FCC CFR47 PART 95 SUBPART D CERTIFICATION

TEST REPORT

FOR

75 MHz – 3CHANNEL BROADCAST TRANSMITTER

MODEL: LYNX 3D

FCC ID: IFHHP-MIM75

REPORT NUMBER: 99U0206

ISSUE DATE: APRIL 28,1999

Prepared for
HITEC RCD INC.
10729 WHEATLANDS AVE. #C
SANTEE, CA 92071

Prepared by
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LAB CODE:200065-0

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1. FCC CERTIFICATION INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part 2, Subpart J, sections 2.983 - 2.999.

2.983(a) Applicant: HITEC RCD INC.
10729 WHEATLANDS AVE. #C
SANTEE, CA 92071

2.983(b) FCC ID:IFHHP-MIM75

2.983(c) Quantity production is planned.

2.983(d) Technical Description

(1) Types of Emissions
F1D

(2) Frequency Range

Transmitter: 75.41-75.99MHz.

(3) Range of Operating Power

400 mW +/-50mW

(4) Maximum Power Rating
450mW

(5) Applied voltages and currents into the final transistor elements

SEE ATTACHMENT: SPECIFICATIONS OF TRANSMITTER

(6) List of each Active Device:

SEE ATTACHMENT: SPECIFICATIONS OF TRANSMITTER

(7) Complete Circuit Diagrams and Functional Block Diagram

SEE ATTACHMENT: SPECIFICATIONS OF TRANSMITTER

(8) Instructions/Installation Manual

SEE ATTACHMENT: INSTRUCTION MANUAL

(9) Tune-up/Optimization Procedure

1. Attached 9.6 V dc power supply
2. Using a spectrum analyzer and a short pick-up antenna, look for 75 MHz signal with sufficient scan width to see 30- 150MHz spurious .
3. Adjust T1, T2, T3,T4, and T5 for maximum output at operating frequency and minimum output at any harmonics.
4. Repeat step 3
5. Check for minimum emission from 30 to 760 MHz.

(10) Means for Frequency Stabilization

SEE ATTACHMENT: SPECIFICATIONS OF TRANSMITTER

(11) Means for Limiting Modulation

SEE ATTACHMENT: SPECIFICATIONS OF TRANSMITTER

(11) Means for Limiting Power

SEE ATTACHMENT: SPECIFICATIONS OF TRANSMITTER

(11) Means for Attenuating Higher Audio Frequencies

Not Applicable

(12) Description of Digital Modulation Techniques

Not Applicable

2.983(e) Standard Test Conditions

The transmitter was tested under the following conditions:

Room Temperature: 20 - 23 °C
Relative Humidity: 35 - 50%
DC Supply Voltage: 9.6 Vdc
The transmitter was aligned and tuned up according to manufacturer's alignment procedure, prior to testing. All data presented represents the worst case parameter being measured.

Section 2.983(f) Equipment Identification

FCC ID:IFHHP-MIM75

Section 2.983(g) Photographs

SEE ATTACHMENT: PHOTOS

.Section 2.983 Description of Various Base Station Configurations

Not applicable

Section 2.983 Use of Various Power Supplies

Not applicable

TYPE OF EQUIPMENT:	RC TRANSMITTER
MEASUREMENT DISTANCE:	3 METER
TECHNICAL LIMIT:	95.635
FCC RULES:	95.635
EQUIPMENT AUTHORIZATION PROCEDURE	CERTIFICATION
MODIFICATIONS MADE ON EUT	NO

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 15 AND 95. The results of testing in this report apply to the product/system, which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved By

MIKE C.I. KUO / VICE - PRESIDENT
COMPLIANCE CERTIFICATION SERVICES

2. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

3. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code:200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT(1300F2))

4. MEASUREMENT INSTRUMENTATION

Radiated emissions were measured with one or more of the following types of linearly polarized antennas: tuned dipole, Biconical, log periodic, BI-log, ridged waveguide, and liner horn. EMI receivers were used for line conducted readings, spectrum analyzers with pre-selectors and quasi-peak detectors were used to perform radiated measurements. Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specification for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

5. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

6. UNITS OF MEASUREMENT

Measurements of radiated interference are reported in terms of dB(uV/m) at a specified distance. The indicated readings on the spectrum analyzer were converted to dB(uV/m) by

use of appropriate conversion factors. Measurements of conducted interference are reported in terms of dB(uV).

The field strength is calculated by adding the Antenna Factor and Cable Factors, then by subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4dB/m and a Cable Factor of 1.1dB is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/m. The 32 dBuV/m value was mathematically converted to its corresponding level in uV/m.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBuV/m

Level in uV/m = Common Antilogarithm [(32 dBuV/m)/20] = 39.8 uV/m

7. CLASSIFICATION OF DIGITAL DEVICE

Class A includes digital devices that are marketed for use in commercial, industrial or business environments, excluding devices which are marketed for use by the general public or are intended to be used in the home.

Class B includes digital devices that are marketed for use in residential environments, notwithstanding use in commercial, business and industrial environments.

Note: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as Class B device, and in fact is encouraged to do so provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

8. RADIATED EMISSION LIMITS

FCC PART 15 CLASS A

MEASURING DISTANCE OF 10 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)

30-88	90	39.1
88-216	150	43.5
216-960	210	46.4
Above 960	300	49.5

FCC PART 15 CLASS B

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

FCC RADIATED EMISSION ALTERNATIVE METHOD
(CISPR 22/EN55022)

Limits for radiated disturbance of Class A ITE at
measuring distance of 10 m

Frequency range MHz	Quasi-peak limits dB(uV/m)
30 to 230	**40**
230 to 1000	**47**
NOTES 1. The lower limit shall apply at the transition frequency. 2. Additional provisions may be required for cases where interference occurs.	

Limits for radiated disturbance of Class B ITE at
Measuring distance of 10 m

Frequency range MHz	Quasi-peak limits dB(uV/m)
30 to 230	**30**
230 to 1000	**37**
NOTES 1. The lower limit shall apply at the transition frequency. 2. Additional provisions may be required for cases where interference occurs.	

9. RADIATED EMISSION TEST PROCEDURE

The EUT and all other support equipment are placed on a wooden table 80-cm above the ground screen. Antenna to EUT distance is 3 meters . During the test, the table is rotated 360 degrees to maximize emissions and the antenna is positioned from 1 to 4 meters above the ground screen to further maximize emissions. The antenna is polarized in both vertical and horizontal positions.

EUT test configuration is according to Section 8 of ANSI C63.4/1992.

Monitor the frequency range of interest at a fixed antenna height and EUT azimuth. Frequency span should be small enough to easily differentiate between broadcast stations and intermittent ambients. Rotate EUT 360 degrees to maximize emissions received from EUT. If emission increases by more than 1 dB, or if another emission appears that is greater by 1 dB, return to azimuth where maximum occurred and perform additional cable manipulation to further maximize received emission.

Move antenna up and down to further maximize suspected highest amplitude signal. If emission increased by 1 dB or more, or if another emission appears that is greater by 1dB or more, return to antenna height where maximum signal was observed and manipulate cables to produce highest emissions, noting frequency and amplitude.

10. AMBIENT CONDITIONS

The ambient conditions at the time of final tests were as follows:

	Radiated Emission	Conducted Emission
Temperature	**20**	**N/A**^{o}C
Humidity	**60**	**N/A%**

11. EQUIPMENT MODIFICATIONS

Not Applicable

12. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Site	Cal Date	Due Date
Spectrum Analyzer	**H.P.**	**8568B**	**2732A03661**	**C**	**04/99**	**04/00**
Spectrum Display	**H.P.**	**85662A**	**2811A015728**	**C**	**04/99**	**04/00**
Quasi-peak Detector	**H.P.**	**85650A**	**2811A01335**	**C**	**11/98**	**11/99**
Pre-Amp	**H.P.(P5)**	**8447D**	**2944A06550**	**C**	**09/98**	**09/99**
Antenna	**Eaton**	**94455-1**	**1214**	**C**	**10/98**	**10/99**
Antenna	**EMCO**	**3146**	**9107-3163**	**C**	**10/98**	**10/99**

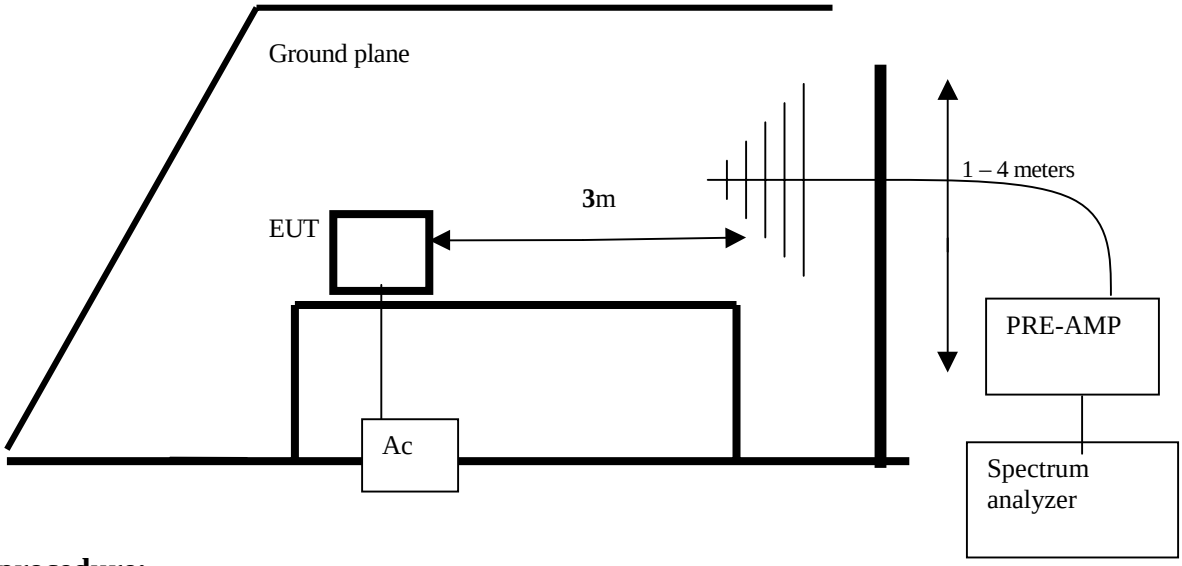
13. FCC PART 2 CERTIFICATION TEST RESULTS:

SECTION 2.1046 (was section 2.985): RF POWER OUTPUT

Equipment used.

HP Spectrum Analyzer/8566B
HP Spectrum Display/85662A
HP Quasi-Peak Detector/85650A
HP Pre-Amp(P5)/8447D
Emco Log-Periodic Antenna/3146

Test setup



Test procedure:

The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3 Meters from the EUT. With the transmitter operating at full power the turntable was slowly rotated to locate the direction of maximum emission once maximum direction was determined; the search antenna was raised and lowered in both vertical and horizontal polarization.

Test Result:

Radiated power was measured with Spectrum analyzer. Output power was calculated from radiated readings.

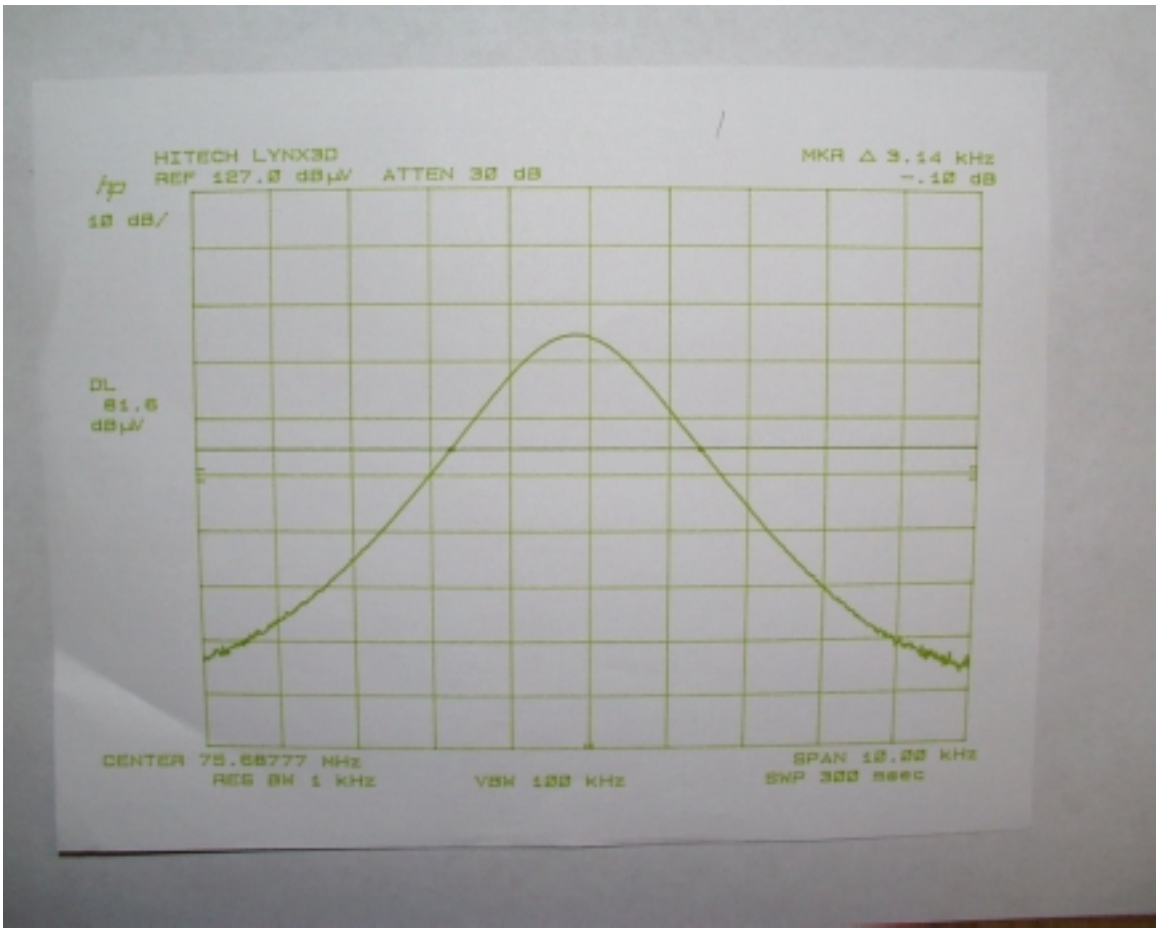
114.99dBuV/m=0.56V/m

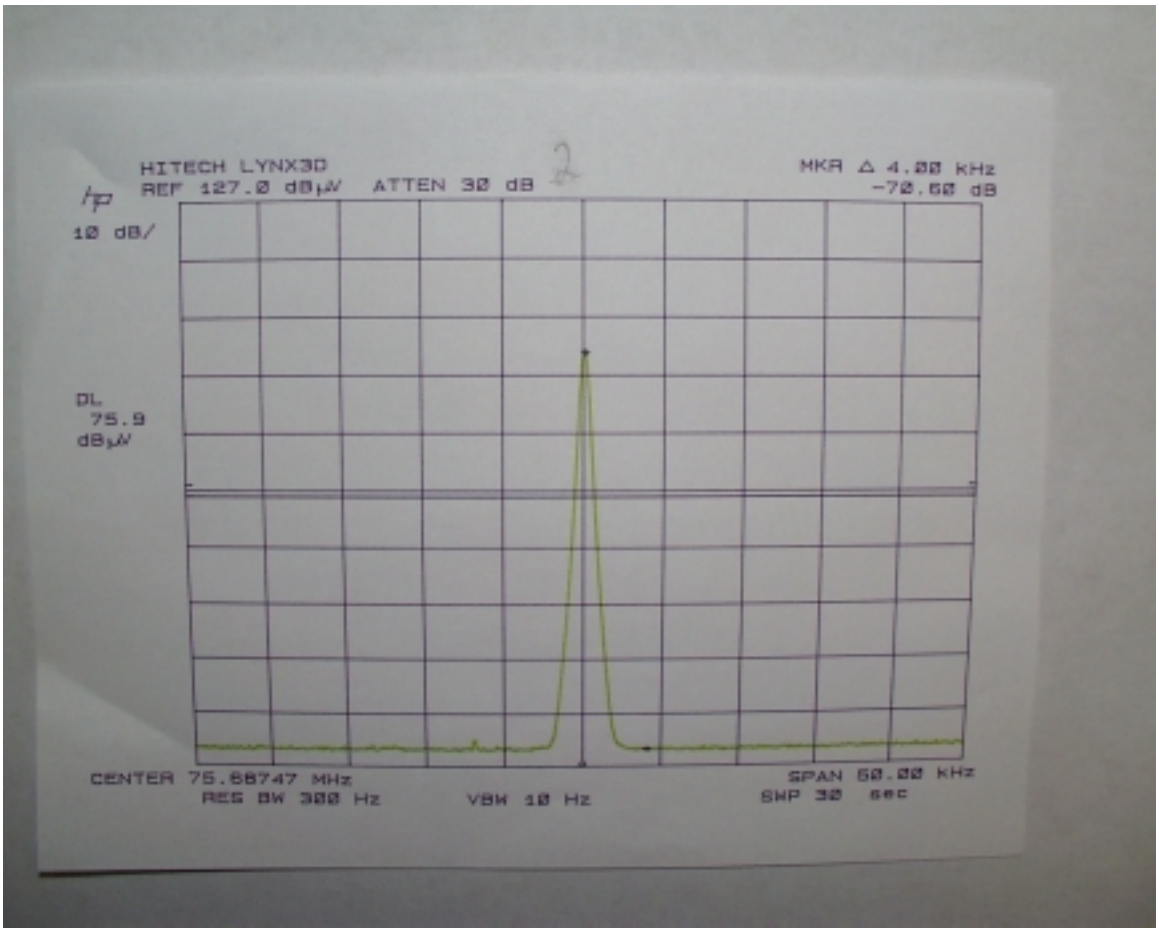
$ERP = \frac{(E*D)^2}{30*G}$ $ERP = \frac{(0.56*3)^2}{30*0.24}$ = 397mWatts

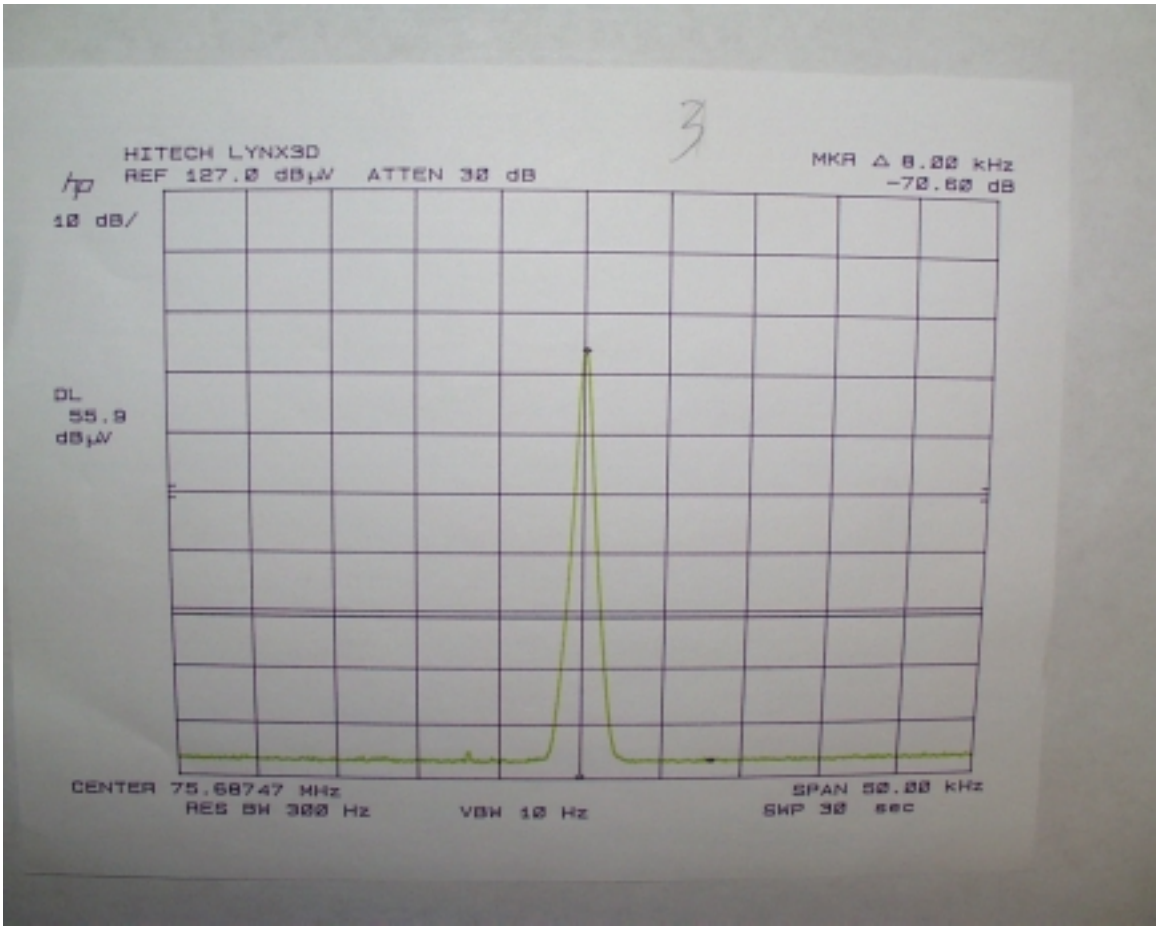
E=V/m
D= distance in meters, G= antenna gain

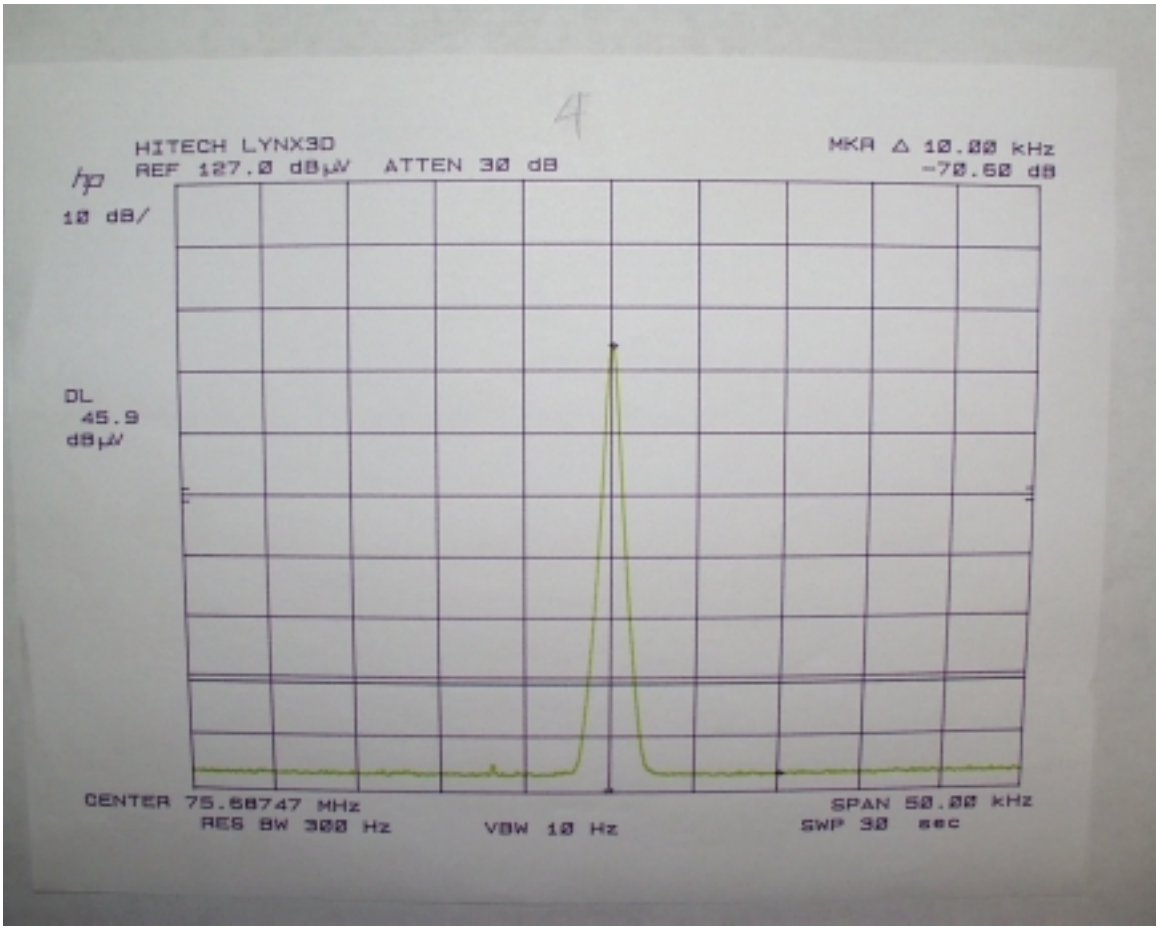
SECTION 2.1049 (Was Section 2.989): OCCUPIED BANDWIDTH

PLOT	PLOT #
Authorized Bandwidth	1
50%-100% of Auth. B/W -25dB	2
100%-125% of Auth. B/W -45dB	3
125%-250% of Auth. B/W -55dB	4









SECTION 2.1051 (2.991): SPURIOUS EMISSION AT ANTENNA TERMINAL.

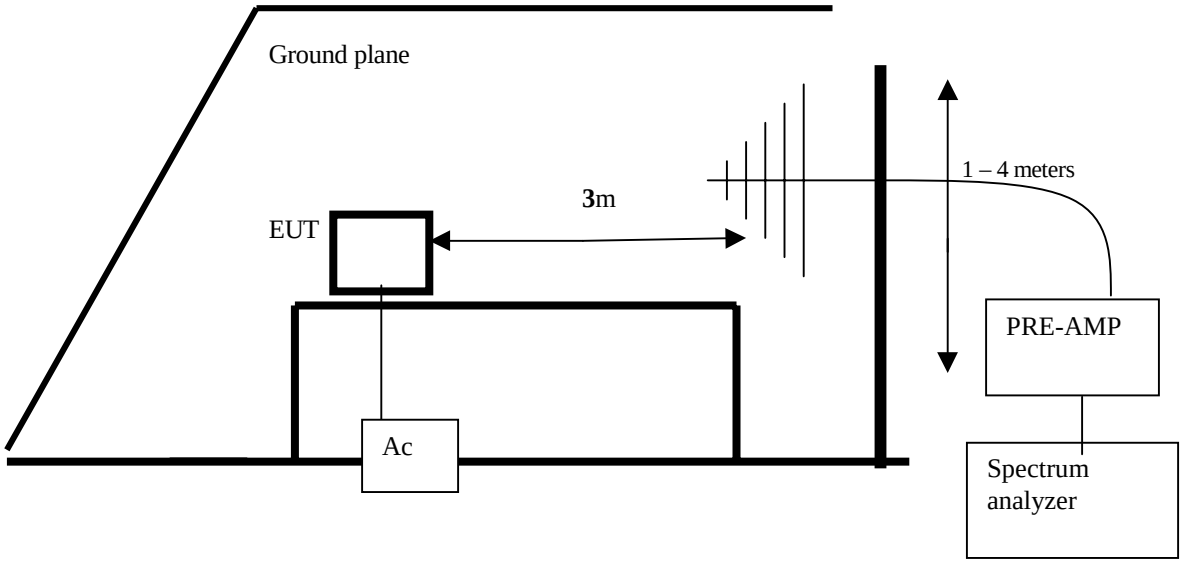
Not Applicable

SECTION 2.1053 (2.993): FIELD STRENGTH OF SPURIOUS RADIATION.

Equipment used.

HP Spectrum Analyzer/8566B
HP Spectrum Display/85662A
HP Quasi-Peak Detector/85650A
HP Pre-Amp(P5)/8447D
Emco Log-Periodic Antenna/3146

Test setup



Test procedure:

The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3 Meters from the EUT. With the transmitter operating at full power the turntable was slowly rotated to locate the direction of maximum emission once maximum direction was determined; the search antenna was raised and lowered in both vertical and horizontal polarization.

Test Result:

Radiated data attached.

Compliance Engineering Services Inc.

Project No. : 99U0206
Report No. : 990427B3
Date : 04/28/1999
Time : 14:47
Test Engr : PETE K

>> 3 M RADIATED EMISSION DATA <<

Company : HITEC RCD
Equipment Under Test : LYNX 3D
Test Configuration : EUT ONLY
Type of Test : FCC CLASS B
Mode of Operation : NORMAL

Freq.	dBuV	PreAmp	Ant	Cable	dBuV/m	Limit	Margin	Pol	Hgt(m)	Az
X-AXIS:										
Biconical 1197 ; No Pre-pamp :										
75.69	105.40	0.00	7.07	1.70	114.17			H	3.0	90
151.38	43.30	0.00	16.59	2.51	62.40	69.20	-6.80	H	2.0	90
Z-AXIS:										
75.69	103.90	0.00	7.07	1.70	112.67			H	3.0	90
151.38	40.70	0.00	16.59	2.51	59.80	43.50	-9.40	H	3.0	0
Y-AXIS:										
75.69	105.60	0.00	7.69	1.70	114.99			V	1.0	0
151.38	43.00	0.00	17.27	2.51	62.78	69.20	-6.42	V	1.0	0
LP 2120 ; No Pre-pamp :										
227.00	41.00	0.00	11.19	3.13	55.32	69.20	-13.88	V	1.0	0
LP 2120 ; Pre-pamp = 8447D-P8 2944A06589:										
302.76	56.50	-26.79	14.00	3.69	47.39	69.20	-21.81	V	1.0	0
378.45	61.10	-27.18	15.14	4.16	53.22	69.20	-15.98	V	1.0	0
454.12	64.30	-27.60	16.52	4.61	57.83	69.20	-11.37	V	1.0	0
529.83	61.60	-27.93	17.71	5.03	56.41	69.20	-12.79	V	1.0	0
605.52	50.60	-28.10	18.51	5.43	46.44	69.20	-22.76	V	1.0	0
681.20	57.60	-28.08	20.06	5.91	55.50	69.20	-13.70	V	1.0	0
756.90	54.10	-27.90	20.68	6.31	53.19	69.20	-16.01	V	1.0	0
X-XIS:										
LP 2120 ; No Pre-pamp :										
227.00	45.10	0.00	11.68	3.13	59.91	69.20	-9.29	H	2.0	90
LP 2120 ; Pre-pamp = 8447D-P8 2944A06589:										
302.76	65.50	-26.79	14.51	3.69	56.90	69.20	-12.30	H	2.0	90
378.45	70.40	-27.18	15.65	4.16	63.04	69.20	-6.16	H	2.0	90
454.14	65.40	-27.60	16.82	4.61	59.23	69.20	-9.97	H	2.0	90
529.83	67.20	-27.93	18.05	5.03	62.34	69.20	-6.86	H	2.0	90
605.52	58.60	-28.10	19.36	5.43	55.29	69.20	-13.91	H	2.0	90
681.21	60.70	-28.08	20.61	5.91	59.14	69.20	-10.06	H	2.0	90
756.90	56.70	-27.90	21.36	6.31	56.47	69.20	-12.73	H	2.0	90
Z-AXIS:										
LP 2120 ; No Pre-pamp :										

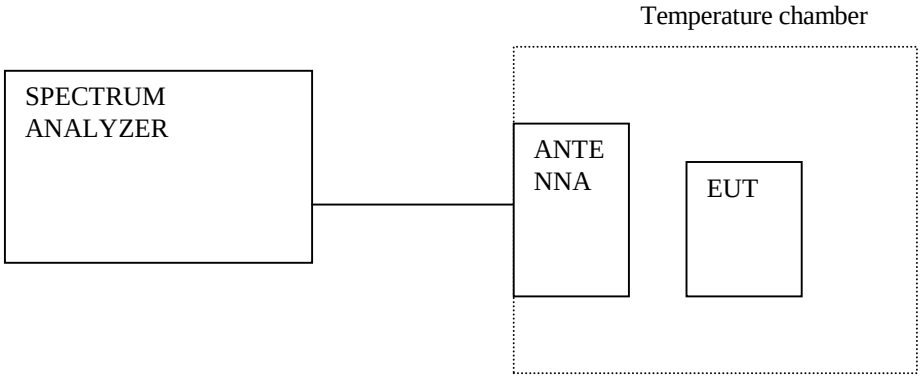
```
 227.00   43.70    0.00  11.68   3.13   58.51  69.20  -10.69   H    2.0    90
LP 2120 ; Pre-pamp = 8447D-P8 2944A06589:
 302.76   59.20  -26.79  14.51   3.69   50.60  69.20  -18.60   H    2.0    90
 378.45   62.30  -27.18  15.65   4.16   54.94  69.20  -14.26   H    2.0    90
 454.14   67.50  -27.60  16.82   4.61   61.33  69.20   -7.87   H    2.0    90
 529.83   64.20  -27.93  18.05   5.03   59.34  69.20   -9.86   H    2.0    90
 605.52   53.90  -28.10  19.36   5.43   50.59  69.20  -18.61   H    2.0    90
 681.21   52.70  -28.08  20.61   5.91   51.14  69.20  -18.06   H    2.0    90
 756.90   52.30  -27.90  21.36   6.31   52.07  69.20  -17.13   H    2.0    90
Total # of data 32
V. b2.2
```

SECTION 2.1055 (Was Section 2.995): FREQUENCY STABILITY

Test Equipment:

HP Spectrum Analyzer/8593EM
FLEXCO cable; 1ft. coaxial cable (loss: .9dB/ft @ 26GHz)
Thermotron Corp./SAF-16C Mini max (Temperature chamber)

Test Setup:



Minimum Requirement:

Test Method
Temperature: Vary the ambient temperature from -30 to +50°C, in 10 degree increments, allowing the EUT to stabilize at each temperature.

Primary Supply Voltage: Vary the supply voltage from 85% to 115% of the nominal operating voltage

Test Results
Refer to spreadsheet.

HITEC RCD INC							
			Frequency Stability 95.623				
M/N Lynx 3D							
Tx Output (MHz)	%	limit(MHz)					
75.69	0.002%	0.001514					
Frequency (MHz)	Temp	Delta (Hz)		Frequency (MHz)	Percent	Voltage	Delta (Hz)
75.6905	-30	0.000500		75.6915	85	8.16	0.001500
75.6915	-20	0.001500		75.6895	115	11.04	-0.000500
75.6915	-10	0.001500					
75.691	0	0.001000					
75.691	10	0.001000					
75.691	20	0.001000					
75.691	30	0.001000					
75.691	40	0.001000					
75.6915	50	0.001500					

SECTION 95.635 EMISSION MASKS

PLOT	PLOT #
Authorized Bandwidth	1
50%-100% of Auth. B/W -25dB	2
100%-125% of Auth. B/W -45dB	3
125%-250% of Auth. B/W -55dB	4