

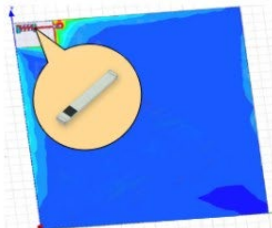


The demand for wireless connectivity has covered basically all applications and fields; therefore, the technology industry devotes a lot of effort into improving the efficiency and functionality of wireless communication. Good antenna design is crucial to succeed in the vast market of wireless devices. Portable devices are striving for smaller, lighter and thinner antennas and for faster delivery to the market. Chips antennas are a popular choice to achieve all the features mentioned above.

Unictron has the most comprehensive line of chip antennas; thus, we are able to provide a solution for any design of customer's device. Besides monopole chip antennas, Unictron also offers patented solutions with superior performance like TELA and Pillar chip antenna series.

Introduction of Unictron's chip antennas and instructions for use

1. Overview of the 3 kinds of chip antennas



Monopole Antenna

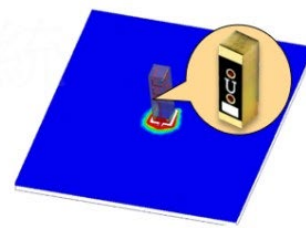
- 1) Antenna length is of $\frac{1}{4}$ wavelength.
- 2) Dominating electric field.
- 3) Horizontal polarization.
- 4) The radiated current is distributed on the antenna and the metal ground.
- 5) No metal shielding around the antenna.
- 6) Antenna placed at the corner of the board.



Unictron's patented product

TELA Antenna

- 1) Loop antenna design, dominating magnetic field.
- 2) Metal around the antenna is used as a common radiator (the metal on the left and right side shall be about $\frac{1}{4}$ of the wavelength)
- 3) Horizontal polarization.
- 4) no metal shielding under/above the antenna.
- 5) Installed away from the corner, ideally center of the PCB edge.



Unictron's patented product

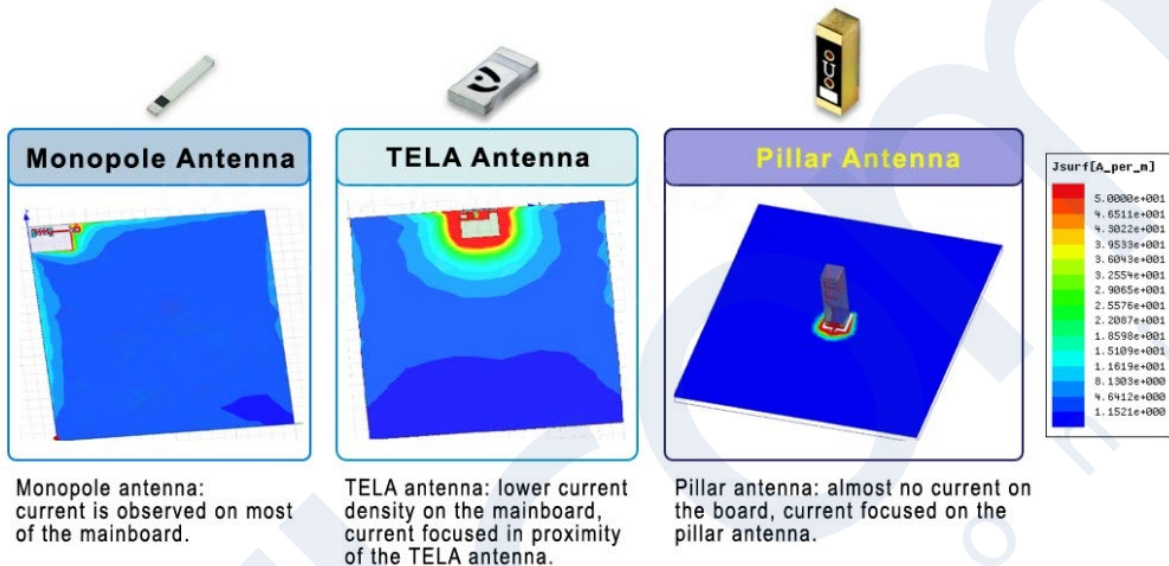
Pillar Antenna

- 1) Design with the direct radiated current perpendicular to the ground plane.
- 2) Dominating electric field.
- 3) Pillar height is taller than the other chip antennas.
- 4) Provides both horizontal and vertical polarizations.
- 5) Optional no-ground-clearance implementation.
- 6) Can be placed anywhere on the board.

2.The capability of 3 kinds of chip antennas to resist noise

Q: How to reduce the impact of noise on the embedded antennas?

When the radiation current is concentrated around the antenna or even only on the antenna body, the isolation between the antenna and the other components can be effectively improved. When the conductive noise is generated on the circuit board, the impact on the performance of antenna can be reduced.



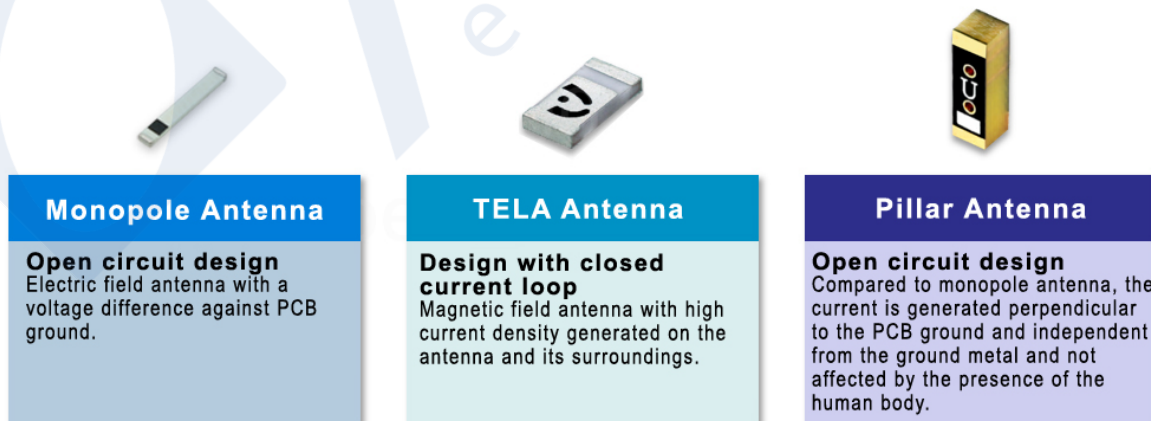
3.The capability of 3 kinds of chip antennas to resist human interference

Q: How to reduce the influence of the human body on the built-in antenna?


The human body is basically a dielectric body (dielectric constant is about 37), which has a large impact on the electric field and a small impact on the magnetic field.

Therefore, when designing the antenna, the reactance of the near field shall be redesigned to have a dominance in a magnetic field instead.

Reduce the area where the radiated electric field overlaps with the human body, and/or use metal objects to have a shield between the human body and the antenna.



4. Comparison table of the 3 kinds of chip antennas



Unictron's patent Unictron's patent

Item \ Antenna type	Monopole chip antenna	TELA chip antenna	Pillar chip antenna
Antenna position	Corner	Center of the PCB edge	Anywhere
Antenna height	Low	Low	Column
Clearance requirements	Slightly larger	Small	Option for no clearance ✓
Anti-noise capability	Weak	Good	Excellent ✓
Radiation pattern control	Not easy	Easy	Easy
Interference by human body	Significant	Resistant	Excellent resistant ✓

The table above shows a summary of the key technical principles and design methods of the 3 chip antennas offered by Unictron. Different product designs, device environments or applications have different requirements on the antenna. Unictron, with decades of the experience, can provide the optimal solution to each specific case.

The followings are different areas of application with related recommended chip antennas:

- Bluetooth headset/earbuds application: for this wearable technology, Unictron recommends TELA chip antennas
- Wi-Fi routers and set top boxes: these devices often use external dipole (rubber ducky) antennas or embedded PCB antennas. They occupy relatively large space and require manual installation within the device. Unictron's pillar antennas provide comparable performance (even better throughput), SMT installation with the considerably smaller form factor, allowing slimmer and stylish design.
- Miniature trackers: portable trackers often combine with satellite positioning (even high precision positioning requirements), Bluetooth transmission for shorter distances and low-power wide-area transmission for smaller data out. Having many frequency bands on one device is a challenging task, but multiple Unictron's chip antennas have been successfully implemented on miniature boards such as, pet trackers, livestock trackers, bicycle trackers, asset trackers).
- Bicycle navigation: this miniaturized computer obviously requires miniature antenna. Unictron's chip antenna with just 3.2×1.6×0.5mm size can provide even multi band GNSS positioning functionality.

As there is no “one antenna fit them all,” there are applications and user cases where other types of antennas are more suitable. Fortunately, Unictron offers complete antenna product lines and design support, including PCB/FPC antennas, LDS antennas, metal stamping, rubber duck and other external antennas. Do not hesitate to get a free consultation from Unictron’s team for the most suitable antenna for your device.



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