TABLE OF CONTENTS

APPLICANT: OMEGA RESEARCH & DEVELOPMENT, INC.
D/B/A EXCALIBUR OF AMERICA

FCC ID: L2MREC-11

TEST REPORT CONTAINING:

PAGE 1.....TEST EQUIPMENT LIST & TEST PROCEDURE
PAGE 2.....TEST PROCEDURE CONTD.
PAGE 3.....RADIATION INTERFERENCE TEST DATA
PAGE 4.....CALCULATION OF DUTY CYCLE
PAGE 5A-5C.....DUTY CYCLE PLOTS
PAGE 6.....OCCUPIED BANDWIDTH
PAGE 7.....OCCUPIED BANDWIDTH PLOTS

EXHIBIT ATTACHMENTS:

EXHIBIT 1.....SCHEMATIC
EXHIBIT 2.....INSTRUCTION MANUAL
EXHIBIT 3.....FCC ID LABEL SAMPLE AND LOCATION
EXHIBIT 4A.....FRONT VIEW EXTERNAL PHOTO
EXHIBIT 4B.....REAR VIEW EXTERNAL PHOTO
EXHIBIT 5A.....COMPONENT SIDE INTERNAL PHOTO
EXHIBIT 5B.....COPPER SIDE INTERNAL PHOTO
EXHIBIT 6.....TEST SET UP PHOTO
EXHIBIT 7.....CIRCUIT DESCRIPTION
EXHIBIT 8.....BLOCK DIAGRAM

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FCC ID: L2MREC-11

TEST EQUIPMENT LIST

1._X_Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/ preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter HP 8565OA, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02, S/N 3008A00372 Cal. 10/17/99
2._X_Biconnical Antenna: Eaton Model 94455-1, S/N 1057
3.___Biconnical Antenna: Electro-Metrics Model BIA-25, S/N 1171
4._X_Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
5.___Log-Periodic Antenna: Electro-Metrics Model LPA-30, S/N 409
6._X_Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180, 1-18 GHz, S/N 2319
7.___18-26.3GHz Systron Donner Standard Gain Horn #DBE-520-20
8.___Horn 40-60GHz: ATM Part #19-443-6R
9.___Line Impedance Stabilization Network: Electro-Metrics Model ANS-25/2, S/N 2604 Cal. 2/9/00
10.___Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
11.___Frequency Counter: HP Model 5385A, S/N 3242A07460 Cal 10/6/99
12.___Peak Power Meter: HP Model 8900C, S/N 2131A00545
13._X_Open Area Test Site #1-3meters Cal. 12/22/99
14.___Signal Generator: HP 8640B, S/N 2308A21464 Cal. 9/23/99
15.___Signal Generator: HP 8614A, S/N 2015A07428
16.___Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N 9706-1211 Cal. 6/10/00
17.___Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153 Cal. 11/24/99
18.___AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 9/21/99
19.___Digital Multimeter: Fluke Model 8012A, S/N 4810047 Cal 9/21/99
20.___Digital Multimeter: Fluke Model 77, S/N 43850817 Cal 9/21/99
21.___Oscilloscope: Tektronix Model 2230, S/N 300572 Cal 9/23/99

TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a preselector. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz. The ambient temperature of the UUT was 79oF with a humidity of 52%.

TEST PROCEDURES CONTD.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz)	METER READING + ACF = FS
33	20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.4-1992 10.1.7 MEASUREMENT PROCEDURES: The UUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10th harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings were converted to average readings based on the duration of "ON" time.

Measurements were made by TIMCO ENGINEERING INC. at the registered open field test site located at 849 N.W. State Road 45, Newberry, Fl 32669.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

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D/B/A EXCALIBUR OF AMERICA

FCC ID: L2MREC-11

NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.231

REQUIREMENTS:

Fundamental Frequency MHz	Field Strength of Fundamental dBuV	Field Strength of Harmonics and Spurious Emissions (dBuV/m @ 3m)
40.66 to 40.70	67.04	47.04
70 to 130	61.94	41.94
130 to 174	61.94 to 71.48	41.94 to 51.48
174 to 260	71.48	51.48
260 to 470	71.48 to 81.94	51.48 to 61.94
470 and above	81.94	61.94

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE FUNDAMENTAL FREQUENCY= 80.83 dBuV/m dBuV/m. NO FUNDAMENTAL IS ALLOWED IN THE RESTRICTED BANDS.

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE HARMONICS AND SPURIOUS FREQUENCIES = 60.83 dBuV/m dBuV/m. SPURIOUS IN THE RESTRICTED BANDS MUST BE LESS THAN 54dBuV/m OR 15.209.

TEST DATA:

EMISSION FREQ. MHz	METER READING @ 3m dBuV	COAX LOSS dB	ACF dB	PEAK FIELD STRNGTH dBuV/m	AVERAGE FIELD STRNGTH dBuV/m	MARGIN dB	ANT.
434.20	63.00	1.60	17.79	82.39	75.40	5.42	V
868.40	29.40	2.90	23.82	56.12	49.13	11.69	V
1302.60R	33.30	1.00	25.21	59.51	52.52	1.48	V
1736.80	30.60	1.00	26.95	58.55	51.56	9.26	V
2171.00	21.50	1.06	28.43	50.98	44.00	16.83	V
2605.20	14.50	1.12	29.51	45.13	38.15	22.68	V
3039.40	1.20	1.19	30.60	32.98	26.00	34.83	H

SAMPLE CALCULATION OF LIMIT @ 303 MHz:

(470 - 260)Mhz = 210 MHz
(12500 - 3750)uV/m = 8750 uV/m
8750uV/m/210MHz = 41.67 uV/m/MHz
(303-260)MHz = 43 MHz
43 MHz * 41.67 uV/m/MHz = 1791.81 uV/m
(1791.81 + 3750)uV/m = 5541.81 uV/m limit @ 303 MHz

The transmitter ceases transmitting when the button is released.
TEST RESULTS: The unit DOES meet the FCC requirements.

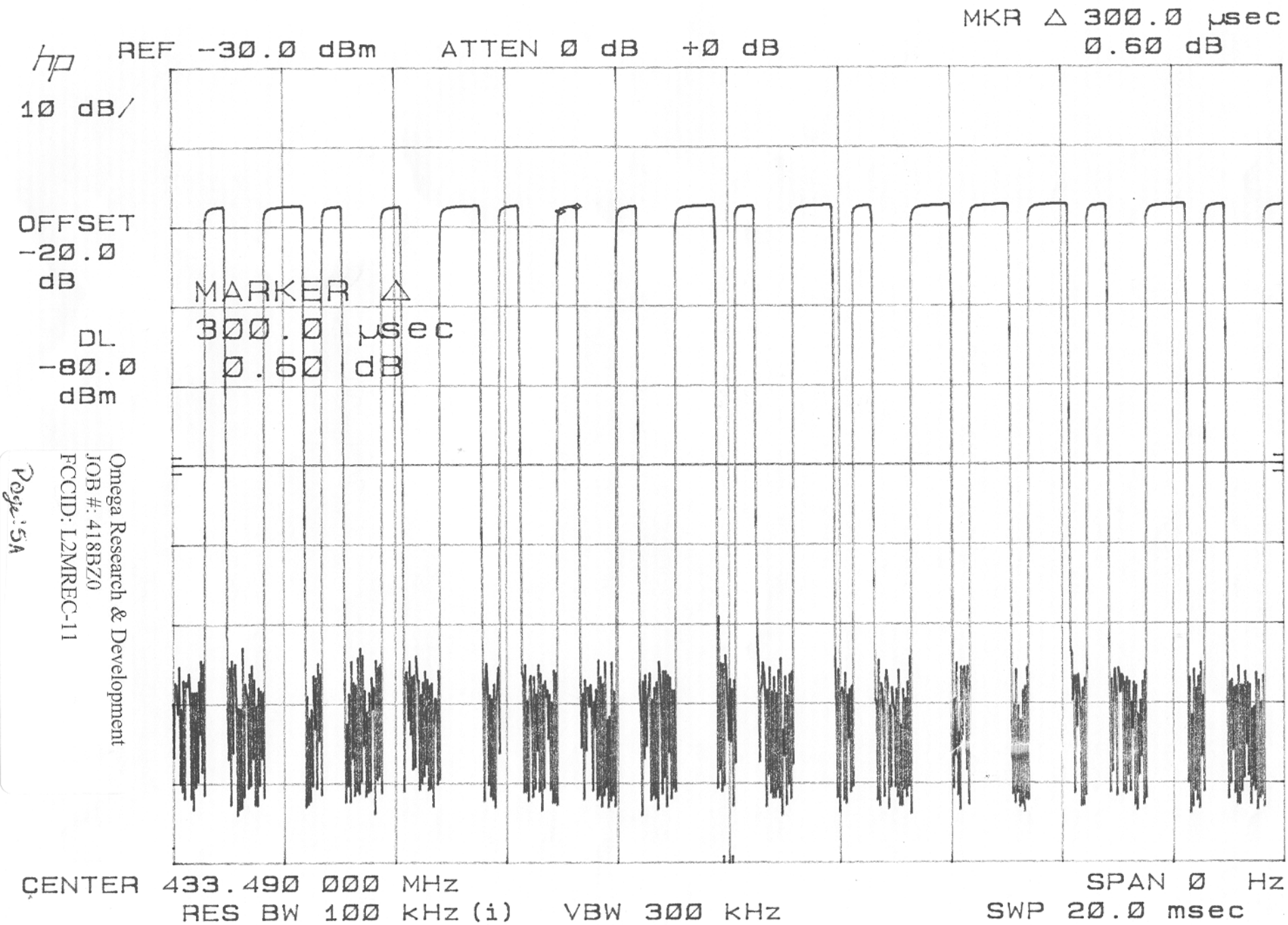
PERFORMED BY: JOSEPH SCOGLIO DATE TESTED: DECEMBER 17, 2000

REPORT #: T:\CUS\O\OMEGA\418BZU0\418BZU0RPT.DOC
PAGE #: 3

CALCULATION OF DUTY CYCLE:

The period of the pulse train is determined by observing it on an oscilloscope or a spectrum analyzer with zero(0) frequency span. A plot is then made of the pulse train with a sweep time of 100milliseconds. This sweep determines the duration of the pulse train, which in this case is 80.9 milliseconds. This sweep allows the determination of the number of and type of pulses, i.e. long & short. Plots are then made showing the duration of each type of pulse and its duration. From the 100millisecond Plot the number of a given type of pulse is then multiplied by the duration of that type pulse. This allows the calculation of the amount of time the UUT is on within 100milliseconds. If the pulse train is longer than 100milliseconds then this number is multiplied by 100 to determine the percentage ON TIME. If the pulse train is less than 100milliseconds the total on-time is divided by the length of the pulse train and then multiplied by 100 to determine the percentage ON TIME. In this case there were 32 pulses 700milliseconds long and 46pulses 300milliseconds long for a total of 80.9 mSmilliseconds on time within either the 100milliseconds or the pulse train. The average field strength is determined by multiplying the peak field strength by the percent on time. In this case the percentage ON time was 44.7%percent.

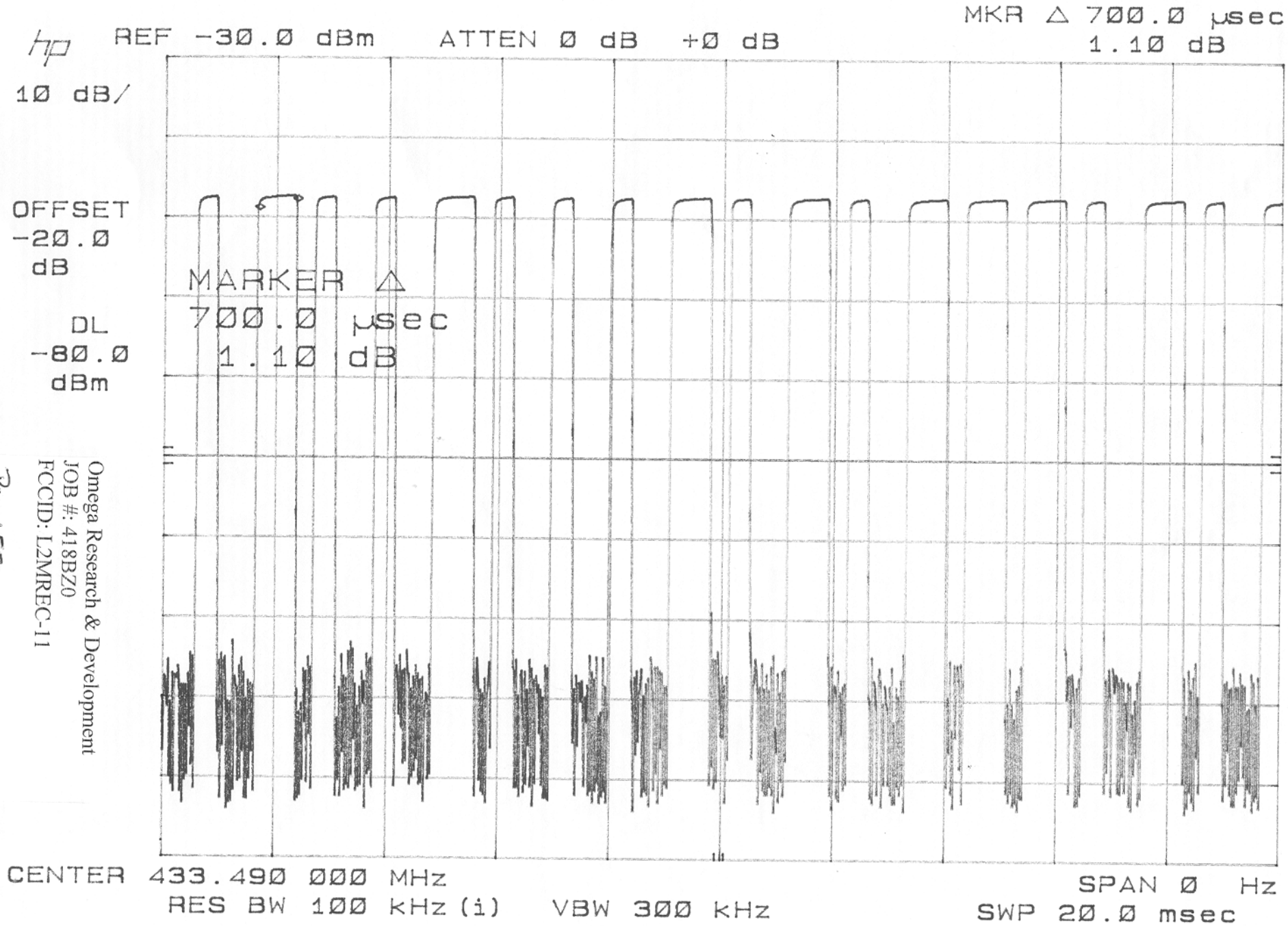
DUTY CYCLE - SHORT PULSES



Omega Research & Development
JOB #: 418BZ0
FCCID: L2MREC-11

Page 5A

DUTY CYCLE - LONG PULSES



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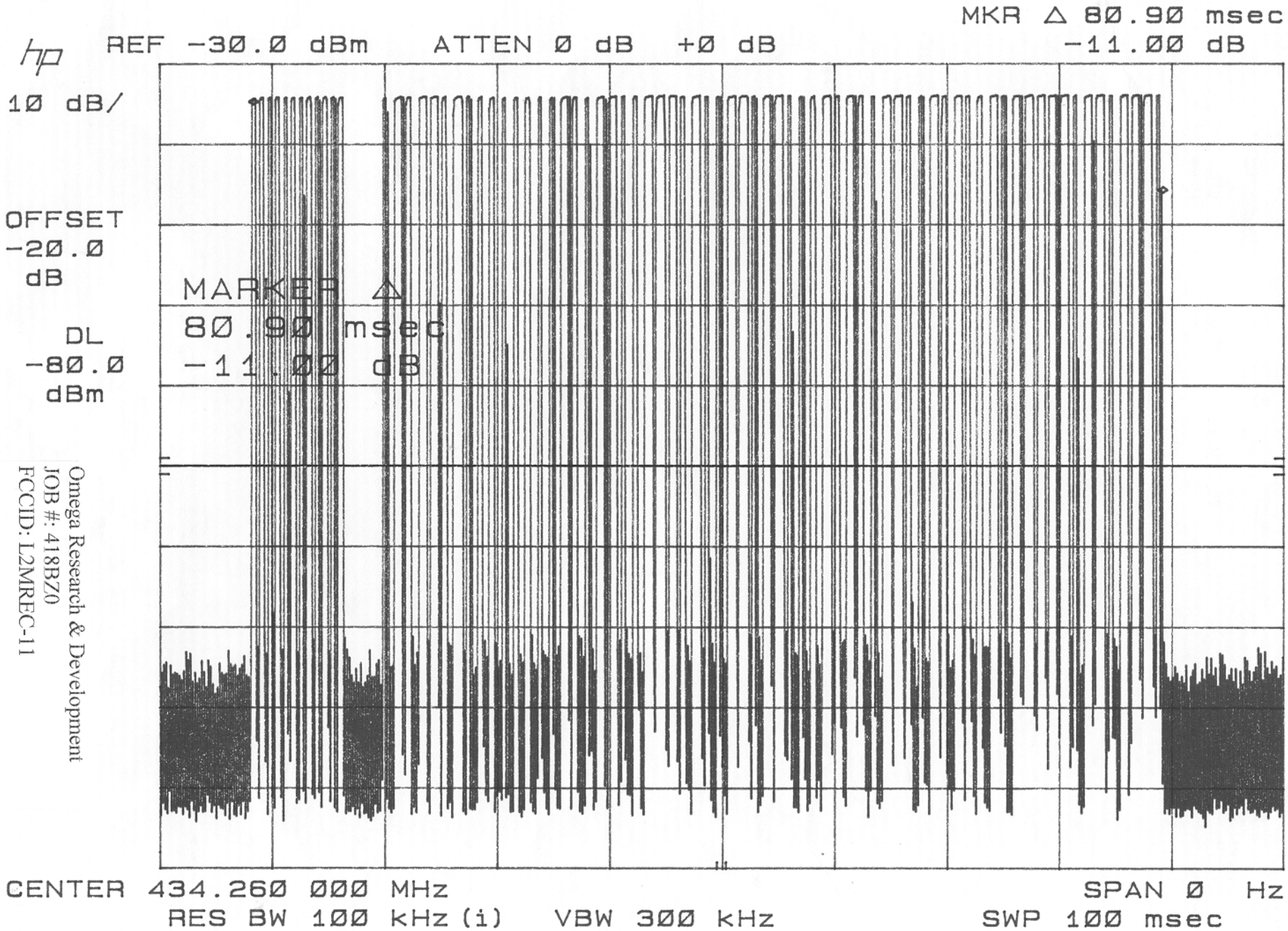
JOB #: 418BZ0
FCCID: L2MREC-11

Page: 53

DUTY CYCLE - PULSE TRAIN



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JOB #: 418BZ0
FCCID: L2MREC-11

Page 50

APPLICANT: OMEGA RESEARCH & DEVELOPMENT, INC.
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FCC ID: L2MREC-11

NAME OF TEST: Occupied Bandwidth

RULES PART NO.: 15.231(C)

REQUIREMENTS: The bandwidth of the emission shall be no wider than .25% of the center frequency for devices operating between 70 and 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

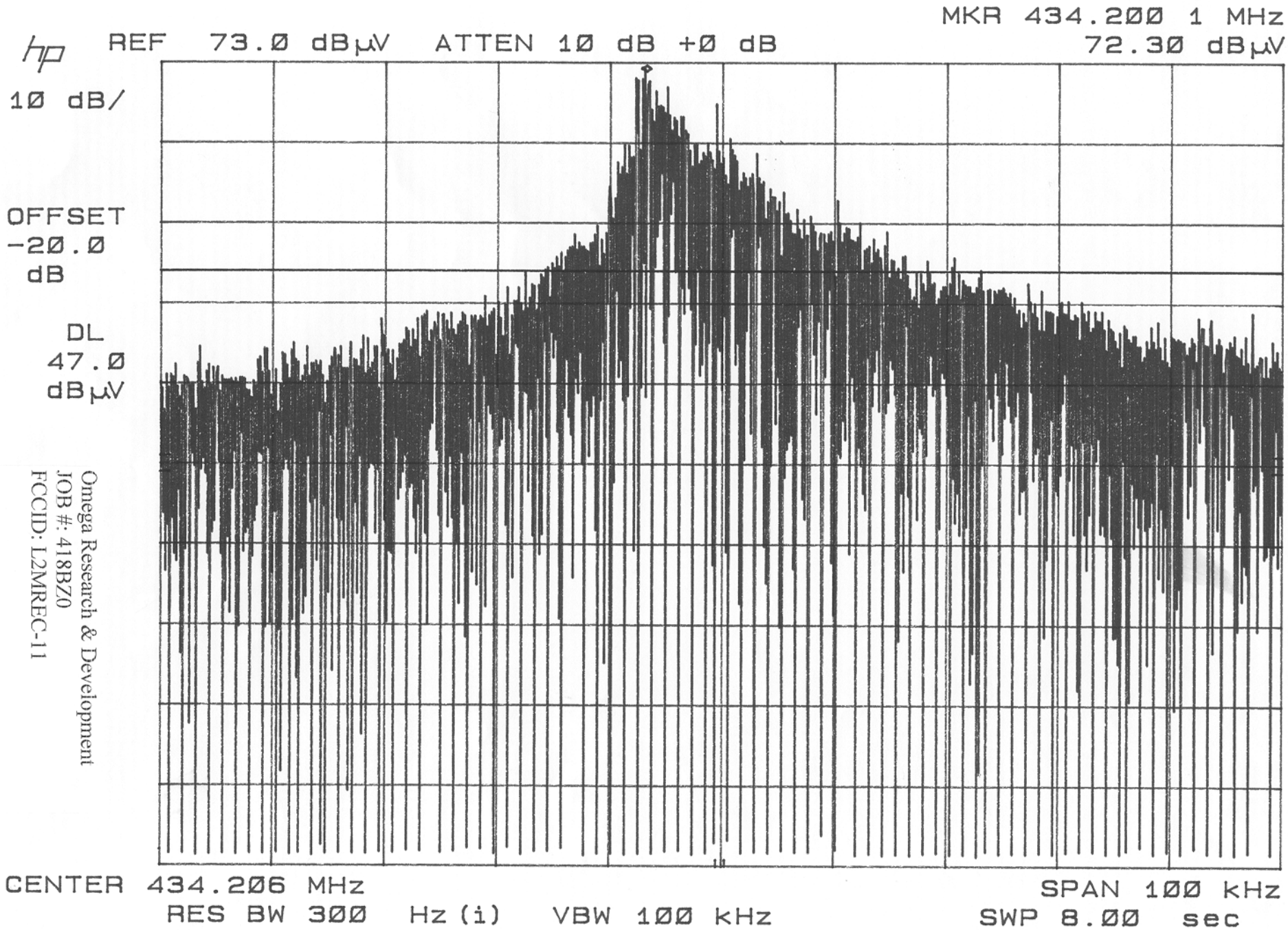
434.20 MHz * .0025 = 1.0855 MHz
1.0855 MHz/2 = +/- 542.75 kHz

THE GRAPH ON THE NEXT PAGE REPRESENTS THE EMISSIONS TAKEN FOR THE DEVICE.

METHOD OF MEASUREMENT: A small sample of the transmitter output was fed into the spectrum analyzer and the plot in exhibit 9 was generated. The vertical scale is set to 10 dB per division: the horizontal scale is set to 100 kHz per division.

TEST RESULTS: The unit meets the FCC requirements.

PERFORMED BY: JOSEPH SCOGLIO DATE: DECEMBER 17, 2000



Omega Research & Development
JOB #: 418BZ0
FCCID: L2MREC-11

Page: 7