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L. S. Compliance, Inc.

Compliance Testing of:  
ALL-AMERICAN VOICE RELEASE  
WIRELESS VOICE TRAP RELEASE SYSTEM

PREPARED FOR:

Blount International, Inc.  
P.O. Box 39  
Onalaska, WI 54650

Test Report Number: 300346

Date of Testing: October 30<sup>th</sup> and 31<sup>st</sup> , 2000

All results of this report relate only to the items that were tested.

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## 1.1 Description of Measurement Facilities

Site on File with the Federal Communications Commission – United States  
ID Number: 31040/SIT, 1300F2  
For 3 Meter Semi-Anechoic Chamber and OATS

Site Listed with Industry Canada of Ottawa, Canada  
ID Numbers: IC 3088, IC 3088-A  
For 3 Meter Semi-Anechoic Chamber and OATS

**“The site referenced above has been found to comply with the test criteria found in  
ANSI C63.4-1992 and 47CFR Section 2.948”**

## 1.1 A2LA Certificate of Accreditation



THE AMERICAN  
ASSOCIATION  
FOR LABORATORY  
ACCREDITATION

### ACCREDITED LABORATORY

A2LA has accredited

**L.S. COMPLIANCE, INC.**  
**Cedarburg, WI**

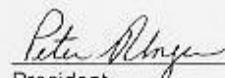
for technical competence in the field of

### Electrical (EMC) Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 30<sup>th</sup> day of December, 1998.



  
\_\_\_\_\_  
President  
For the Accreditation Council  
Certificate Number 1255.01  
Valid to January 31, 2001

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation

## 1.2 Accreditation Scope

 <b>American Association for Laboratory Accreditation</b>	
<u>SCOPE OF ACCREDITATION TO ISO/IEC GUIDE 25-1990</u>	
<b>L.S. COMPLIANCE, INC.</b> W66 N220 Commerce Court Cedarburg, WI 53012 James Blaha Phone: 414 375 4400	
<b>ELECTRICAL (EMC)</b>	
Valid to: January 31, 2001	Certificate Number: 1255-01
In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests:	
<u>Test</u>	<u>Test Method(s)</u>
Conducted Emissions Continuous/Discontinuous	Code of Federal Regulations (CFR) 47, FCC Method Parts 15 and 18 using ANSI C63.4; EN: 55011, 55022, 55081-1, 55082-1; CISPR: 11, 22
Radiated Emissions	Code of Federal Regulations (CFR) 47, FCC Method Parts 15 and 18 using ANSI C63.4; EN: 55011, 55022, 55081-1, 55082-1; CISPR: 11,22
Conducted Immunity Fast Transients/Burst	IEC: 1000-4-4, 801-4; EN: 61000-4-4, 50081-2, 50082-2
Surge	IEC: 1000-4-5, 801-5; ENV 50142; EN: 61000-4-5, 50081-2, 50082-2
RF Fields	IEC: 1000-4-6, 801-6; ENV 50141; EN: 50081-2, 50082-2
Voltage Dips/Interruptions	IEC 1000-4-11; EN: 61000-4-11, 50081-2, 50082-2
Radiated Immunity RF Fields	IEC: 801-3, 1000-4-3; ENV 50140; EN: 61000-4-3, 50081-2, 50082-2
RF Fields (50 Hz)	IEC 1000-4-8; EN 61000-4-8
RF Fields (Pulse Mode)	EN: 50081-2, 50082-2; ENV 50204
Electrostatic Discharge (ESD)	IEC: 1000-4-2, 801-2; BSEN 60801-2; EN: 61000-4-2, 50081-2, 50082-2





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### 1.3 Signature Page



Prepared By:

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Betty Ventura, Documents Coordinator

12/4/00

Date



Tested By:

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Kenneth L. Boston, EMC Engineer

12/4/00

Date



Approved By:

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Kenneth L. Boston, EMC Lab Manager  
PE #31926 Licensed Professional Engineer  
Registered in the State of Wisconsin, United States

12/4/00

Date

## 1.4 Summary Of Test Report

Manufacturer: Blount International, Inc.

Model: All –American Voice Release

Serial: Engineering Unit

Description: Remote control transmitter, VOX controlled, which triggers a trap release receiver.

Frequency Range: 418 MHz

Test Voltage: 9Volts D.C.

The Wireless Voice Release was tested and found to **Meet** the radiated emission specification of Title 47 CFR FCC, part 15, subpart C for an intentional radiator.

### **Product Description:**

The Wireless Voice Release system consists of a fixed frequency, remote control transmitter, which sends a short digital burst to a receiver located at a trap shoot location. The transmitter is voice activated, and will send the coded burst, when the trap shooter yells “pull”. The receiver detects the burst, and activates the appropriate trap release, located in the trap house, which releases a clay pigeon for the trap shooter.

## 1.5 Introduction

On October 30<sup>th</sup> and 31<sup>st</sup> , 2000, a series of Radiated Emissions tests were performed on one test sample model of the All-American Voice Release. This product operates by a means of a short burst of data transmission containing an I. D. code.

These tests were performed using the test procedure outlined in ANSI C63.4, 1992 for intentional radiators, and in accordance with the limits set forth in FCC Part 15. 231e, for a periodic transmitter.

These tests were performed by Kenneth L. Boston, EMC Engineer of L.S. Compliance, Inc.

## 1.6 Purpose

The above mentioned tests were performed in order to determine the compliance of the Test Sample with limits contained in various provisions of Title 47 CFR, FCC Part 15, including: 15.205, 15.209, 15.231b and 15.231c.

All radiated emissions tests were performed to measure the emissions in the frequency bands described by the above sections, and to determine whether said emissions are below the limits established by the above sections.

These tests were performed in accordance with the procedures described in the American National Standard for methods of measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz, (ANSI C63.4-1992).

Another document used as reference for the EMI receiver specification was the International Special Committee on Radio Interference - CISPR number 16-1 (1993).

## 1.7 Radiated Emissions Test Setup

The test sample was operated within the 3 Meter Semi-Anechoic Chamber, ( FCC listed and on file with Industry Canada),located at L.S. Compliance in Cedarburg, Wisconsin. The test sample was placed on an 80cm high wooden pedestal, which was centered on the flush mounted 2m diameter metal turntable.

The test sample was operated in a normal manner, with all functions being exercised. The test sample was operated on its own [new] internal battery, consisting of a 9 volt alkaline battery.

The test sample was configured to run in a continuous transmit mode during the 15.231b measurements. One sample was modified to transmit a typical data packet repeatedly for tests of the fundamental and spurious/harmonic emissions. This unit was then returned to normal operation for testing of the data packet length and occupied bandwidth.



## 1.8 Radiated Emission Test Procedure

The fundamental and spurious (harmonic) emissions of the transmitter were tested for compliance to Title 47 CFR, FCC Part 15.231b limits for periodic devices. For the calculations used to determine the limits applicable for the test sample, refer to Appendix A. These limits are expressed in decibels (dB) above 1 microvolt per meter (  $\mu$ V/m).

The test sample was tested from the lowest frequency generated by the transmitter (without going below 9 kHz) to the 10<sup>th</sup> harmonic of the fundamental frequency generated by the device. The appropriate limits were also observed when the fundamental or spurious signals were located within any of the restricted bands as described in Part 15.205a.

The sample was placed on an 80 cm tall pedestal and the antenna mast was placed such that the antenna was 3m from the test object. A biconical antenna or tuned dipole was used to measure emissions from 30 to 200 MHz, a log periodic or tuned dipole was used to measure emissions from 200 to 1000 MHz, and a double ridged waveguide horn was used to measure emissions above 1 GHz.

The test sample was programmed to operate in continuous transmit in a continuous manner and the resultant signals were maximized by rotating the turntable 360 degrees and by raising and lowering the antenna between 1 and 4 meters. The test sample was also given several different orientations to determine the maximum signal levels, using both horizontal and vertical antenna polarities. The orientation with the sample lying flat on the pedestal yielded the worst case emissions.

No significant emissions were found aside from the transmitter fundamental and several harmonics. The unit was scanned for emissions, over the range 30 to 4200 MHz to establish compliance with Part 15.231b and 15.205 while in continuous transmit. At frequencies below the fundamental, no spurious signals, other than the noise floor of the system could be found within 20dB of the limits.

In addition to measuring the levels of radiated emissions, the occupied bandwidth of the transmitter was measured. In accordance with FCC Part 15.231c, the 20dB bandwidth of the transmitted signal should be within a window of 0.25% of the center carrier frequency. The calculation for this bandwidth can be found in Appendix A. The resolution bandwidth was set to the closest available filter setting on the HP8546A EMI system that corresponded to 5% of the allowable bandwidth determined in the calculation mentioned above, without going below the resolution bandwidth of 10kHz, as dictated in ANSI C63.4-1992 section 13.1.7.

The sample was activated to transmit in a continuous mode and was placed on the aforementioned test configuration within the 3-meter chamber. The transmitted signal was received on a tuned dipole antenna and fed to the HP8546A EMI System, where the fundamental frequency was displayed, and a plot of the occupied bandwidth was produced. These plots are included in Appendix C. From the data supplied, it can be seen that the test samples do need **MEET** the bandwidth requirement established by FCC Part 15.231b.



### 1.9 Radiated Emission Test Equipment Utilized

A list of the test equipment and antennas used for the tests can be found in [Section 1.12](#), which includes the calibration information as well as the equipment description. All equipment is calibrated and used according to the user manuals supplied by the manufacturer. All antenna calibrations were performed at a N.I.S.T. traceable site, and the resultant correction factors were entered into the Hewlett Packard 8546A EMI receiver software database.

The connecting cables used were also measured for loss using a calibrated signal generator and the HP 8546A EMI receiver. The resulting loss factors were entered into the HP 8546A database. This allowed for automatic change in the antenna correction factor, as well as cable loss or other corrections, to be added to the EMI receiver display while taking measurements. Thus, the resulting data taken from the HP 8546A is an actual reading and can be entered into the database as a corrected meter reading. When a reading is taken using the peak detector, a duty cycle correction factor can be applied for conversion to an average reading. This operation can be used when measuring periodic data transmission, under FCC Part 15.231b and Part 15.231c. The calculation for deriving this duty factor can be found in Appendix A.

The resulting average reading was then compared to the appropriate limit in order to determine compliance. The HP 8546A EMI receiver was operated with a bandwidth of 120 kHz when receiving signals below 1 GHz, and with a bandwidth of 1 MHz when receiving signals above 1 GHz, in accordance with CISPR 16.

The peak detector function was used.

### 1.10 Conducted Emission Measurements

Due to the fact that the product operated from its own internal batteries, it was not connected to the public AC mains, and therefore, it was unnecessary to perform a test for conducted emissions.

### 1.11 Summary of Results and Conclusions

Based on the procedures outlined in this report, and the test results included in appendices B and C, it can be determined that the test sample does **MEET** the emission requirements of Title 47 CFR, FCC Part 15 Subpart C for an intentional radiator.

The level of the 10<sup>th</sup> harmonic emission of the sample was found to be only 3.2dB below the limit in the worst-case configuration. As this level is within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

The enclosed test results pertain to the samples of the test item listed, and only for the tests performed on the data sheets. Any subsequent modification or changes to the test items could invalidate the data contained herein and could therefore invalidate the findings of the report.

## 1.12 Test Equipment

Asset #	Manufacturer	Model #	Serial #	Description	Due Date
					Date of Cal
AA960004	EMCO	93146	9512-4276	Log Periodic Antenna	8/21/01
AA960005	EMCO	93110B	9601/2280	Biconical Antenna	9/28/01
AA960007	EMCO	3115	99111-4198	Double Ridge Horn Antenna	9/18/01
EE960004	EMCO	2090	9607-1164	Mast/Table controller	PM
EE960014	HP	85460	3617A00320	EMI receiver Display section	8/12/01
EE960013	HP	85462	3205A00103	EMI receiver Preselector section	8/12/01
CC000221	HP	E4407b	US39160256	26.5 GHz Spectrum Analyzer	7/16/01
N/A	LSC	Cable	0011	3 meter 1/2 " Heliax Cable	January 18, 2001
N/A	LSC	Cable	0038	1 meter RG214 Cable	January 18, 2001
N/A	LSC	Cable	0050	10 meter RG214 Cable	January 1, 2001
N/A	LSC	Attenuator		10 dB Attenuator	PM
(Lease) 1088.7490.40	Rhode & Schwartz	ESI40	8375/4/003	EMI Receiver	9/26/01

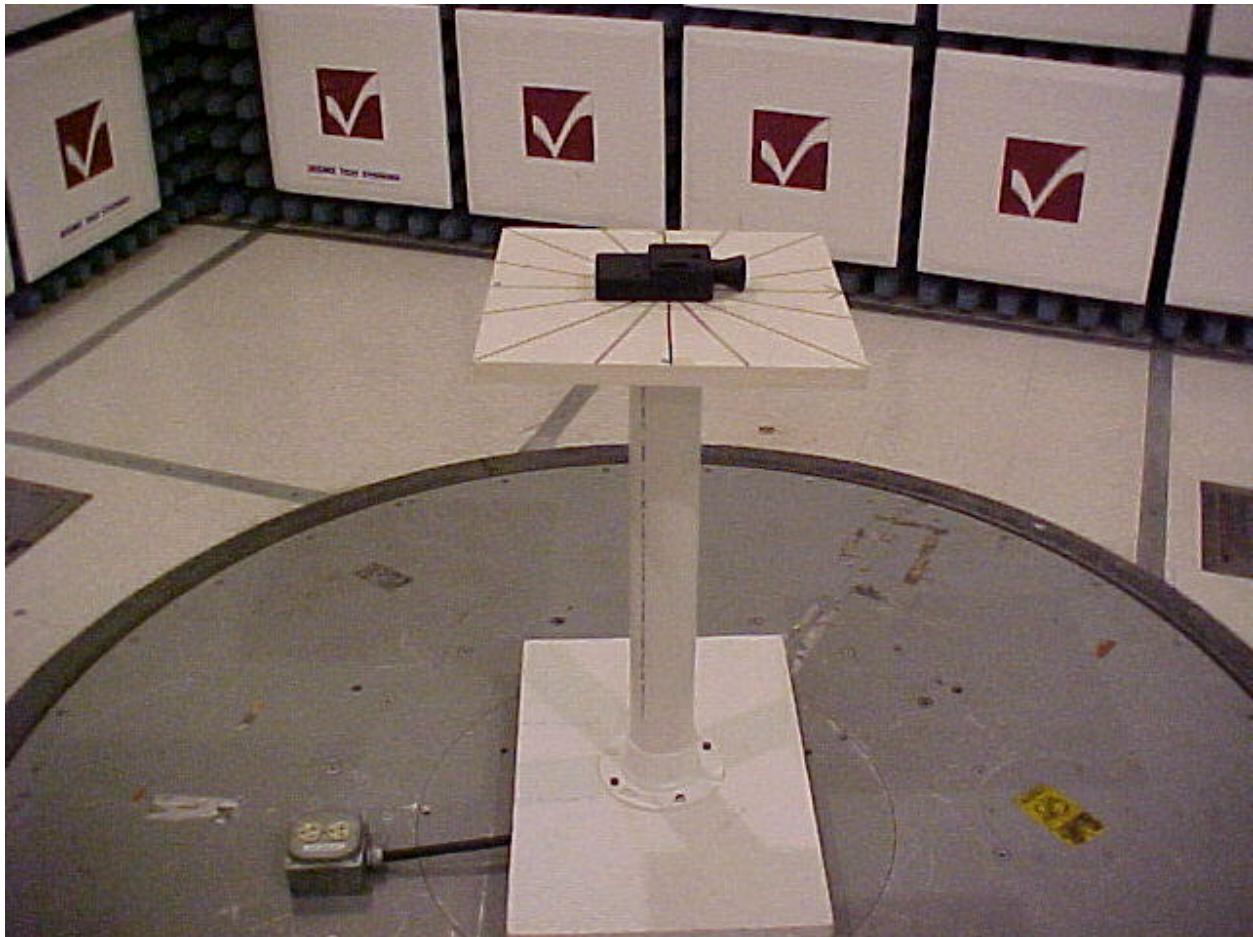
**1.13 Measurement of Electromagnetic Radiated Emissions  
Within the FCC Listed 3 Meter Chamber  
Frequency Range Inspected: 30 to 1000 MHz**

Manufacturer:	Blount International, Inc.
Model:	All American
Serial:	Engineering Unit
Specifications:	15.231b and 15.209
Distance:	3 Meters

	µV)	Limit (dB/µ
608 614		46.0
960-	500	54.0
-1427	500	
1435 1626.5		54.0
1660-	500	54.0
-1722.2	500	
2200 2300		54.0
2310-	500	54.0
-2500	500	
2655 2900		54.0
3260-	500	54.0
-3339	500	
3345.8 3358		54.0
3600-	500	54.0

### 1.14 Photo of Test Set Up

View of Setup for Radiated Emissions Test of Wireless Voice Release in the 3 Meter Semi-Anechoic Chamber



Manufacturer: Blount International, Inc.

: All American

Serial Number: Engineering Unit

## Sample Calculations

**Manufacturer: Blount International, Inc.**

**Model: All American**

**Serial Number: Engineering Unit**

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## **Calculation of Radiated Emissions limits for FCC Part 15.231(b) (260-470 MHz)**

### **FIELD STRENGTH OF FUNDAMENTAL FREQUENCIES:**

The calculation involves a linear interpolation of 3750 to 12,500  $\mu$ V/m over 260-470 MHz, where field strength of the fundamental frequency ( $f_0$ ) when,  $260 \leq f_0 \leq 470$  MHz, can be found by:  $3750 + 41.667(f_0 - 260)$ , where  $f_0$  is in MHz.

### **FIELD STRENGTH OF SPURIOUS/HARMONIC FREQUENCIES:**

The calculation involves a linear interpolation of 375 to 1250  $\mu$ V/m over 260 to 470 MHz, where field strength of the harmonic frequencies ( $2f_0, 3f_0, \dots$ ), when  $260 \leq f_0 \leq 470$  MHz, can be found by:  $375 + 4.167(f_0 - 260)$ , where  $f_0$  is in MHz.

❖ Where  $f_0 = 418$  MHz

Fundamental:  $3750 + 41.667(418 - 260) = 10,333 \mu$ V/m

Harmonic:  $375 + 4.167(418 - 260) = 1033 \mu$ V/m

Frequency (MHz)	Fundamental limit ( $\mu$ V/m)	Fundamental limit (dB $\mu$ V/m)	Harmonic limit ( $\mu$ V/m)	Harmonic limit (dB $\mu$ V/m)
418.0	10,333	80.28	1033	60.28

## Duty Cycle Correction Factor Calculation

For a graphical presentation of the data bursts being transmitted from the Remote Control Transmitter, refer to Appendix C. This plot was taken of a unit, which has been programmed to send its activation code repeatedly by a firmware patch, when powered on. Under normal usage, a single packet is sent upon receipt of a voice command. Internal delays allow no less than a 2 second delay until the next response.

### Average (Relaxation) Factor

Averaging Factor =  $20 * \log(\text{Worst Case On-Time over 100 mS})$

Message Format: [Sync bit] + [ 2 address bits] + [Sync bit] + [2 address bits] + {Sync bit] + [command] + [stop bit]

Synchronization bit = 1.239 mS high + 0.826 mS low

Address or Command bit = 0.826 mS high or low

Stop Bit = 0.826 mS high

Averaging Factor Calculation: [On – Time / 100 mS period]

Worst case (all address bits high, command bit high)

$$1.239 \text{ mS} + 2 \times 0.826 \text{ mS} + 1.239 \text{ mS} + 2 \times 0.826 \text{ mS} + 1.239 \text{ mS} + 2 \times 0.826 \text{ mS} = 8.673 \text{ mS}$$

When the total on-time is computed over a 100 millisecond window, according to **FCC Part 15.35(c)**, where the pulse train exceeds 100 milliseconds, a total of 8.673 milliseconds are obtained. This results in a relaxation factor of 21.2 dB, which is above the allowable cap of 20 dB, as stated in **FCC Part 15.35(b)**.

$$\begin{aligned}\text{Relaxation Factor} &= 20 \log (.08673) \\ &= 21.2 \text{ dB} \\ &= 20.0 \text{ dB (15.356)}\end{aligned}$$

## Occupied Bandwidth Calculations

FCC Part 15.231(c) states that the bandwidth of the periodic device shall be no wider than 0.25% of the center frequency for devices operating between 70 and 900 MHz.

Said bandwidth is determined at the **-20 dB** reference to peak carrier points.

For 418 MHz, the 20 dB bandwidth is  $0.0025 \times 418 = 1.045$  MHz

Refer to Appendix C for the set of graphs that show the actual occupied bandwidth of the test sample, which for this sample is .397 MHz, well within the limits.

## **Appendix B**

### **Data Charts**

**Measurement of Electromagnetic Radiated Emissions within the  
3 Meter Semi Anechoic FCC Listed Chamber**

**Frequency Range inspected: 30 to 4200 MHz**

Date of Testing:	October 30 <sup>th</sup> and 31 <sup>st</sup> , 2000	Manufacturer:	Blount International, Inc.
Location:	L.S. Compliance, Inc. W66 N220 Commerce Ct. Cedarburg, WI 53012	Model No.:	All American
		Serial No.:	Engineering Unit
Specifications:	15.321b and 15.209	Configuration:	Continuous Data Transmit
		Detector(s) Used:	Peak
Equipment:	Rhode & Schwartz ESI 40 EMCO 3115 Double Ridged Wave Guide/Horn Antenna EMCO 93146 Log Periodic EMCO 3121C Dipole Set Antenna EMCO 3110B Biconical		

The following table depicts the level of significant fundamental and harmonic emissions found:

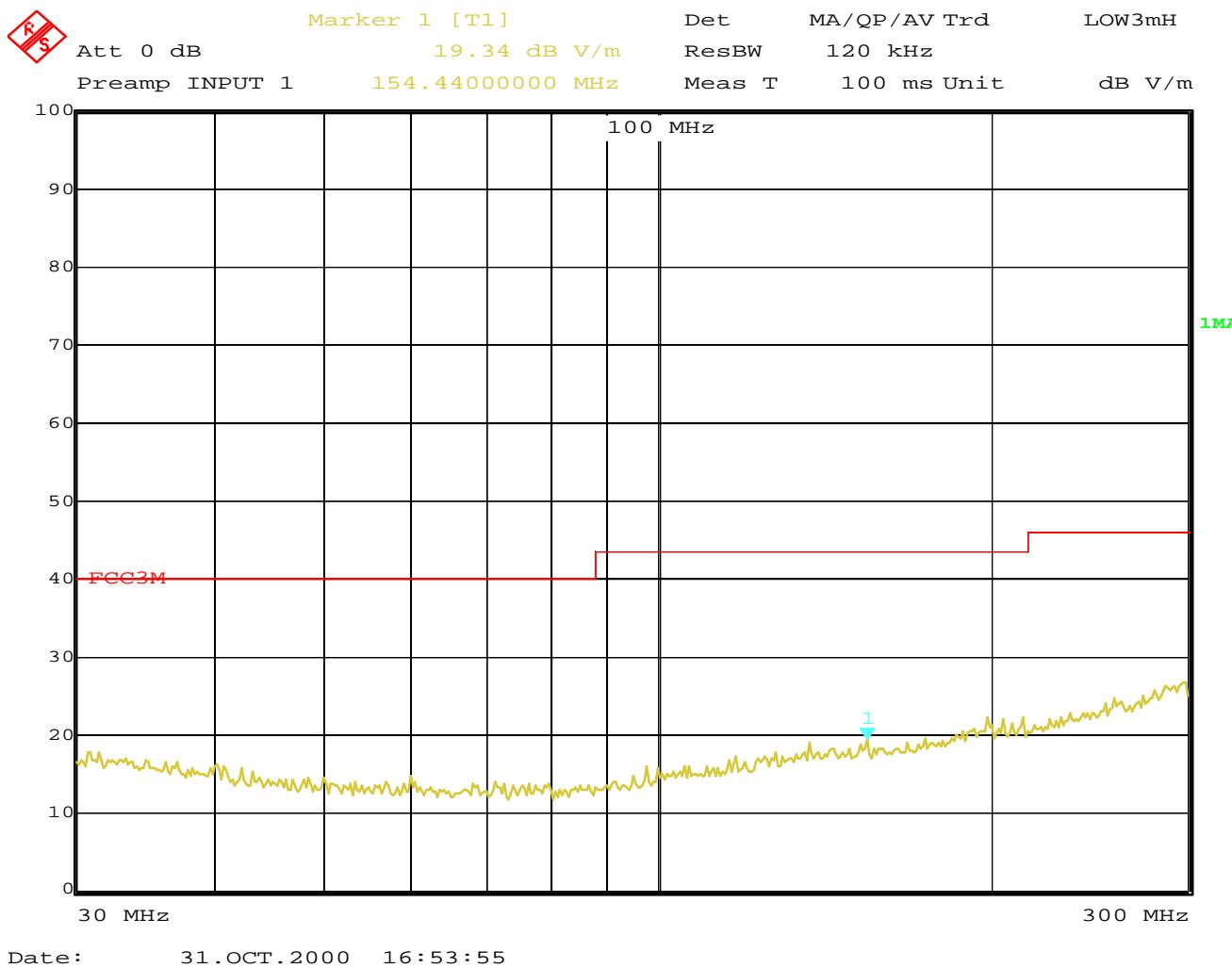
\* Denotes the noise floor of the receiving system:

Frequency (MHz)	Antenna Polarity	Height (meters)	Azimuth (0° - 360°)	EMI Meter Reading (dB μV/m)	Duty Cycle Correction (dB)	Corrected Reading (dB μV/m)	15.231b Limit (dB μV/m)	Margin (dB)
418	H	1	270	96.7	20.0	76.7	80.3	3.6
936	H	1	270	*64.0	20.0	44.0	60.3	16.3
1254	H	1.3	270	57.9	20.0	37.9	60.3	22.4
1672	H	1.25	70	54.1	20.0	34.1	54.0	19.9
2090	H	1.0	250	68.1	20.0	48.1	60.3	12.2
2508	H	1.0	270	*47.9	20.0	27.9	60.3	32.4
2926	H	1.0	270	*49.9	20.0	29.9	60.3	30.2
3344	H	1.0	270	*50.1	20.0	30.1	60.3	30.2
3762	V	1.15	145	64.8	20.0	44.8	54.0	9.2
4180	H	1.15	120	70.8	20.0	50.8	54.0	3.2

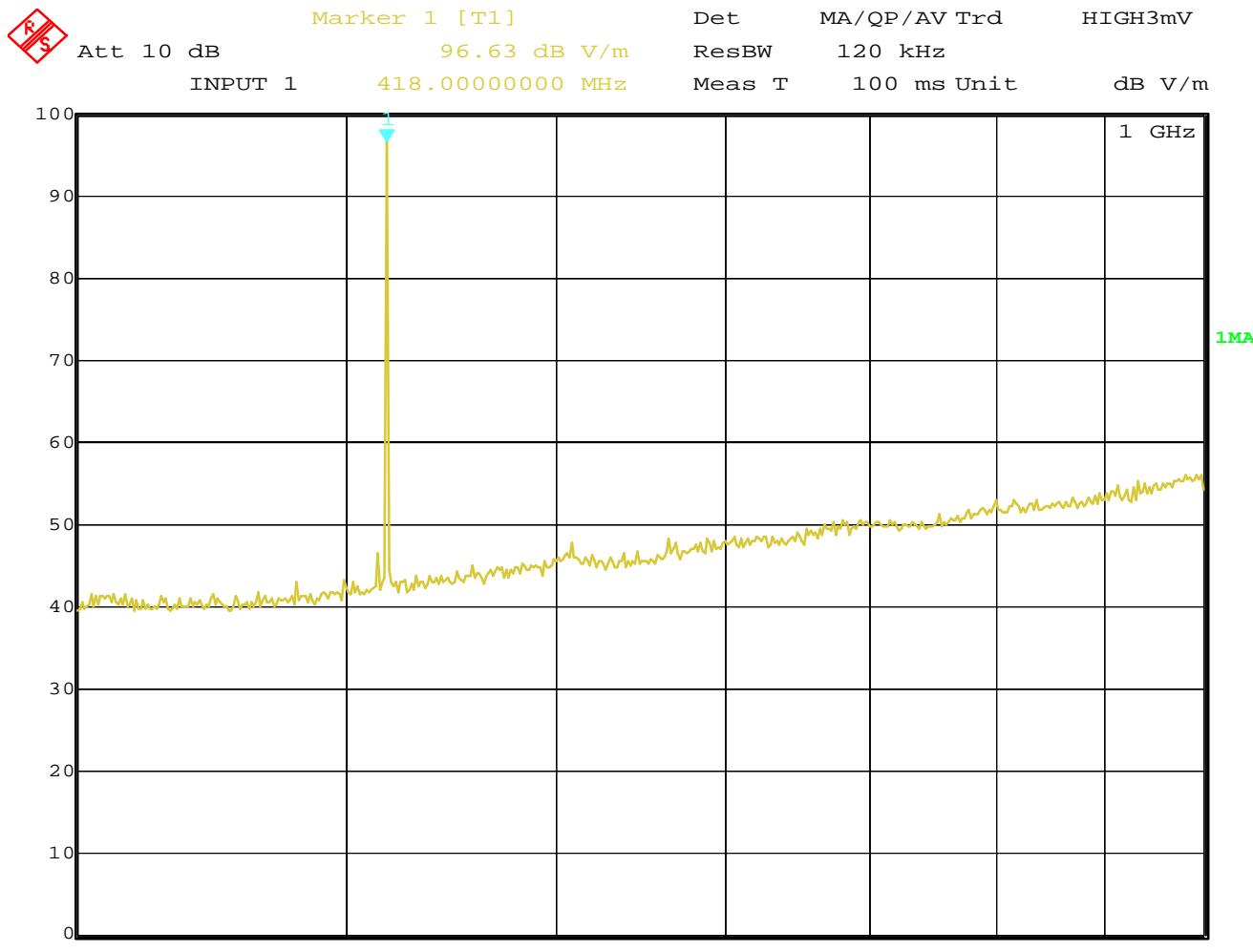
## Appendix C

### Graphs

## Radiated Emissions 30-300 MHz Horizontal Polarity

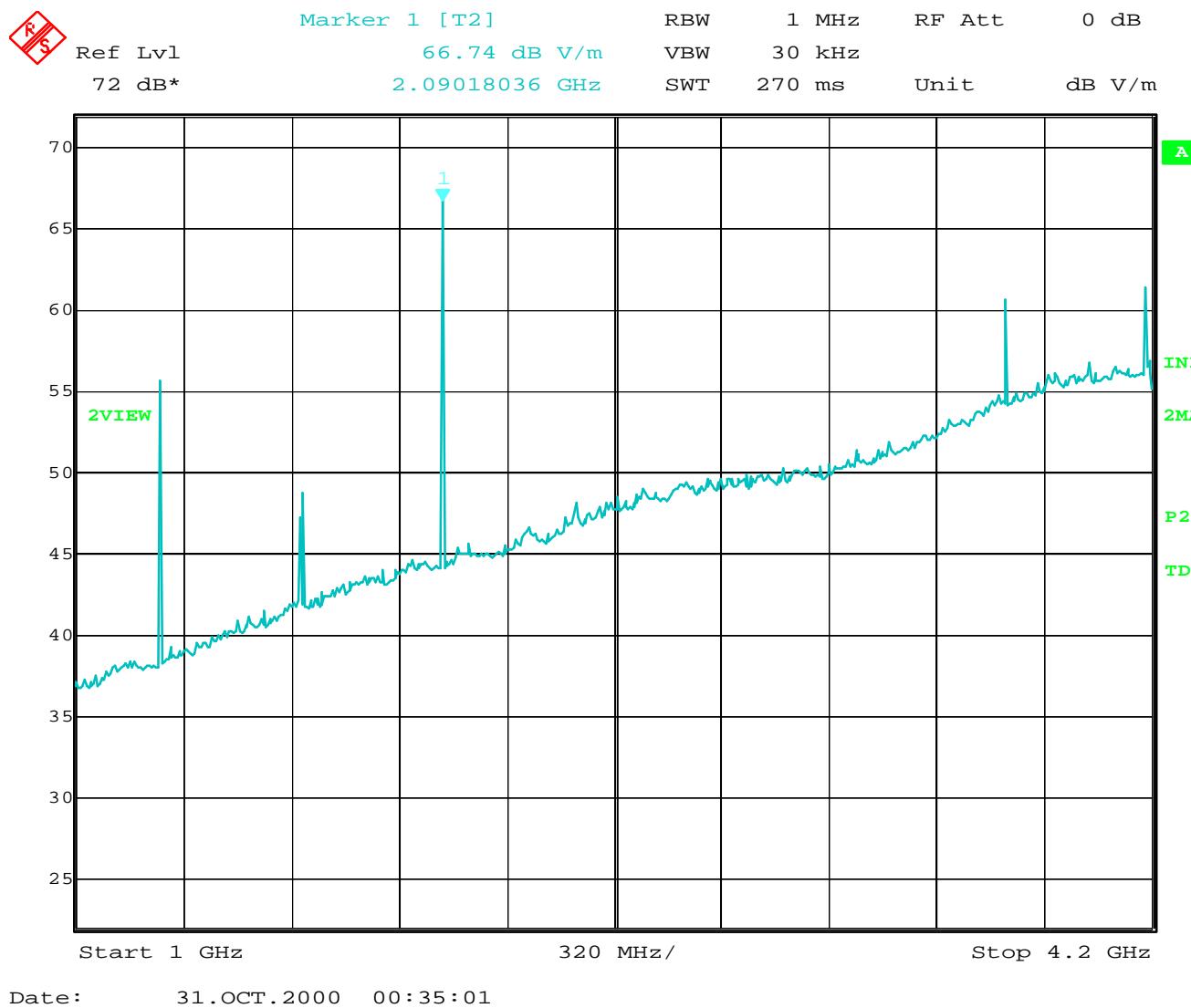


## Radiated Emissions, 300-1000 MHz Horizontal Polarity

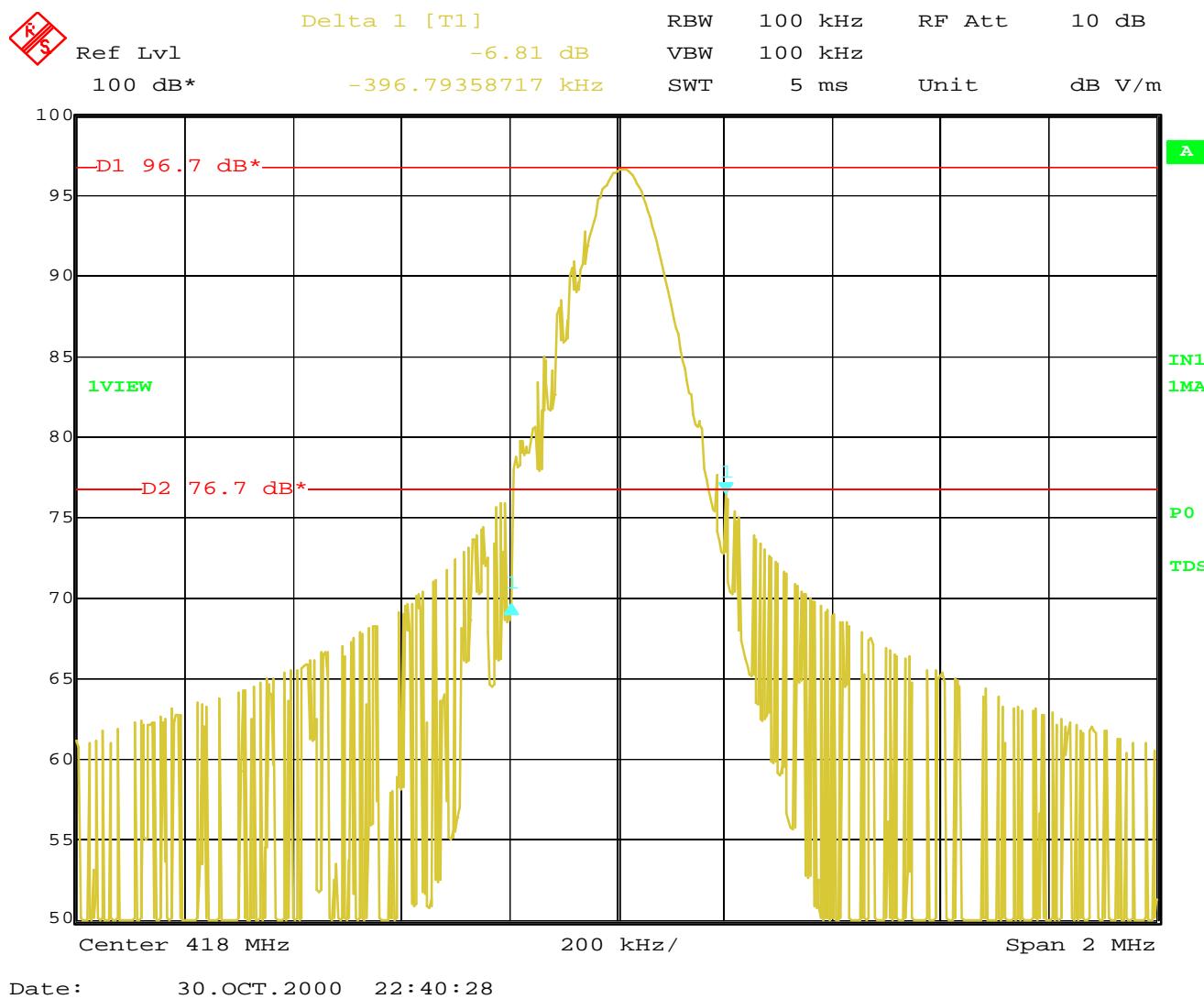


Date: 30.OCT.2000 22:32:41

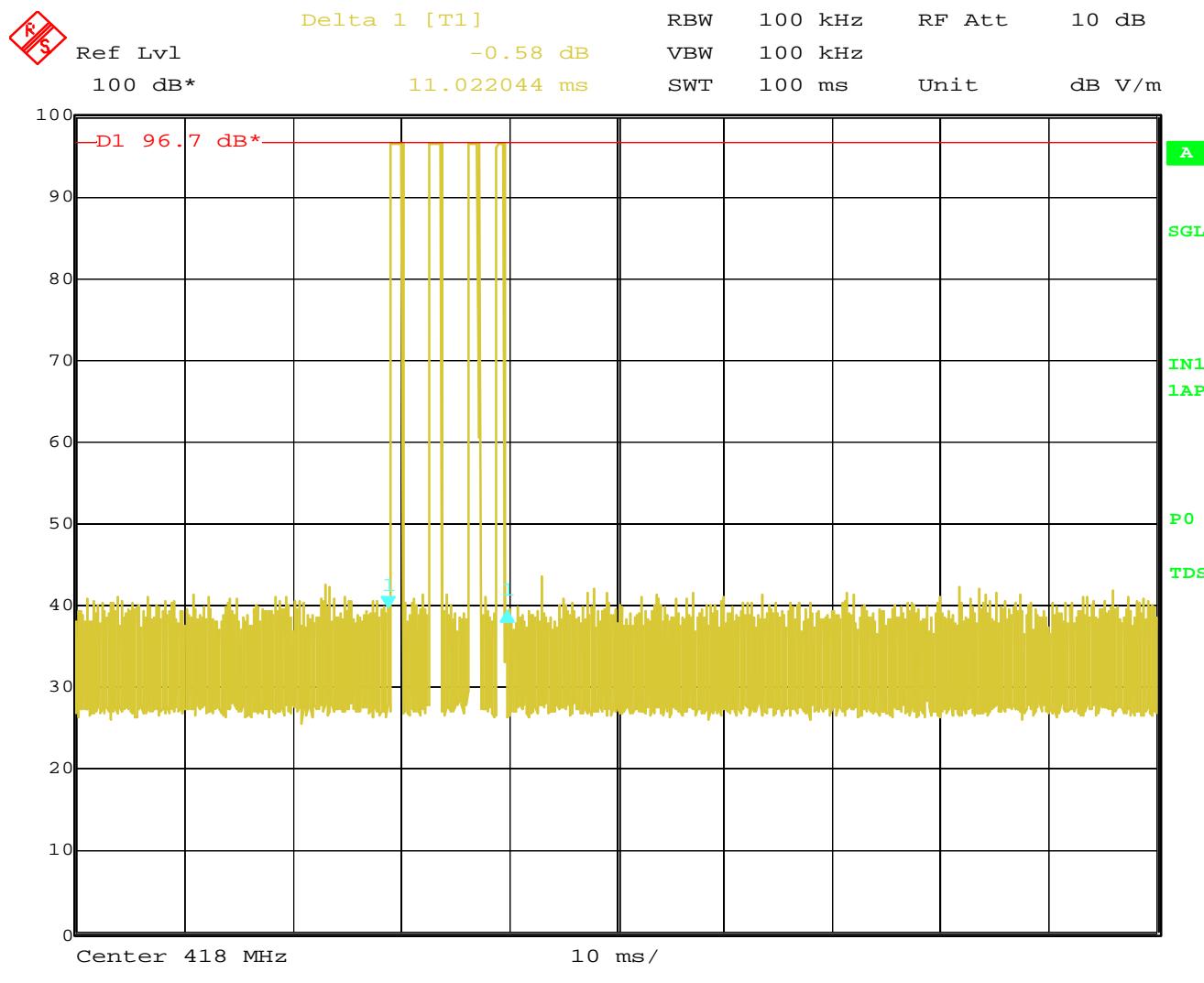
## Radiated Emissions 1.000 4.2 GHz Horizontal Polarity



## Occupied Bandwidth



## Data Packet Detail, 100mS



## Data Packet Detail, 20 Milliseconds

