

# CALCULATION OF ELEVATION ANGLES ABOVE 30 DEGREES FOR RADWIN 2000 E

The list of antennas approved with **RADWIN 2000 E** are provided in the table below.

All antennas are crosspolarized 2x2 MIMO.

The **RADWIN 2000 E INT EI00** is the integrated antenna form factor,

The **RADWIN 2000 E CON EC00** is the connectorized form factor.

The **RADWIN 2000 E** form factors are software configurable to Standard Power Access Point or Fixed Client

## **Antennas List**

| Type     | Manufacturer | Model        | Family | Gain (dBi) | BF Gain | Dir BW | X-Pol | Frequency Band (MHz) |
|----------|--------------|--------------|--------|------------|---------|--------|-------|----------------------|
| Integral | RADWIN       | AX6400       | Panel  | 24.0       | -       | 13.0   | Yes   | 5925-6425            |
| External | RADWIN       | RW-9622-5001 | Panel  | 27.0       | -       | 5.0    | Yes   | 5925-6425            |
| External | RADWIN       | RW-9628-5872 | Dish   | 28.0       | -       | 6.0    | Yes   | 5925-6425            |
| External | RADWIN       | RW-9632-5872 | Dish   | 32.0       | -       | 4.0    | Yes   | 5925-6425            |
| External | RADWIN       | RW-9732-4965 | Dish   | 25.0       | -       | 7.0    | Yes   | 5925-6425            |

The next pages consist the tables with the calculation of the elevation angles above 30 degrees for all the above antennas according to KDB Publication 987594 D02

## **Method:**

1. Mounting elevation angle defined as 0° relative to horizon.
2. The EIRP was calculated for each transmission chain by combining the conducted power and the highest radiation gain between 30° and 90° for each frequency and channel bandwidth.
3. The EIRP from both chains was combined to calculate the overall EIRP and compared to the 125 mW (21 dBm) limit.

**Antenna AX6400**

| CBW (MHz) | Freq (MHz) | Port a (H)         |                           |            | Port b (V)         |                           |            | Total EIRP (dBm) | EIRP Limit [Θ≥30°] (dBm) | Result |
|-----------|------------|--------------------|---------------------------|------------|--------------------|---------------------------|------------|------------------|--------------------------|--------|
|           |            | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) |                  |                          |        |
| 20.0      | 5945.0     | 8.02               | 2.40                      | 10.42      | 8.61               | 5.10                      | 13.71      | 15.38            | 21.00                    | PASS   |
| 20.0      | 6175.0     | 8.45               | 2.83                      | 11.28      | 8.62               | 4.10                      | 12.72      | 15.07            | 21.00                    | PASS   |
| 20.0      | 6415.0     | 8.27               | 4.41                      | 12.68      | 8.50               | 4.15                      | 12.65      | 15.68            | 21.00                    | PASS   |
| 40.0      | 5960.0     | 8.41               | 2.40                      | 10.81      | 8.51               | 5.10                      | 13.61      | 15.44            | 21.00                    | PASS   |
| 40.0      | 6175.0     | 8.38               | 2.83                      | 11.21      | 8.47               | 4.10                      | 12.57      | 14.95            | 21.00                    | PASS   |
| 40.0      | 6405.0     | 8.53               | 4.41                      | 12.94      | 8.68               | 4.15                      | 12.83      | 15.90            | 21.00                    | PASS   |
| 80.0      | 5985.0     | 8.35               | 3.37                      | 11.72      | 8.79               | 5.95                      | 14.74      | 16.50            | 21.00                    | PASS   |
| 80.0      | 6175.0     | 8.31               | 2.83                      | 11.14      | 8.51               | 4.10                      | 12.61      | 14.95            | 21.00                    | PASS   |
| 80.0      | 6385.0     | 8.43               | 4.41                      | 12.84      | 8.50               | 4.15                      | 12.65      | 15.76            | 21.00                    | PASS   |
| 160.0     | 6025.0     | 8.19               | 3.42                      | 11.61      | 8.52               | 5.28                      | 13.80      | 15.85            | 21.00                    | PASS   |
| 160.0     | 6175.0     | 8.20               | 2.83                      | 11.03      | 8.29               | 4.10                      | 12.39      | 14.77            | 21.00                    | PASS   |
| 160.0     | 6345.0     | 8.20               | 3.26                      | 11.46      | 8.38               | 4.30                      | 12.68      | 15.12            | 21.00                    | PASS   |

**Antenna RW-9622-5001**

| CBW (MHz) | Freq (MHz) | Port a (H)         |                           |            | Port b (V)         |                           |            | Total EIRP (dBm) | EIRP Limit [Θ≥30°] (dBm) | Result |
|-----------|------------|--------------------|---------------------------|------------|--------------------|---------------------------|------------|------------------|--------------------------|--------|
|           |            | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) |                  |                          |        |
| 20.0      | 5945.0     | 5.02               | 5.80                      | 10.82      | 5.61               | 7.36                      | 12.97      | 15.04            | 21.00                    | PASS   |
| 20.0      | 6175.0     | 5.45               | 2.53                      | 7.98       | 5.62               | 6.82                      | 12.44      | 13.77            | 21.00                    | PASS   |
| 20.0      | 6415.0     | 5.27               | 6.84                      | 12.11      | 5.50               | 2.77                      | 8.27       | 13.61            | 21.00                    | PASS   |
| 40.0      | 5960.0     | 5.41               | 5.80                      | 11.21      | 5.51               | 7.36                      | 12.87      | 15.13            | 21.00                    | PASS   |
| 40.0      | 6175.0     | 5.38               | 2.53                      | 7.91       | 5.47               | 6.82                      | 12.29      | 13.64            | 21.00                    | PASS   |
| 40.0      | 6405.0     | 5.53               | 6.84                      | 12.37      | 5.68               | 2.77                      | 8.45       | 13.85            | 21.00                    | PASS   |
| 80.0      | 5985.0     | 5.35               | 5.80                      | 11.15      | 5.79               | 7.36                      | 13.15      | 15.27            | 21.00                    | PASS   |
| 80.0      | 6175.0     | 5.31               | 2.53                      | 7.84       | 5.51               | 6.82                      | 12.33      | 13.65            | 21.00                    | PASS   |
| 80.0      | 6385.0     | 5.43               | 6.84                      | 12.27      | 5.50               | 2.77                      | 8.27       | 13.73            | 21.00                    | PASS   |
| 160.0     | 6025.0     | 5.19               | 5.80                      | 10.99      | 5.52               | 7.36                      | 12.88      | 15.05            | 21.00                    | PASS   |
| 160.0     | 6175.0     | 5.20               | 2.53                      | 7.73       | 5.29               | 6.82                      | 12.11      | 13.46            | 21.00                    | PASS   |
| 160.0     | 6345.0     | 5.20               | 4.59                      | 9.79       | 5.38               | 4.57                      | 9.95       | 12.88            | 21.00                    | PASS   |

**Antenna RW-9628-5872**

| CBW (MHz) | Freq (MHz) | Port a (H)         |                           |            | Port b (V)         |                           |            | Total EIRP (dBm) | EIRP Limit [Θ≥30°] (dBm) | Result |
|-----------|------------|--------------------|---------------------------|------------|--------------------|---------------------------|------------|------------------|--------------------------|--------|
|           |            | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) |                  |                          |        |
| 20.0      | 5945.0     | 4.02               | 4.39                      | 8.41       | 4.61               | 4.20                      | 8.81       | 11.62            | 21.00                    | PASS   |
| 20.0      | 6175.0     | 4.45               | 4.39                      | 8.84       | 4.62               | 4.20                      | 8.82       | 11.84            | 21.00                    | PASS   |
| 20.0      | 6415.0     | 4.27               | -0.47                     | 3.80       | 4.50               | -0.94                     | 3.56       | 6.69             | 21.00                    | PASS   |
| 40.0      | 5960.0     | 4.41               | 4.39                      | 8.80       | 4.51               | 4.20                      | 8.71       | 11.77            | 21.00                    | PASS   |
| 40.0      | 6175.0     | 4.38               | 4.39                      | 8.77       | 4.47               | 4.20                      | 8.67       | 11.73            | 21.00                    | PASS   |
| 40.0      | 6405.0     | 4.53               | -0.47                     | 4.06       | 4.68               | -0.94                     | 3.74       | 6.91             | 21.00                    | PASS   |
| 80.0      | 5985.0     | 4.35               | 4.39                      | 8.74       | 4.79               | 4.20                      | 8.99       | 11.88            | 21.00                    | PASS   |
| 80.0      | 6175.0     | 4.31               | 4.39                      | 8.70       | 4.51               | 4.20                      | 8.71       | 11.72            | 21.00                    | PASS   |
| 80.0      | 6385.0     | 4.43               | -0.47                     | 3.96       | 4.50               | -0.94                     | 3.56       | 6.77             | 21.00                    | PASS   |
| 160.0     | 6025.0     | 4.19               | 4.39                      | 8.58       | 4.52               | 4.20                      | 8.72       | 11.66            | 21.00                    | PASS   |
| 160.0     | 6175.0     | 4.20               | 4.39                      | 8.59       | 4.29               | 4.20                      | 8.49       | 11.55            | 21.00                    | PASS   |
| 160.0     | 6345.0     | 4.20               | -0.47                     | 3.73       | 4.38               | -0.94                     | 3.44       | 6.60             | 21.00                    | PASS   |

**Antenna RW-9632-5872**

| CBW (MHz) | Freq (MHz) | Port a (H)         |                           |            | Port b (V)         |                           |            | Total EIRP (dBm) | EIRP Limit [Θ≥30°] (dBm) | Result |
|-----------|------------|--------------------|---------------------------|------------|--------------------|---------------------------|------------|------------------|--------------------------|--------|
|           |            | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) |                  |                          |        |
| 20.0      | 5945.0     | 0.02               | 0.13                      | 0.15       | 0.61               | -0.62                     | -0.01      | 3.08             | 21.00                    | PASS   |
| 20.0      | 6175.0     | 0.45               | 0.21                      | 0.66       | 0.62               | 0.09                      | 0.71       | 3.70             | 21.00                    | PASS   |
| 20.0      | 6415.0     | 0.27               | -0.28                     | -0.01      | 0.50               | 1.22                      | 1.72       | 3.95             | 21.00                    | PASS   |
| 40.0      | 5960.0     | 0.41               | 0.13                      | 0.54       | 0.51               | -0.62                     | -0.11      | 3.24             | 21.00                    | PASS   |
| 40.0      | 6175.0     | 0.38               | 0.21                      | 0.59       | 0.47               | 0.09                      | 0.56       | 3.59             | 21.00                    | PASS   |
| 40.0      | 6405.0     | 0.53               | -0.28                     | 0.25       | 0.68               | 1.22                      | 1.90       | 4.16             | 21.00                    | PASS   |
| 80.0      | 5985.0     | 0.35               | 1.36                      | 1.71       | 0.79               | 1.81                      | 2.60       | 5.19             | 21.00                    | PASS   |
| 80.0      | 6175.0     | 0.31               | 0.21                      | 0.52       | 0.51               | 0.09                      | 0.60       | 3.57             | 21.00                    | PASS   |
| 80.0      | 6385.0     | 0.43               | -0.28                     | 0.15       | 0.50               | 1.22                      | 1.72       | 4.02             | 21.00                    | PASS   |
| 160.0     | 6025.0     | 0.19               | 1.36                      | 1.55       | 0.52               | 1.81                      | 2.33       | 4.97             | 21.00                    | PASS   |
| 160.0     | 6175.0     | 0.20               | 0.21                      | 0.41       | 0.29               | 0.09                      | 0.38       | 3.41             | 21.00                    | PASS   |
| 160.0     | 6345.0     | 0.20               | 0.90                      | 1.10       | 0.38               | 1.80                      | 2.18       | 4.68             | 21.00                    | PASS   |

**Antenna RW-9732-4965**

| CBW (MHz) | Freq (MHz) | Port a (H)         |                           |            | Port b (V)         |                           |            | Total EIRP (dBm) | EIRP Limit [Θ≥30°] (dBm) | Result |
|-----------|------------|--------------------|---------------------------|------------|--------------------|---------------------------|------------|------------------|--------------------------|--------|
|           |            | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) | Output Power (dBm) | Max Ant. G. [Θ≥30°] (dBi) | EIRP (dBm) |                  |                          |        |
| 20.0      | 5945.0     | 7.02               | 2.49                      | 9.51       | 7.61               | 2.94                      | 10.55      | 13.07            | 21.00                    | PASS   |
| 20.0      | 6175.0     | 7.45               | 1.75                      | 9.20       | 7.62               | 1.20                      | 8.82       | 12.02            | 21.00                    | PASS   |
| 20.0      | 6415.0     | 7.27               | 2.28                      | 9.55       | 7.50               | 0.81                      | 8.31       | 11.98            | 21.00                    | PASS   |
| 40.0      | 5960.0     | 7.41               | 2.49                      | 9.90       | 7.51               | 2.94                      | 10.45      | 13.19            | 21.00                    | PASS   |
| 40.0      | 6175.0     | 7.38               | 1.75                      | 9.13       | 7.47               | 1.20                      | 8.67       | 11.92            | 21.00                    | PASS   |
| 40.0      | 6405.0     | 7.53               | 2.28                      | 9.81       | 7.68               | 0.81                      | 8.49       | 12.21            | 21.00                    | PASS   |
| 80.0      | 5985.0     | 7.35               | 1.75                      | 9.10       | 7.79               | 1.20                      | 8.99       | 12.06            | 21.00                    | PASS   |
| 80.0      | 6175.0     | 7.31               | 1.75                      | 9.06       | 7.51               | 1.20                      | 8.71       | 11.90            | 21.00                    | PASS   |
| 80.0      | 6385.0     | 7.43               | 2.28                      | 9.71       | 7.50               | 0.81                      | 8.31       | 12.08            | 21.00                    | PASS   |
| 160.0     | 6025.0     | 7.19               | 1.75                      | 8.94       | 7.52               | 1.20                      | 8.72       | 11.84            | 21.00                    | PASS   |
| 160.0     | 6175.0     | 7.20               | 1.75                      | 8.95       | 7.29               | 1.20                      | 8.49       | 11.74            | 21.00                    | PASS   |
| 160.0     | 6345.0     | 7.20               | 2.28                      | 9.48       | 7.38               | 0.81                      | 8.19       | 11.89            | 21.00                    | PASS   |