

Report on Test Measurements

Occupied Bandwidth – TDMA Linear Simulcast Modulation (LSM), 12.5 kHz Channel Spacing

There is one exhibit shown for Linear Simulcast Modulation. It can be used in a system configuration based upon channel usage as described in Exhibit B. The occupied bandwidth chart references the following setup and specification requirements.

Modulation Type: TDMA Linear Simulcast Modulation, LSM
 Emission Designator: 8K70D7W
 Channelization: 12.5 kHz
 Power Setting: 110 Watts, Average

Specification Requirement § 90.210(d) Emission Limits:

Emission Mask D. 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 (f_0) to 5.625 kHz removed from f_0 : *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 $7.27 * (f_d - 2.88 \text{ kHz})$ 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 plus $10 \log_{10}(P)$ dB or 70 dB, whichever is the lesser attenuation.*

(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide to capture the true peak emission of the equipment under test. In order to show compliance with the emissions mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to ensure that the emission profile is developed.

Necessary Bandwidth Calculation: The necessary bandwidth of the modulation signal is not calculable per the formulas defined in 47 CFR 2.202 (b). Specifically, although the modulation for this emission is a composite modulation, the equations given in the composite tables in 2.202 are not applicable since none of them adequately approximate the form of digital modulation used. The necessary bandwidth of 8.70 kHz is based upon a 99% power measurement of the transmitter spectrum, per 2.202 (a).

Measurement Procedure and Instrument Settings:

Emission Measurement Analyzer Settings:

| | | | |
|----------------|--------------------------------|-----------------------|---------|
| Horizontal: | 12.5 kHz per Division | Resolution Bandwidth: | 100 Hz |
| Vertical: | 10 dB per Division | Video Bandwidth: | 10 kHz |
| Sweep Time: | 72 Seconds (<2000 Hz / Second) | Span: | 125 kHz |
| Detector Mode: | Peak | | |

Test Procedure:

- 1) Adjust the spectrum analyzer per the values specified in the Emission Measurement Analyzer Settings.
- 2) Modulate the transmitter with the appropriate signaling pattern, (pseudorandom data) and key the transmitter at the full power rating. Use the analyzer controls to set this signal to the full-scale reference line. Allow the analyzer to sweep fully and store the sweep.
- 3) Use the band power marker function of the spectrum analyzer to measure the power of the carrier in a 12.5 kHz bandwidth.
- 4) Use the carrier power value from the previous step to generate the emission mask limit.
- 5) Plot the resulting analyzer trace and the emission mask limit, add text and labeling as appropriate.

| EXHIBIT | DESCRIPTION |
|----------------|--|
| E1-2.7 | TDMA Linear Simulcast Modulation (LSM) |

Report on Test Measurements

Occupied Bandwidth – TDMA Compatible 4-Level Frequency Modulation (C4FM), 12.5 kHz Channel Spacing
 There is one exhibit shown for C4FM. It can be used in a system configuration based upon channel usage as described in Exhibit B. The occupied bandwidth chart references the following setup and specification requirements.

Modulation Type: TDMA Compatible 4-Level Frequency Modulation, C4FM
 Emission Designator: 8K10F7W
 Channelization: 12.5 kHz
 Power Setting: 110 Watts

Specification Requirement § 90.210(d) Emission Limits:

Emission Mask D. 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 (f_0) to 5.625 kHz removed from f_0 : *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 $7.27 * (f_d - 2.88 \text{ kHz})$ 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 plus $10 \log_{10}(P)$ dB or 70 dB, whichever is the lesser attenuation.*

(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide to capture the true peak emission of the equipment under test. In order to show compliance with the emissions mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to ensure that the emission profile is developed.

Necessary Bandwidth Calculation: An occupied bandwidth of 8.10 kHz was measured for this emission, per 2.202 paragraph (a) of the Rules and Regulations, as that bandwidth which contains 99% of the power in the transmitted signal. For this system, the necessary bandwidth has been chosen to be the same as the occupied bandwidth, thereby per paragraph (b) (2), the necessary bandwidth is 8K10.

Measurement Procedure and Instrument Settings:

Emission Measurement Analyzer Settings:

| | | | |
|----------------|--------------------------------|-----------------------|---------|
| Horizontal: | 12.5 kHz per Division | Resolution Bandwidth: | 100 Hz |
| Vertical: | 10 dB per Division | Video Bandwidth: | 10 kHz |
| Sweep Time: | 72 Seconds (<2000 Hz / Second) | Span: | 125 kHz |
| Detector Mode: | Peak | | |

Test Procedure:

- 1) Adjust the spectrum analyzer per the values specified in the Emission Measurement Analyzer Settings.
- 2) Modulate the transmitter with the appropriate signaling pattern, (pseudorandom data) and key the transmitter at the full power rating. Use the analyzer controls to set this signal to the full-scale reference line. Allow the analyzer to sweep fully and store the sweep.
- 3) Use the band power marker function of the spectrum analyzer to measure the power of the carrier in a 12.5 kHz bandwidth.
- 4) Use the carrier power value from the previous step to generate the emission mask limit.
- 5) Plot the resulting analyzer trace and the emission mask limit, add text and labeling as appropriate.

| <u>EXHIBIT</u> | <u>DESCRIPTION</u> |
|----------------|---|
| E1-2.8 | TDMA Compatible 4-Level Frequency Modulation (C4FM) |

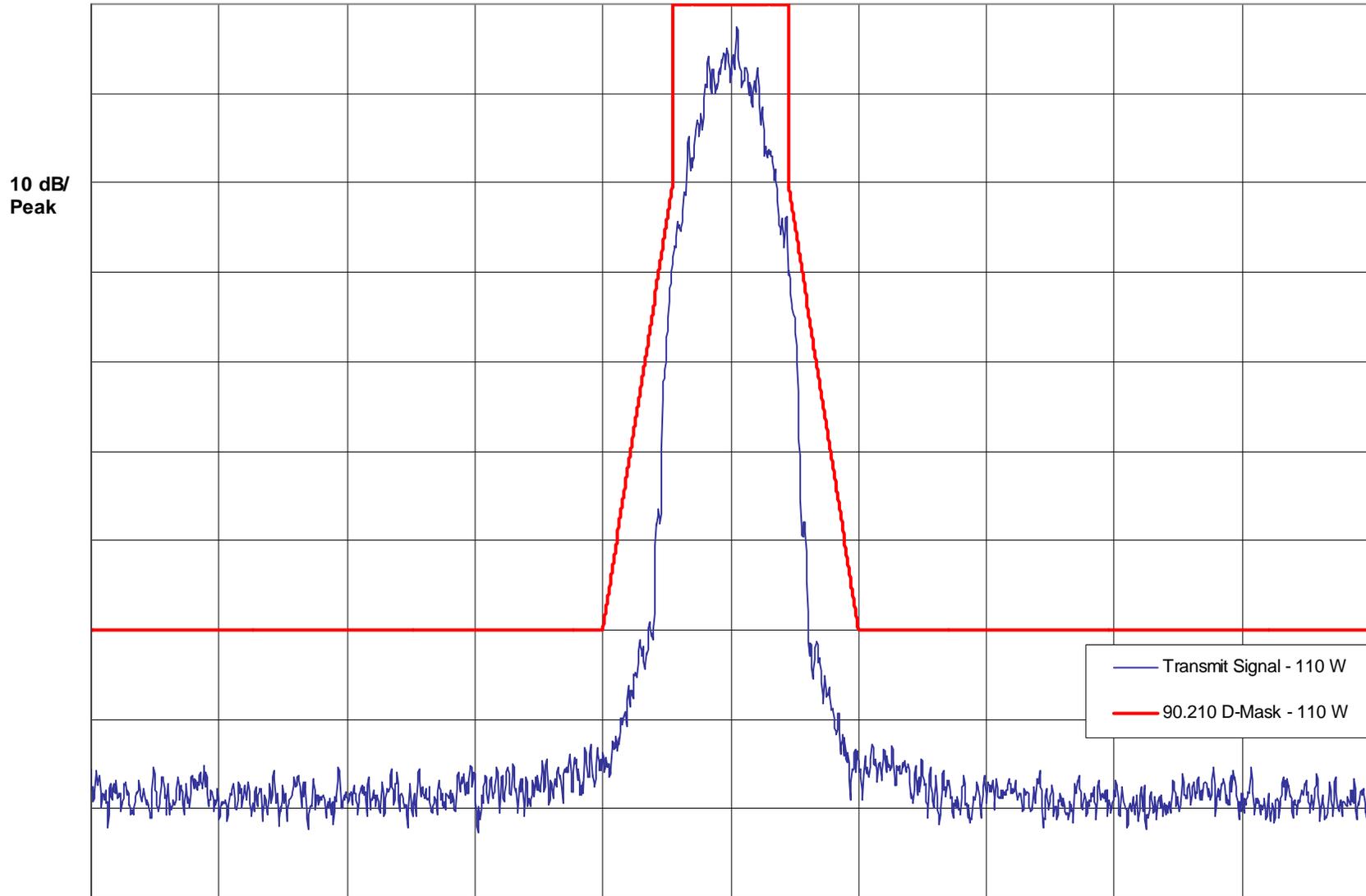
Report on Test Measurements

Occupied Bandwidth – TDMA Linear Simulcast Modulation (LSM)

Occupied Bandwidth -- TDMA - Linear Simulcast Modulation - 8K70D7W - 110 Watts

REF 50.4 dBm

ATTEN 20 dB



CENTER 434.975.0000 MHz

RES BW 100 Hz

VID BW 10 kHz

SPAN 125 kHz

SWP 72 sec

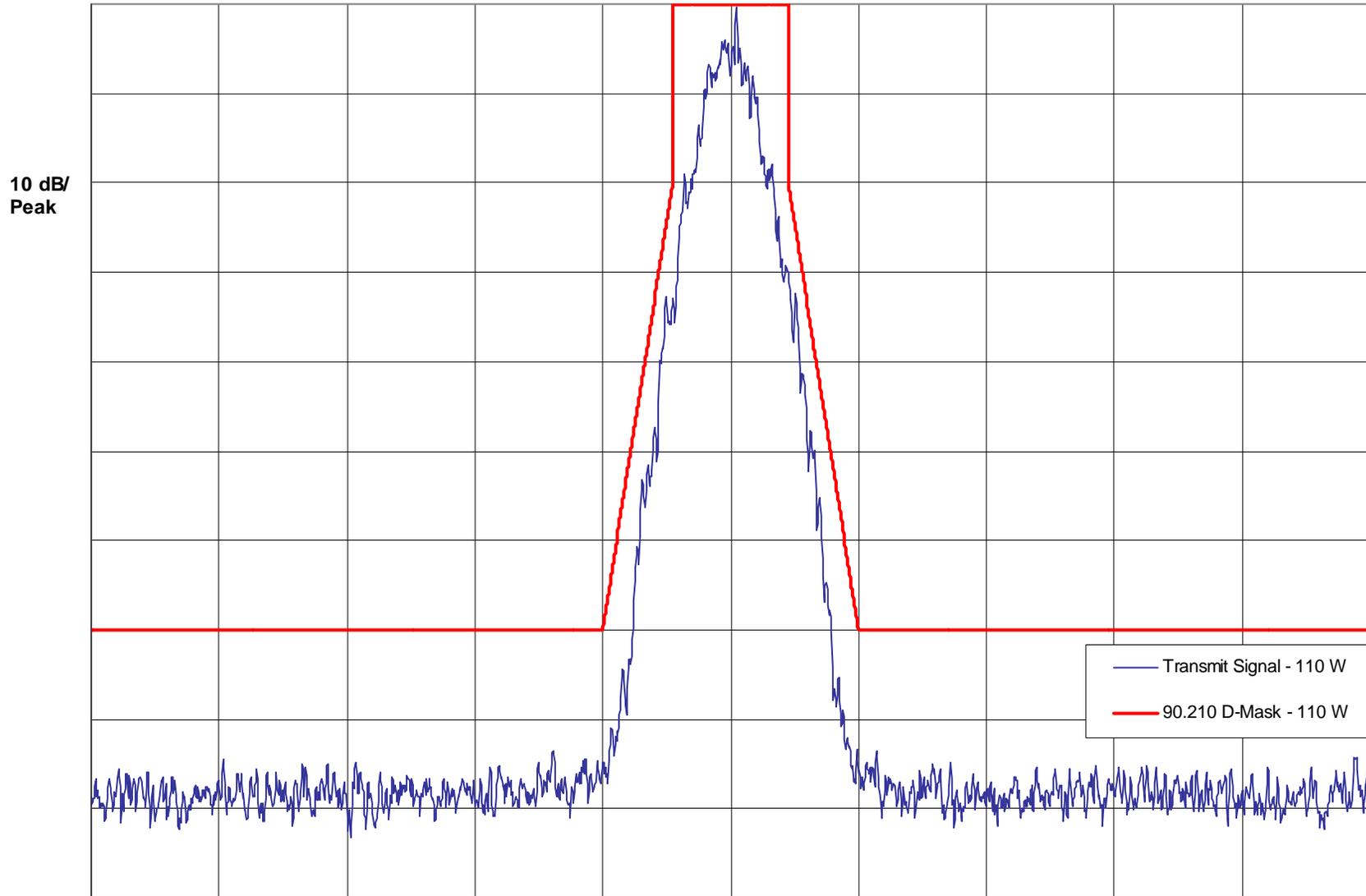
Report on Test Measurements

Occupied Bandwidth – TDMA Compatible 4-Level Frequency Modulation (C4FM)

Occupied Bandwidth -- TDMA - Compatible 4-Level Frequency Modulation - 8K10F7W - 110 Watts

REF 50.4 dBm

ATTEN 20 dB



CENTER 434.975.0000 MHz

RES BW 100 Hz

VID BW 10 kHz

SPAN 125 kHz

SWP 72 sec