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November 15, 2013  
Subject: RF MPE EXPOSURE  
Re: FCC ID: PWO460003

To Whom It May Concern:

The MPE calculations for model 460003 signal booster were done for each frequency band: 1700/2100 MHz, 800 MHz, 700 MHz Band 13, 700 MHz Band 12, 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: fixed outside and inside antennas. The order of the attached calculations is as follows:

1700/2100 MHz band:

1. Fixed Outside Antenna: 314453-40075
2. Inside Antenna: 311155

800 MHz band:

1. Fixed Outside Antenna: 311124-400100
2. Inside Antenna: 311155

700 MHz Band 13:

1. Fixed Outside Antenna: 314411-40075
2. Inside Antenna: 311155

700 MHz Band 12:

1. Fixed Outside Antenna: 314411
2. Inside Antenna: 311155

1900 MHz band:

1. Fixed Outside Antenna: 311129-1180
2. Inside Antenna: 309904-75F

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 ( $\text{mW}/\text{cm}^2$ ) 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'.

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               | 1710    |
| Pout Watts                  | 0.25704 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 8.20    |
| Coax Loss dB                | 4.36    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 3.84   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.6223 |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 1.00   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.1201 |

### REFERENCE DATA

|                                         |       |
|-----------------------------------------|-------|
| Pout dBm                                | 24.10 |
| Antenna Gain (non-log)                  | 6.61  |
| Coax loss (non-log)                     | 0.37  |
| General FCC Limit (mw/cm <sup>2</sup> ) | 1.00  |

**Antenna # 314453-40075**



## Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

### INPUT DATA

|                             |         |
|-----------------------------|---------|
| Frequency MHz               | 2110    |
| Pout Watts                  | 0.00174 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 6.70    |
| Coax Loss dB                | 0.00    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 6.70   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.0081 |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 1.00   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.0016 |

### REFERENCE DATA

|                                         |      |
|-----------------------------------------|------|
| Pout dBm                                | 2.41 |
| Antenna Gain (non-log)                  | 4.68 |
| Coax loss (non-log)                     | 1.00 |
| General FCC Limit (mw/cm <sup>2</sup> ) | 1.00 |

**Antenna # 311155**



## Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

### INPUT DATA

|                             |         |
|-----------------------------|---------|
| Frequency MHz               | 824     |
| Pout Watts                  | 0.27542 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 9.64    |
| Coax Loss dB                | 4.70    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 4.94   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.8590 |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 0.55   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.1657 |

### REFERENCE DATA

|                                         |        |
|-----------------------------------------|--------|
| Pout dBm                                | 24.40  |
| Antenna Gain (non-log)                  | 9.20   |
| Coax loss (non-log)                     | 0.34   |
| General FCC Limit (mw/cm <sup>2</sup> ) | f/1500 |

**Antenna # 311124-400100**



## Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

### INPUT DATA

|                             |         |
|-----------------------------|---------|
| Frequency MHz               | 869     |
| Pout Watts                  | 0.00282 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 6.10    |
| Coax Loss dB                | 0.00    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 6.10   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.0115 |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 0.58   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.0022 |

### REFERENCE DATA

|                                         |        |
|-----------------------------------------|--------|
| Pout dBm                                | 4.50   |
| Antenna Gain (non-log)                  | 4.07   |
| Coax loss (non-log)                     | 1.00   |
| General FCC Limit (mw/cm <sup>2</sup> ) | f/1500 |

**Antenna # 311155**



## Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

### INPUT DATA

|                             |         |
|-----------------------------|---------|
| Frequency MHz               | 776     |
| Pout Watts                  | 0.26303 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 7.20    |
| Coax Loss dB                | 3.00    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 4.20   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.6918 |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 0.52   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.1335 |

### REFERENCE DATA

|                                         |        |
|-----------------------------------------|--------|
| Pout dBm                                | 24.20  |
| Antenna Gain (non-log)                  | 5.25   |
| Coax loss (non-log)                     | 0.50   |
| General FCC Limit (mw/cm <sup>2</sup> ) | f/1500 |

**Antenna # 314411-40075**



## Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

### INPUT DATA

|                             |         |
|-----------------------------|---------|
| Frequency MHz               | 746     |
| Pout Watts                  | 0.00282 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 4.20    |
| Coax Loss dB                | 0.00    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 4.20   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.0074 |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 0.50   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.0014 |

### REFERENCE DATA

|                                         |        |
|-----------------------------------------|--------|
| Pout dBm                                | 4.50   |
| Antenna Gain (non-log)                  | 2.63   |
| Coax loss (non-log)                     | 1.00   |
| General FCC Limit (mw/cm <sup>2</sup> ) | f/1500 |

**Antenna # 311155**



## Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

### INPUT DATA

|                             |         |
|-----------------------------|---------|
| Frequency MHz               | 704     |
| Pout Watts                  | 0.17783 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 7.30    |
| Coax Loss dB                | 0.00    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 7.30   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.9550 |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 0.47   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.1842 |

### REFERENCE DATA

|                                         |        |
|-----------------------------------------|--------|
| Pout dBm                                | 22.50  |
| Antenna Gain (non-log)                  | 5.37   |
| Coax loss (non-log)                     | 1.00   |
| General FCC Limit (mw/cm <sup>2</sup> ) | f/1500 |

**Antenna # 314411**



## Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

### INPUT DATA

|                             |         |
|-----------------------------|---------|
| Frequency MHz               | 734     |
| Pout Watts                  | 0.00295 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 4.20    |
| Coax Loss dB                | 0.00    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 4.20   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.0078 |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 0.49   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.0015 |

### REFERENCE DATA

|                                         |        |
|-----------------------------------------|--------|
| Pout dBm                                | 4.70   |
| Antenna Gain (non-log)                  | 2.63   |
| Coax loss (non-log)                     | 1.00   |
| General FCC Limit (mw/cm <sup>2</sup> ) | f/1500 |

**Antenna # 311155**



## Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

### INPUT DATA

|                             |         |
|-----------------------------|---------|
| Frequency MHz               | 728     |
| Pout Watts                  | 0.00295 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 10.90   |
| Coax Loss dB                | 6.25    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 4.65   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.0086 |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 0.49   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.0017 |

### REFERENCE DATA

|                                         |        |
|-----------------------------------------|--------|
| Pout dBm                                | 4.70   |
| Antenna Gain (non-log)                  | 12.30  |
| Coax loss (non-log)                     | 0.24   |
| General FCC Limit (mw/cm <sup>2</sup> ) | f/1500 |

**Antenna # 311129-1180**



## Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

### INPUT DATA

|                             |         |
|-----------------------------|---------|
| Frequency MHz               | 1930    |
| Pout Watts                  | 0.01096 |
| Duty Cycle Percent          | 100.0%  |
| Ant. Gain dBi               | 9.77    |
| Splitter and Coax Loss dB   | 3.17    |
| Distance From Antenna In cm | 20.3    |

### RESULTS OF CALCULATIONS

|                                                |        |
|------------------------------------------------|--------|
| Ant. Gain less Coax Loss dBi                   | 6.60   |
| Distance From Antenna In Inches                | 8.00   |
| EIRP (Watts)                                   | 0.050  |
| FCC Power Density Limit (mw/cm <sup>2</sup> )  | 1.00   |
| Calculated Power Density (mw/cm <sup>2</sup> ) | 0.0097 |

### REFERENCE DATA

|                                         |       |
|-----------------------------------------|-------|
| Pout dBm                                | 10.40 |
| Antenna Gain (non-log)                  | 9.48  |
| Coax loss (non-log)                     | 0.48  |
| General FCC Limit (mw/cm <sup>2</sup> ) | 1.00  |

**Antenna # 309904-75F**