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February 3, 2014

Subject: RF MPE EXPOSURE
Re: FCC ID: PWO460013

To Whom It May Concern:

The MPE calculations for model 460013 signal booster were done for each frequency band: 800 MHz and 1900 MHz. For each band two calculations were done; these included the different possibilities of antennas that may be connected to this signal booster: inside antennas and mobile outside antennas. The order of the attached calculations is as follows:

800 MHz band:

1. Mobile Outside Antenna: 311104
2. Inside Antenna: 311127

1900 MHz band:

3. Mobile Outside Antenna: 311101
4. Inside Antenna: 311106

Radiation Safety

5. Calculated Combined Power Density

A booster's uplink power must not exceed 1 watt equivalent isotropic radiated power (EIRP) for each band of operation. Composite downlink power must not exceed 0.05 watt EIRP for each band of operation (20.21(e)(8)(i)(D)). The following formula was used to calculate the equivalent isotropic radiated power:

$$\text{EIRP} = \text{Power Out (Watts)} * \text{Duty Cycle Percent} * \text{Antenna Gain (non-log)} * \text{Coax loss (non-log)}$$

The power density (mW/cm^2) is calculated using the following formula:

$$\text{Calculated Power Density} = 1000 * \text{EIRP (Watts)} / (4 * \pi * (\text{Distance from Antenna (cm)}^2))$$

Sincerely,

A handwritten signature in black ink, appearing to read 'Patrick L. Cook', written in a cursive style.

Patrick L. Cook
Senior Research and Development Engineer



Minimum Safe Distance From Antennas Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	824
Pout Watts	0.48641
Duty Cycle Percent	100.0%
Ant. Gain dBi	2.48
Coax Loss dB	0.00
Distance From Antenna In cm	20.3

RESULTS OF CALCULATIONS

Ant. Gain less Coax Loss dBi	2.48
Distance From Antenna In Inches	8.00
EIRP (Watts)	0.8610
FCC Power Density Limit (mw/cm ²)	0.55
Calculated Power Density (mw/cm ²)	0.1661

REFERENCE DATA

Pout dBm	26.87
Antenna Gain (non-log)	1.77
Coax loss (non-log)	1.00
General FCC Limit (mw/cm ²)	f/1500

Antenna # 311104



Minimum Safe Distance From Antennas Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	869
Pout Watts	0.00045
Duty Cycle Percent	100.0%
Ant. Gain dBi	2.19
Coax Loss dB	0.00
Distance From Antenna In cm	20.3

RESULTS OF CALCULATIONS

Ant. Gain less Coax Loss dBi	2.19
Distance From Antenna In Inches	8.00
EIRP (Watts)	0.0007
FCC Power Density Limit (mw/cm ²)	0.58
Calculated Power Density (mw/cm ²)	0.0001

REFERENCE DATA

Pout dBm	-3.50
Antenna Gain (non-log)	1.66
Coax loss (non-log)	1.00
General FCC Limit (mw/cm ²)	f/1500

Antenna # 311127



Minimum Safe Distance From Antennas Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	1850
Pout Watts	0.41305
Duty Cycle Percent	100.0%
Ant. Gain dBi	6.12
Coax Loss dB	2.30
Distance From Antenna In cm	20.3

RESULTS OF CALCULATIONS

Ant. Gain less Coax Loss dBi	3.82
Distance From Antenna In Inches	8.00
EIRP (Watts)	0.9954
FCC Power Density Limit (mw/cm ²)	1.00
Calculated Power Density (mw/cm ²)	0.1920

REFERENCE DATA

Pout dBm	26.16
Antenna Gain (non-log)	4.09
Coax loss (non-log)	0.59
General FCC Limit (mw/cm ²)	1.00

Antenna # 311101



Minimum Safe Distance From Antennas Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	1930
Pout Watts	0.00166
Duty Cycle Percent	100.0%
Ant. Gain dBi	0.89
Coax Loss dB	0.00
Distance From Antenna In cm	20.3

RESULTS OF CALCULATIONS

Ant. Gain less Coax Loss dBi	0.89
Distance From Antenna In Inches	8.00
EIRP (Watts)	0.0020
FCC Power Density Limit (mw/cm ²)	1.00
Calculated Power Density (mw/cm ²)	0.0004

REFERENCE DATA

Pout dBm	2.20
Antenna Gain (non-log)	1.23
Coax loss (non-log)	1.00
General FCC Limit (mw/cm ²)	1.00

Antenna # 311106



Radiation Safety - Combined Radiation From Amplifier and Cell Phone

Calculated Power Density and Minimum Safe Distance For Cellular Phones (Uplink)

INPUT DATA

Frequency MHz (Uplink)	824	1850
Radiated Power (Watts)	0.48641	0.41305
Duty Cycle Percent	100.0%	100.0%
Distance From Antenna In cm	20.3	20.3

RESULTS OF CALCULATIONS

Distance From Antenna In Inches	8.00	8.00
EIRP (Watts)	0.4864	0.4131
FCC Power Density Limit (mw/cm ²)	0.55	1.00
Calculated Power Density (mw/cm ²)	0.09	0.08

Calculated Power Density and Minimum Safe Distance For Amplifier (Downlink)

Frequency MHz	869	1930
Pout Watts	0.00045	0.00166
Duty Cycle Percent	100.0%	100.0%
Ant. Gain dBi	2.19	0.89
Coax Loss dB	0.00	0.00
Distance From Antenna In cm	20.3	20.3

RESULTS OF CALCULATIONS

Ant. Gain less Coax Loss dBi	2.19	0.89
Distance From Antenna In Inches	8.00	8.00
EIRP (Watts)	0.00075	0.00204
FCC Power Density Limit (mw/cm ²)	0.58	1.00
Calculated Power Density (mw/cm ²)	0.00014	0.00039

Calculated Combined Power Density and For Amplifier and Phone at 20.31 cm (8.0 in.)

(Determined by Most limiting factors)

FCC Power Density Limit (mw/cm ²)	0.55	1.00
Combined Power Density for Phone and Amp (mw/cm²)	0.09	0.08