



Ground Plane Size , Resonant Frequency and Soldering Notes for GPS Patch Antennas



Patch Environment

The size of the ground plane the patch antenna is mounted on, and the protective enclosure that it is placed in, greatly effect the performance of the antenna. The size of the ground plane changes antenna gain and impedance. Antenna impedance is effected by the type of plastic used, its thickness, and the air gap spacing between the patch and the housing. Table 1 shows the optimized air gap and plastic thickness for various ground plane sizes. This chart is based on general purpose ABS housing, and will vary for different materials.

Table 1 Plastic Thickness for Various Size Antenna Ground Planes

Ground Plane Size	Air Gap Spacing	Plastic Thickness
1.375	.045	.070
2.0	.045	.080
3.0	.045	.085
4.0	.045	.090

Note: unit of measure in inches

Patch Resonant Frequency

M/A-COM has carefully designed the patch antenna to resonate 4 MHz higher than the GPS frequency of 1575.42 MHz. We did this knowing that GPS OEMs would always enclose the patch antenna in some type of plastic housing. Plastic enclosures typically cause a downward shift in resonant frequency of the antenna. The amount of frequency shift is related to the dielectric constant of the housing material and its thickness. (See Table 1 above for the recommended housing parameters.)

Environmental Capability

The ANPC-129 and ANPC-13X series of antennas have been qualified to a number of General Motors Engineering Standards and passed the Electronic Module Validation Test.

Testing

Our comprehensive testing includes thermal shock, moisture susceptibility, random vibration, salt fog, mechanical shock, drop test, power temperature cycling, low temperature endurance, biased humidity, electrostatic discharge, and immunity to radiated electromagnetic fields. For specific test information, see our application note entitled: *GPS Antenna Considerations for Automotive Applications*.

Out of Band Rejection

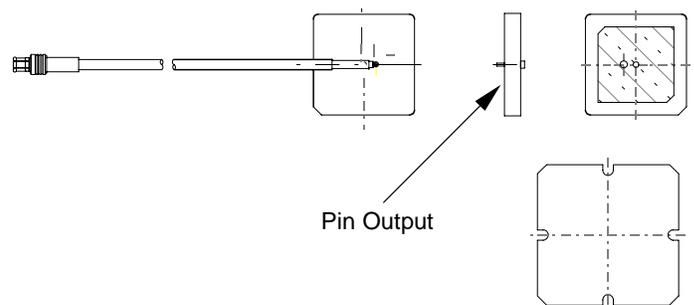
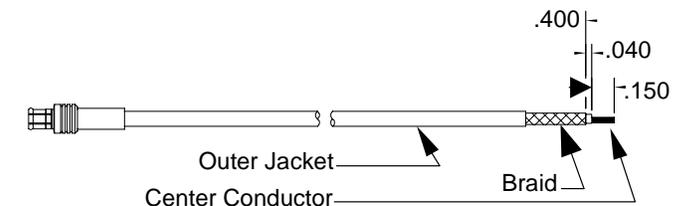
The ANPC-129 and ANPC-13X series of GPS antennas provide filtering for unwanted signals outside of the GPS pass-band. The ANPC-13X series has been designed with a 2 pole ceramic filter. The ANPC-129 series has no filter component, but provides significant out of band rejection because of its inherent band-pass impedance qualities.

Antenna	+/- 50 MHz	500<F<1400 MHz
ANPC-129 series	> -6 dB	>-20 dB
ANPC-130 (1)	>-25 dB	>-42 dB
ANPC-134 (5)	>-27 dB	> -52 dB

Table 2 Out of Band Rejection Specification

Soldering Directions for ANPC-129

The ANPC-129 is shipped with a direct solder pen designed for PC board connections. Coaxial cable can be soldered to the back of the patch if proper care is taken to prepare the cable and make the solder connection (see Diagram). We recommend RG-316 coaxial cable because of its Teflon core. It is critical to the impedance match that the .04" dielectric gap (see Diagram) be maintained. If using a lower grade coaxial cable, use even more care in soldering to prevent the core from expanding under the heat of the soldering iron; thermal expansion of the core beyond .04" will cause a degradation in input impedance.



V2.00

