



Antenna Development Corporation
151 S. Walnut Street, Suite B-6, Las Cruces, NM 88001-2614

Microstrip Patch Antennas

Antenna Development Corporation, Inc. (AntDevCo) has designed and manufactured spacecraft microstrip patch antennas for many spacecraft programs - including **Cubesats**. The antennas are capable of supporting high data rates and at least 10 Watts of transmitted power. Applications include GPS, USAF SGLS, NASA space flight tracking and data network (STDN) (Including TDRSS forward/return pairs), radar transponder, and the NASA DSN. Versions are offered that operate with LHCP, RHCP, or linear polarizations and with single frequency or dual frequency bands. They are supplied in a number of standard form factors:

- (A) 4.0" X 4.0" Standard antennas, all frequencies
- (B) 3.3" X 3.3" SGLS pairs, GPS L1, or GPS L1/L2 pairs **(Cubesat-ready)**
- (C) 2" X 2" C or X-band units **(Cubesat-ready)**
- (D) 1.4" X 1.4" S-band - STDN **(Cubesat-ready)**

The antenna thickness depends on the polarization and number of frequencies (typically 0.120" for single frequency units or 0.180" for dual frequency units). All antennas include robust integral radomes to protect the radiating elements.

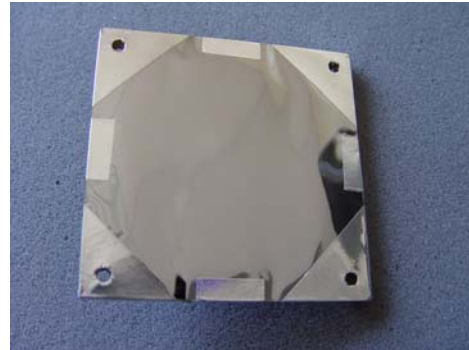
The antennas include extensive testing data: Principal Plane Radiation Pattern Plots, Gain Bounds Plots, and Coverage Statistics. Simulations of the expected performance on specific satellites or other vehicles are also available with extra charges.

The antennas may be configured with semi-conductive films for applications where no exposed dielectrics are allowed. Environmental acceptance testing can also be conducted by AntDevCo.

AntDevCo offers similar antennas for launch vehicle and RV applications which can be supplied in curved conformal formats. LV and RV antenna designs have been qualified for major launch vehicle programs.

These antennas are:

- Space qualified Conformal form factor
- Low mass High Performance



Patch antenna with antistatic cover.

- Gain: Larger units: +6 dBic on axis
Smaller units: +2 dBic on axis (Gnd plane, frequency, & size dependent)
- Frequency: L-, S-, C-, or X-bands.
Single or dual frequency units
- Bandwidth: 20 MHz nominal S-band units (frequency dependent)
- HPBW: 70 degrees full width (S-band)
- Impedance: 50 Ohms
- Polarization: Linear or Circular
- VSWR: < 1.5:1 at center freq.
- Axial Ratio: < 6 dB at center frequency
- Connector: SMA Female (others available)
- Mass: < 120 grams (4" X 4" units)
< 20 grams (1.4" X 1.4" units)
- Temperature: -100° to +100° C (typical limit)
-65° to +100° C (operational)
- Power: To at least 10 Watts CW
- IR Emissivity = 0.90
Absorptivity = 0.43 (no static cover)

AntDevCo is ISO 9001:2000 certified, registration number 4121811.

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Precision Antennas for Spacecraft, Rockets, and Missiles



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Typical Radiation Patterns.

These microstrip patch antennas have radiation patterns that are essentially identical to those reported in the literature for single-element patch antennas. The patterns below are typical but not guaranteed. The actual radiation patterns of the antenna mounted on the spacecraft structure are restricted by ITAR and are available to qualified recipients only.

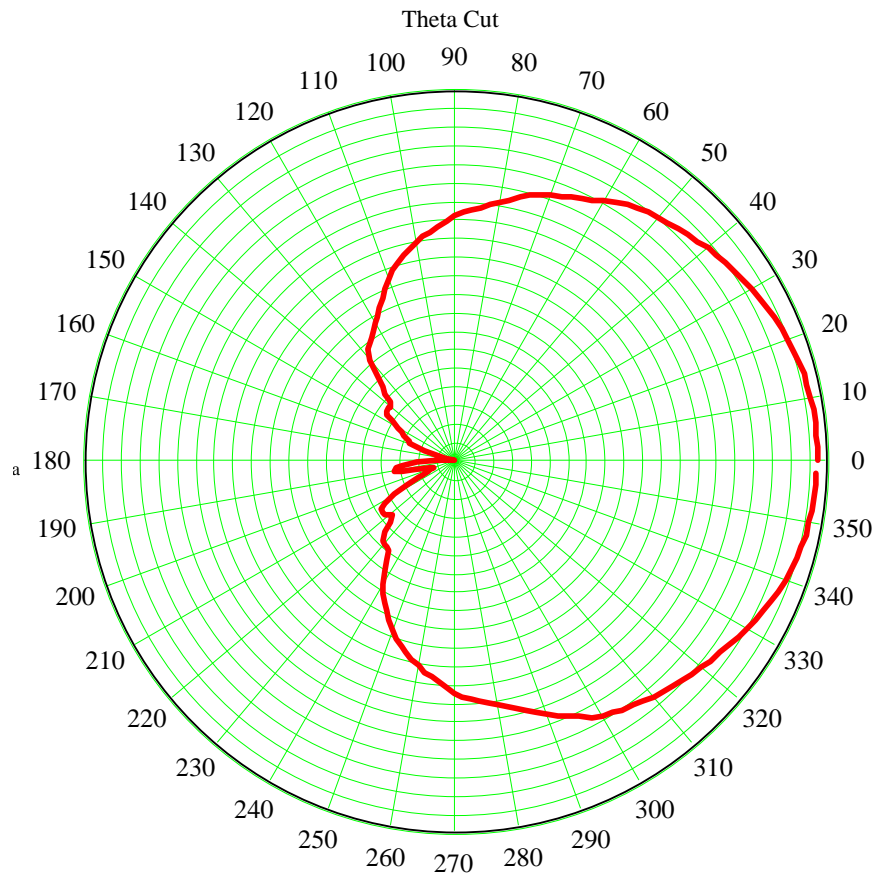


Figure 1. Typical elevation radiation pattern for full size patch antenna. ~ 2050 MHz

Maximum on the plot is 8 dBic, 2 dB per division. Dual frequency patch antenna.



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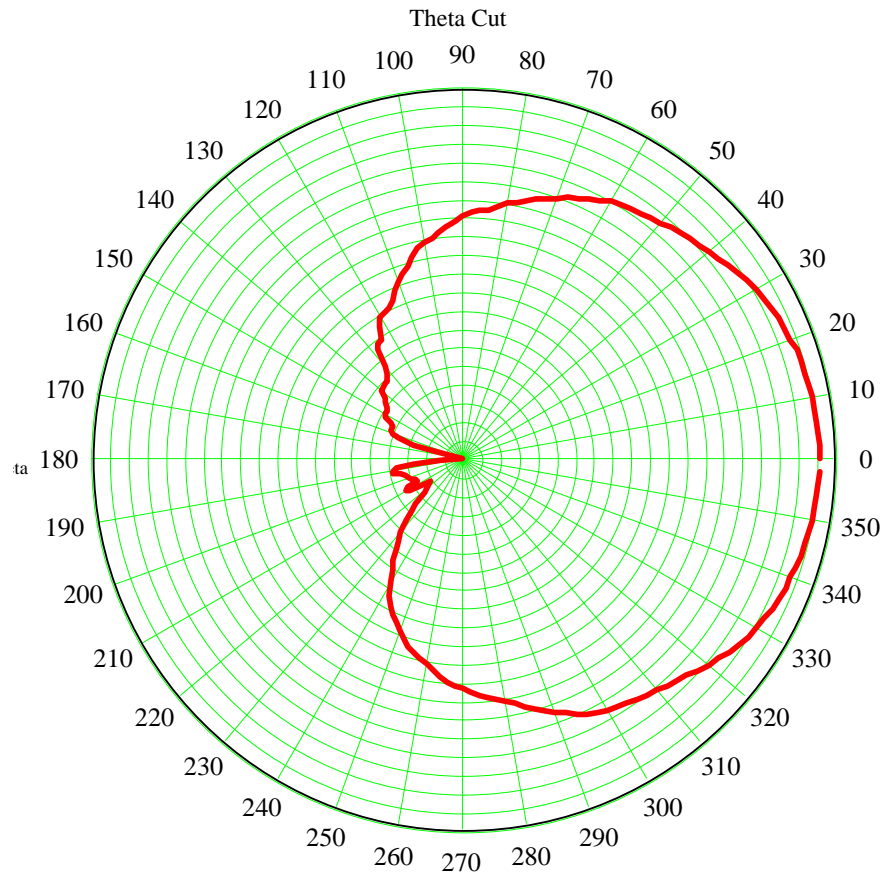


Figure 2. Typical elevation radiation pattern for full size patch antenna. ~ 2200 MHz

Maximum on the plot is 8 dBic, 2 dB per division. Dual frequency patch antenna.