Occupied Bandwidth and
Spurious Emissions Measurements

To Demonstrate Compliance with
Section 73.317(b) through 73.317(d) of the FCC Rules and Regulations and hybrid FM specifications.

W278CY 103.5 Mhz 278D
W288CX 105.5 Mhz 278D
W292EU 106.3 Mhz 292D

Columbia SC
10/30/2019

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Measurements were conducted to demonstrate that W278CY,W288CX and W292EU operating into a combined antenna system comply with section 73.317(b) through 73.317(d) of the FCC Rules and Regulations and in support of form 350 to cover BNPFT-20181102AAF. The measurements were conducted on 10/30.2019 by Benjamin H Brinitzer CPBE with Analog carriers of all stations simultaneously utilizing the shared antenna. The spectrum analyzer used for the measurements was a Rigol DSA815-TG Serial # DSA8A150800353 calibrated 9/2017. A sample of W278CY, W288CX and W292EU signals was derived from the main transmission line at the output of the combiner/filters. RF was coupled to the analyzer using a short length of RG-142 50Ω double-shielded coaxial cable. One switchable 20 db pad (Bird model 5-A-MFN-06) was inserted ahead of the analyzer to avoid overload and to provide isolation.

The modulated carrier level of W278CY was +0 dBm, the modulated carrier level of W288CX was +0 dBm and W292EU was +1 Dbm. Since the W278CY reference level was “fundamental” and lower, it was used as the reference for all harmonic, spurious and intermoduation measurements. All measurements were conducted with the transmitters and associated equipment adjusted as used in normal program operation.

For all occupied bandwidth measurements, the spectrum analyzer was placed in the peak hold mode for at least 10 minutes per measurement before the waveforms were observed. W278CY, W288CX and W292EU were observed to be in full compliance with section 73.317(b) of the FCC Rules with emissions appearing on frequencies removed from the carrier frequencies by between 120 kHz and 240 kHz attenuated by at least 25 dB below the modulated carrier level indicating the occupied bandwidth of each transmitter to be 240 kHz or less. Transmitters were also observed to be in full compliance with section 73.317(c) of the FCC Rules with emissions appearing on frequencies removed from the carrier frequencies by between 240 kHz and 600 kHz attenuated by at least 35 dB.

Extensive measurement were also conducted to insure 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, notch filters were placed before the switchable 20 dB pad so that the spectrum analyzer gain could be increased by 27 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 22.5 dB at 103.5 Mhz 278D and 22.5 dB at 105.5 Mhz 278D and 21.5 DB at 106.3 Mhz 292D.

All harmonic and intermodulation frequencies in the range of frequencies between 3 MHz and 500 MHz through the 3rd order that could be produced by the combined operation of W278CY, W288CX and W292EU were predicted with a computer program, the results of which are shown in Table 1.

TABLE 1

#	Mult	x	Freq.	Sum/Dif	Mult	x	Freq.	=	Product
1.	1	x	103.5	+	1	x	105.5	=	209
2.	1	x	103.5	+	1	x	106.3	=	209.8
3.	1	x	105.5	+	1	x	103.5	=	209
4.	1	x	105.5	+	1	x	106.3	=	211.8
5.	1	x	106.3	+	1	x	103.5	=	209.8
6.	1	x	106.3	+	1	x	105.5	=	211.8
7.	1	x	103.5	+	2	x	105.5	=	314.5
8.	1	x	103.5	+	2	x	106.3	=	316.1
9.	1	x	105.5	+	2	x	103.5	=	312.5
10.	1	x	105.5	+	2	x	106.3	=	318.1
11.	1	x	106.3	+	2	x	103.5	=	313.3
12.	1	x	106.3	+	2	x	105.5	=	317.3
13.	2	x	103.5	=				=	207
14.	2	x	103.5	+	1	x	105.5	=	312.5
15.	2	x	103.5	−	1	x	105.5	=	101.5
16.	2	x	103.5	+	1	x	106.3	=	313.3
17.	2	x	103.5	−	1	x	106.3	=	100.7

(cont. on next page)

#	Mult	x	Freq.	Sum/Dif	Mult	x	Freq.	=	Product
18.	2	x	105.5	=				=	211
19.	2	x	105.5	+	1	x	103.5	=	314.5
20.	2	x	105.5	−	1	x	103.5	=	107.5
21.	2	x	105.5	+	1	x	106.3	=	317.3
22.	2	x	105.5	−	1	x	106.3	=	104.7
23.	2	x	106.3	=				=	212.6
24.	2	x	106.3	+	1	x	103.5	=	316.1
25.	2	x	106.3	−	1	x	103.5	=	109.1
26.	2	x	106.3	+	1	x	105.5	=	318.1
27.	2	x	106.3	−	1	x	105.5	=	107.1
28.	3	x	103.5	=				=	310.5
29.	3	x	103.5	−	1	x	105.5	=	205
30.	3	x	103.5	−	1	x	106.3	=	204.2
31.	3	x	105.5	=				=	316.5
32.	3	x	105.5	−	1	x	103.5	=	213
33.	3	x	105.5	−	1	x	106.3	=	210.2
34.	3	x	106.3	=				=	318.9
36.	3	x	106.3	−	1	x	105.5	=	213.4
37.	3	x	103.5	−	2	x	105.5	=	99.5
38.	3	x	103.5	−	2	x	106.3	=	97.9
39.	3	x	105.5	−	2	x	103.5	=	109.5
40.	3	x	105.5	−	2	x	106.3	=	103.9
41.	3	x	106.3	−	2	x	103.5	=	111.9
42.	3	x	106.3	−	2	x	105.5	=	107.9

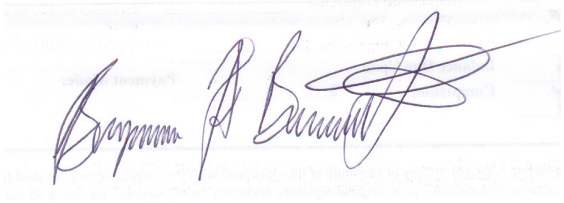
While special attention was given to the “product” frequencies listed in Table 1, measurements were conducted covering the entire range of frequencies between

3 MHz and 500 MHz. It was noted that Station W292EU was not in compliance with section 73.317(d) and was indicating a third harmonic of 318.9 Mhz – 30Db from fundamental. Further measurments were conducted with the carriers of W288CX and W278CY turned off to eliminate ay possibility of intermodulation from added installation of W278CY with no change in results. Additionally, W288CX and W278CY were turned on and W292EU turned off and the unwanted signal disappeared. The licensee RADIO TRAINING NETWORK, INC was notified and immediately ceased operations of W292EU, pending repairs to their equipment.

The only signals detected at levels attenuated by less than 80 dB below the modulated carrier levels and appearing on frequencies removed from the W278CY, W288CX and W292EU carrier frequencies by more than 600 kHz were the carriers of nearby FM and Television stations and the unwanted third harmonic of Licensee Radio training Network Inc.. In each case where these signals were observed to be at a level greater than –76 dBm (80 dB below the modulated carrier level of W278CY) W288CX and W292EU transmitter was turned off while the amplitude of the signal was observed to be unchanged, indicating that the signal was not the result of the combined operation of W278CY, W288CX and W292EU.

Results of the measurements at the specific frequencies where harmonic or intermodulation products were predicted to possibly occur resulted in levels less than 80 DB under the fundamentals

The results of these measurements confirm that the combined operations of W278CY, W288CX and W292EU into a shared antenna are in full compliance with section 73.317(b) through 73.317(d) of the FCC Rules and Regulations as a result of the combined operations. The 3rd order harmonic of W292EU as noted, was attributable to the licensee's malfunctioning Transmitter, therefore we request Program Test Authority for W278CY be granted.



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