

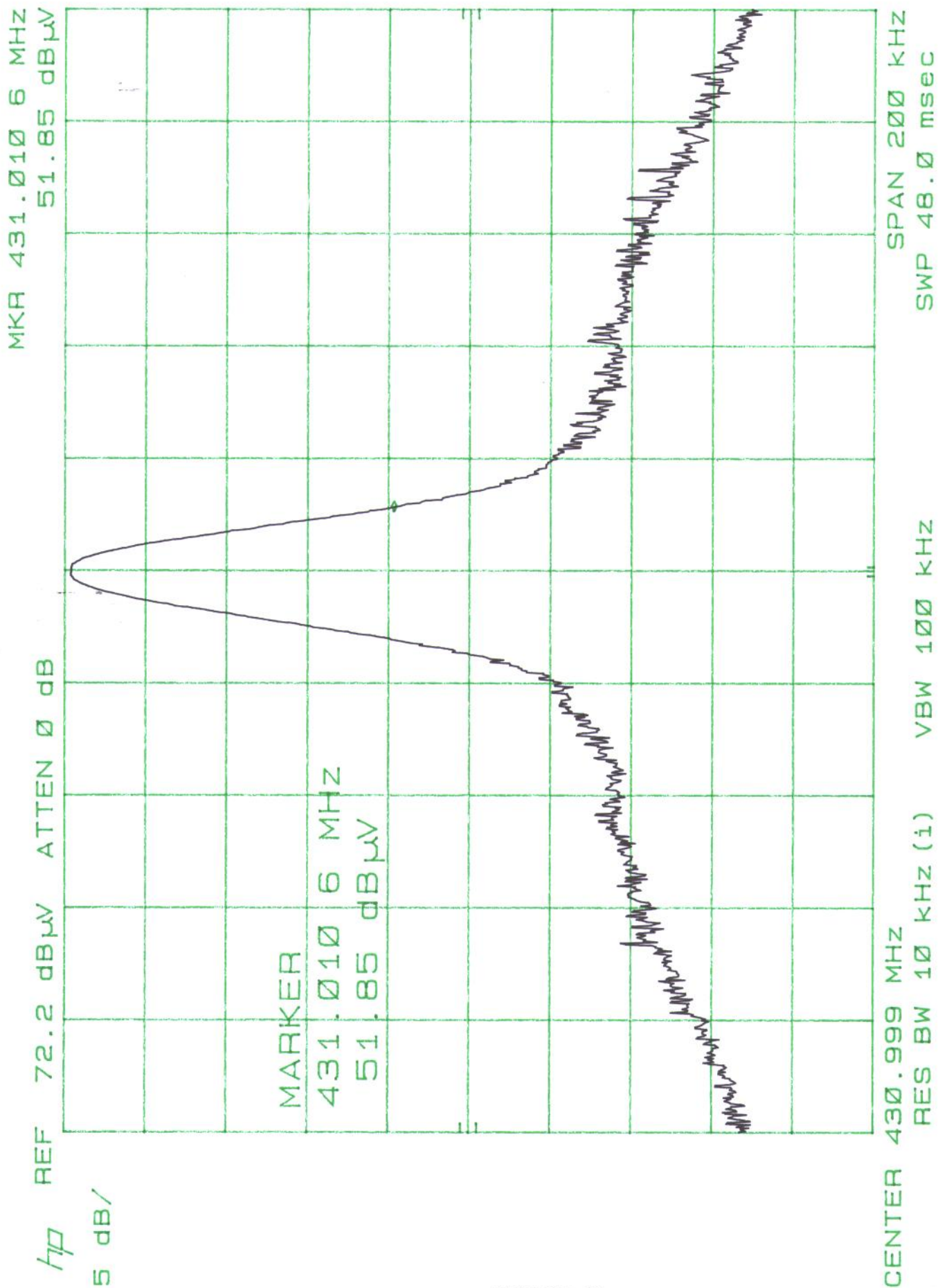


FIGURE 39



Company: Lutron Electronics
Model # HRT-3LD
Fund. Freq.: 437MHz

Test Personnel: J. Kavalusky ^{JK}
Date: 04/26/2006

Bandwidth of Fundamental Frequency

	Frequency (MHz)	Measurement (dBuV/m)
Center Frequency	437.000	69.35
20 dB down	436.986	49.10
20 dB down	437.009	49.05

The bandwidth is 23kHz.

Allowable Bandwidth: 0.25% of Fundamental Frequency
For 437MHz: $\pm 0.5463\text{MHz}$

Figure 40

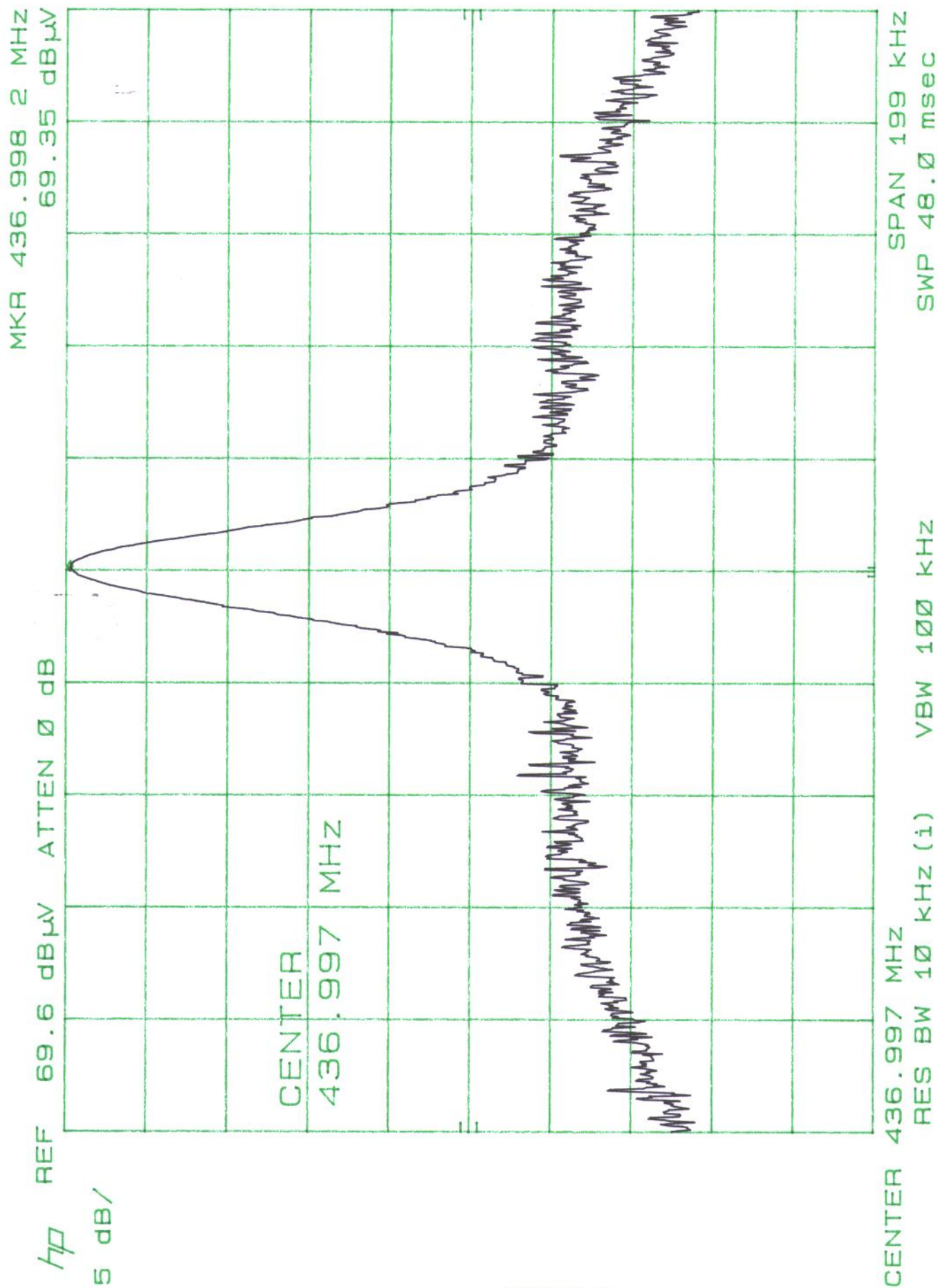


FIGURE 41

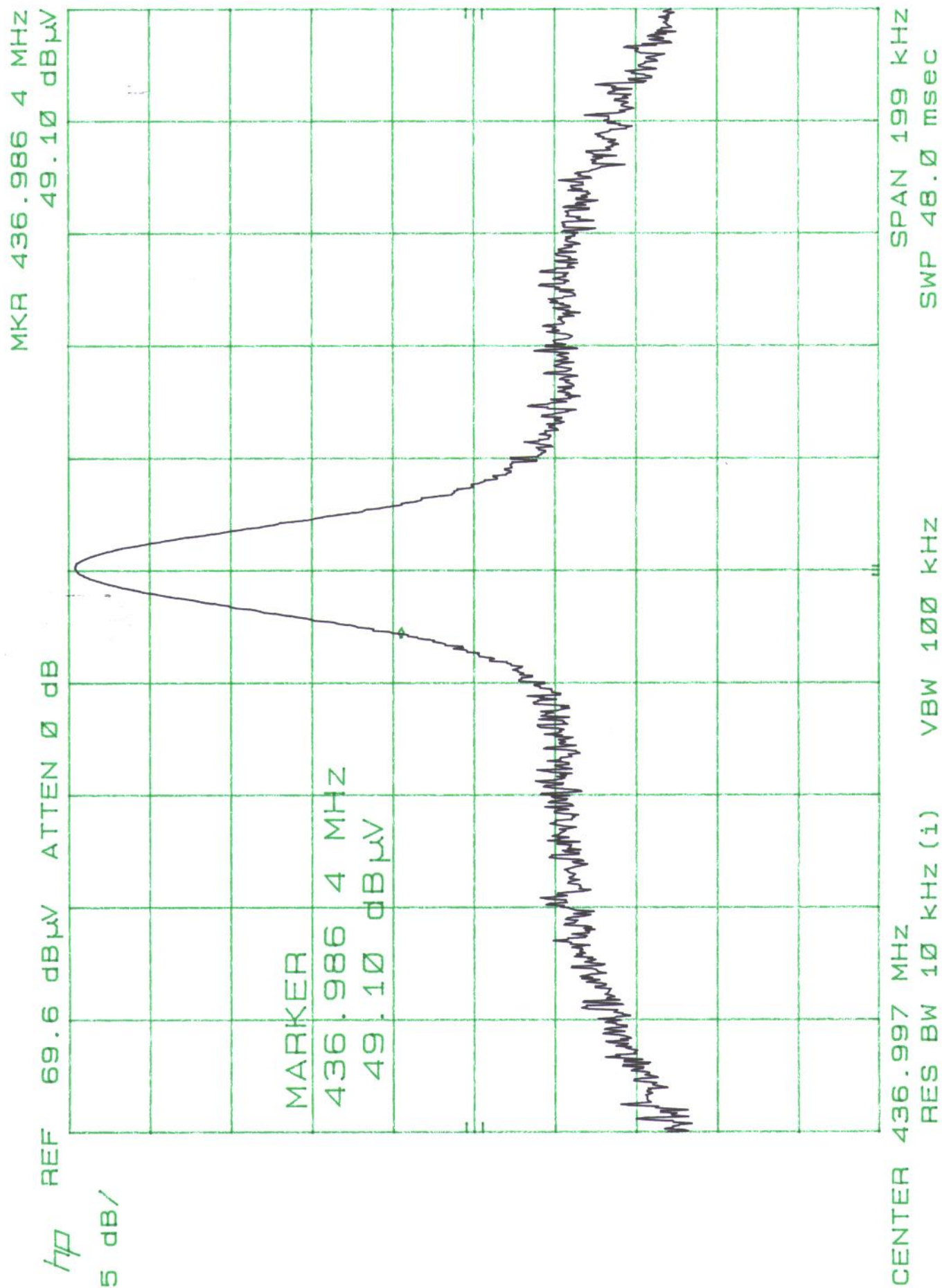


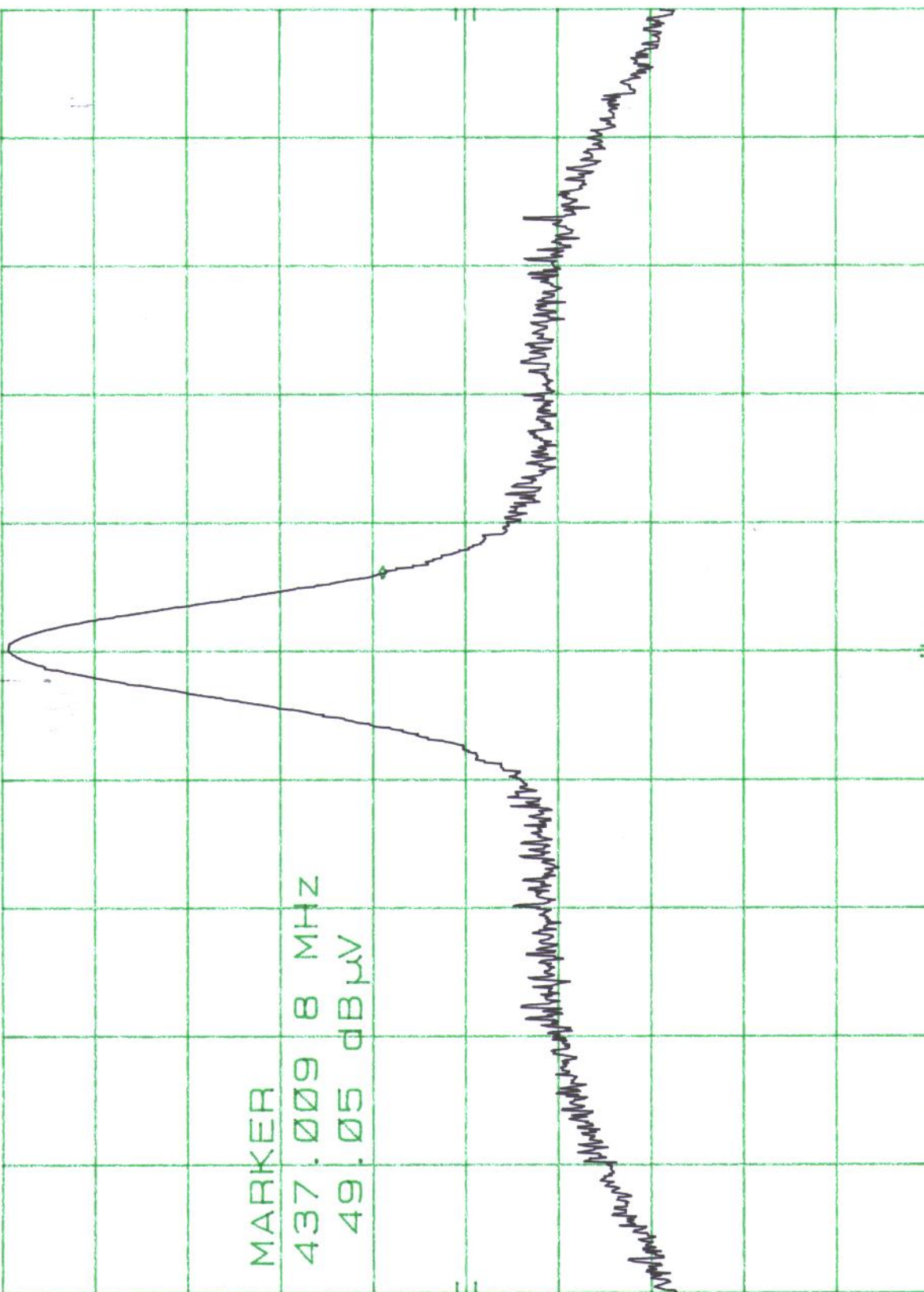
FIGURE 42

MKR 437.009 8 MHz
49.05 dB μ V

hp REF 69.6 dB μ V ATTN 0 dB

5 dB/

MARKER
437.009 8 MHz
49.05 dB μ V



SPAN 199 KHz
SWP 48.0 msec

VBW 100 KHz

CENTER 436.997 MHz
RES BW 10 KHz (1)

FIGURE 43



4.4 Radiated Emissions Measurements, §15.33, §15.35, §15.109, §15.205, §15.209, §15.231

Radiated Emissions measurements were recorded for the test sample at a distance of 3 meters. Radiated Emissions were measured with the antenna in both the horizontal and vertical polarizations. The antenna was raised 1 to 4 meters in height and the Equipment Under Test (**EUT**) was rotated 360° to maximize the emission. No significant emission level changes occurred while positioning the **EUT** power cable. The **EUT** was tested in FM Packet Mode.

For intentional radiators the field strength of emissions of the **EUT** was measured out to the tenth harmonic of the carrier frequency. The carrier frequency was set to 431 and 437MHz.

Figure 24 is a test setup diagram for Radiated Emissions and Figure 25 are the photographs of the test setup.

The test results for Radiated Emissions testing are shown in the following figures:

- Figure 44 Unintentional Radiated Emissions Test Results Data FM Tx Mode 431MHz, Vert.
- Figure 45 Unintentional Radiated Emissions Test Results Data, FM Tx Mode, 431MHz, Horiz.
- Figure 46 Unintentional Radiated Emissions Test Results Data, FM Tx Mode, 437MHz, Vert.
- Figure 47 Unintentional Radiated Emissions Test Results Data, FM Tx Mode, 437MHz, Horiz.
- Figure 48 Intentional Radiated Emissions Test Results Data, FM Tx Mode 431MHz
- Figure 49 Intentional Radiated Emissions Test Results Data, FM Tx Mode 437MHz

ALL LEVELS COMPLY WITH THE APPLICABLE FCC LIMITS FOR RADIATED EMISSIONS PER THE APPLICABLE PARAGRAPHS.

Test Personnel: J. Kavalusky
Date: 7/24/06

[illegible]

Figure 44

Company: Lutron Electronics
 Model # HRT-3LD
 Fund. Freq.: 431MHz
 Mode: Tx. (FM)

Test Personnel: J. Kavalusky
 Date: 7/24/06

Radiated Emissions for Unintentional Radiators

Frequency (MHz)	Polarity	Antenna Height (Meters)	Antenna Azimuth (Degrees)	Indicated Level (dBuV)	Antenna Factor (dB)	Pre-Amp Gain Factor (dB)	Cable Loss (dB)	Averaging Factor (dB)	Field Strength @ 3m (dBuV/m)	Limits @ 3m (dBuV/m)	Margin (dB)
72	Horiz	2.43	180.0	24.2	8.6	0.0	1.4		34.2	41.93	-7.7
75.6	Horiz	2.43	180.0	24.2	8.8	0.0	1.4		34.4	41.93	-7.5
120.0	Horiz	2.33	180.0	9.0	11.0	0.0	1.9		21.9	41.58	-19.7
200.0	Horiz	1.65	180.0	7.2	14.0	0.0	2.3		23.5	51.48	-28.0
300.0	Horiz	1.00	127.9	-0.7	15.2	0.0	3.0		17.5	54.67	-37.2
427.67	Horiz	1.00	113.0	25.1	16.6	0.0	3.6		45.3	60.85	-15.6
434.36	Horiz	1.00	236.0	21.3	17.3	0.0	3.6		42.2	60.67	-18.5
435	Horiz	1.00	150.6	23.1	17.20	0.0	3.6		43.9	60.86	-17.0
500.0	Horiz	1.00	0	-1.1	18.2	0.0	4.0		21.1	61.9	-40.8
861.386	Horiz	1.00	0	10.0	22.7	0.0	5.4		38.1	61.9	-23.8
1000.0	Horiz	1.00	0	-0.2	24.6	0.0	5.8		30.2	61.9	-31.7
1292.0	Horiz	1.00	0	53.8	25.0	-31.0	1.0		48.8	61.9	-13.1
1723.0	Horiz	1.00	0	53.1	26.6	-33.0	1.0		47.7	61.9	-14.2
2153.0	Horiz	1.00	0	43.6	28.0	-29.0	1.0		43.6	61.9	-18.3

Figure 45

Test Personnel: J. Kavalusky
Date: 7/24/06

[illegible]

Figure 46



Test Personnel: J. Kavalusky
Date: 7/24/06

Radiated Emissions for Unintentional Radiators

[illegible]

Figure 47

Company: Lutron Electronics
 Model # HRT-3LD
 Fund. Freq. 431 MHz.
 Mode Tx (FM)

Test Personnel: J. Kavalusky
 Date: 7/24/2006

Radiated Emission for Intentional Radiators

Frequency (MHz)	Polarity	Antenna Height (Meters)	Antenna Azimuth (Degrees)	Indicated Level (dBuV)	Antenna Factor (dB)	Pre-Amp Gain Factor (dB)	Cable Loss (dB)	Averaging Factor (dB)	Field Strength @ 3m (dBuV/m)	Limits @ 3m (dBuV/m)	Margin (dB)
431	Vert	1.00	238.9	70.0	17.4	0.0	3.6	-20.0	71.0	80.73	-9.7
862	Vert	1.00	238.9	49.0	22.5	0.0	5.4	-20.0	56.9	61.93	-5.0
1293	Vert	1.00	0	46.00	25.0	-31.0	1.0	-20.0	21.00	61.93	-40.9
1724	Vert	1.00	0	44.00	26.3	-33.0	1.0	-20.0	18.30	61.93	-43.6
2155	Vert	1.00	0	48.1	28.0	-29.0	1.0	-20.0	28.1	61.93	-33.8
2586	Vert	1.00	0	46.00	30.0	-32.0	1.0	-20.0	25.00	61.93	-36.9
3017	Vert	1.00	0	42.00	30.3	-27.0	1.0	-20.0	26.30	61.93	-35.6
3448	Vert	1.00	0	41.0	31.3	-25.0	1.0	-20.0	28.3	61.93	-33.6
3879	Vert	1.00	0	41.5	32.4	-23.3	1.0	-20.0	31.60	54.0	-22.4
4310	Vert	1.00	0	41.5	32.5	-22.0	1.0	-20.0	33.0	54.0	-21.0
431	Horiz	1.00	238.9	70.3	17.3	0.0	3.6	-20.0	71.2	80.73	-9.5
862	Horiz	1.00	238.9	45.4	22.8	0.0	5.4	-20.0	53.6	61.93	-8.3
1293	Horiz	1.00	198	56.7	25.0	-31.0	1.0	-20.0	31.7	61.93	-30.2
1724	Horiz	1.00	0	50.4	26.6	-33.0	1.0	-20.0	25.0	61.93	-36.9
2155	Horiz	1.00	0	47.40	28.0	-29.0	1.0	-20.0	27.40	61.93	-34.5
2586	Horiz	1.00	0	45.70	29.9	-32.0	1.0	-20.0	24.6	61.93	-37.3
3017	Horiz	1.00	0	44.50	30.4	-27.0	1.0	-20.0	28.90	61.93	-33.0
3448	Horiz	1.00	0	41.40	31.4	-25.0	1.0	-20.0	28.80	61.93	-33.1
3879	Horiz	1.00	0	41.50	32.5	-23.3	1.0	-20.0	31.70	54.0	-22.3
4310	Horiz	1.00	0	41.50	32.5	-22.0	1.0	-20.0	33.00	54.0	-21.0

Figure 48



RADIATION SCIENCES INC.

Company: Lutron Electronics
Model # HRT-3LD
Fund. Freq.: 437MHz
Mode: Tx (CW)

Test Personnel: J. Kavalusky
Date: 7/24/06

Radiated Emission for Intentional Radiators

Frequency (MHz)	Polarity	Antenna Height (Meters)	Antenna Azimuth (Degrees)	Indicated Level (dBuV)	Antenna Factor (dB)	Pre-Amp Gain Factor (dB)	Cable Loss (dB)	Averaging Factor (dB)	Field Strength @ 3m (dBuV/m)	Limits @ 3m (dBuV/m)	Margin (dB)
437	Vert	1.28	242.9	68.9	17.4	0.0	3.6	-20.0	69.9	80.3	-10.4
874	Vert	3.50	242.9	40.0	22.8	0.0	5.4	-20.0	48.2	61.9	-13.7
1311	Vert	1.00	0	53.20	25.1	-32.0	1.0	-20.0	27.3	61.9	-34.6
1748	Vert	1.00	0	50.00	26.3	-33.0	1.0	-20.0	24.30	54.0	-29.7
2185	Vert	1.00	0	44.0	28.2	-29.0	1.0	-20.0	24.2	61.9	-37.7
2622	Vert	1.00	0	45.00	30.0	-32.0	1.0	-20.0	24.00	61.9	-37.9
3059	Vert	1.00	0	42.30	30.3	-27.0	1.0	-20.0	26.60	61.9	-35.3
3496	Vert	1.00	0	42.0	31.4	-25.0	1.0	-20.0	29.4	54.0	-24.6
3933	Vert	1.00	0	41.0	32.44	-23.3	1.0	-20.0	31.14	54.0	-22.9
4370	Vert	1.00	0	41.0	32.5	-22.0	1.0	-20.0	32.5	54.0	-21.5
437	Horiz	1.00	255.0	74.0	17.3	0.0	3.6	-20.0	74.9	80.3	-5.4
874	Horiz	1.00	255.0	40.0	23.3	0.0	5.4	-20.0	48.7	61.9	-13.2
1311	Horiz	1.00	255.0	53.50	25.1	-32.0	1.0	-20.0	27.60	61.9	-34.3
1748	Horiz	1.00	0	47.30	26.6	-33.0	1.0	-20.0	21.90	54.0	-32.1
2185	Horiz	1.00	0	43.00	28.2	-29.0	1.0	-20.0	23.2	61.9	-38.7
2622	Horiz	1.00	0	45.10	29.9	-32.0	1.0	-20.0	24.00	61.9	-37.9
3059	Horiz	1.00	0	41.70	30.4	-27.0	1.0	-20.0	26.10	61.9	-35.8
3496	Horiz	1.00	0	41.70	31.5	-25.0	1.0	-20.0	29.20	54.0	-24.8
3933	Horiz	1.00	0	41.40	32.54	-23.3	1.0	-20.0	31.64	54.0	-22.4
4370	Horiz	1.00	0	40.80	32.5	-22.0	1.0	-20.0	32.30	54.0	-21.7

Figure 49



4.5 Bandwidth Measurements, Paragraph 15.231

Bandwidth measurements were made at the three transmit frequencies of 431 and 437MHz.

RSI used an HP 8566 Spectrum Analyzer to perform bandwidth measurements. Bandwidth plots are shown on data sheets.

The requirement states that the bandwidth shall be no wider than .25% of the center frequency at the 20dB down points. Results of testing are shown in Figures 50 through 55.

THE BANDWIDTH MEASUREMENTS COMPLIED WITH THE FCC REQUIREMENTS SET FORTH IN PARAGRAPH 15.231.

Company: Lutron Electronics
 Model # HRT-3LD
 Fund. Freq.: 431MHz

Test Personnel: John Kavalusky
 Date: 8/01/06

Bandwidth of Fundamental Frequency

	Frequency (MHz)	Measurement (dBuV/m)
Center Frequency	430.198	75.85
20 dB down	431.168	57.00
20 dB down	429.878	57.00

The bandwidth is 440kHz.

Allowable Bandwidth: 0.25% of Fundamental Frequency
 For 431MHz: $\pm 0.5388\text{MHz}$

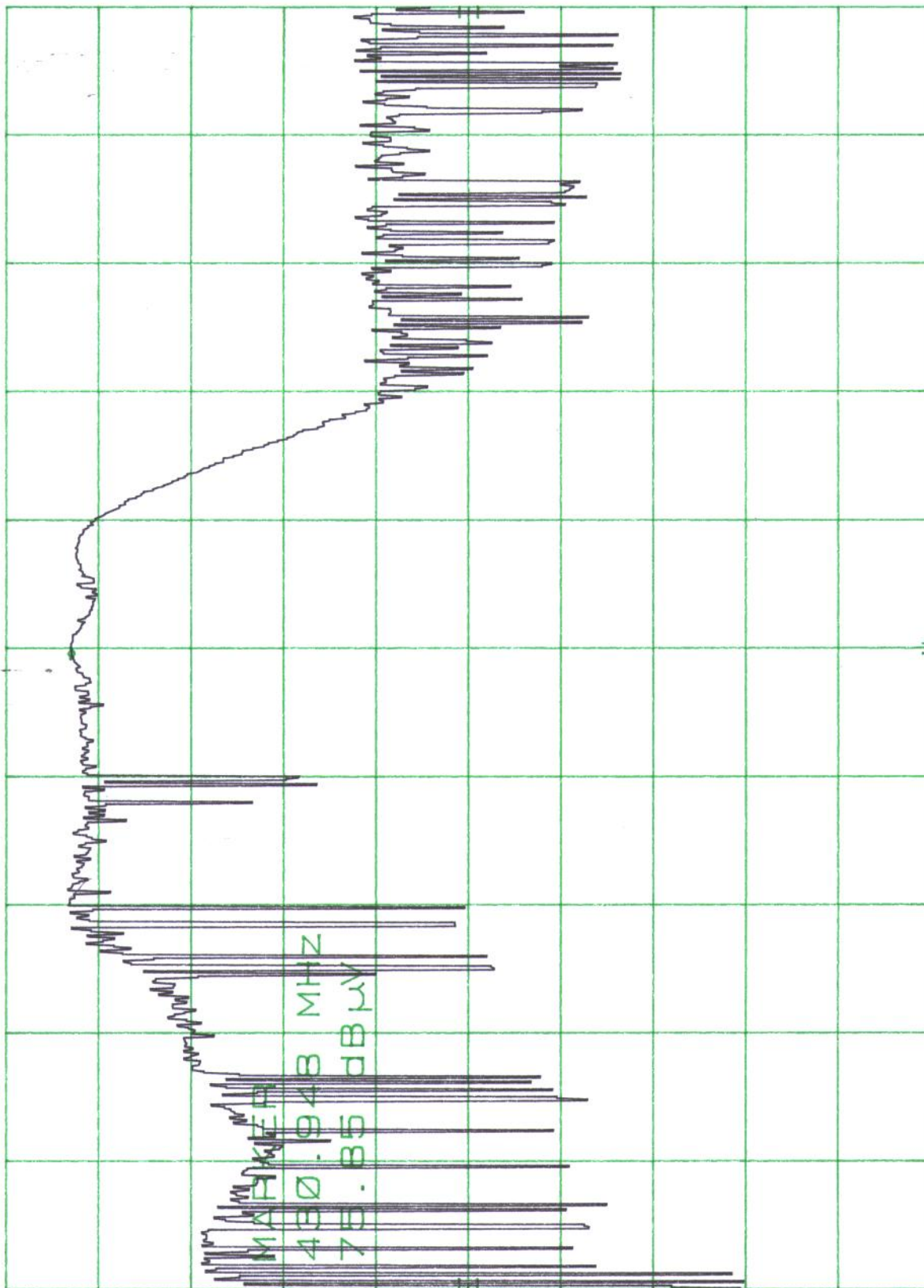
Figure 50

MKR 430.948 MHz
75.85 dB μ V

ATTEN 20 dB

REF 79.4 dB μ V

HP
5 dB/



SPAN 1.000 MHz
SWP 50 msec

VBW 300 kHz

RES BW 100 kHz (i)

CENTER 430.953 MHz

5 dB/

FIGURE 51

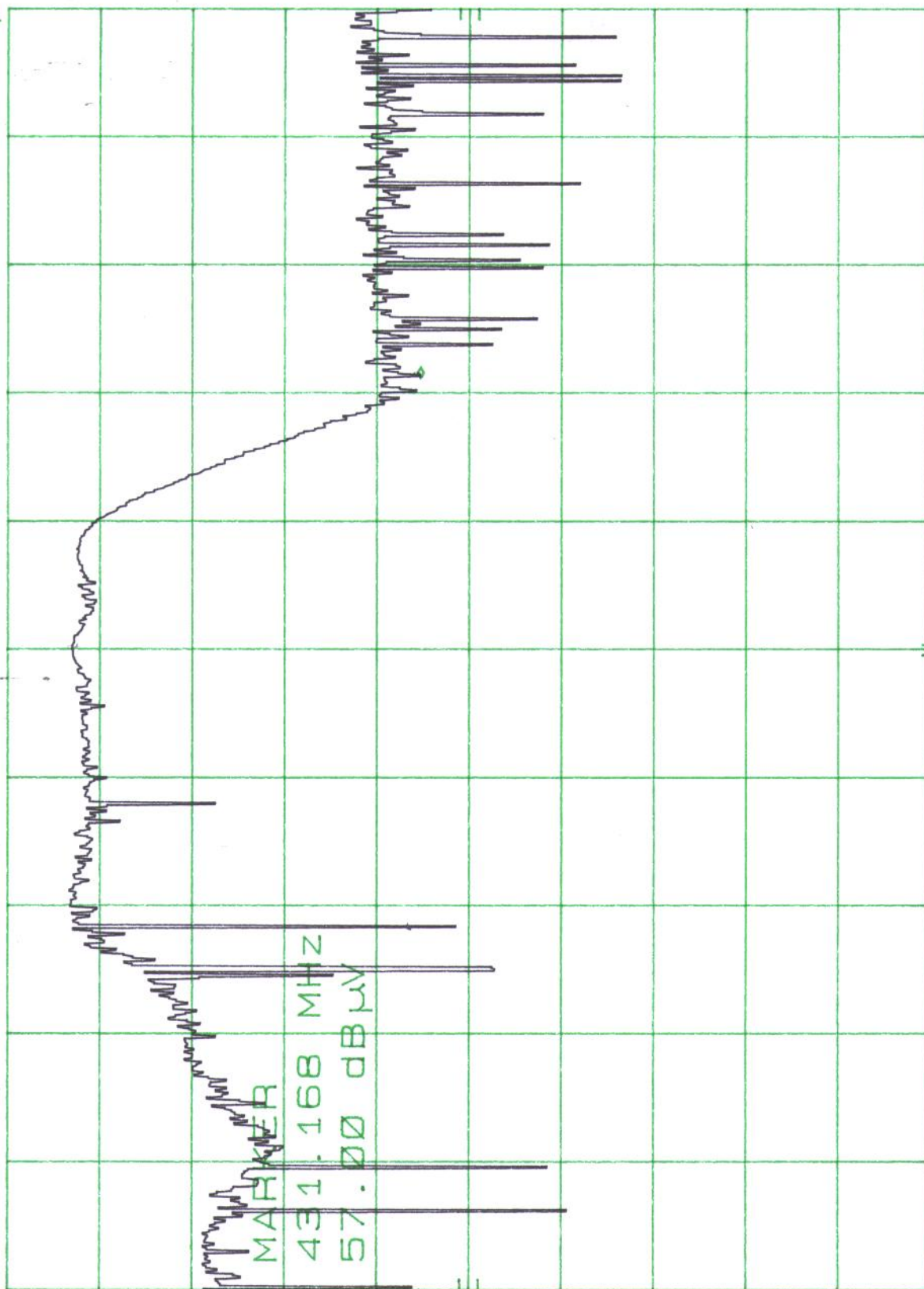
MKR 431.168 MHz
 57.00 dBμV

ATTEN 20 dB

REF 79.4 dBμV

HP

5 dB/



CENTER 430.953 MHz
 RES BW 100 KHz (i)

VBW 300 KHz

SPAN 1.000 MHz

SWP 50 msec

FIGURE 52

Company: Lutron Electronics
 Model # HRT-3LD
 Fund. Freq.: 437MHz

Test Personnel: John Kavalusky
 Date: 8/01/06

Bandwidth of Fundamental Frequency

	Frequency (MHz)	Measurement (dBuV/m)
Center Frequency	431.000	77.75
20 dB down	437.177	55.95
20 dB down	436.729	55.95

The bandwidth is 448 kHz.

Allowable Bandwidth: 0.25% of Fundamental Frequency
 For 437MHz: $\pm 0.5463\text{MHz}$

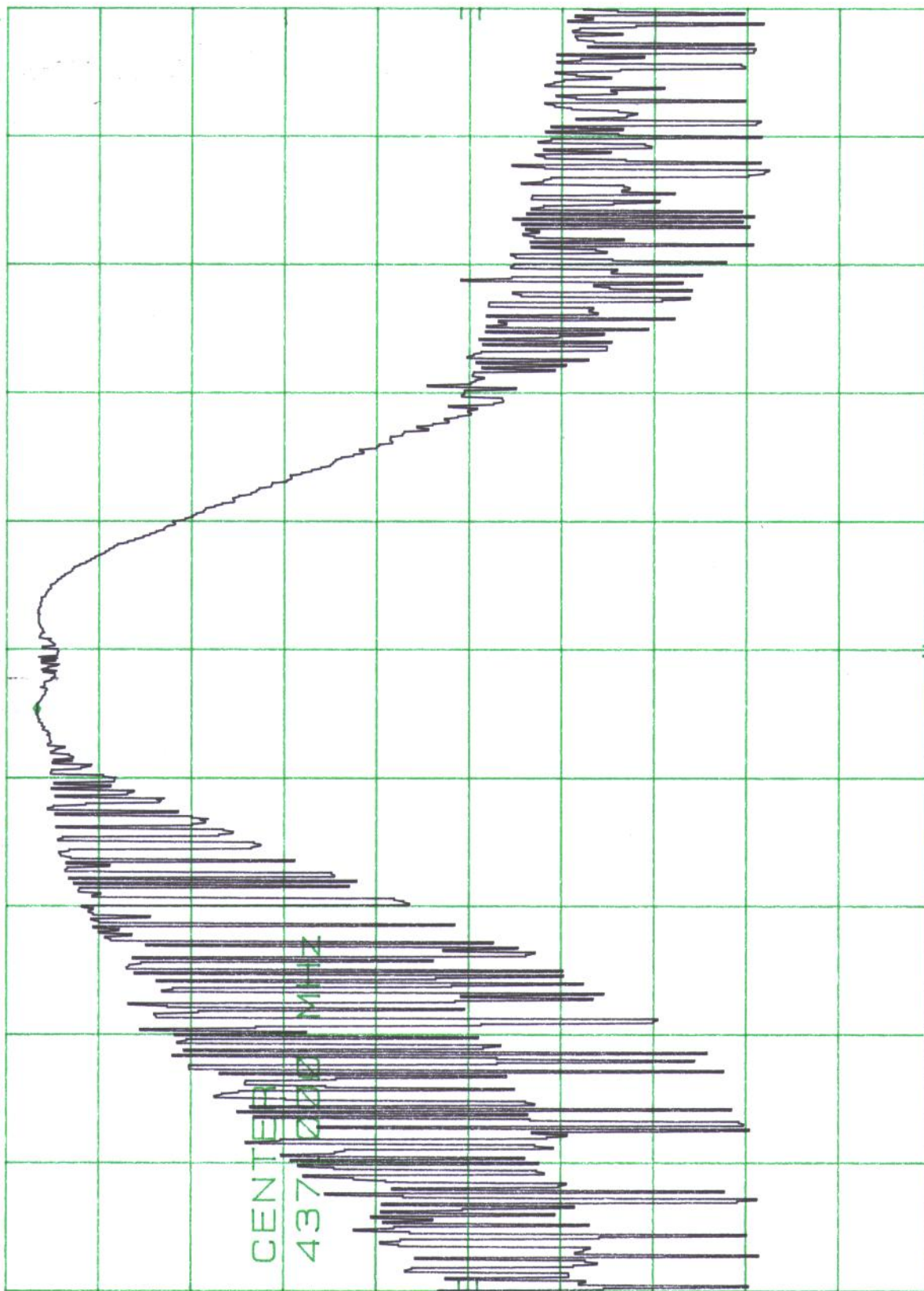
Figure 53

MKR 436.953 MHz
77.75 dBμV

ATTEN 20 dB

REF 79.4 dBμV

5 dB/



SPAN 1.000 MHz
SWP 50 msec

VBW 300 kHz

RES BW 100 kHz (i)

CENTER 437.000 MHz

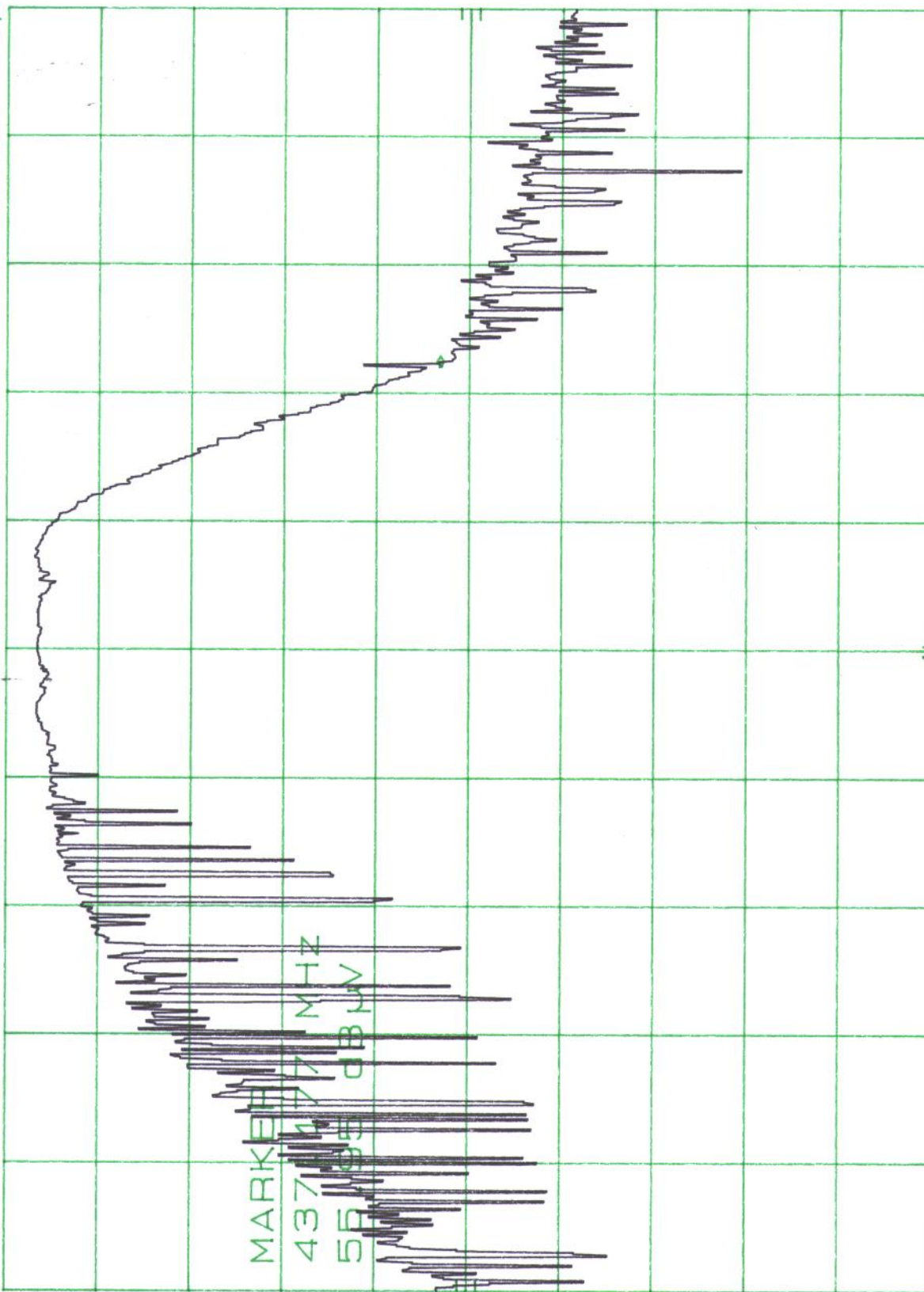
FIGURE 54

MR 437.177 MHz
55.95 dBμV

ATTEN 20 dB

REF 79.4 dBμV

5 dB/



SPAN 1.000 MHz
SWP 50 msec

VBW 300 KHz

CENTER 436.953 MHz

RES BW 100 KHz (i)

FIGURE 55



5.0 CONCLUSIONS

The evaluation of the **Lutron Electronics Model #: HRT-3LD**, configured as described herein, indicated that the unit complies with the requirements set forth in Subpart B and C of Part 15 of the **FCC** Rules for unintentional and intentional radiators.

1. The **EUT** meets the Conducted Emissions limits set forth in §15.107
2. The **EUT** meets the Radiated Emissions limits for unintentional radiators set forth in §15.109.
3. The **EUT** meets the Radiated Emissions limits for intentional radiators set forth in §15.205, §15.209, and §15.231 (c).