10.0 TEST REPORTS

This section should include the test report and data showing compliance with all applicable technical standards. The rule sections which require the test report to be submitted are 2.983(e), and 2.1033(d)(6). Test report is defined as a "complete package" showing data, graphs, test method description, and a list of test equipment

10.1 RF Power Measurements

Figure 15 shows the block diagram of the test set-up used for the measurements. The results are shown in Table 2 below.

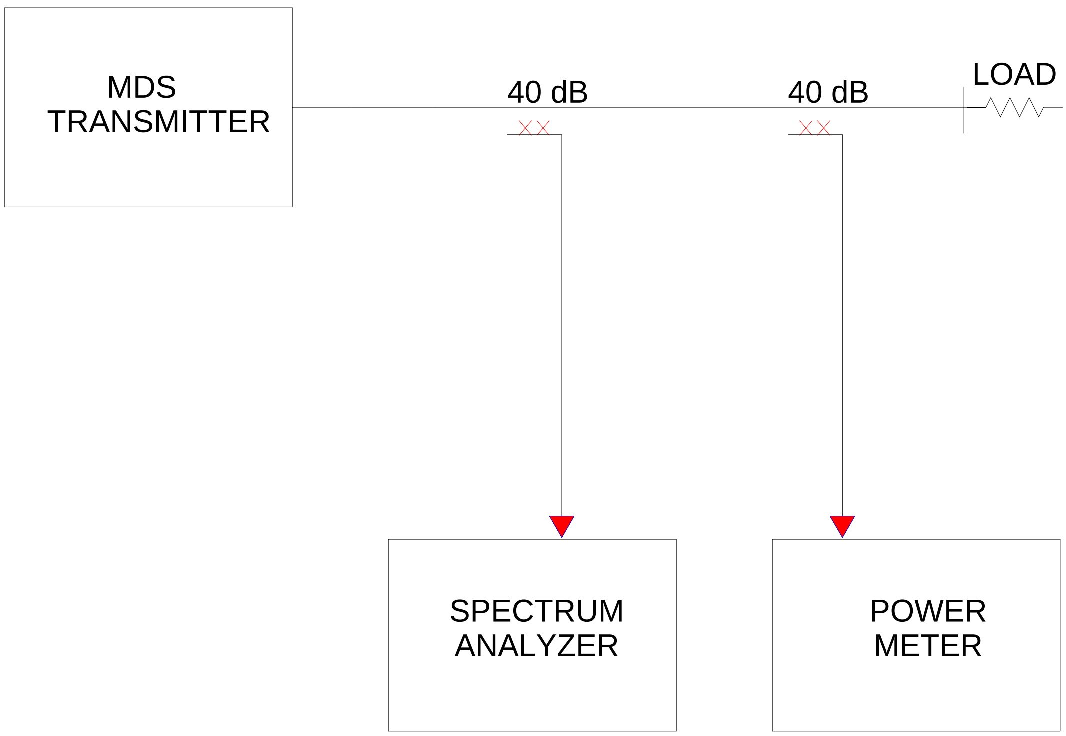

Figure 15. RF Power Measurement Test Set-up.

Table 2. RF Power Measurements.

Number of channels	Peak Sync Power (per channel)	Intermodulation Distortion Products (dBc below sync peak)
1	10 Watts	65.5

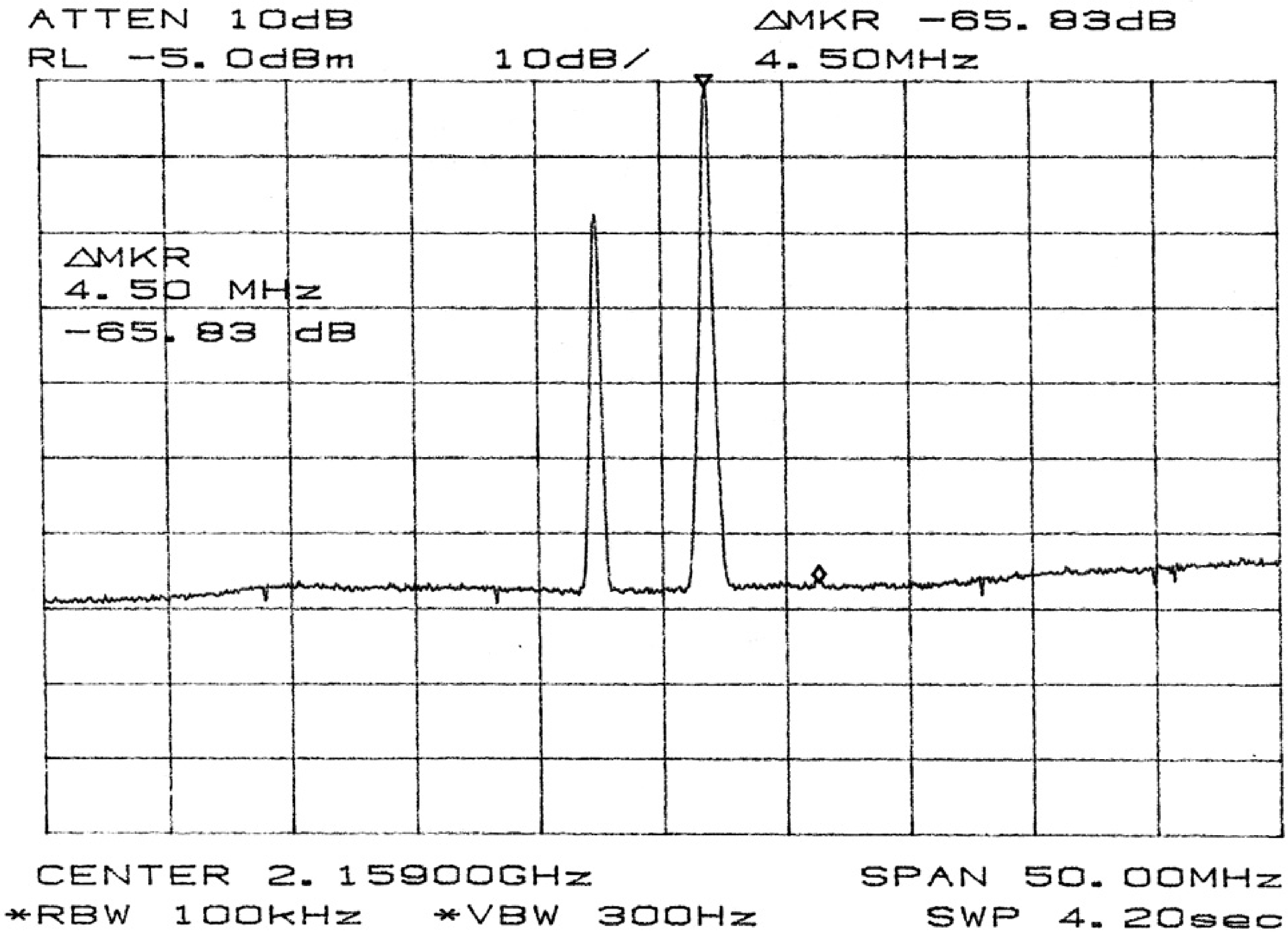

Figure 16. RF Power Measurement, Output Power Plot, 10 Watts - 1 Channel.

10.2 Frequency Response

The frequency response test set-up is shown in Figure 17. Table 3 shows the measured frequency response. The sweep display is shown in Figure 18.

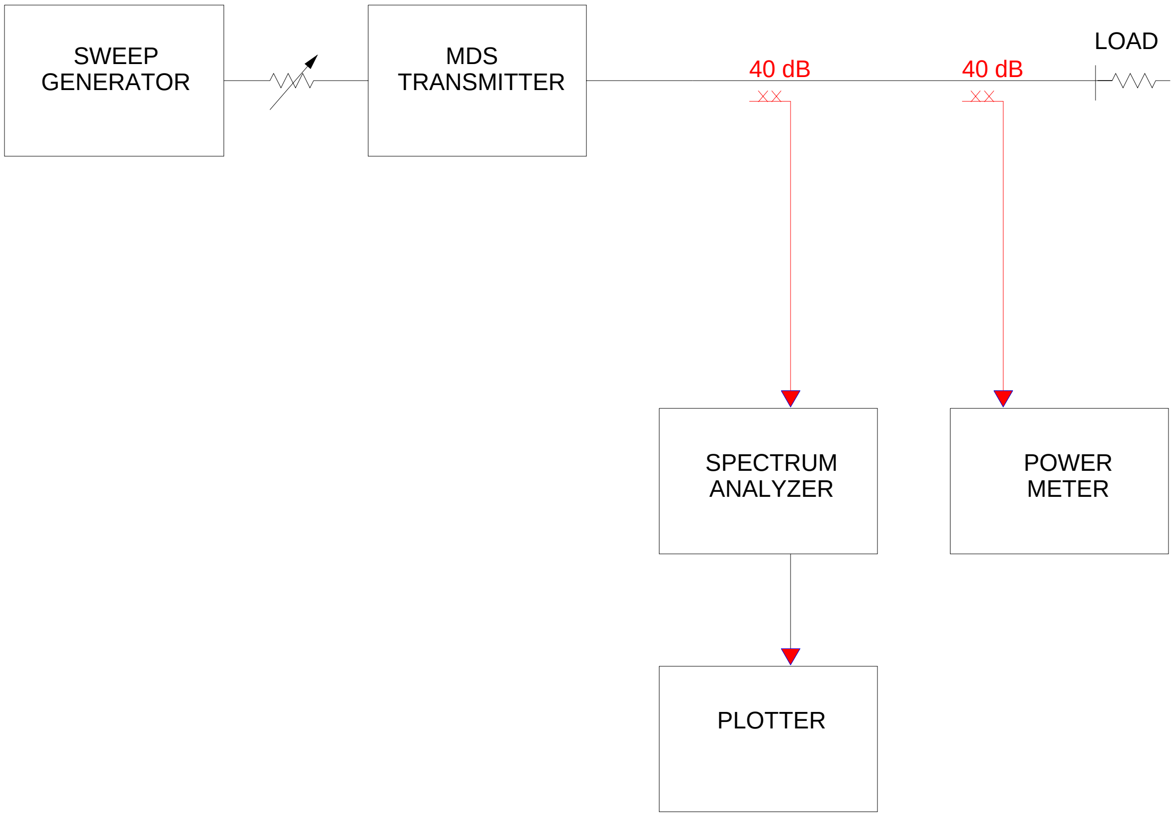

Figure 17. Frequency Response Test Set-up.

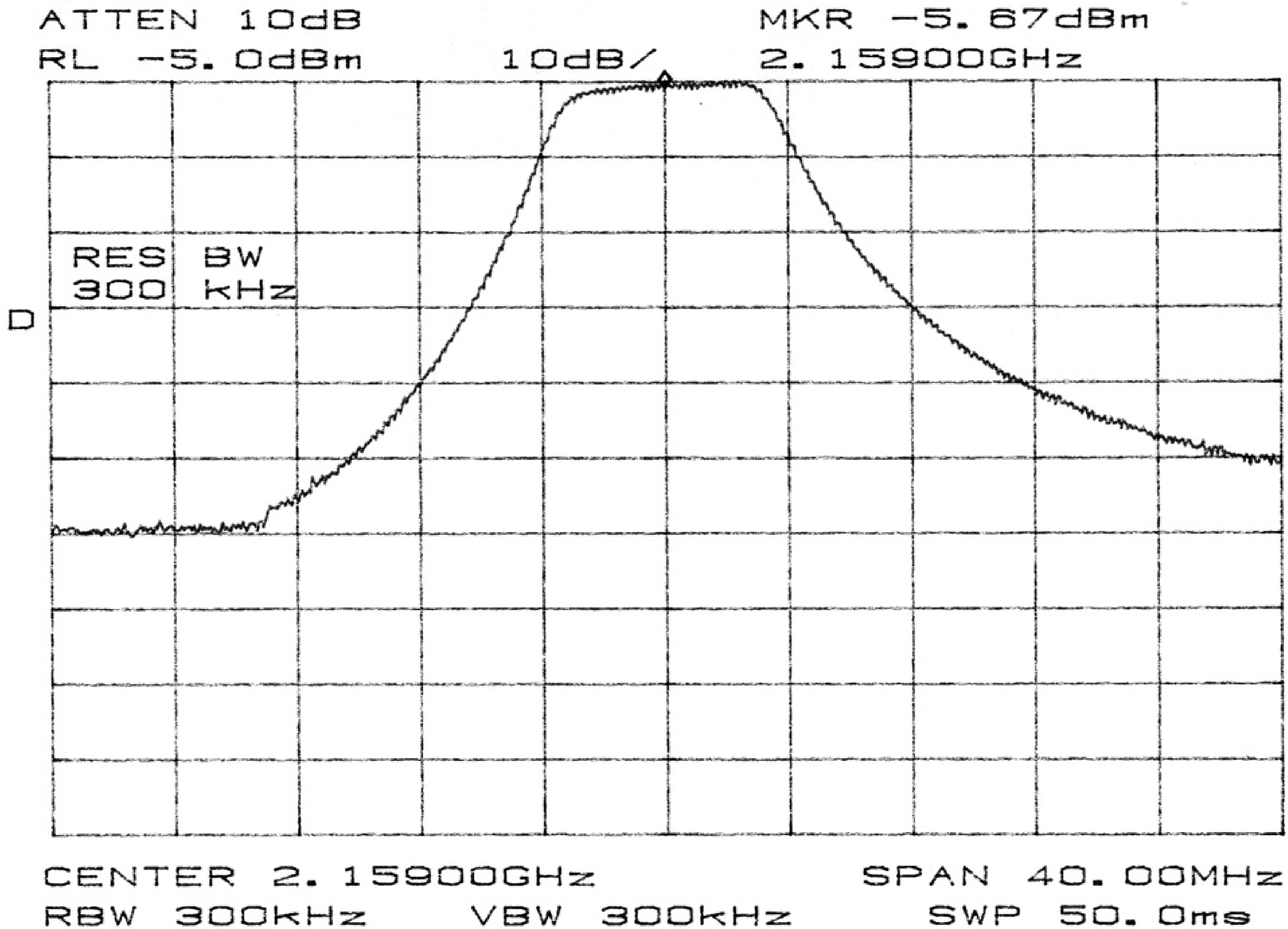

Figure 18. Frequency Response.

Table 3. Measured Frequency Response.

Frequency (MHz)	Level (dBm)	Delta (dB)
2156	-6.5	-0.5
2157	-6.0	0.0
2158	-5.5	0.5
2159	-6.0	0.0
2160	-5.5	0.5
2161	-5.5	0.5
2162	-6.0	0.0

10.3 Occupied Bandwidth

The test set-up for occupied bandwidth is shown in Figure 15. The occupied bandwidth spectrum is shown in Figure 19.

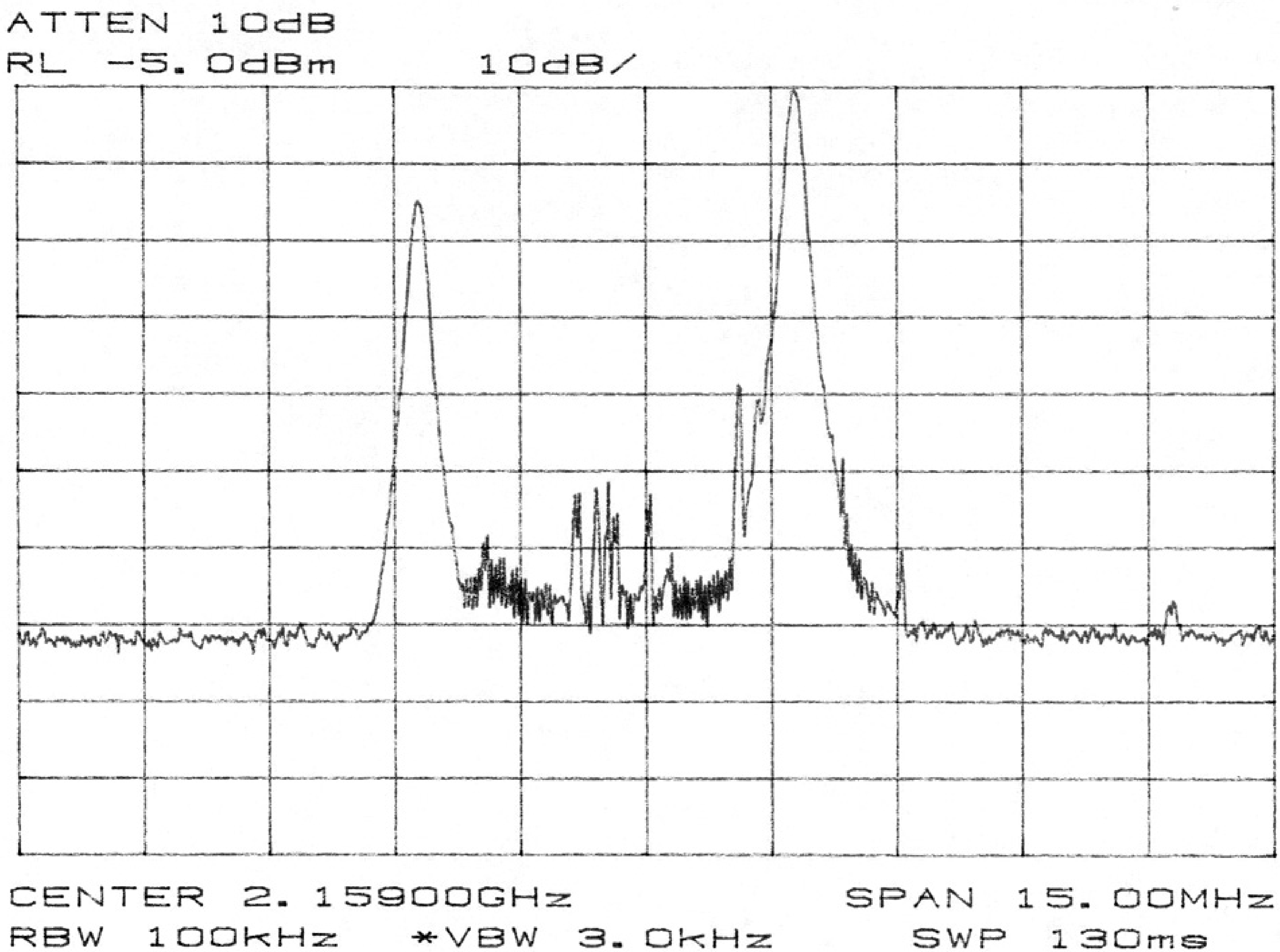

Figure 19. Occupied Bandwidth.

10.4 Conducted Spurious Emissions

The test set-up for conducted spurious emissions is shown in Figure 15. Spectrum Analyzer presentations of the measured results are shown in Figure 20 and Figure 21. Table 4 contains the tabulated results of these measurements.

Table 4. One Channel Loading Data.

Frequency	Source	Peak Sync level Observed/Channel
2156 to 2162 MHz	1 Carrier	10 Watts
2156 to 2162 MHz	Lower Composite Triple Beat Products	-67 dBc
2156 to 2162 MHz	Upper Composite Triple Beat Products	-66 dBc
4312 to 4318 MHz	Second Harmonic	-78 dBc
6468 to 6474 MHz	Third Harmonic	-82 dBc

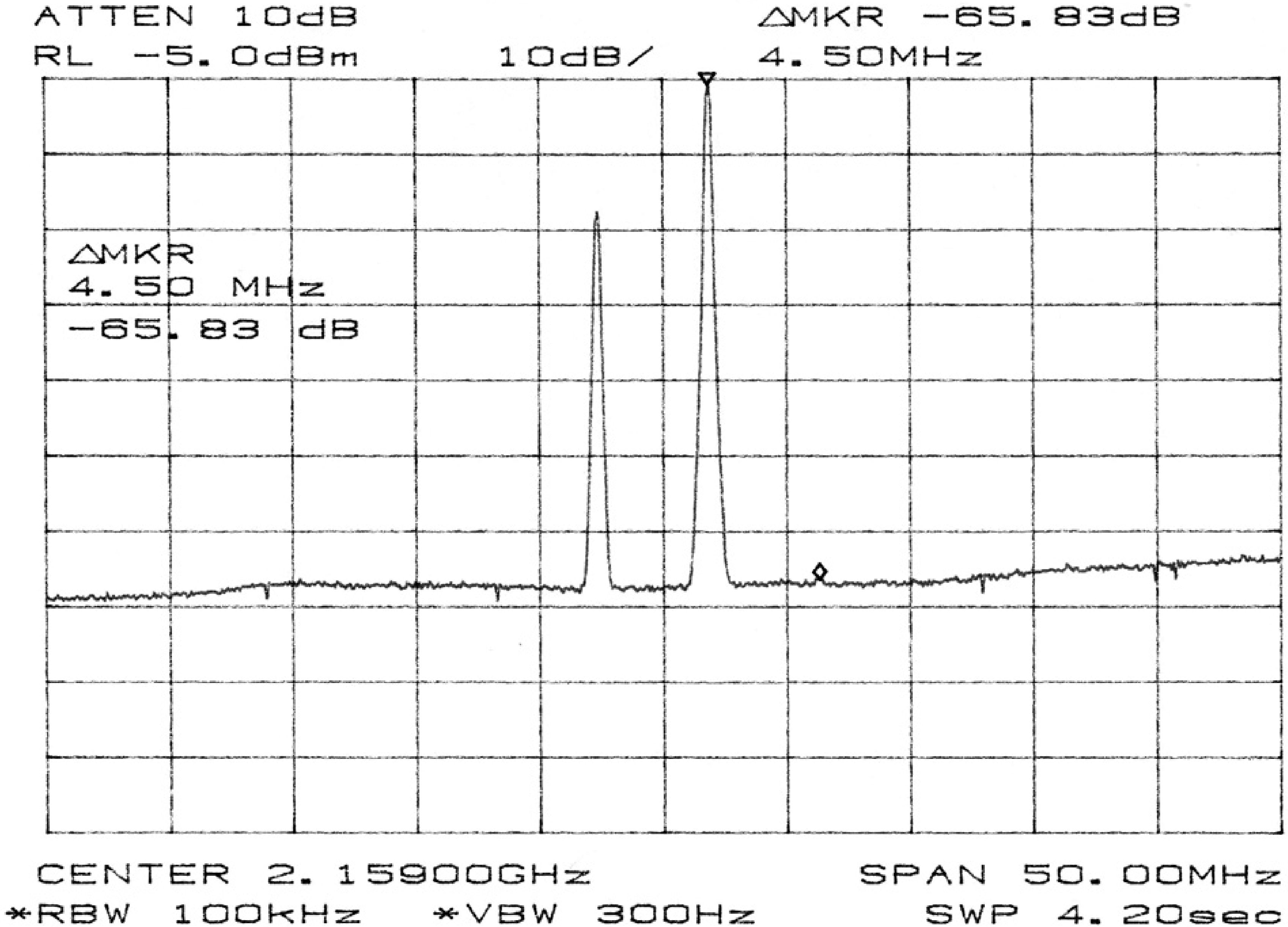

Figure 20. Conducted Spurious Emissions 1 Channel Loading.

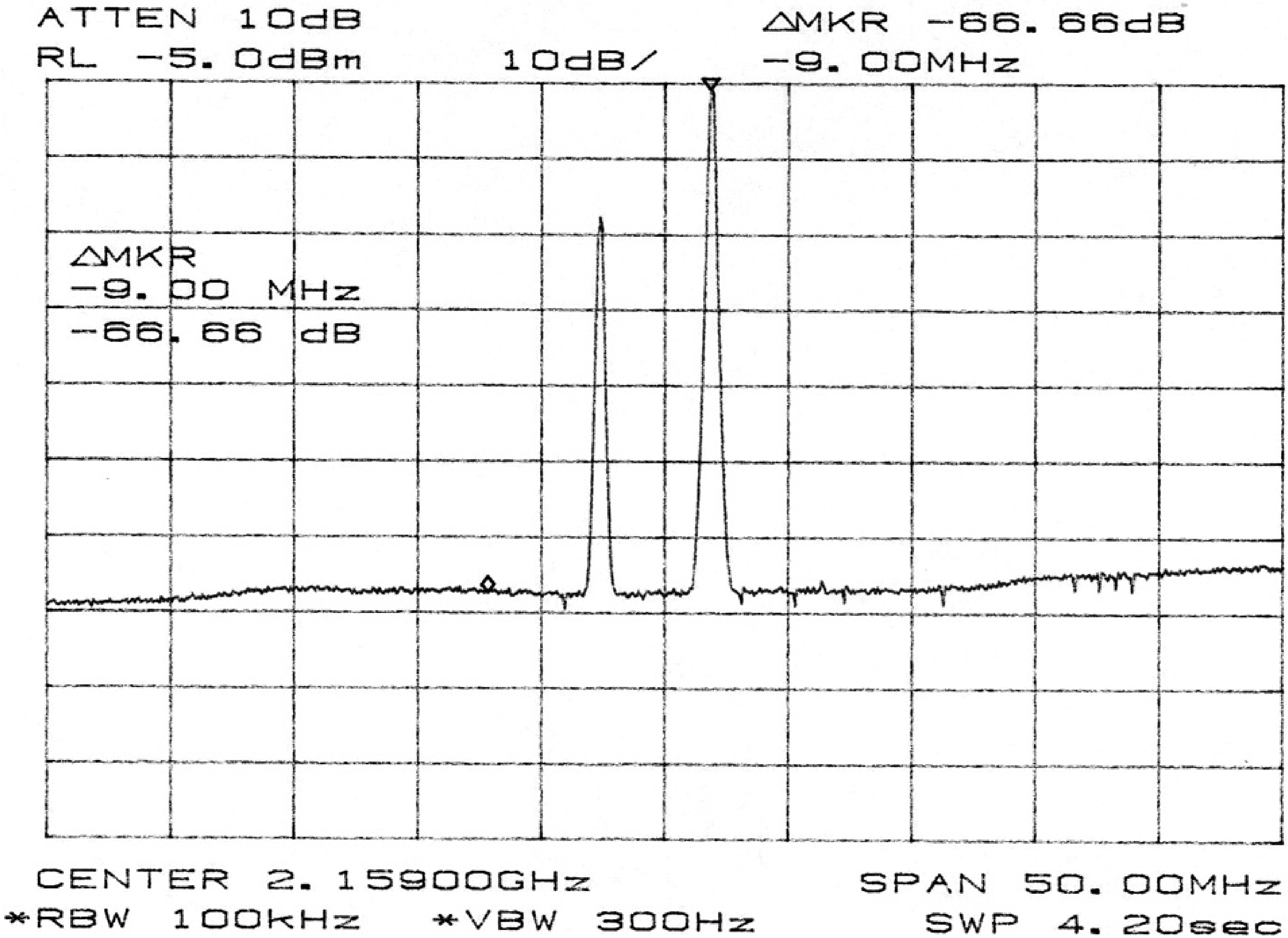

Figure 21. Conducted Spurious Emissions 1 Channel Loading.

10.5 Radiated Emissions

The transmitter was loaded at full power with one channel and its output terminated with a high power 50-ohm termination. An antenna dipole was located 4 meters from the transmitter and connected to the Spectrum Analyzer. The antenna was rotated for maximum signal and the data recorded. This procedure was repeated for the second and third harmonics of the signal, with the following results:

Table 5. Radiated Emissions.

Frequency	Measured Level
2156 to 2162 MHz	-95.0 dBm
4312 to 4318 MHz	Less than –99 dBm
6468 to 6474 MHz	Less than –95 dBm

The procedure was repeated with an adjustable length dipole for the 40 to 230 MHz range and extended in the upper range to 12,000 MHz. No measurable signals were observed in this range, with the Spectrum Analyzer set at a minimum sensitivity of -97 dBm.

A Spectrum Analyzer presentation of the data shown in Table 5 above is shown in Figure 22, Figure 23 and Figure 24. The observed radiation level in the 2156 to 2162 MHz range can be referenced to the transmitter output power as follows:

Assuming isotropic radiation of a signal of 10 watts peak power, the power density at 4 meters would be:

$$\text{Power density} = P / 4\pi\ D^2 = 10 / 4\pi\ 4^2 = 49.74 \times 10^{-3}\ \text{Watt/m}^2$$

Assuming a transmission with the pattern of a dipole antenna, the power density is increased by a factor of 1.64 times to:

$$1.64 \times 49.74 \times 10^{-3}\ \text{Watt/ m}^2 = 81.57 \times 10^{-3}\ \text{Watt/m}^2$$

Since a dipole is used to receive the signal, the received signal level equals the power density times the effective area of the receive antenna, which is 1.64 $(\lambda^2)/ 4\pi$:

Received signal level = $81.57 \times 10^{-3} \times (1.64 \times (0.12)^2/4\pi) = 153.29 \times 10^{-6}$ Watts = -8.14 dBm.

Since the actual received signal level is –95.0 dBm (from Table 5 above), the relative level is:

$$\text{Relative receive signal level} = -8.14 - (-95.0) = 86.86\ \text{dBc}$$

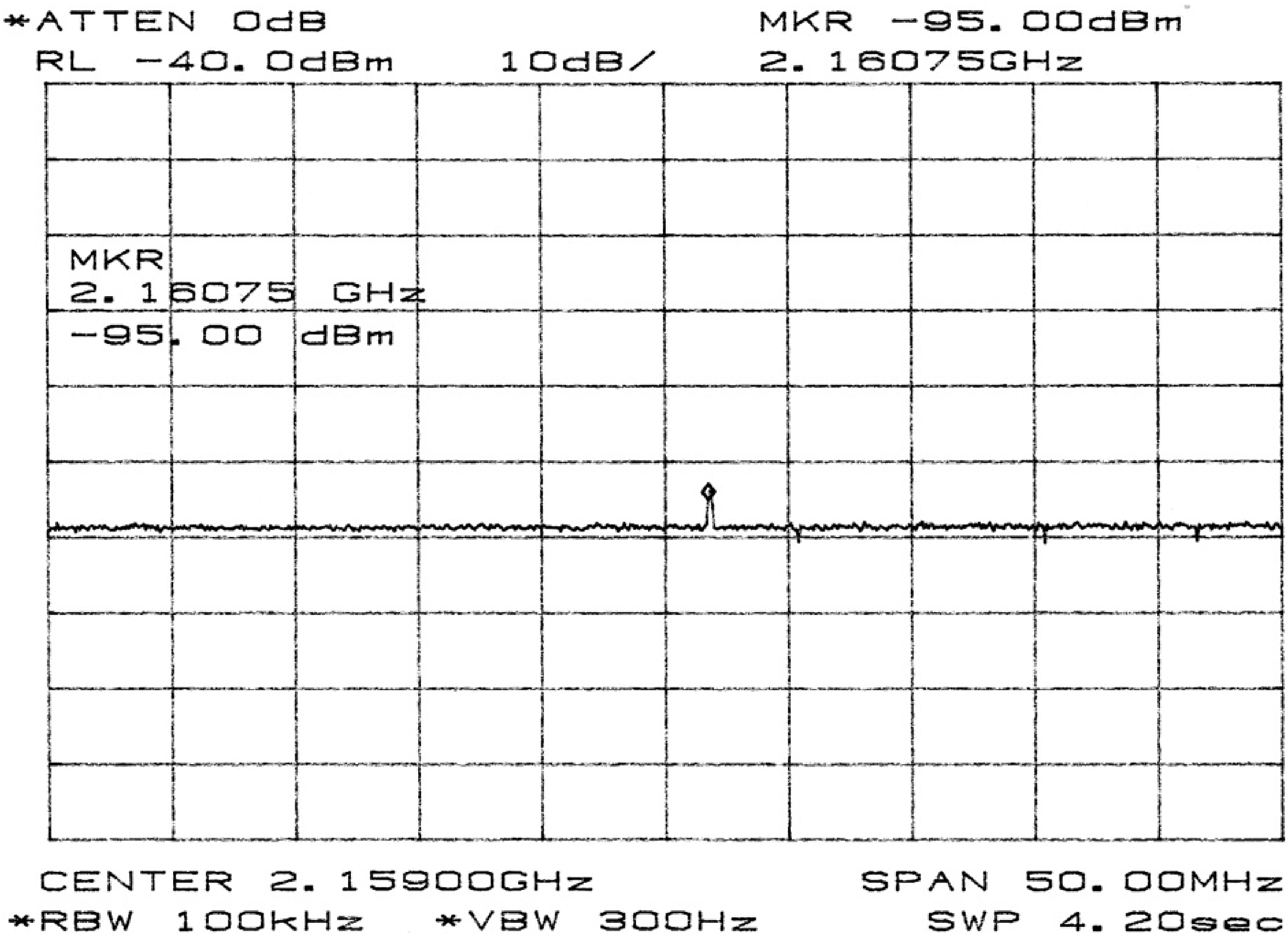

Figure 22. Radiated Emissions Fundamental.

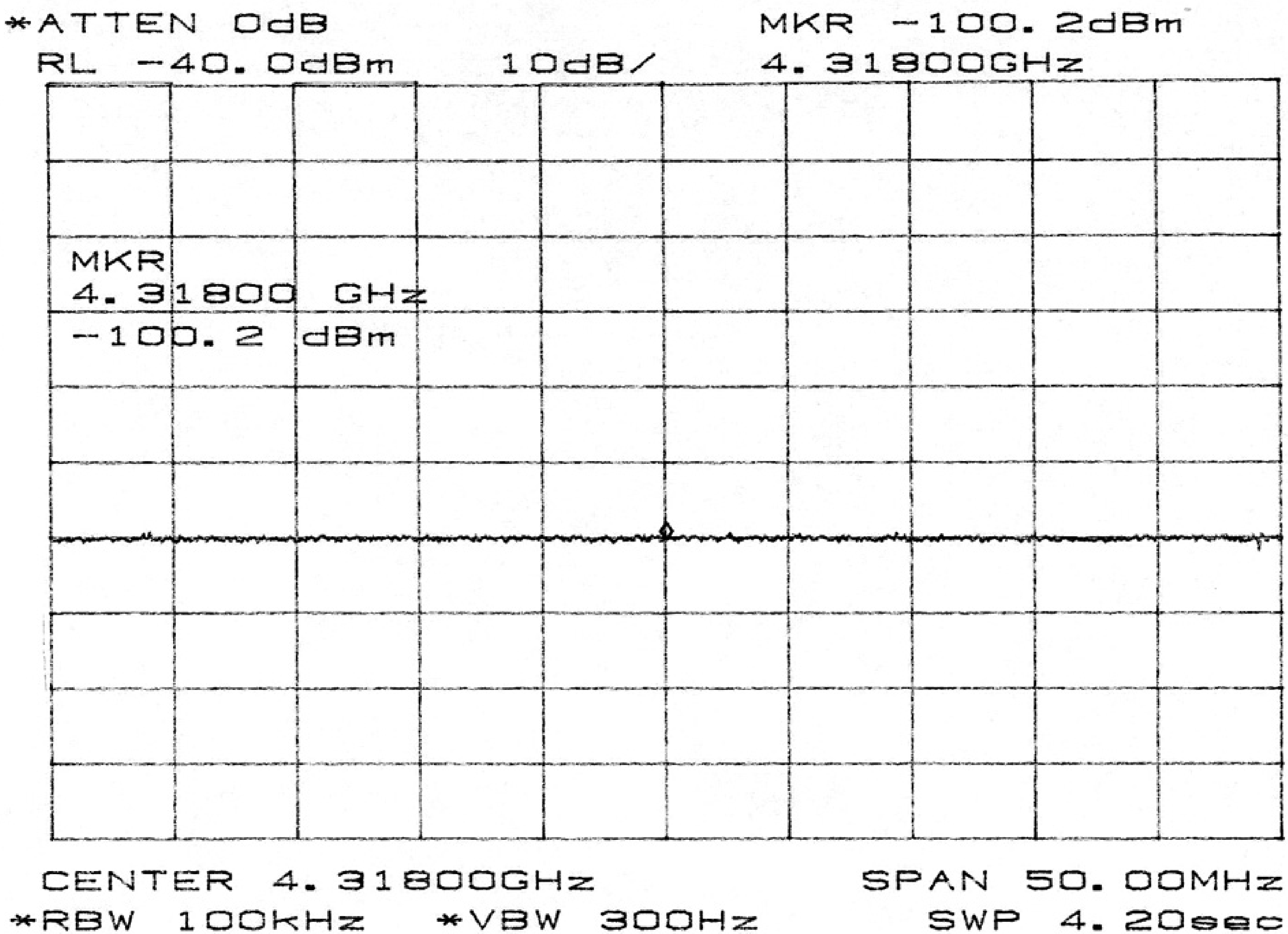

Figure 23. Radiated Emissions 2nd Harmonic.

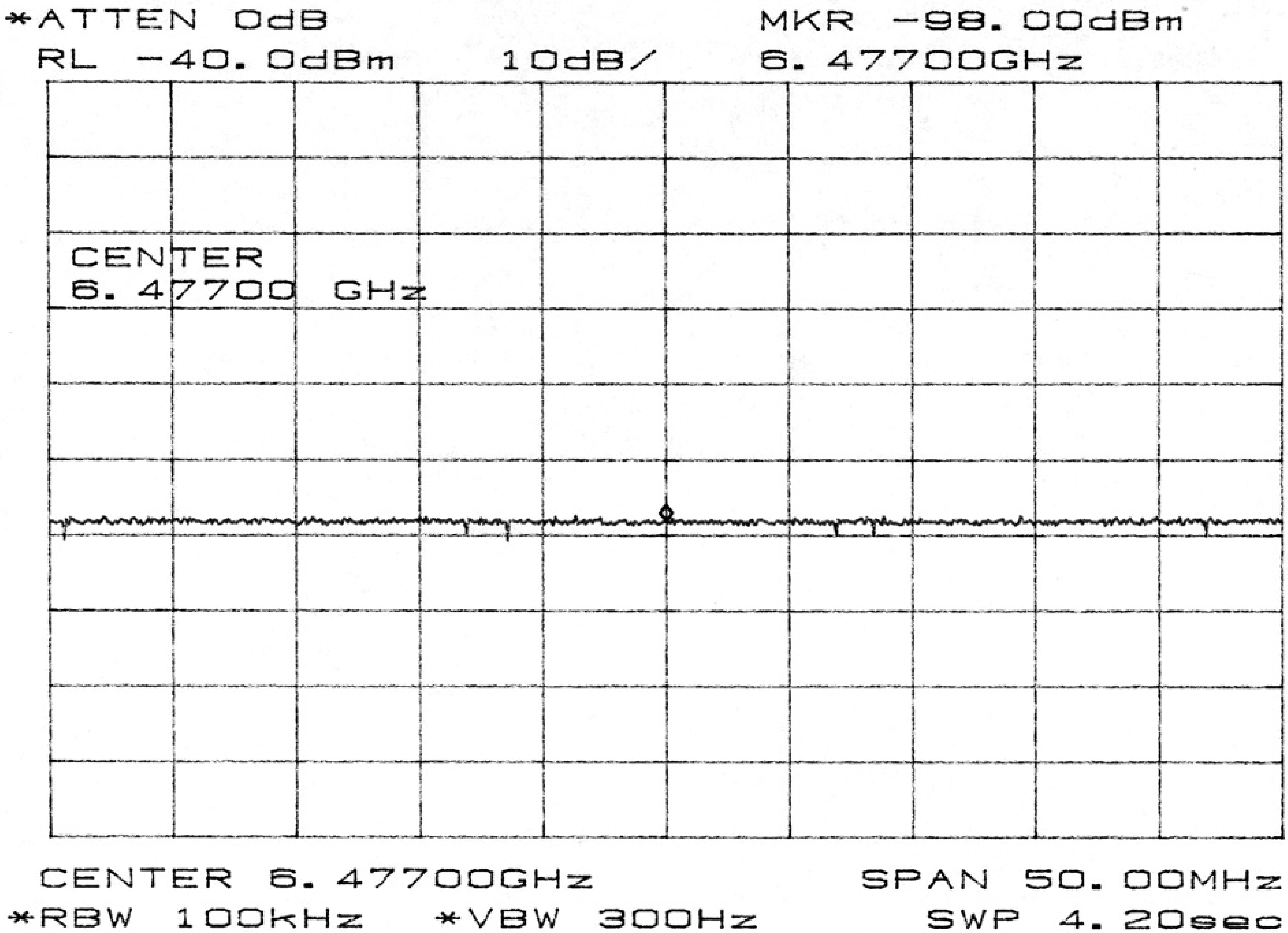

Figure 24. Radiated Emissions 3rd Harmonic.

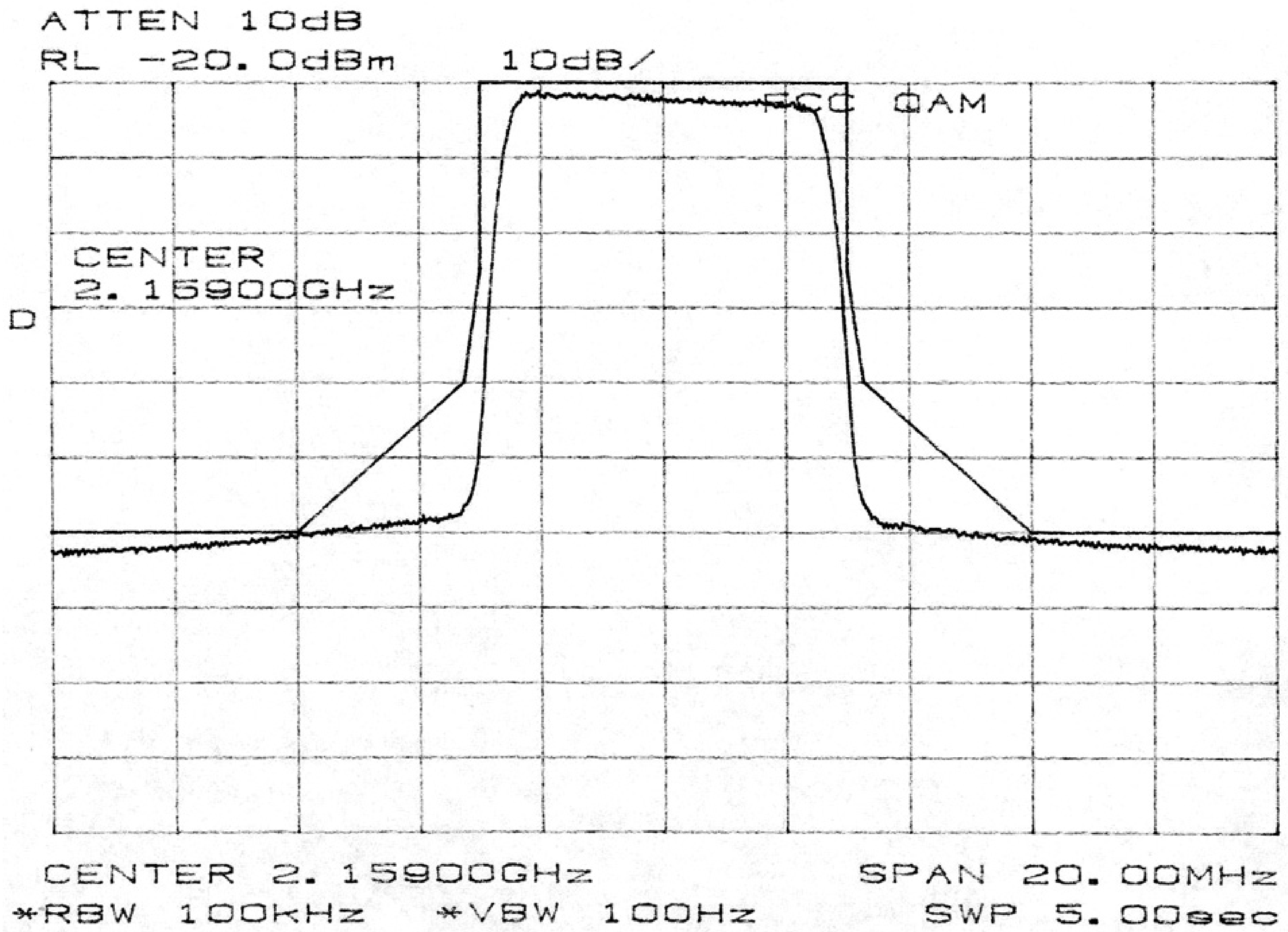

Figure 25. QAM Spectral Mask.

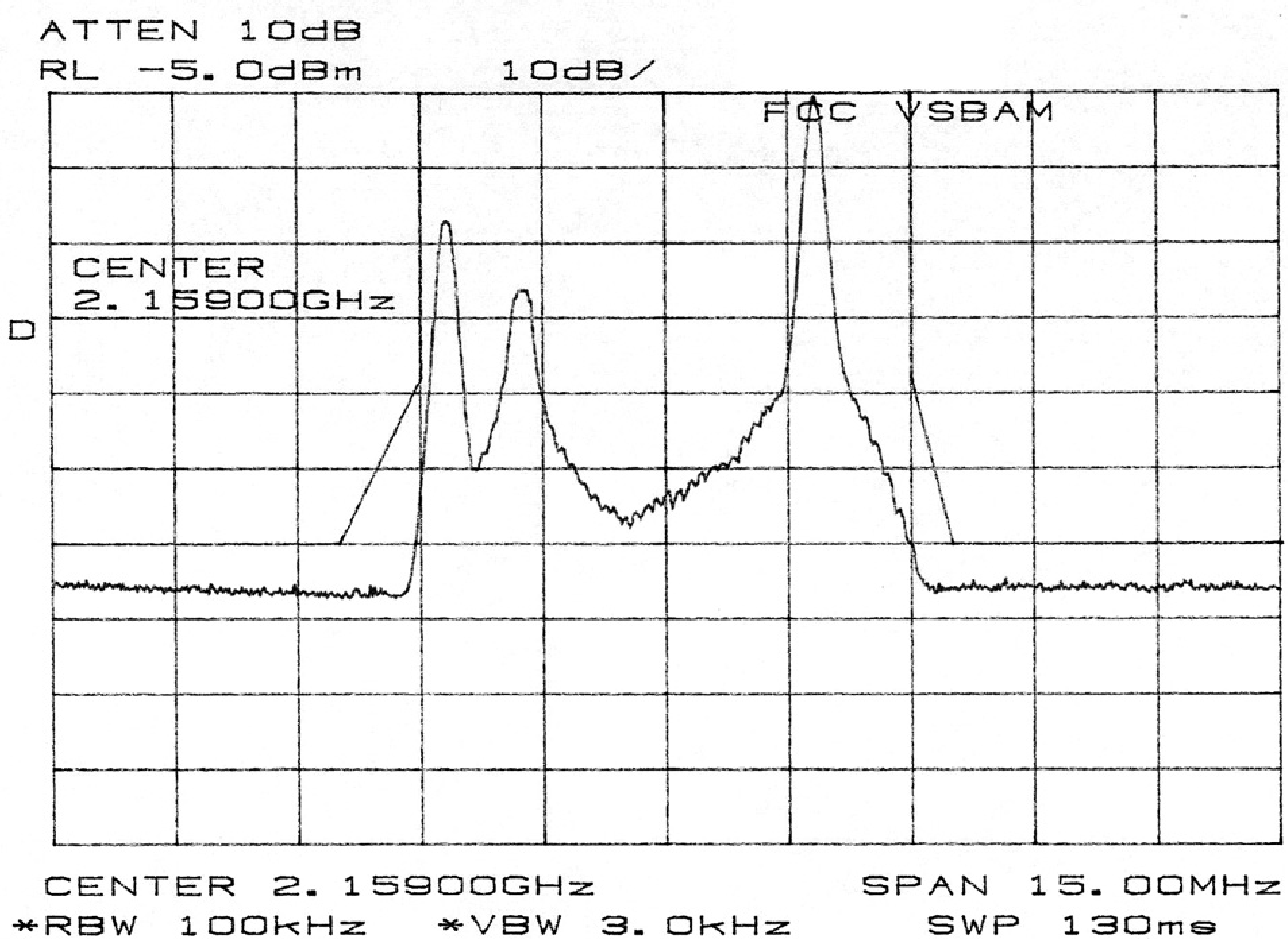

Figure 26. VSBAM Spectral Mask.

10.6 Frequency Stability

The frequency stability test set-up is shown in Figure 27. Table 6 shows the measured results.

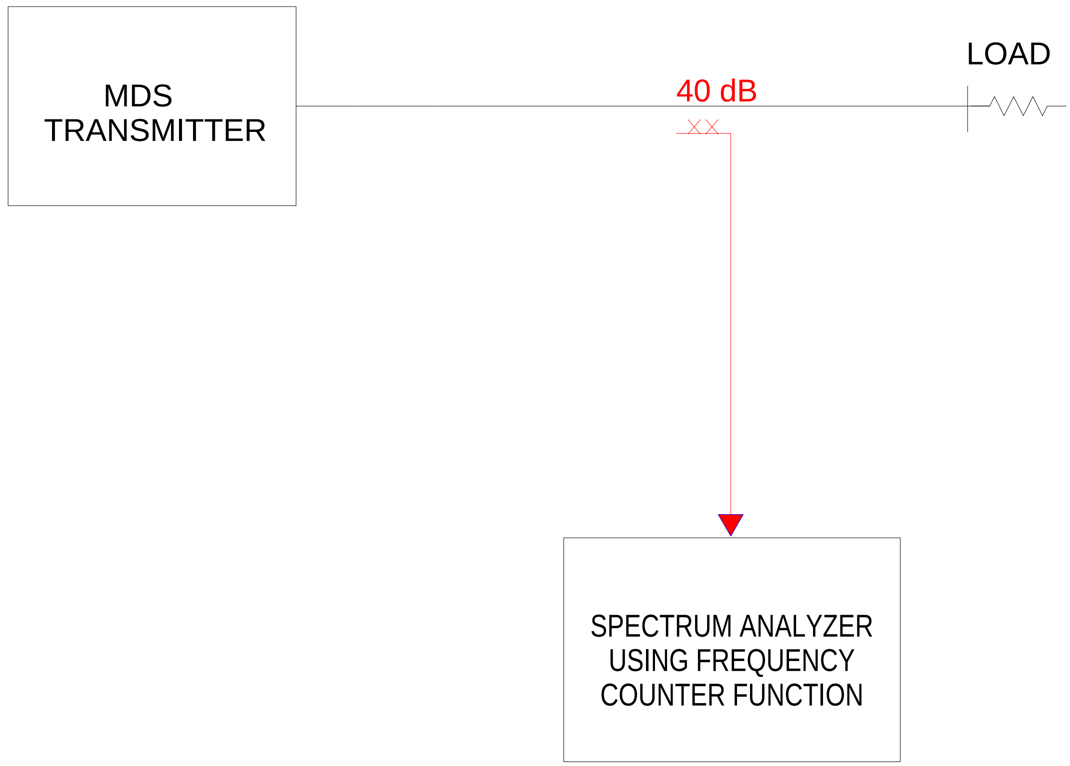

Figure 27. Frequency Stability Test Set-up.

Table 6. Frequency Stability.

Date	FREQUENCY-Hz	DRIFT-Hz
9-5-04	2278000000	0
9-12-04	2278000006	6
9-19-04	2278000032	32
9-26-04	2278000100	100
10-2-04	2278000045	45

10.7 Certification of Test Data

This equipment has been tested in accordance with the requirements contained in the appropriate Commission regulation. To the best of my knowledge, these tests were performed using measurement procedures consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported, or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested within variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measurements were made by Cable AML, Inc., 3427 Lomita Boulevard, Torrance, CA 90505, USA.

Francisco Bernues

Dr. Francisco Bernues