Exhibit B: Test Report
Long Range Systems
T1505 Transmitter

Project Number: 04050-10

Prepared for:
Long Range Systems
9855 Chartwell
Dallas , TX 75243

By

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October 2003

CERTIFICATION
Electromagnetic Interference Test Report
Long Range Systems
T1505 Transmitter
(Intentional Radiator Portion)

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Certificate of Compliance

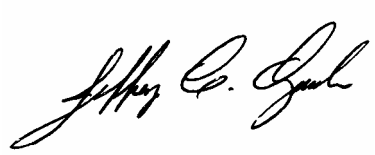
Applicant:	Long Range Systems
Applicant's Address:	9855 Chartwell Dallas, TX 75243
FCC ID:	M74T1505
Project Number:	04050-10
Test Dates:	January 9, 2004

I, Jeffrey A. Lenk, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures have reviewed the test setup, measured data and this report. I believe them to be true and accurate.

The **Long Range Systems, T1505 Transmitter** was tested to and found to be in compliance with FCC Part 15 Subpart C for an Intentional Radiator.

The highest emissions generated by the above equipment are listed below:

	Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Fundamental	467.75	81.0	81.9	-0.9
Conducted	.288	35.2	50.3	-15.1
Harmonics	2806	52.3	63.5	-11.2



Jeffrey A. Lenk
President

This report has been reviewed and accepted by Long Range Systems. The undersigned is responsible for ensuring that **Long Range Systems, T1505 Transmitter** will continue to comply with the FCC rules.

1.0 EUT Description

The Equipment under Test (EUT) is the **Long Range Systems, T1505 Transmitter**. The **T1505 Transmitter** is part of the Posey Sitter II, a multi-purpose on-premise paging system. The **T1505 Transmitter** generates NBFM signals to UHF paging receivers. When the unit receives a close circuit, it transmits a pre-canned message. It is powered on 7.5 VDC and can operate on 4 AAA batteries when power is not available. The EUT operates at 467.750 MHz and is designed for compliance with 47 CFR 15.231 of the FCC rules. Specific test requirements for this device include the following:

47 CFR 15.209 & 15.231	Fundamental Transmit Power
47 CFR 15.231 & 15.205	Spurious Radiated Power
47 CFR 15.231	Occupied Bandwidth
47 CFR 15.203	Antenna Requirement
47 CFR 15.207	Conducted Emissions

The system tested consisted of the following:

Manufacturer & Model	**Serial #**	**FCC ID #**	**Description**
Long Range Systems, T1505 Transmitter	N/A	M74T1505	Transmitter used in wireless paging system

System Peripherals:
None

Cables and Cords:

Quantity	**Length**						
Each	**Feet**	**Meters**	**Shielded**	**Unshielded**	**Type**	**Cable**	**Cord**
1	6	2		X	Power	X	

1.1 EUT Operation

The **Long Range Systems T1505 Transmitter** was tested in the following manner. The test push button was used to put the EUT in operating mode. For the purpose of testing, the EUT was configured to operate in an atypical mode, in which it transmitted continuously.

2.0 Electromagnetic Emissions Testing

Professional Testing (EMI), Inc. (PTI), follows the guidelines of NIST for all uncertainty calculations, estimates and expressions thereof for EMC testing.

2.1 Conducted Emissions Measurements

Conducted emissions measurements were made on the mains terminals of the **Long Range Systems T1505 Transmitter** to determine the line-to-ground radio noise emitted from each power-input terminal. Conducted emissions measurements on the mains terminals were performed at Professional Testing, located in Round Rock, Texas.

2.1.1 Test Procedure

The EUT was configured and operated in a continuously transmitting mode, which is an atypical mode used for the purpose of testing. The EUT power cord in excess of one meter was folded back and forth forming a bundle 30 to 40 cm long in the approximate center of the cable. Power supply cords for the peripheral equipment were powered from an auxiliary LISN. Excess interface cable lengths were separately bundled in a non-inductive arrangement at the approximate center of the cable with the bundle 30 to 40 centimeters in length. The conducted emissions were maximized, by varying the operating states and configuration of the EUT.

The tests were performed in a 12' x 16' RayProof modular shielded room. The EUT was placed on a non-metallic table 0.4 meters from a vertical metal reference plane and 0.8 meters from a horizontal metal reference plane.

The measurements were taken using a Line Impedance Stabilization Network (LISN). A Spectrum Analyzer with a measurement bandwidth of 10 kHz was used to record the conducted emissions measurements. The configuration of the shielded room showing the location of the EUT and the measurement equipment is given as Figure 1.

2.1.2 Test Criteria

The FCC Part 15.207 conducted emissions limits are given below.

Frequency (MHz)	Limits (dBµV) Average	Limits (dBµV) Quasi-Peak
0.15 – .50	56 - 46	66 to 56
.50 - 5	46	56
5 – 30	50	60

The lower limit shall apply at the transition frequency.

2.1.3 Test Results

The conducted emissions data is included in Appendix A. The conducted emissions generated by the **Long Range Systems T1505 Transmitter** as measured on the mains terminals were found to be below FCC 15.207 maximum emissions criteria.

2.2 Radiated Emissions Measurements

Radiated emission measurements were made of the Fundamental levels for the **Long Range Systems T1505 Transmitter.** Measurements of the occupied bandwidth were also made for the **T1505 Transmitter**.

Measurements of the maximum emission levels for the fundamental and the spurious/harmonic emissions of the **Long Range Systems T1505 Transmitter** were made at the Professional Testing "Open Field" Site 3, located in Round Rock, Texas to determine the radio noise radiated from the EUT. A "Description of Measurement Facilities" has been submitted to the FCC and approved pursuant to Section 2.948 of CFR 47 of the FCC rules.

Tests of the fundamental for the device were performed to determine the worst case polarization of the devices. The EUT was tested in three orthogonal axes.

2.2.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable which allows 360 degree rotation. For measurements of the fundamental signal, a measurement antenna was positioned at a distance of 3 meters as measured from the closest point of the EUT. For harmonic measurements above 1 GHz, the measurement antenna was placed 1 meter from the EUT. The radiated emissions were maximized by rotating the EUT.

A Spectrum Analyzer with peak detection was used to find the maximums of the radiated emissions during the variability testing. A drawing showing the test setup is given as Figure 2.

2.2.2 Test Criteria

The table below shows FCC Part 15.231 radiated limits for an intentional radiator operating at 467.750 MHz band. FCC Part 15.231 allows the use of its spurious limit which is higher than the 15.209 limit normally associated with the restricted bands outlined in 15.205. The spurious measurements and the harmonics were performed to the 10th harmonic of the fundamental.

	Test Distance	Field Strength	
Signal Type	(Meters)	(μV/m)	(dBμV/m)
Fundamental 467.750 MHz	3	12500	81.9

Note: Radiated emissions above 1000 MHz were measured at 1 meter and the limit was increased by 9.5 dB.

2.2.3 Test Results

The radiated test data for the fundamental is included in Appendix A. Peak detection was used during the test. The radiated emission test data for the harmonics is included in Appendix A. The emissions were maximized at each frequency and the highest emissions identified were measured using Peak detection for frequencies below 1 GHz and Average detection for frequencies below 1 GHz. The radiated emissions generated by the **Long Range Systems T1505 Transmitter** are below the FCC Part 15.231 maximum emission criteria.

3.0 Occupied Bandwidth Measurements

Measurements of the occupied bandwidth for the fundamental signals of the FCC Part 15.231 were made at the Professional Testing's Round Rock, Texas site. All measurements were made in a controlled indoor environment in a configuration which did not present measurement distortion or ambient interference.

3.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the floor. The table was rotated to an angle which presented the highest signal level. The occupied bandwidth was measured on the device. The occupied bandwidth was based on a 20 dB criteria (20 dB down either side of the emission from the peak emission).

3.2 Test Criteria

According to FCC Part 15.231, the bandwidth of the emission shall not be wider than 0.25 % of the center frequency for the devices operating above 70 MHz and below 900 MHz. The limit is 1.169 MHz for the transmitter operating at 467.750 MHz.

Measurement of the occupied bandwidth was performed to verify that the emission bandwidth from the EUT did not exceed 1.169 MHz. The typical occupied bandwidth for the module is 10.65 kHz.

FCC Part 15.231 deals with frequency bands. No occupied bandwidth criteria are set forth.

3.3 Test Results

The occupied bandwidth test data is included in Appendix B. The occupied bandwidth for the fundamental frequency 467.750 MHz is 10.65 KHz. The figure is typical for the **T1505 Transmitter.** This occupied bandwidth complies with the FCC Part 15.231 requirement.

4.0 Antenna Requirement

An analysis of the **Long Range Systems T1505 Transmitter** was performed to determine compliance with Section 15.203 of the Rules. This section requires specific handling and control of antennas used for devices subject to regulations under the Intentional Radiator portions of Part 15.

4.1 Evaluation Procedure

The structure and application of the **Long Range Systems T1505 Transmitter** were analyzed with respect to the rules.

The EUT has an external antenna, half of which protrudes externally and half is enclosed. It is screwed in and attached to the circuit board. No auxiliary antenna port is present.

4.2 Evaluation Criteria

Section 15.203 of the rules states that the subject device must meet at least one of the following criteria:

(a) Antenna be permanently attached to the unit.

(b) Antenna must use a unique type of connector to attach to the EUT.

(c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

4.3 Evaluation Results

The **T1505 Transmitter** meets the criteria of this rule by virtue of having an external antenna permanently attached to the unit and not accessible to the user. The EUT is therefore compliant with §15.203.

5.0 Modifications to Equipment

The following modification was made on the **T1505 Transmitter** during the performance of the test program in order to meet the FCC criteria. An additional lowpass filter was added in series with the output of the transmitter chip and the antenna. It consists of a PI shaped filter with 22nH series inductor and two shunt 8pF capacitors.

6.0 List of Test Equipment

A list of the test equipment utilized to perform the testing is given below. The date of calibration is given for each.

Device	Description	Calibration Due
Electromagnetic Emissions Test Equipment		
EMCO 3146	Log Periodic Antenna	December 2004
HP 85662A	Display unit	November 2004
HP 8447F	Preamplifier	November 2004
HP 8566B	Spectrum Analyzer	November 2003
HP 85650A	Quasi-Peak Adapter	November 2004
EMCO 3108	Biconical Antenna	November 2004
EMCO 3115	Ridge Guide Antenna	June 2004
Compliance Design B-100	Biconical Antenna	December 2004
Cond. EMI Cable	RG-223	November 2004
MITEQ	18GHz 20dB Preamplifier	December 2003
SOLAR 8012-50-R-24-BNC	LISN	October 2004

FIGURE 1: Conducted Emissions Mains Terminal Measurements

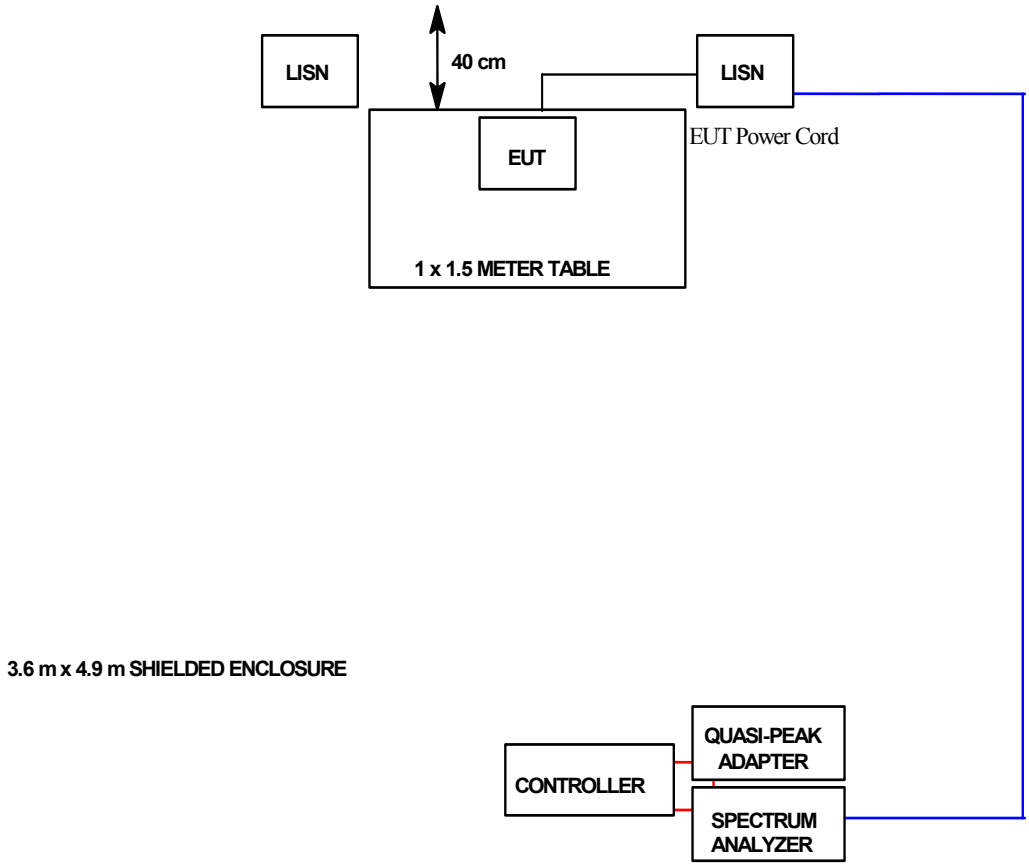
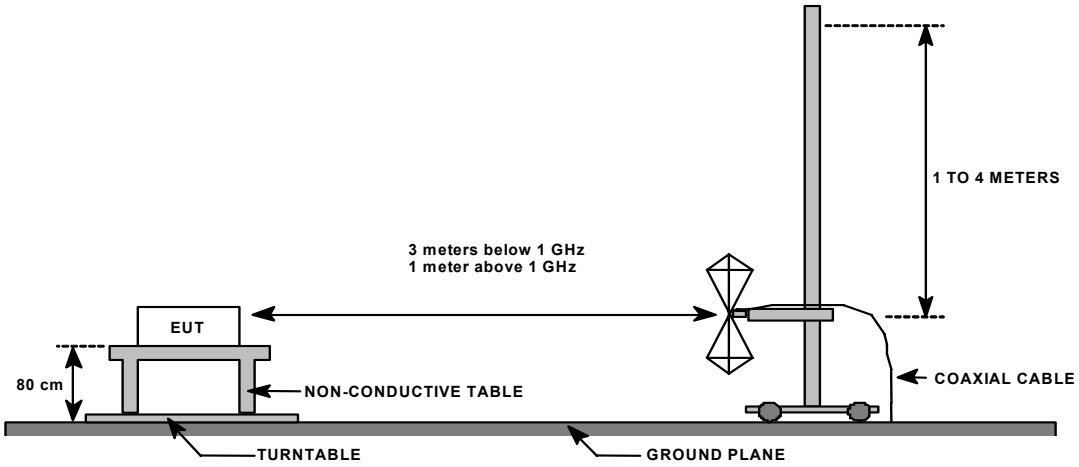


FIGURE 2: Radiated Emissions Test Setup



Appendix A Emissions Data Sheet

Conducted Data Sheet
Long Range Systems
T1505 Transmitter

DATE: October 23, 2003 PROJECT #: 04050-10

Line Measured: Neutral

FREQ	READING	CORR	CORR	Limit	Margin	Detector
INPUT	INPUT	FACTOR	READING	dBuV	dB	Function
MHz	dBuV	dB	dBuV			
0.177	21.3	0.2	21.5	54.8	-33.3	peak
0.471	15.1	0.2	15.3	47	-31.7	peak
1.92	13.4	0.5	13.9	46	-32.1	peak
3.78	14.6	0.5	15.1	46	-30.9	peak
14.47	14.7	0.9	15.6	50	-34.4	peak
29.5	22	1.6	23.6	50	-26.4	peak

Line Measured: Phase

FREQ	READING	CORR	CORR	Limit	Margin	Detector
INPUT	INPUT	FACTOR	READING	dBuV	dB	Function
MHz	dBuV	dB	dBuV			
0.288	35	0.2	35.2	50.3	-15.1	peak
1.41	14.3	0.3	14.6	46	-31.4	peak
9.09	15.9	0.7	16.6	50	-33.4	peak
14.75	14.2	0.9	15.1	50	-34.9	peak
22.12	19	1.2	20.2	50	-29.8	peak
29.49	22.1	1.6	23.7	50	-26.3	peak

Comment: 120 v/60Hz

Test Engineer: Jason Haley

Radiated Data Sheet
Fundamental
Long Range Systems
T1505 Transmitter

DATE: January 9, 2004
PROJECT: 04050-10

MEASUREMENT DISTANCE (m): 3
DETECTOR FUNCTION: Peak

Antenna: Horizontal

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	EUT Orient
467.75	133	2	82.4	27.0	16.3	7.4	79.1	81.9	-2.8	flat
467.75	131	2.2	75.8	27.0	16.3	7.4	72.5	81.9	-9.4	flat
467.75	206	1.8	81.3	27.0	16.3	7.4	78.0	81.9	-3.9	side
935.5	146	1	34.2	26.2	26.1	12.6	46.7	61.9	-15.2	side
935.5	213	1	36.5	26.2	26.1	12.6	49.0	61.9	-12.9	edge
935.5	52	1	30.3	26.2	26.1	12.6	42.8	61.9	-19.1	edge

Antenna: Vertical

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	EUT Orient
467.75	94	1	70.4	27.0	16.3	7.4	67.1	81.9	-14.8	flat
467.75	111	1	84.3	27.0	16.3	7.4	81.0	81.9	-0.9	flat
467.75	242	1.1	81.1	27.0	16.3	7.4	77.8	81.9	-4.1	side
935.5	281	1.3	34.5	26.2	26.1	12.6	47.0	61.9	-14.9	side
935.5	120	1.2	37	26.2	26.1	12.6	49.5	61.9	-12.4	edge
935.5	158	2.2	35.9	26.2	26.1	12.6	48.4	61.9	-13.5	edge

Corrected Level = Recorded Level - Amplifier Gain + Antenna Factor + Cable Loss

Comment: This data represents the worst case resulting from testing the product in the three orthogonal axes.

TEST ENGINEER: Jason Haley

Microwave Radiated Data Sheet
Harmonics and Spurious
Long Range Systems
T1505 Transmitter

DATE: January 9, 2004
PROJECT: 04050-10

MEASUREMENT DISTANCE (m): 1
DETECTOR FUNCTION: Peak

Antenna Horizontal

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/M)	Cable Loss (dB)	Corrected Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)	EUT Orient.
1403.2	0	1	35	23.2	24.9	2.1	38.8	63.5	-24.7	flat
1403.2	100	1	34.2	23.2	24.9	2.1	38.0	63.5	-25.5	flat
1403.2	110	1	33.8	23.2	24.9	2.1	37.6	63.5	-25.9	flat
1871	120	1	40.8	22.8	27.0	2.4	47.4	71.4	-24.0	side
1871	45	1	39.6	22.8	27.0	2.4	46.2	71.4	-25.2	side
1871	280	1	37.7	22.8	27.0	2.4	44.3	71.4	-27.1	side
2806	270	1	34.8	22.7	29.8	3.1	45.0	63.5	-18.5	edge
2806	170	1	36.8	22.7	29.8	3.1	47.0	63.5	-16.5	edge
2806	280	1	39.2	22.7	29.8	3.1	49.4	63.5	-14.1	edge

Antenna Vertical

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/M)	Cable Loss (dB)	Corrected Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)	EUT Orient.
1403.2	0	1	36	23.2	24.9	2.1	39.8	63.5	-23.7	flat
1403.2	200	1	34	23.2	24.9	2.1	37.8	63.5	-25.7	flat
1403.2	100	1	34.8	23.2	24.9	2.1	38.6	63.5	-32.8	flat
1871	100	1	42.3	22.8	27.0	2.4	48.9	71.4	-22.5	side
1871	95	1	38.7	22.8	27.0	2.4	45.3	71.4	-26.1	side
1871	270	1	42.3	22.8	27.0	2.4	48.9	71.4	-14.6	side
2806	180	1	42.1	22.7	29.8	3.1	52.3	63.5	-11.2	edge
2806	90	1	40.3	22.7	29.8	3.1	50.5	63.5	-13.0	edge
2806	175	1	36	22.7	29.8	3.1	46.2	63.5	-17.3	edge

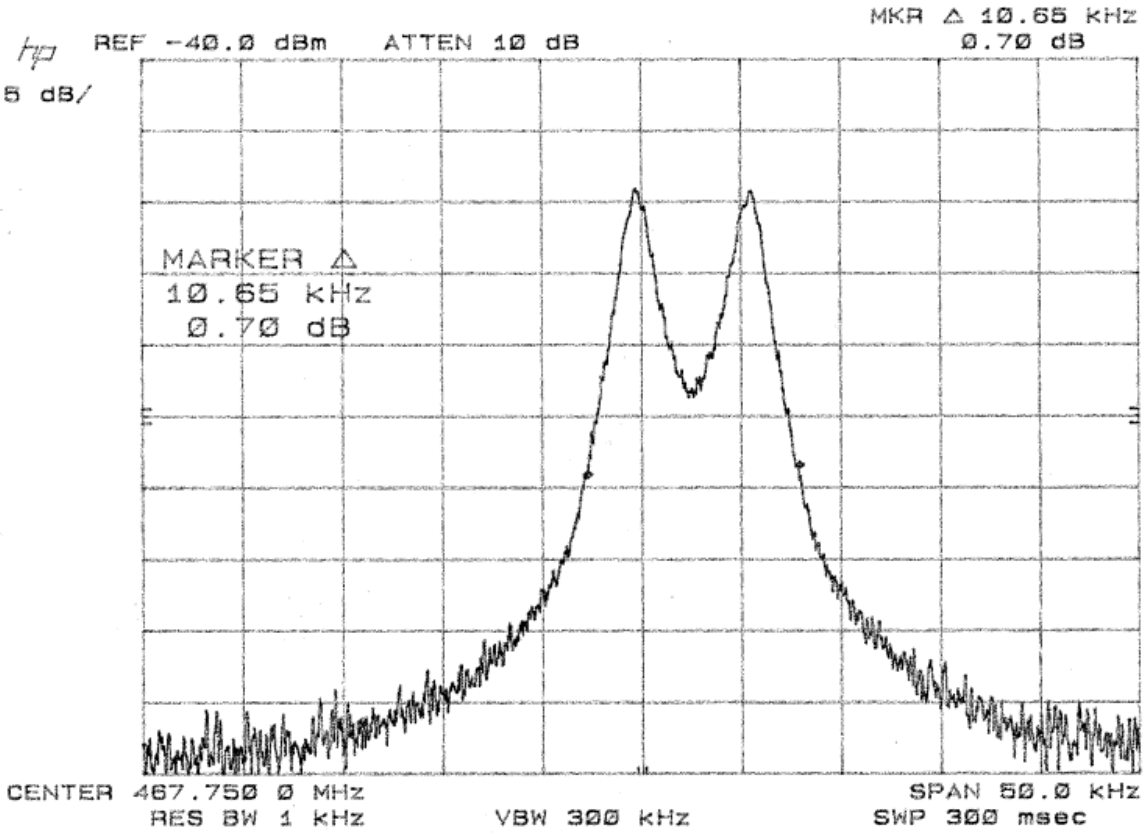
Corrected Level = Recorded Level - Amplifier Gain + Antenna Factor + Cable Loss

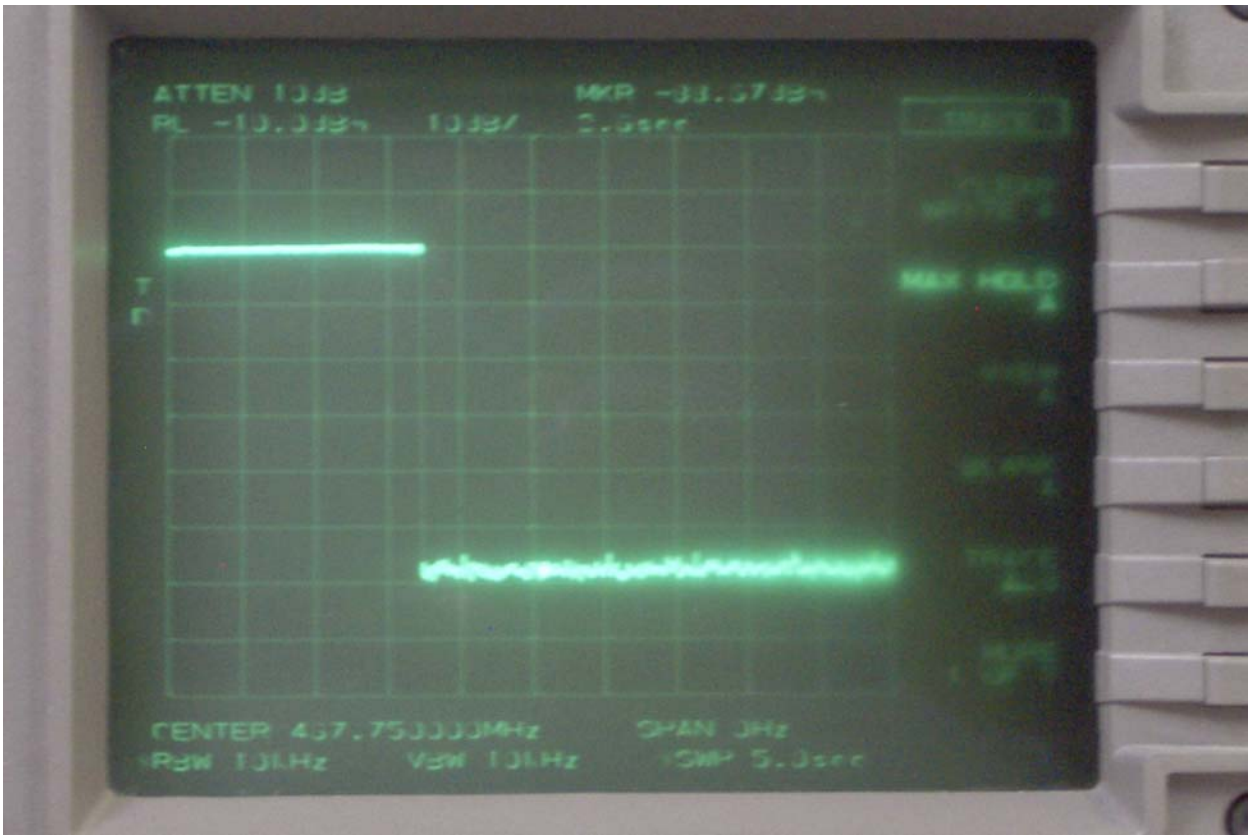
TEST ENGINEER: Jason Haley

Appendix B Occupied Bandwidth Data Sheets

Occupied Bandwidth Datasheet
Long Range Systems
T1505 Transmitter

467.750 MHz Trasmitter





Timing Information

The Spectrum analyzer was set to a zero span at the transmit frequency, with a 5 second sweep time, video triggered. When the transmit button was pressed, it triggered the spectrum analyzer and it started sweeping. The plot demonstrates that the total transmit time for one push of the button doesn't exceed the required 5 seconds or less. The transmit time displayed on the plot is about 1.6 seconds.