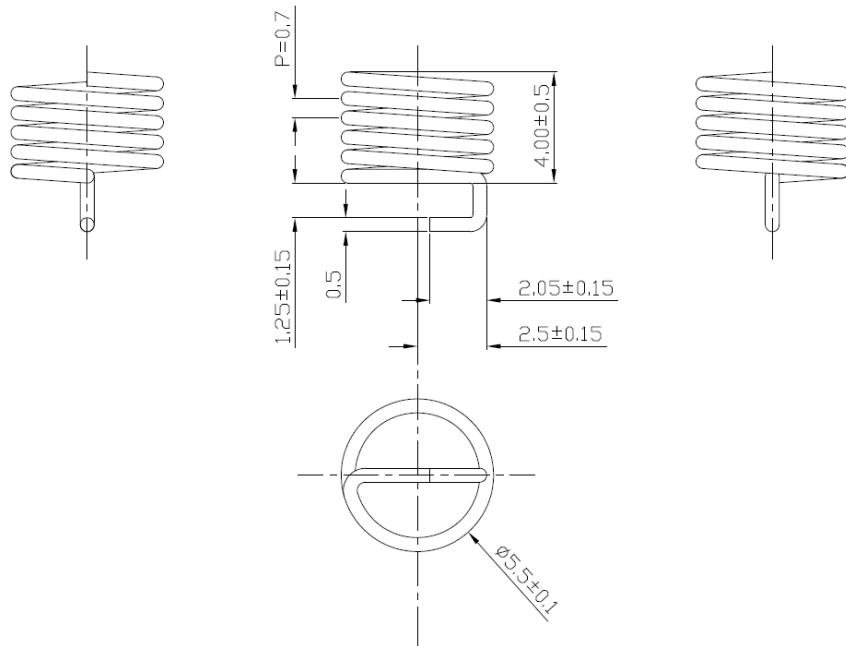


## 4mm 915MHz Helical Spring antenna

This is a copper spring antenna designed for a wireless communication system for frequency 915MHz. It has good VSWR, stable performance and good anti vibration.

### Specifications:

- Frequency range:  $915\text{MHz} \pm 20\text{MHz}$
- VSWR:  $\leq 1.5$
- Input impedance: 50 ohms.
- Maximum power: 5W
- Gain: 2.15dBi
- Polarization: Vertical polarization
- Height: 4mm
- Interface: Welded directly.
- Color: Silver.
- Dimensions:
  - Spring Diameter: 0.5mm
  - Pitch: 0.7mm.
  - Number of Turns:  $5T \pm 0.125T$



## 3D View

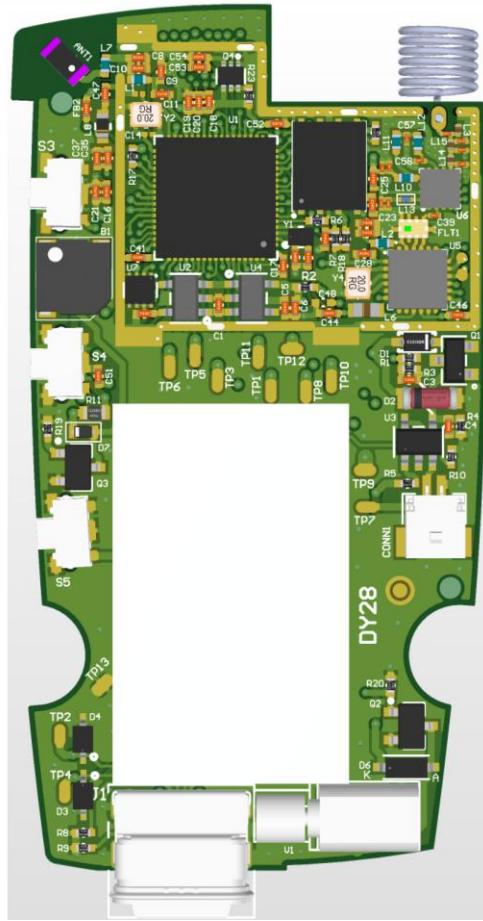
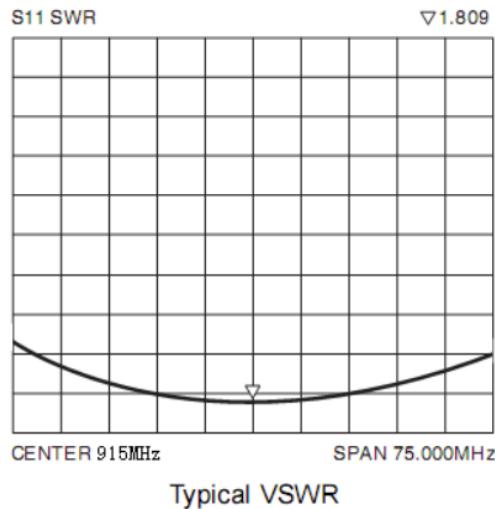


Figure 1 PCB 3D View

## VSWR

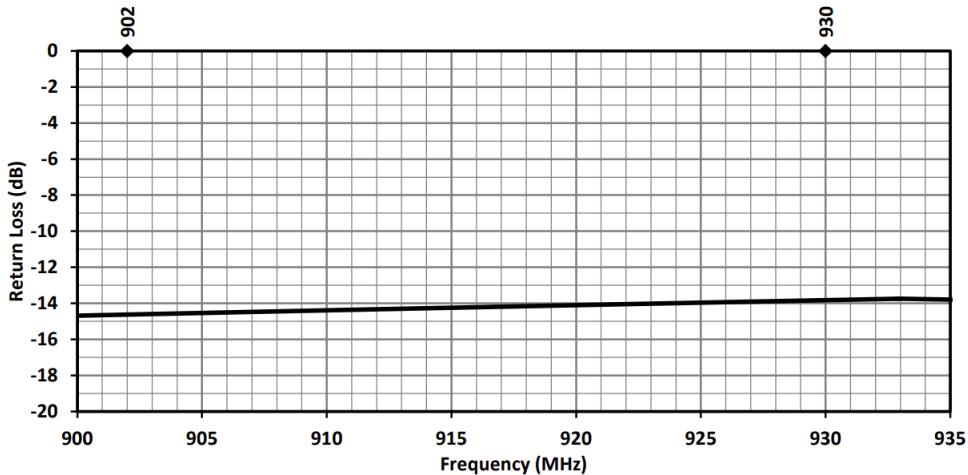
Voltage Standing Wave Ratio (VSWR) is a unitless ratio that describes the power reflected from the antenna back to the radio. A lower VSWR value indicates better antenna performance at a given frequency. VSWR is easily derived from Return Loss.

$$\text{VSWR} = \frac{10^{\left[\frac{\text{Return Loss}}{20}\right]} + 1}{10^{\left[\frac{\text{Return Loss}}{20}\right]} - 1}$$



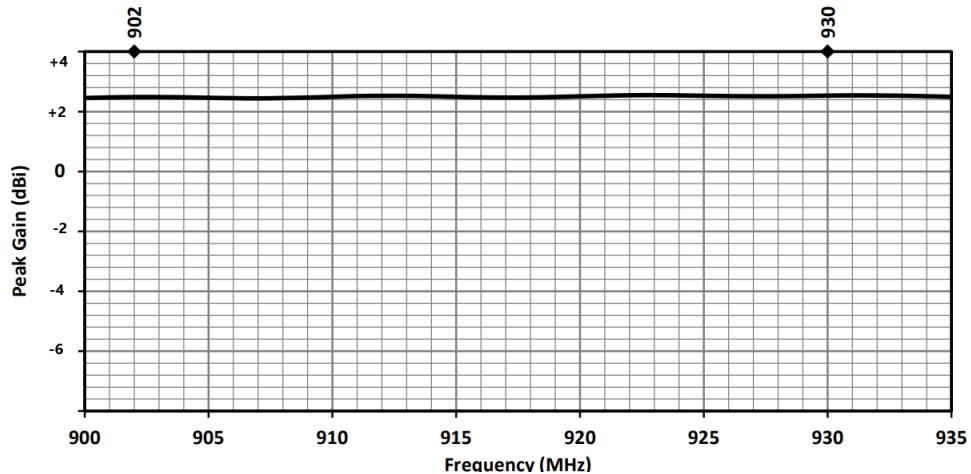
## Return Loss

Return loss represents the loss in power at the antenna due to reflected signals. Like VSWR, a lower return loss value indicates better antenna performance at a given frequency.



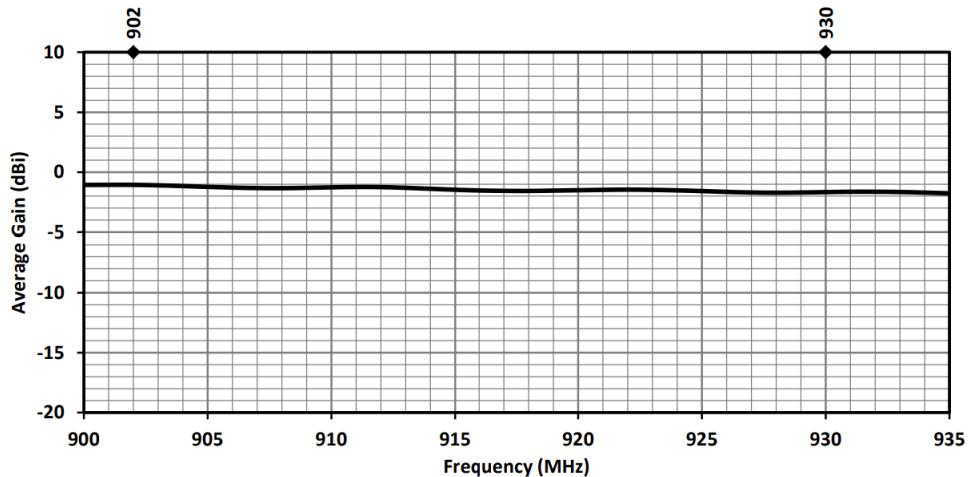
## Peak Gain

The peak gain across the antenna bandwidth is shown in Figure below. Peak gain represents the maximum antenna input power concentration across 3-dimensional space, and therefore peak performance at a given frequency, but does not consider any directionality in the gain pattern.



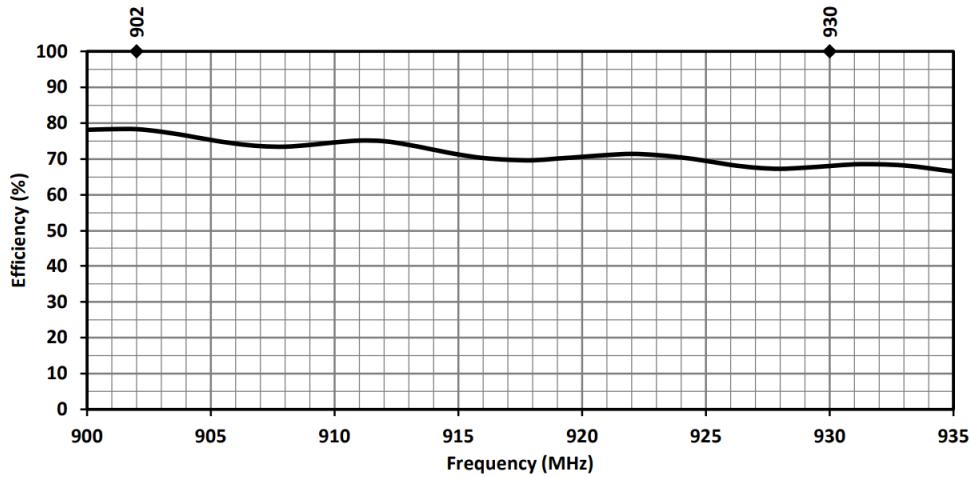
### Average Gain

Average gain, is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.



### Radiation Efficiency

Radiation efficiency shows the ratio of power delivered to the antenna relative to the power radiated at the antenna, expressed as a percentage, where a higher percentage indicates better performance at a given frequency.



### Radiation Patterns 902MHz to 930MHz (915MHz)

Radiation patterns provide information about the directionality and 3-dimensional gain performance of the antenna by plotting gain at specific frequencies in three orthogonal planes. Antenna radiation patterns for an edge straight orientation are shown in Figure below using polar plots covering 360 degrees.

