Serial No. GM21022f

FCC EMC TEST REPORT
FOR THE
DBS LODGING TECHNOLOGIES, LLC
ENTERGIZE MASTER CONTROL UNIT
TRANSMITTER FCC ID PLGMCS001

Prepared for:

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Submitted by:

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DBS Lodging Technologies, LLC
FCC EMC Testing
At
Green Mountain Electromagnetics, Inc.
Middlebury, Vermont

Unit: Entergize Master Control Unit Transmitter PLGMCS001
Received: 4/9/01
Tested: April 10 & 11, 2001

I. Applicable Standards:

The unit described in this report was measured for verification of compliance with the FCC Intentional Radiator EMC standard, 47 CFR: Part 15, Subpart C paragraphs 207, 209 & 231. Measurement procedures were in accordance with ANSI C63.4, "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (1992)."

II. Units Tested:

The DBS Lodging Technologies, LLC Entergize Master Control Unit Transmitter provides control of a slave-switch receiver and a duplex-outlet receiver. The unit consists of the transmitter electronics and a card reader installed in a standard, wall-mounted, light-switch enclosure. The transmitter electronics use SAW technology, and all assemblies are permanently installed. The table below describes the unit that was subjected to measurements determining compliance with applicable EMC standards: (The receivers were used to verify transmitter operation).

Product	Manufacturer	Model	FCCID
315-MHz Low-Power Transmitter	DBS Lodging Technologies, LLC	Entergize P/N 6000	PLGMCS001
315-MHz Outlet Receiver	DBS Lodging Technologies, LLC	Entergize P/N 6001	n/a
315-MHz Slave Switch Receiver	DBS Lodging Technologies, LLC	Entergize P/N 6002	n/a

III. Equipment and Cable Configuration:

GME witnessed the unit in satisfactory condition for testing, however the manufacturer is responsible for ensuring that the equipment under test (EUT) represents the product line. The manufacturer is also responsible for the EMC test plan and for assuring that this report is consistent with that plan.

The EUT was arranged as in the photographs in Section IX. The EUT configuration produced the maximum radiated emissions. The equipment was subjected to complete emissions tests. A receiver was used to verify transmitter operation during all testing.

The equipment was operating in a continuous mode utilizing and testing its control functions. The EUT was also set to self-test upon power up. The temperature, humidity, and atmospheric pressure during testing were 17˚C, 33% RH and 101.9 kPa. Exception: 5˚C for radiated emissions.

IV. Measuring Equipment:

The table below describes the instrumentation used by Green Mountain Electromagnetics, Inc. (GME) to perform this testing:

Unit	Manufacturer	Model	Serial #	Last Cal.	Next Cal.
Spectrum Analyzer	Hewlett-Packard	8592	3624A00631	12/01/00	12/01/01
Amplifier	Kalmus	700A	7945-1	8/18/00	8/18/01
Pre-amplifier	Mini-Circuits	ZJL-7G	D122298	11/14/00	11/14/01
LISN	GME	4A/50A	n/a	8/21/00	8/21/01
Plotter	Hewlett-Packard	7475A	2517A05281	n/a	n/a
Broadband E-field Antenna	Antenna Research Associates	LPB-2513/A	1125	10/03/00	10/03/01

V. Units of Measurement:

Measurements of radiated electric fields were made in units of dB referenced to 1 microvolt per meter (dBuV/m). Limits appearing on the spectrum analyzer data were corrected for the appropriate antenna factor, cable loss, amplifier gain and measurement distance X.

The following equations were employed:
Corrected Limit (dBuV/m) = Limit (dBuV/m) + 20 log(X/3 meters) - Antenna Factor (dB) + (Amplifier Gain (dB) - Cable Loss (dB)).

Sample calculation at 30 MHz:
55.0 dBuV corrected limit = 40.0 dBuV/m limit + 20 log(3/3) dB distance - 19.0 dB/m AF + 34.0 dB amp/cable loss.

Uncertainty:
The combined uncertainties for GME emissions measurements are: u(y) = 1.946 for radiated and u(y) = 1.298 for conducted.

VI. Measurement Location:

The GME laboratory and Open Area Test Site (OATS) are located at 219 Blake Roy Road, Middlebury, VT. The OATS is a 3-meter site complete with antenna positioner, ground plane and motorized turntable. The OATS is constructed in accordance with ANSI C63.7-1992 and complies with the requirements for radiated emissions testing in ANSI C63.4-1992 and CISPR 16-1993.

The electromagnetics laboratory is constructed in accordance with CE immunity standards and ANSI C63.4-1992 (conducted emissions).

GME is internationally accredited by the American Association for Laboratory Accreditation (A2LA) and meets the quality requirements in EN 45001-1989 and ISO/IEC Guide 25-1990, "General Requirements for the Competence of Calibration and Testing Laboratories."

VII. Measurement Procedures:

1. Radiated Emissions in accordance with Part 15.209 & 15.231.

Frequency range: 30 MHz to 88 MHz
Limit: 40 dBuV @ 3 meters
Frequency range: 88 MHz to 216 MHz
Limit: 43.5 dBuV @ 3 meters
Frequency range: 216 MHz to 960 MHz
Limit: 46 dBuV @ 3 meters
Frequency range: 960 MHz to 3.1 GHz
Limit: 54 dBuV @ 3 meters
Fundamental frequency: 315 MHz
Limit: 73.9 dBuV average/93.9 dBuV peak @ 3 meters
Harmonic frequencies: 630, 945, 1260, 1575, 1890, 2205, 2520, 2835, 3150 MHz
Limit: 61.9 dBuV @ 3 meters

a. Set up instrumentation at open area test site.
   i. Mount EUT on table and broadband antenna on antenna positioner.
   ii. Record temperature, humidity and atmospheric pressure.
   iii. Measurement distance is 3 meters and antenna scan height is varied from 1 to 4 meters.
b. Verify spectrum analyzer and antenna operation.
   i. Spectrum analyzer is connected to antenna.
   ii. Preamplifier is inserted between antenna and analyzer to ensure analyzer noise threshold is at least 6 dB below specification limit.
c. Set up, power and operate EUT as described in Section III.
d. Perform preliminary evaluation of equipment in the near field.
   i. Vary antenna height, antenna polarization, and antenna orientation to EUT.
   ii. Repeat step d.i. while evaluating electromagnetic radiation in the 30 MHz to 3150 MHz spectrum.
e. Determine frequencies and equipment orientations that produce maximum radiation.
   i. Identify processor, clock and beat frequencies, and harmonics.
f. Perform final evaluation of unit by recording spectrum analyzer data on the plotter.
   i. Ensure the EUT is producing the maximum radiation found in step e.
   ii. Collect data over the entire frequency range.
   iii. Collect fundamental frequency and spurious harmonics data per 15.231.

2. Conducted Emissions in accordance with FCC Paragraph 15.207.

Frequency range: 450 kHz to 30 MHz

Limit: 48 dBuV quasi-peak

a. Set up instrumentation in laboratory.
   i. Mount EUT over ground plane.
   ii. Record temperature, humidity and atmospheric pressure.
   iii. Attach EUT power cable to the Line Impedance Stabilization Network (LISN).

b. Verify spectrum analyzer and LISN operation.
   i. Spectrum analyzer is connected to LISN.
   ii. Measurements are made at both phase (L1) and neutral (L2) leads.

c. Set up, power and operate EUT as described in Section III.
   i. Use supplied power cable.

d. Perform preliminary evaluation of equipment.
   i. Vary EUT modes and cable placement.
   ii. Repeat step d.i. while evaluating conducted emissions in the 450 kHz to 30 MHz spectrum.

e. Determine frequencies and cable orientations that produce maximum emissions.
   i. Identify beat frequencies and harmonics.

f. Perform final evaluation of unit by recording spectrum analyzer data on the plotter.
   i. Ensure the EUT is producing the maximum emissions found in step e.
   ii. Collect data over the entire frequency range.

VIII. Summary of Results:

The DBS Lodging Technologies, LLC, Entergize Master Control Unit Transmitter complies with the FCC Part 15, Subpart C emissions requirements.

Sections X and XI contain the spectrum analyzer output identified in measurement procedures VII-1 & -2. Section X compares the unit radiated emissions to the applicable limit from 30 MHz to 3.15 GHz in accordance with the equation identified in V. Section X also contains the fundamental frequency characteristic required by 15.231. Section XI compares the unit conducted emissions to the applicable limit from 450 kHz to 30 MHz.

Testing was performed by Kyle R. Kowalczyk, president, Green Mountain Electromagnetics and requested by:

DBS Lodging Technologies, LLC
1408 Irvine Avenue, #118
Newport Beach, CA 92660
USA

KRK

Kyle R. Kowalczyk
4/17/01

IX. Photographs of Measurement Setup:

The following pages are photographs of the equipment as it was tested.

Photograph 1 – Radiated Emissions

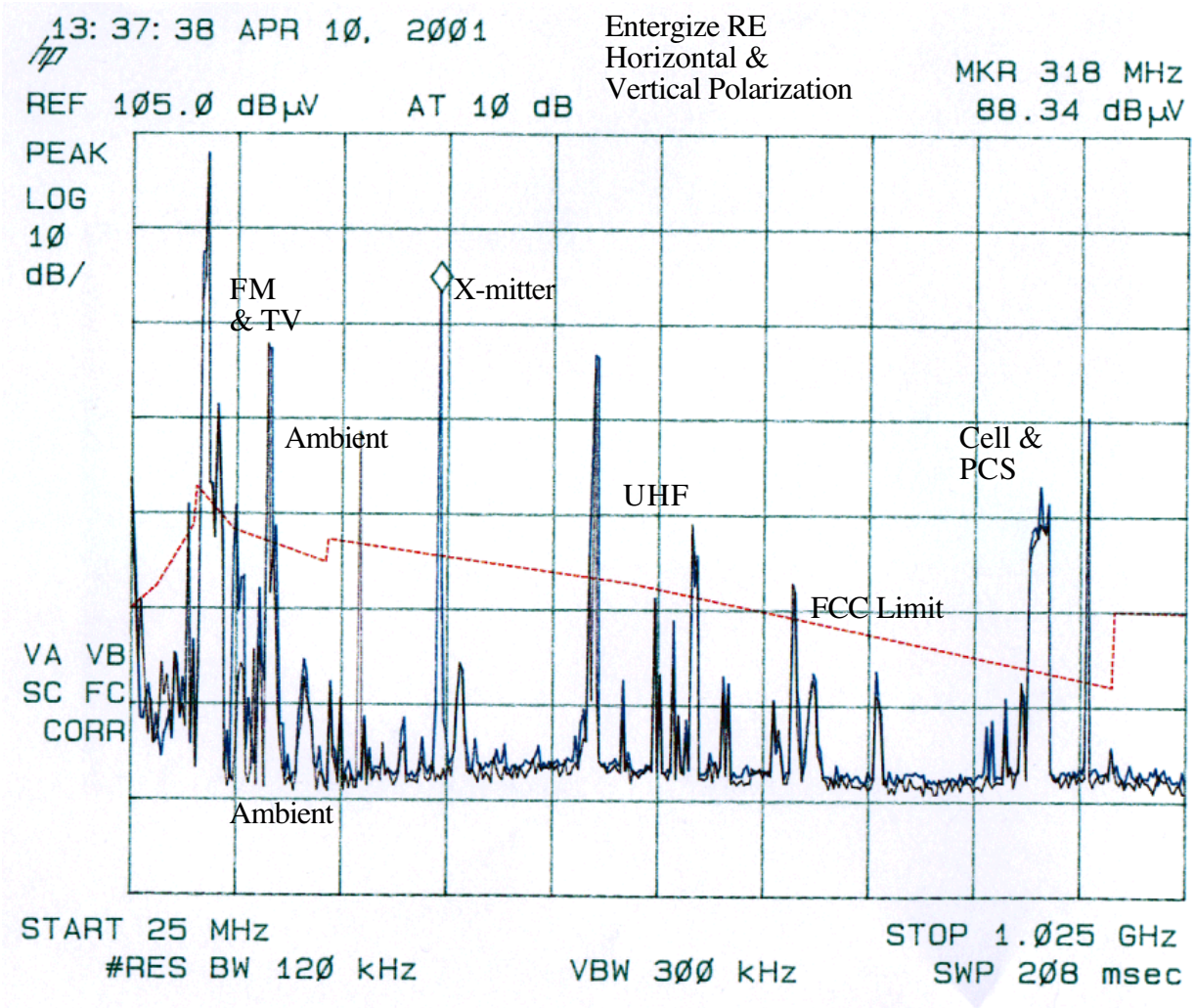
Photograph 2 – Conducted Emissions

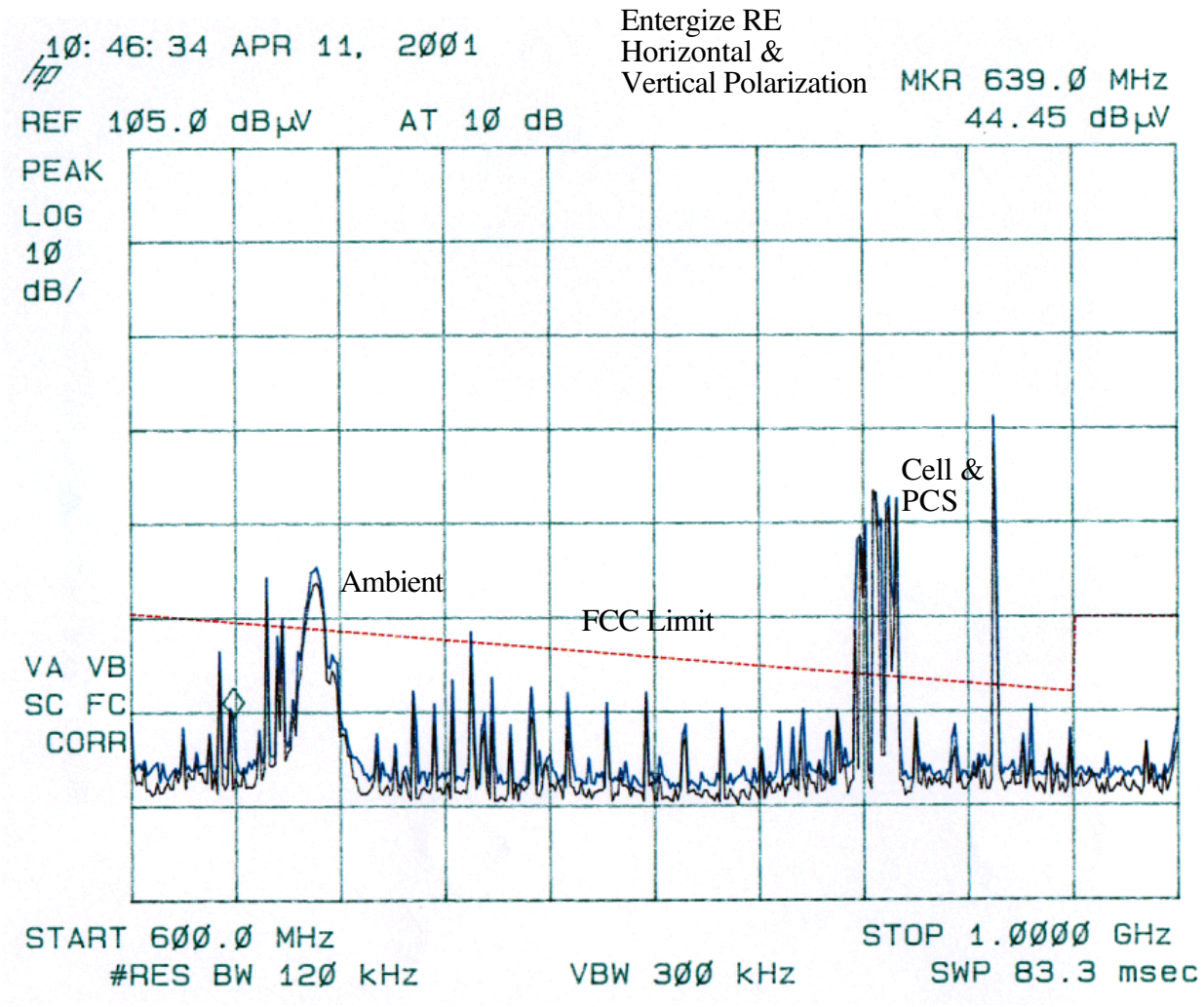
X. Radiated Emissions Data:

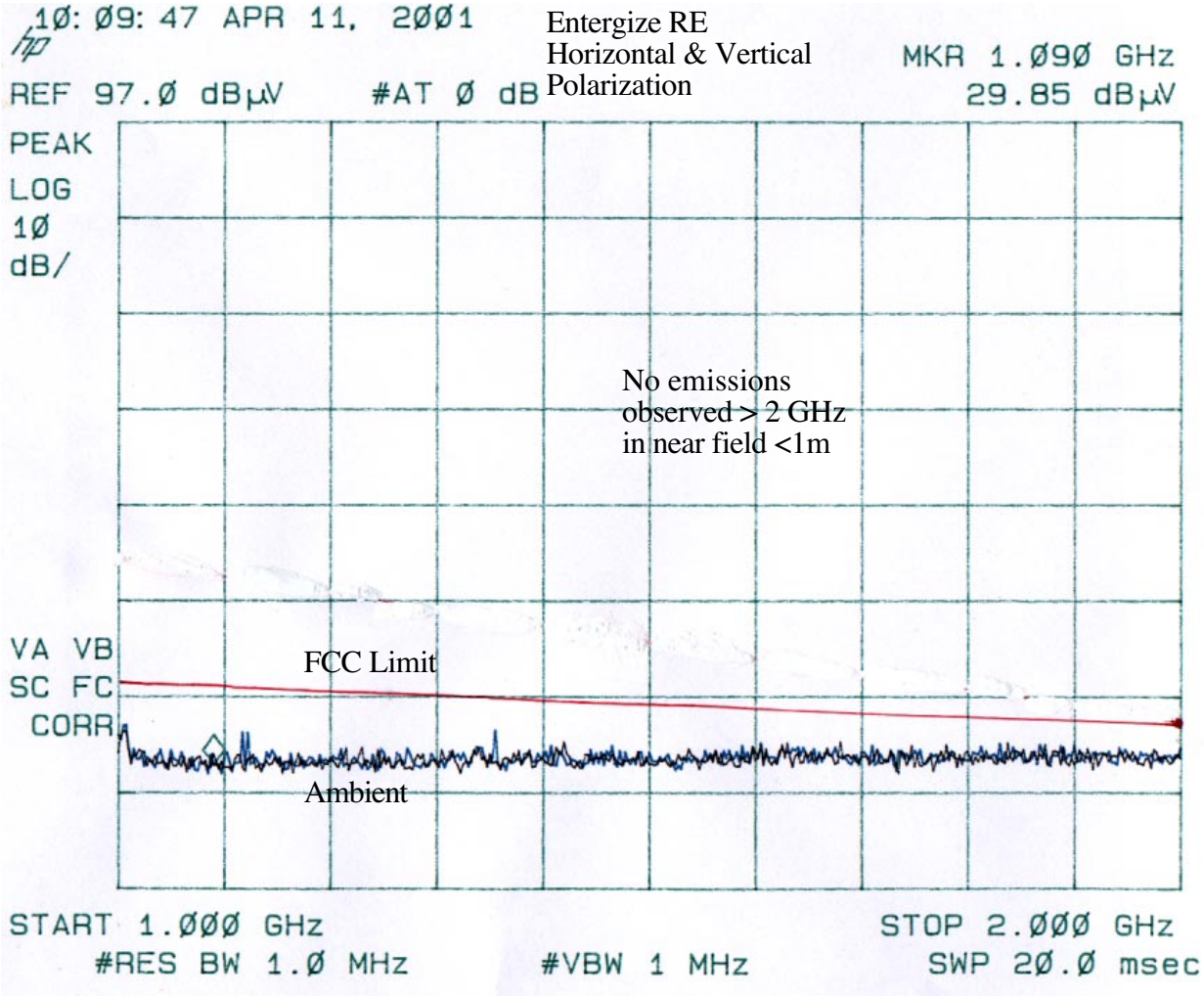
The following pages contain spectrum analyzer output with the corrected intentional radiator limit superimposed. The black pen is the ambient condition, and the other color identifies EUT emissions. All data is peak detect, is horizontally and vertically polarized, and is taken at all frequencies.

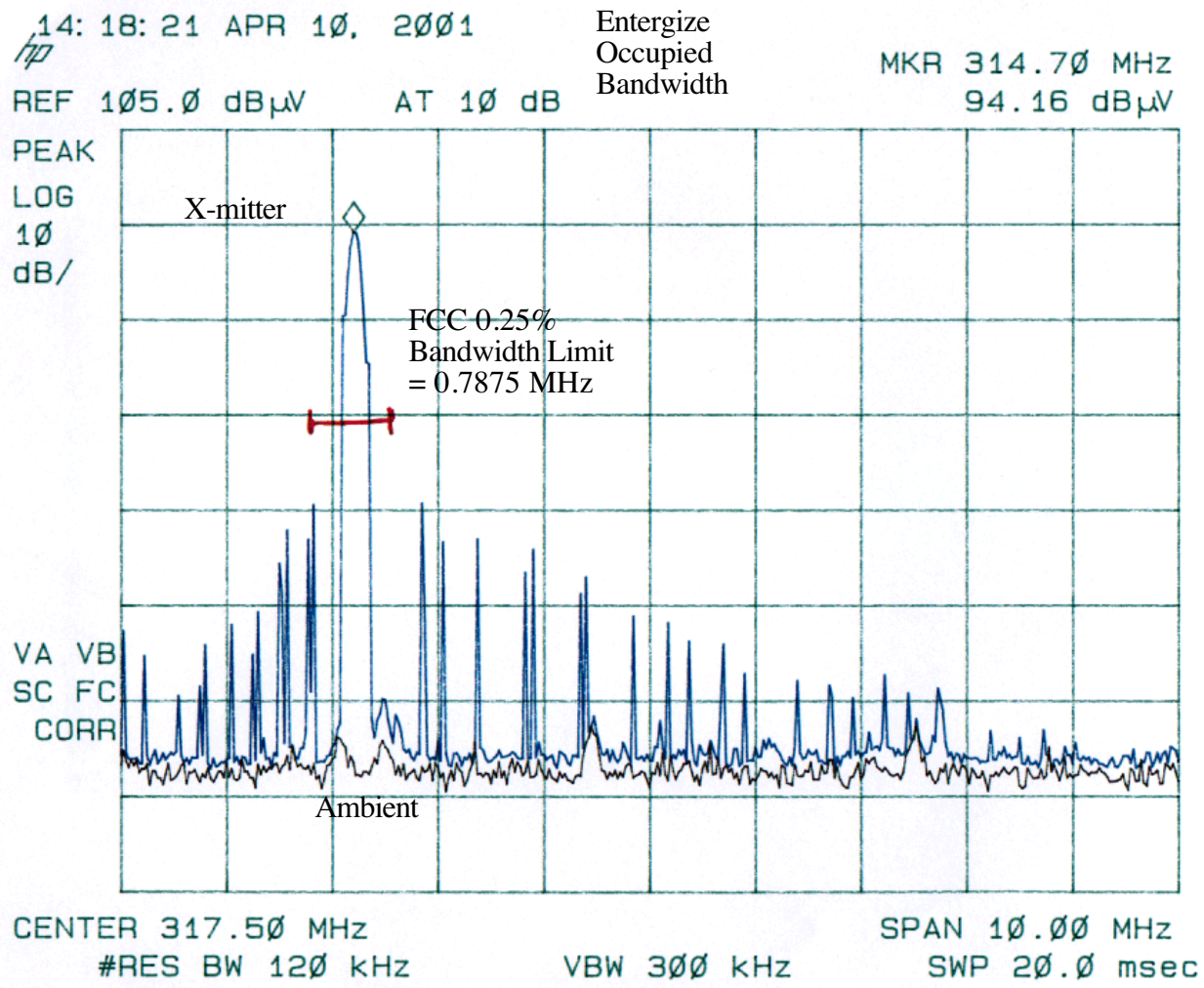
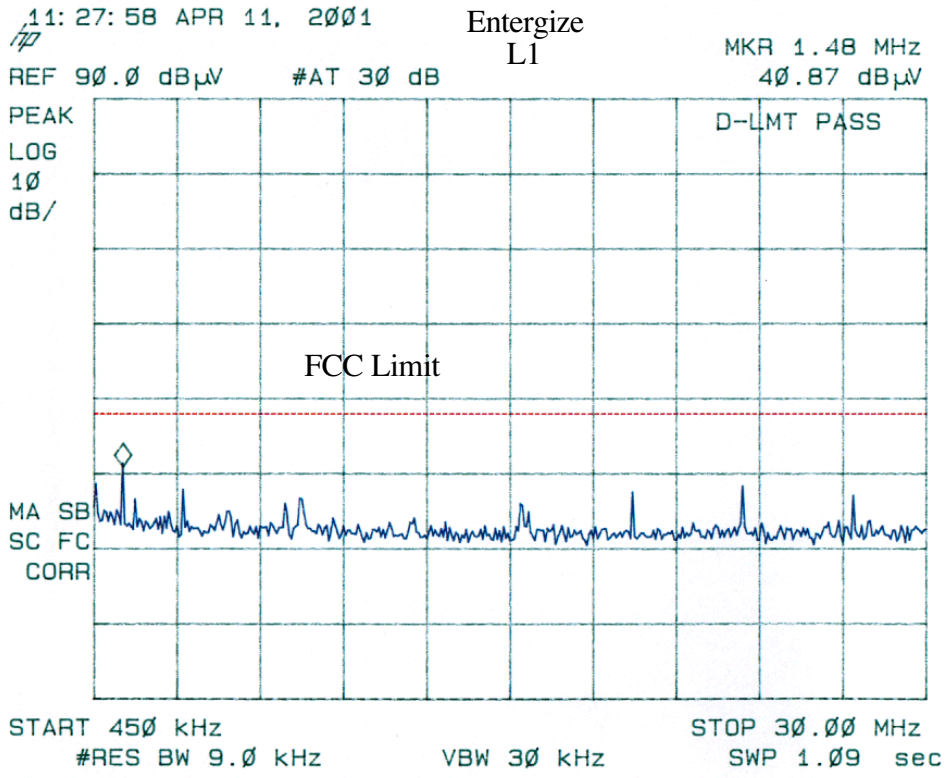
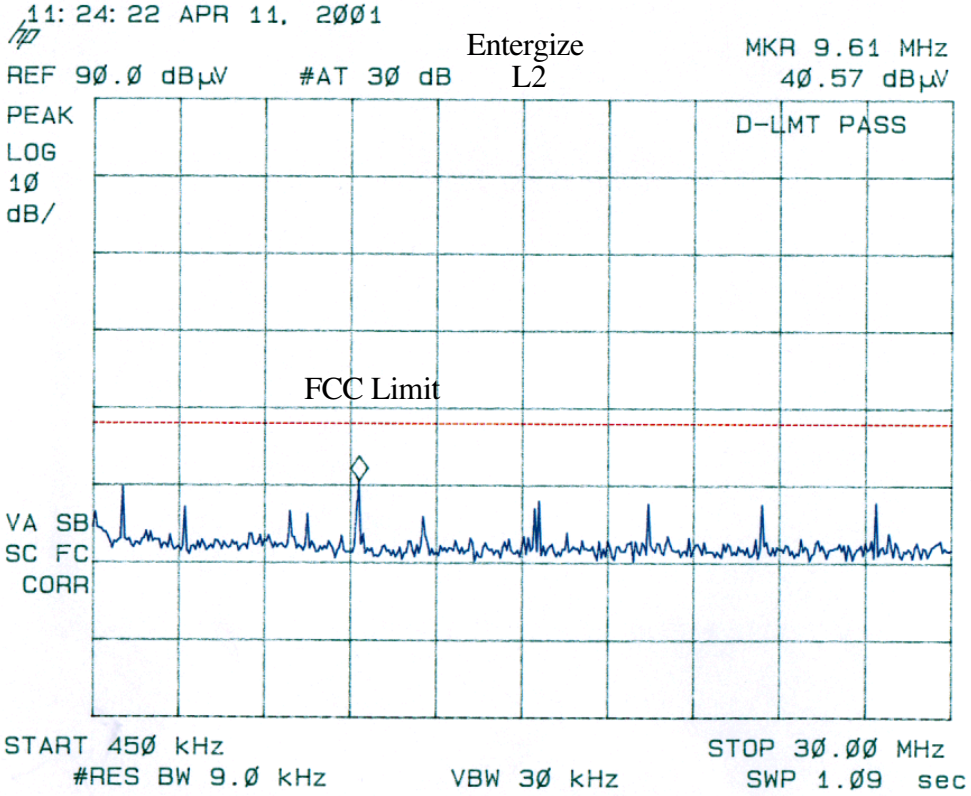
Frequency MHz	IR @ 3m dBuV	Antenna dB	Cable/Amp dB	Delta dB	Corrected Limit dBuV
30	40.0	19.0	34.0	15.0	55.0
50	40.0	15.6	33.0	17.4	57.4
88	40.0	8.7	33.0	24.3	64.3
89	43.5	8.7	33.0	24.3	67.8
100	43.5	12.5	32.0	19.5	63.0
125	43.5	12.2	32.0	19.8	63.3
150	43.5	10.5	31.0	20.5	64.0
215	43.5	13.7	30.0	16.3	59.8
216	46.0	13.7	30.0	16.3	62.3
300	46.0	15.1	30.0	14.9	60.9
315	73.9	15.1	30.0	14.9	88.8
315 (par.231)	73.9	15.1	36.0	20.9	94.8
500	46.0	18.2	30.0	11.8	57.8
630	46.0	18.8	30.0	11.2	57.2
945	46.0	24.0	25.0	1.0	47.0
959	46.0	24.0	25.0	1.0	47.0
960	54.0	24.0	25.0	1.0	55.0
1260	54.0	25.2	8.7	-16.5	37.5
1575	54.0	26.7	8.5	-18.2	35.8
1890	54.0	27.5	8.1	-19.4	34.6
2205	54.0	28.6	7.8	-20.8	33.2
2520	54.0	29.3	7.5	-21.8	32.2
2835	54.0	30.1	7.2	-22.9	31.1
3150	54.0	31.2	6.5	-24.7	29.3

Table 1 – Corrected FCC Limit


13: 37: 38 APR 1Ø, 2ØØ1
Entergize RE
Horizontal &
Vertical Polarization
MKR 318 MHz
88.34 dBµV
REF 1Ø5.Ø dBµV
AT 1Ø dB
PEAK
LOG
1Ø
dB/
FM
& TV
X-mitter
Ambient
UHF
Cell &
PCS
FCC Limit
VA VB
SC FC
CORR
Ambient
START 25 MHz
STOP 1.Ø25 GHz
#RES BW 12Ø kHz
VBW 3ØØ kHz
SWP 2Ø8 msec


Entergize RE
Horizontal &
Vertical Polarization
10: 46: 34 APR 11, 2001
MKR 639.0 MHz
REF 105.0 dBμV
AT 10 dB
44.45 dBμV
PEAK
LOG
10
dB/
Cell &
PCS
Ambient
FCC Limit
VA VB
SC FC
CORR
START 600.0 MHz
STOP 1.0000 GHz
#RES BW 120 kHz
VBW 300 kHz
SWP 83.3 msec


10: 09: 47 APR 11, 2001
Entergize RE
Horizontal & Vertical
Polarization
MKR 1.090 GHz
REF 97.0 dBμV
#AT 0 dB
29.85 dBμV
PEAK
LOG
10
dB/
No emissions
observed > 2 GHz
in near field <1m
VA VB
SC FC
CORR
FCC Limit
Ambient
START 1.000 GHz
STOP 2.000 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
SWP 20.0 msec


14: 18: 21 APR 1Ø, 2ØØ1
Entergize
Occupied
Bandwidth
MKR 314.7Ø MHz
REF 1Ø5.Ø dBµV
AT 1Ø dB
94.16 dBµV
PEAK
LOG
1Ø
dB/
X-mitter
FCC 0.25%
Bandwidth Limit
= 0.7875 MHz
VA VB
SC FC
CORR
Ambient
CENTER 317.5Ø MHz
SPAN 1Ø.ØØ MHz
#RES BW 12Ø kHz
VBW 3ØØ kHz
SWP 2Ø.Ø msec

XI. Conducted Emissions Data: