

Proof of Performance Report

K273CL Beaver, UT

FIN: 140509

102.5 MHz

October 26, 2016

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Introduction

The permittee for the K273CL Construction Permit (file number BMPFT-20161011AAS) is Air – Free Wireless, Inc. Stephen Wilde is an Electrical RF Engineer employed by SWE Services, LLC. Stephen Wilde completed the K273CL spurious emissions proof.

Test Equipment

- Agilent N9912A 2-Port Network Analyzer
- Agilent N9912A Spectrum Analyzer
- Bird B series Directional Coupler
- Shively FM 2-Cavity Band Pass Filters
- Mini Circuits High Pass filters

Station Equipment

- Nicom FM Transmitter
- Bext FDCSDC05 FM Combiner
- Nicom BKG-77 FM Antenna
- Andrew 1/2" Air Coaxial line

Summary

Harmonics, Intermodulation, Spurious, and Occupied Bandwidth Emissions measurements were completed at the output of the combiner network with K273CL and all other transmissions operating at 100% power. These measurements provide proof that K273CL is in compliance with the requirements of FCC Part 73.317.

Affidavit

STATE OF CALIFORNIA
Sacramento County

I, Stephen Wilde, do affirm that:

1. I have been engaged in the RF engineering and installation of broadcast facilities since 2005.
2. I hold Bachelor of Science degree in Electrical Engineering from DeVry University Chicago, IL.
3. I further declare, under penalty of perjury, that the statements contained herein are true and correct to the best of my knowledge.

Stephen Wilde
January 25, 2017

1/26/2017

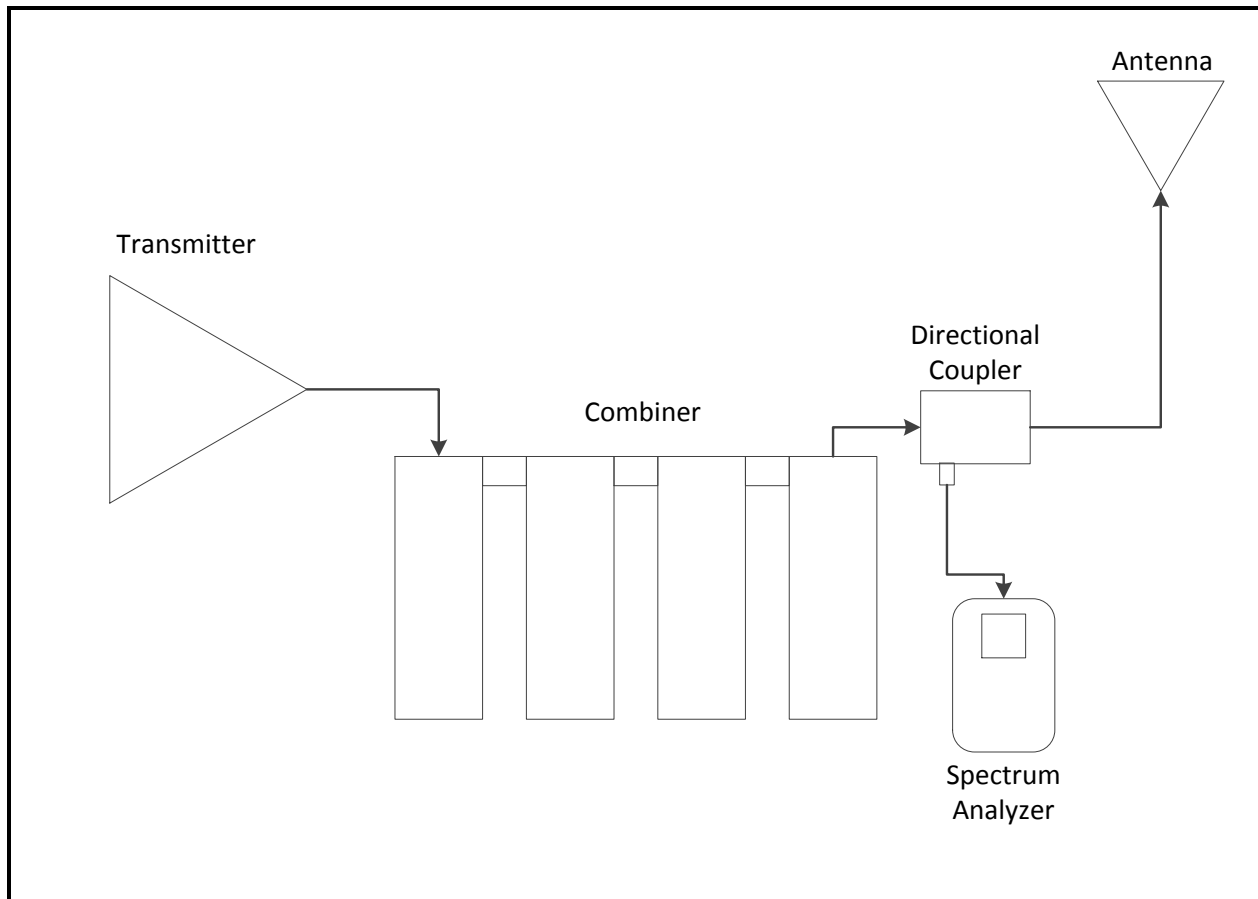
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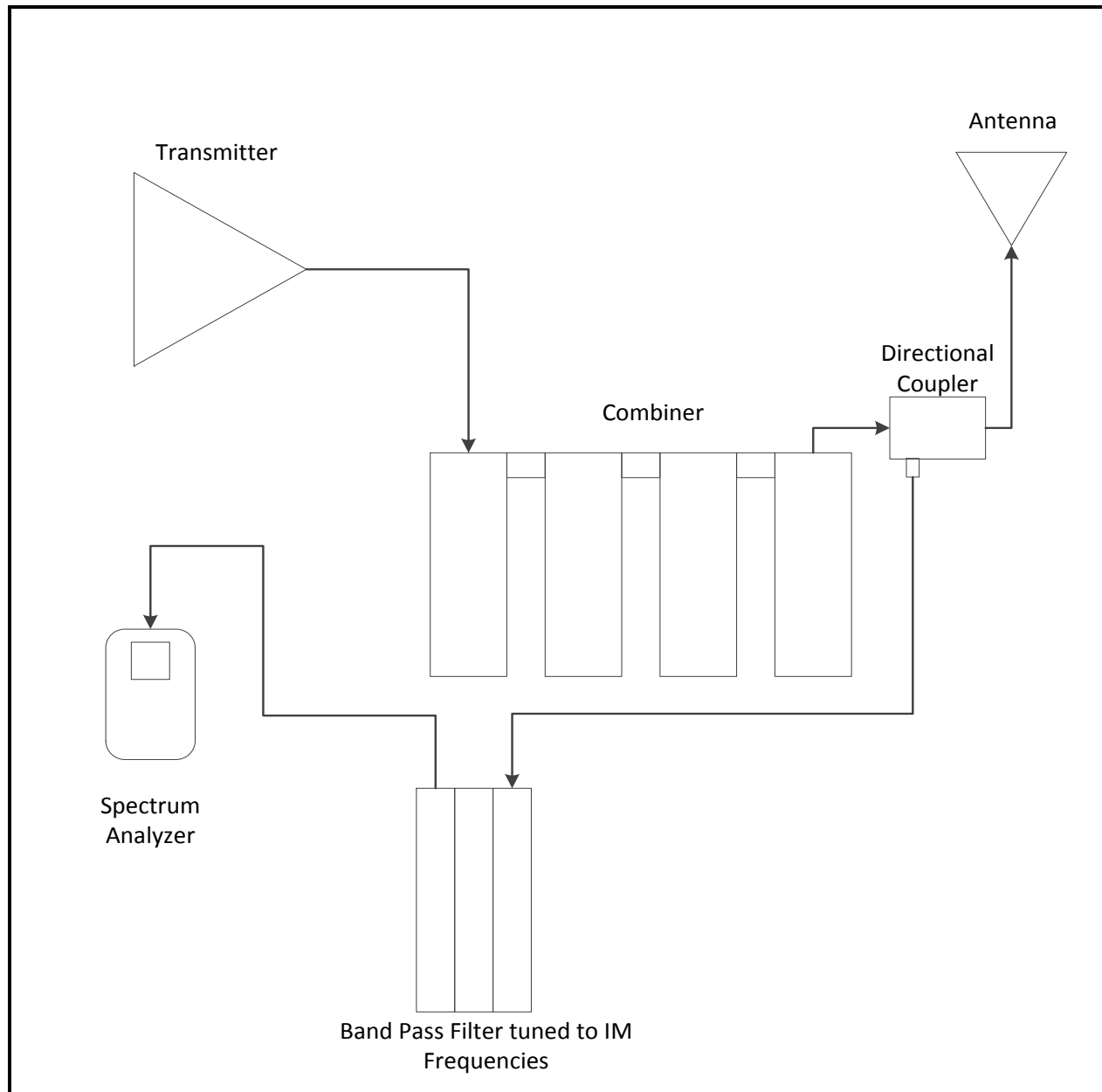
Stephen Wilde
RF Engineer
Signed by: swilde

Measurement Diagrams

Harmonic Emissions, Spurious Emissions, and Occupied Bandwidth measurement configuration



Intermodulation frequency measurement configuration



Measurement Results

Frequency Measurement

Assigned Frequency	98.5000000	MHz	Variance in Hz
Measured Frequency	98.5002449	MHz	244.9

TPO Calculation

Transmitter output KW	Coax Jumper(s) Efficiency	Combiner Efficiency	Coax Efficiency	Antenna Power Gain	ERP KW
0.343	0.977	0.908	0.912	0.90	0.250

Measurement Methodology

To ensure accurate measurements, the frequency response of all couplers, RF filters, and sample ports were characterized prior to taking any measurements. The resulting dB variances at each frequency were added to the recorded measurements to ensure accurate calculations.

The spectrum analyzer reference point of the fundamental frequency is 0.00 dBm. The directional coupler forward power sample port has less loss at all harmonic frequencies in reference to the fundamental frequency. The losses and gains are a dB reference relative to the fundamental frequency. Therefore, the directional coupler forward port loss or gain, high pass filter loss, and dB reference point are added to the instrument measurement to provide the resulting dBc calculation.

Harmonic Emissions Measurement

Harmonic	Frequency (MHz)	Directional Coupler (dB)	High Pass Filter (dB)	Reference Level (dB)	Instrument Reading (dB)	Corrected Measurement (dBc)	FCC Limit (dBc)	Clearance (dB)
X2	205.00	-5.50	0.50	0.00	-120.90	-125.90	-66.98	58.92
X3	307.50	-9.10	0.40	0.00	-121.80	-130.50	-66.98	63.52
X4	410.00	-11.60	0.30	0.00	-124.80	-136.10	-66.98	69.12
X5	512.50	-13.60	0.10	0.00	-110.80	-124.30	-66.98	57.32
X6	615.00	-15.00	0.10	0.00	-117.00	-131.90	-66.98	64.92
X7	717.50	-16.10	0.10	0.00	-123.80	-139.80	-66.98	72.82
X8	820.00	-17.00	0.10	0.00	-126.70	-143.60	-66.98	76.62
X9	922.50	-17.60	0.20	0.00	-126.80	-144.20	-66.98	77.22

Intermodulation Emissions Measurement

Due to the relationship between the fundamental frequencies, the resulting intermodulation products were evaluated with all fundamental frequencies within the combiner network operating at 100% power.

IM Product Frequency (MHz)	Bandpass Filter (dB)	Reference Level (dB)	Directional Coupler (dB)	Instrument Reading (dB)	Corrected Measurement (dBc)	FCC Limit (dBc)	Clearance (dB)
82.9	0.00	0.00	0.00	-88.68	-88.68	-66.98	21.70
112.3	0.00	0.00	0.00	-87.55	-87.55	-66.98	20.57

Occupied Bandwidth Measurement

The occupied bandwidth was measured with an Agilent N9912A spectrum analyzer utilizing fourteen mask segments to determine the occupied bandwidth. Measurements were completed over five minutes using a max-hold spectrum sweep, and demonstrate that K273CL is operating within the permissible bandwidth.

