

T-2071-M (Derringer) Occupied Bandwidth:

Relevant FCC Chapters:

§ 2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(c) Radiotelephone transmitters equipped with a device to limit modulation or peak envelope power shall be modulated as follows.

(1) Other than single sideband or independent sideband transmitters—when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

§ 90.210 Emission masks.

(The T-2071-M is designed to operate at either 12.5 kHz bandwidth (aka Narrow) or 25 kHz bandwidth (Wide). Under Section 90 part 210, the masks for equipment designated to operate in the 150 to 174 MHz band are specified in the Applicable Emission Masks Chart, footnote 2.)

“² Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D”

(d) *Emission Mask D - 12.5 kHz channel bandwidth equipment.* For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

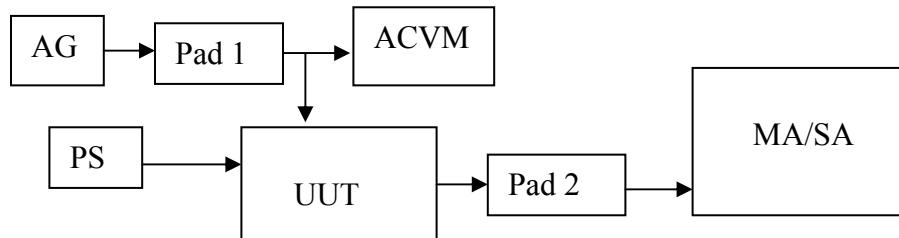
- (1) On any frequency from the center of the authorized bandwidth f₀ to 5.625 kHz removed from f₀: Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27 dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

(b) *Emission Mask B - 25 kHz channel bandwidth equipment.* For transmitters that are equipped with an audio lowpass filter pursuant to § 90.211(a), the power of any emission must be below the unmodulated carrier power (P) as follows:

- (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
- (2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
- (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Test Setup:

The setup for this test is shown below.



AG – Audio Generator – Leader LAG126S – SN 9050213

PS – Power Supply – Hewlett-Packard HP6207B – SN 1149A01889

Pad 1 – 20 dB Pad – Mini Circuits CAT20

ACVM – AC Volt Meter – Leader LMV181A – SN 2010903

UUT – T-2071-M Derringer

MA – Modulation Analyzer – Marconi 2955R – SN 132260-001

SA – Spectrum Analyzer – Advantest R3162 – SN 120401992

Pad 2 – 10 dB Pad – Mini Circuits CAT10

Test Method:

With the carrier frequency 162.000000MHz and the Power Supply set to 9.0 VDC, the unit under test was calibrated to 100% modulation with a 1 kHz tone at a level of 50 mV RMS. The Unit was then modulated with a 2500 Hz tone at a level of %50 – 1.25 kHz. The input level was then increased by 16 dB. This resulted in FM deviation of 1.9 kHz at the Narrow Band setting and 3.8 kHz at the Wide Band setting. The deviation was measured using the Marconi 2955R Modulation analyzer, then the output was switched to the spectrum analyzer for the purpose of measuring the occupied bandwidth. The spectrum was measured with the unit set to each of the following modes:

Unmodulated Carrier
Narrow Band, AGC On
Narrow Band, AGC Off
Wide Band, AGC On
Wide Band, AGC Off

For the purpose of calculating mask segment (b)(3), the power of the unmodulated carrier was 700 mW, therefore

$$43 + 10\log(.7) = 41.45 \text{ dB}$$

Test Results:

The results of the test are shown in Figures 8 - 12.

The unit under test passes per the criteria established in 2.1049 and 90.210.

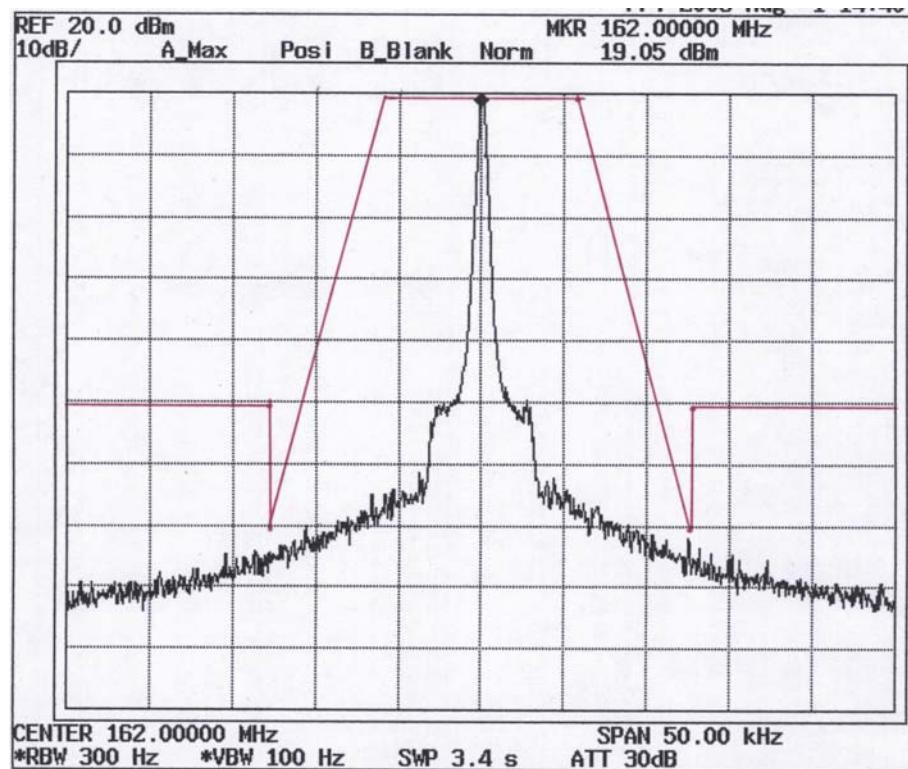


Figure 8 – Unmodulated Carrier

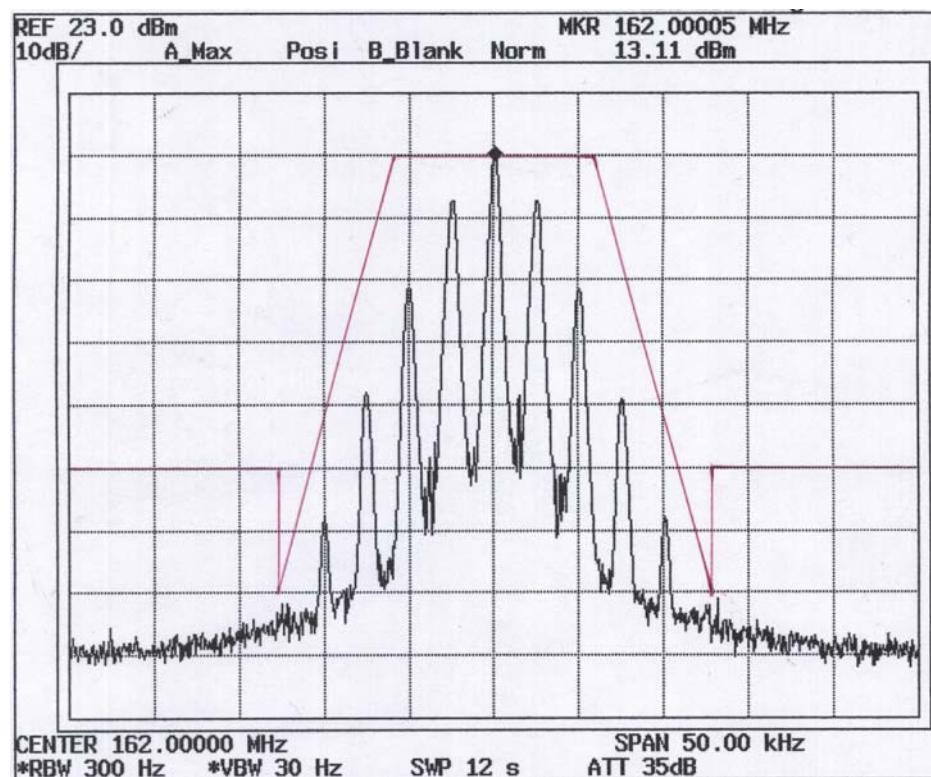


Figure 9 – Narrow Band, AGC On

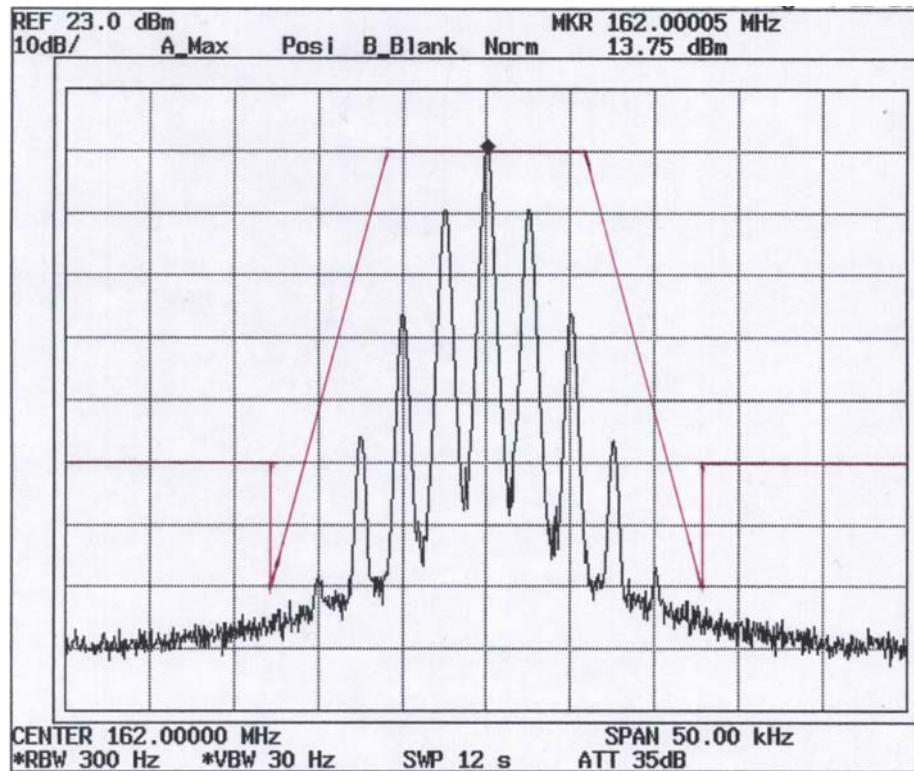


Figure 10 – Narrow Band, AGC Off

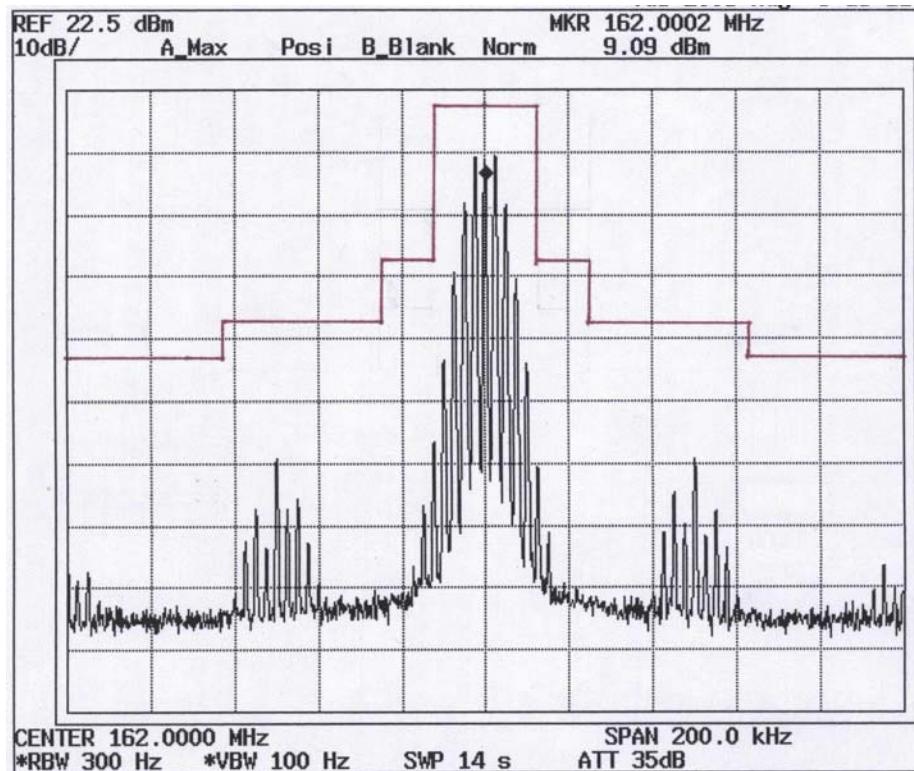


Figure 11 – Wide Band, AGC On

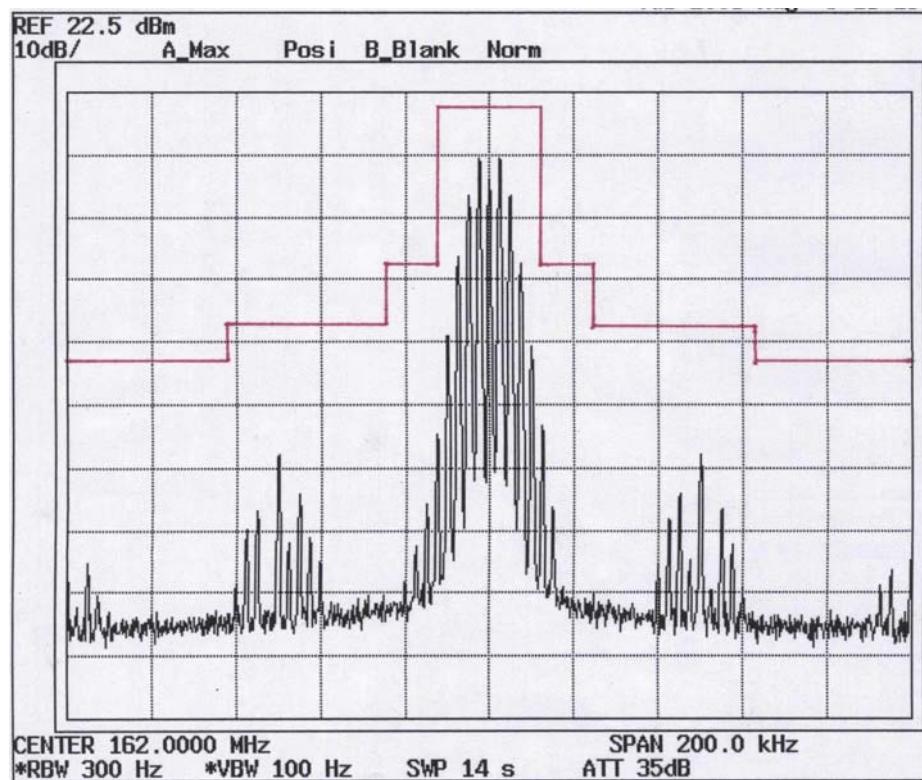


Figure 12 – Wide Band, AGC Off