



Spurious Emissions Measurements

**To Demonstrate Compliance with
Section 73.317(b) through 73.317(d) of the
FCC Rules and Regulations**

W227BF – 93.3 MHz

Shoreview, MN (Facility ID No: 140133)

K244FE – 96.7 MHz

Calhoun Beach, MN (Facility ID No: 147274)

K273BH – 102.5 MHz

Fridley, MN (Facility ID No: 140150)

June 4 2015

Spurious Emissions Measurements

Measurements were conducted to demonstrate that W227BF, Shoreview, MN, K244FE, Calhoun Beach, MN and K273BH, Fridley, MN operating into a combined antenna system, comply with section 73.317(b) through 73.317(d) of the FCC Rules and Regulations as specified in “Special operating conditions or restrictions” 2 of the K244FE construction permit BPFT-20141008AAZ. Jess E. Meyer conducted the measurements on June 1, 2015, with all stations simultaneously utilizing the shared antenna. The spectrum analyzer used for the measurements was an Agilent Technologies model 9340B, S/N CN03480806. A sample of the W227BF, K244FE and K273BH signals was derived from a Coaxial Dynamics Variable Signal Sampler, model 7998, at the output of the combiner and was coupled to the analyzer using a short length of RG-58 50Ω coaxial cable. A 20 dB pad (Bird model 2-A-MFB-20 or equivalent) was inserted ahead of the analyzer to avoid overload and to provide isolation.

The measured unmodulated carrier level of all three stations was 0 dBm which was used as the reference for all harmonic, spurious and intermodulation measurements. All measurements were conducted with the transmitters and associated equipment adjusted as used in normal program operation.

Measurements were conducted to ensure that emissions appearing on frequencies removed from the carrier frequencies by more than 600 kHz were attenuated by at least 80 dB as required by section 73.317(d) of the FCC Rules. To facilitate these measurements, Microwave Filter Company two-pole notch filters, model 6367-2, were placed between the RF sampler and the attenuator so that the spectrum analyzer gain could be increased by up to 20 dB. The filters were necessary to avoid the possible generation of false spurious or intermodulation products in the analyzer. The attenuation of the notch filters was 34dB at 93.3 MHz, 41dB at 96.7 MHz and 39dB at 102.5 MHz.

The most likely intermodulation frequencies in the range 2.5 MHz to 550 MHz that could be produced by the combined operation of W227BF, K244FE and K273BH and harmonic frequencies through the 5th harmonic were calculated and the results of the measurements at these frequencies are listed in Table 1. Highlighted in red font, six of the resultant calculated product frequencies, 89.9 MHz, 90.9 MHz, 100.1 MHz, 103.5 MHz, 483.5 MHz and 484.9 MHz are occupied within the Minneapolis/St. Paul metro area, therefore producing inaccurate indications, which I have included for reference only.

Table 1

Frequency A	102.5
Frequency B	96.7
Frequency C	93.3

DESCRIPTION	FREQ. MHZ	ATTENUATION DB	DESCRIPTION	FREQ. MHZ	ATTENUATION DB
A + B	199.2	111	(2 X A) + (3 X C)	484.9	90.3
A - B	5.8	108.9	(2 X C) + (3 X A)	494.1	109.6
A + (2 X B)	295.9	111.2	(3 X A) - C	214.2	110.6
B + (2 X A)	301.7	110	3 X C	279.9	110.4
A + (3 X B)	392.6	110.8	(3 X C) - A	177.4	110.7
B + (3 X A)	404.2	110	(3 X A) - (2 X C)	120.9	110.6
2 X A	205	109	(3 X C) - (2 X A)	74.9	107.5
(2 X A) - B	108.3	100.3	(3 X A) - (3 X C)	27.6	112.1
2 X B	193.4	111	B + C	190	110.2
(2 X B) - A	90.9	99	B - C	3.4	110.6
(2 X A) + (2 X B)	398.4	111	B + (2 X C)	283.3	110
(2 X A) - (2 X B)	11.6	110.9	C + (2 X B)	286.7	111.5
(2 X A) + (3 X B)	495.1	110.3	B + (3 X C)	376.6	111.7
(2 X B) + (3 X A)	500.9	110.1	C + (3 X B)	383.4	110.8
3 X A	307.5	111	(2 X B) - C	100.1	93
(3 X A) - B	210.8	112	(2 X C) - B	89.9	87.7
3 X B	290.1	110.1	(2 X B) + (2 X C)	380	111.5
(3 X B) - A	187.6	110	(2 X B) - (2 X C)	6.8	110.1
(3 X A) - (2 X B)	114.1	111.4	(2 X B) + (3 X C)	473.3	110.2
(3 X B) - (2 X A)	85.1	111	(2 X C) + (3 X B)	476.7	110.9
(3 X A) - (3 X B)	17.4	110.8	(3 X B) - C	196.8	109.7
A + C	195.8	110	(3 X C) - B	183.2	110.6
A - C	9.2	110.4	(3 X B) - (2 X C)	103.5	47
A + (2 X C)	289.1	112.8	(3 X C) - (2 X B)	86.5	108
C + (2 X A)	298.3	111.8	(3 X B) - (3 X C)	10.2	110.6
A + (3 X C)	382.4	111.1	4 X A	410	110.9
C + (3 X A)	400.8	111.9	4 X B	386.8	111.2
(2 X A) - C	111.7	103.4	4 X C	373.2	111
2 X C	186.6	110.9	5 X A	512.5	109.9
(2 X C) - A	84.1	104.9	5 X B	483.5	100.5
(2 X A) + (2 X C)	391.6	111.5	5 X C	466.5	111.1
(2 X A) - (2 X C)	18.4	111.4			

While special attention was given to the “product” frequencies listed in Table 1, measurements were conducted covering the entire range of frequencies between 2.5 MHz and 550 MHz. Over this frequency range, no signals were detected at levels greater than -100 dBm below the unmodulated carrier level.

The results of these measurements confirm that the combined operations of W227BF, K244EQ and K273BH into the shared antenna are in full compliance with section 73.317(b) through 73.317(d) of the FCC Rules and Regulations.

A handwritten signature in dark ink, appearing to read "Jess Meyer". The signature is fluid and cursive, with the first name "Jess" being more prominent than the last name "Meyer".

Jess E Meyer
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