



5.10. RF Exposure

5.10.1. Limit For Maximum Permissible Exposure (MPE)

This product can be classified as mobile device, so the 20cm separation distance warning is required. In this section, the power density at 20cm location is calculated to examine if it is lower than the limit.

(A) Limits for Occupational / Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm ²) | Averaging Time E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|--|--|
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842 / f | 4.89 / f | (900 / f)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | | | F/300 | 6 |
| 1500-100,000 | | | 5 | 6 |

(B) Limits for General Population / Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm ²) | Averaging Time E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|---|--|
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | (180/f)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | | | F/1500 | 30 |
| 1500-100,000 | | | 1.0 | 30 |

F = frequency in MHz

*Plane-wave equivalent power density

5.10.2. MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (mW/cm}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (mW)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the gain



of the used antenna, the RF power density can be obtained.

5.10.3. Calculated Result and Limit

- **Normal Mode**
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

Mode 1

| Frequency | Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) |
|-----------|--------------------|------------------------|-------------------------|--------------------------|---|--|
| 5180 MHz | 4.00 | 2.51 | 14.77 | 29.99 | 0.0150 | 1 |
| 5200 MHz | 4.00 | 2.51 | 14.91 | 30.97 | 0.0155 | 1 |
| 5240 MHz | 4.00 | 2.51 | 14.28 | 26.79 | 0.0134 | 1 |
| 5260 MHz | 4.00 | 2.51 | 21.26 | 133.66 | 0.0668 | 1 |
| 5280 MHz | 4.00 | 2.51 | 21.40 | 138.04 | 0.0690 | 1 |
| 5320 MHz | 4.00 | 2.51 | 15.21 | 33.19 | 0.0166 | 1 |
| 5745 MHz | 4.00 | 2.51 | 13.08 | 20.32 | 0.0102 | 1 |
| 5765 MHz | 4.00 | 2.51 | 23.44 | 220.80 | 0.1103 | 1 |
| 5805 MHz | 4.00 | 2.51 | 13.96 | 24.89 | 0.0124 | 1 |



Mode 2

| Frequency | Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) |
|-----------|--------------------|------------------------|-------------------------|--------------------------|---|--|
| 5180 MHz | 6.00 | 3.98 | 14.71 | 29.58 | 0.0234 | 1 |
| 5200 MHz | 6.00 | 3.98 | 14.91 | 30.97 | 0.0245 | 1 |
| 5240 MHz | 6.00 | 3.98 | 14.28 | 26.79 | 0.0212 | 1 |
| 5260 MHz | 6.00 | 3.98 | 21.26 | 133.66 | 0.1059 | 1 |
| 5280 MHz | 6.00 | 3.98 | 21.40 | 138.04 | 0.1094 | 1 |
| 5320 MHz | 6.00 | 3.98 | 15.21 | 33.19 | 0.0263 | 1 |
| 5745 MHz | 6.00 | 3.98 | 13.08 | 20.32 | 0.0161 | 1 |
| 5765 MHz | 6.00 | 3.98 | 23.44 | 220.80 | 0.1749 | 1 |
| 5805 MHz | 6.00 | 3.98 | 13.96 | 24.89 | 0.0197 | 1 |

Mode 3

| Frequency | Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) |
|-----------|--------------------|------------------------|-------------------------|--------------------------|---|--|
| 5180 MHz | 8.00 | 6.31 | 14.71 | 29.58 | 0.0372 | 1 |
| 5200 MHz | 8.00 | 6.31 | 14.91 | 30.97 | 0.0389 | 1 |
| 5240 MHz | 8.00 | 6.31 | 14.28 | 26.79 | 0.0336 | 1 |
| 5260 MHz | 8.00 | 6.31 | 21.26 | 133.66 | 0.1679 | 1 |
| 5280 MHz | 8.00 | 6.31 | 21.40 | 138.04 | 0.1734 | 1 |
| 5320 MHz | 8.00 | 6.31 | 15.21 | 33.19 | 0.0417 | 1 |
| 5745 MHz | 8.00 | 6.31 | 13.08 | 20.32 | 0.0255 | 1 |
| 5765 MHz | 8.00 | 6.31 | 23.44 | 220.80 | 0.2773 | 1 |
| 5805 MHz | 8.00 | 6.31 | 13.96 | 24.89 | 0.0313 | 1 |



Mode 4

| Frequency | Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) |
|-----------|--------------------|------------------------|-------------------------|--------------------------|---|--|
| 5180 MHz | 2.50 | 1.78 | 16.57 | 46.77 | 0.0165 | 1 |
| 5200 MHz | 2.50 | 1.78 | 16.52 | 44.87 | 0.0158 | 1 |
| 5240 MHz | 2.50 | 1.78 | 16.59 | 45.60 | 0.0161 | 1 |
| 5260 MHz | 2.50 | 1.78 | 19.97 | 99.31 | 0.0351 | 1 |
| 5280 MHz | 2.50 | 1.78 | 20.18 | 104.23 | 0.0368 | 1 |
| 5320 MHz | 2.50 | 1.78 | 20.99 | 125.60 | 0.0444 | 1 |
| 5745 MHz | 2.50 | 1.78 | 20.61 | 115.08 | 0.0407 | 1 |
| 5765 MHz | 2.50 | 1.78 | 20.59 | 114.55 | 0.0405 | 1 |
| 5805 MHz | 2.50 | 1.78 | 20.16 | 114.54 | 0.0405 | 1 |



- **Turbo Mode**
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

Mode 1

| Frequency | Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) |
|-----------|--------------------|------------------------|-------------------------|--------------------------|---|--|
| 5210 MHz | 4.00 | 2.51 | 14.31 | 26.98 | 0.0135 | 1 |
| 5250 MHz | 4.00 | 2.51 | 14.30 | 26.92 | 0.0134 | 1 |
| 5290 MHz | 4.00 | 2.51 | 18.19 | 65.92 | 0.0329 | 1 |
| 5760 MHz | 4.00 | 2.51 | 17.30 | 53.70 | 0.0268 | 1 |
| 5800 MHz | 4.00 | 2.51 | 11.37 | 13.71 | 0.0068 | 1 |

Mode 2

| Frequency | Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) |
|-----------|--------------------|------------------------|-------------------------|--------------------------|---|--|
| 5210 MHz | 6.00 | 3.98 | 14.31 | 26.98 | 0.0214 | 1 |
| 5250 MHz | 6.00 | 3.98 | 14.30 | 26.92 | 0.0213 | 1 |
| 5290 MHz | 6.00 | 3.98 | 18.19 | 65.92 | 0.0522 | 1 |
| 5760 MHz | 6.00 | 3.98 | 17.30 | 53.70 | 0.0425 | 1 |
| 5800 MHz | 6.00 | 3.98 | 11.37 | 13.71 | 0.0109 | 1 |



Mode 3

| Frequency | Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) |
|-----------|--------------------|------------------------|-------------------------|--------------------------|---|--|
| 5210 MHz | 8.00 | 6.31 | 14.31 | 26.98 | 0.0339 | 1 |
| 5250 MHz | 8.00 | 6.31 | 14.30 | 26.92 | 0.0338 | 1 |
| 5290 MHz | 8.00 | 6.31 | 18.19 | 65.92 | 0.0828 | 1 |
| 5760 MHz | 8.00 | 6.31 | 17.30 | 53.70 | 0.0674 | 1 |
| 5800 MHz | 8.00 | 6.31 | 11.37 | 13.71 | 0.0172 | 1 |

Mode 4

| Frequency | Antenna Gain (dBi) | Antenna Gain (numeric) | Peak Output Power (dBm) | Peak Output Power (mW) | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) |
|-----------|--------------------|------------------------|-------------------------|--------------------------|---|--|
| 5210 MHz | 2.50 | 1.78 | 16.57 | 45.39 | 0.0160 | 1 |
| 5250 MHz | 2.50 | 1.78 | 16.50 | 44.67 | 0.0158 | 1 |
| 5290 MHz | 2.50 | 1.78 | 20.72 | 118.03 | 0.0417 | 1 |
| 5760 MHz | 2.50 | 1.78 | 20.73 | 118.30 | 0.0418 | 1 |
| 5800 MHz | 2.50 | 1.78 | 16.30 | 42.66 | 0.0151 | 1 |