# Intermodulation (IM) and Bandwidth Report

For On-Channel Booster Site

KKCN-FM1, 103.1 MHz, San Angelo, TX

As an On-Channel Booster For

KKCN, 103.1 MHz, Ballinger, TX

Facility ID: 124900

This exhibit is in support of the filing for FCC Form 302 for station KKCN-FM1, San Angelo, Texas. This exhibit is for the application for a License to Cover the Construction Permit (File #: 0000211825) granted on 3/24/2023. The purpose of this exhibit is to demonstrate compliance with the Special Operating Conditions set forth in the Construction Permit for this facility.

All spectral measurements were made with an Anritsu S332E analyzer (Serial Number 1713408) which was calibrated as per factory specifications. Samples of the signals were obtained with a Bird Thruline section inserted into the coax line after the combiner. Samples were coupled to the spectrum analyzer with a Bird 553-75 directional coupler element rotated to measure forward power on the transmission line. Transmitter power was set on both stations to be at the power which was calculated based on antenna gain, line loss, and combiner losses (Table 1).

A sweep of +/- 500kHz was completed on KKCN-FM1 with no modulation. At no time did the spectrum show any artifacts above that specified by 47 CFR 73.317 (Figure 1). Additionally, the spectrum was monitored beyond +/- 500kHz and all signals were below the noise threshold of the analyzer, which is below -80 dBc.

A second sweep of +/- 500kHz was performed with normal analog modulation of the carrier. At no time did the spectrum show any artifacts above that specified in 47 CFR 73.317 (Figure 2).

It is, therefore, my opinion that this station meets the requirements of the Special Operating Conditions set out in the aforementioned Construction Permit.

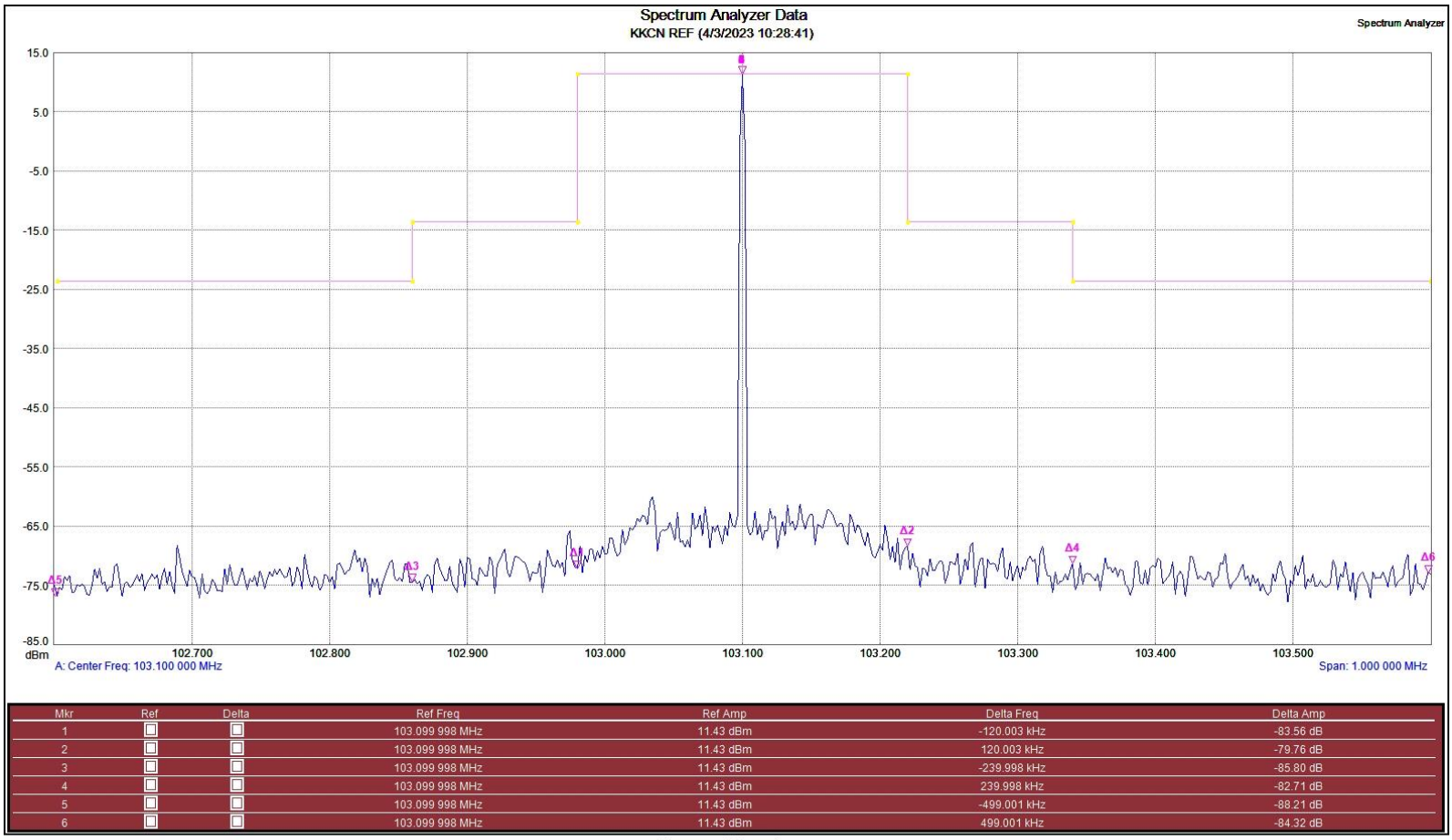
I, Edward C. Dulaney, performed all measurements myself, utilizing the equipment specified above. I have worked in the Broadcast Engineering field for over 40 years and am qualified to make the above measurements. I am a member of the Society of Broadcast Engineers (member number 20832) and hold Certified Professional Broadcast Engineer (CPBE) certification.

Edward C. Dulaney

Dated 04/12/2023

| | ERP (W) | dBW | Antenna gain | Antenna gain (dB) | Filter dB loss | Coax loss (dB/100') | Length of Coax | Coax Loss (dB) | # of connectors | Loss per connector | Total connector loss | Required TPO (dBW) | Required TPO (W) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KNRX-FM1 | 270 | 24.31364 | 1.37 | 1.367 | 0.41 | 0.359 | 340 | 1.2206 | 4 | 0.02 | 0.08 | 24.6570 | 292 |
| KKCN-FM1 | 1400 | 31.46128 | 1.37 | 1.367 | 0.40 | 0.338 | 340 | 1.1506 | 4 | 0.02 | 0.08 | 31.7247 | 1488 |

*Table 1*

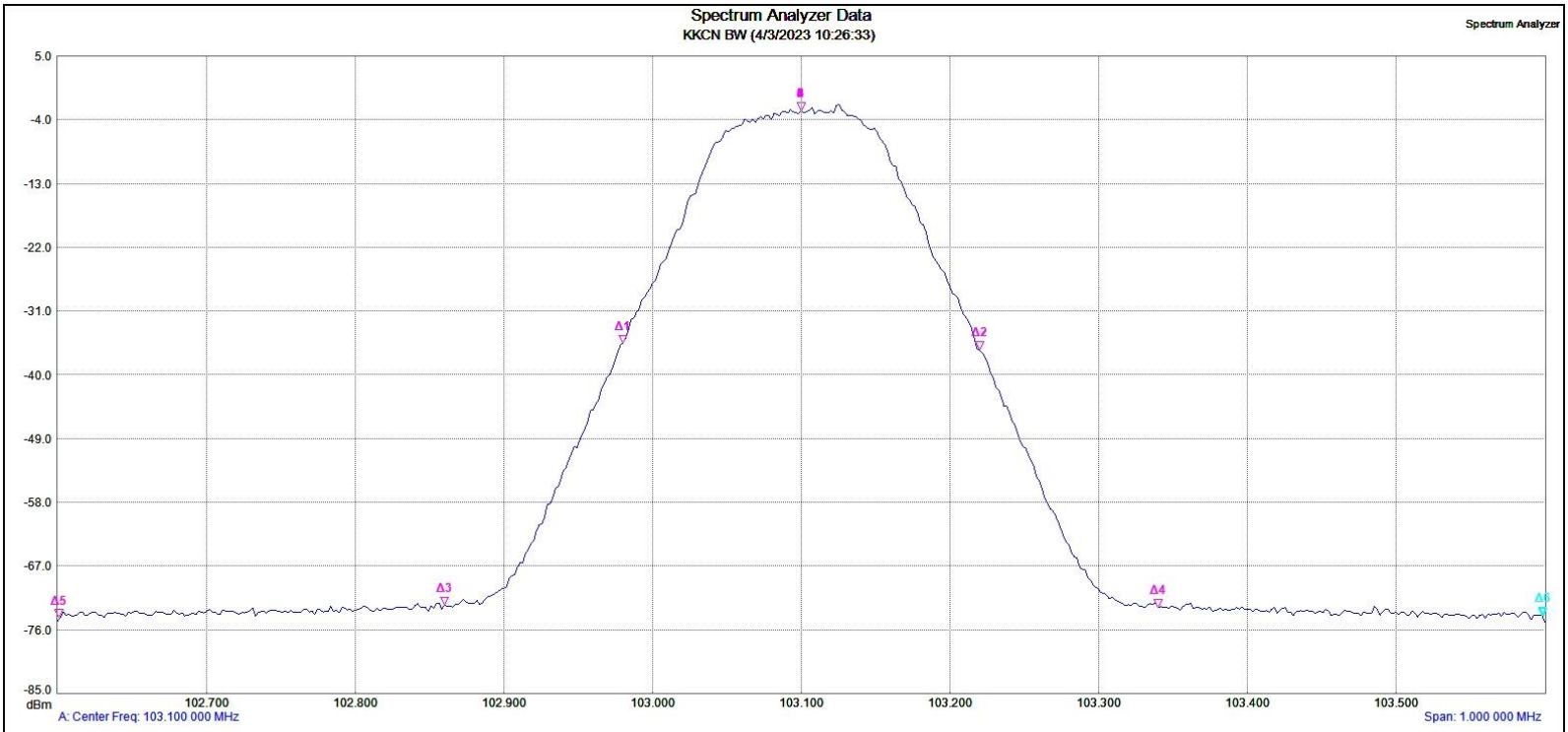



| Mkr | Ref | Delta | Ref Freq | Ref Amp | Delta Freq | Delta Amp |
|---|---|---|---|---|---|---|
| 1 | ☐ | ☐ | 103.099 998 MHz | 11.43 dBm | -120.003 kHz | -83.56 dB |
| 2 | ☐ | ☐ | 103.099 998 MHz | 11.43 dBm | 120.003 kHz | -79.76 dB |
| 3 | ☐ | ☐ | 103.099 998 MHz | 11.43 dBm | -239.998 kHz | -85.80 dB |
| 4 | ☐ | ☐ | 103.099 998 MHz | 11.43 dBm | 239.998 kHz | -82.71 dB |
| 5 | ☐ | ☐ | 103.099 998 MHz | 11.43 dBm | -499.001 kHz | -88.21 dB |
| 6 | ☐ | ☐ | 103.099 998 MHz | 11.43 dBm | 499.001 kHz | -84.32 dB |

Measurement Parameters

| | | | |
|---|---|---|---|
| | | Stop Frequency | 103.600 000 MHz |
| Trace Mode | Normal | Frequency Span | 1.000 000 MHz |
| Preamp | OFF | Reference Level | 15.000 dBm |
| Min Sweep Time | 0.001 S | Scale | 10.0 dB/div |
| Reference Level Offset | 0 dB | Serial Number | 1713048 |
| Input Attenuation | 30.0 dB | Base Ver. | V5.97 |
| RBW | 1.0 kHz | App Ver. | V7.22 |
| VBW | 1.0 kHz | Model | S332E |
| Detection | Peak | Options | 21, 509 |
| Center Frequency | 103.100 000 MHz | Date | 4/3/2023 10:28:41 |
| Start Frequency | 102.600 000 MHz | Device Name | |

*Figure 1*




| Mkr | Ref | Delta | Ref Freq | Ref Amp | Delta Freq | Delta Amp |
|---|---|---|---|---|---|---|
| 1 | ☐ | ☐ | 103.099 998 MHz | -2.74 dBm | -120.000 kHz | -32.79 dB |
| 2 | ☐ | ☐ | 103.099 998 MHz | -2.74 dBm | 120.000 kHz | -33.74 dB |
| 3 | ☐ | ☐ | 103.099 998 MHz | -2.74 dBm | -240.000 kHz | -69.76 dB |
| 4 | ☐ | ☐ | 103.099 998 MHz | -2.74 dBm | 240.000 kHz | -70.12 dB |
| 5 | ☐ | ☐ | 103.099 998 MHz | -2.74 dBm | -499.000 kHz | -71.55 dB |
| 6 | ☐ | ☐ | 103.099 998 MHz | -2.74 dBm | 499.000 kHz | -71.21 dB |

Measurement Parameters

| | | | |
|---|---|---|---|
| Trace A data:Trace Average | 32 | Stop Frequency | 103.600 000 MHz |
| Trace Mode | Average | Frequency Span | 1.000 000 MHz |
| Preamp | OFF | Reference Level | 5.000 dBm |
| Min Sweep Time | 0.001 S | Scale | 9.0 dB/div |
| Reference Level Offset | 0 dB | Serial Number | 1713048 |
| Input Attenuation | 30.0 dB | Base Ver. | V5.97 |
| RBW | 1.0 kHz | App Ver. | V7.22 |
| VBW | 1.0 kHz | Model | S332E |
| Detection | Peak | Options | 21, 509 |
| Center Frequency | 103.100 000 MHz | Date | 4/3/2023 10:26:33 |
| Start Frequency | 102.600 000 MHz | Device Name | |

*Figure 2*