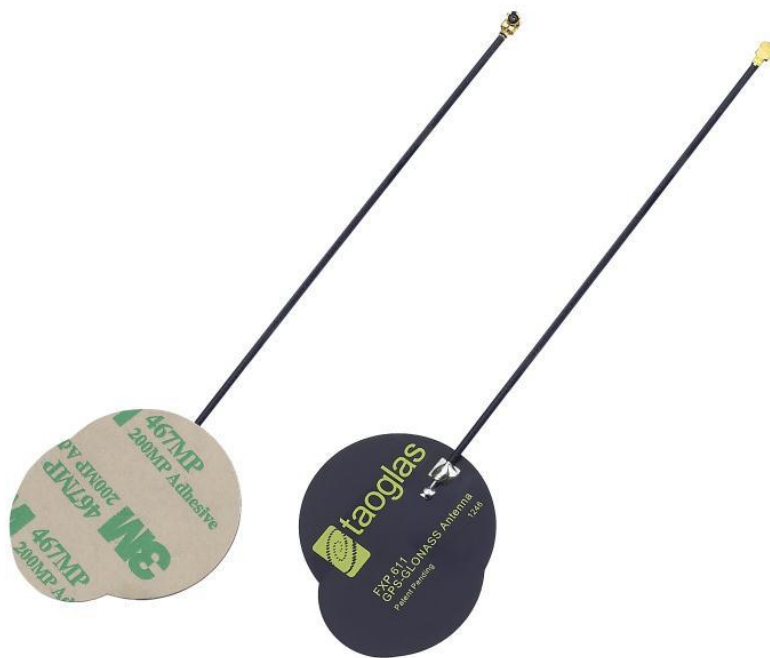


FXP611 Flexible PCB Antenna with Cable Application Note



1. BASICS

A Flexible PCB antenna with cable is a very flexible, low profile, highly reliable, and economical solution widely used in the wireless industry.

Usually consisting of polyimide flexible PCB (polyimide), a trace is printed on the substrate to get the desired antenna topology. Various antenna types such as monopoles, dipoles, and printed F antennas can be made.

This design application note is intended to help the antenna integrator understand the relevant parameters affecting the antenna performance. Taoglas recommends that the integrator strictly follow the guidelines in this application note. Upon your device prototype completion, Taoglas can provide further optimization by custom tuning and testing service of the antenna in your device. (see Section 15 of this document for further info on Tuning)

2. APPLICATIONS

A Flexible PCB antenna with cable is suitable for mobile applications where internal antennas are required, but not much space or volume is available. It is ideally affixed to the plastic housing of a device directly by double-sided adhesive. Taoglas Flexible PCB antennas come in single-band or multi-band solutions starting from 450MHz up to 6 GHz.

3. SIZE

The larger the antenna surface area (or volume), in general the higher the performance in terms of gain and radiation characteristics.

4. SHAPE AND THICKNESS

A Flexible antenna can be made into any 2D shape for ease of fit into a product.

Flexible PCB antennas are super low profile (0.5mm).

5. GROUND PLANE EFFECTS

In general there should be 10mm of minimum clearance from the main ground-plane to achieve adequate antenna efficiency. Close proximity to the ground plane can degrade the antenna performance.



6. POLARIZATION

GPS patch antennas are most widely used for GPS receiver applications because they are circularly polarized antennas. The advantage is that patch antennas can be made to be circularly polarized, which matches more efficiently with the circularly polarized radiation transmitted from the GPS satellites. The disadvantages of the patch antennas can be very critical sometimes because they are very directional and very sensitive to device orientation. The FXP611 is linear polarized antenna, but it poses an omni-directional attribute which makes it less sensitive to the orientation. The antenna can be mounted vertically or horizontally in the device.

7. ADVANTAGES of Flexible antennas with cable

- Adheres directly to inner shell of plastic housing of device
- No space needed on main board of device
- Extremely low profile
- Design Flexibility – size, shape, cable, connector all fully customizable with minimum tooling cost
- Quick turn-around time on new designs – 2 weeks to prototypes
- Economical pricing

8. MOUNTING

Taoglas flexible PCB antennas use 3M 467 double-sided adhesive for the most reliable mounting solution. Ideally the Flexible PCB antenna is mounted close to the outer housing of the device to allow it to radiate outwards and receive signals without obstruction from internal components in the device. The antenna can be placed into a slot, screwed down, or affixed with double-

sided adhesive. Generally the orientation of the antenna is not critical, as long as clearance from metal components is maintained.

9. ENVIRONMENTAL CONSIDERATIONS

Close proximity to components or housing affects the electrical performance of all antennas. When placed on a non-conductive area of the board, in most cases, there should be minimum clearance of 10mm in all directions from the board/housing for maximum efficiency. A reduction in the efficiency of the antenna and shift in tuned frequency will be observed if the antenna is placed close to noisy components like switching power supplies, microphones, camera etc. Proximity effects will also have an adverse effect on the radiation pattern of the antenna. Device housings should never be metal or have conductive materials.

10. TUNING

The frequencies of flexible PCB antennas with cable are easily shifted when close to other components or even if the cable is bent more than 30 degrees. This phenomenon is called “detuning”. The antenna can also be detuned by high dielectric constant materials. Taoglas offers Flexible PCB antenna samples to customers on the understanding that they be tested outside the device as a benchmark performance. The actual production antenna will be customized for each customer.

This is why Taoglas always offers a tuning service to its customers at the prototype integration phase. We “tune” the antenna frequency back to the right bands for the application at our lab. Samples are sent back to the customer within 2 weeks of receiving the device along with a test report showing antenna performance, Return Loss/VSWR, Gain, and Radiation

Characteristics in the customer's device. Please contact us for costing for this service. sales@taoglas.com

11. CABLE & CONNECTOR

Ø1.13mm diameter micro coax cable is preferred in most GPS antenna projects as the most economical solution. Cable loss is not a big factor if cable length is kept below 150mm.

The cable should not be looped because it will cause frequency shifts and also create magnetic fields which will interact with the main antenna magnetic field. The cable should not have a sharp bend (90 degree).

The cable should be kept away from emitting components such as LCD driver chips or CPUs.

It is preferred to use connectors on the cables for higher reliability in connection over solder. The most economical connector solution is the IPEX line of connectors which are compatible with Hirose industry standards U.FL and W.FL. Taoglas offers any cable and connector solution for the integrator. Taoglas also offers the on-board mating connector and cable jumpers.