April 2, 2018

To: Whom it May Concern

<u>Subject: Calculated Mobile Station Coupling Losses (MSCL) For FCCID: PWO460042</u>

The following formulas were used to calculate MSCL with a 6' foot path loss
and a 45 degree polarity mismatch between the inside antenna and the mobile device:

Path Loss dB = 36.6 dB + 20Log(F MHz) dB+ 20Log(D_{miles}) dB

Polarity Loss dB = $10Log(E_1/E_2)^2$ dB = P_L dB
P_L dB= $10Log(E_1^2/(E_1 Sin(45_{deg}))^2)$ dB = $20Log(1/Sin(45_{deg}))$ dB = 3.01dB
Where:
  E_1 = Maximum Possible Magnitude of the Electric Field from the Mobile Device
  E_2 = Magnitude of the electric field from the Mobile device with a 45deg polarity mismatch = $E_1 Sin(\tau)$.
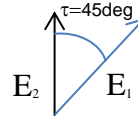
MSCL dB = Path Loss dB + Polarity Loss dB - Antenna Gain dB

The results of the calculations are shown in the following table:

Uplink Center Frequency MHz	707-710	782	836.5	1732.5	1880-1882.5
Path Loss (dB)	34.70	35.57	36.16	42.48	43.21
Polarity Loss (dB)	3	3	3	3	3
Antenna Gain with Coax Loss	-1.17	-1.37	-2.36	-0.01	1.09
MSCL (dB)	38.87	39.94	41.52	45.49	45.12

Note: Antenna Gain with Coax Loss as measured.

Sincerely

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