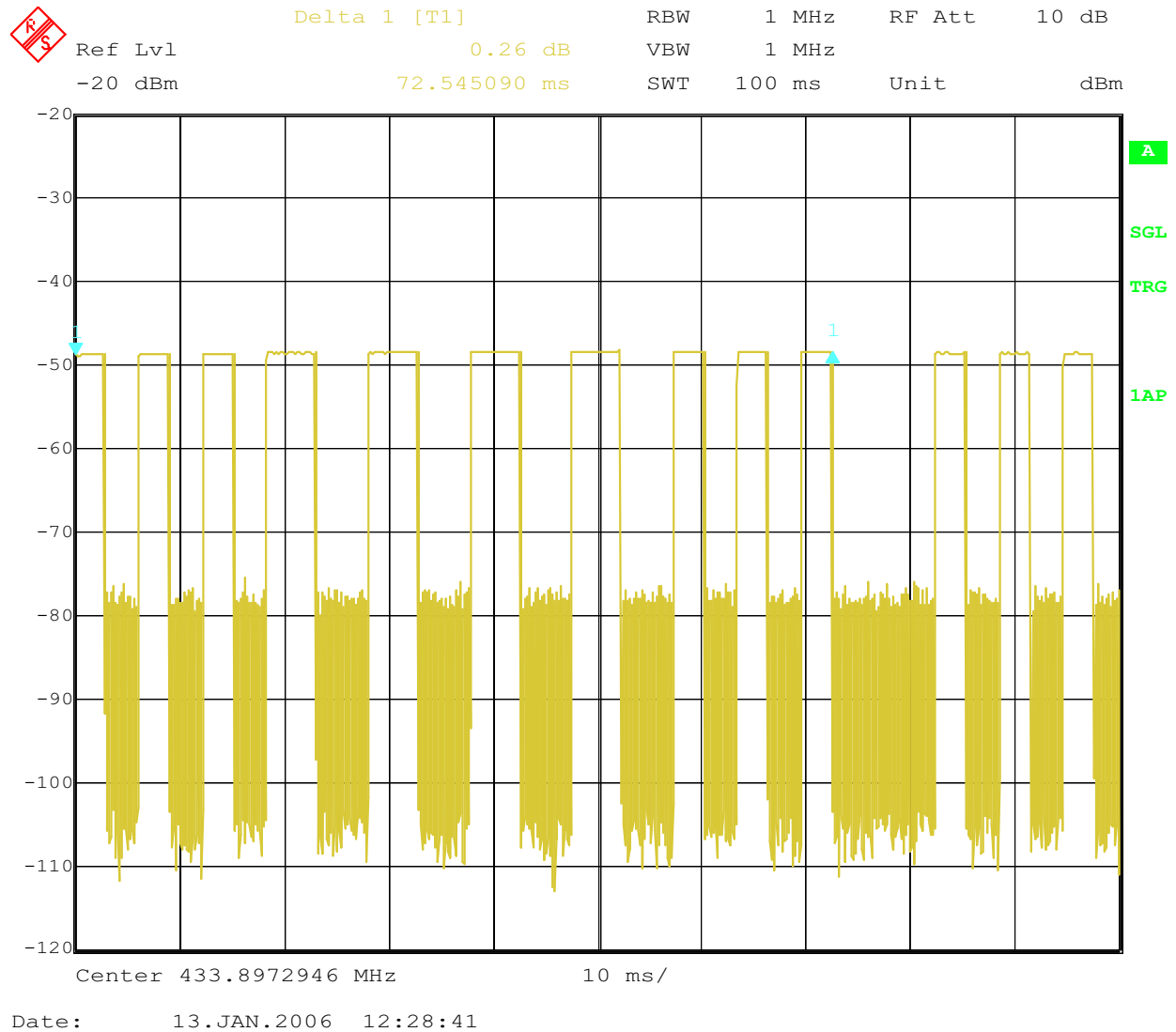
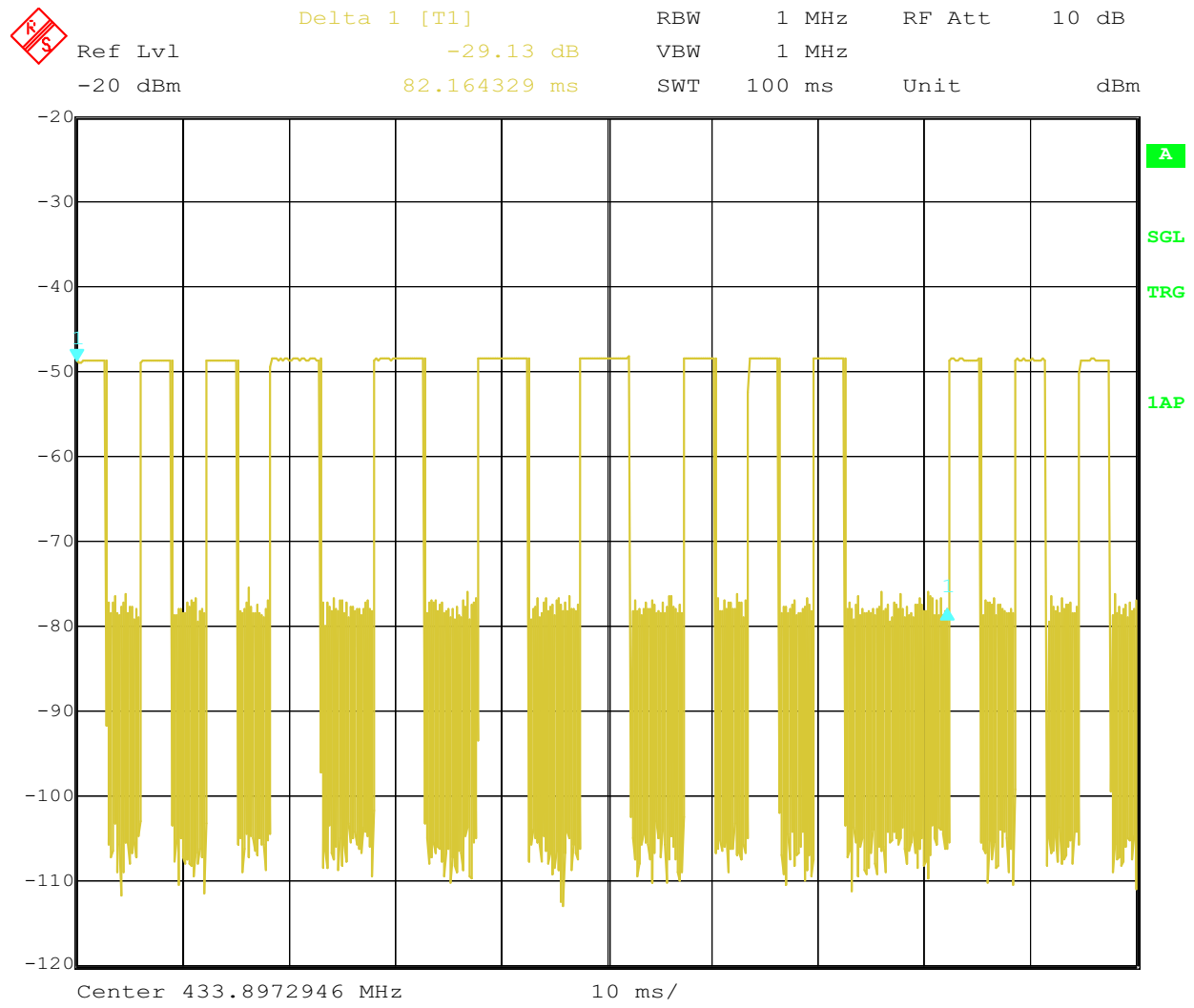


Figure 4-5: Output – Pulse Sequence Cycle Width



Date: 13.JAN.2006 12:30:24

5 Antenna Requirement

X	The transmitter uses a permanently connected antenna.
	The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but does NOT use a standard antenna jack or electrical connector.
	The EUT requires professional installation.

Please refer to the attached documentation for details.

6 List of test equipment

Equipment	Manufacturer	Model Number	Serial Number	Cal. Interval	Cal. Due
EMI Receiver	Hewlett-Packard	8546A	3650A00362	1 yr	01/05/2006
RF Filter Section	Hewlett-Packard	85460A	3704A00331	1 yr	01/05/2006
Spectrum Analyzer	Rohode & Schwarz	FSEK 30	100353	1 yr	01/03/2006
Amplifier	Hewlett-Packard	HP8449B	3008A00989	1 yr	04/22/2006
Antenna	Schnaffner-Chase	CBL6112B	2622	1 yr	08/30/2006
Horn Antenna	EMCO	3115	9208-3919	1 yr	03/11/2006
Cable	Megaphase	G919-NKNK-394	MP3	1 yr	05/11/2006
Cable	Pasternack	RG214/U	E01	1 yr	05/11/2006
Cable	Huber-Suhner	Sucoflex 104PEA	E11	1 yr	05/11/2006
Cable	Huber-Suhner	Sucoflex 104PE	E08	1 yr	05/13/2006
Cable	Huber-Suhner	Sucoflex 104PEA	E05	1 yr	05/12/2006
Cable	Megaphase	TM18 NKNK 118	E201	1 yr	05/12/2006

7 Document History

Report Number	Writer Initials	Date	Change
3084244-37-1-1	CDC	January 20, 2006	Original document
3084244-37-1-1	CDC	January 20, 2006	Average factor and plots corrected