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November 21, 2013

Subject: RF MPE EXPOSURE

Re: FCC ID: PWO460006

To Whom It May Concern:

The MPE calculations for model 460006 signal booster were done for each frequency band: 800 MHz and 1900 MHz. The power density for multiple radiators was calculated as well as two calculations for each band; these included the different possibilities of antennas that may be connected to this signal booster: Mobile Outside and Fixed Outside Antennas. The Inside Antenna is integrated into the model 460006 Signal Booster and any other Inside Antenna is non-applicable to this device. The order of the attached calculations is as follows:

800 MHz band:

1. Mobile Outside Antenna: 311104
2. Fixed Outside Antenna: 311124-400100

1900 MHz band:

3. Outside Antenna: 311101
4. Fixed Outside Antenna: 314473-0640

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 'P. 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	0.19320
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)	0.3420
FCC Power Density Limit (mw/cm ²)	0.55
Calculated Power Density (mw/cm ²)	0.0660

REFERENCE DATA

Pout dBm	22.86
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	824
Pout Watts	0.19320
Duty Cycle Percent	100.0%
Ant. Gain dBi	9.60
Coax Loss dB	4.70
Distance From Antenna In cm	20.3

RESULTS OF CALCULATIONS

Ant. Gain less Coax Loss dBi	4.90
Distance From Antenna In Inches	8.00
EIRP (Watts)	0.5970
FCC Power Density Limit (mw/cm ²)	0.55
Calculated Power Density (mw/cm ²)	0.1152

REFERENCE DATA

Pout dBm	22.86
Antenna Gain (non-log)	9.12
Coax loss (non-log)	0.34
General FCC Limit (mw/cm ²)	f/1500

Antenna # 311124-400100



Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	1850
Pout Watts	0.32734
Duty Cycle Percent	100.0%
Ant. Gain dBi	6.21
Coax Loss dB	2.39
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)	0.7889
FCC Power Density Limit (mw/cm ²)	1.00
Calculated Power Density (mw/cm ²)	0.1522

REFERENCE DATA

Pout dBm	25.15
Antenna Gain (non-log)	4.18
Coax loss (non-log)	0.58
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	1850
Pout Watts	0.32734
Duty Cycle Percent	100.0%
Ant. Gain dBi	10.04
Coax Loss dB	5.30
Distance From Antenna In cm	20.3

RESULTS OF CALCULATIONS

Ant. Gain less Coax Loss dBi	4.74
Distance From Antenna In Inches	8.00
EIRP (Watts)	0.9750
FCC Power Density Limit (mw/cm ²)	1.00
Calculated Power Density (mw/cm ²)	0.1881

REFERENCE DATA

Pout dBm	25.15
Antenna Gain (non-log)	10.09
Coax loss (non-log)	0.30
General FCC Limit (mw/cm ²)	1.00

Antenna # 314473-0640



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)	1.00000	1.00000
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)	1.0000	1.0000
FCC Power Density Limit (mw/cm ²)	0.55	1.00
Calculated Power Density (mw/cm ²)	0.1929	0.1929

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

Frequency MHz	869	1930
Pout Watts	1.57E-06	1.222E-06
Duty Cycle Percent	100.0%	100.0%
Ant. Gain dBi	0.70	2.60
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	0.70	2.60
Distance From Antenna In Inches	8.00	8.00
EIRP (Watts)	0.00000185	0.00000222
FCC Power Density Limit (mw/cm ²)	0.58	1.00
Calculated Power Density (mw/cm ²)	0.0000004	0.0000004

Calculated Combined Power Density 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/cm ²)	0.193	0.193