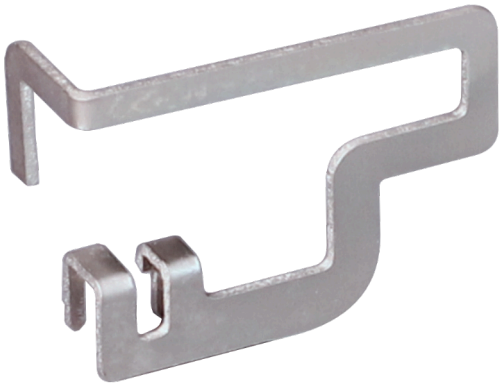
Datasheet

AC30026-01
Global Navigation (GNSS) Embedded Stamped Metal Antenna

The AC30026-01 is an omnidirectional, linearly polarized, global navigation antenna operating in the GPS L1, Galileo E1, GLONASS L1, Beidou B1-BOC and QZSS bands.

The AC30026-01 antenna features excellent efficiency and VSWR characteristics, providing quality of service for GNSS applications like vehicle tracking.

The AC30026-01 antenna is very compact and mounts at the corner of a printed circuit board, occupying less space than most other antenna options.



AC30026-01 Stamped Metal GNSS Antenna

Features

- Performance at 1.567 GHz to 1.584 GHz
  - VSWR: 2.0
  - Peak Gain: 4.2 dBi
  - Efficiency: 63%
- Performance at 1.593 GHz to 1.609 GHz
  - VSWR: 1.5
  - Peak Gain: 4.6 dBi
  - Efficiency: 68%
- Corner mount antenna to save PCB space
- Linear polarization for use in varying orientations
- Compact
  - 18.6 mm x 12.7 mm x 7.0 mm
- Omnidirectional radiation pattern
- Through-hole mount for reflow- or hand-solder assembly

Applications

- Global Navigation (GNSS)
  - GPS L1,
  - Galileo E1
  - GLONASS L1
  - Beidou B1-BOC
  - QZSS
- Timing Applications
- OBD-II Modules

Ordering Information

Part Number	Description
AC30026-01	GNSS antenna

Available from The Antenna Company (sales@antennacompany.com) and select distributors and representatives.

Table 1. RF/Electrical Specifications

Frequency Band	GPS Bands	VSWR	Return Loss (dBi)	Peak Gain (dBi)	Efficiency (%)
1561 MHz	COMPASS CPII/Beidou-B1, E2	2.2	-8.4	3.6	58
1575 MHz	GPS L1, Galileo E1, GLONASS II L1, COMPASS CPII/Beidou B1-BOC, QZSS	2.0	-9.3	4.2	63
1590 MHz	COMPASS CPII/Beidou-B1-2	1.7	-12.1	4.3	65
1601/1602 MHz	GLONASS I L1, GLONASS II L1	1.5	-13.4	4.6	67

Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omnidirectional

Electrical specifications and plots measured with the antenna on a Printed Circuit Board (PCB), with a 42 mm x 42 mm (1.65 in x 1.65 in) reference ground plane.

Table 2. Mechanical Specifications

Parameter	Value
Connection	Through-hole Solder
Operating Temperature Range	-40 °C to +80 °C
Weight	0.46 g (3.32 oz)
Dimensions	18.6 mm x 12.7 mm x 7.0 mm (0.73 in x 0.50 in x 0.28 in)

Antenna Dimensions

The dimensions for the AC30026-01 are shown below in Figure 1.

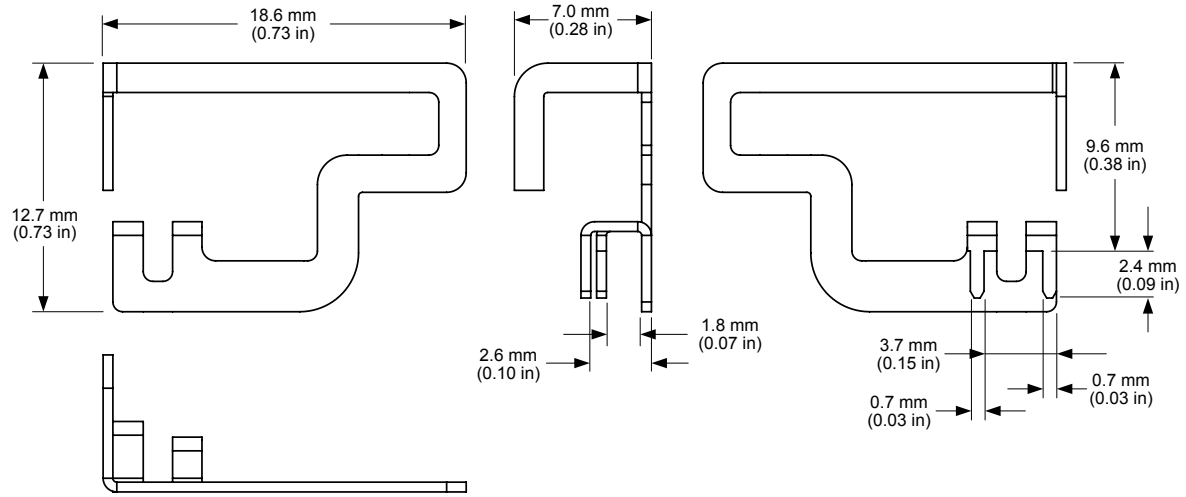


Figure 1. AC30026-01 Antenna Dimensions

VSWR

Figure 2 provides the voltage standing wave ratio (VSWR) across the antenna bandwidth. VSWR characterizes the power reflected from the antenna back to the transmitter. A lower VSWR value indicates better antenna performance at a given frequency. Reflected power is also shown on the right-side vertical axis as a measure of the percentage of transmitter power reflected back from the antenna.

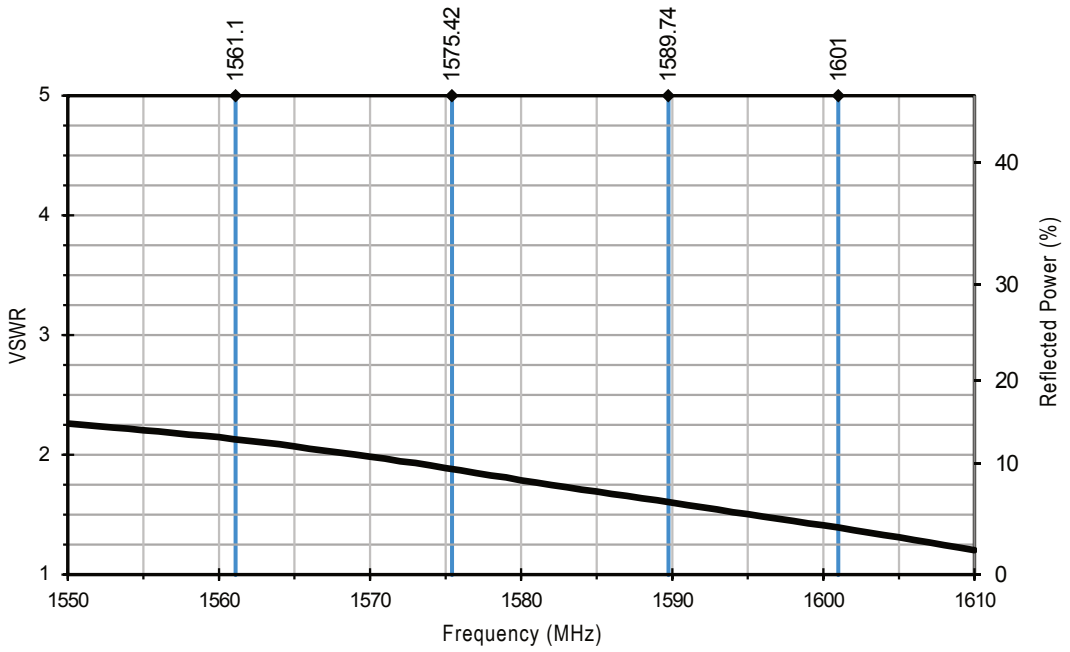


Figure 2. AC30026-01 Antenna VSWR with Frequency Band Highlights

Return Loss

Return loss (Figure 3), 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.

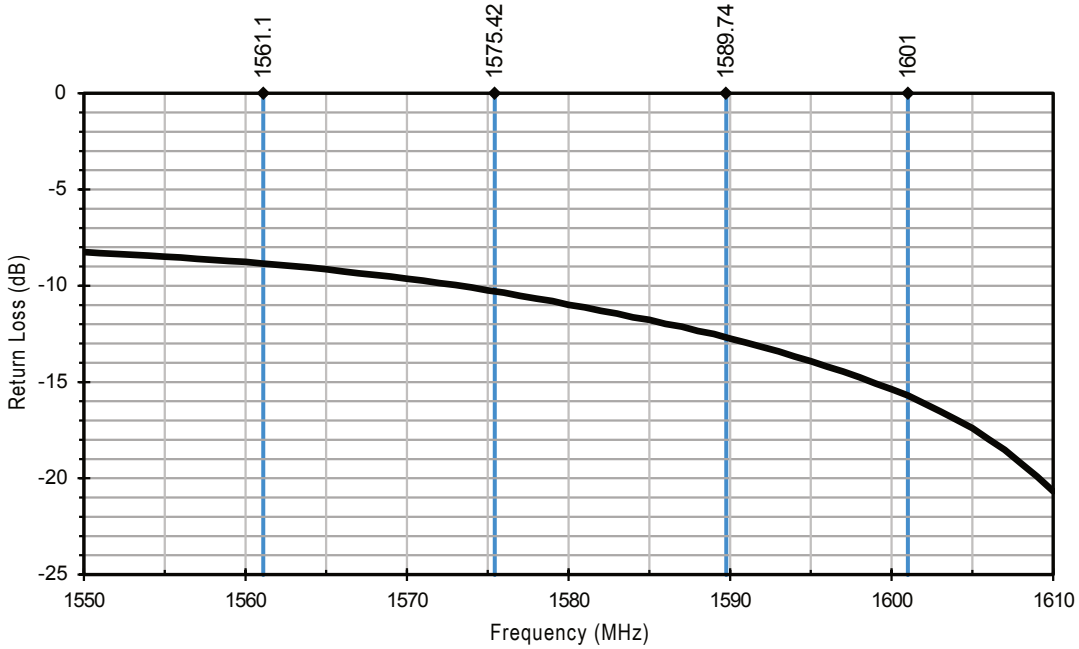


Figure 3. AC30026-01 Antenna Return Loss with Frequency Band Highlights

Peak Gain

Peak gain, (See Figure 4) provides a measure of the maximum conversion of antenna input power to radio waves at a given frequency. Peak gain does not account for the directionality of gain in 3-dimensional space.

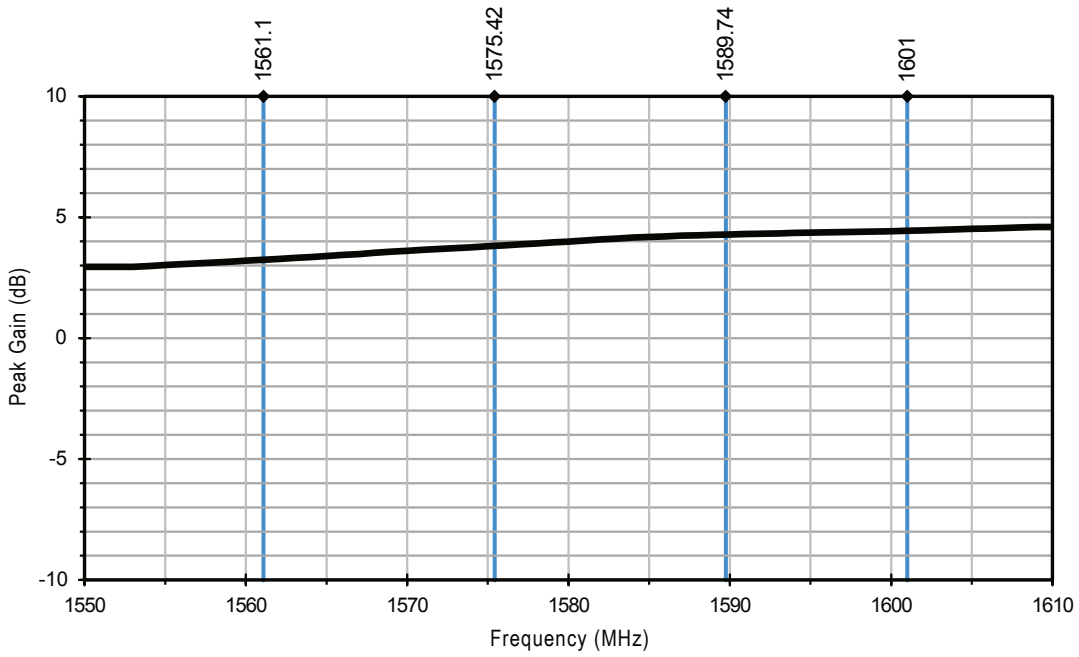


Figure 4. AC30026-01 Antenna Peak Gain with Frequency Band Highlights

Average Gain

Average gain (Figure 5), is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.

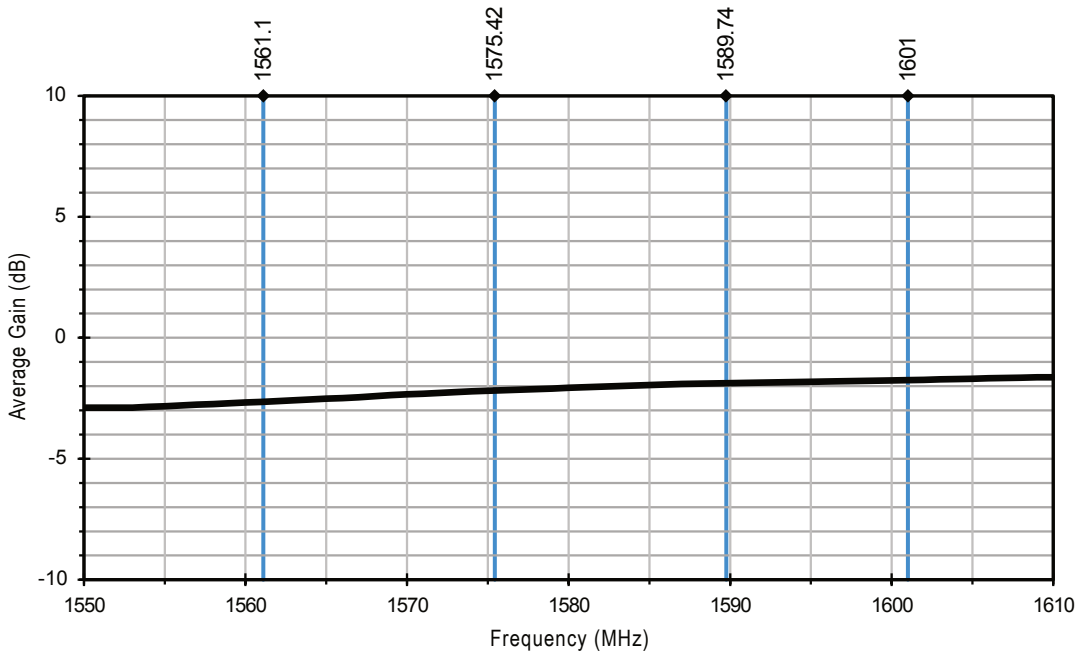


Figure 5. AC30026-01 Antenna Average Gain with Frequency Band Highlights

Radiation Efficiency

Radiation efficiency (Figure 6), is 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.

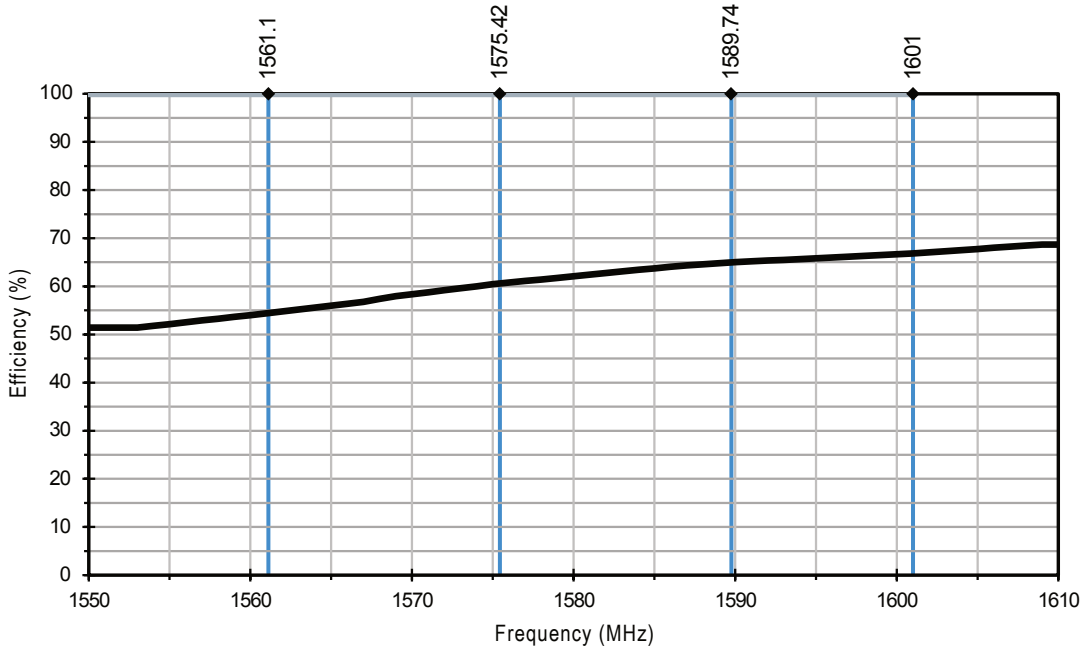
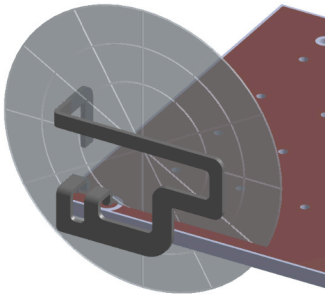


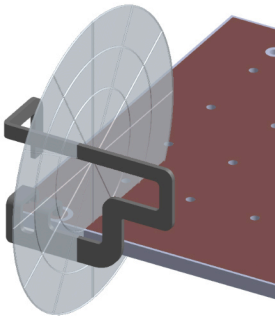
Figure 6. AC30026-01 Antenna Radiation Efficiency with Frequency Band Highlights

Radiation Patterns

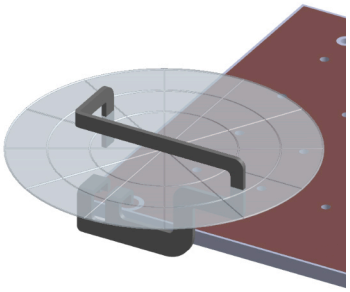
Radiation patterns provide information about the directional performance of the antenna by plotting gain in three orthogonal planes at the high-, low- and center-frequencies of an antenna frequency band. Antenna radiation patterns (Figure 7), are shown using polar plots covering 360 degrees with the plane of reference depicted above the plots. Note: when viewed with typical PDF viewing software, zooming into radiation patterns is possible to reveal fine detail.



XZ-Plane Gain

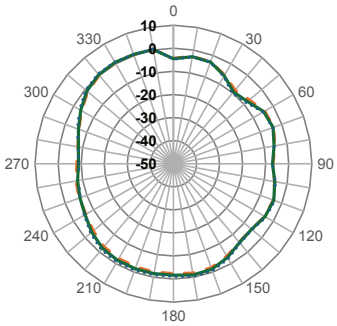


YZ-Plane Gain

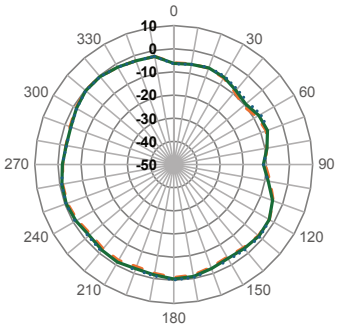


XY-Plane Gain

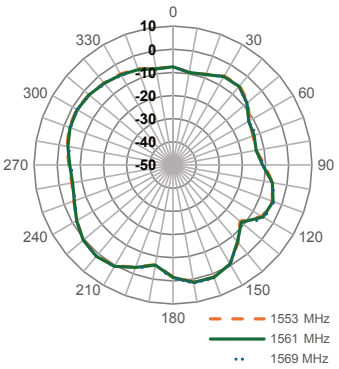
1553 MHz to 1569 MHz (1561 MHz)



XZ-Plane Gain

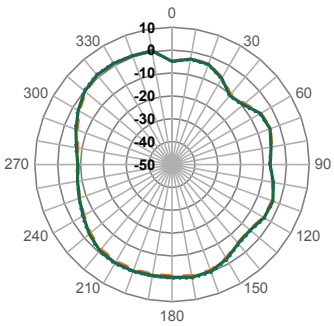


YZ-Plane Gain

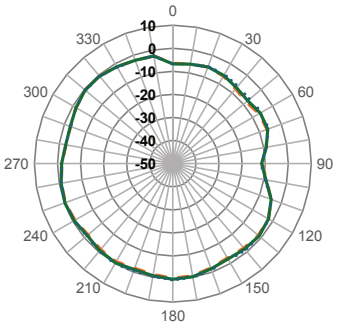


XY-Plane Gain

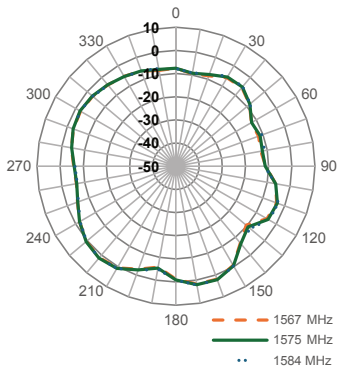
1567 MHz to 1584 MHz (1575 MHz)



XZ-Plane Gain

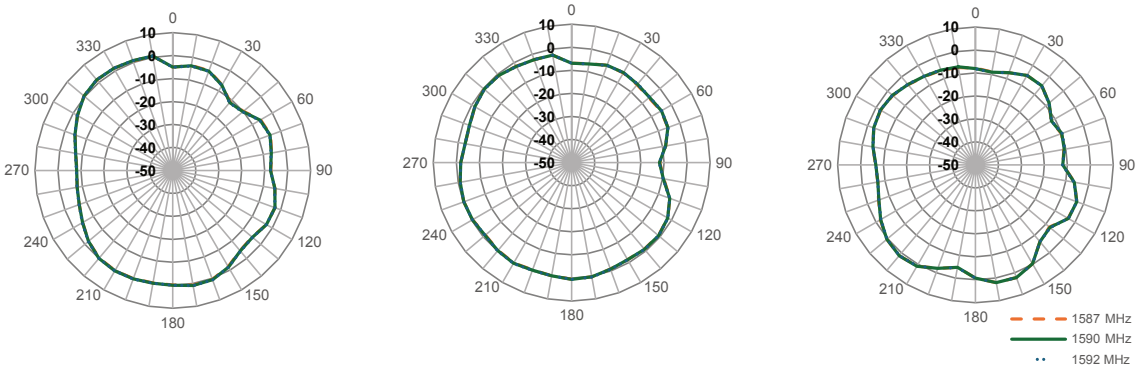


YZ-Plane Gain



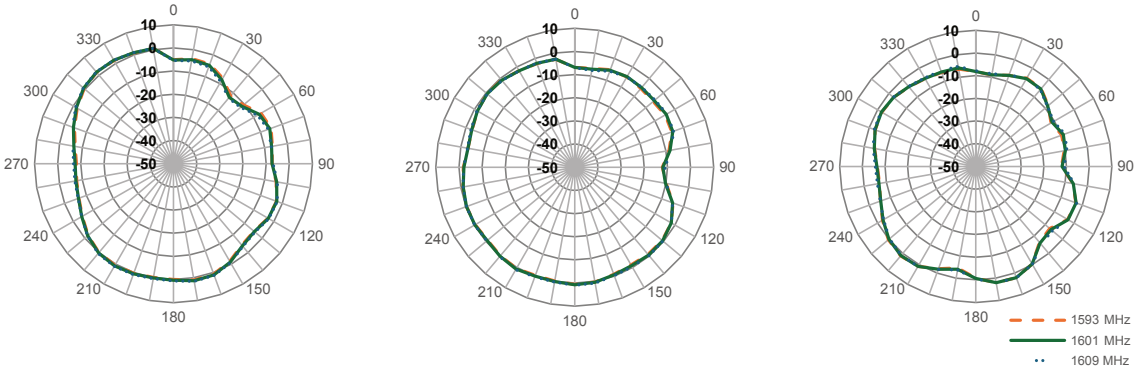
XY-Plane Gain

1587 MHz to 1592 MHz (1590 MHz)



XZ-Plane Gain YZ-Plane Gain XY-Plane Gain

1593 MHz to 1609 MHz (1601 MHz)



XZ-Plane Gain YZ-Plane Gain XY-Plane Gain

Figure 7. Radiation Patterns for AC30026-01 Antenna

PCB Footprint

The recommended design implementation of the AC30026-01 includes a matching network, ground plane and PCB transmission line from the antenna to the matching network and to the radio circuitry. Figure 8 shows the PCB layout footprint for mounting the AC30026-01.

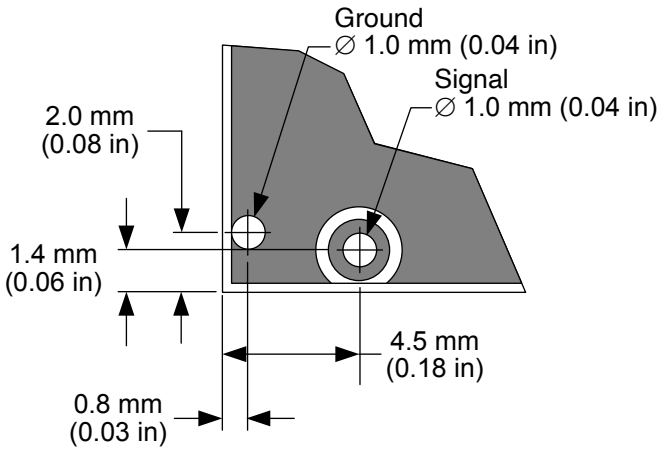


Figure 8. PCB Footprint for the AC30026-01 Antenna

Antenna Installation Requirements

Figure 9 shows the AC30026-01 antenna mounted onto the main PCB. The minimum distance between the antenna and the edge of the PCB is 0.6 mm which may be achieved by leveraging the footprint shown in Figure 8.

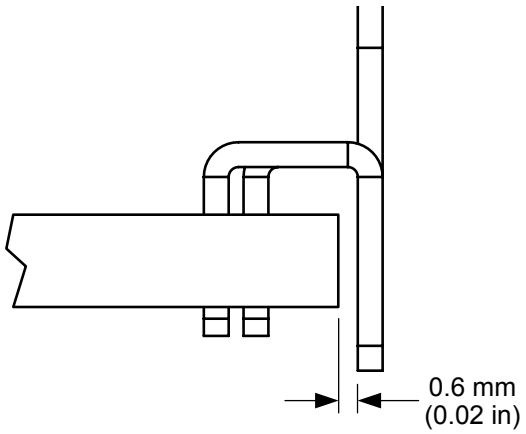


Figure 9. AC30026-01 Antenna Installation Requirements

Ground Plane

The AC30026-01 requires a ground plane on the PCB to which it is mounted for proper operation. The Antenna Company recommends a 42 mm x 42 mm or larger ground plane. The AC30026-01 should be mounted in relation to the edge of the ground plane as shown in Figure 9. Other ground plane sizes and antenna mounting locations are possible. The Antenna Company offers PCB design reviews to help optimize solution performance.

Matching Network

The Antenna Company recommends inclusion of at least a 3-element, surface mount pi matching network of two parallel capacitors, (X1, X3) and one serial inductor, (X2) in all designs (See Figure 10). Surface mount components should be 0603 or 0402 size. The AC30026-01, as designed, does not require matching, but matching may improve end-product antenna performance depending on the effects of the enclosure, PCB and other electronic components. If no matching is necessary, the serial element (X2) may be populated with a zero-ohm resistor and no components in the X1 and X3 positions.

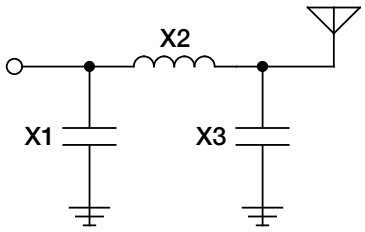


Figure 10. Matching Network Recommendation

Transmission Lines for Embedded Antennas

For most designs, The Antenna Company recommends a microstrip transmission line for the AC30026-01. A microstrip transmission line is a PCB trace that runs over a ground plane to maintain the characteristic impedance for optimal signal transfer between the antenna and radio circuitry. The Antenna Company designs all standard antennas with a characteristic impedance of 50 Ω.

Important practices to observe when designing a transmission line are:

- Keep all transmission lines to a minimum length for best signal performance.
- Use RF components that also operate at a 50 Ω impedance.
- If the radio is not on the same PCB as the antenna, the microstrip should be terminated in a connector enabling a shielded cable to complete the antenna connection to the radio.
- For designs subject to significant electromagnetic interference, a coplanar waveguide transmission line may be used on the PCB.

Reflow Solder Profile

The AC30026-01 uses a typical RoHS solder reflow profile as shown in Figure 11. Table 3 provides temperature ranges for each stage of reflow.

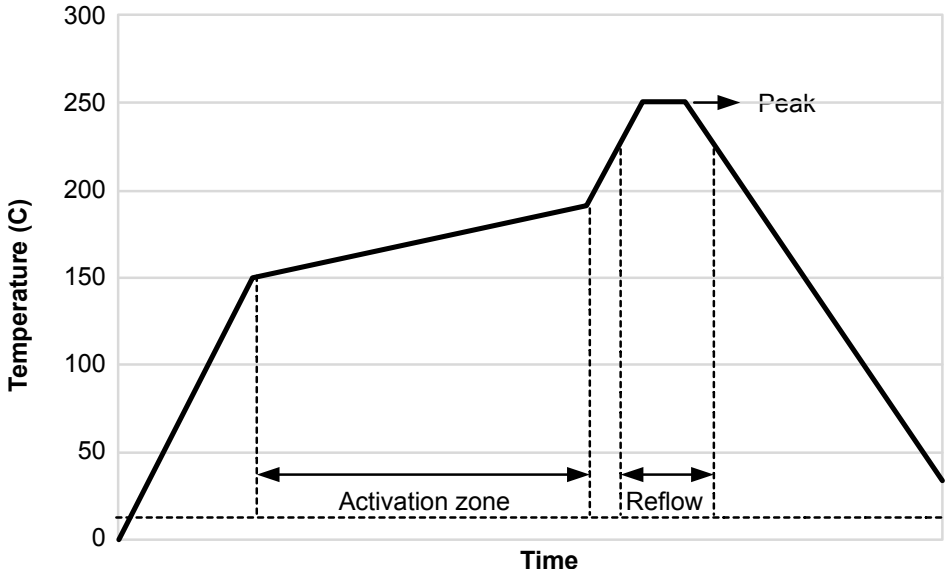


Figure 11. RoHS Solder Reflow Profile

Table 3. Temperature Ranges

		Temperature Range	Time
T0 - T1	**Heating Zone**	0 °C to 150 °C	Controlled 1 °C ~ 3 °C/sec
T1 - T2	**Activation Zone**	150 °C to 190 °C	60s to 120s
T3 - T4	**Reflow**	220 °C to 250 °C (Peak)	Above 45s
T4 - End	**Cooling Zone**	Cool-down	Controlled ~ 4 °C/sec

Packaging Information

The AC30026-01 antenna is securely packaged in PVC plastic trays (Figure 12). Trays are packed in cartons of 2,500 pcs. (37 trays containing 66 antennas, and one tray containing the remaining 58 pcs.) Two additional empty trays are provided for product stability during shipment. All trays are sealed in a moisture-proof bag containing dessicant pouches.

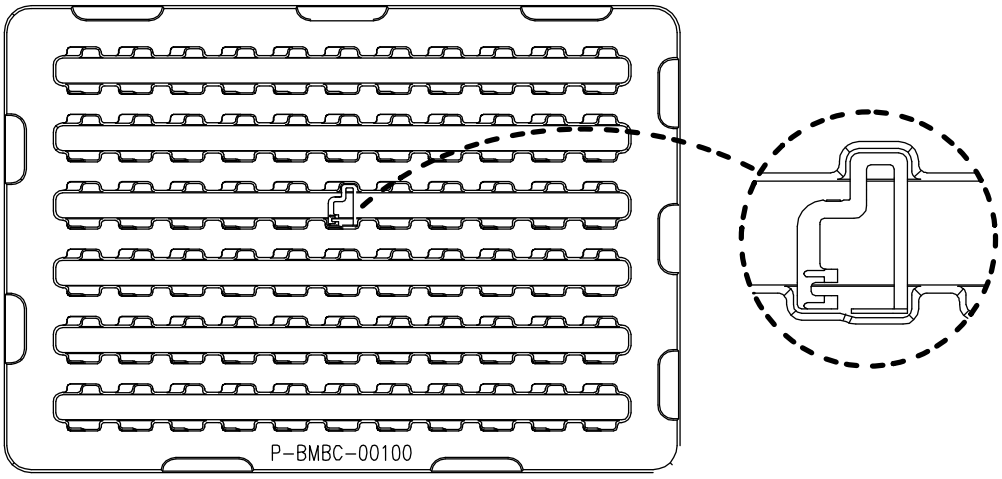


Figure 12. Packaging Tray for the AC30026-01 Antenna

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