



CERTIFICATION TEST REPORT
FOR THE
TORO EZ-REMOTE TRANSMITTER &
IRRITROL SYSTEMS KWIKSTART
FCC PART 15.231
COMPLIANCE

DATE OF ISSUE: MARCH 2, 2000

PREPARED FOR:

The Toro Company
5825 Jasmine Street
Riverside, CA 92504

P.O. No: GS 8326
W.O. No: 72756

PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: November 30 &
December 1, 1999

Report No: FC00-009

DOCUMENTATION CONTROL:

Tracy Phillips
Documentation Control Supervisor
CKC Laboratories, Inc.

APPROVED BY:

Dennis Ward
Director of Laboratories
CKC Laboratories, Inc.

This report contains a total of 58 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc.

TABLE OF CONTENTS

Administrative Information	4
Summary Of Results.....	5
Equipment Under Test (EUT) Description.....	5
Measurement Uncertainty.....	5
EUT Operating Frequency.....	5
Peripheral Devices	6
Report Of Measurements.....	7
Table 1: Fundamental Radiated Emission Levels	7
Table 2: Six Highest Radiated Emission Levels - 30-1000 MHz for I-A	8
Table 3: Six Highest Radiated Emission Levels - 1-5 GHz for I-A	9
Table 4: Six Highest Radiated Emission Levels – Sleep Mode for I-A	10
Table 5: Six Highest Radiated Emission Levels - 30-1000 MHz for I-S	11
Table 6: Six Highest Radiated Emission Levels - 1-5GHz for I-S.....	12
Table 7: Six Highest Radiated Emission Levels - Sleep Mode for I-S	13
Table A : List Of Test Equipment	14
EUT Setup	15
Test Instrumentation And Analyzer Settings.....	15
Table B : Analyzer Bandwidth Settings Per Frequency Range.....	15
Spectrum Analyzer Detector Functions.....	16
Peak	16
Quasi-Peak.....	16
Average.....	16
Test Methods	17
Radiated Emissions Testing.....	17
Occupied Bandwidth	18
Sample Calculations	18
Appendix A : Information About The Equipment Under Test.....	19
I/O Ports.....	20
Crystal Oscillators	20
Printed Circuit Boards	20
Required EUT Changes To Comply.....	20
Cable Information.....	20
Equipment Configuration Block Diagram.....	21
Photograph Showing Radiated Emissions.....	22
Photograph Showing Radiated Emissions.....	23
Photograph Showing Radiated Emissions.....	24
Photograph Showing Radiated Emissions.....	25
Appendix B : Measurement Data Sheets.....	26
Occupied Bandwidth Plot – I-A Configuration.....	27
Occupied Bandwidth Plot – I-S Configuration.....	28

Duty Cycle Plot – I-A	29
Duty Cycle Plot – I-A	30
Duty Cycle Plot – I-A	31
Duty Cycle Plot – I-A	32
Duty Cycle Plot – I-A	33
Duty Cycle Plot – I-A	34
Duty Cycle Plot – I-A	35
Duty Cycle Plot – I-A	36
Duty Cycle Plot – I-A	37
Duty Cycle Plot – I-S	38
Duty Cycle Plot – I-S	39
Duty Cycle Plot – I-S	40
Duty Cycle Plot – I-S	41
Duty Cycle Plot – I-S	42
Duty Cycle Plot – I-S	43
Duty Cycle Plot – I-S	44
Duty Cycle Plot – I-S	45
Duty Cycle Plot – I-S	46

CKC Laboratories, Inc. has Certificates of Accreditation from the following agencies:
DATEch (Germany); A2LA (USA); FCC (USA); VCCI (Japan); BSMI (Taiwan); HOKLAS (Hong Kong).
CKC Laboratories, Inc. has Letters of Acceptance through an MRA for the following agencies:
ACA/NATA (Australia); SABS (South Africa); SWEDAC (Sweden); TUV Rheinland-Germany; TUV Rheinland-Korea; TUV Rheinland-Russia; Radio Communications Agency (RA); NEMKO (Norway).

ADMINISTRATIVE INFORMATION

DATE OF TEST: November 30 & December 1, 1999

PURPOSE OF TEST: To demonstrate the compliance of the Toro EZ-Remote & Irritrol Systems KwikStart with the requirements for FCC Part 15.231 devices.

MANUFACTURER: JDI Electronics
Clima Industrial Park
Zhang Ping Town
Donguan, China

REPRESENTATIVE: Dan Yee

TEST LOCATION: CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92621

TEST PERSONNEL: Stuart Yamamoto

TEST METHOD: ANSI C63.4 1992 & FCC Part 15.231

FREQUENCY RANGE TESTED: 30 kHz - 5000 MHz

EQUIPMENT UNDER TEST: **Toro EZ-Remote & Irritrol Systems KwikStart**
Manuf: The Toro Company
Model: Toro EZ-Remote & Irritrol Systems KwikStart
Config: I-A & I-S
Serial: N/A
FCC ID: Pending

SUMMARY OF RESULTS

The Toro EZ-Remote & Irritrol Systems KwikStart, was tested in accordance with ANSI C63.4 1992 for compliance with FCC Part 15.231.

As received, the above equipment was found to be fully compliant with the limits of FCC Part 15.231. The results in this report apply only to the items tested, as identified herein.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT is a transmitter designed to communicate to a receiver, which is connected to a Toro or Irritrol Systems irrigation timing controller, to activate one or more output stations of the attached controller. The size of the transmitter and the receiver is approximately that of a television remote control device. The wireless technology of the EUT is the same as that of the garage door opener. The transmitter is powered by a 9V alkaline battery, while the receiver draws its power from the controller attached.

There are two identical transmitter models; the model EZ-Remote is made by Toro and the model KwikStart is made by Irritrol Systems. The only difference in the models is an external decal which identifies it as either the Toro or Irritrol Systems product. Due to a component sourcing constraints, two different components are being procured for use in the production of the transmitter's PCB. One component is an axial lead and the other is a surface mount. During testing two different configurations of the transmitter were tested. Configuration "I-A" represents the EUT with an internal antenna and using the axial lead component and configuration "I-S" represents the EUT with an internal antenna and using the surface mount component.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ± 4 dB measurement uncertainty.

EUT OPERATING FREQUENCY

The EUT was operating at 433 MHz.

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

REPORT OF MEASUREMENTS

The following tables report the highest worst case levels recorded during the tests performed on the Toro EZ-Remote & Irritrol Systems KwikStart. All readings taken are peak readings unless otherwise noted by a “Q” or “A”. The data sheets from which these tables were compiled are contained in Appendix B.

Table 1: Fundamental Radiated Emission Levels									
FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable DB	Dist dB				
433.818 I-A Config	79.3	16.1	-27.8	5.2		72.8	80.5	-7.7	H
433.860 I-A Config	83.4	16.1	-27.8	5.2		76.9	80.5	-3.6	H
433.879 I-A Config	82.4	16.1	-27.8	5.2		75.9	80.5	-4.6	V
433.882 I-A Config	85.1	16.1	-27.8	5.2		78.6	80.5	-1.9	VD
433.890 I-A Config	85.8	16.1	-27.8	5.2		79.3	80.5	-1.2	HD
433.932 I-A Config	78.4	16.1	-27.8	5.2		71.9	80.5	-8.6	V

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.231
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Includes -6dB duty cycle factor
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT is a transmitter with either internal antenna and axial component (I-A) or internal antenna and surface mount component (I-S). The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data above is highest emissions of all three axis. Temperature: 18°C Humidity: 44% Pressure: 100kPa. Note: Only I-A configuration is shown because the lowest I-S reading starts at -15.dB.

Table 2: Six Highest Radiated Emission Levels - 30-1000 MHz for I-A

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT DBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
679.350	29.0	22.1	-27.4	6.9		30.6	60.5	-29.9	H
712.931	28.8	22.6	-27.3	7.1		31.2	60.5	-29.3	H
867.756	52.5	22.9	-27.1	7.7		56.0	60.5	-4.5	HD
952.065	30.2	23.9	-27.3	8.3		35.1	60.5	-25.4	V
956.214	28.6	24.0	-27.3	8.3		33.6	60.5	-26.9	H
960.443	28.8	24.0	-27.3	8.3		33.8	60.5	-26.7	V

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.231
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Includes -6dB duty cycle factor
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT is a transmitter with internal antenna and axial component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data above is highest emissions of all three axis. Frequency range scanned and maximized, 30-1000 MHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Table 3: Six Highest Radiated Emission Levels - 1-5 GHz for I-A

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT DBμV/m	MARGIN dB	NOTES
		Horn dB	Amp dB	Cable dB	Dist dB				
1301.699	60.2	24.9	-39.6	5.7		51.2	60.5	-9.3	V
1735.602	58.2	26.3	-39.0	7.3		52.8	60.5	-7.7	VA
2169.435	54.0	27.5	-39.0	7.8		50.3	60.5	-10.2	H
2603.351	44.2	28.6	-39.4	8.4		41.8	60.5	-18.7	H
3037.330	44.2	30.8	-37.5	9.6		47.1	60.5	-13.4	H
3471.233	44.7	31.0	-39.1	11.0		47.6	60.5	-12.9	H

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.231
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT is a transmitter with internal antenna and axial component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data above is highest emissions of all three axis. Frequency range scanned and maximized, 1-5 GHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Table 4: Six Highest Radiated Emission Levels – Sleep Mode for I-A

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
31.428	38.7	15.4	-28.1	1.4		27.4	40.0	-12.6	V
33.509	39.9	14.9	-28.1	1.4		28.1	40.0	-11.9	H
37.707	43.2	13.9	-28.2	1.4		30.3	40.0	-9.7	H
52.455	42.2	10.6	-28.2	1.7		26.3	40.0	-13.7	V
952.065	30.2	23.9	-27.3	8.3		35.1	46.0	-10.9	V
956.214	28.6	24.0	-27.3	8.3		33.6	46.0	-12.4	H

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.231
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT is a transmitter with internal antenna and axial component. The EUT is not transmitting but is in a sleep mode. Power to EUT is supplied by a 9 V battery. Data above is highest emissions of all three axis. Frequency range scanned and maximized, 30-1000 MHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Table 5: Six Highest Radiated Emission Levels - 30-1000 MHz for I-S

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
35.708	44.7	14.4	-28.2	1.4		32.3	60.5	-28.2	V
44.035	45.6	13.1	-28.2	1.5		32.0	60.5	-28.5	V
285.115	34.0	20.8	-28.0	4.0		30.8	60.5	-29.7	H
641.646	28.7	20.8	-27.7	6.6		28.4	60.5	-32.1	H
658.504	29.5	21.4	-27.5	6.7		30.1	60.5	-30.4	H
867.925	49.6	22.9	-27.1	7.7		53.1	60.5	-7.4	HD

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.231
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Includes -6dB duty cycle factor
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT is a transmitter with internal antenna and surface mount component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data above is highest emissions of all three axis. Frequency range scanned and maximized, 30-1000 MHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Table 6: Six Highest Radiated Emission Levels - 1-5GHz for I-S

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Horn dB	Amp dB	Cable dB	Dist dB				
1301.783	55.3	24.9	-39.6	5.7		46.3	60.5	-14.2	V
1301.991	55.0	24.9	-39.6	5.7		46.0	60.5	-14.5	H
1735.859	53.8	26.3	-39.0	7.3		48.4	60.5	-12.1	H
2169.895	54.1	27.5	-39.0	7.8		50.4	60.5	-10.1	H
2603.767	52.6	28.6	-39.4	8.4		50.2	60.5	-10.3	H
3037.739	47.4	30.8	-37.4	9.6		50.4	60.5	-10.1	H

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.231
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT is a transmitter with internal antenna and surface mount component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data above is highest emissions of all three axis. Frequency range scanned and maximized, 1-5 GHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Table 7: Six Highest Radiated Emission Levels - Sleep Mode for I-S

FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS				CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
31.469	39.1	15.4	-28.1	1.4		27.8	40.0	-12.2	H
35.708	44.7	14.4	-28.2	1.4		32.3	40.0	-7.7	V
44.035	45.6	13.1	-28.2	1.5		32.0	40.0	-8.0	V
285.115	34.0	20.8	-28.0	4.0		30.8	46.0	-15.2	H
641.646	28.7	20.8	-27.7	6.6		28.4	46.0	-17.6	H
658.504	29.5	21.4	-27.5	6.7		30.1	46.0	-15.9	H

Test Method:
Spec Limit :
Test Distance:

ANSI C63.4 1992
FCC Part 15.231
3 Meters

NOTES: H = Horizontal Polarization
 V = Vertical Polarization
 N = No Polarization
 D = Dipole Reading
 Q = Quasi Peak Reading
 A = Average Reading

COMMENTS: The EUT is a transmitter with internal antenna and surface mount component. The EUT is not transmitting but is in a sleep mode. Power to EUT is supplied by a 9 V battery. Data above is highest emissions of all three axis. Frequency range scanned and maximized, 30-1000 MHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

TABLE A

LIST OF TEST EQUIPMENT

Brea Emissions

Function	S/N	Calibration Date	Cal Due Date	Asset #
Bicon Antenna	220	10/13/1999	10/13/2000	306
Log Periodic Antenna	331	10/08/1999	10/08/2000	300
Antenna Cable	Cable#1	07/01/1999	07/01/2000	0
Pre-Amp	193A02548	03/22/1999	03/22/2000	309
QP adapter	3303A01884	09/11/1999	09/11/2000	1437
Spectrum Analyzer	2532A02509	09/11/1999	09/11/2000	1685
Horn Antenna	9603-4683	02/24/1999	02/24/2000	1646
1/4" Helix Coaxial cable	Cable#4 (60ft)	07/02/1999	07/02/2000	0
1/4" Helix Coaxial cable	Cable#7	07/02/1999	07/02/2000	0
Microwave Amplifier	3123A00282	02/24/1999	02/24/2000	787

EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Tables 1 for fundamental radiated emissions and Tables 2-5 for radiated emissions. Additionally, a complete description of all the ports and I/O cables is included on the information sheets contained in Appendix A.

During radiated emissions testing, the EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters. This configuration is typical for radiated emissions testing of table top devices.

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Table A were used to collect the radiated emissions data for the Toro EZ-Remote & Irritrol Systems KwikStart. For radiated measurements below 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. Above 1 GHz was tested using the horn antenna. All antennas were located at a distance of 3 meters from the edge of the EUT.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dB μ V, and a vertical scale of 10 dB per division.

TABLE B : ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	40 GHz	1 MHz

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in Tables 1-5 indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the Toro EZ-Remote & Irritrol Systems KwikStart.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

When the frequencies exceed 1 GHz, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

TEST METHODS

The radiated emissions data of the Toro EZ-Remote & Irritrol Systems KwikStart, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the "Sample Calculations". The corrected data was then compared to the FCC Part 15, Subpart C emissions limits to determine compliance.

Preliminary and final measurements were taken in order to better ensure that all emissions from the EUT were found and maximized.

Radiated Emissions Testing

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. The frequency range of 30 MHz - 88 MHz was then scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks which were at or near the limit were recorded. The frequency range of 100 - 300 MHz was scanned with the biconical antenna in the same manner, and the peaks recorded. Lastly, a scan of the FM band from 88 - 110 MHz was made, using a reduced resolution bandwidth and a reduced frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 - 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 - 1000 MHz was again scanned. For frequencies above 1000 MHz, the horn antenna was used. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

For the final radiated scan, the equipment was again positioned facing the antenna. A thorough scan of all frequencies was manually made using a small frequency span, rotating the turntable as needed. Comparison with the previously recorded measurements was then made.

Using the peak readings from both scans as a guide, the test engineer then maximized the readings with respect to the table rotation and antenna height.

FCC Part 15.231(c) - Occupied Bandwidth Measurements

In accordance with Part 15.231(c), the fundamental frequency was kept within 0.25% of the center frequency for devices operating >70 MHz and < 900 MHz.

SAMPLE CALCULATIONS

The basic spectrum analyzer reading was converted using correction factors as shown in the emissions readings in Tables 1-5. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula:

$$\begin{aligned} & \text{Meter reading (dB}\mu\text{V)} \\ & + \text{Antenna Factor (dB)} \\ & + \text{Cable Loss (dB)} \\ & - \text{Distance Correction (dB)} \\ & - \text{Pre-amplifier Gain (dB)} \\ & = \text{Corrected Reading (dB}\mu\text{V/m)} \end{aligned}$$

This reading was then compared to the applicable specification limit to determine compliance.

A typical data sheet will display the following in column format:

#	Freq MHz	Rdng dB μ V	Cable	Amp	Bicon	Horn	Log	Dist	Corr dB μ V/m	Spec	Margin	Polar
---	-------------	--------------------	-------	-----	-------	------	-----	------	----------------------	------	--------	-------

means reading number

Freq MHz is the frequency in MHz of the obtained reading.

Rdng dB μ V is the reading obtained on the spectrum analyzer in dB μ V.

Amp is short for the preamplifier factor or gain in dB.

Bicon is the biconical antenna factor in dB.

Log is the log periodic antenna factor in dB.

Horn is the horn antenna factor in dB.

Cable is the cable loss in dB of the coaxial cable on the OATS.

Dist is the distance factor (in dB). It is used when testing at a different test distance than the one stated in the spec.

Corr dB μ V/m is the corrected reading which is now in dB μ V/m (field strength).

Spec is the specification limit (dB) stated in the agency's regulations.

Margin is the closeness to the specified limit in dB; + is over and - is under the limit.

Polar is the Polarity of the antenna with respect to earth.

APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	N/A
CRT was displaying:	N/A
Power Supply Manufacturer:	N/A
Power Supply Part Number:	N/A
AC Line Filter Manufacturer:	N/A
AC Line Filter Part Number:	N/A
The EUT has no power cord. Battery operated.	

I/O PORTS	
Type	#

CRYSTAL OSCILLATORS	
Type	Freq. In MHz
	433.92

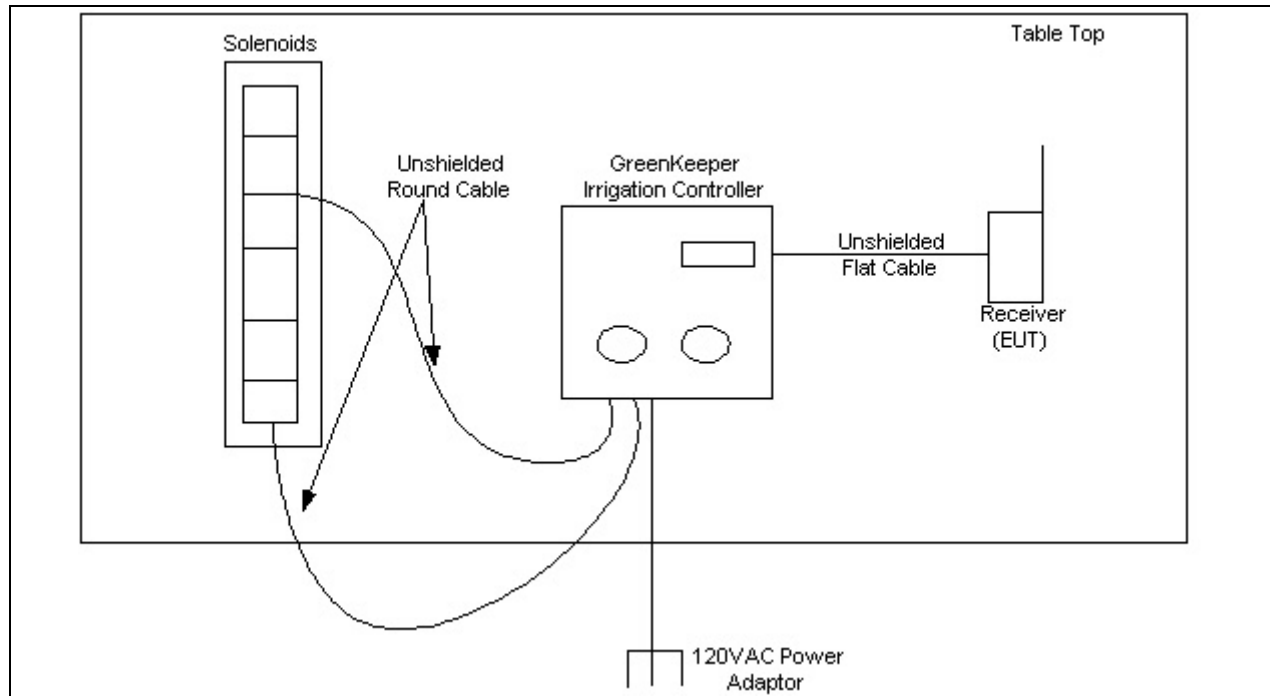
PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
Transmitter		433.92	2	

REQUIRED EUT CHANGES TO COMPLY:
None.

CABLE INFORMATION

Cable #:	1	Cable(s) of this type:	1
Cable Type:		Shield Type:	No
Construction:		Length In Meters:	
Connected To End (1):	Receiver	Connected To End (2):	Irrigation Controller, Model GK212
Connector At End (1):	Custom	Connector At End (2):	RJ11
Shield Grounded At (1):	No	Shield Grounded At (2):	No
Part Number:		Number of Conductors:	
Notes and/or description:			

EQUIPMENT CONFIGURATION BLOCK DIAGRAM



PHOTOGRAPH SHOWING RADIATED EMISSIONS



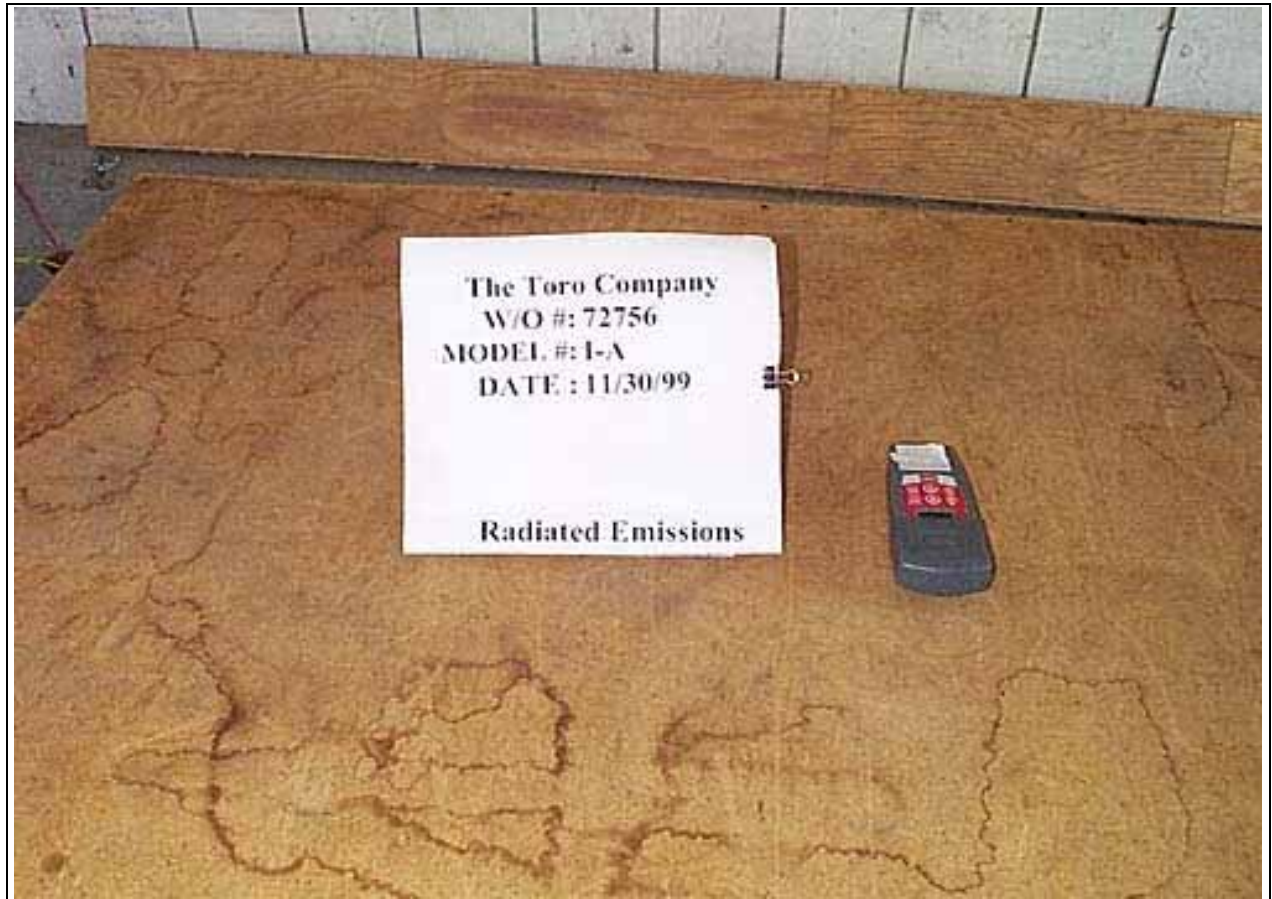
Radiated Emissions - Front View for I-A Configuration

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View for I-S Configuration

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View for I-A Configuration

PHOTOGRAPH SHOWING RADIATED EMISSIONS

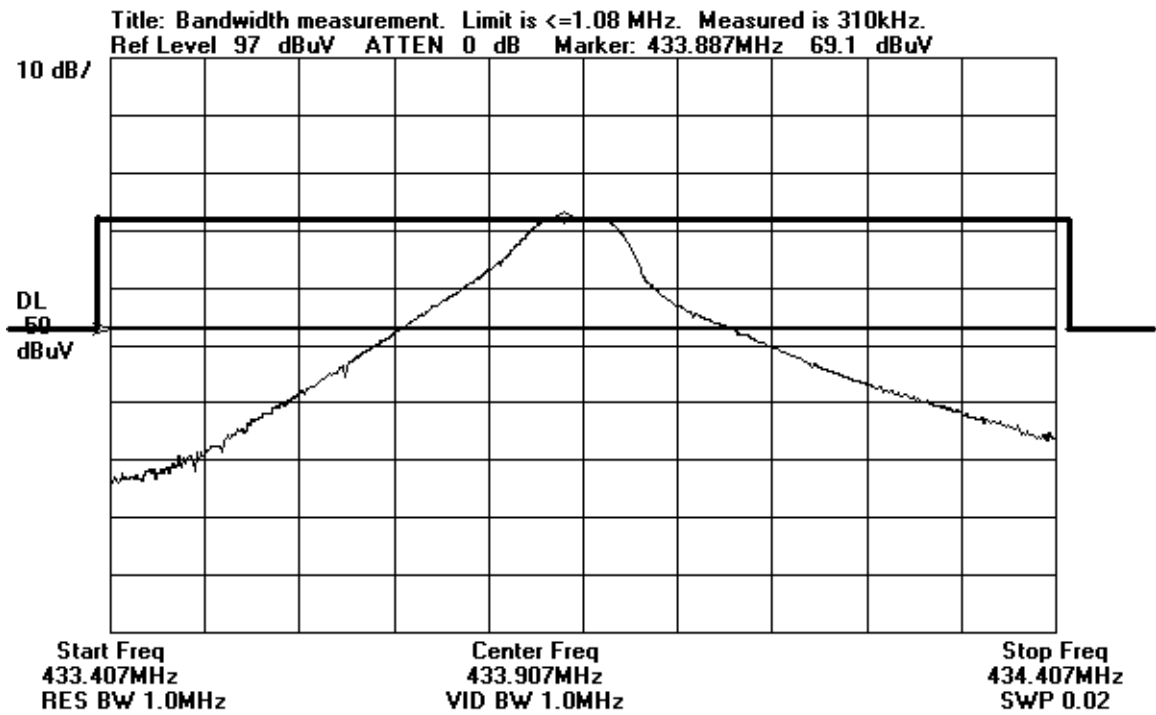


Radiated Emissions - Back View for I-S Configuration

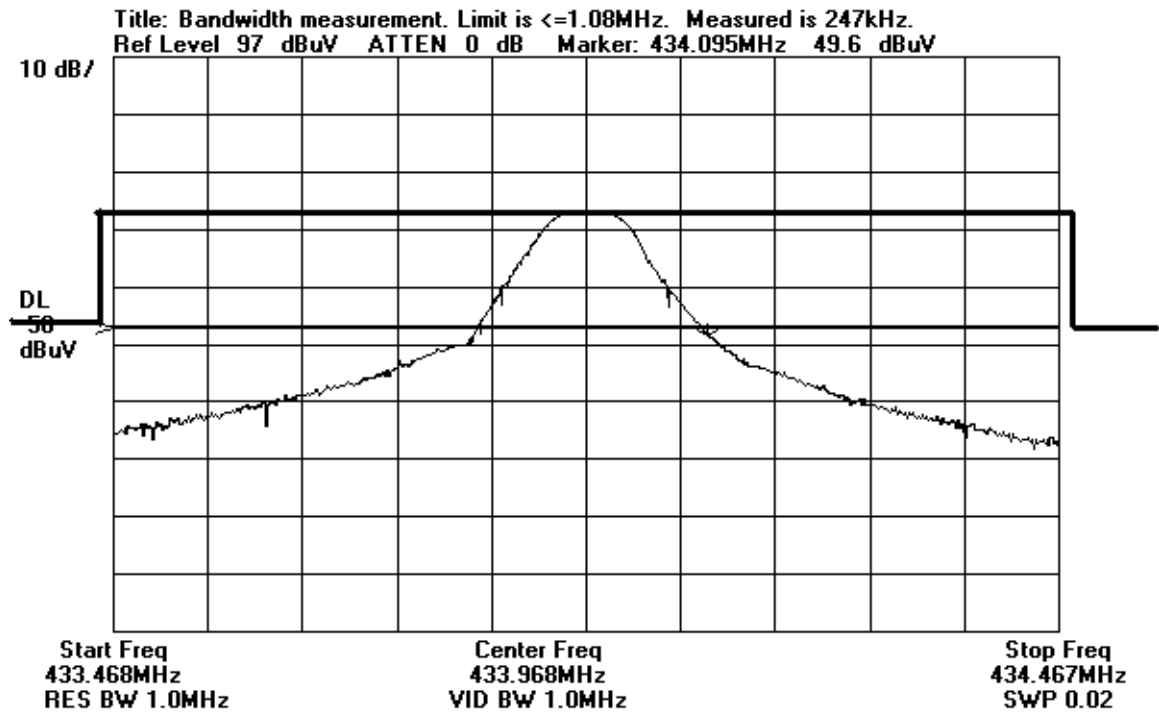
APPENDIX B

MEASUREMENT DATA SHEETS

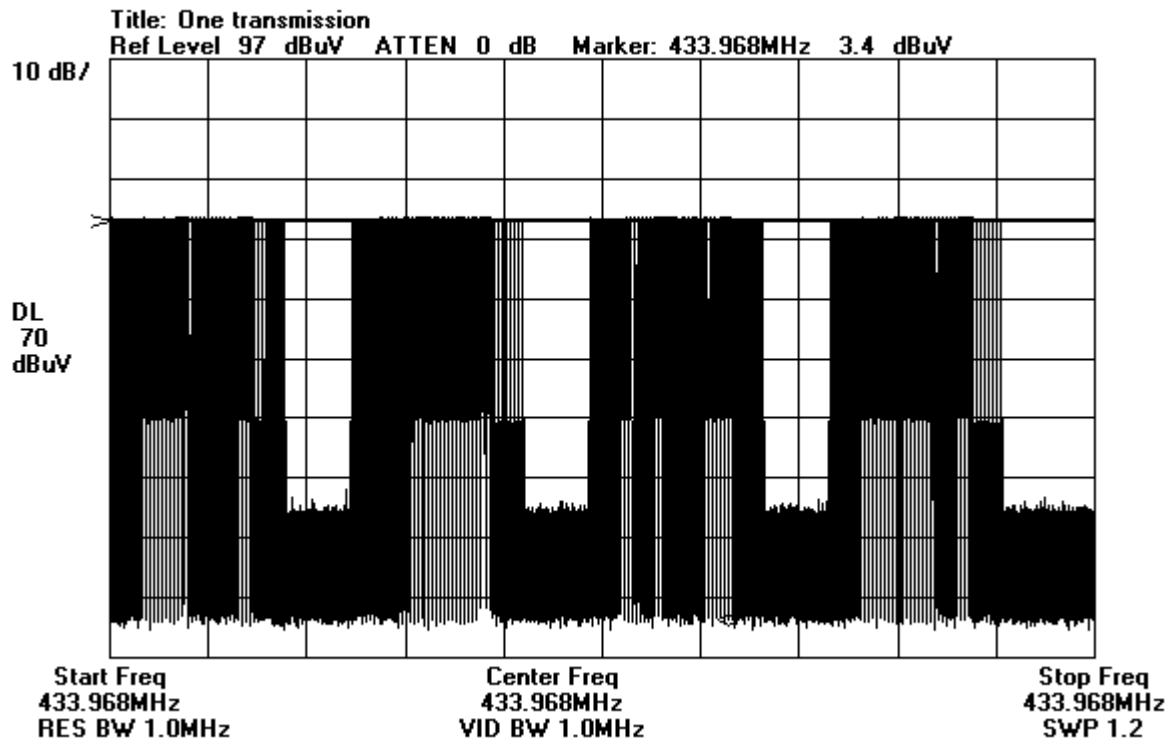
Occupied Bandwidth Plot – I-A Configuration



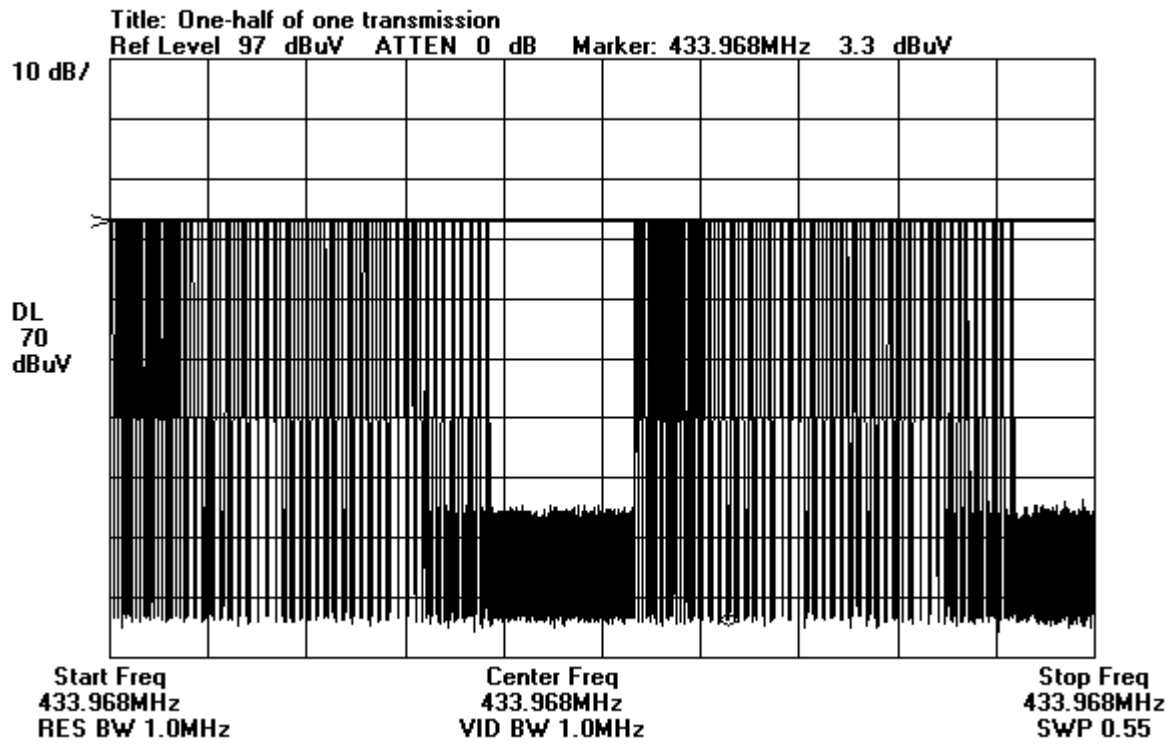
Occupied Bandwidth Plot – I-S Configuration



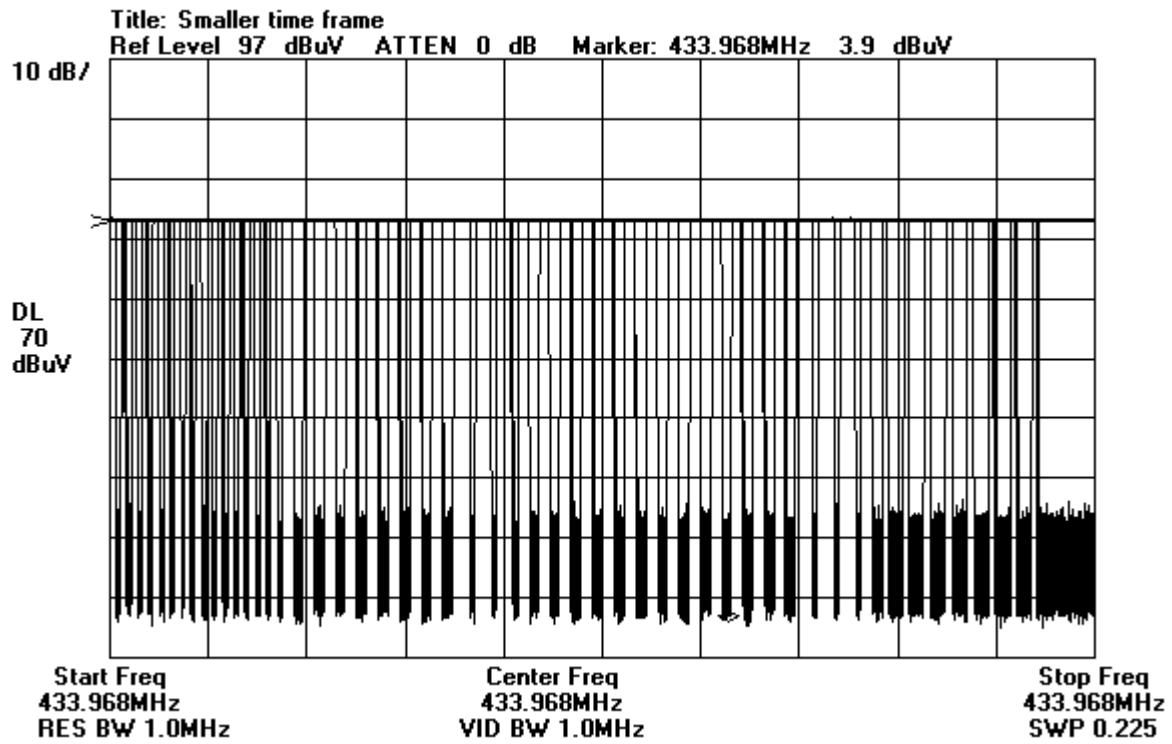
Duty Cycle Plot – I-A Configuration



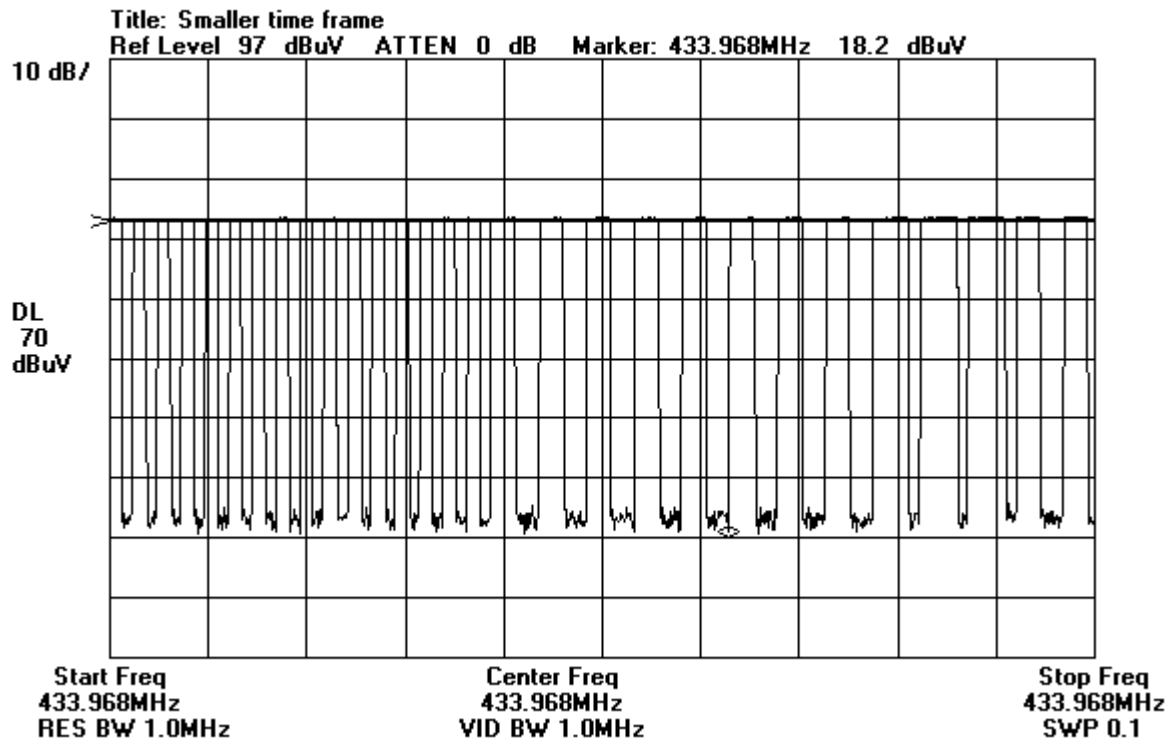
Duty Cycle Plot – I-A Configuration



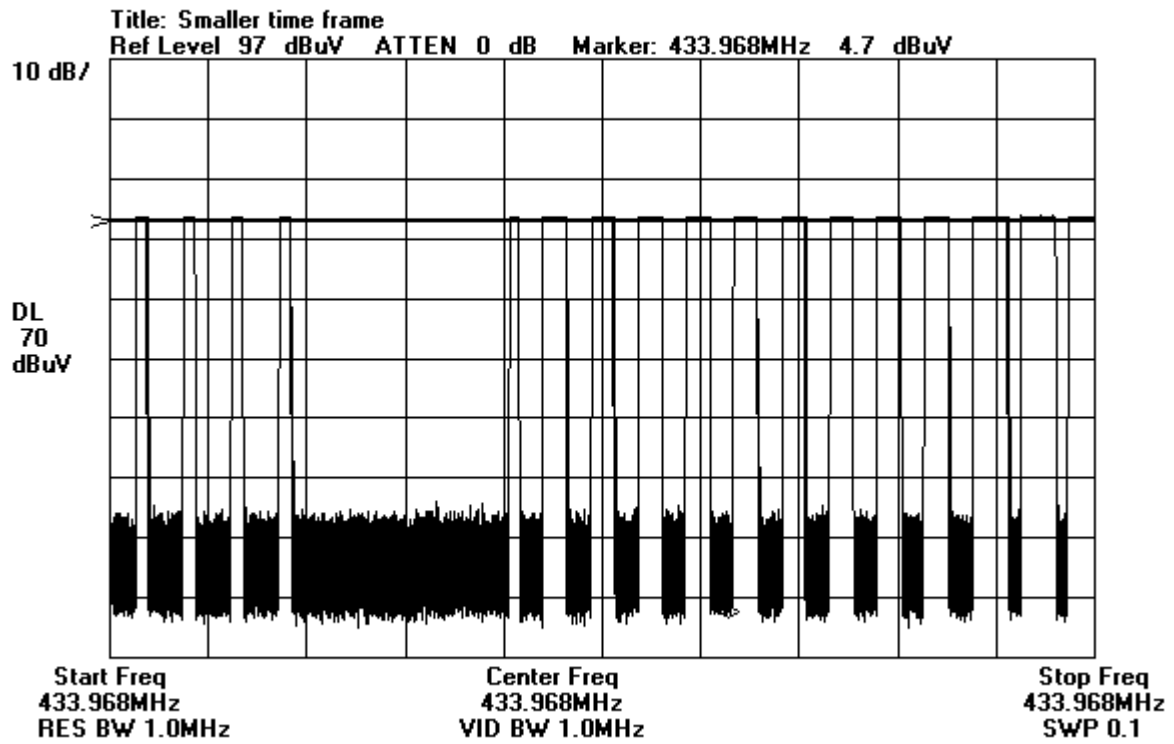
Duty Cycle Plot – I-A Configuration



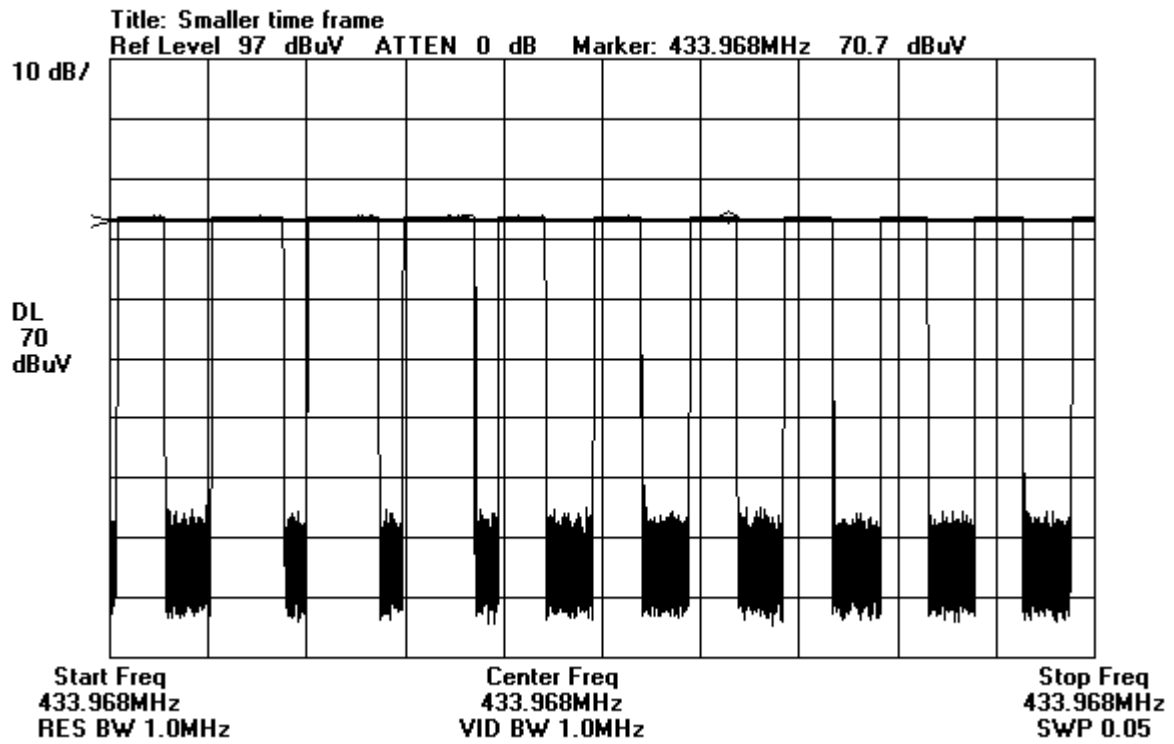
Duty Cycle Plot – I-A Configuration



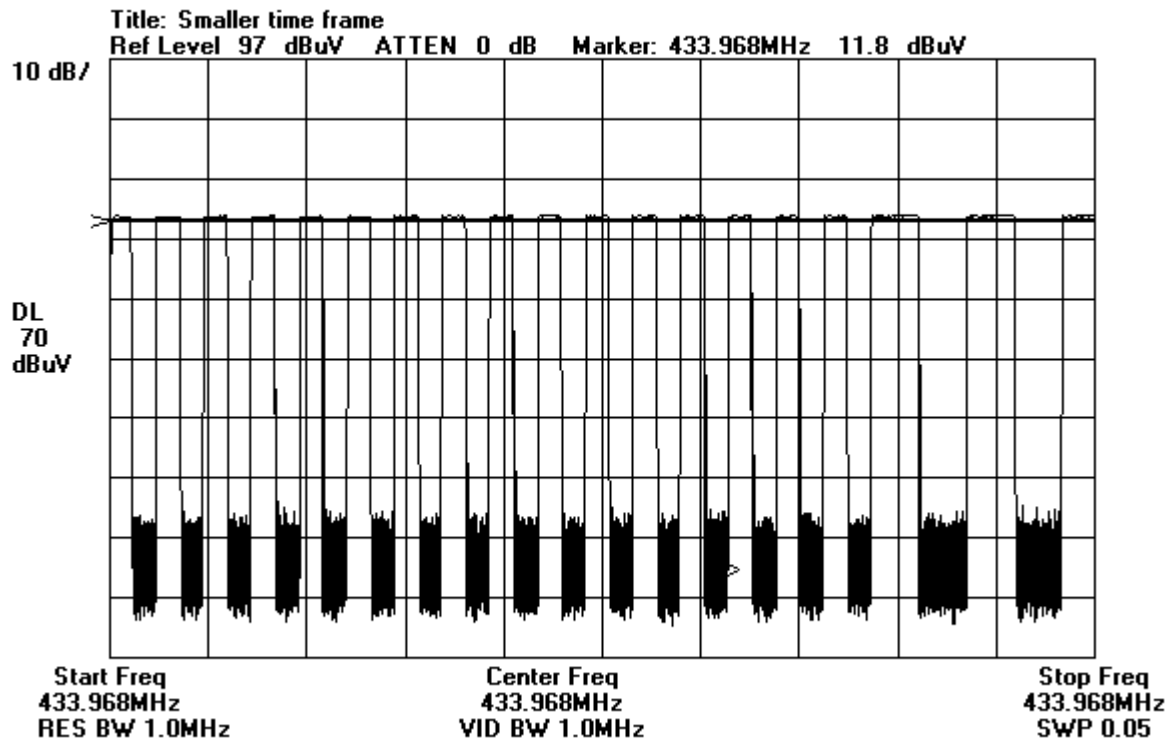
Duty Cycle Plot – I-A Configuration



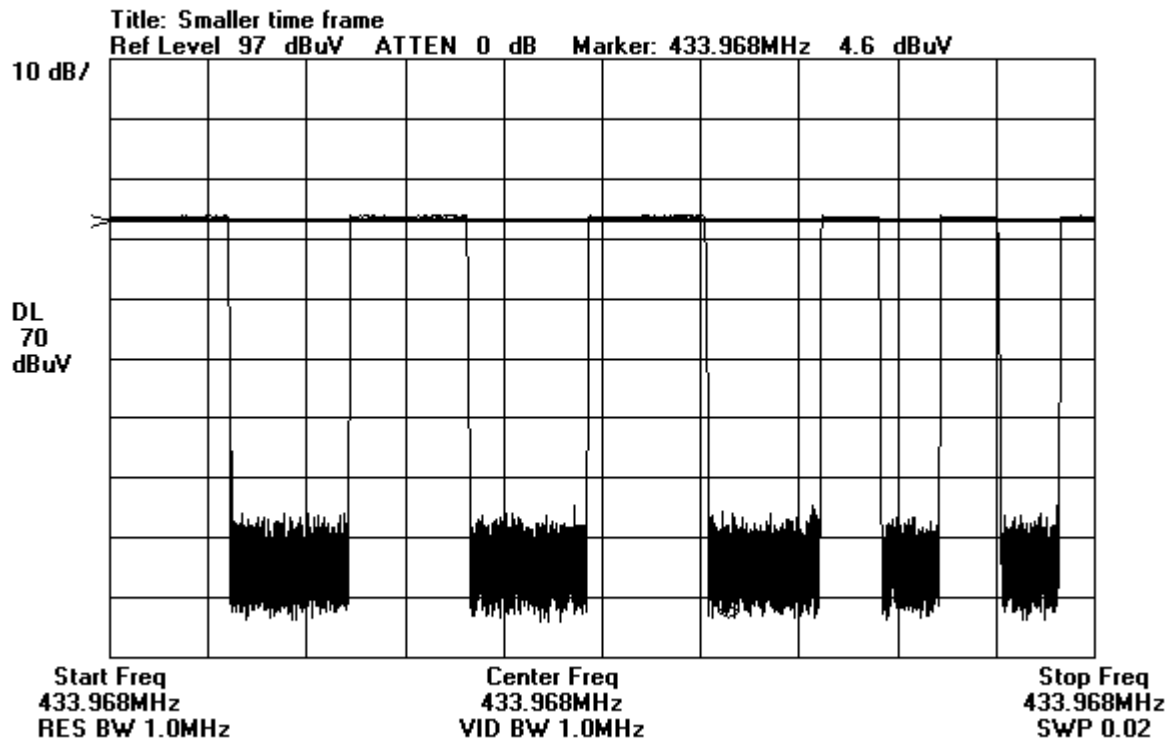
Duty Cycle Plot – I-A Configuration



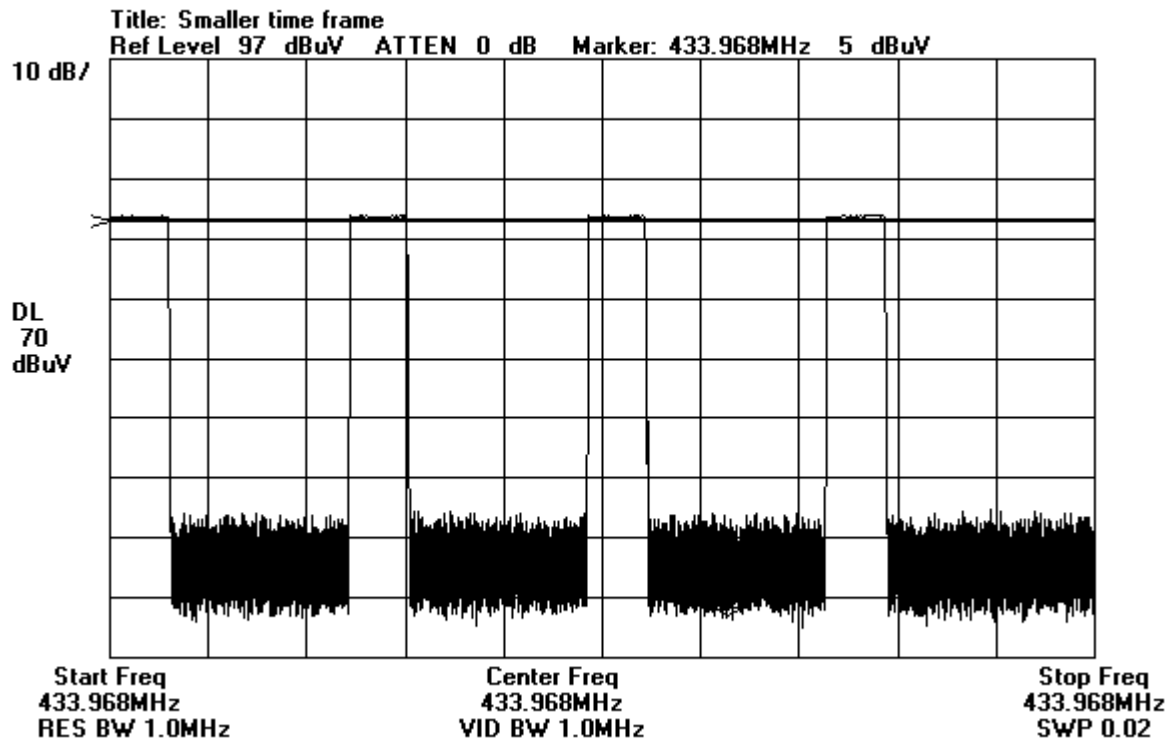
Duty Cycle Plot – I-A Configuration



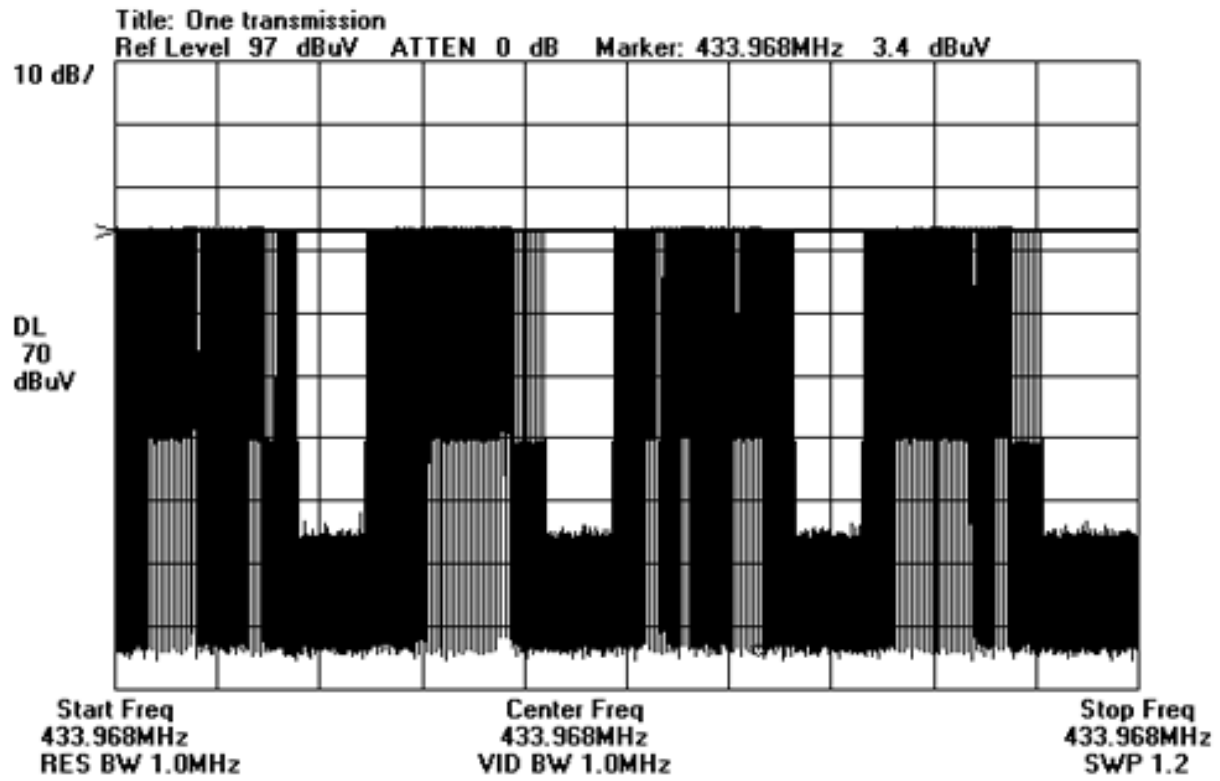
Duty Cycle Plot – I-A Configuration



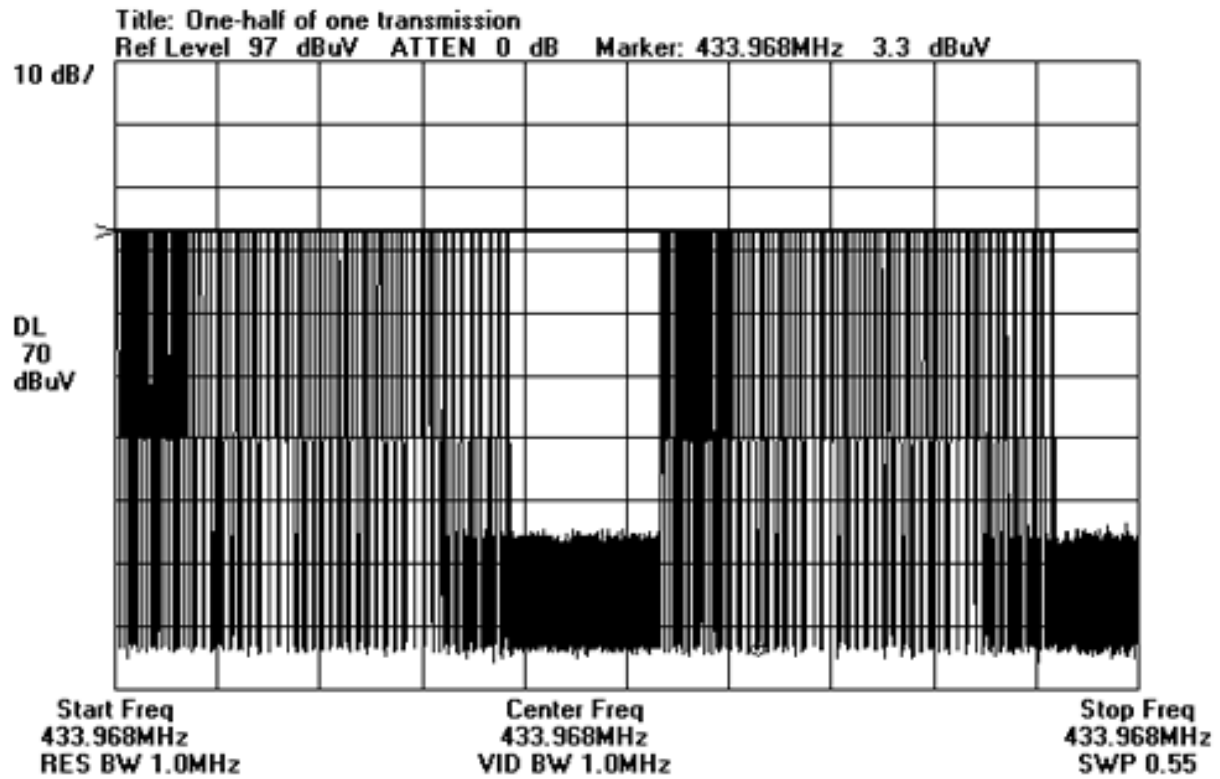
Duty Cycle Plot – I-A Configuration



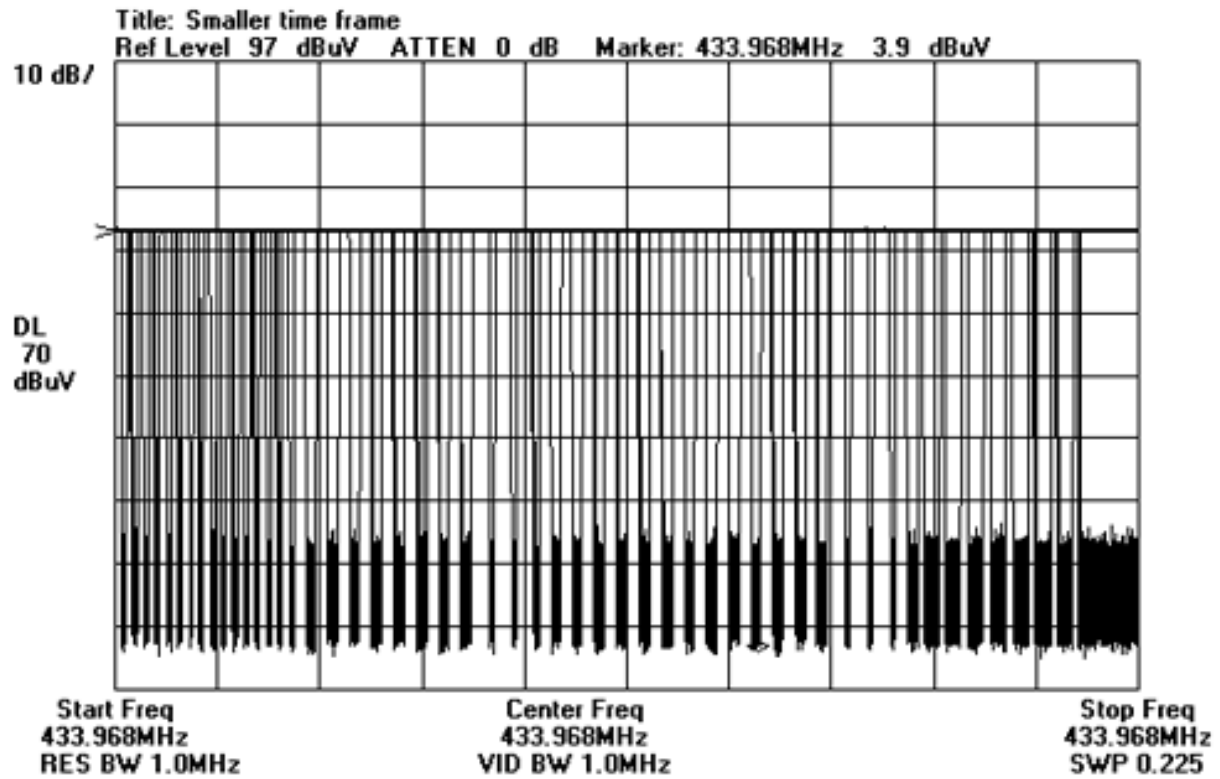
Duty Cycle Plot – I-S Configuration



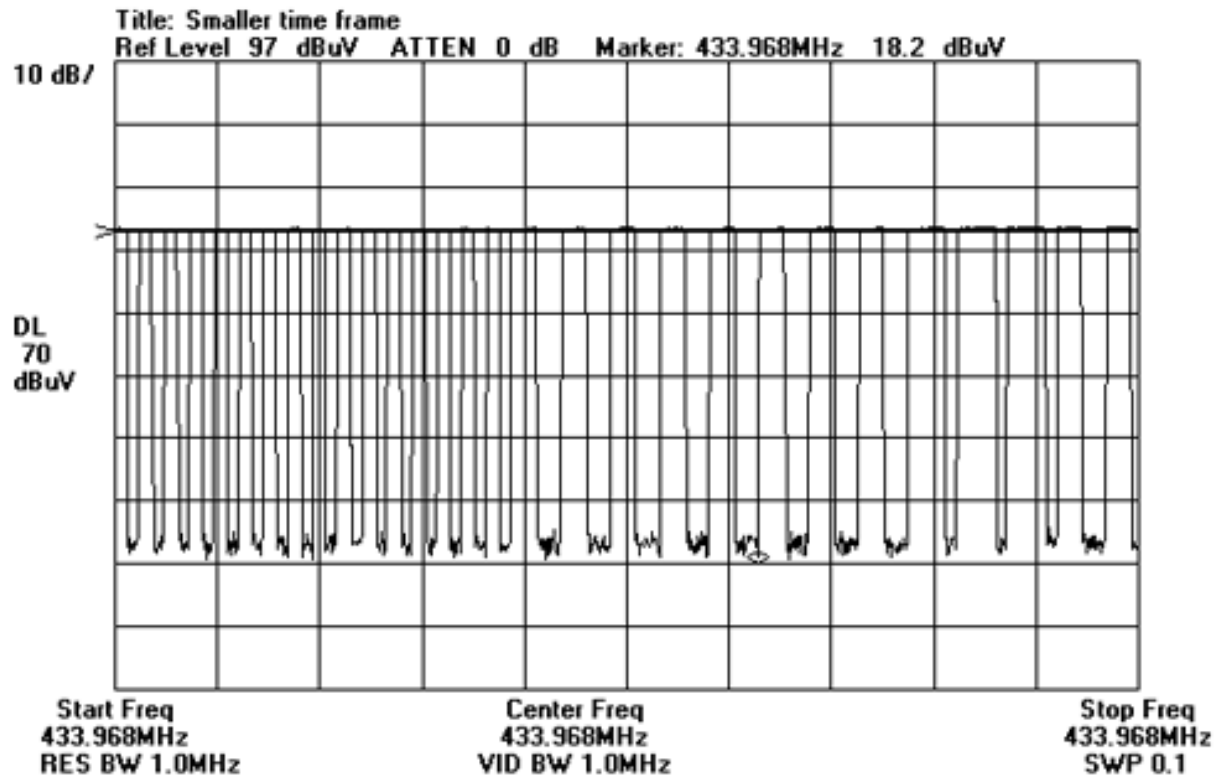
Duty Cycle Plot – I-S Configuration



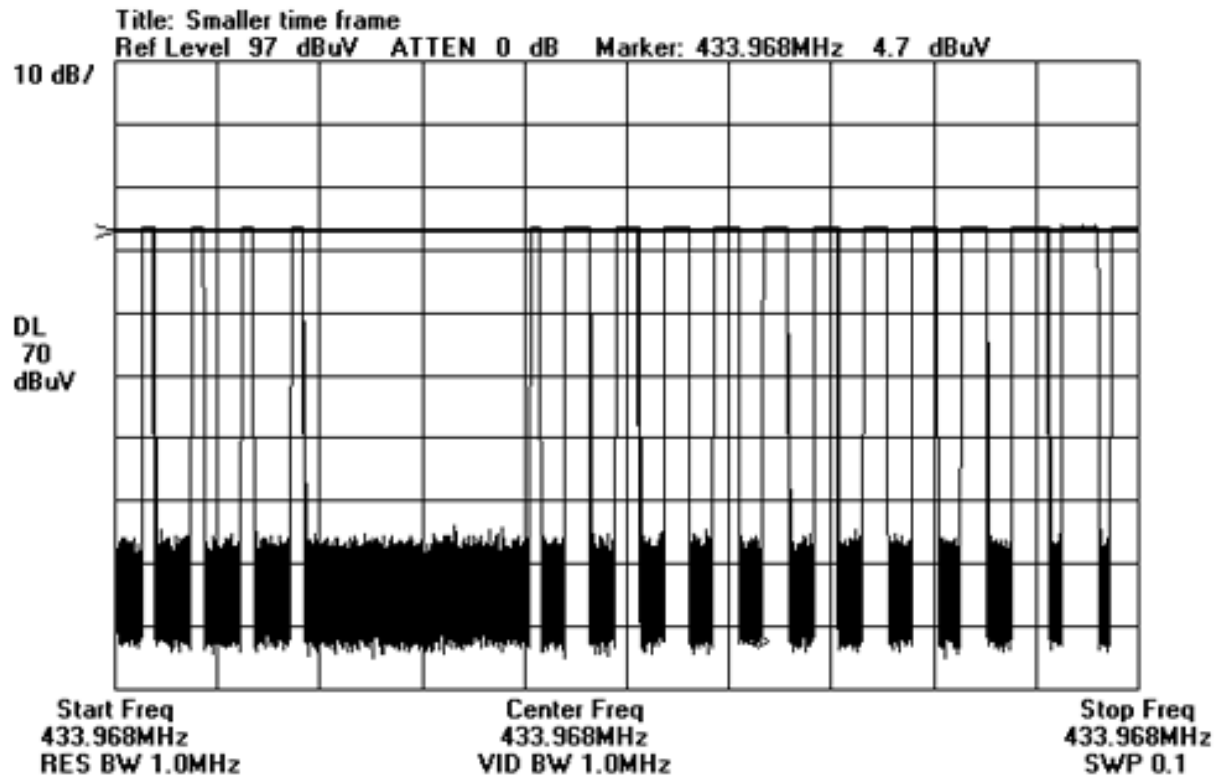
Duty Cycle Plot – I-S Configuration



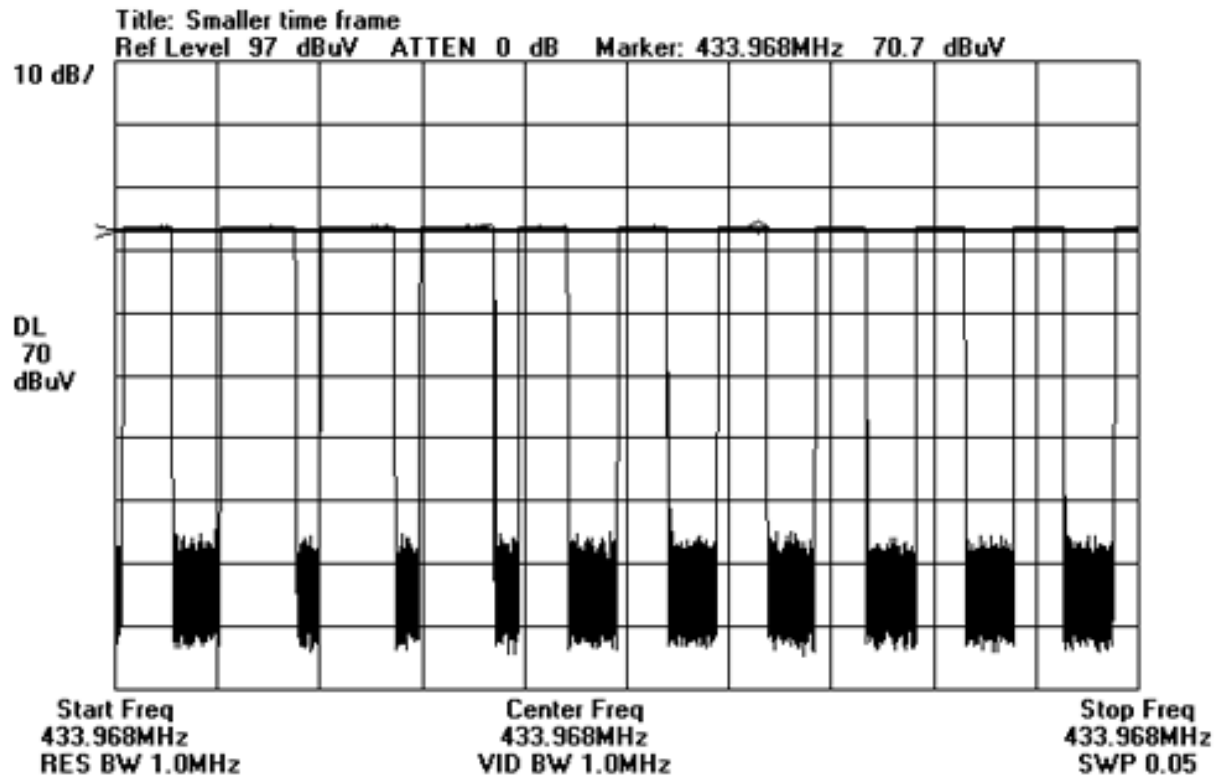
Duty Cycle Plot – I-S Configuration



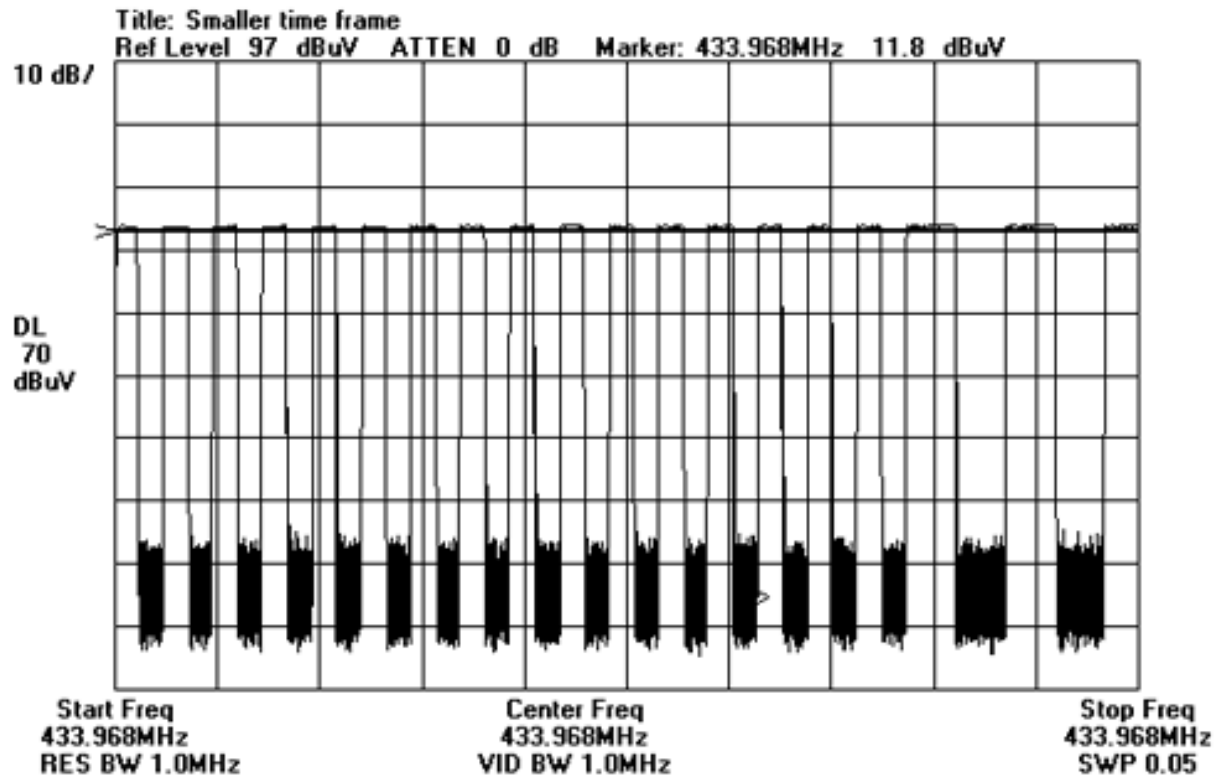
Duty Cycle Plot – I-S Configuration



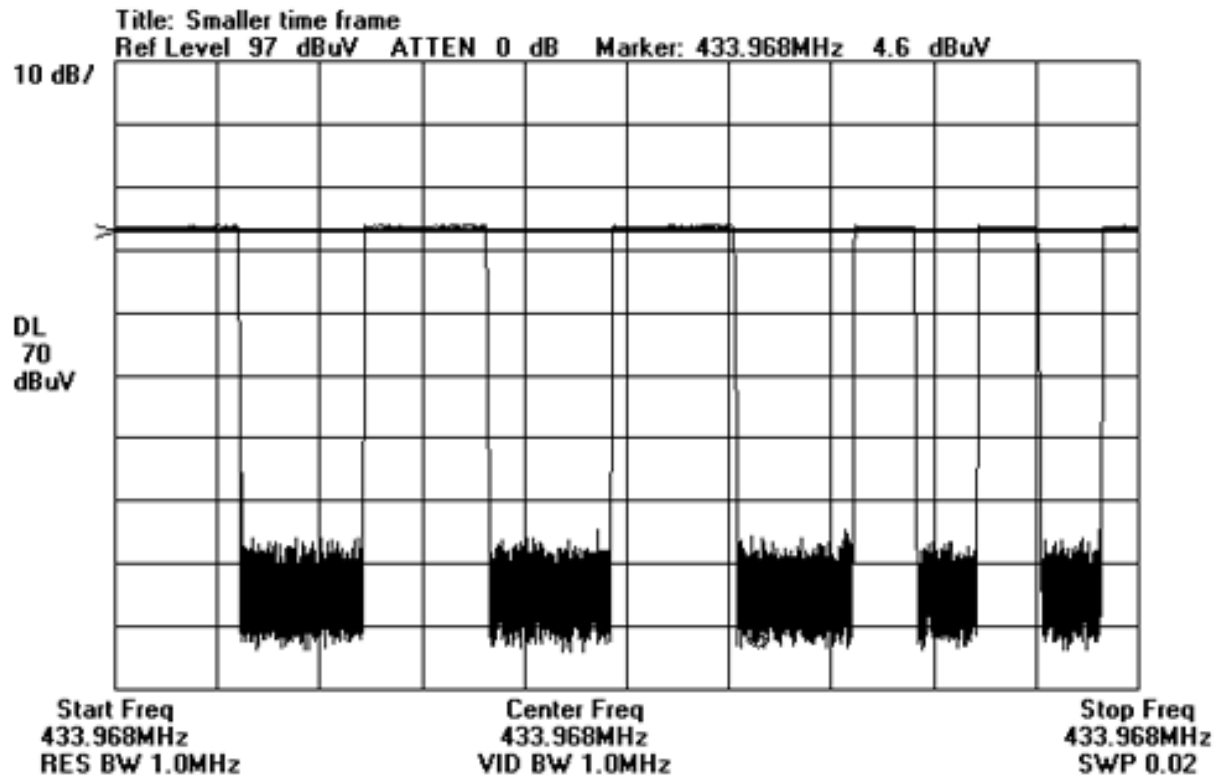
Duty Cycle Plot – I-S Configuration



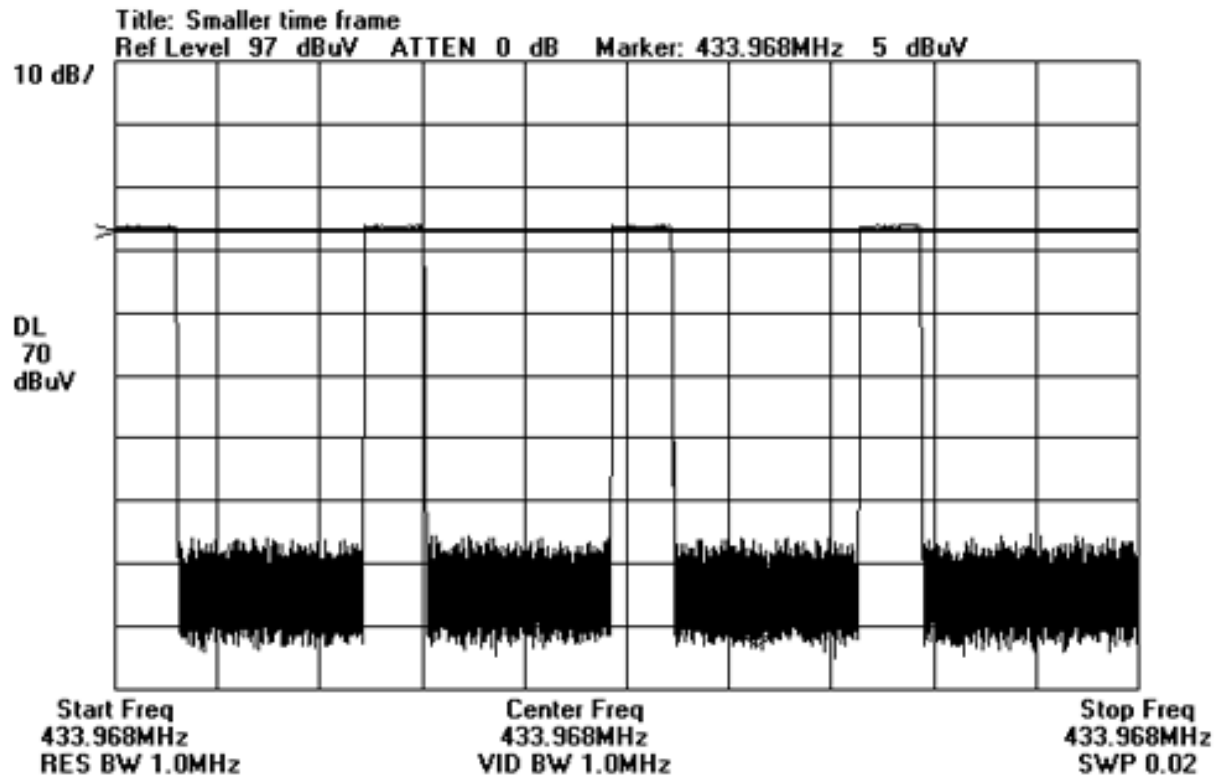
Duty Cycle Plot – I-S Configuration



Duty Cycle Plot – I-S Configuration



Duty Cycle Plot – I-S Configuration



Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112
 Customer: **The Toro Company**
 Specification: **FCC 15.231 Fundamental**
 Work Order #: **73137**
 Test Type: **Maximized Emissions**
 Equipment: **Transmitter**
 Manufacturer: The Toro Company
 Model: I-A

Date: 02/28/2000
 Time: 16:10:12
 Sequence#: 1
 Tested By: Stuart Yamamoto
 S/N:

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Transmitter*	The Toro Company	I-A	

Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is a transmitter with internal antenna and axial component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data below is highest emissions of all three axis. Temp: 18°C Humidity: 44% Pressure: 100kPa

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Cable dB	Bicon dB	Log dB	Amp dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	433.890M	85.8	+5.2	+0.0	+16.1	-27.8	+0.0 180	79.3	80.5 (Y-axis) -6dB correction factor for average reading due to 50% duty cycle	-1.2	Horiz
^	433.890M	91.8	+5.2	+0.0	+16.1	-27.8	+0.0 276	85.3	80.5 (Y-axis) See above for corrected reading.	+4.8	Horiz
^	433.860M	83.4	+5.2	+0.0	+16.1	-27.8	+0.0 180	76.9	80.5 (X-axis)	-3.6	Horiz
^	433.818M	79.3	+5.2	+0.0	+16.1	-27.8	+0.0 180	72.8	80.5 (Z-axis)	-7.7	Horiz
5	433.882M	85.1	+5.2	+0.0	+16.1	-27.8	+0.0 180	78.6	80.5 (Y-axis) -6dB correction factor for average reading due to 50% duty cycle	-1.9	Vert
^	433.882M	91.1	+5.2	+0.0	+16.1	-27.8	+0.0 180	84.6	80.5 (Y-axis) See above for corrected reading.	+4.1	Vert
^	433.879M	82.4	+5.2	+0.0	+16.1	-27.8	+0.0 180	75.9	80.5 (X-axis)	-4.6	Vert
^	433.932M	78.4	+5.2	+0.0	+16.1	-27.8	+0.0 180	71.9	80.5 (Z-axis)	-8.6	Vert

Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112

Customer: **The Toro Company**
 Specification: **FCC 15.231 Fundamental**
 Work Order #: **73137** Date: 02/28/2000
 Test Type: **Maximized Emissions** Time: 16:13:01
 Equipment: **Transmitter** Sequence#: 1
 Manufacturer: The Toro Company Tested By: Stuart Yamamoto
 Model: I-S
 S/N:

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Transmitter*	The Toro Company	I-S	

Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is a transmitter with internal antenna and surface mount component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data below is highest emissions of all three axis. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Cable dB	Bicon dB	Log dB	Amp dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	433.947M	72.0	+5.2	+0.0	+16.1	-27.8	+0.0 -1	65.5	80.5 (Y-axis)	-15.0	Horiz
2	433.950M	72.0	+5.2	+0.0	+16.1	-27.8	+0.0	65.5	80.5 (Y-axis)	-15.0	Vert
3	433.965M	69.4	+5.2	+0.0	+16.1	-27.8	+0.0	62.9	80.5 (X-axis)	-17.6	Horiz
4	433.962M	68.5	+5.2	+0.0	+16.1	-27.8	+0.0	62.0	80.5 (X-axis)	-18.5	Vert
5	433.995M	65.8	+5.2	+0.0	+16.1	-27.8	+0.0	59.3	80.5 (Z-axis)	-21.2	Vert
6	433.991M	65.7	+5.2	+0.0	+16.1	-27.8	+0.0	59.2	80.5 (Z-axis)	-21.3	Horiz

Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112

Customer: **The Toro Company**
 Specification: **FCC 15.231 Spurious**
 Work Order #: **72756**
 Test Type: **Maximized Emissions**
 Equipment: **Transmitter**
 Manufacturer: The Toro Company
 Model: I-A
 S/N:

Date: Tue Nov-30-1999
 Time: 16:32:06
 Sequence#: 2
 Tested By: Stuart Yamamoto

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Transmitter*	The Toro Company	I-A	

Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is a transmitter with internal antenna and axial component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data below is highest emissions of all three axis. Frequency range scanned and maximized, 30-1000 MHz
 Temperature: 18°C Humidity: 44% Pressure: 100kPa

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Cable dB	Bicon dB	Log dB	Amp dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	867.756M	52.5	+7.7	+0.0	+22.9	-27.1	+0.0 131	56.0	60.5 -6dB correction factor for average reading due to 50% duty cycle	-4.5	Horiz
^	867.756M	58.5	+7.7	+0.0	+22.9	-27.1	+0.0 131	62.0	60.5 See above for corrected reading.	+1.5	Horiz
3	867.775M	49.6	+7.7	+0.0	+22.9	-27.1	+0.0 131	53.1	60.5 -6dB correction factor for average reading due to 50% duty cycle	-7.4	Vert
^	867.775M	55.6	+7.7	+0.0	+22.9	-27.1	+0.0 360	59.1	60.5 See above for corrected reading.	-1.4	Vert
5	952.065M	30.2	+8.3	+0.0	+23.9	-27.3	+0.0	35.1	60.5	-25.4	Vert
6	960.443M	28.8	+8.3	+0.0	+24.0	-27.3	+0.0	33.8	60.5	-26.7	Vert
7	956.214M	28.6	+8.3	+0.0	+24.0	-27.3	+0.0	33.6	60.5	-26.9	Horiz
8	956.283M	28.5	+8.3	+0.0	+24.0	-27.3	+0.0 358	33.5	60.5	-27.0	Vert
9	960.409M	28.1	+8.3	+0.0	+24.0	-27.3	+0.0 293	33.1	60.5	-27.4	Horiz

10	952.002M	27.8	+8.3	+0.0	+23.9	-27.3	+0.0 357	32.7	60.5	-27.8	Horiz
11	712.931M	28.8	+7.1	+0.0	+22.6	-27.3	+0.0 77	31.2	60.5	-29.3	Horiz
12	712.920M	28.7	+7.1	+0.0	+22.6	-27.3	+0.0 360	31.1	60.5	-29.4	Vert
13	679.350M	29.0	+6.9	+0.0	+22.1	-27.4	+0.0 332	30.6	60.5	-29.9	Horiz
14	679.692M	28.8	+6.9	+0.0	+22.1	-27.4	+0.0 57	30.4	60.5	-30.1	Vert
15	37.707M	43.2	+1.4	+13.9	+0.0	-28.2	+0.0 354	30.3	60.5	-30.2	Horiz
16	37.696M	42.7	+1.4	+13.9	+0.0	-28.2	+0.0	29.8	60.5	-30.7	Vert
17	610.928M	31.5	+6.4	+0.0	+19.6	-28.0	+0.0 107	29.5	60.5	-31.0	Horiz
18	610.954M	30.7	+6.4	+0.0	+19.6	-28.0	+0.0 353	28.7	60.5	-31.8	Vert
19	33.509M	39.9	+1.4	+14.9	+0.0	-28.1	+0.0 9	28.1	60.5	-32.4	Horiz
20	344.812M	31.6	+4.6	+0.0	+19.1	-27.8	+0.0	27.5	60.5	-33.0	Horiz
21	31.428M	38.7	+1.4	+15.4	+0.0	-28.1	+0.0	27.4	60.5	-33.1	Vert
22	438.069M	33.1	+5.2	+0.0	+16.2	-27.7	+0.0	26.8	60.5	-33.7	Horiz
23	31.417M	37.8	+1.4	+15.4	+0.0	-28.1	+0.0 356	26.5	60.5	-34.0	Horiz
24	344.820M	30.5	+4.6	+0.0	+19.1	-27.8	+0.0 352	26.4	60.5	-34.1	Vert
25	52.455M	42.2	+1.7	+10.6	+0.0	-28.2	+0.0 310	26.3	60.5	-34.2	Vert
26	429.699M	32.6	+5.1	+0.0	+16.0	-27.8	+0.0 361	25.9	60.5	-34.6	Horiz
27	33.547M	37.1	+1.4	+14.9	+0.0	-28.1	+0.0 336	25.3	60.5	-35.2	Vert
28	438.110M	31.3	+5.2	+0.0	+16.2	-27.7	+0.0 360	25.0	60.5	-35.5	Vert
29	129.999M	33.7	+2.4	+16.1	+0.0	-28.0	+0.0 13	24.2	60.5	-36.3	Vert
30	130.014M	32.5	+2.4	+16.1	+0.0	-28.0	+0.0 357	23.0	60.5	-37.5	Horiz
31	429.752M	29.5	+5.1	+0.0	+16.0	-27.8	+0.0 1	22.8	60.5	-37.7	Vert
32	52.414M	36.4	+1.7	+10.6	+0.0	-28.2	+0.0	20.5	60.5	-40.0	Horiz

Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112
 Customer: **The Toro Company**
 Specification: **FCC 15.231 Spurious**
 Work Order #: **72756**
 Test Type: **Maximized Emissions**
 Equipment: **Transmitter**
 Manufacturer: The Toro Company
 Model: I-A
 S/N:

Date: Tue Nov-30-1999
 Time: 15:38:07
 Sequence#: 3
 Tested By: Stuart Yamamoto

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Transmitter*	The Toro Company	I-A	

Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is a transmitter with internal antenna and axial component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data below is highest emissions of all three axis. Frequency range scanned and maximized, 1-5 GHz
 Temperature: 18°C Humidity: 44% Pressure: 100kPa

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Cable dB	Cable dB	Amp dB	Horn dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	1735.602M	58.2	+2.4	+4.9	-39.0	+26.3	+0.0	52.8	60.5	-7.7	Vert
	Ave										
^	1735.602M	64.2	+2.4	+4.9	-39.0	+26.3	+0.0	58.8	60.5	-1.7	Vert
3	1301.699M	60.2	+1.7	+4.0	-39.6	+24.9	+0.0	51.2	60.5	-9.3	Vert
4	1301.762M	60.1	+1.7	+4.0	-39.6	+24.9	+0.0	51.1	60.5	-9.4	Horiz
							360				
5	1735.664M	55.9	+2.4	+4.9	-39.0	+26.3	+0.0	50.5	60.5	-10.0	Horiz
	Ave										
^	1735.665M	61.9	+2.4	+4.9	-39.0	+26.3	+0.0	56.5	60.5	-4.0	Horiz
7	2169.435M	54.0	+2.3	+5.5	-39.0	+27.5	+0.0	50.3	60.5	-10.2	Horiz
							360				
8	2169.530M	52.2	+2.3	+5.5	-39.0	+27.5	+0.0	48.5	60.5	-12.0	Vert
9	3471.233M	44.7	+3.5	+7.5	-39.1	+31.0	+0.0	47.6	60.5	-12.9	Horiz
10	3037.330M	44.2	+2.9	+6.7	-37.5	+30.8	+0.0	47.1	60.5	-13.4	Horiz
11	3037.431M	42.0	+2.9	+6.7	-37.4	+30.8	+0.0	45.0	60.5	-15.5	Vert
							359				
12	2603.351M	44.2	+2.5	+5.9	-39.4	+28.6	+0.0	41.8	60.5	-18.7	Horiz
13	2603.451M	41.9	+2.5	+5.9	-39.4	+28.6	+0.0	39.5	60.5	-21.0	Vert
							359				

Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112

Customer: **The Toro Company**
 Specification: **FCC 15.231 Sleep Mode**
 Work Order #: **73137**
 Test Type: **Maximized Emissions**
 Equipment: **Transmitter**
 Manufacturer: The Toro Company
 Model: I-A
 S/N:

Date: Tue Nov-30-1999
 Time: 16:42:47
 Sequence#: 4
 Tested By: Stuart Yamamoto

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Transmitter*	The Toro Company	I-A	

Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is a transmitter with internal antenna and axial component. The EUT is not transmitting but is in a sleep mode. Power to EUT is supplied by a 9 V battery. Data below is highest emissions of all three axis. Frequency range scanned and maximized, 30-1000 MHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Cable dB	Bicon dB	Log dB	Amp dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	37.707M	43.2	+1.4	+13.9	+0.0	-28.2	+0.0 354	30.3	40.0	-9.7	Horiz
2	37.696M	42.7	+1.4	+13.9	+0.0	-28.2	+0.0	29.8	40.0	-10.2	Vert
3	952.065M	30.2	+8.3	+0.0	+23.9	-27.3	+0.0	35.1	46.0	-10.9	Vert
4	33.509M	39.9	+1.4	+14.9	+0.0	-28.1	+0.0 9	28.1	40.0	-11.9	Horiz
5	956.214M	28.6	+8.3	+0.0	+24.0	-27.3	+0.0	33.6	46.0	-12.4	Horiz
6	956.283M	28.5	+8.3	+0.0	+24.0	-27.3	+0.0 358	33.5	46.0	-12.5	Vert
7	31.428M	38.7	+1.4	+15.4	+0.0	-28.1	+0.0	27.4	40.0	-12.6	Vert
8	952.002M	27.8	+8.3	+0.0	+23.9	-27.3	+0.0 357	32.7	46.0	-13.3	Horiz
9	31.417M	37.8	+1.4	+15.4	+0.0	-28.1	+0.0 356	26.5	40.0	-13.5	Horiz
10	52.455M	42.2	+1.7	+10.6	+0.0	-28.2	+0.0 310	26.3	40.0	-13.7	Vert
11	33.547M	37.1	+1.4	+14.9	+0.0	-28.1	+0.0 336	25.3	40.0	-14.7	Vert
12	712.931M	28.8	+7.1	+0.0	+22.6	-27.3	+0.0 77	31.2	46.0	-14.8	Horiz
13	712.920M	28.7	+7.1	+0.0	+22.6	-27.3	+0.0 360	31.1	46.0	-14.9	Vert
14	679.350M	29.0	+6.9	+0.0	+22.1	-27.4	+0.0 332	30.6	46.0	-15.4	Horiz

15	679.692M	28.8	+6.9	+0.0	+22.1	-27.4	+0.0 57	30.4	46.0	-15.6	Vert
16	610.928M	31.5	+6.4	+0.0	+19.6	-28.0	+0.0 107	29.5	46.0	-16.5	Horiz
17	610.954M	30.7	+6.4	+0.0	+19.6	-28.0	+0.0 353	28.7	46.0	-17.3	Vert
18	344.812M	31.6	+4.6	+0.0	+19.1	-27.8	+0.0	27.5	46.0	-18.5	Horiz
19	438.069M	33.1	+5.2	+0.0	+16.2	-27.7	+0.0	26.8	46.0	-19.2	Horiz
20	129.999M	33.7	+2.4	+16.1	+0.0	-28.0	+0.0 13	24.2	43.5	-19.3	Vert
21	52.414M	36.4	+1.7	+10.6	+0.0	-28.2	+0.0	20.5	40.0	-19.5	Horiz
22	344.820M	30.5	+4.6	+0.0	+19.1	-27.8	+0.0 352	26.4	46.0	-19.6	Vert
23	429.699M	32.6	+5.1	+0.0	+16.0	-27.8	+0.0 361	25.9	46.0	-20.1	Horiz
24	960.443M	28.8	+8.3	+0.0	+24.0	-27.3	+0.0	33.8	54.0	-20.2	Vert
25	130.014M	32.5	+2.4	+16.1	+0.0	-28.0	+0.0 357	23.0	43.5	-20.5	Horiz
26	960.409M	28.1	+8.3	+0.0	+24.0	-27.3	+0.0 293	33.1	54.0	-20.9	Horiz
27	438.110M	31.3	+5.2	+0.0	+16.2	-27.7	+0.0 360	25.0	46.0	-21.0	Vert
28	429.752M	29.5	+5.1	+0.0	+16.0	-27.8	+0.0 1	22.8	46.0	-23.2	Vert

Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112

Customer: **The Toro Company**
 Specification: **FCC 15.231 Spurious**
 Work Order #: **72756**
 Test Type: **Maximized Emissions**
 Equipment: **Transmitter**
 Manufacturer: **The Toro Company**
 Model: **I-S**
 S/N:

Date: Tue Nov-30-1999
 Time: 14:38:15
 Sequence#: 2
 Tested By: Stuart Yamamoto

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Transmitter*	The Toro Company	I-S	

Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is a transmitter with internal antenna and surface mount component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data below is highest emissions of all three axis. Frequency range scanned and maximized, 30-1000 MHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Cable dB	Bicon dB	Log dB	Amp dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin DB	Polar Ant
1	867.925M	49.6	+7.7	+0.0	+22.9	-27.1	+0.0 360	53.1	60.5	-7.4	Horiz
									-6dB correction factor for average reading due to 50% duty cycle		
^	867.925M	55.6	+7.7	+0.0	+22.9	-27.1	+0.0 360	59.1	60.5	-1.4	Horiz
									See above for corrected reading.		
3	867.915M	47.1	+7.7	+0.0	+22.9	-27.1	+0.0	50.6	60.5	-9.9	Vert
									-6dB correction factor for average reading due to 50% duty cycle		
^	867.915M	53.1	+7.7	+0.0	+22.9	-27.1	+0.0	56.6	60.5	-3.9	Vert
									See above for corrected reading.		
5	35.708M	44.7	+1.4	+14.4	+0.0	-28.2	+0.0 360	32.3	60.5	-28.2	Vert
6	44.035M	45.6	+1.5	+13.1	+0.0	-28.2	+0.0 360	32.0	60.5	-28.5	Vert
7	35.709M	43.4	+1.4	+14.4	+0.0	-28.2	+0.0	31.0	60.5	-29.5	Horiz
8	285.115M	34.0	+4.0	+20.8	+0.0	-28.0	+0.0	30.8	60.5	-29.7	Horiz
9	658.504M	29.5	+6.7	+0.0	+21.4	-27.5	+0.0 9	30.1	60.5	-30.4	Horiz

10	658.523M	28.7	+6.7	+0.0	+21.4	-27.5	+0.0 356	29.3	60.5	-31.2	Vert
11	641.646M	28.7	+6.6	+0.0	+20.8	-27.7	+0.0 335	28.4	60.5	-32.1	Horiz
12	281.037M	31.8	+4.0	+20.4	+0.0	-28.1	+0.0	28.1	60.5	-32.4	Vert
13	641.568M	28.3	+6.6	+0.0	+20.8	-27.7	+0.0	28.0	60.5	-32.5	Vert
14	31.469M	39.1	+1.4	+15.4	+0.0	-28.1	+0.0 360	27.8	60.5	-32.7	Horiz
15	31.484M	38.9	+1.4	+15.4	+0.0	-28.1	+0.0 360	27.6	60.5	-32.9	Vert
16	281.102M	30.5	+4.0	+20.4	+0.0	-28.0	+0.0 357	26.9	60.5	-33.6	Horiz
17	285.134M	29.5	+4.0	+20.8	+0.0	-28.0	+0.0 357	26.3	60.5	-34.2	Vert
18	44.028M	37.2	+1.5	+13.1	+0.0	-28.2	+0.0	23.6	60.5	-36.9	Horiz

Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112

Customer: **The Toro Company**
 Specification: **FCC 15.231 Spurious**
 Work Order #: **72756**
 Test Type: **Maximized Emissions**
 Equipment: **Transmitter**
 Manufacturer: The Toro Company
 Model: I-S
 S/N:

Date: Tue Nov-30-1999
 Time: 15:04:43
 Sequence#: 3
 Tested By: Stuart Yamamoto

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Transmitter*	The Toro Company	I-S	

Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is a transmitter with internal antenna and surface mount component. The EUT is transmitting at intervals of approximately three seconds. The transmission has a fifty percent duty cycle. Power to EUT is supplied by a 9 V battery. Data below is highest emissions of all three axis. Frequency range scanned and maximized, 1-5 GHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Cable dB	Cable dB	Amp dB	Horn dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	3037.739M	47.4	+2.9	+6.7	-37.4	+30.8	+0.0	50.4	60.5	-10.1	Horiz
2	2169.895M	54.1	+2.3	+5.5	-39.0	+27.5	+0.0	50.4	60.5	-10.1	Horiz
3	2603.767M	52.6	+2.5	+5.9	-39.4	+28.6	+0.0	50.2	60.5	-10.3	Horiz
4	2169.808M	52.5	+2.3	+5.5	-39.0	+27.5	+0.0	48.8	60.5	-11.7	Vert
5	1735.859M	53.8	+2.4	+4.9	-39.0	+26.3	+0.0	48.4	60.5	-12.1	Horiz
6	2603.810M	50.8	+2.5	+5.9	-39.4	+28.6	+0.0 360	48.4	60.5	-12.1	Vert
7	1735.870M	53.4	+2.4	+4.9	-39.0	+26.3	+0.0 360	48.0	60.5	-12.5	Vert
8	1301.783M	55.3	+1.7	+4.0	-39.6	+24.9	+0.0 19	46.3	60.5	-14.2	Vert
9	1301.991M	55.0	+1.7	+4.0	-39.6	+24.9	+0.0 361	46.0	60.5	-14.5	Horiz

Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112

Customer: **The Toro Company**
 Specification: **FCC 15.231 Sleep Mode**
 Work Order #: **73137**
 Test Type: **Maximized Emissions**
 Equipment: **Transmitter**
 Manufacturer: The Toro Company
 Model: I-S
 S/N:

Date: Tue Nov-30-1999
 Time: 16:47:38
 Sequence#: 2
 Tested By: Stuart Yamamoto

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Transmitter*	The Toro Company	I-S	

Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is a transmitter with internal antenna and surface mount component. The EUT is not transmitting but is in a sleep mode. Power to EUT is supplied by a 9 V battery. Data below is highest emissions of all three axis. Frequency range scanned and maximized, 30-1000 MHz. Temperature: 18°C Humidity: 44% Pressure: 100kPa

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	Cable dB	Bicon dB	Log dB	Amp dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	35.708M	44.7	+1.4	+14.4	+0.0	-28.2	+0.0 360	32.3	40.0	-7.7	Vert
2	44.035M	45.6	+1.5	+13.1	+0.0	-28.2	+0.0 360	32.0	40.0	-8.0	Vert
3	35.709M	43.4	+1.4	+14.4	+0.0	-28.2	+0.0	31.0	40.0	-9.0	Horiz
4	31.469M	39.1	+1.4	+15.4	+0.0	-28.1	+0.0 360	27.8	40.0	-12.2	Horiz
5	31.484M	38.9	+1.4	+15.4	+0.0	-28.1	+0.0 360	27.6	40.0	-12.4	Vert
6	285.115M	34.0	+4.0	+20.8	+0.0	-28.0	+0.0	30.8	46.0	-15.2	Horiz
7	658.504M	29.5	+6.7	+0.0	+21.4	-27.5	+0.0 9	30.1	46.0	-15.9	Horiz
8	44.028M	37.2	+1.5	+13.1	+0.0	-28.2	+0.0	23.6	40.0	-16.4	Horiz
9	658.523M	28.7	+6.7	+0.0	+21.4	-27.5	+0.0 356	29.3	46.0	-16.7	Vert
10	641.646M	28.7	+6.6	+0.0	+20.8	-27.7	+0.0 335	28.4	46.0	-17.6	Horiz
11	281.037M	31.8	+4.0	+20.4	+0.0	-28.1	+0.0	28.1	46.0	-17.9	Vert
12	641.568M	28.3	+6.6	+0.0	+20.8	-27.7	+0.0	28.0	46.0	-18.0	Vert

13	281.102M	30.5	+4.0	+20.4	+0.0	-28.0	+0.0	26.9	46.0	-19.1	Horiz
							357				
14	285.134M	29.5	+4.0	+20.8	+0.0	-28.0	+0.0	26.3	46.0	-19.7	Vert
							357				