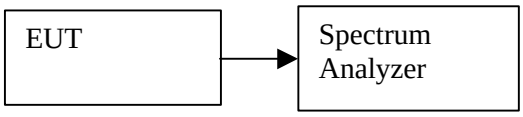
7.6. PEAK POWER SPECTRAL DENSITY

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The hopping function is turned off and the transmitter is set to a fixed frequency. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW and VBW are set to 3 kHz, the sweep time is set to span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

RESULTS

No non-compliance noted:

DATA MODE

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-3.11	8	-11.11
Middle	2441	-3.87	8	-11.87
High	2480	-4.47	8	-12.47

INQUIRY MODE

PPSD (dBm)	Limit (dBm)	Margin (dB)
-5.17	8	-13.17

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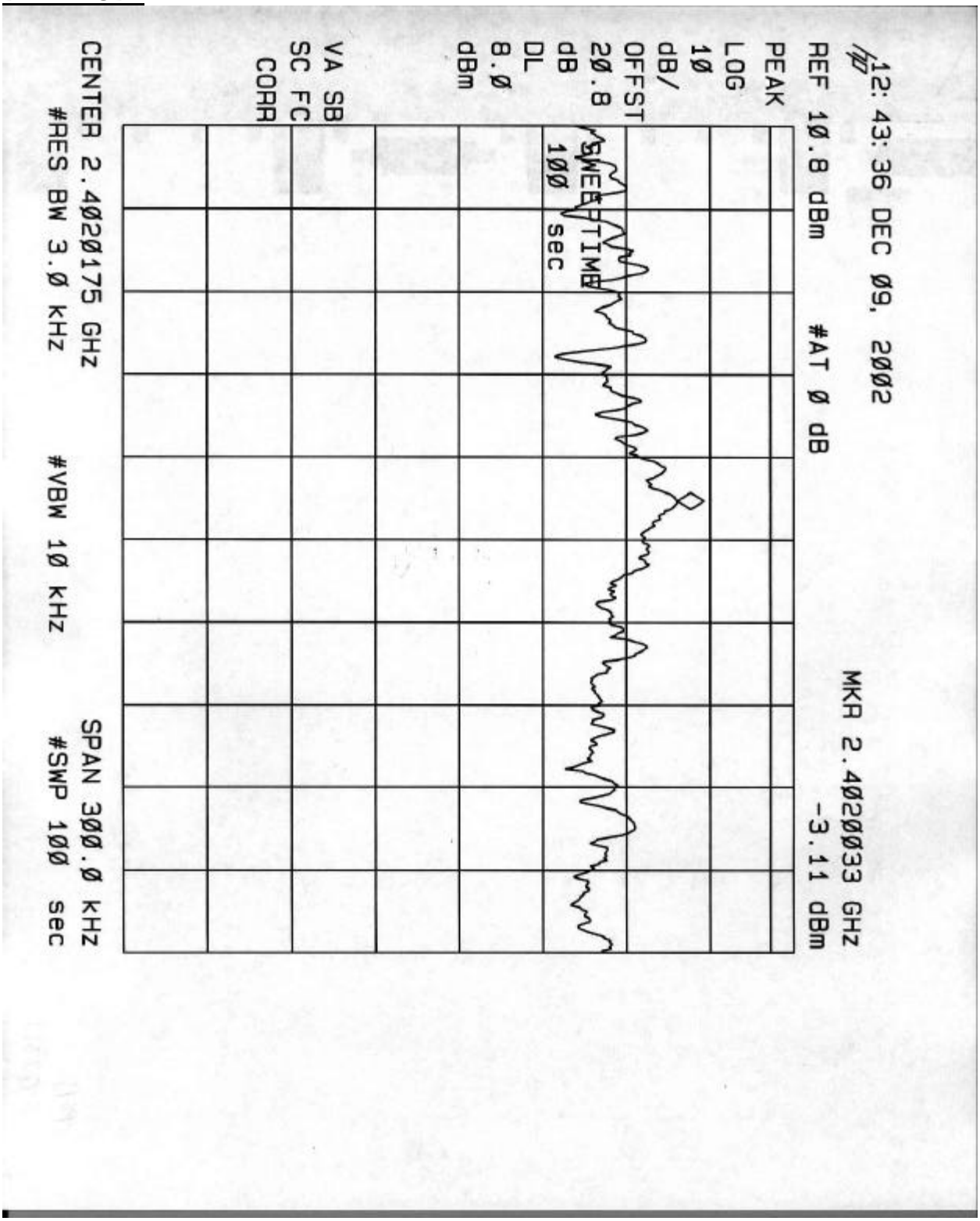
DATA MODE



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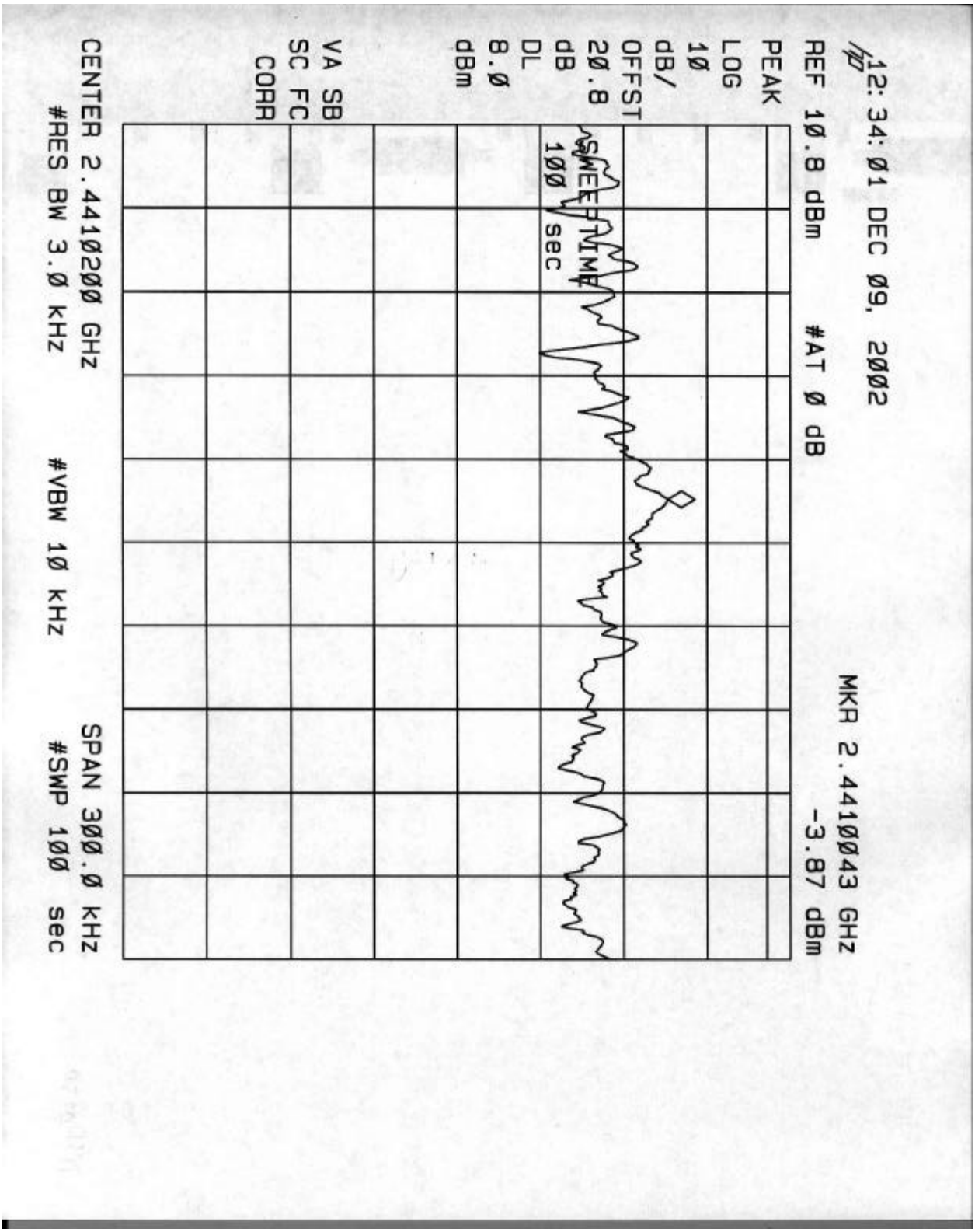

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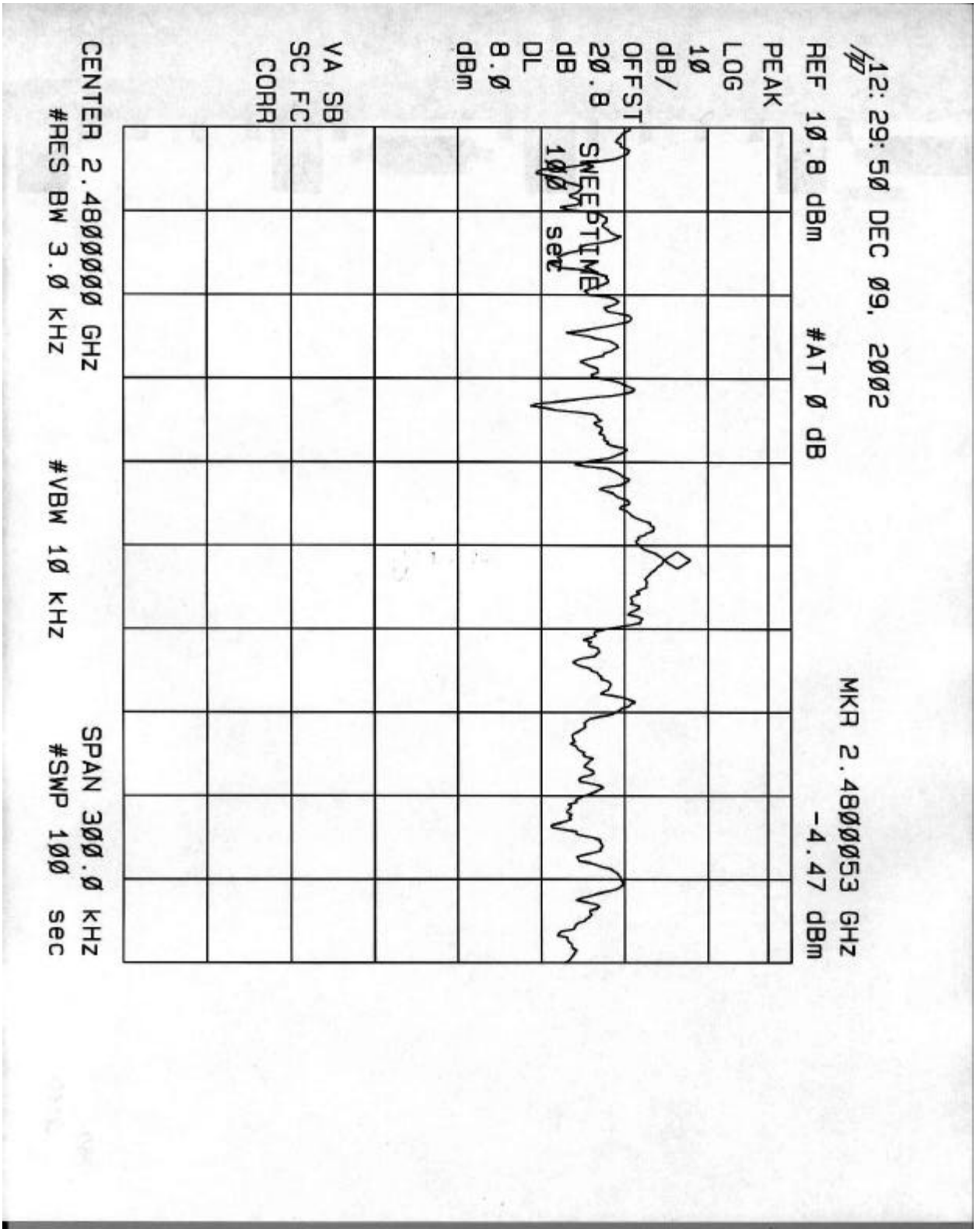

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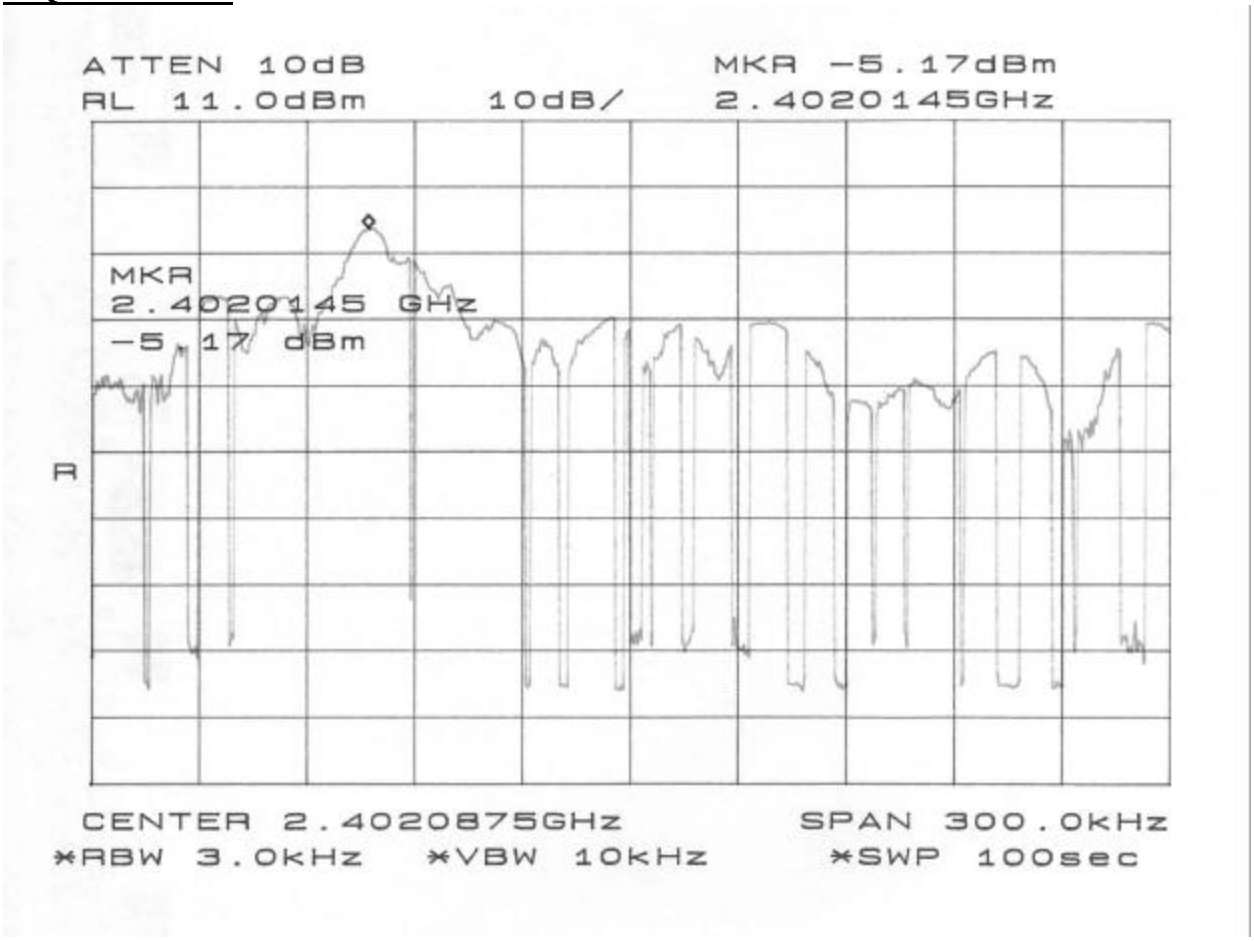
INQUIRY MODE



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MAXIMUM PERMISSIBLE EXPOSURE

CALCULATIONS

Given

$$E = \sqrt{(30 * P * G)} / d$$

and

$$S = E \wedge 2 / 3770$$

where

E = Field Strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = distance in meters
S = Power Density in milliwatts / square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = 100 * d (m)$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW / cm^2

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Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and

G (numeric) = 10 ^ (G (dBi) / 10)

yields

d = 0.282 * 10 ^ ((P + G) / 20) / √ S Equation (1)

where
d = MPE safe distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW / cm^2

RESULTS

No non-compliance noted:

EUT output power = +7.9 dBm
Antenna Gain = -1.6 dBi
S = 1.0 mW / cm^2 from 1.1310 Table 1

Substituting these parameters into Equation (1) above:

MPE Safe Distance = 0.58 cm

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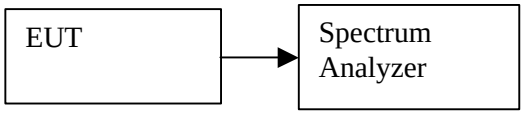
7.7. SPURIOUS EMISSIONS – CONDUCTED MEASUREMENTS

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

Measurements are made over the 30 MHz to 26.5 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

No non-compliance noted:

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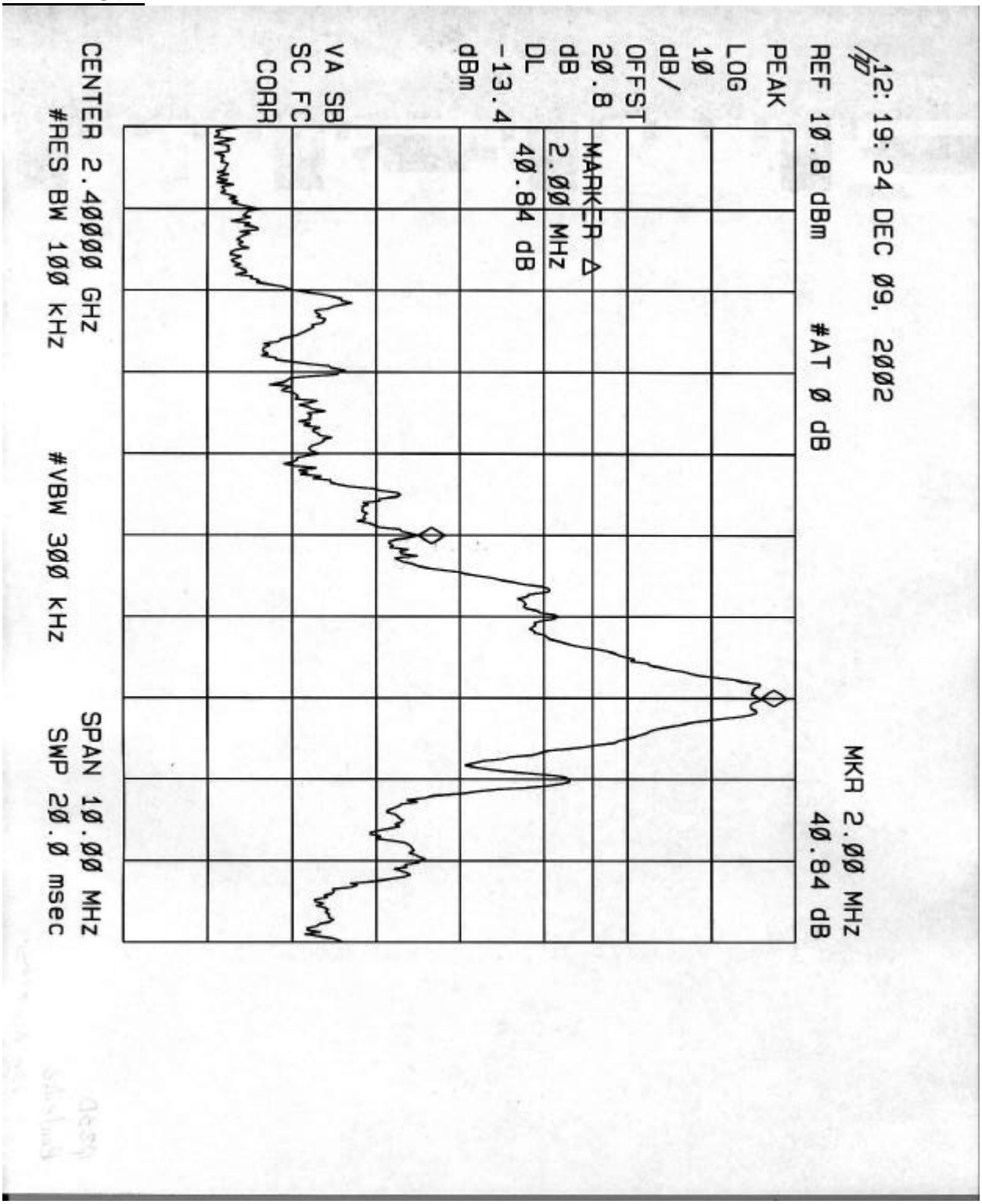
DATA MODE



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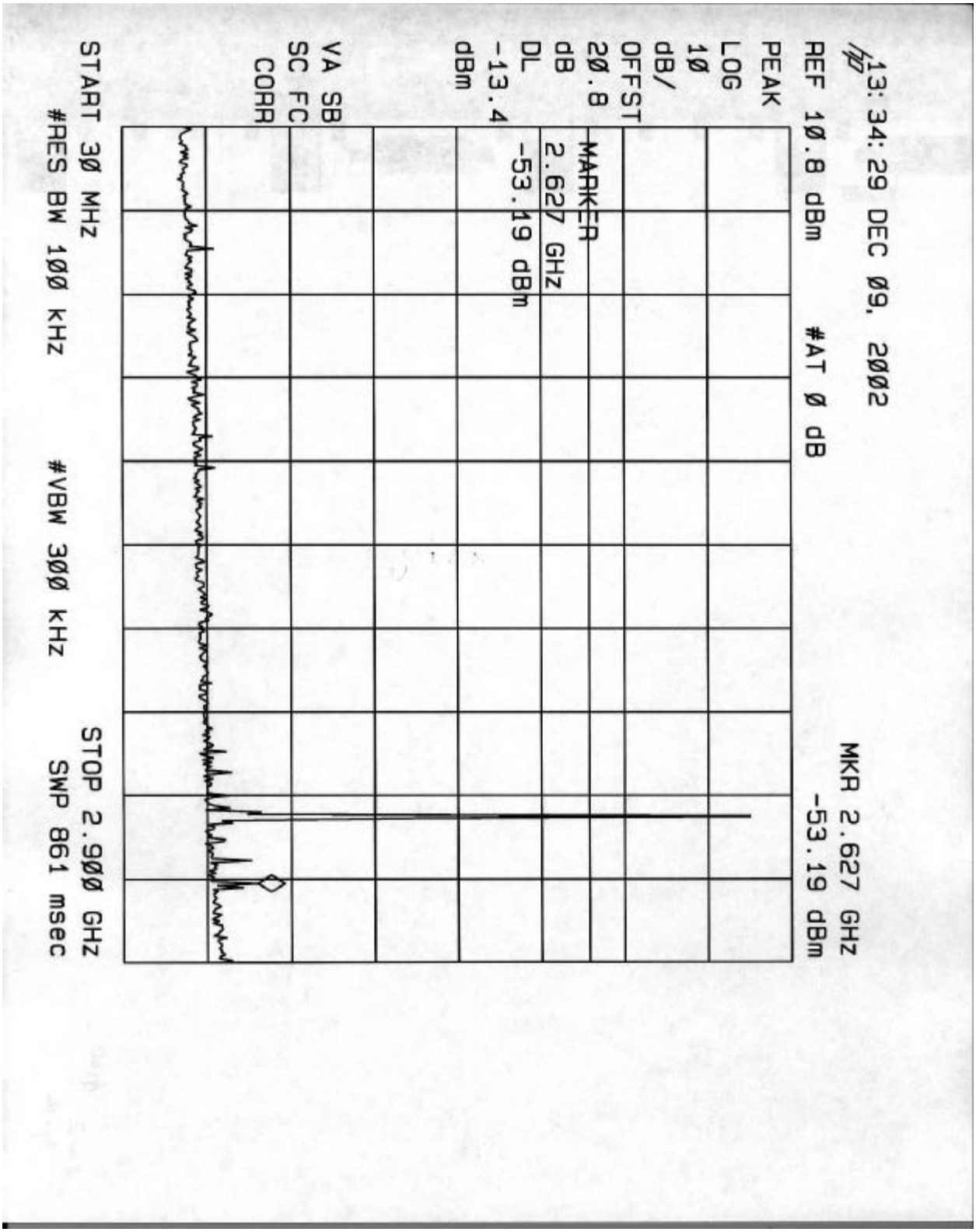

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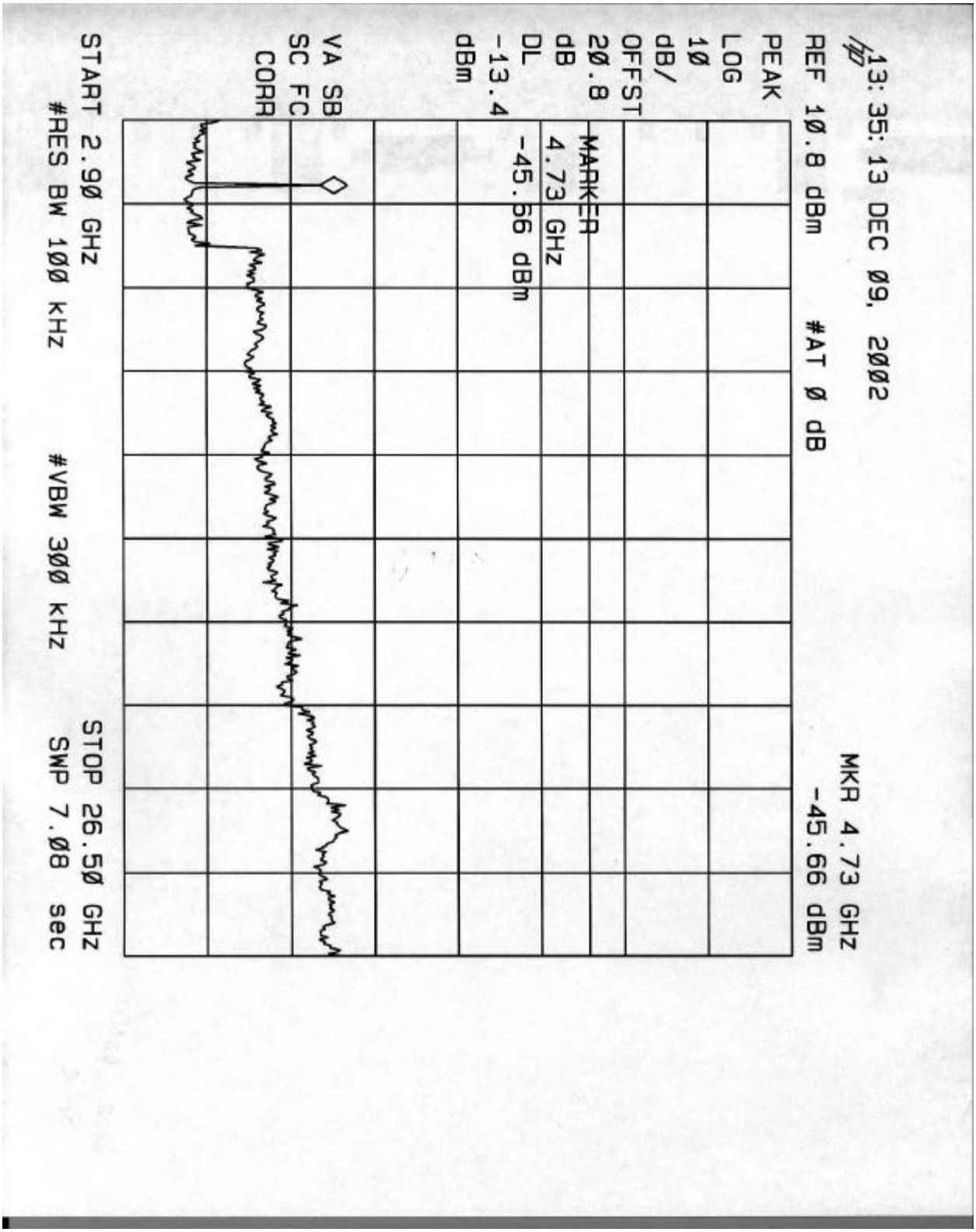

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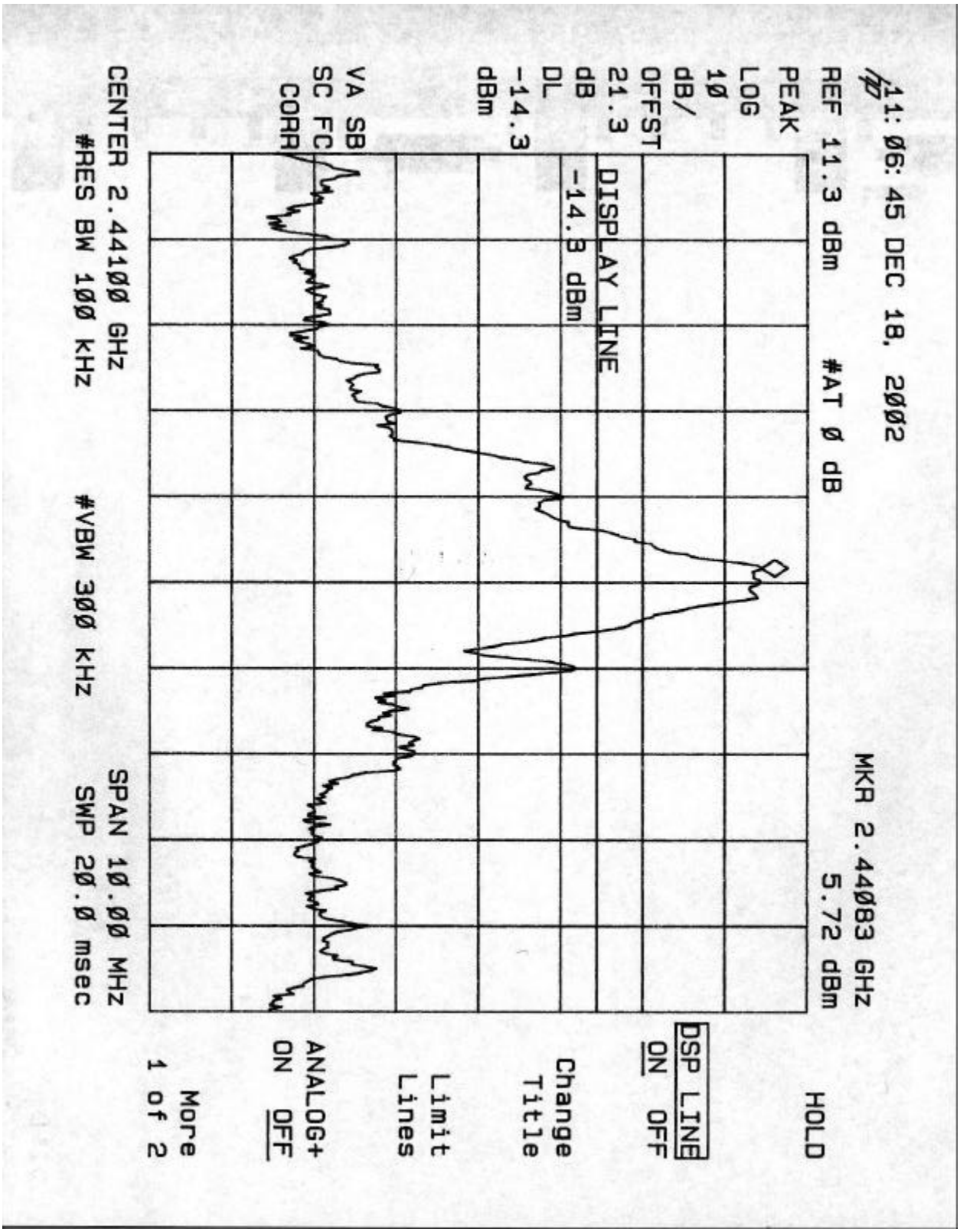

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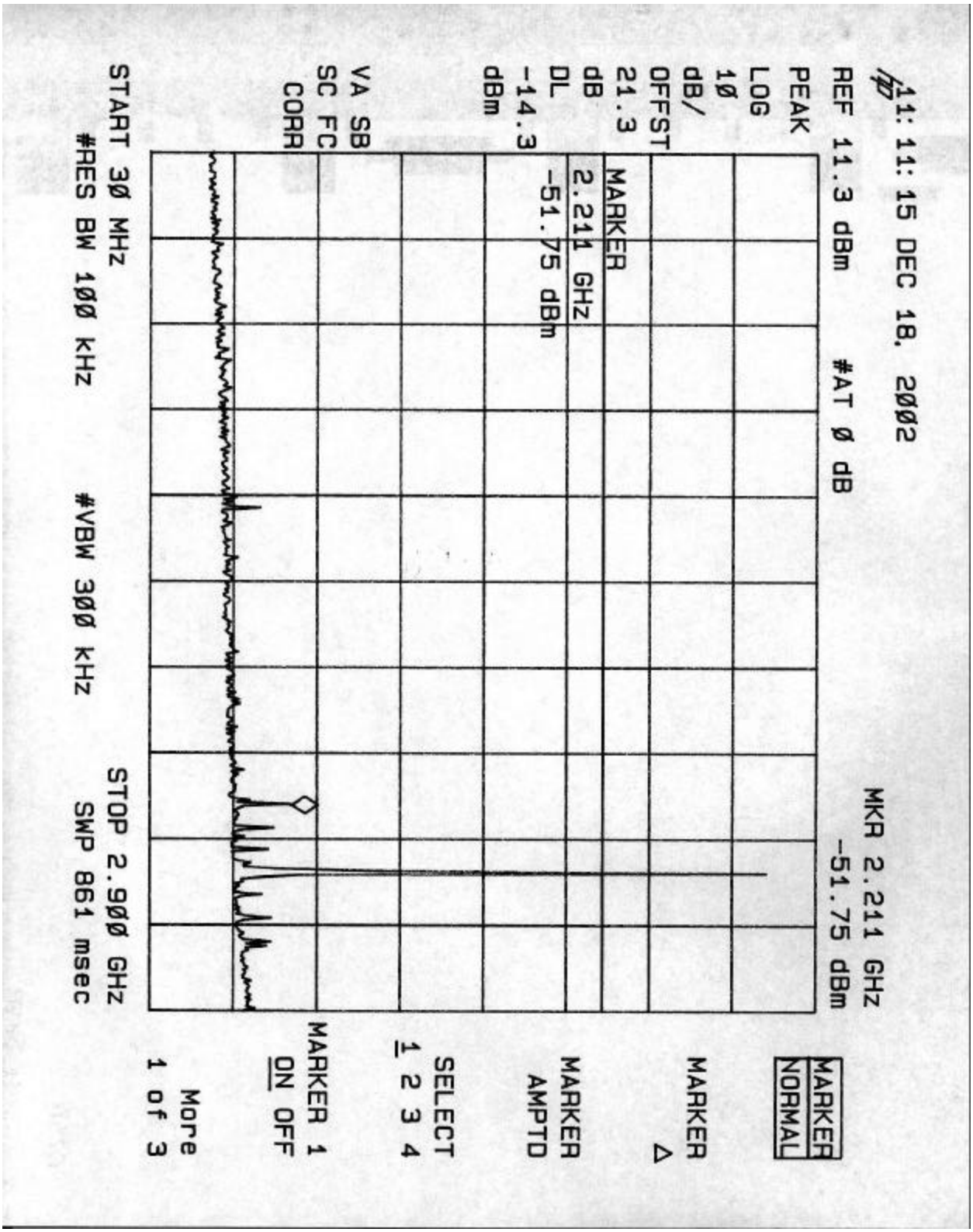

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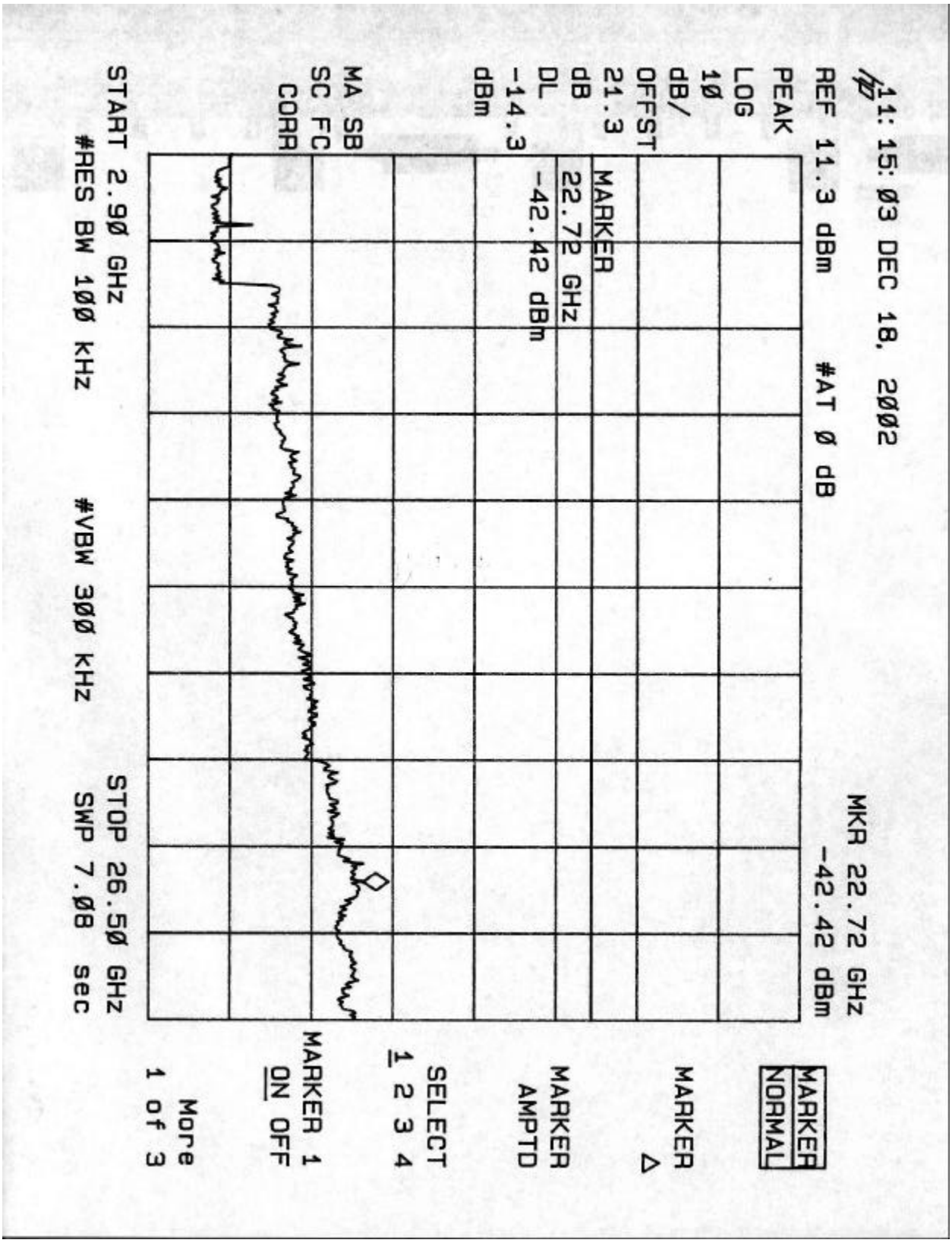

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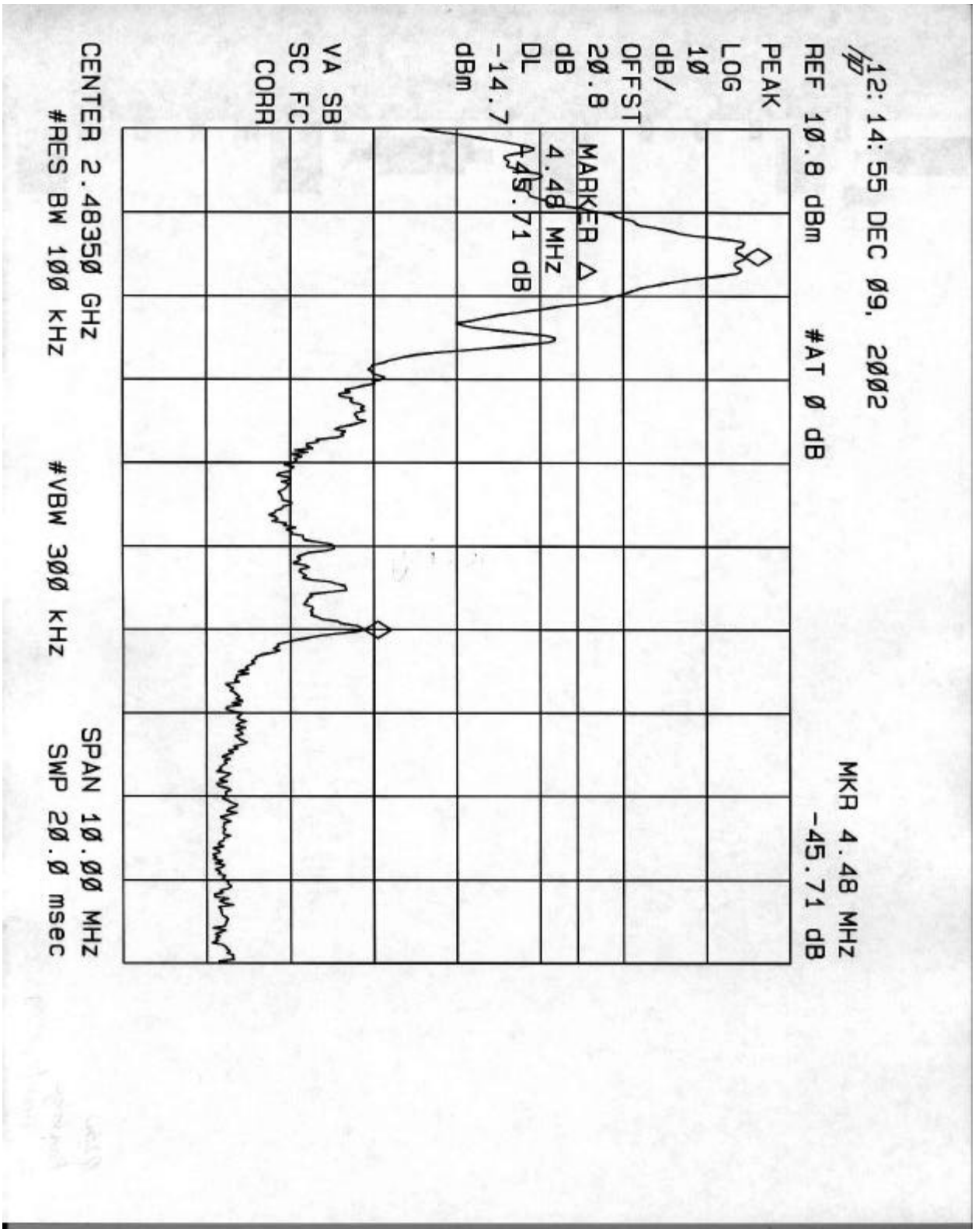

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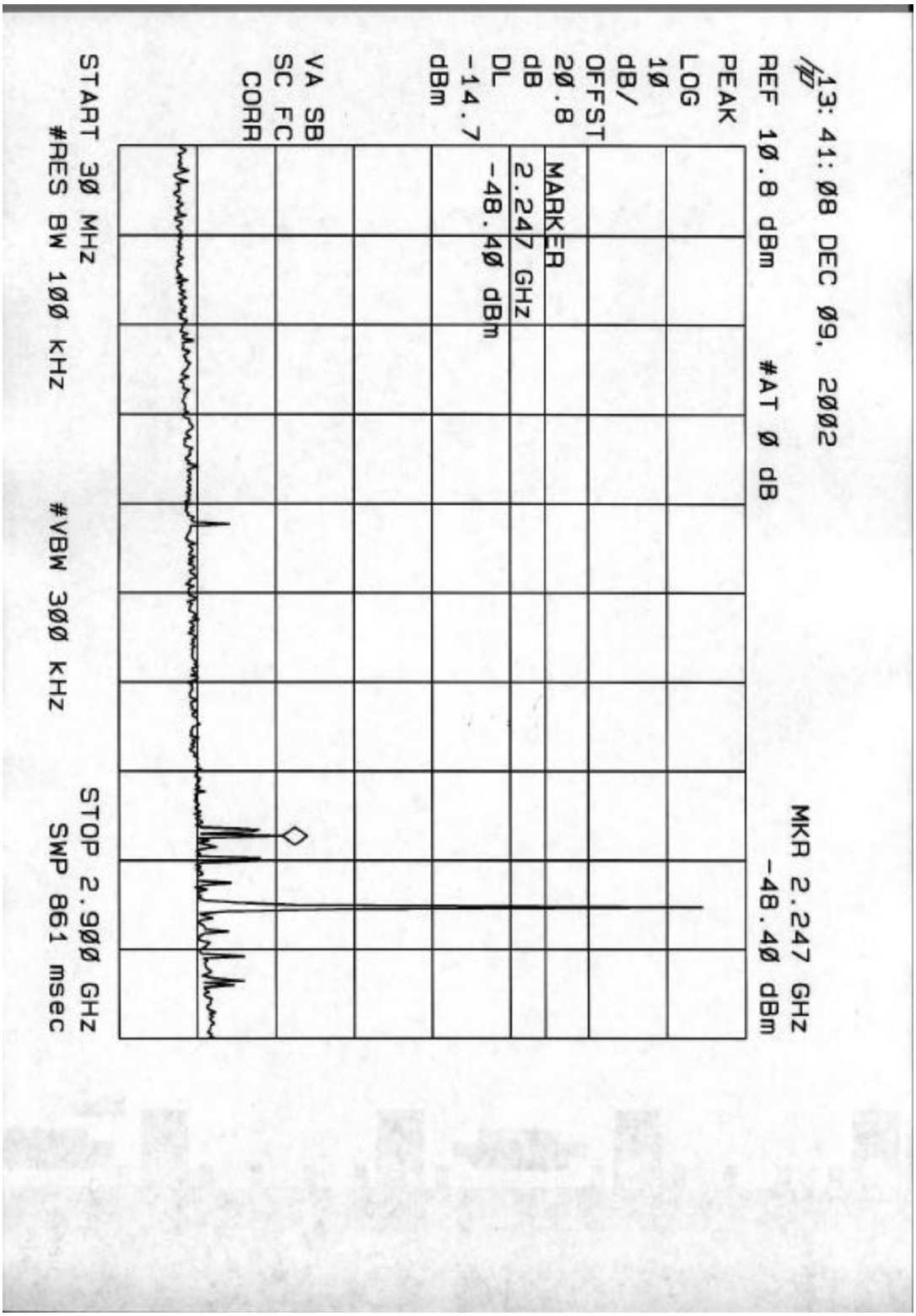

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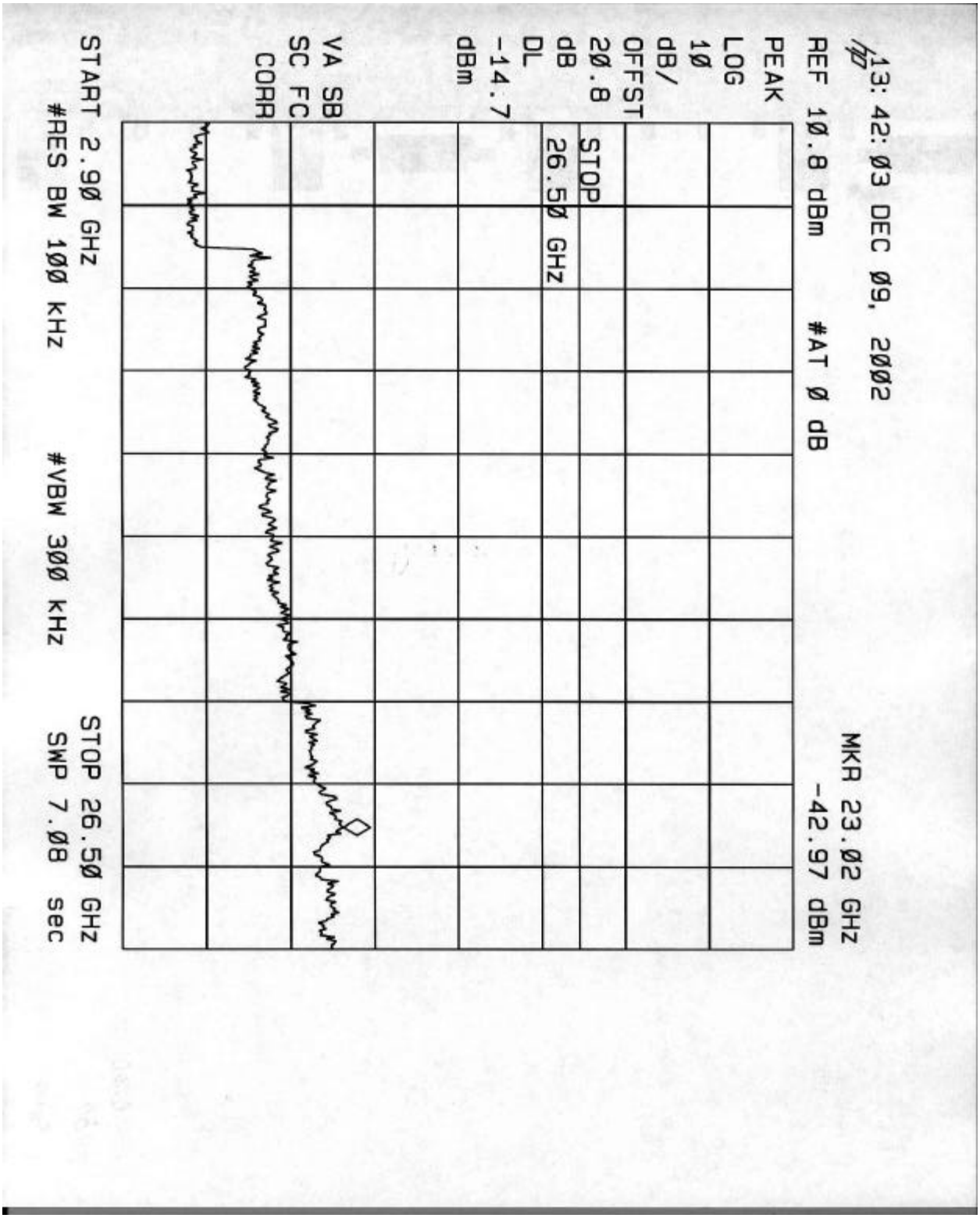

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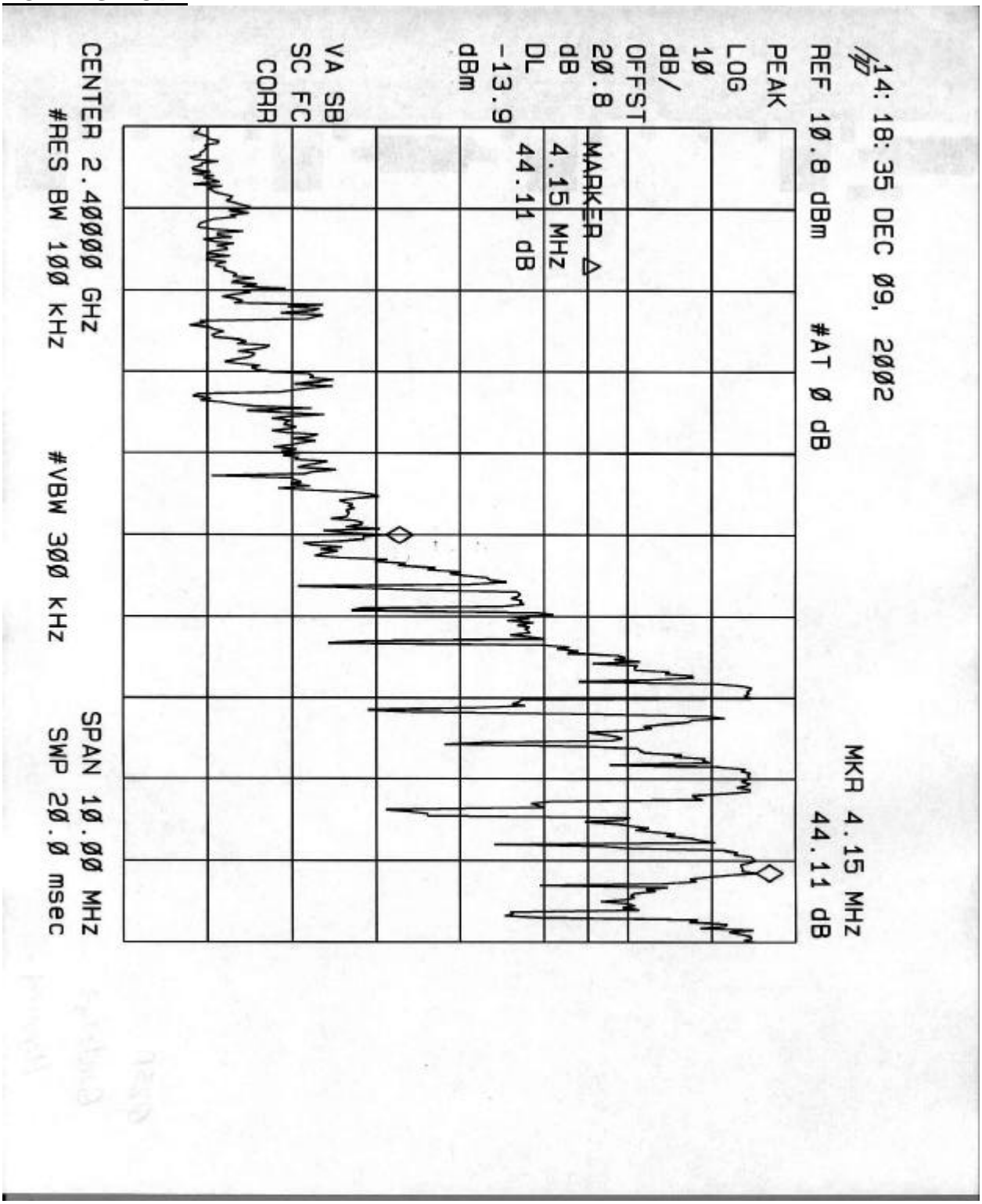
HOPPING MODE



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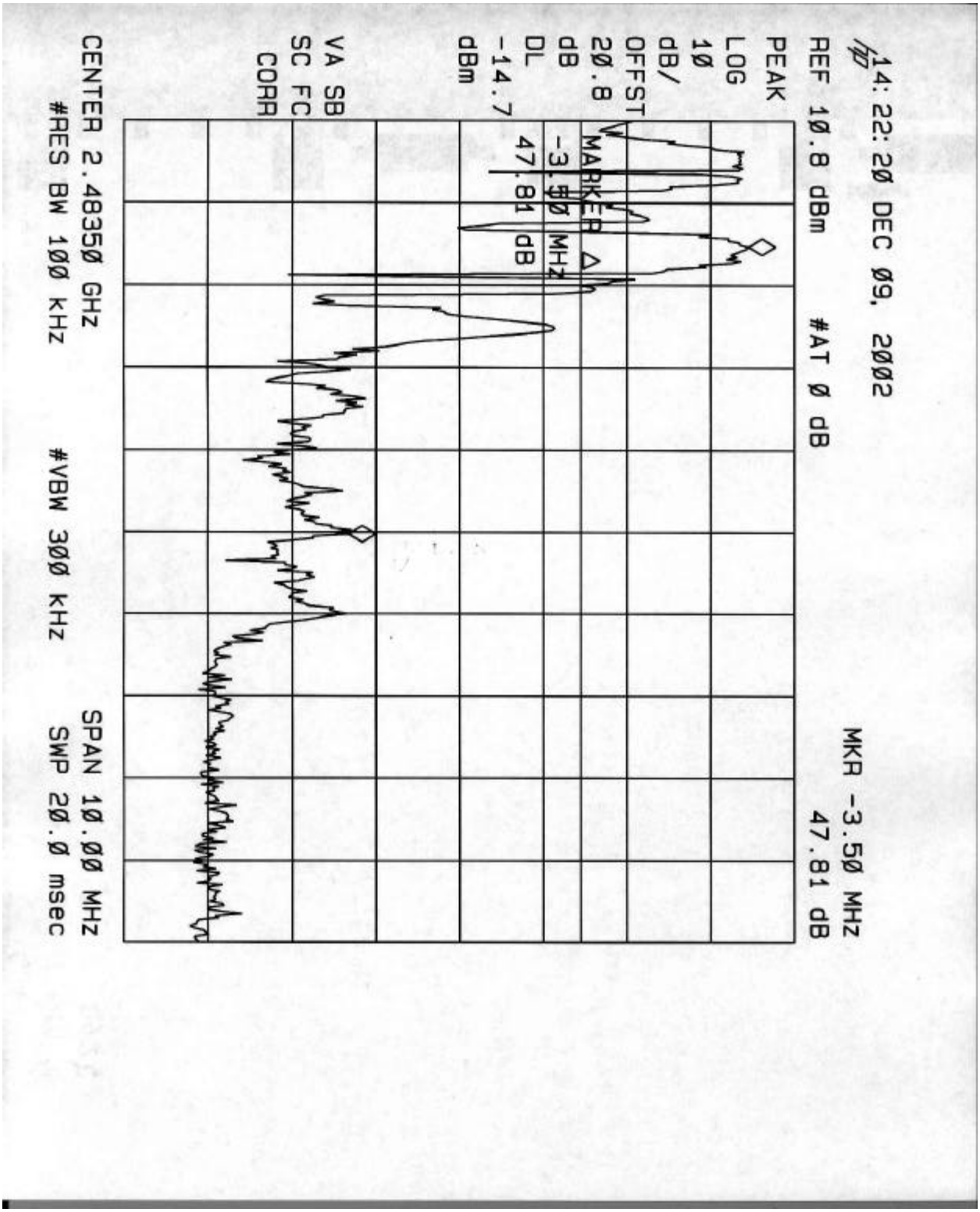

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7.8. UNDESIRABLE EMISSIONS – RADIATED MEASUREMENTS

TEST SETUP

The EUT is placed on the wooden table. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4/1992.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The frequency span is set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the suspected signal. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

TEST RESULTS

No non-compliance noted:

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DIGITAL DEVICE RADIATED EMISSIONS

See Client's Radiated Emissions Plot as an attachment.

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TRANSMITTER EMISSIONS

See Client's Transmitter Emissions Plots as an attachment.

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7.9. POWERLINE CONDUCTED EMISSIONS

TEST SETUP

The EUT is placed on a wooden table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane on the floor.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

The resolution bandwidth is set to 10 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

Conducted Emissions were performed at the Apple Computer EMC compliance lab located at 20650 Valley Green Drive, Cupertino, California. The EUT was placed on a nonmetallic table, 80 cm above the metallic ground-plane. The EUT and peripherals were powered from a filtered main supply. The frequency spectrum from 400 kHz to 30 MHz was scanned. This procedure was performed for both ac lines of the EUT.

RESULTS

See Client's Power Conducted Emission Plots as an attachment.

No non-compliance noted:

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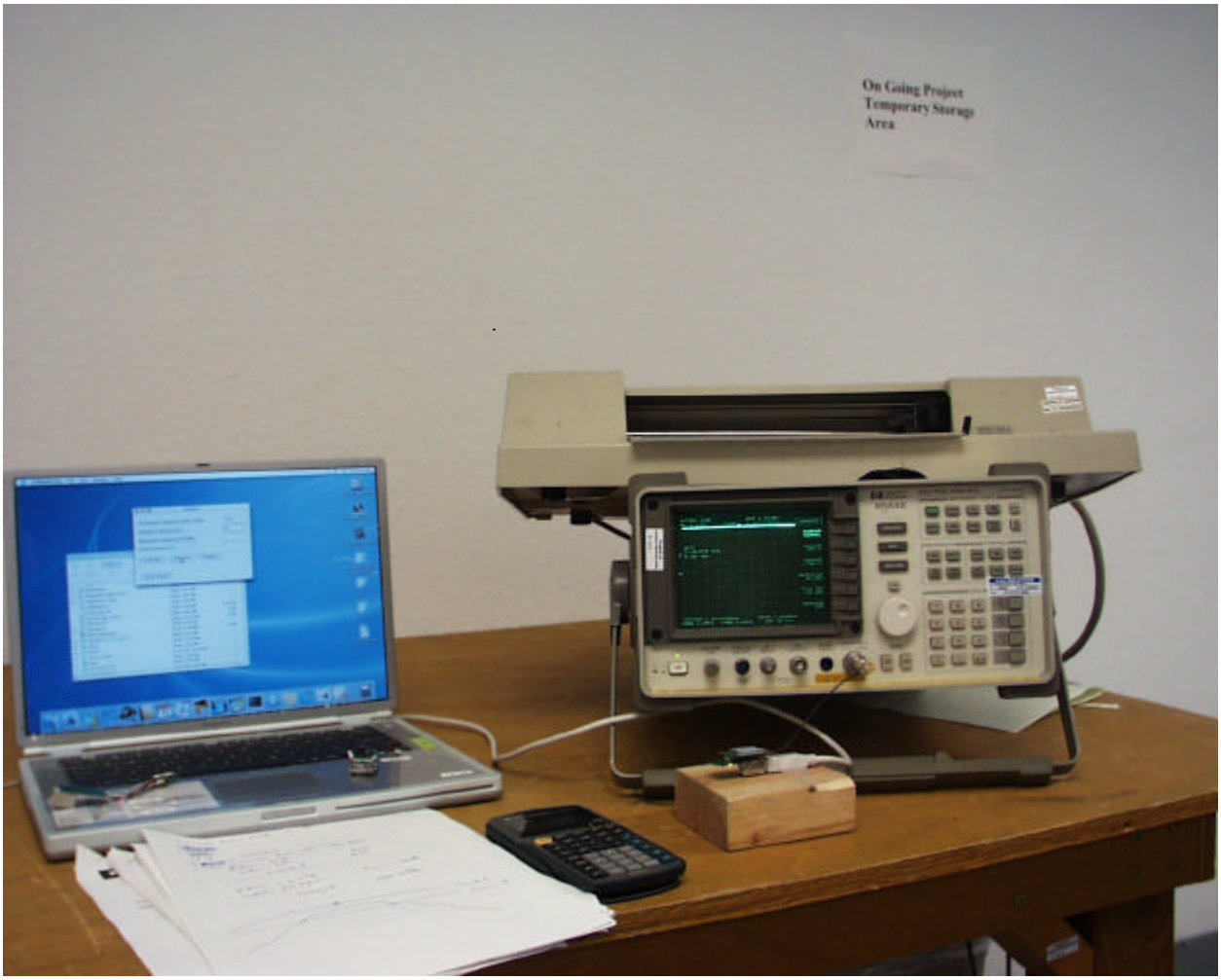
7.10. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



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RADIATED RF MEASUREMENT SETUP

See Client's Setup Photos as an attachment.

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DIGITAL DEVICE RADIATED EMISSIONS MEASUREMENT SETUP

See Client's Setup Photos as an attachment.

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POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

See Client's Setup Photos as an attachment

END OF REPORT

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