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April 30, 2019

To: Whom it May Concern

Subject: Calculated Mobile Station Coupling Losses (MSCL)

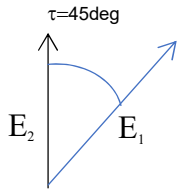
FCCID: **PWO460049**

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

Distance (feet): 6

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_1Sin(t).



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)	34.72	35.58	36.16	42.49	43.20
Polarity Loss (dB)	3	3	3	3	3
Inside Antenna Gain with Coax Loss (dBi)	-2.43	-1.69	-3.09	-0.33	-1.29
MSCL (dB)	**40.15**	**40.27**	**42.25**	**45.82**	**47.49**

Note: Antenna Gain with Coax Loss as measured.

Sincerely

Patrick L. Cook