

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
<http://www.timcoengr.com>
888.472.2424 F 352.472.2030 email: tei@timcoengr.com

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APPLICANT: UNIDEN AMERICA CORPORATION

MODEL: VHF650

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MODEL NO.: VHF650

IC #: 513C-UT621D

DATE: 2/12/2006

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ENGINEERING TEST REPORT

FOR

MODEL NO. VHF650

MARINE RADIO

to

INDUSTRY CANADA

R.S.S. 182, ISSUE 4

DATE OF REPORT: 11/22/06

Tested at test site designated as file number
IC 2056-A, 849 NW State Road 45 Newberry,
Florida 32669.

UNIDEN AMERICA CORP.
181 N. COUNTRY CLUB ROAD
P.O. BOX 580
LAKE CITY, SC 29560

PHONE: 843-374-3852

APPROVED

BY:

MARIO DE ARANZETA, ENGINEER
TIMCO ENGINEERING, INC.
849 NW State Road 45
PO BOX 370
Newberry, Florida 32669
Phone: 352.472.550

APPLICANT: UNIDEN AMERICA CORPORATION
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TYPE OF EQUIPMENT:.....VHF MARINE TRANSMITTER

RADIO STANDARDS

SPECIFICATION NO:.....182 Issue 4

ISSUE NO.:.....4

TEST PERFORMED BY:.....JOSEPH SCOGLIO

APPROVED BY:.....MARIO DE ARANZETA

NOTES:

- | | |
|---------------------|---------------------------------|
| 1. FREQUENCY RANGE | 156.025-157.425 MHz |
| 2. TEST FREQUENCIES | 156.00, 157.40 MHz |
| 3. POWER OUTPUT | 25 Watts (High)
1 Watt (Low) |
| 5. DATE OF TEST: | 2/2/2007 |

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EQUIPMENT: UNIDEN AMERICA CORPORATION

MODEL: VHF650

3.2(f)(g) RF TRANSMITTER POWER OUTPUT

RF power is measured PER §6.2 by connecting a 50-ohm, resistive wattmeter to the RF output connector. With standard temperature & voltage. The UUT was modulated with a 2500Hz tone.

OUTPUT POWER: HIGH - 25 Watts
LOW - 1 Watt

FOR LOW POWER SETTING INPUT POWER: $(13.8V)(1.37A) = 18.91$ Watts
FOR HIGH POWER SETTING INPUT POWER: $(13.8V)(5.10A) = 70.38$ Watts

This UUT only has a high/low RF power switch for switching from 1 Watt to 25 Watts. The end user can only change the frequency to the designated marine channels. This transmitter does not have programmable frequencies outside of the marine band.

3.2(h) Occupied Bandwidth

Type of Emission: 16K0F3E

$$\begin{aligned} B_n &= 2M + 2DK \\ M &= 3000 \\ D &= 4.6 \text{ kHz (Peak Deviation)} \\ K &= 1 \\ B_n &= 2(3K) + 2(4.6K)(1) = 6.0K + 9.2K = 15.2k \end{aligned}$$

ALLOWED AUTHORIZED BANDWIDTH = 20.00 kHz

See Occupied Bandwidth Plot on the following page.

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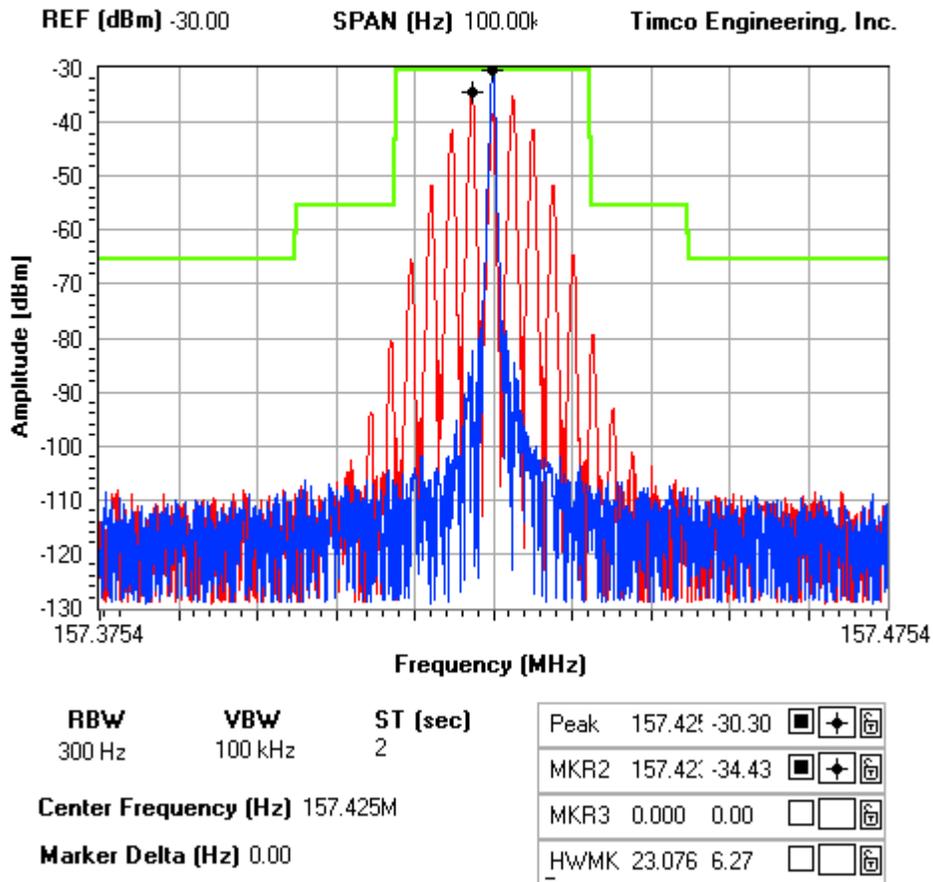
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OCCUPIED BANDWIDTH PLOT

NOTES:

189aut7 occupied bandwidth



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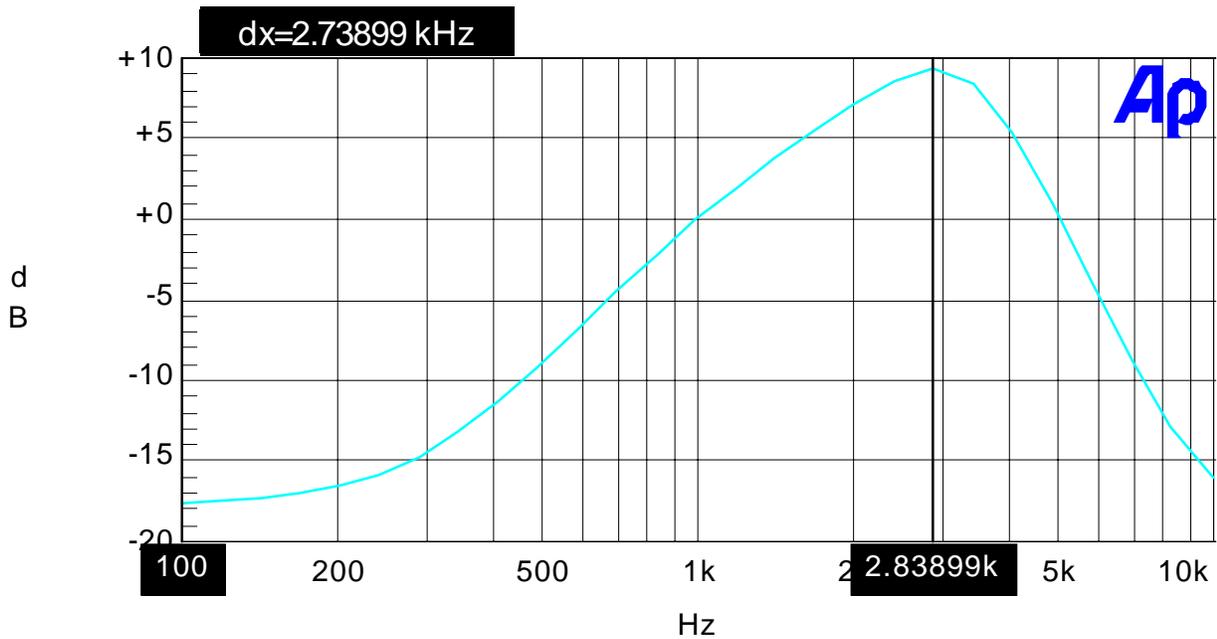
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3.4 FM MODULATION LIMITING AND AUDIO LOW PASS FILTER

REQUIREMENTS: Minimum Attenuation relative to 1kHz $60\log(f/3)$ dB

TEST DATA: SEE FOLLOWING

189aut7 audio frequency response 01/31/07 08:43:42



Color	Line Style	Thick	Data	Axis	Cursor1
Cyan	Solid	1	Anlr.Level A!Normalize	Left	..

MaxFreq.at1

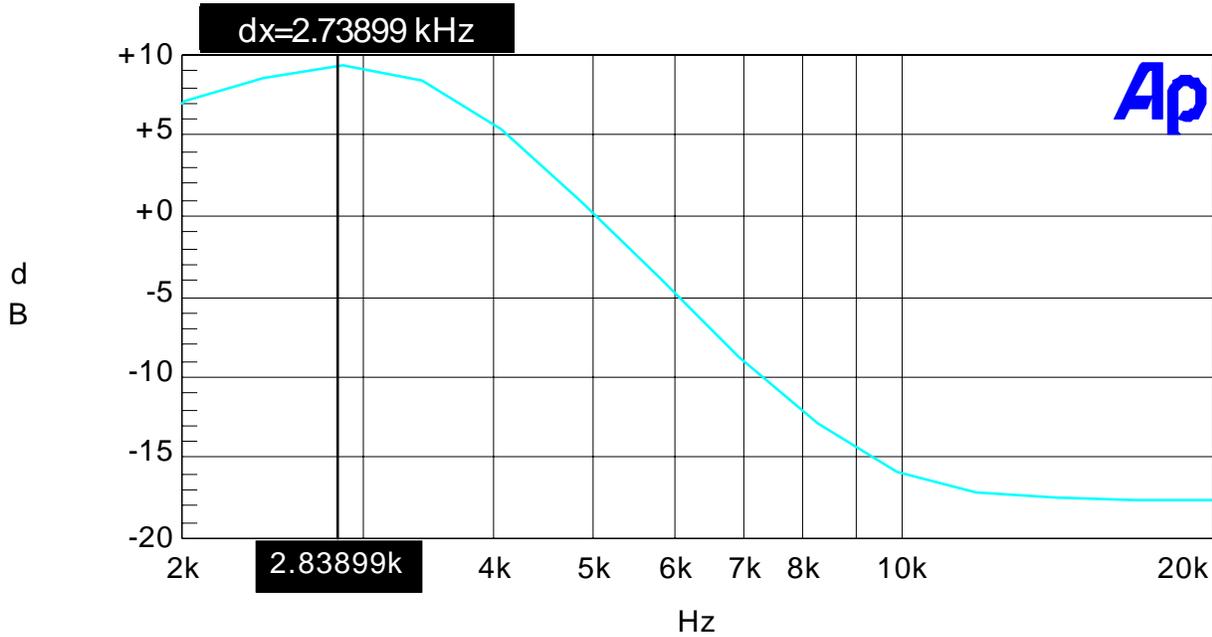
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189aut7 audio low pass

01/31/07 08:43:42



Color	Line Style	Thick	Data	Axis	Cursor1
Cyan	Solid	1	Anlr.Level A!Normalize	Left	..

MaxFreq.at1

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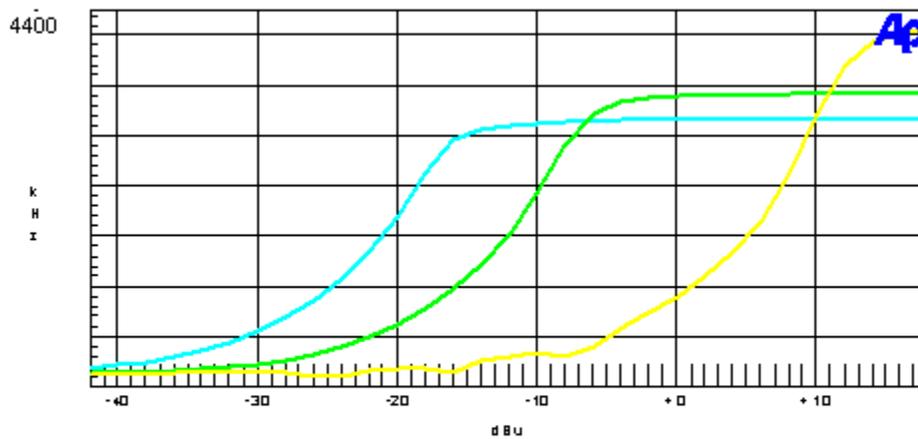
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189 aut7 modulation limiting 4.4kHz max deviation
blue 2.5kHz green 1kHz yellow 300hz



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6.3/6.4 UNWANTED EMISSIONS-CONDUCTED

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

$$43 + 10\log(25) = 57 \text{ dB}$$

$$43 + 10\log(1) = 43 \text{ dB}$$

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
156.00	156.00	0		156.00	156.00	0
	312.10	74.9			312.10	51.9
	468.10	83.1			468.10	84
	624.20	92.7			624.20	88.4
	780.20	92.9			780.20	90.6
	936.30	105.2			936.30	90.8
	1092.30	109.7			1092.30	98.5
	1248.40	98.7			1248.40	95.3
	1404.40	87.9			1404.40	88.2

TF HIGH POWER	EF	dB below carrier		TF LOW POWER	EF	dB below carrier
157.40	157.40	0		157.40	157.40	0
	314.80	73.5			314.80	51.6
	472.20	84.1			472.20	83
	629.70	94.5			629.70	89.3
	787.10	97			787.10	89.1
	944.50	106.4			944.50	91.2
	1101.90	106.5			1101.90	99.8
	1259.40	97.8			1259.40	95.2
	1416.80	86.4			1416.80	89.8
	1574.20	92.2			1574.20	93.9

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4.4 UNWANTED EMISSIONS-RADIATED SPURIOUS EMISSIONS

REQUIREMENTS: HIGH POWER: $43 + 10\log(25) = 57$ dB
 LOW POWER: $43 + 10\log(1) = 43$ dB

HIGH POWER:

Tuned Frequency (MHz)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)		Tuned Frequency (MHz)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
156.00	156.00	V	0		157.40	157.40	V	0
	312.10	H	79.15			314.80	H	81.65
	468.10	H	89.61			472.20	H	90.11
	624.20	V	90.17			629.70	V	90.07
	780.20	V	87.66			787.10	V	87.96
	936.30	V	96.32			944.50	V	96.12
	1092.30	H	91.48			1101.90	V	94.58
	1248.40	V	95.59			1259.40	V	90.79
	1404.40	H	94.00			1416.80	V	88.40
	1560.50	V	97.86			1574.20	H	96.96

LOW POWER:

Tuned Frequency (MHz)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)		Tuned Frequency (MHz)	Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
156.00	156.00	V	0		157.40	157.40	V	0
	312.10	H	58.45			314.80	H	56.85
	468.10	H	83.41			472.20	H	85.31
	624.20	H	84.67			629.70	H	86.17
	780.20	V	82.76			787.10	V	83.16
	936.30	V	82.12			944.50	V	83.92
	1092.30	V	82.88			1101.90	V	83.38
	1248.40	V	81.79			1259.40	H	83.69
	1404.40	V	83.50			1416.80	H	84.40
	1560.50	V	86.16			1574.20	V	86.66

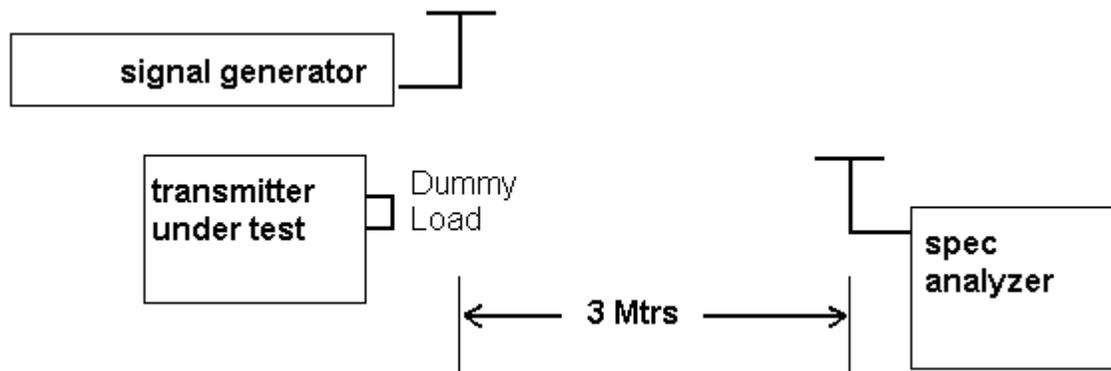
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METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA standard 603 using the substitution method. Measurements were made at the open field test site of TIMCO ENGINEERING, INC. located at 849 N.W. State Road 45, Newberry, FL 32669.

Method of Measuring Radiated Spurious Emissions



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6.1 FREQUENCY STABILITY
EQUIPMENT TRANSMITTER MODEL VHF650
NAME OF TEST: FREQUENCY STABILITY
MINIMUM STANDARD: +, -10ppm
TEST RESULTS: AS INDICATED BELOW
TEST CONDITIONS: 20 C; -15 C, +20oC, 55oC,

MEASUREMENT DATA:

Assigned Frequency (MHz)		157.424611
Temperature (°C)	Frequency (MHz)	Frequency Stability (PPM)
-30	157.426178	9.95
-20	157.426151	9.78
-10	157.425999	8.82
0	157.425663	6.68
+10	157.425261	4.13
+20	157.424744	0.84
+30	157.424420	-1.21
+40	157.424264	-2.20
+50	157.424273	-2.15

Assigned Frequency (MHz)		157.424611
% Battery	Frequency (MHz)	Frequency Stability (PPM)
-15%	157.424620	0.06
+15%	157.424625	0.09

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EQUIPMENT: RECEIVER - VHF650
NAME OF TEST: RECEIVER SPURIOUS EMISSIONS
R.S.S.NO. RSS-210 ISSUE 4
RULE PART: 4.5
MINIMUM STANDARD:
30-88 MHz 320uV/m or 50.0 dBuV/m measured at 3 meters
88-216 MHz 500uV/m or 54.0dBuV/m
216-470 MHz 500-1500uV/m or 54-63.5 dbuV/m
ABOVE 470 MHz 1500uV/m or 63.5dBuV/m

TEST RESULTS: COMPLIES WITH THIS REQUIREMENT SEE BELOW

TEST DATA:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Pol	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
156.0	114.10	19.9	V	1.49	10.84	32.23	11.27
156.0	114.10	25.1	H	1.49	10.14	36.73	6.77
156.0	228.20	16.2	V	2.53	11.25	29.98	16.02
156.0	228.20	21.3	H	2.53	11.48	35.31	10.69
156.0	342.30	10.4	V	3.01	14.45	27.86	18.14
156.0	342.30	15.2	H	3.01	14.65	32.86	13.14
161.9	120.00	20.3	V	1.55	11.10	32.95	10.55
161.9	120.00	25.3	H	1.55	10.50	37.35	6.15
161.9	240.10	23.9	V	2.57	12.00	38.47	7.53
161.9	240.10	29.0	H	2.57	12.01	43.58	2.42
161.9	360.10	14.4	V	3.10	14.80	32.30	13.70
161.9	360.10	20.5	H	3.10	15.00	38.60	7.40
162.5	120.50	19.3	V	1.56	11.21	32.07	11.44
162.5	120.50	23.7	H	1.56	10.60	35.86	7.64
162.5	241.10	23.5	V	2.57	12.04	38.11	7.89
162.5	241.10	29.3	H	2.57	12.07	43.94	2.06
162.5	361.70	15.2	V	3.11	14.82	33.13	12.87
162.5	361.70	21.3	H	3.11	15.02	39.43	6.57

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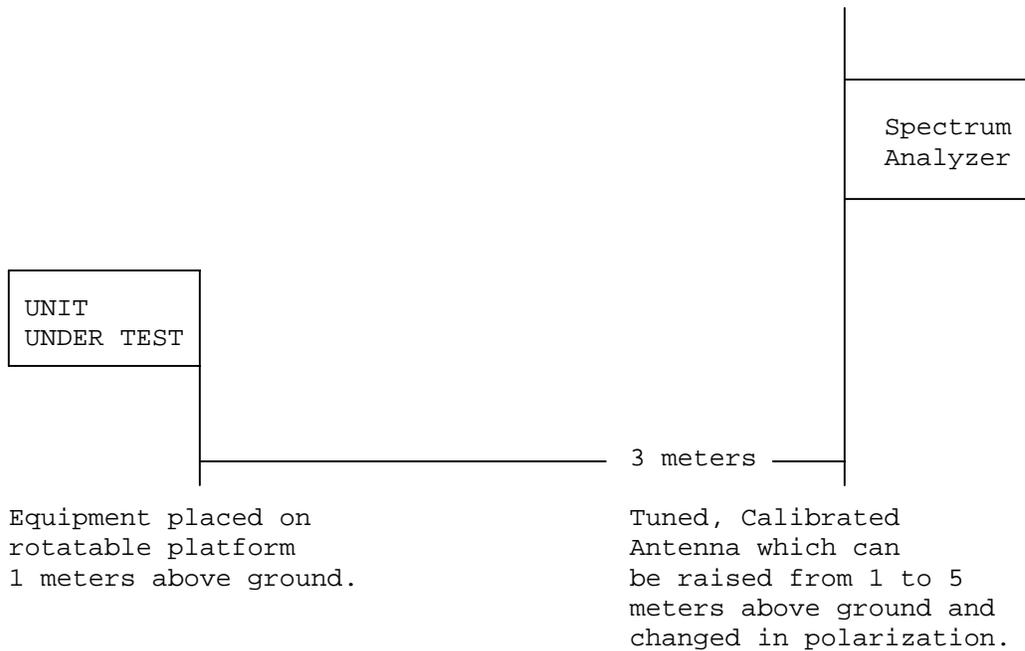
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NAME OF TEST: RADIATION LEVELS(CONT.)

TEST SET-UP

Method of Measuring Radiated Spurious Emissions



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TEST EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
Antenna: Biconnical	Eaton	94455-1	1057	CAL 12/12/05	12/12/07
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Analyzer Blue Tower Quasi- Peak Adapter	HP	85650A	2811A01279	CAL 4/13/05	4/13/07
Analyzer Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 9/5/05	9/5/07
Analyzer Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/13/05	4/13/07
LISN	Electro-Metrics	ANS-25/2	2604	CAL10/5/06	10/5/08
LISN	Electro-Metrics	EM-7820	2682	CAL 4/28/05	4/28/07
Antenna: Log- Periodic	Eaton	96005	1243	CAL 12/14/05	12/14/07

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