KTL Test Report:	0R02491
Applicant:	EXI Wireless Systems Inc. Suite 100-13551 Commerce Parkway Richmond, BC V6V 2L1
Equipment Under Test: (E.U.T.)	Wireless Keypad
FCC ID:	HE7 WKP
In Accordance With:	**FCC Part 15, Subpart C** For Low Power Transmitters Operating Periodically In The Band 40.66 - 40.77 MHz And Above 70 MHz
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	
	R. Grant, Wireless Group Manager
Date:	
Total Number of Pages:	25

Table of Contents

Section 1. Summary of Test Results

General

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.231. All tests were conducted using measurement procedure ANSI C63.4-1992. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

D	S	C

Equipment Code

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
Kevin Carr, Technologist

Summary Of Test Data

Name of Test	Para. Number	Results
Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Not Applicable
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	Not Applicable
Periodic Alternate Field Strength Requirements	15.231(e)	Complies
Powerline Conducted Emissions	15.207	Not Applicable

Footnotes For N/A's:

- Applicant filing under Clause 15.231(e).
- Applicant does not transmit within the band 40.66 MHz to 40.70 MHz.
- The EUT is battery powered.

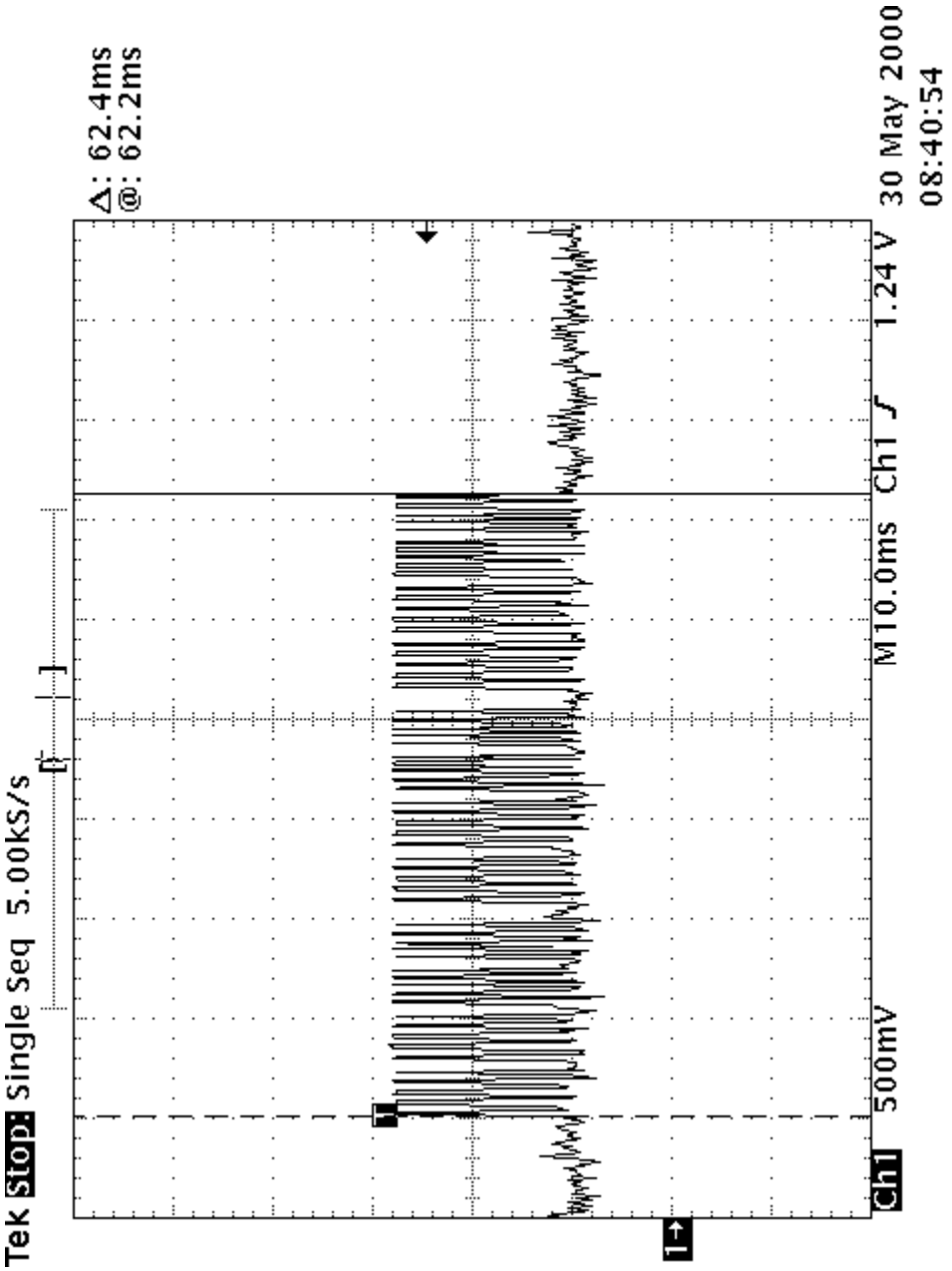
Test Conditions:

Indoor	Temperature:	15 °C
	Humidity:	35 %
Outdoor	Temperature:	15 °C
	Humidity:	35 %

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Manufacturer:	EXI Wireless Systems Inc.
Model No.:	None
Serial No.:	KP002
Date Received In Laboratory:	May 25, 2000
KTL Identification No.:	Item #1
Frequency Range:	433.92 MHz
Operating Frequency(ies) of Sample:	433.85 MHz
Type of Emission:	PCM
Emission Designator:	41K3L1D
Supply Power Requirement:	Battery, 3.1 Vdc
Duty Cycle Calculation:	$20 \text{ Log} \left(\frac{60x0.54}{100} \right) \text{ms} = -9.79 \text{ dB}$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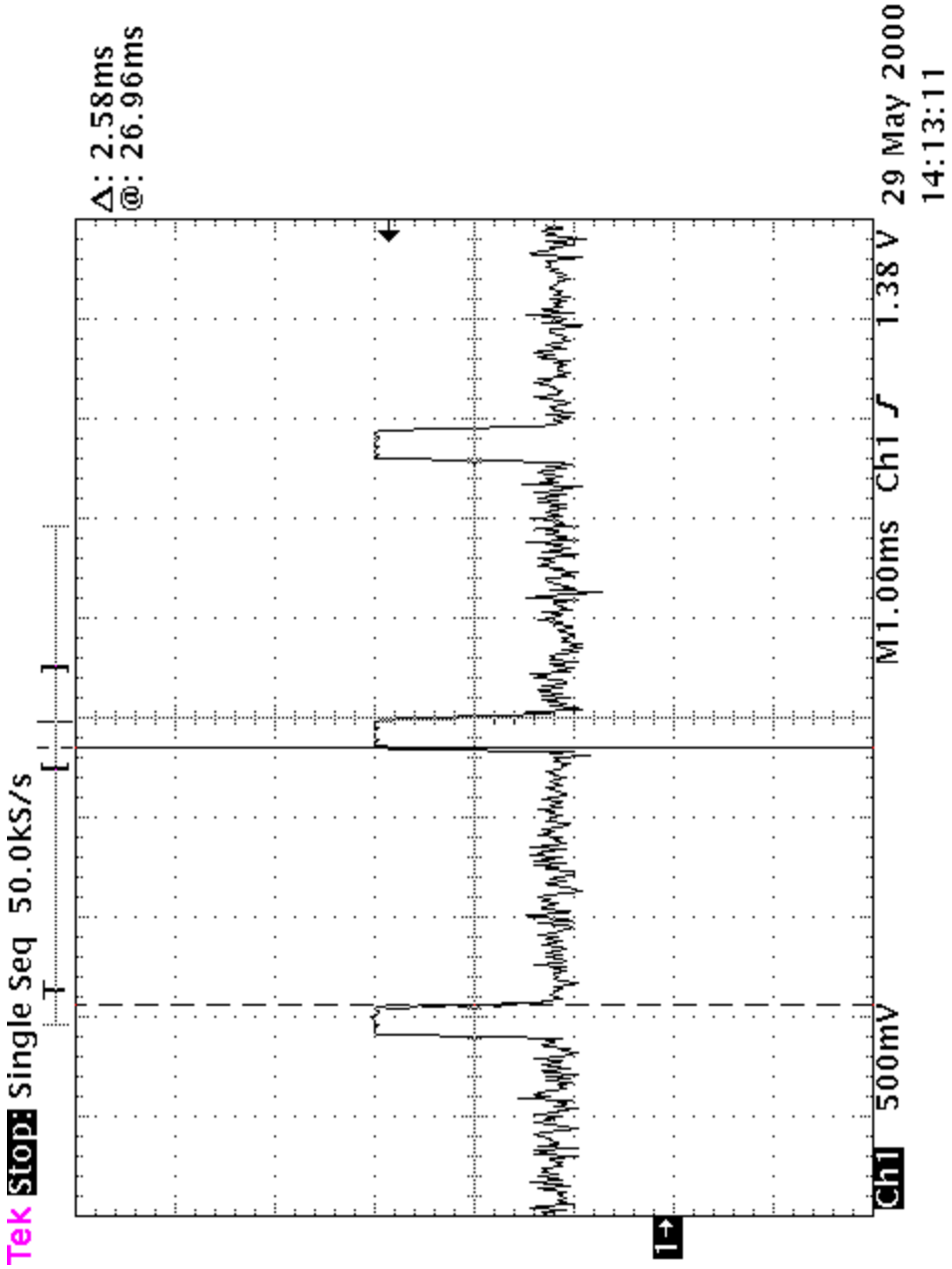
M10.0ms Ch1
500mV
Ch1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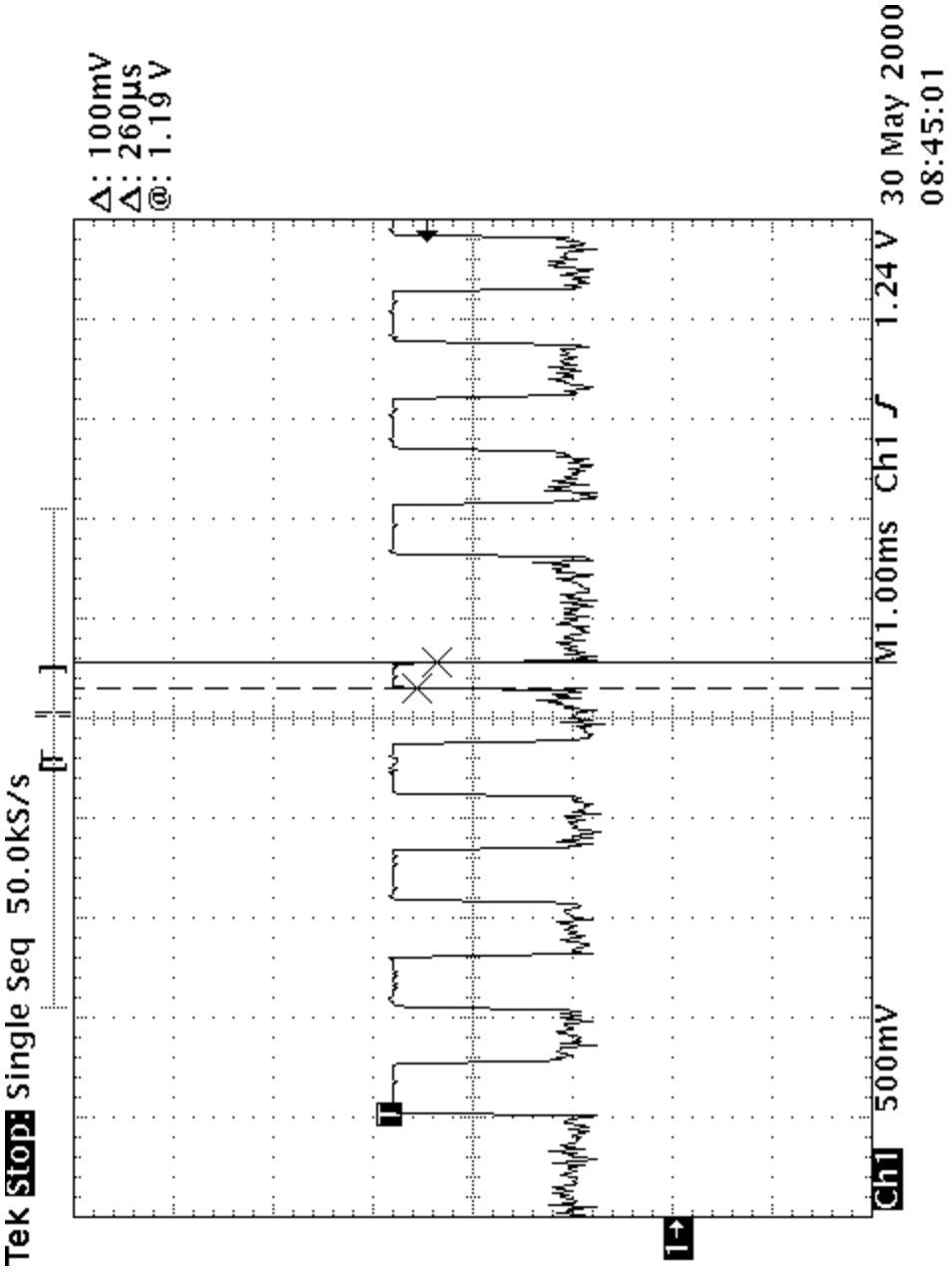
Ch1 500mV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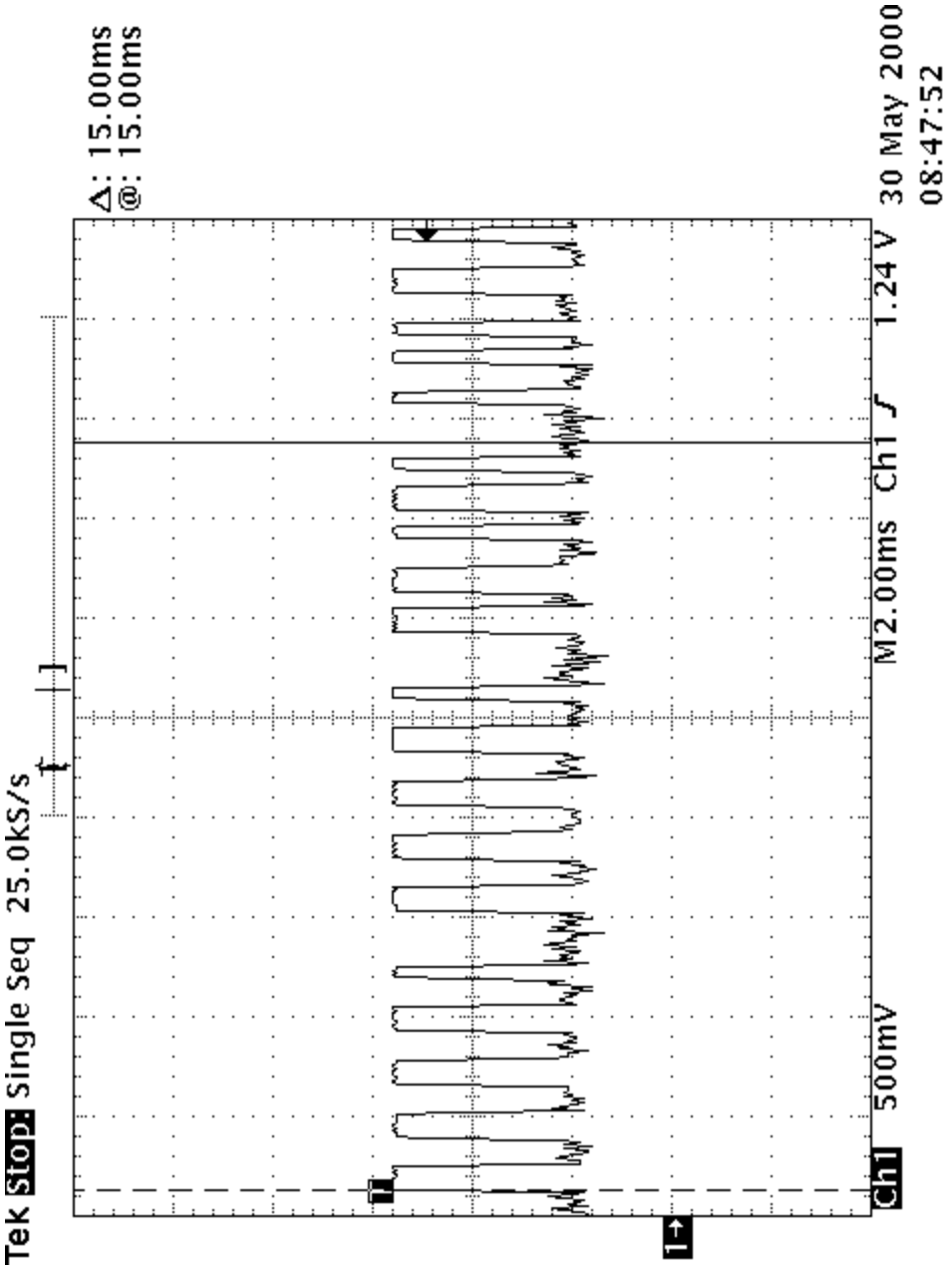
500mV
Ch1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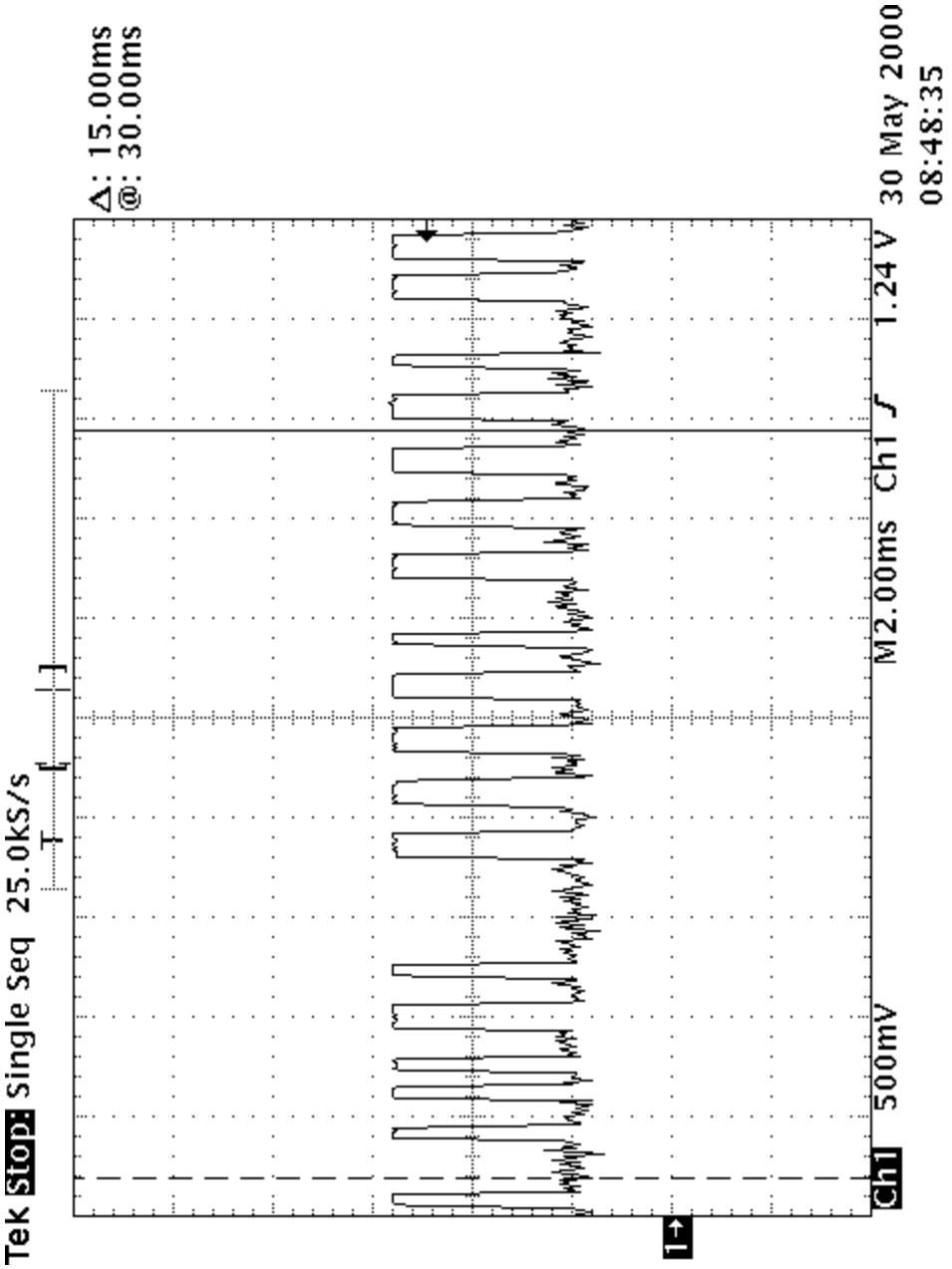
Ch1 500mV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08:48:35
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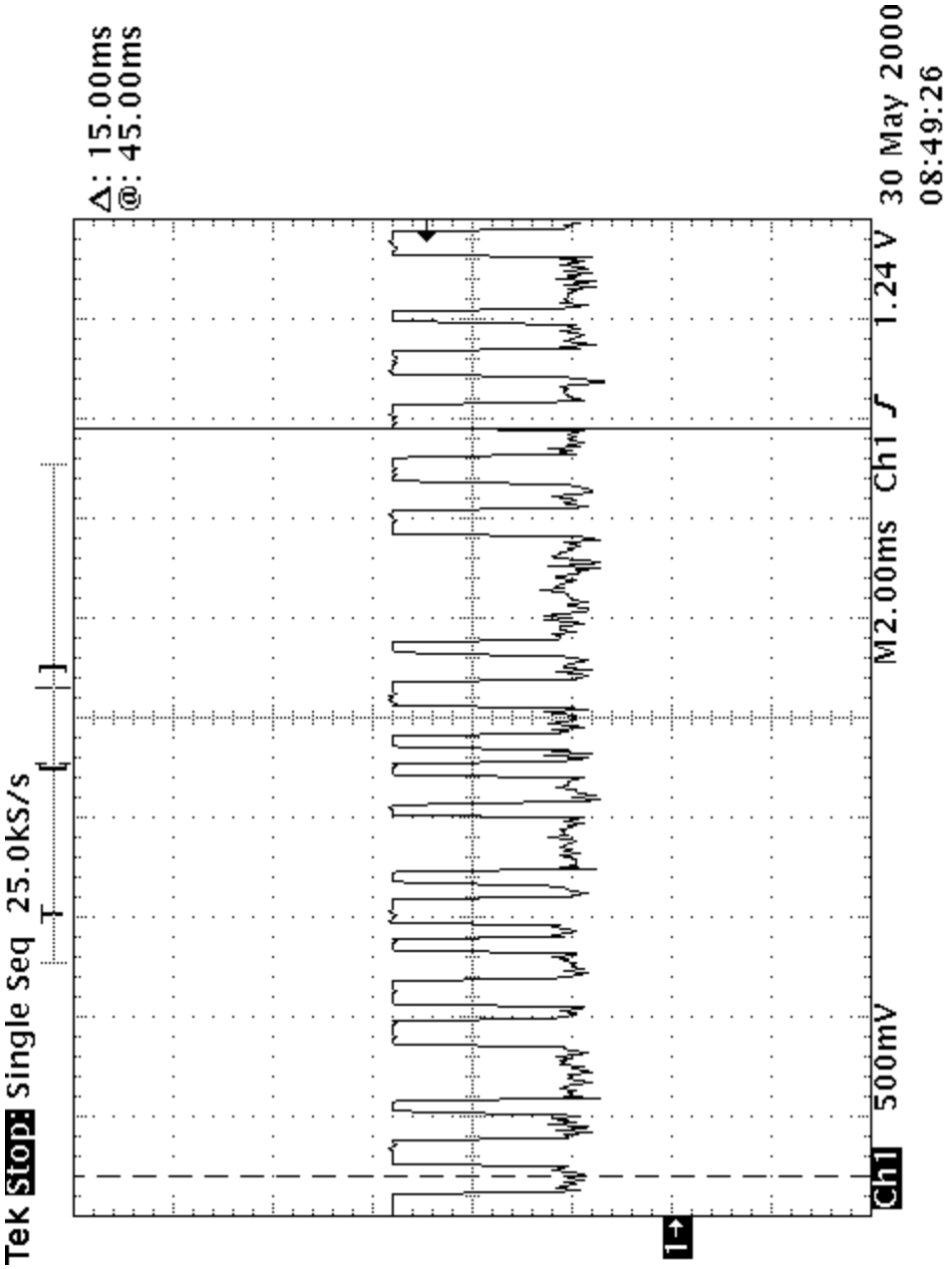
M2.00ms Ch1
Ch1 500mV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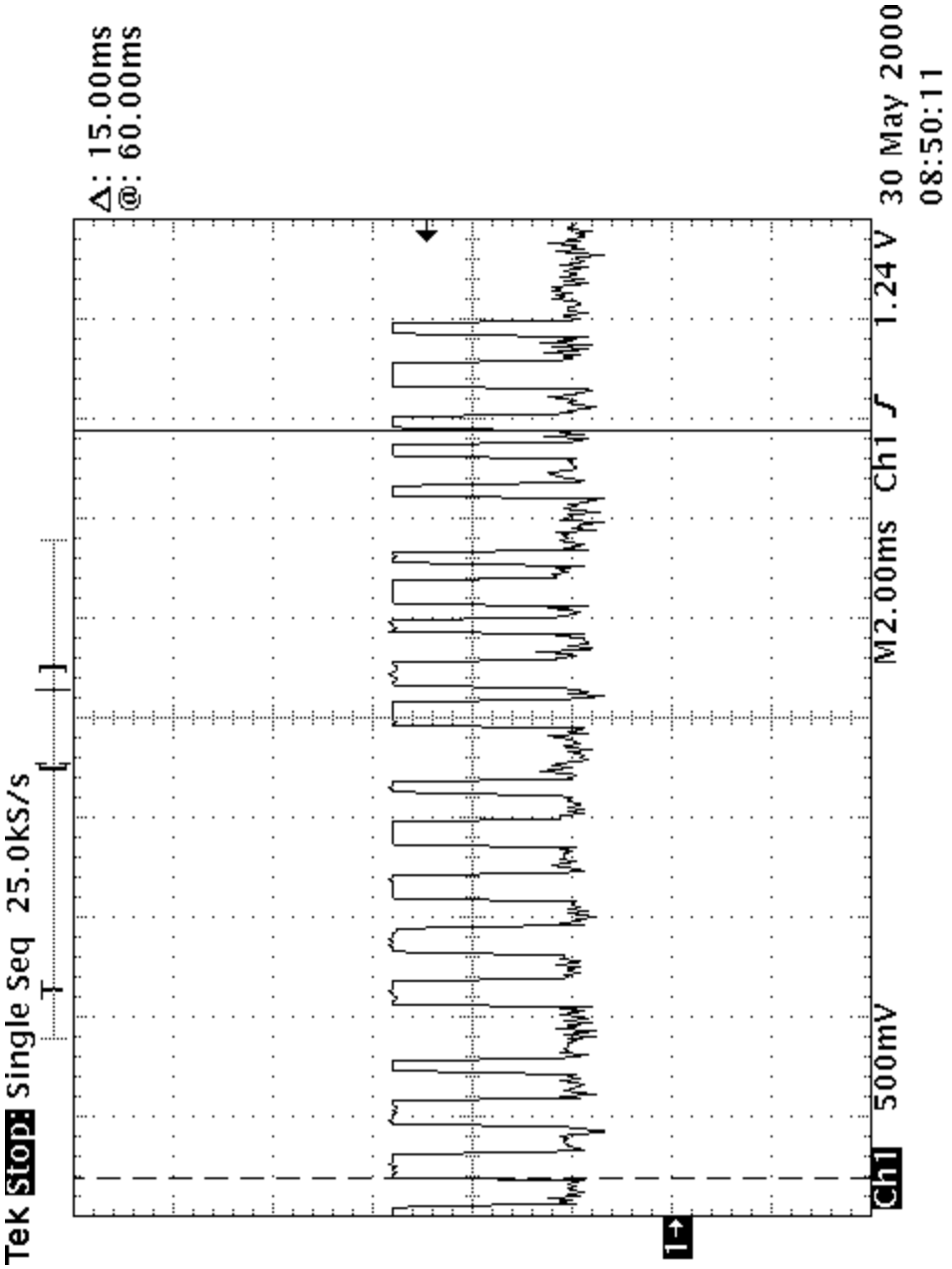
Ch1 500mV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Ch1
M2.00ms Ch1
500mV
Ch1
Tek Stop: Single Seq 25.0kS/s

Section 3. Transmission Requirements

Para. No.: 15.231(a)

Test Performed By: Kevin Carr	**Date of Test:** June 6, 2000

Minimum Standard:

15.231(a) Continuous transmissions such as voice, video or data transmissions are not permitted.

15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds after being released.

15.231(a)(2) A transmitter activated automatically shall cease transmission within 5 seconds of activation.

15.231(a)(3) Periodic transmissions at regular pre-determined intervals are not permitted. However polling or supervisory transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

15.231(a)(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm.

Test Results: Complies.

Test Data: Compliance was determined by verification of technical specifications and a functional test on the equipment.

Rationale for Compliance with Transmission Requirements

15.231(a)(1) : The E.U.T. transmits one 62.4ms data burst when the push button is depressed.

15.231(a)(2) : The E.U.T. does not transmit automatically.

15.231(a)(3) : See attached customer supplied statement.

15.231(a)(4) : Not applicable.

06/06/2000 11:13 604-207-7765 EXI WIRELESS PAGE 01/01

EXI
WIRELESS SYSTEMS INC.

351

FACSIMILE COVER SHEET

TO: Russel Grant
FROM: Bruce Barlow
COMPANY: KTL, Ottawa
FAX NUMBER: 613-737-969
SUBJECT: Clarification of Periodic Operation

X URGENT ☐ FY ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:
The Wireless Keypad normally sends one message transmission when keyed and is essentially non-periodic during the life of the battery. When the battery becomes low, the Wireless Keypad will automatically transmit one message (with battery low bit set) every 30 minutes.

The design battery life, to the low detect state, is 4 years, and will typically be over 5 years.

Regards,

Bruce Barlow
Sr. Staff Engineer
EXI Wireless Systems Inc.

Suite 100 - 13551 Commerce Parkway
Richmond, BC Canada V6V 2L1
Phone (604) 207-7760 1-800-667-9689 Fax (604) 207-7765
e-mail: info@exi.com www.exi.com

Section 4. Occupied Bandwidth

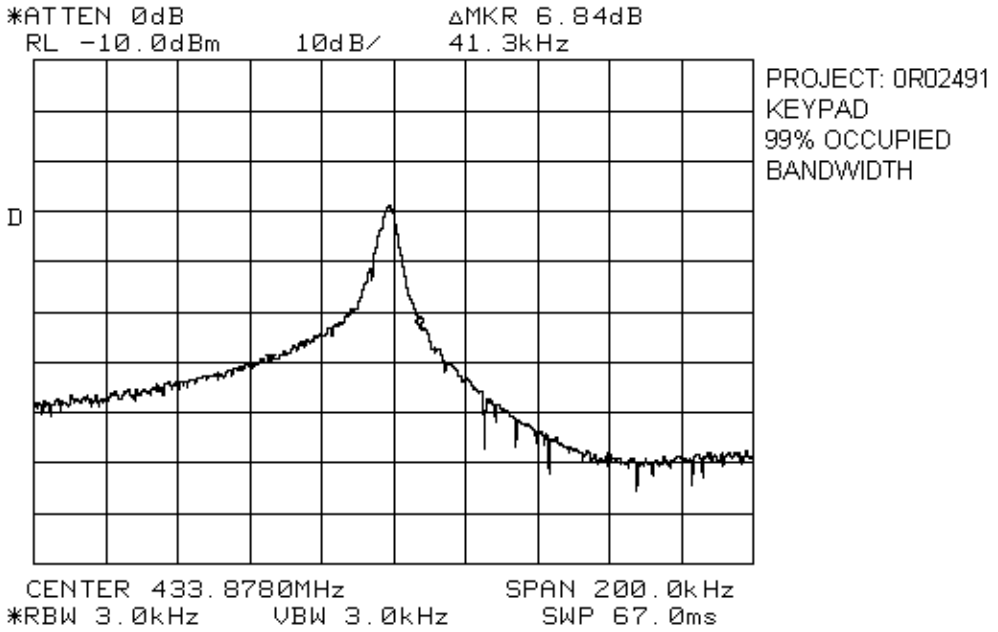
Para. No.: 15.231(c)

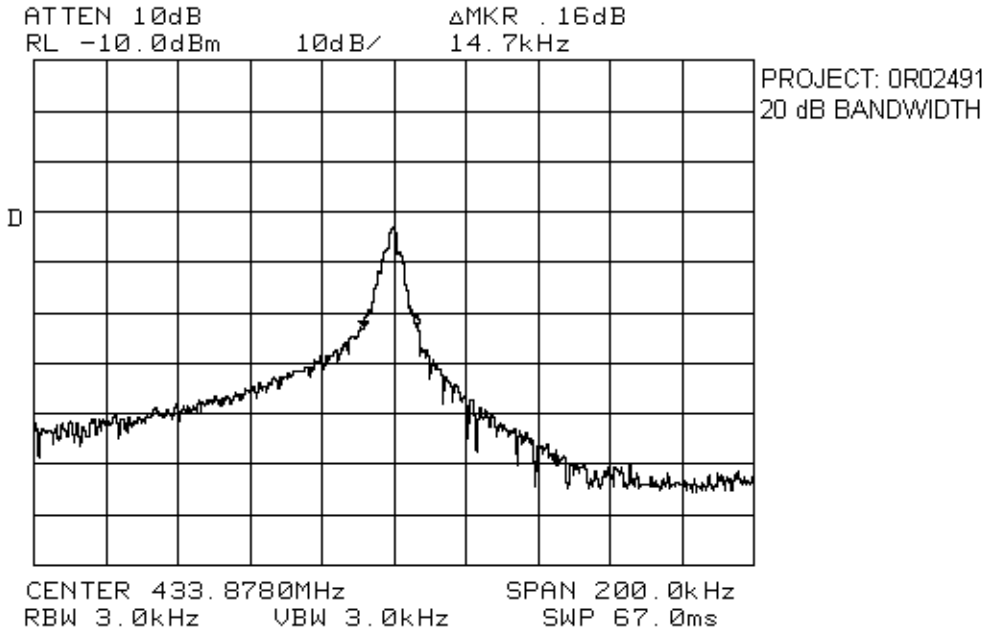
Test Performed By: Kevin Carr	**Date of Test:** May 31, 2000

Minimum Standard: 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Results: Complies. See attached graph.

Test Data: See attached graph.


*ATTEN 0dB
RL -10.0dBm
10dB/
ΔMKR 6.84dB
41.3kHz
D
PROJECT: 0R02491
KEYPAD
99% OCCUPIED
BANDWIDTH
CENTER 433.8780MHz
SPAN 200.0kHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms


ATTEN 10dB
RL -10.0dBm
10dB/
ΔMKR .16dB
14.7kHz
PROJECT: 0R02491
20 dB BANDWIDTH
D
CENTER 433.8780MHz
SPAN 200.0kHz
RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms

Section 5. Periodic Alternate Field Strength Requirements

Para. No.: 15.231(e)

Test Performed By: Kevin Carr	**Date of Test:** June 1, 2000

Minimum Standard:

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

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

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

Test Results: Complies. The worst case emission is 51.7 dBµV/m @ 3m at 1735.5 MHz. This is 1.2 dB below the specification limit.

Test Data: See attached table.

Test Data - Periodic Alternate Field Strength Requirements

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP		RBW: 100 kHz, 1 MHz		Detector: Peak	
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
433.87	E/D4	V	43.3	25.9		-9.8	59.4	72.9	13.5
433.87	E/D4	H	44.2	25.9		-9.8	60.3	72.9	12.6
867.75	E/D4	V	25.6	33.7		-9.8	49.5	52.9	3.4
867.75	E/D4	H	26.7	33.7		-9.8	50.6	52.9	2.3
1301.6	Hrn2	V	32.3	29.4		-9.8	51.9	54.0	2.1
1301.6	Hrn2	H	31.7	29.4		-9.8	51.3	54.0	2.7
1735.5	Hrn2	V	29.4	32.1		-9.8	51.7	52.9	1.2
1735.5	Hrn2	H	28.7	32.1		-9.8	51.0	52.9	1.9
2169.50	H2	V	70.7	35.6	-57.9	-9.8	38.6	52.9	14.3
2169.50	H2	H	63.7	35.6	-57.9	-9.8	31.6	52.9	21.3
2603.40	H2	V	70.2	37.2	-60.0	-9.8	37.6	52.9	15.3
2603.40	H2	H	74.0	37.2	-60.0	-9.8	41.4	52.9	11.5
3037.30	H2	V	78.4	38.8	-59.4	-9.8	48.0	52.9	4.9
3037.30	H2	H	74.8	38.8	-59.4	-9.8	44.4	52.9	8.5
3471.20	H2	V	69.6	40.8	-57.0	-9.8	43.6	52.9	9.3
3471.20	H2	H	70.2	40.8	-57.0	-9.8	44.2	52.9	8.7
3905.10	H2	V	57.6	42.0	-57.7	-9.8	32.1	54.0	21.9
3905.10	H2	H	57.2	42.0	-57.7	-9.8	31.7	54.0	22.3
4339.00	H2	V	52.0	43.5	-55.0	-9.8	30.7	54.0	23.3
4339.00	H2	H	53.3	43.5	-55.0	-9.8	32.0	54.0	22.0

Notes:

B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole

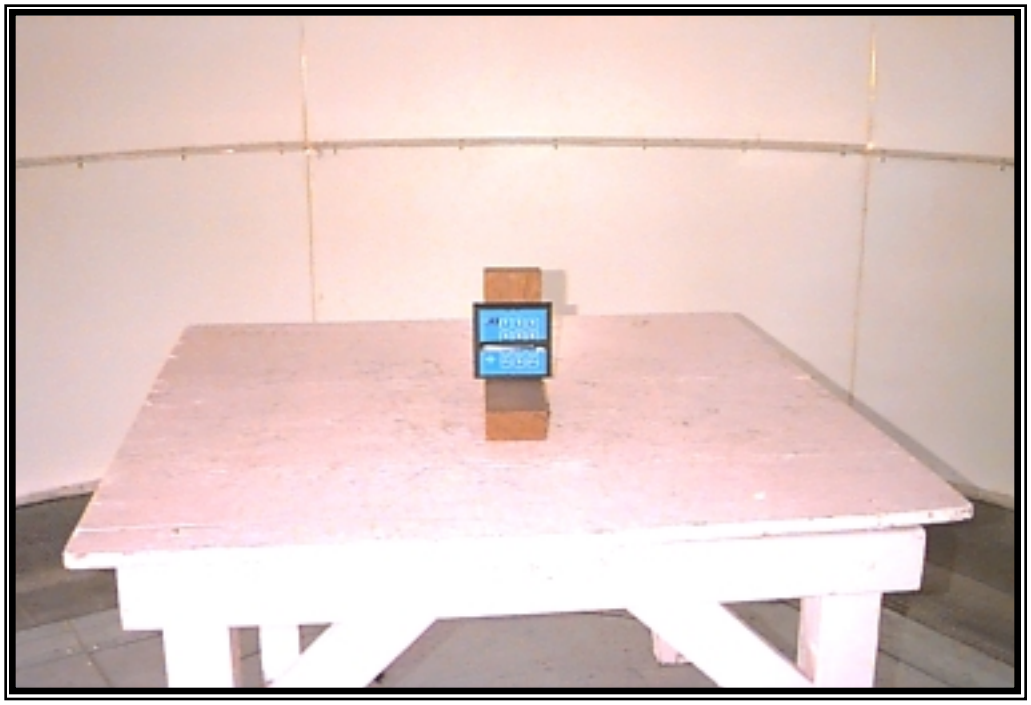
* Re-Measured Using Dipole Antenna. ( ) Denotes Failing Emission Level.

(1) 120 kHz, Q-Peak,
(2) 10 kHz, Peak,
(3) 100 kHz RGW, 300 kHz VBW, Peak,
(4) 300 kHz RBW, 1 MHz VBW, Peak,
(5) 1 MHz RBW, 3 MHz VBW, Peak,
(6) 1 MHz RBW, 10 Hz VBW, Peak

N.D. = Not Detected

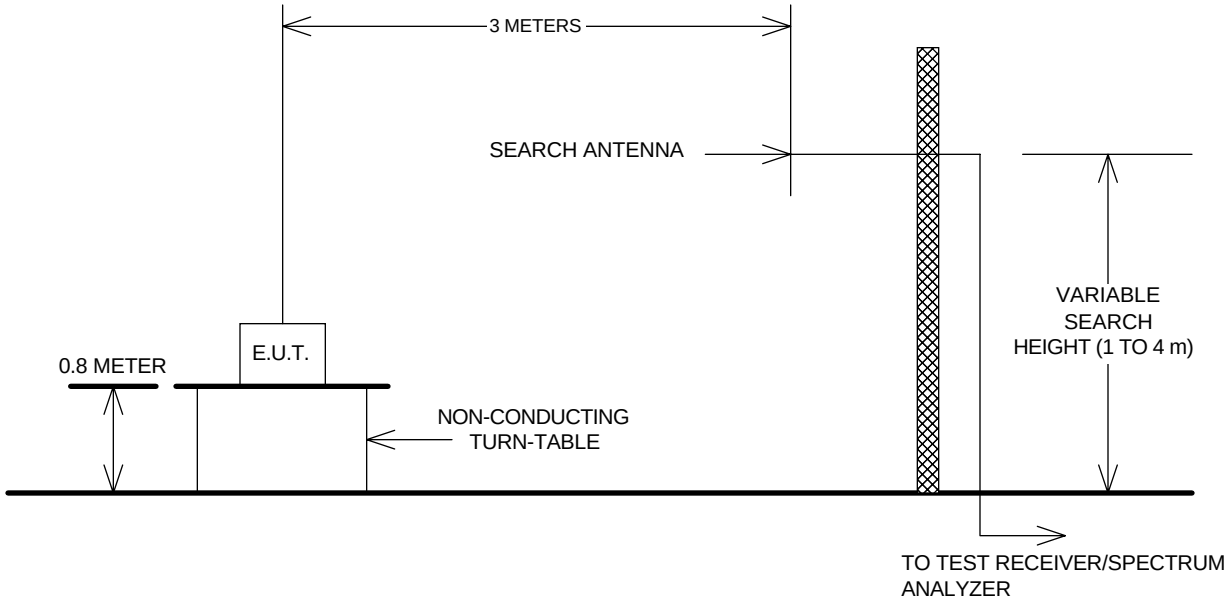
EUT Setup Photographs (Worst Case Configuration)

Front View



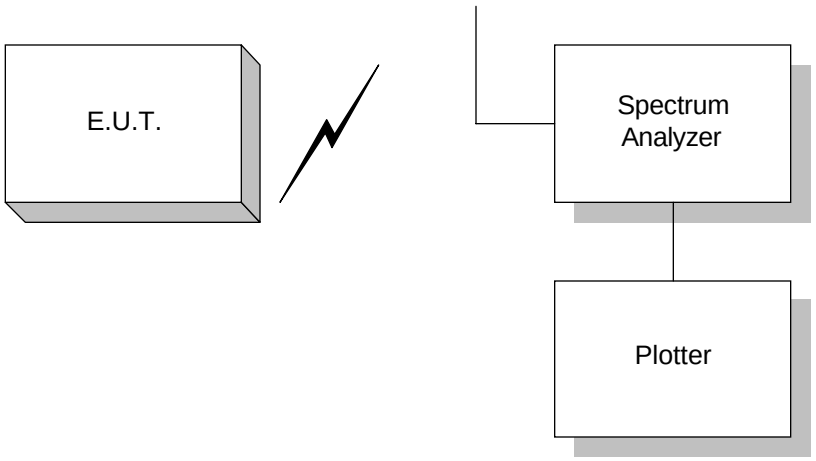
Section 6. Block Diagrams

Outdoor Test Site For Radiated Emissions



The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.

Occupied Bandwidth



Section 7. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8564E	3846A01407	May 31/99	May 31/00
	Power Supply	Astron	VS-50M	8405071	NCR	NCR
1 Year	Receiver	Rohde & Schwarz	ESVP	892661/014	April 5/00	April 5/01
1 Year	Horn Antenna	EMCO #2	3115	4336	Nov. 11/99	Nov. 11/00
1 Year	Dipole Antenna Set	EMCO #2	3121C	FA001349	June 5/00	June 5/01
1 Year	RF AMP	JCA	2-4 GHz	FA001486	May 31/00	May 31/01
1 Year	RF AMP	JCA	4-8 GHz	FA001497	May 31/00	May 31/01

NA: Not Applicable
NCR: No Cal Required
COU: CAL On Use

Annex A

Restricted Bands

Section A Restricted Bands of Operation

(a) Except as shown in paragraph (d) of this section , only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.15
0.49 - 0.51	16.69475-16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425-16.80475	960-1240	7.25-7.75
3.020 - 3.026	25.5-25.67	1300-1427	8.025-8.5
4.125 - 4.128	37.5-38.25	1435-1626.6	9.0-9.2
4.17725 - 4.17775	73-74.6	1645.5-1646.5	9.3-9.5
4.20725 - 4.20775	74.8-75.2	1660-1710	10.6-12.7
6.215 - 6.218	108-121.94	1718.8-1722.2	13.25-13.4
6.31175 - 6.31225	123-138	2220-2300	14.47-14.5
8.291 - 8.294	149.9-150.05	2310-2390	15.35-16.2
8.362 - 8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625 - 8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425 - 8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29 - 12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975 - 12.52025	240-285	3345.8-3358	36.43-36.5
12.57675 - 12.57725	322-335.4	3600-4400	Above 38.6
13.36 - 13.41			