

## Antennas Specifications PQG-XREADER

The co-location MPE should be done for the highest permitted antenna gains for worst case condition.

In our actual implementation we are using these WiFi and RFID antennas with gains equal or less than the maximum permitted. Below you can see one example for the WiFi antenna and three examples for the RFID antennas.

## Power density calculation for the WiFi Module

### 5.1. Power Density Calculation

| Band        | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Maximum EIRP (W) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|-------------|-----------------|--------------------|---------------------|--------------------|------------------|-------------------|---------------------------------------------|-----------------------------|
| Bluetooth   | 2402.0          | 3.2                | 12.5                | 15.700             | 0.037            | 37.154            | 0.007                                       | 1.000                       |
| 2.4GHz WLAN | 2412.0          | 3.2                | 17.5                | 20.700             | 0.117            | 117.490           | 0.023                                       | 1.000                       |
| 5GHz WLAN   | 5180.0          | 4.5                | 19.5                | 24.000             | 0.251            | 251.189           | 0.050                                       | 1.000                       |

**Note:** For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band

The actual antenna used with the WiFi module has a slightly lower gain in all bands, which meets our requirements.



**FlexPIFA**  
3-dBi Antenna with MHF1/U.FL Cable  
2.4 GHz/5.5 GHz



### FEATURES AND BENEFITS

- Dual band antenna – 2.4 GHz and 5.5 GHz
- Quick and easy installation
- Adhesive holds to surface during humidity exposure and hot/cold cycles
- RoHS-compliant
- Can be installed in the following ways:
  - On different non-conductive surfaces and thicknesses
  - Near metals or the human body
  - On flat or curved surfaces

| SPECIFICATIONS     |                                       |             |
|--------------------|---------------------------------------|-------------|
| Frequency (MHz)    | 2400 - 2480                           | 4900 - 5900 |
| Peak Gain (dBi)    | +2.5                                  | +3.0        |
| Average Gain (dBi) | > -2.5                                | > -3.4      |
| VSWR (MHz)         | <2.5:1                                | <3.0:1      |
| Impedance (Ω)      | 50                                    |             |
| Antenna Type       | Flexible Planar Inverted F (FlexPIFA) |             |
| Polarization       | Linear                                |             |

## Power density calculation for the RFID Reader Module

The co-location MPE should be done for the highest permitted antenna gains for worst case condition.

In our actual implementation we are using these RFID antennas with gains equal or less than the maximum permitted (other antenna(s) of a similar type and with equal or lower gain might be used later):

- A. The MTI Wireless MT-242043/TRH/A/K 9.5dBic gain, existing C2PC that is OK
- B. The TE (Laird) PAL86518H & PAR86518H 8.5dBic gain, 1dB axial ratio => 6dBi gain => OK
- C. The Times-7 A5020 5dBic typical gain, 2dB axial ratio => 2.9dBi typical gain <6dBi => OK

### A) Gain Specification for the MTI Wireless MT-242043/TRH/A/K antennas.



[Homepage](#) > [Products](#) > [RFID Antennas](#) > [865-956MHz \(WB UHF\) Reader Antennas](#) > [Circular Antennas](#)

## CIRCULAR ANTENNAS



MT-242043/TRH/A/K  
865 - 956 MHz, 8.5 DBIC RHCP READER ANTENNA



| ELECTRICAL              |                                                                                                                                                |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| REGULATORY COMPLIANCE   | RoHS, CE 0682                                                                                                                                  |
| FREQUENCY RANGE         | 865 - 956 MHz                                                                                                                                  |
| GAIN                    | 7.5 dBic (min) , 8.5 dBic (max) @ 865-870 MHz<br>8.5 dBic (min) , 9.5 dBic (max) @ 902-928 MHz<br>7.5dBic (min) , 9.0 dBic (max) @ 950-956 MHz |
| VSWR                    | 1.2:1 (typ) 1.35:1(max)                                                                                                                        |
| POLARIZATION            | RHCP                                                                                                                                           |
| 3dB ELEVATION BEAMWIDTH | 65° (typ)                                                                                                                                      |
| 3dB AZIMUTH BEAMWIDTH   | 65° (typ)                                                                                                                                      |
| F/B RATIO               | -18 dB (max)                                                                                                                                   |
| POWER                   | 6W (max)                                                                                                                                       |
| INPUT IMPEDANCE         | 50 (ohm)                                                                                                                                       |

As per the FCC IC Test Report No.: FCC\_IC\_RF\_SL20061501-JAD-006, this antenna passes the emission limits when paired with the RFID module we intend to use (FCC ID: QV5MERCURY6E-M IC: 5407A-MERCURY6EM).

### B) Gain Specification for the TE (Laird) PAL86518H & PAR86518H antennas.

Note: from the chart we see that the antenna gain is specified 8.5dBiC, which means 5.5dBi

| SPECIFICATIONS           |                                           |
|--------------------------|-------------------------------------------|
| Antenna Part Number      | PAL86518H/PAR86518H                       |
| Frequency Range          | 865 - 956 MHz                             |
| Gain                     | 8.5 dBiC                                  |
| Maxium VSWR              | 1.5:1                                     |
| 3 dB Beamwidth - Azimuth | 65°                                       |
| Front to Back Ratio      | 20dB                                      |
| Polarization             | Circular Right-hand or circular Left-hand |
| Maxium Input Power       | 3 Watts                                   |
| Input Impedence          | 50 Ohms                                   |
| Axial Ratio              | 1dB                                       |

DATA AND DEVICES / PAL86518H-FNF/PAR86518H-FNF

### C) Gain Specification for the Times-7 A5020 antennas.

Note: from the chart we see that the antenna gain is specified 5dBiC, which means 2dBi

### Electrical Specifications

|                         |                                        |
|-------------------------|----------------------------------------|
| Frequency Range         | 865-868 MHz (ETSI) / 902-928 MHz (FCC) |
| Polarization            | RHCP (Right Hand Circular Polarized)   |
| Far-field Gain          | 5 dBiC typical                         |
| Far-field 3dB beamwidth | 105° in both planes typical            |
| VSWR                    | 1.4 typical                            |
| Front to back           | -10 dB typical                         |
| Axial Ratio             | 2 dB typical                           |
| Nominal Impedance       | 50 Ω                                   |
| Anti-static Protection  | Yes, DC Grounded                       |
| Antenna Detection       | 10K Ω resistance                       |
| Maximum Input Power     | 3 W                                    |