ELITE ELECTRONIC ENGINEERING INC.
1516 CENTRE CIRCLE
DOWNERS GROVE, ILLINOIS 60515-1082

ELITE PROJECT: 31398 DATES TESTED: October 14 and 18, 2002 and November 22 and 23, 2002

TEST PERSONNEL: Richard E. King

TEST SPECIFICATION: FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 for Frequency Hopping Spread Spectrum Intentional Radiators Operating within the 902MHz - 928MHz band

ENGINEERING TEST REPORT NO. 31398-01 REV. A

MEASUREMENTS OF RF EMISSIONS

FROM THE HAND-HELD TRANSMITTER

FOR: Badger Meter
Milwaukee, Wisconsin

PURCHASE ORDER NO.:526930

Report By: Richard E. King
Richard E. King

Approved By: Raymond J. Klouda
Raymond J. Klouda
Registered Professional
Engineer of Illinois - 44894

ADMINISTRATIVE DATA AND SUMMARY OF TESTS

DESCRIPTION OF TEST ITEM: Frequency Hopping Spread Spectrum Transmitter

MODEL NO. : Hand Held Transmitter **SERIAL NO.:** None Assigned

FCC ID NO. :

MANUFACTURER: Badger Meter

APPLICABLE SPECIFICATION: FCC "Code of Federal Regulations", Title 47, Part 15, Subpart C, Sec. 15.247

TEST PERFORMED BY: ELITE ELECTRONIC ENGINEERING INC.
Downers Grove, Illinois 60515

DATES TESTED: October 14 and 18 and November 22-23, 2002

PERSONNEL (OPERATORS, OBSERVERS, AND CO-ORDINATORS):

WITNESS: No Badger Meter personnel were present during the testing.

ELITE ELECTRONIC: Richard E. King

ELITE JOB NO.: 31398

ABSTRACT: The model Hand Held Transmitter meets the requirements of the FCC "Code of Federal Regulations", Title 47, Part 15, Subpart C, Section 15.247 for frequency hopping spread spectrum transmitters. The carrier frequency separation, number of hopping frequencies, time of occupancy (dwell time), 20 dB bandwidth, peak output power, band-edge compliance, spurious emissions and power spectral density were measured and found to comply with the requirements.

See the test results and data pages for more details.

TABLE OF CONTENTS

MEASUREMENT OF RF EMISSIONS

FROM A HAND-HELD TRANSMITTER

1.0 INTRODUCTION:

1.1 DESCRIPTION OF TEST ITEM: This report presents the results of the RF emissions measurements performed for the Hand-Held spread spectrum transmitter, (hereinafter referred to as the test item). The tests were performed for Badger Meter located in Milwaukee, Wisconsin.

The test item is a frequency hopping spread spectrum transceiver used for wireless meter reading applications. It operates in the frequency band 902 to 928MHz.

1.2 PURPOSE: The test series was performed to determine if the test item would meet the selected requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for intentional radiators.

1.3 DEVIATIONS, ADDITIONS AND EXCLUSIONS: There were no deviations from the test requirements.

1.4 APPLICABLE DOCUMENTS: The following documents of the exact issue designated form part of this document to the extent specified herein:

Federal Communications Commission (FCC) "Code of Federal Regulations", Title 47, Part 15, dated 1 October 2001

FCC Public Notice, DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems", Released March 30, 2000

1.5 SUBCONTRACTOR IDENTIFICATION: This series of tests was performed by the Elite Electronic Engineering Inc., of Downers Grove, Illinois.

2.0 TEST ITEM SETUP AND OPERATION:

For all tests the test item was placed on a 0.8 meter high non-conductive table. The 6VDC was supplied to the test item from a 6VDC power supply . The test item is supplied with an internal antenna.

3.0 TEST SITE AND INSTRUMENTATION:

3.1 TEST SITE: All tests were performed at Elite's facility in Downers Grove, Illinois. All tests were performed in a hybrid anechoic/ferrite tile shielded enclosure.

3.2 TEST INSTRUMENTATION: A list of the test equipment used can be found on Table I. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

4.0 REQUIREMENTS, PROCEDURES AND RESULTS:

4.1 POWER LINE CONDUCTED EMISSIONS:

4.1.1 REQUIREMENT: This requirement does not apply since the test item is battery operated. There are no operation modes where the transmitter can be connected to the AC power public utilities, and therefore, the conducted emissions test are not required.

4.2 CARRIER FREQUENCY SEPARATION:

4.2.1 REQUIREMENTS: Per section 15.247 (a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

4.2.2 PROCEDURES: The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to $\geq$ to 1% of the span.

The peak detector and 'Max-Hold' function was engaged. The span was set wide enough to capture the peaks of at least two adjacent channels. When the trace had stabilized after multiple scans. The marker-delta function was used to determine the separation between the peaks of the adjacent channels. The analyzer's display was plotted using a 'screen dump' utility.

4.2.3 RESULTS: Data page 17 shows the carrier frequency separation. As can be seen from this plot, the separation is 201kHz which is greater than the 20dB bandwidth (116kHz).

4.3 NUMBER OF HOPPING FREQUENCIES:

4.3.1 REQUIREMENTS: Per section 15.247(a)(1)(i), frequency hopping systems shall use at least 50 hopping frequencies.

4.3.2 PROCEDURE: The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to $\geq$ to 1% of the span. The peak detector and 'Max-Hold' function was engaged. The span was set wide enough to capture the entire frequency band of operation.

When the trace had stabilized after multiple scans. The number of hopping frequencies was counted. The analyzer's display was plotted using a 'screen dump' utility.

4.3.3 RESULTS: Data page 18 shows the number of hopping frequencies. As can be seen from this plot, the number of frequencies is 64 which is greater than the minimum required of 50.

4.4 TIME OF OCCUPANCY (DWELL TIME):

4.4.1 REQUIREMENTS: Per section 15.247(a)(1)(i), the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

4.4.2 PROCEDURE: The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to 1 MHz. The peak detector and 'Max-Hold' function was engaged. With the span was to 0Hz, the sweep time was adjusted to capture a single event in order to measure the dwell time per hop. Then, the sweep time was expanded to capture the average time between hops. When the trace had stabilized after multiple scans, the time between hops was measured. The analyzer's display was plotted using a 'screen dump' utility.

The dwell time in a 10 second period was then calculated from dwell time per hop divided by time between hops then multiplied by 10 seconds. The dwell time in a 10 second period was then divided by the number of frequency hopping channels to give the dwell time of a single frequency hopping channel.

4.4.3 RESULTS: Data pages 19 and 20 show the plots for the time of occupancy (dwell time). As can be seen from the plots, the time of occupancy can be determined by a 4.8 msec burst every 333.5 msec in a 10 Second period divided by the number of the hopping frequencies. This calculated value is equal to 0.14 seconds which is less than the 0.4 seconds allowed.

4.5 20 dB BANDWIDTH:

4.5.1 REQUIREMENTS: Per section 15.247(a)(1)(i), the maximum 20dB bandwidth of the hopping channel is 500kHz.

4.5.2 PROCEDURE: The test item was setup inside the chamber. With the hopping function disabled, the test item was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The resolution bandwidth (RBW) was set to ≥ to 1% of the 20 dB BW.

The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.

4.5.3 RESULTS: The plots on pages 21 through 23 show that the maximum 20 dB bandwidth was 127kHz. The 20 dB bandwidth was less than the 500kHz maximum requirement.

4.6 PEAK OUTPUT POWER:

4.6.1 REQUIREMENTS: This requirement applies only to the transmit mode of operation. Per section 15.247(b)(2) the maximum peak output power of the transmitter shall not exceed 1 Watt. If transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.6.2 PROCEDURES: Since the antenna was an integrated antenna the equivalent isotropic radiated power (EIRP) was computed from the radiated field strength measurements at 3 meters.

The spectrum analyzer bandwidth was set to 100 kHz which is greater than the 20dB bandwidth of the transmitter. A tunned dipole antenna was positioned 3 meters from the test item. The maximum meter

reading was recorded for the vertical and horizontal receiver antenna polarity while rotating the test item through 360 degrees. The EIRP was calculated for the low, middle and high hopping frequencies.

4.6.3 RESULTS: The results are presented on data page 24. The maximum EIRP measured from the transmitter was 1.9 dBm. Therefore, the transmitter meets the De Facto 36 dBm limit.

4.7 BAND-EDGE COMPLIANCE:

4.7.1 REQUIREMENTS: Per section 15.247(c), the emissions at the band-edges must be at least 20dB below the highest level measured within the band. In addition, any radiated emissions which fall in restricted bands must meet the general limits of 15.209

4.7.2 PROCEDURE: The same data recorded for the low and high hopping frequencies from the 20 dB bandwidth measurements was used to demonstrate compliance with the 20 dB band-edge requirements.

For the radiated emissions which fall in the restricted band the "marker-delta" method described in Public Notice DA 00-705 was used. Initially radiated measurements were performed at the fundamentals of the highest hopping frequencies using 1 MHz bandwidth. For the measurements the "delta" required to meet the general limit was calculated.

Next, the band-edge emissions were plotted using peak detector and 100 kHz bandwidth. The "delta" limit was applied to this plot to determine compliance at the band-edge.

4.7.3 RESULTS: Data pages 25 and 26 show the band-edge compliance results using the marker-delta method. As can be seen from this plot, the emissions at the band-edge in the restricted band are

within the general limits.

4.8 SPURIOUS EMISSIONS:

4.8.1 REQUIREMENTS: Per section 15.247(c), the spurious emissions in any 100 kHz BW outside the frequency band must be at least 20dB below the highest 100 kHz BW level measured within the band. In addition, the radiated emissions which fall in the restricted bands must meet the general limits of 15.209.

4.8.2 PROCEDURES: Since the test item was supplied with a permanently attached antenna, the spurious emissions compliance was evaluated against the radiated emissions levels for unrestricted bands as well as the restricted bands.

The radiated tests were performed in a 32ft. x 20ft. x 18ft. hybrid absorber lined semi-anechoic test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. The floor of the chamber is used as the ground plane. The chamber complies with ANSI 63.4 and CISPR 16 requirements for site attenuation.

Preliminary radiated measurements are performed to determine the frequencies where the significant emissions might be found. With the test item at one set position and the measurement antenna at a set height (i.e. without maximizing), the radiated emissions were measured using peak detection with 100 kHz BW. This data was then automatically plotted up through 10 Ghz.

Next, the harmonic or spurious emissions falling in the restricted bands were measured up through the 10th harmonic. For these

measurements, the measurement bandwidths were set to 1 MHz RBW The analyzer was set to **linear mode** with 10 Hz VBW in order to simulate an average detector. A pre-amplifier was used to increase the receiver sensitivity.

4.8.3 RESULTS: The preliminary emissions levels were plotted. These plots are presented on Data Pages 27 through 32. This plot shows that the spurious emissions were at least 20 dB below the level of the fundamental.

The harmonics and any other emissions that fall in the restricted frequency bands were then re-measured manually. This data is shown in the tables on data Pages 33 through 35. Since the dwell time per channel was less than 100mSeconds, the average measurements were further adjusted using a duty cycle correction factor derived from 20log(dwell time/100mSec). The field intensities levels for the harmonics were within the limit.

A block diagram of the test item orientation position is shown in Figure 1.

5.0 CONCLUSION:

The Badger Meter Hand Held Transmitter does meet the limits imposed by the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for frequency hopping spread spectrum transmitters.

6.0 CERTIFICATION:

Elite Electronic Engineering Inc. certifies that the information contained in this report was obtained under conditions which meet or

exceed those specified in the test specification.

The data presented in this test report pertains to the test item at the test date. Any electrical or mechanical modification made to the test item subsequent to the specified test date will serve to invalidate the data and void this certification.

This report must not be used to claim product endorsement by NVLAP or any agency of the US Government.

TABLE I: TEST EQUIPMENT LIST

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Cal Inv	Due Date
Equipment Type: ACCESSORIES, MISCELLANEOUS								
XLJN	5W, 50 OHM TERMINATION	JFW INDUSTRIES	50T-052	24	DC-2GHZ	06/12/02	12	06/12/03
XZG3	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2421A03059	---		N/A	
Equipment Type: AMPLIFIERS								
APK1	PRE-AMPLIFIER	HEWLETT PACKARD	8449B	3008A01243	1-26.5GHZ	02/22/02	12	02/22/03
APK3	PREAMPLIFIER	AGILENT TECHNOL	8449B	3008A01593	1-26.5GHZ	05/09/02	12	05/09/03
Equipment Type: ANTENNAS								
NDQ1	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	313	400-1000MHZ	01/10/02	12	01/10/03
NTA0	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL611	2057	0.03-2GHZ	06/25/02	12	06/25/03
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	08/25/02	12	08/25/03
Equipment Type: ATTENUATORS								
T1K1	10DB, 2.5W LIMITER	HEWLETT PACKARD	11947A	3107A01737	0.009-200MHZ	03/15/02	12	03/15/03
T2DC	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-34	BH5448	DC-18GHZ	11/28/01	12	11/28/02
Equipment Type: CONTROLLERS								
CDD2	COMPUTER	HEWLETT PACKARD	D4171A#ABA	US61654645	---		N/A	
Equipment Type: METERS								
MPA0	POWER METER	HEWLETT PACKARD	432A	1141A08696	0.01-40GHZ	06/27/02	12	06/27/03
MPAA	THERMISTOR MOUNT	HEWLETT PACKARD	8478B	1144A08340	0.01-18GHZ	09/04/02	12	09/04/03
Equipment Type: PROBES; CLAMP-ON & LISNS								
PLL9	50UH LISN 462D	ELITE	462D/70A	010	0.01-400MHZ	02/27/02	12	02/27/03
PLLA	50UH LISN 462D	ELITE	462D/70A	011	0.01-400MHZ	02/27/02	12	02/27/03
Equipment Type: PRINTERS AND PLOTTERS								
HRE1	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061052	---		N/A	
Equipment Type: RECEIVERS								
RAC2	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	3638A08770	100HZ-22GHZ	02/21/02	12	02/21/03

Cal. Interval: Listed in Months I/O: Initial Only N/A: Not Applicable

Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

TABLE I: TEST EQUIPMENT LIST

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Cal Inv	Due Date
RACC	RF PRESELECTOR	HEWLETT PACKARD	85685A	2648A00507	20HZ-2GHZ	01/17/02	12	01/17/03
RACD	RF PRESELECTOR	HEWLETT PACKARD	85685A	3010A01205	20HZ-2GHZ	02/21/02	12	02/21/03
RAE5	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	2532A02136	100HZ-22GHZ	05/09/02	12	05/09/03
RAF4	QUASIPEAK ADAPTER	HEWLETT PACKARD	85650A	2043A00320	0.01-1000MHZ	06/13/02	12	06/13/03
RAKG	RF SECTION	HEWLETT PACKARD	85462A	3549A00284	0.009-6500MHZ	02/18/02	12	02/18/03
RAKH	RF FILTER SECTION	HEWLETT PACKARD	85460A	3448A00324	---	02/18/02	12	02/18/03

Cal. Interval: Listed in Months I/O: Initial Only N/A: Not Applicable

Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

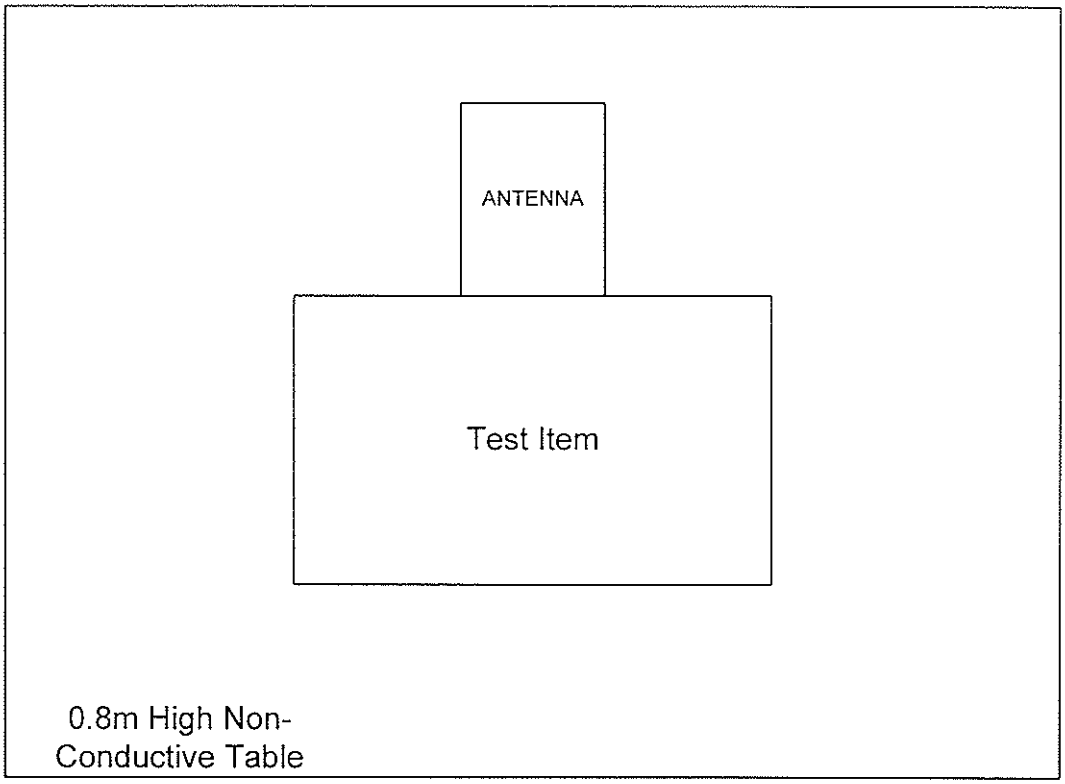
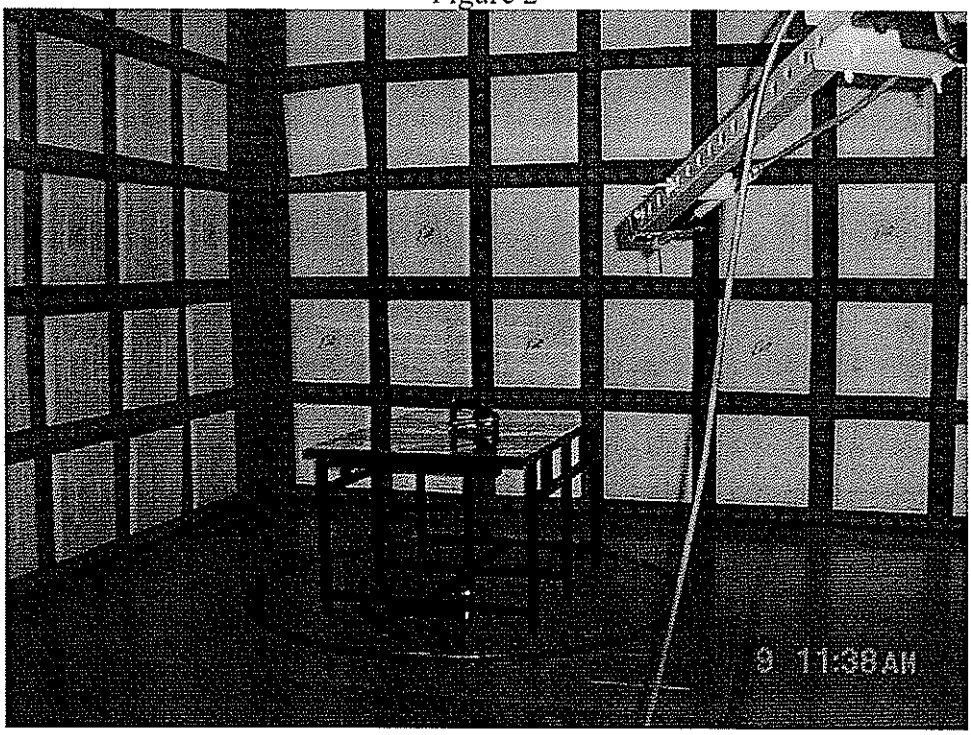
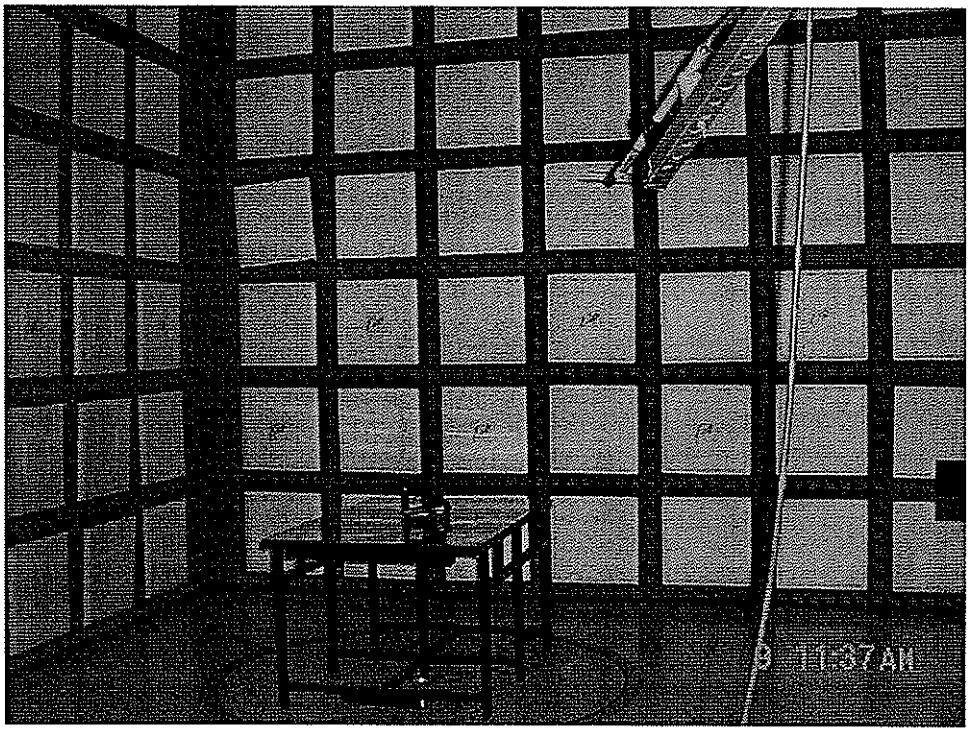


Figure 1 - Block Diagram of Test Item

Figure 2

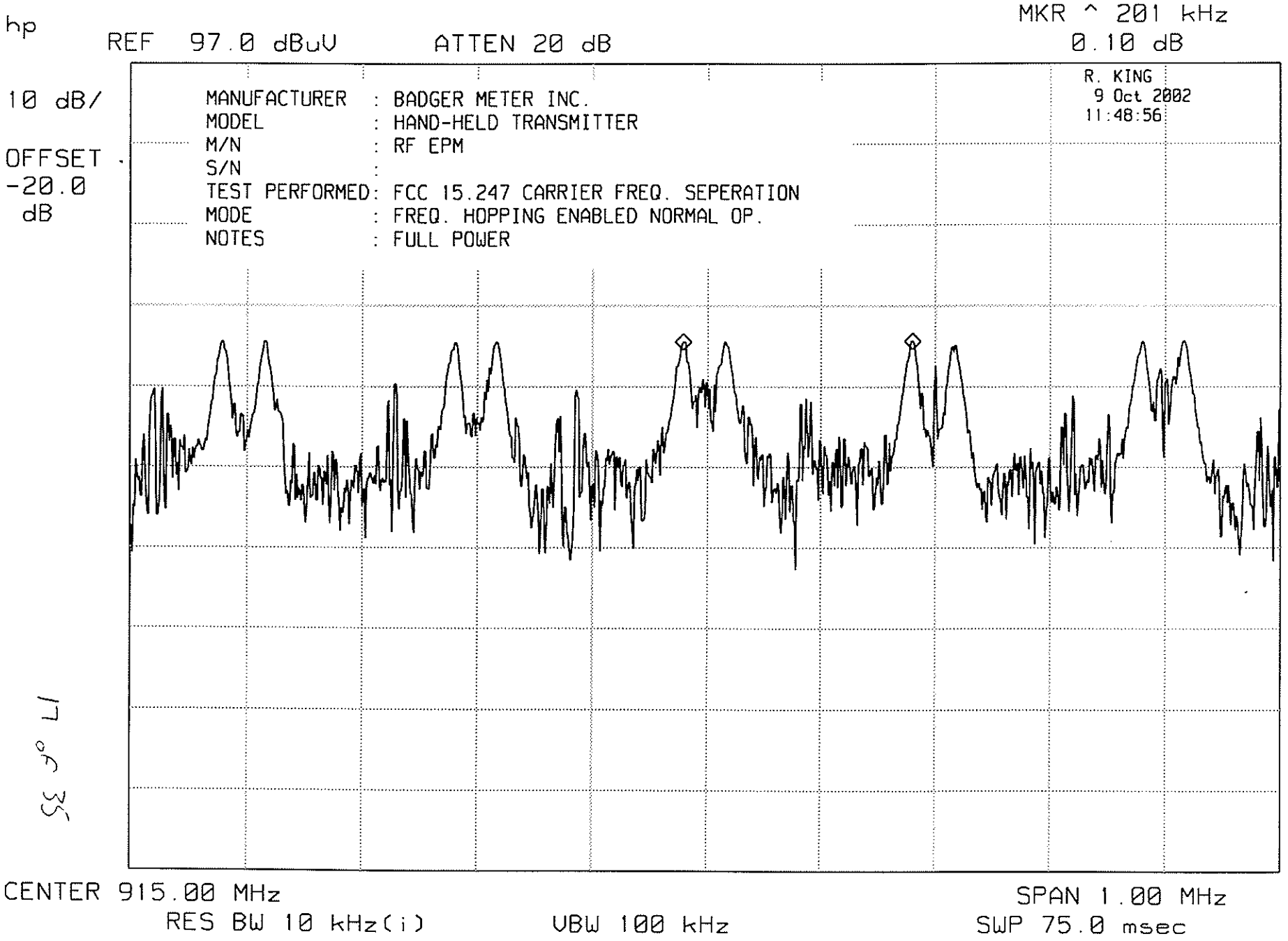


Radiated Emissions Worst Case Horizontal Polarization



Radiated Emissions Worst Case Vertical Polarization

ELITE ELECTRONIC ENGINEERING Inc.



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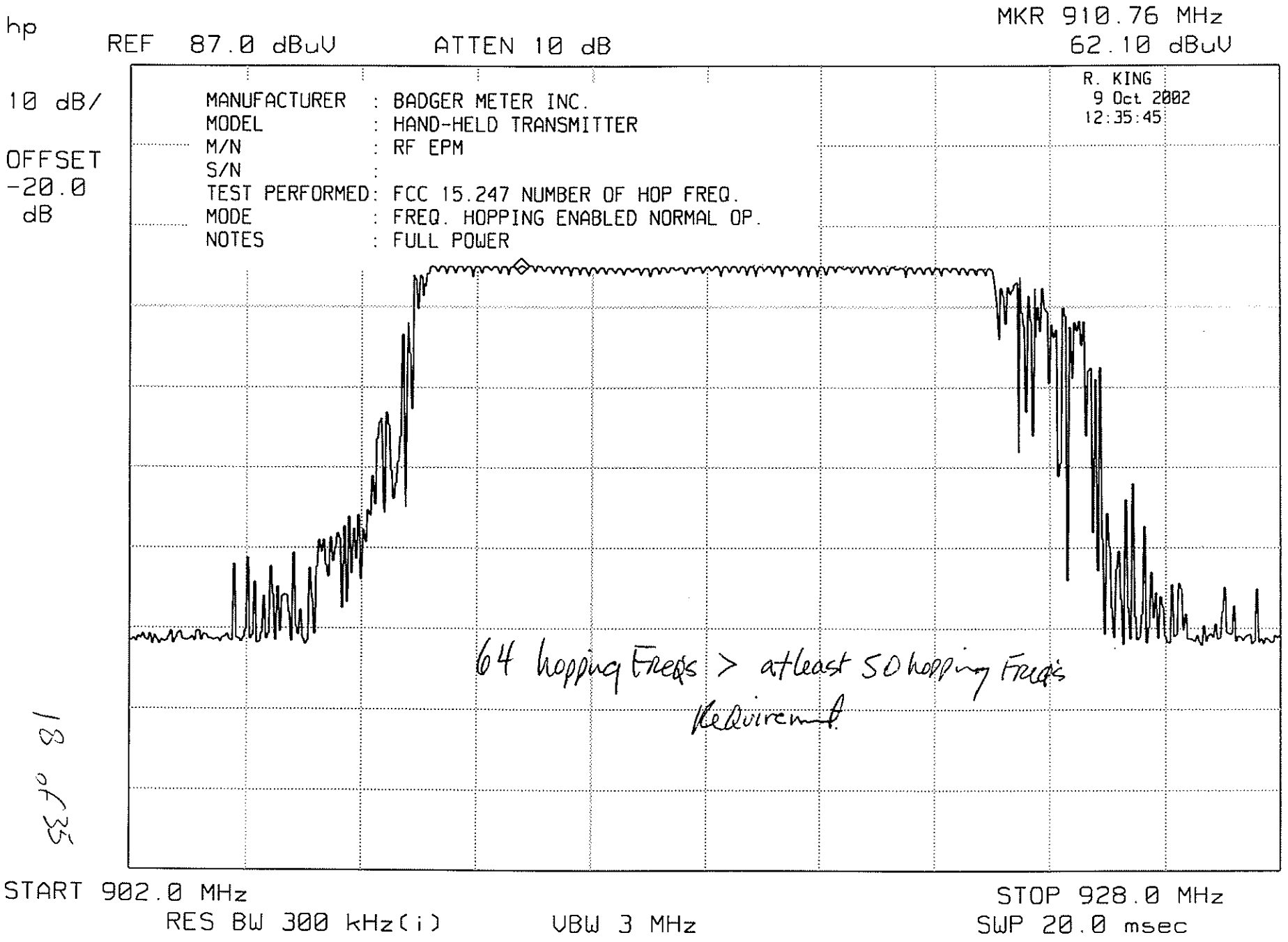

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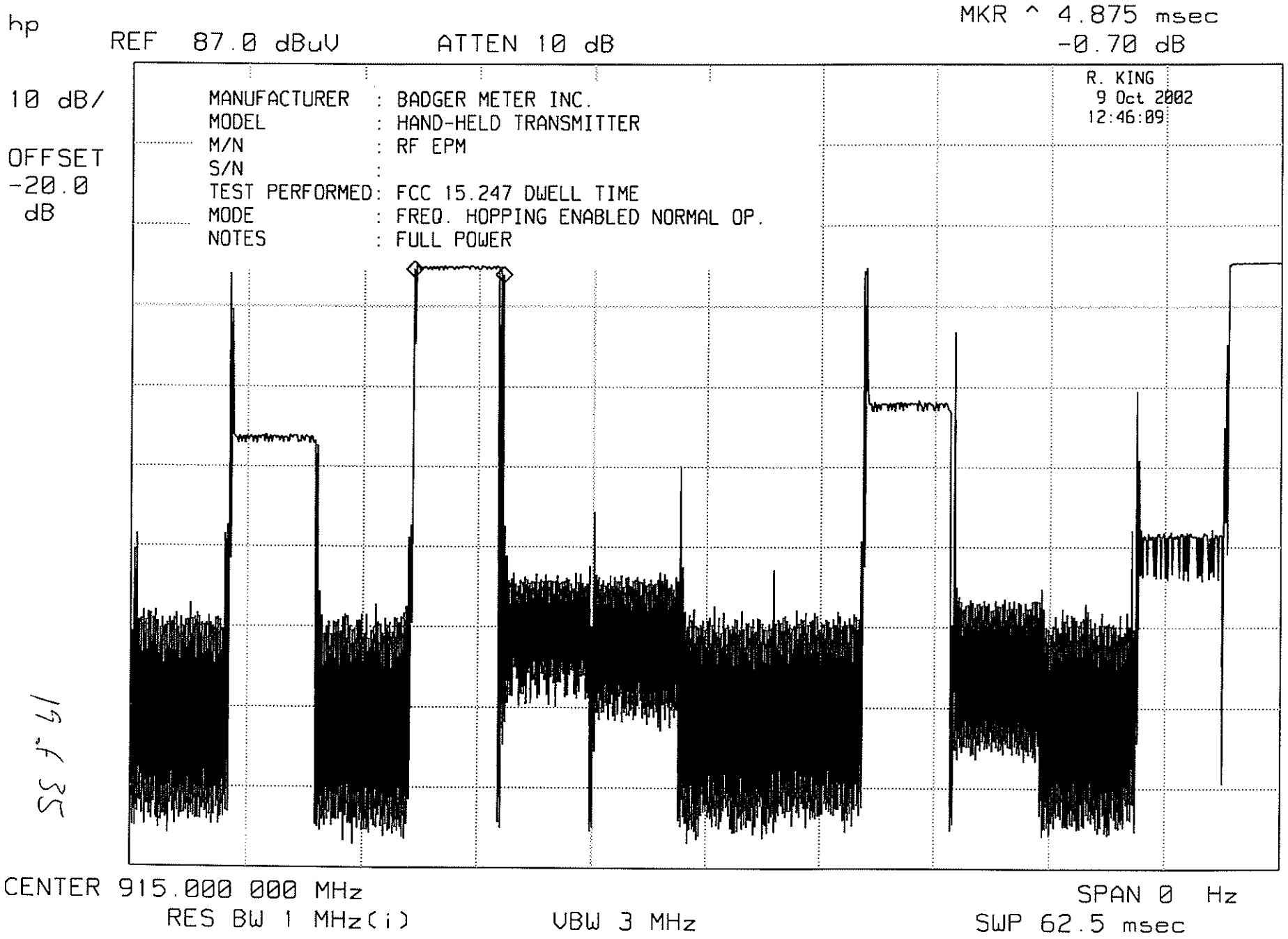

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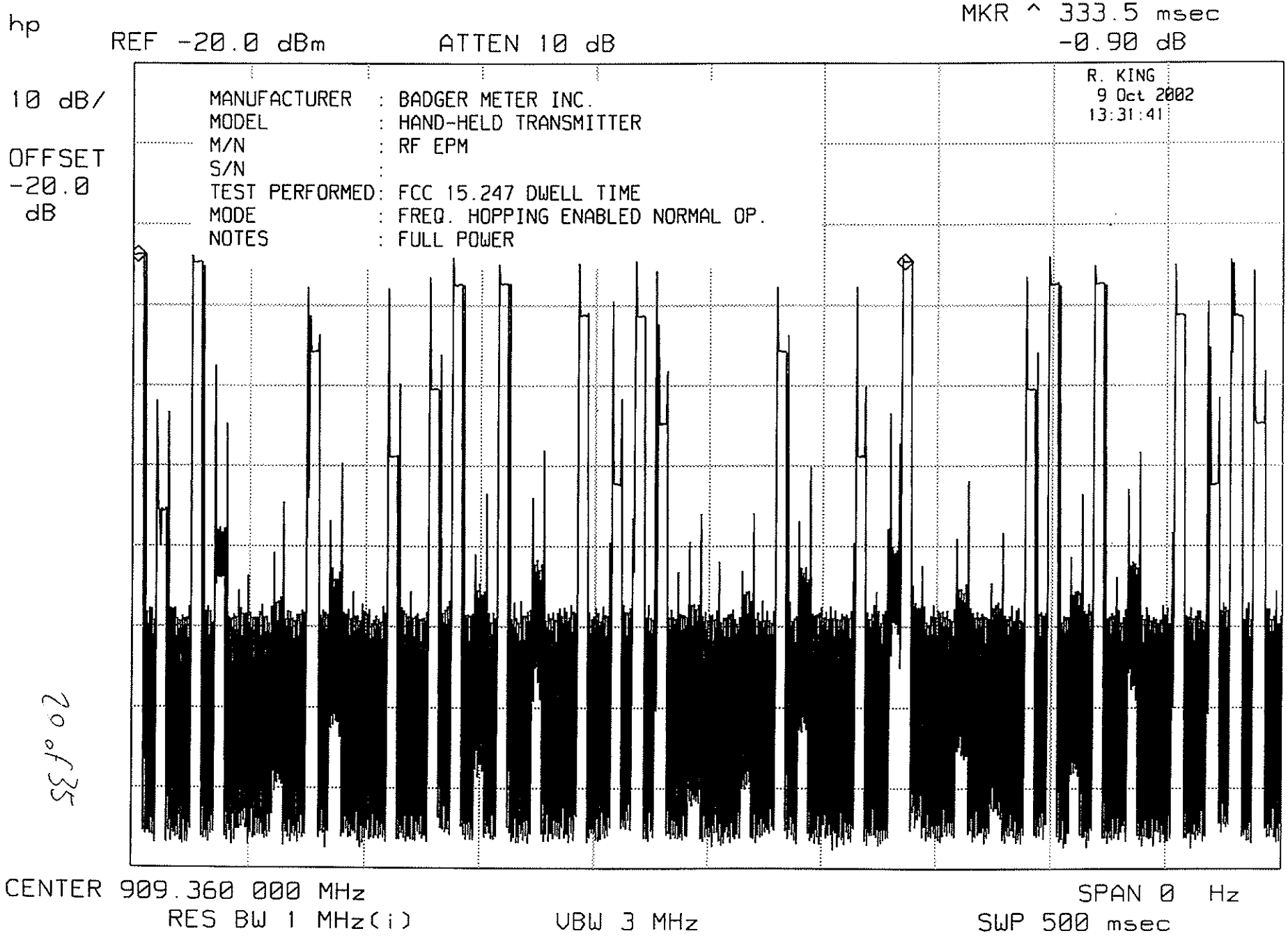

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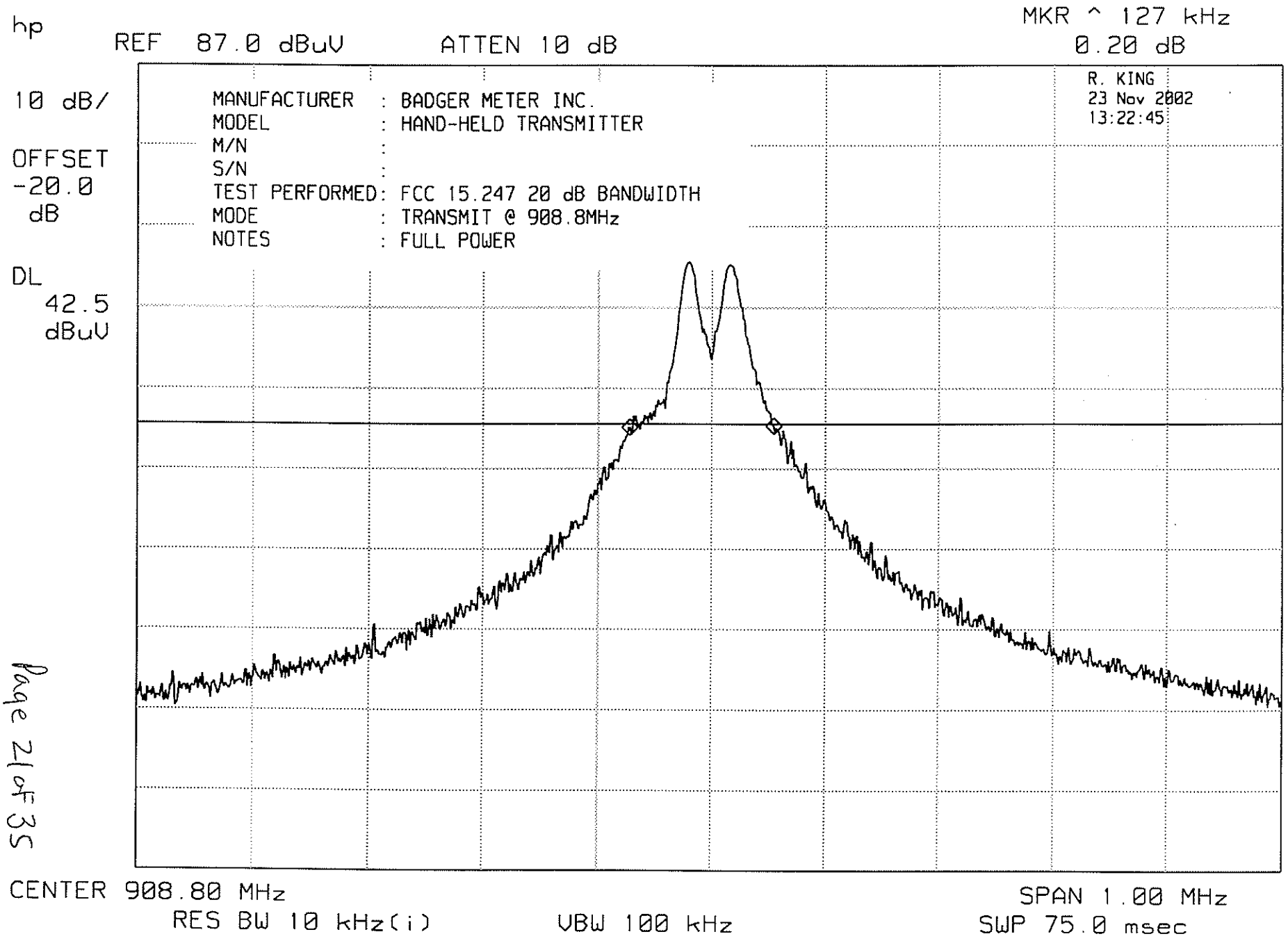

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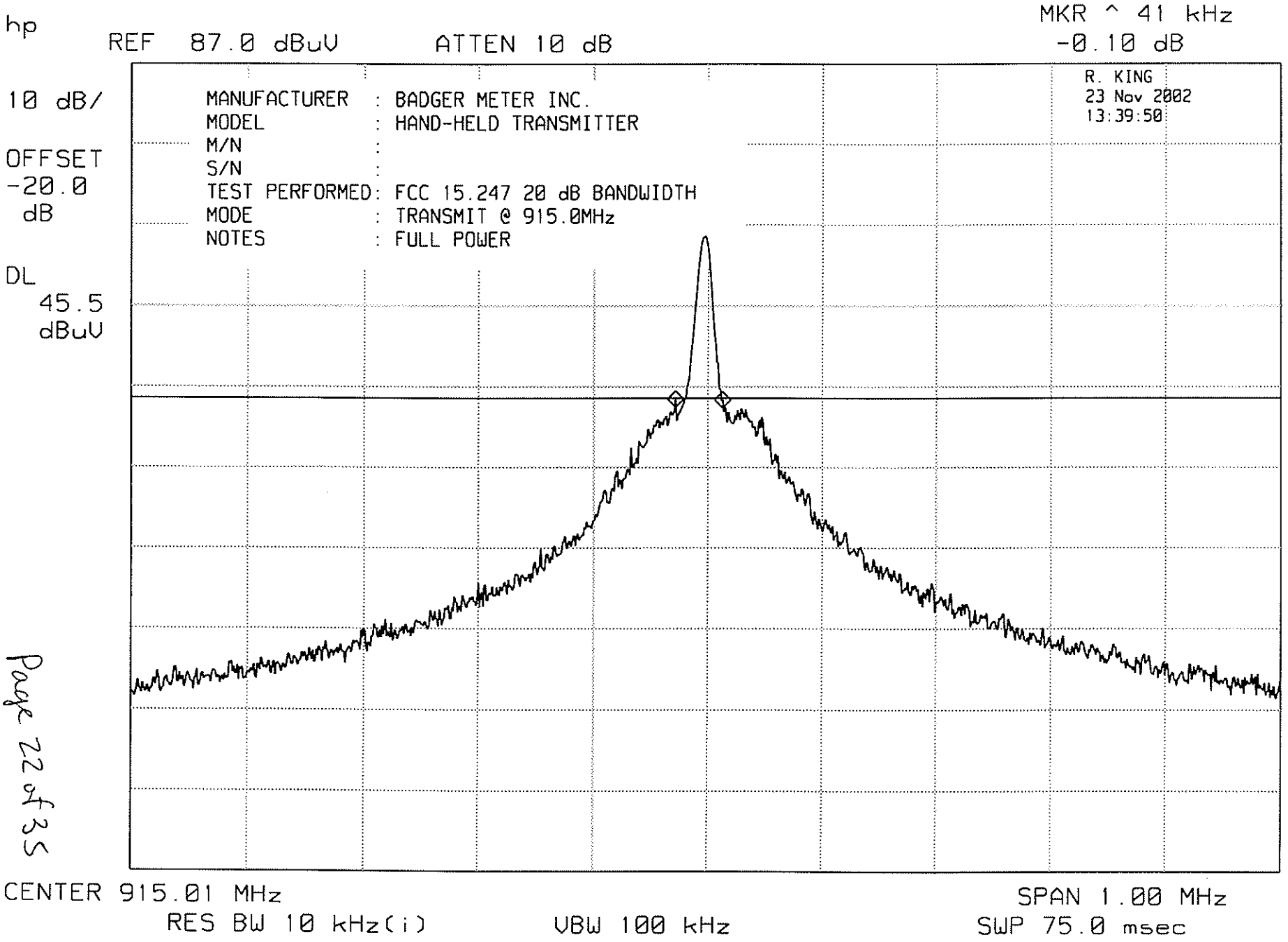

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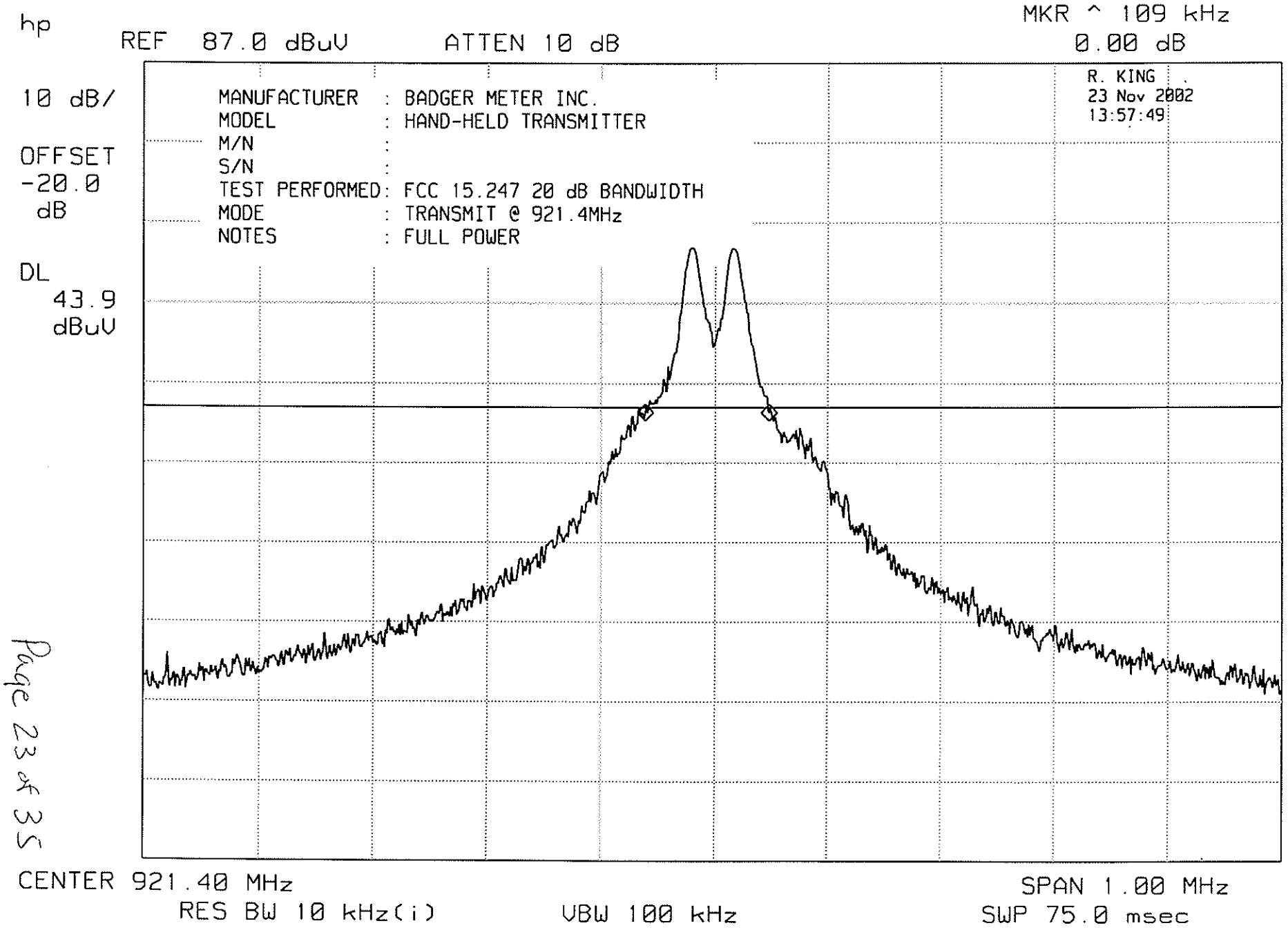


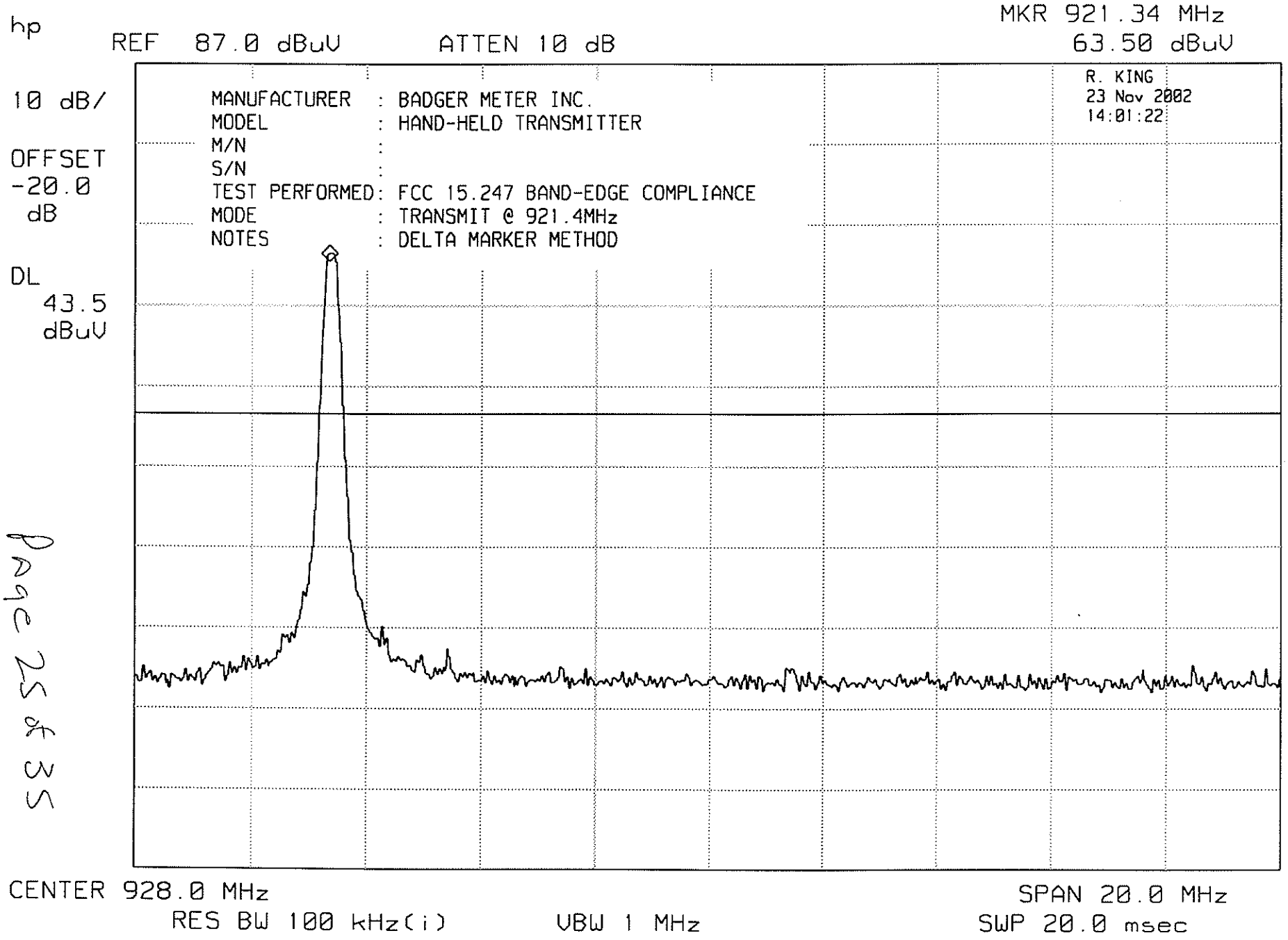
ETR 31516-01

PEAK OUTPUT POWER
SPECIFICATION : FCC-15C (15.247)
MANUFACTURER : BADGER METER
MODEL NO. : HAND-HELD
SERIAL NO. : NONE GIVEN
NOTES : TRANSMITTING AT FULL POWER
TEST DATE : NOVEMBER 23, 2002
TEST DISTANCE : 3m

Freq. (MHz)	Ant. Pol.	F.I. (dBuV/m)	Conv. FI to EIRP	EIRP Total (dbm)	EIRP Limit (dBm)
908.0	H	85.0	95	-10.0	36
	V	94.6	95	-0.4	36
915.0	H	85.4	95	-9.6	36
	V	96.9	95	1.9	36
921.4	H	86.7	95	-8.3	36
	V	96.3	95	1.3	36

CHECKED BY: Richard E. King

ELITE ELECTRONIC ENGINEERING Inc.



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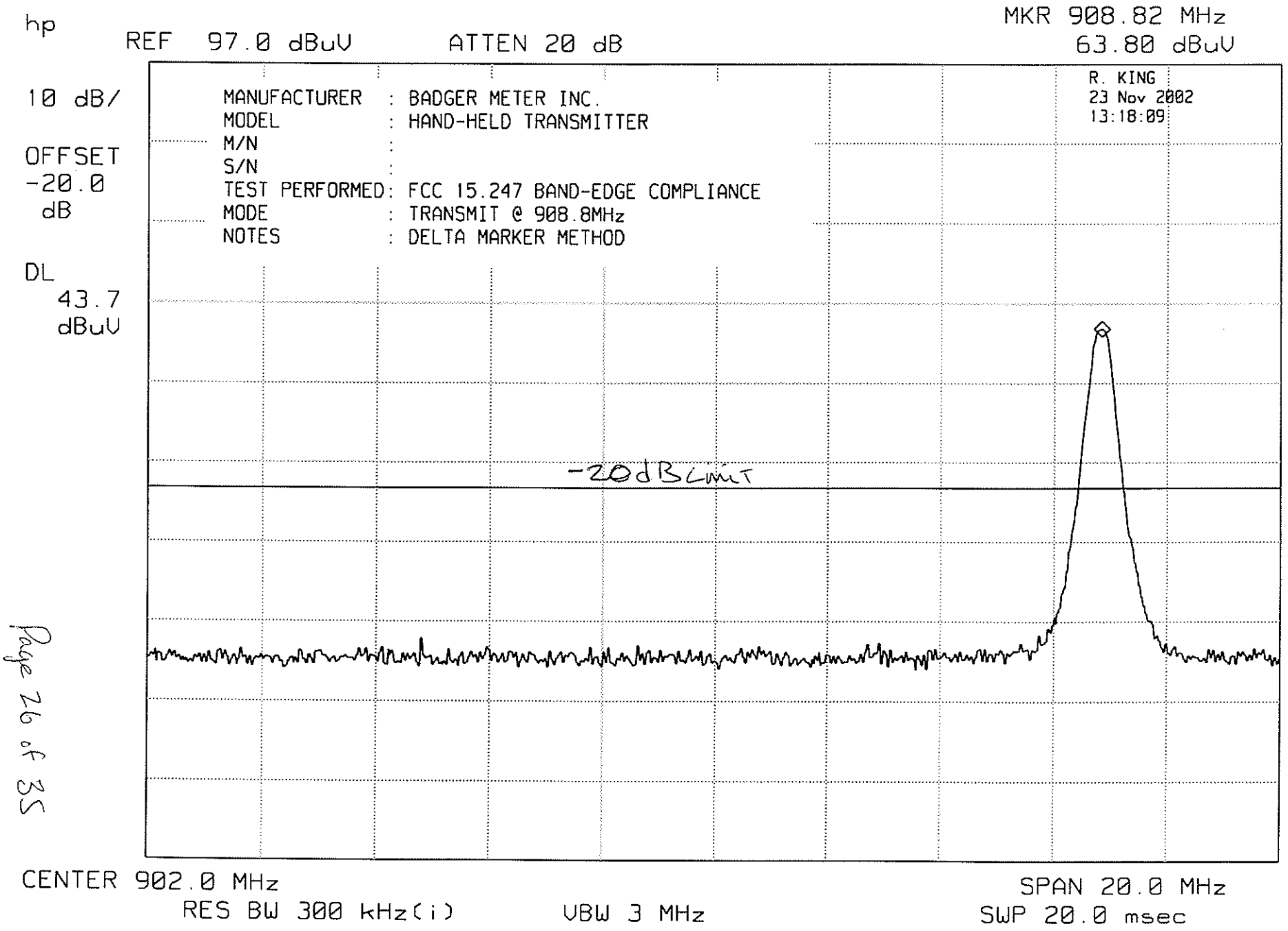
ELITE ELECTRONIC ENGINEERING Inc.



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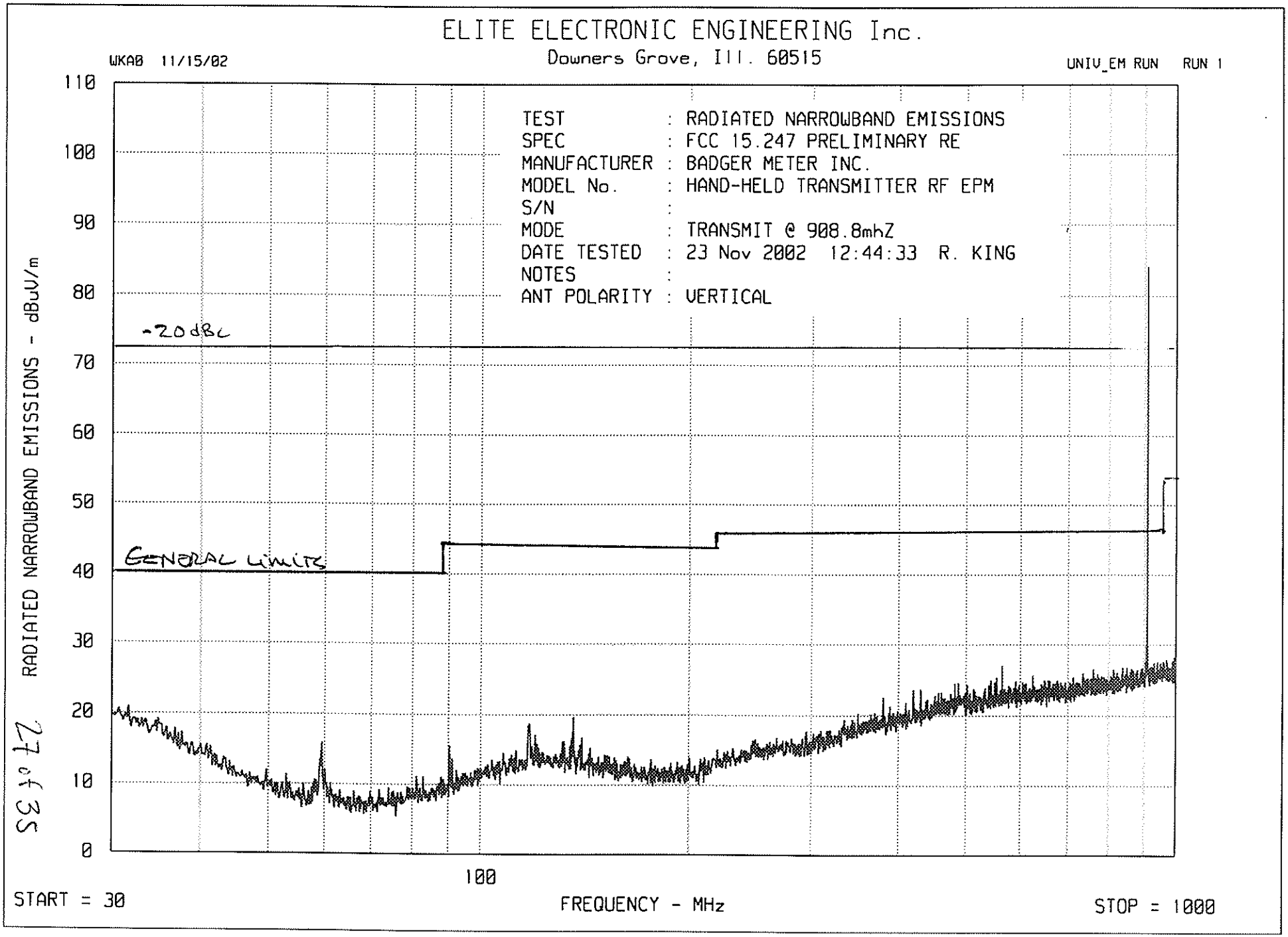

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FTR 31398-01

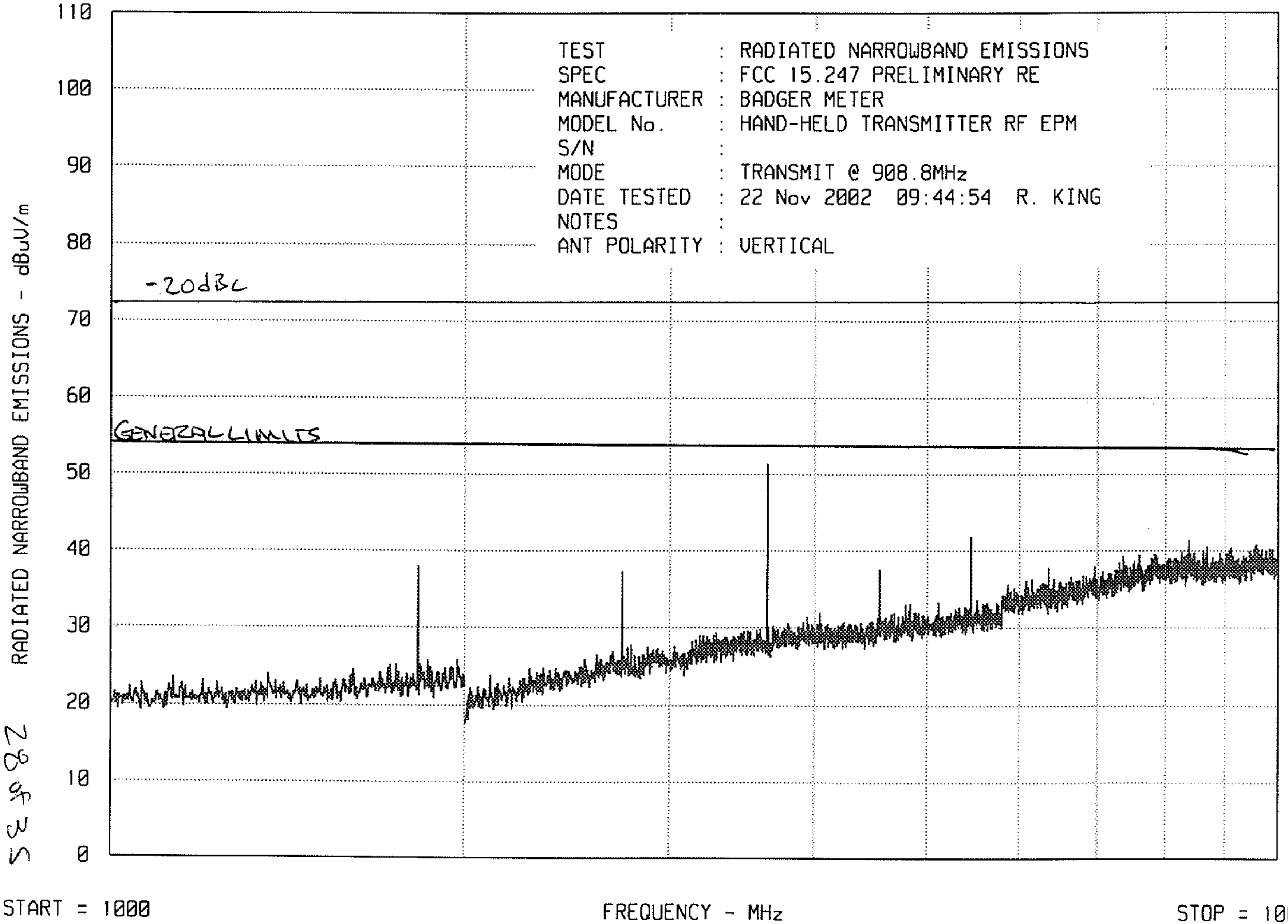
ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

WKA0 11/15/02

UNIV_EM RUN RUN 2

TEST	:	RADIATED NARROWBAND EMISSIONS
SPEC	:	FCC 15.247 PRELIMINARY RE
MANUFACTURER	:	BADGER METER
MODEL No.	:	HAND-HELD TRANSMITTER RF EPM
S/N	:	
MODE	:	TRANSMIT @ 908.8MHz
DATE TESTED	:	22 Nov 2002 09:44:54 R. KING
NOTES	:	
ANT POLARITY	:	VERTICAL



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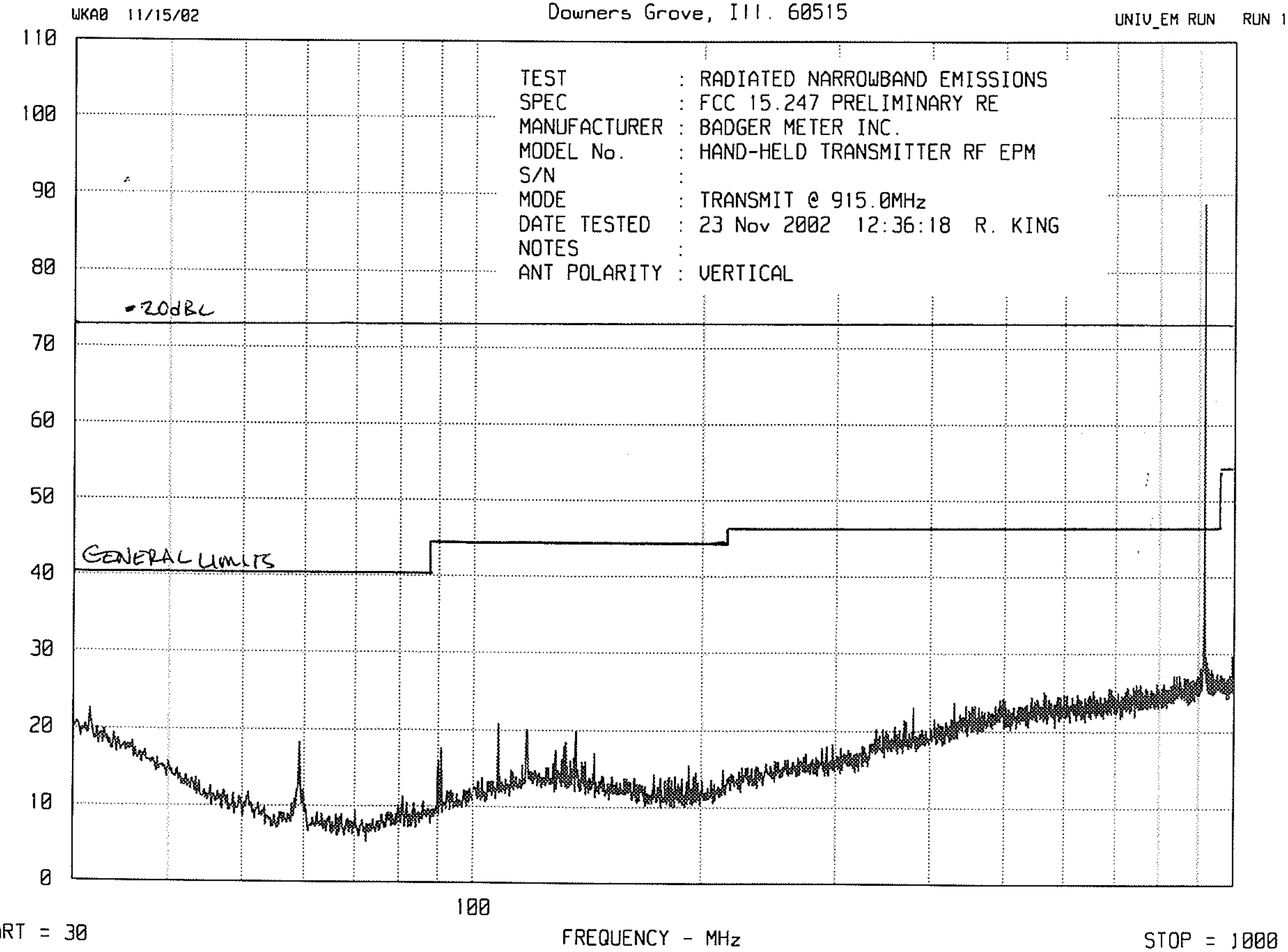
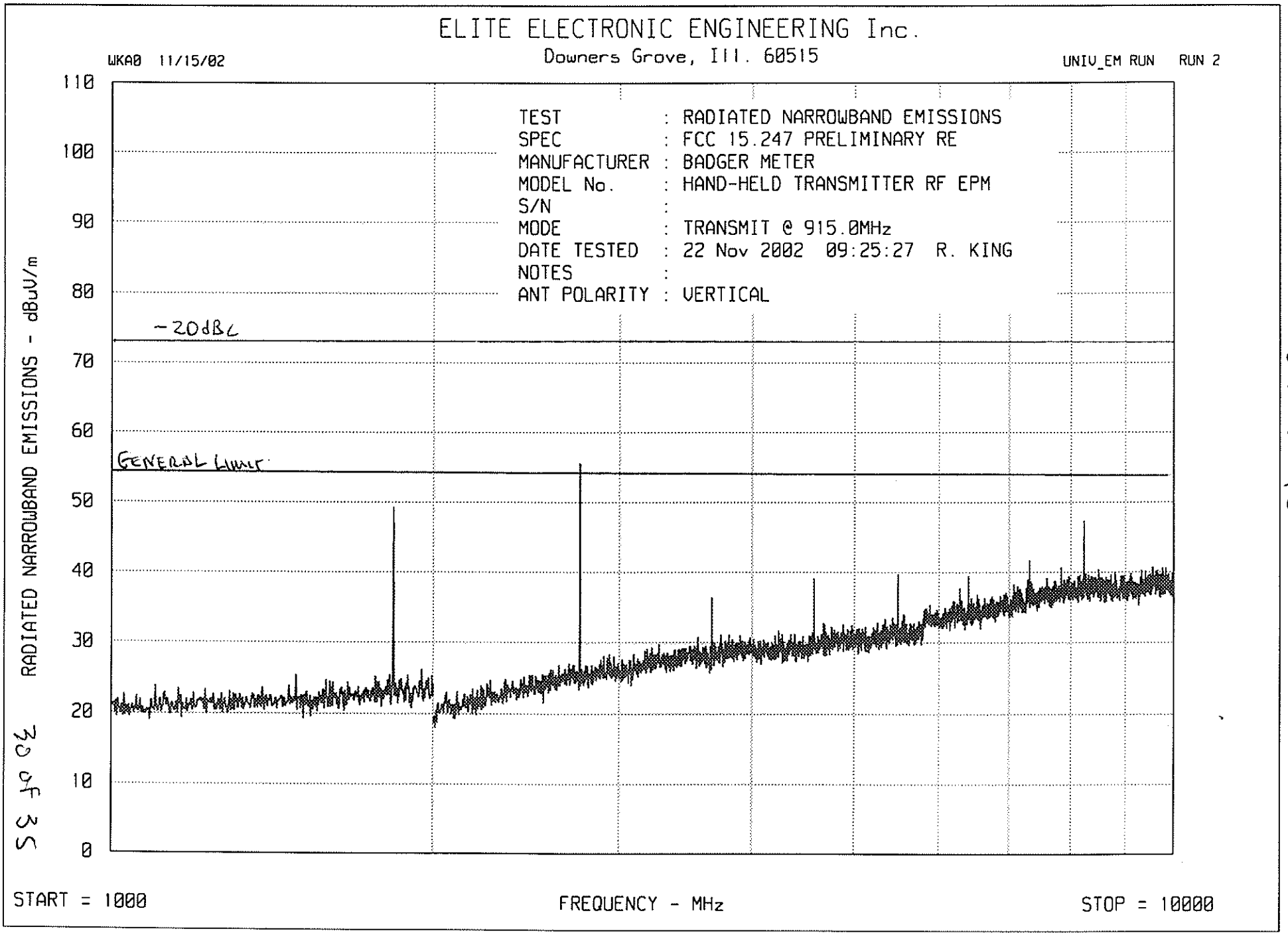
ETR 31398-01

ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515





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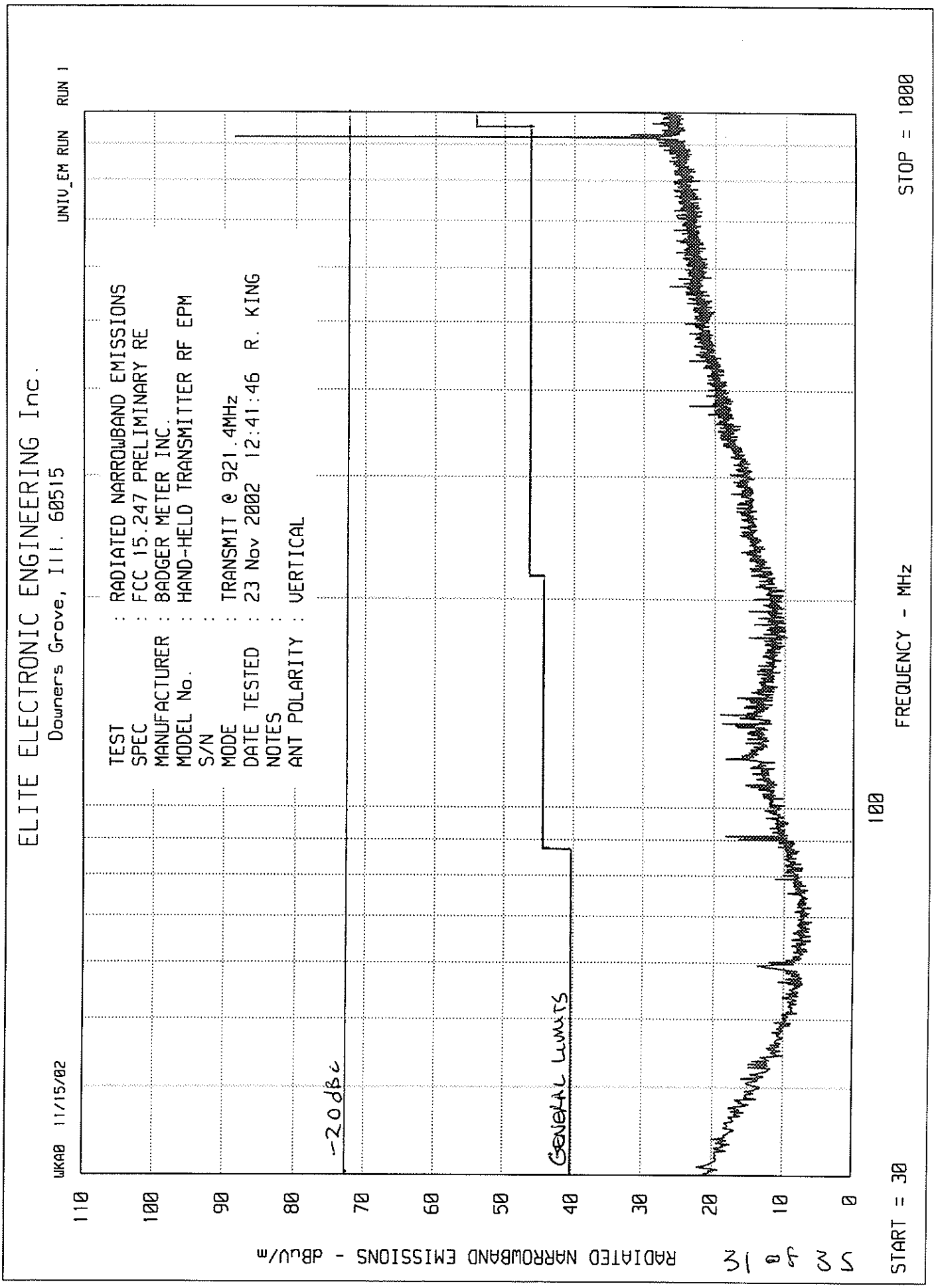
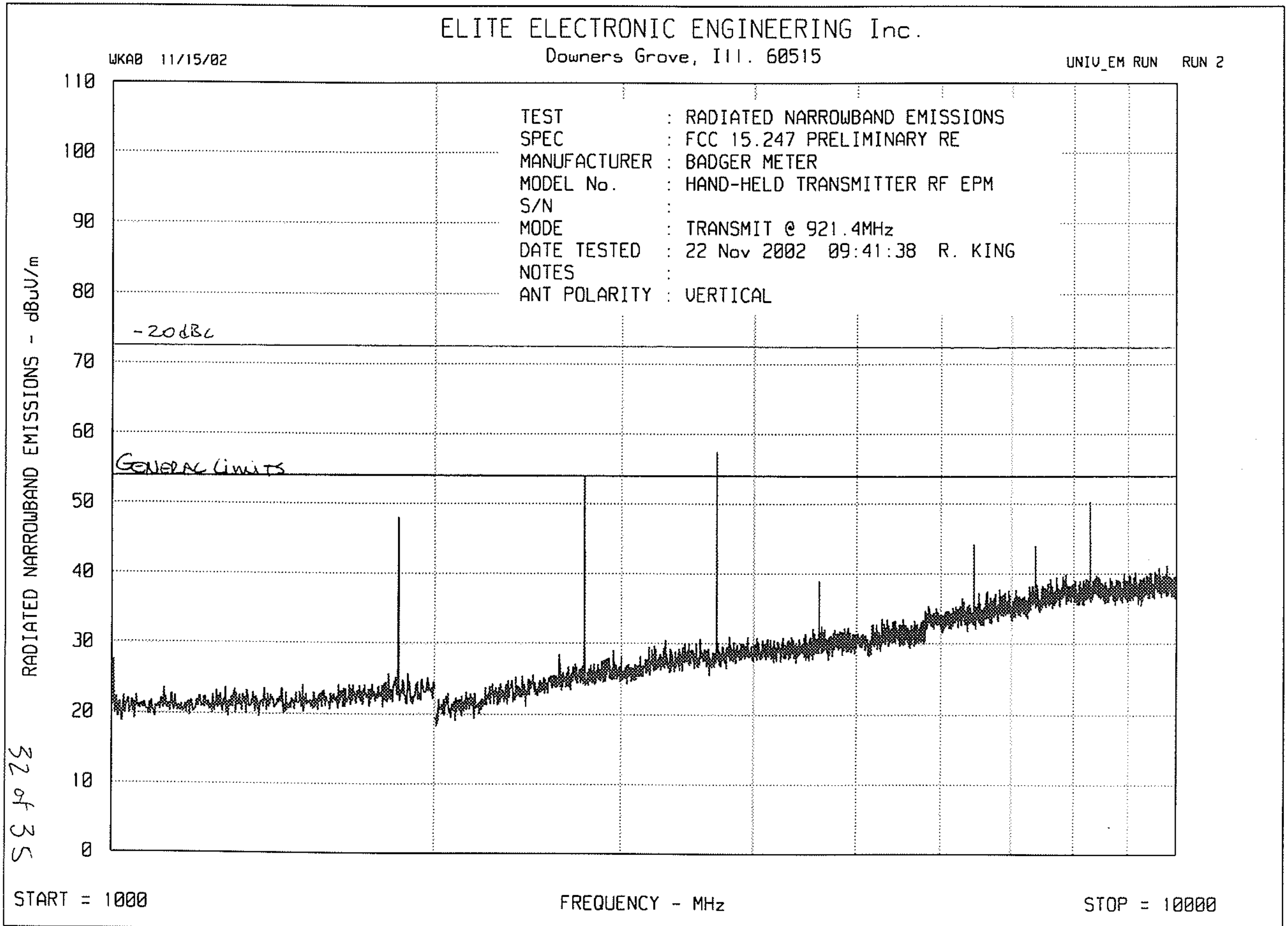
FTR 31398-01

ETR 31398-01


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV_EM RUN RUN 1
WKA0 11/15/02
TEST : RADIATED NARROWBAND EMISSIONS
SPEC : FCC 15.247 PRELIMINARY RE
MANUFACTURER : BADGER METER INC.
MODEL No. : HAND-HELD TRANSMITTER RF EPM
S/N :
MODE : TRANSMIT @ 921.4MHz
DATE TESTED : 23 Nov 2002 12:41:46 R. KING
NOTES :
ANT POLARITY : VERTICAL
-20dBc
General Limits
RADIATED NARROWBAND EMISSIONS - dBuV/m
110
100
90
80
70
60
50
40
30
20
10
0
START = 30
100
FREQUENCY - MHz
STOP = 1000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
WKA0 11/15/02
UNIV_EM RUN RUN 2
TEST : RADIATED NARROWBAND EMISSIONS
SPEC : FCC 15.247 PRELIMINARY RE
MANUFACTURER : BADGER METER
MODEL No. : HAND-HELD TRANSMITTER RF EPM
S/N :
MODE : TRANSMIT @ 921.4MHz
DATE TESTED : 22 Nov 2002 09:41:38 R. KING
NOTES :
ANT POLARITY : VERTICAL
-20dBc
GENERAL LIMITS
RADIATED NARROWBAND EMISSIONS - dBuV/m
110
100
90
80
70
60
50
40
30
20
10
0
START = 1000
FREQUENCY - MHz
STOP = 10000

ETR 31398-01

RADIATED EMISSION MEASUREMENTS IN A 3m ANECHOIC ROOM
SPECIFICATION : FCC-15C (15.247)
MANUFACTURER : BADGER METER
MODEL NO. : HAND-HELD
SERIAL NO. : NONE GIVEN
NOTES : TRANSMIT AT LOW CHANNEL 908.8MHz
TEST DATE : NOVEMBER 22-23, 2002
TEST DISTANCE : 3m

FREQ MHz	ANT POL	MTR RDG dBuV		BW	ANT FAC	CABLE LOSS	PRE AMP	TOTAL dBuV/m	TOTAL uV/m	LIMIT uV
908.8	H	53.3	0.0	100k/3M	27.9	2.2	0.0	83.4	14716.3	
	V	63.2	0.0	100k/3M	27.9	2.2	0.0	93.3	46004.5	
908.8	H	54.9	0.0	1M/3M	27.9	2.2	0.0	85.0	17692.9	
	V	64.5	0.0	1M/3M	27.9	2.2	0.0	94.6	53431.8	
1816.0	H	63.7	0.0	100k/3M	28.2	2.6	-36.9	57.6	758.6	4600.0
	V	62.9	0.0	100k/3M	28.2	2.6	-36.9	56.8	691.8	4600.0
2724.8	H	55.6	-26.6	1M/10	31.4	3.5	-36.7	27.2	22.9	500.0
	V	56.1	-26.6	1M/10	31.2	3.5	-36.7	27.5	23.7	500.0
3633.6	H	64.3	-26.6	1M/10	32.4	4.0	-36.4	37.7	76.4	500.0
	V	62.6	-26.6	1M/10	32.4	4.0	-36.4	36.0	63.1	500.0
4542.4	H	44.4	-26.6	1M/10	32.8	4.4	-36.4	18.6	8.5	500.0
	V	43.4	-26.6	1M/10	32.8	4.4	-36.4	17.6	7.6	500.0
5451.2	H	56.1	-26.6	1M/10	35.2	5.0	-35.9	33.8	48.8	500.0
	V	51.4	-26.6	1M/10	35.2	5.0	-35.9	29.1	28.5	500.0
6360.0	H	42.0	0.0	100k/3M	36.1	5.7	-36.1	47.7	242.7	4600.0
	V	41.9	0.0	100k/3M	36.1	5.7	-36.1	47.6	239.9	4600.0
7268.8	H	34.9	-26.6	1M/10	37.4	6.2	-36.3	15.6	6.0	500.0
	V	33.8	-26.6	1M/10	37.4	6.2	-36.3	14.5	5.3	500.0
8177.6	H	34.3	-26.6	1M/10	37.6	7.0	-36.3	16.0	6.3	500.0
	V	34.4	-26.6	1M/10	37.6	7.0	-36.3	16.1	6.4	500.0
9086.4	H	34.6	-26.6	1M/10	38.0	7.0	-36.6	16.4	6.6	500.0
	V	34.5	-26.6	1M/10	38.0	7.0	-36.6	16.3	6.5	500.0

CHECKED BY: Richard S. King

RADIATED EMISSION MEASUREMENTS IN A 3m ANECHOIC ROOM

SPECIFICATION : FCC-15C (15.247)
MANUFACTURER : BADGER METER
MODEL NO. : RF HAND-HELD
SERIAL NO. : NONE GIVEN
NOTES : TRANSMIT AT LOW CHANNEL 915MHz
TEST DATE : NOVEMBER 22-23, 2002
TEST DISTANCE : 3m

FREQ MHz	ANT POL	MTR RDG dBuV	Duty Cycle	BW	ANT FAC	CABLE LOSS	PRE AMP	TOTAL dBuV/m	TOTAL uV/m	LIMIT uV
915.0	H	53.2	0.0	100k/3M	28.0	2.2	0.0	83.4	14716.3	
	V	64.0	0.0	100k/3M	28.0	2.2	0.0	94.2	51027.0	
915.0	H	55.2	0.0	1M/3M	28.0	2.2	0.0	85.4	18526.8	
	V	66.7	0.0	1M/3M	28.0	2.2	0.0	96.9	69630.6	
1830.0	H	58.5	0.0	100k/3M	28.2	2.6	-36.9	52.4	416.9	5103.0
	V	59.3	0.0	100k/3M	28.2	2.6	-36.9	53.2	457.1	5103.0
2745.0	H	64.4	-26.6	1M/10	31.4	3.5	-36.7	36.0	63.1	500.0
	V	64.8	-26.6	1M/10	31.4	3.5	-36.7	36.4	66.1	500.0
3660.0	H	69.7	-26.6	1M/10	32.4	4.0	-36.4	43.1	142.2	500.0
	V	67.5	-26.6	1M/10	32.4	4.0	-36.4	40.9	110.9	500.0
4575.0	H	59.1	-26.6	1M/10	32.8	4.4	-36.4	33.3	46.2	500.0
	V	50.7	-26.6	1M/10	32.8	4.4	-36.4	24.9	17.6	500.0
5490.0	H	63.1	0.0	100k/3M	35.2	5.0	-35.9	67.4	2344.2	5103.0
	V	64.5	0.0	100k/3M	35.2	5.0	-35.9	68.8	2754.2	5103.0
6405.0	H	50.9	0.0	100k/3M	36.1	5.7	-36.1	56.6	676.1	5103.0
	V	52.9	0.0	100k/3M	36.1	5.7	-36.1	58.6	851.1	5103.0
7320.0	H	33.7	-26.6	1M/10	37.4	6.2	-36.3	14.4	5.2	500.0
	V	33.6	-26.6	1M/10	37.4	6.2	-36.3	14.3	5.2	500.0
8235.0	H	33.5	-26.6	1M/10	37.6	7.0	-36.3	15.2	5.8	500.0
	V	33.9	-26.6	1M/10	37.6	7.0	-36.3	15.6	6.0	500.0
9150.0	H	33.6	-26.6	1M/10	38.0	7.0	-36.6	15.4	5.9	500.0
	V	33.1	-26.6	1M/10	38.0	7.0	-36.6	14.9	5.6	500.0

CHECKED BY: Richard E. King

RADIATED EMISSION MEASUREMENTS IN A 3m ANECHOIC ROOM
SPECIFICATION : FCC-15C (15.247)
MANUFACTURER : BADGER METER
MODEL NO. : RF HAND-HELD
SERIAL NO. : NONE GIVEN
NOTES : TRANSMIT AT LOW CHANNEL 921.4MHz
TEST DATE : NOVEMBER 22-23, 2002
TEST DISTANCE : 3m

FREQ MHz	ANT POL	MTR RDG dBuV	Duty Cycle	BW	ANT FAC	CABLE LOSS	PRE AMP	TOTAL dBuV/m	TOTAL uV/m	LIMIT uV
921.4	H	54.2	0.0	100k/3M	28.2	2.2	0.0	84.6	16896.6	
	V	63.5	0.0	100k/3M	28.2	2.2	0.0	93.9	49294.7	
921.4	H	56.3	0.0	1M/3M	28.2	2.2	0.0	86.7	21517.9	
	V	65.9	0.0	1M/3M	28.2	2.2	0.0	96.3	64983.0	
1842.0	H	52.5	0.0	100k/3M	28.2	2.6	-36.9	46.4	208.9	4929.0
	V	57.2	0.0	100k/3M	28.2	2.6	-36.9	51.1	358.9	4929.0
2764.0	H	60.3	-26.6	1M/10	31.4	3.5	-36.7	31.9	39.4	500.0
	V	60.6	-26.6	1M/10	31.4	3.5	-36.7	32.2	40.7	500.0
3685.5	H	71.2	-26.6	1M/10	32.4	4.0	-36.4	44.6	169.0	500.0
	V	67.5	-26.6	1M/10	32.4	4.0	-36.4	40.9	110.9	500.0
4606.9	H	60.0	-26.6	1M/10	32.8	4.4	-36.4	34.2	51.3	500.0
	V	52.0	-26.6	1M/10	32.8	4.4	-36.4	26.2	20.4	500.0
5528.3	H	66.6	0.0	100k/3M	35.2	5.0	-35.9	70.9	3507.5	4929.0
	V	60.9	0.0	100k/3M	35.2	5.0	-35.9	65.2	1819.7	4929.0
6449.7	H	55.1	0.0	100k/3M	36.1	5.7	-36.1	60.8	1096.5	4929.0
	V	53.9	0.0	100k/3M	36.1	5.7	-36.1	59.6	955.0	4929.0
7371.1	H	39.1	-26.6	1M/10	37.4	6.2	-36.3	19.8	9.8	500.0
	V	40.3	-26.6	1M/10	37.4	6.2	-36.3	21.0	11.2	500.0
8292.5	H	40.1	-26.6	1M/10	37.6	7.0	-36.3	21.8	12.3	500.0
	V	36.8	-26.6	1M/10	37.6	7.0	-36.3	18.5	8.4	500.0
9213.9	H	40.3	0.0	100k/3M	38.0	7.0	-36.6	48.7	272.3	4929.0
	V	39.9	0.0	100k/3M	38.0	7.0	-36.6	48.3	260.0	4929.0

CHECKED BY: Richard E King