

**Airgain™**



Coverage.  
Performance.  
Smart.

**Profile Series  
N01AKACE**

**Airgain  
Embedded  
Antenna  
Engineering  
Data Sheet**

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## Revision History (Required)

Revision	Date	Note
2613C-02-00-001-1 Rev. 1.0	October 8, 2019	Preliminary Datasheet 1.0
2613C-02-00-001-1 Rev. 1.1	October 29, 2019	Add peak gain and Radiation Patterns

## Disclaimers

The information in this document is provided in connection with Airgain Antenna products and is proprietary and confidential. Airgain may make changes at any time, without notice.

***Please verify with Airgain before finalizing a product design.***

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## 1. Model N01AKACE PCB Mounted Embedded Antenna

The Model N01AKACE Embedded Antenna provides a high efficiency, embedded antenna solution for Wi-Fi and ISM applications in the 2.4 GHz band. As efficient, embedded antenna solutions become the focus of next generation wireless product design, the Model N01AKACE antenna provides the combination of small size with top performance. While the physical height of 3mm is less than most through hole mounted antennas, it is still above the surrounding pcb surface, helping to further improve performance. The antenna was designed to accommodate most WLAN applications, such as access points, routers, and gateways. The N01AKACE is optimized for SMT mounting on a printed circuit board utilizing a micro stripline RF interface. It is easily integrated into a PCB design.

## 2. Features

The Model N01AKACE Embedded Antenna is defined by the following features:

- IEEE 802.11 b/g/n standard
- Optimized for PCB SMT mounting in small applications
- PCB Micro stripline RF Interface
- Low Profile, 3 mm high
- 4.1 dBi @ 2.44GHz, peak gain
- High efficiency
- Quick integration



**Figure 1:** Model N01AKACE Embedded Antenna

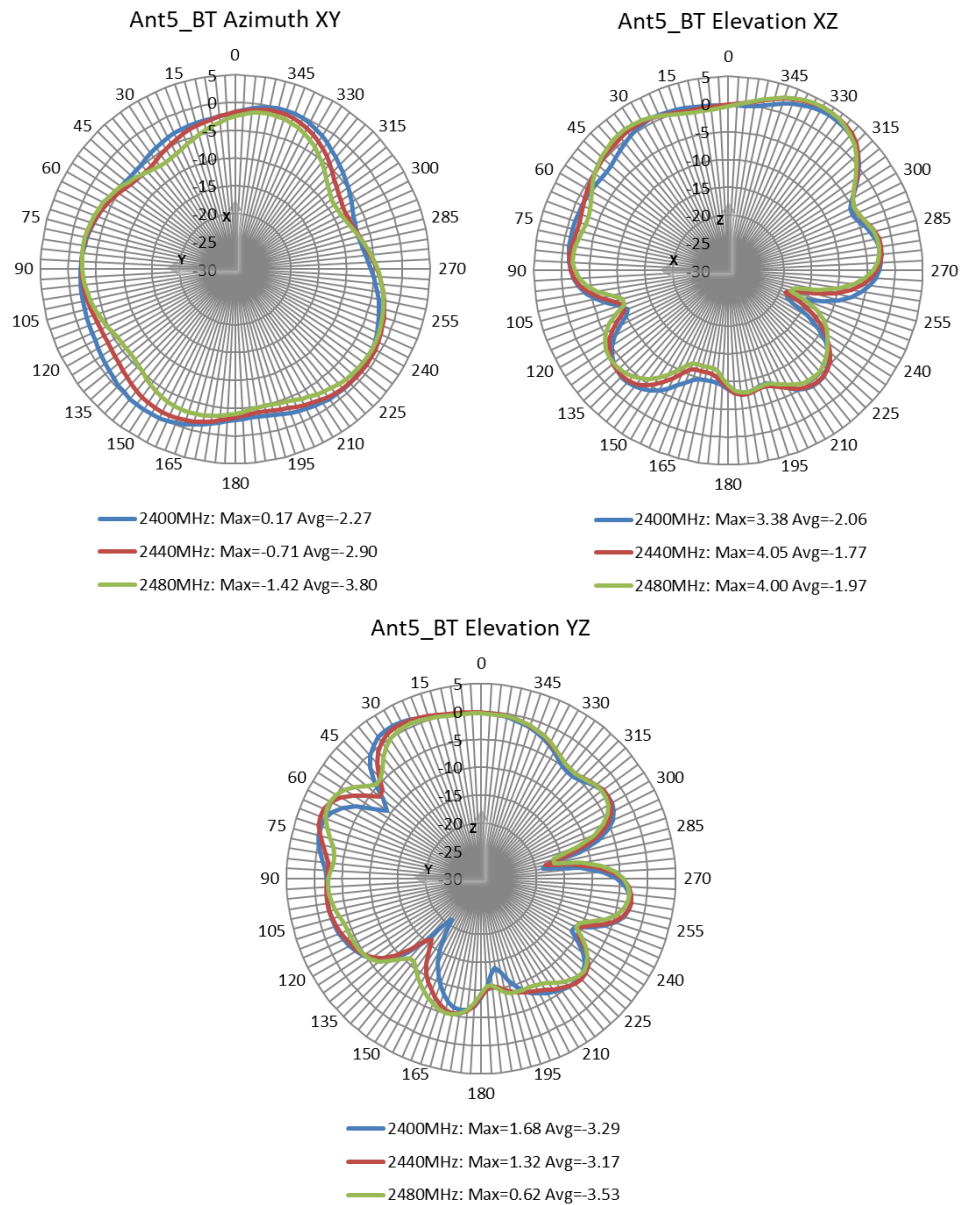
### 3. Specifications and Interface

Standard	IEEE 802.11b/g/n
Frequency range	2.4 to 2.49 GHz
Peak gain	4.1 dBi @ 2.44 GHz
VSWR	< 2:1
Feed impedance	50 ohms
Power handling	30 dBm
Interface	2, SMT soldering pins for 50 ohm, microstripline on PCB
Antenna dimensions	11.6 x 5.5 x 3.0 (mm)
Weight	0.35 g
Temperature range	Operating: -40° C to +75° C (-40° F to +167° F) Storage: -40° C to +85° C (-40° F to +185° F)
Humidity range	0% to 95% non-condensing

### 4. Radiation Patterns



Figure 2: Model N01AKACE Measurement axes



**Figure 3:** Model N01AKACE Measured Radiation Patterns at 2.44 GHz

## 5. Dimensions

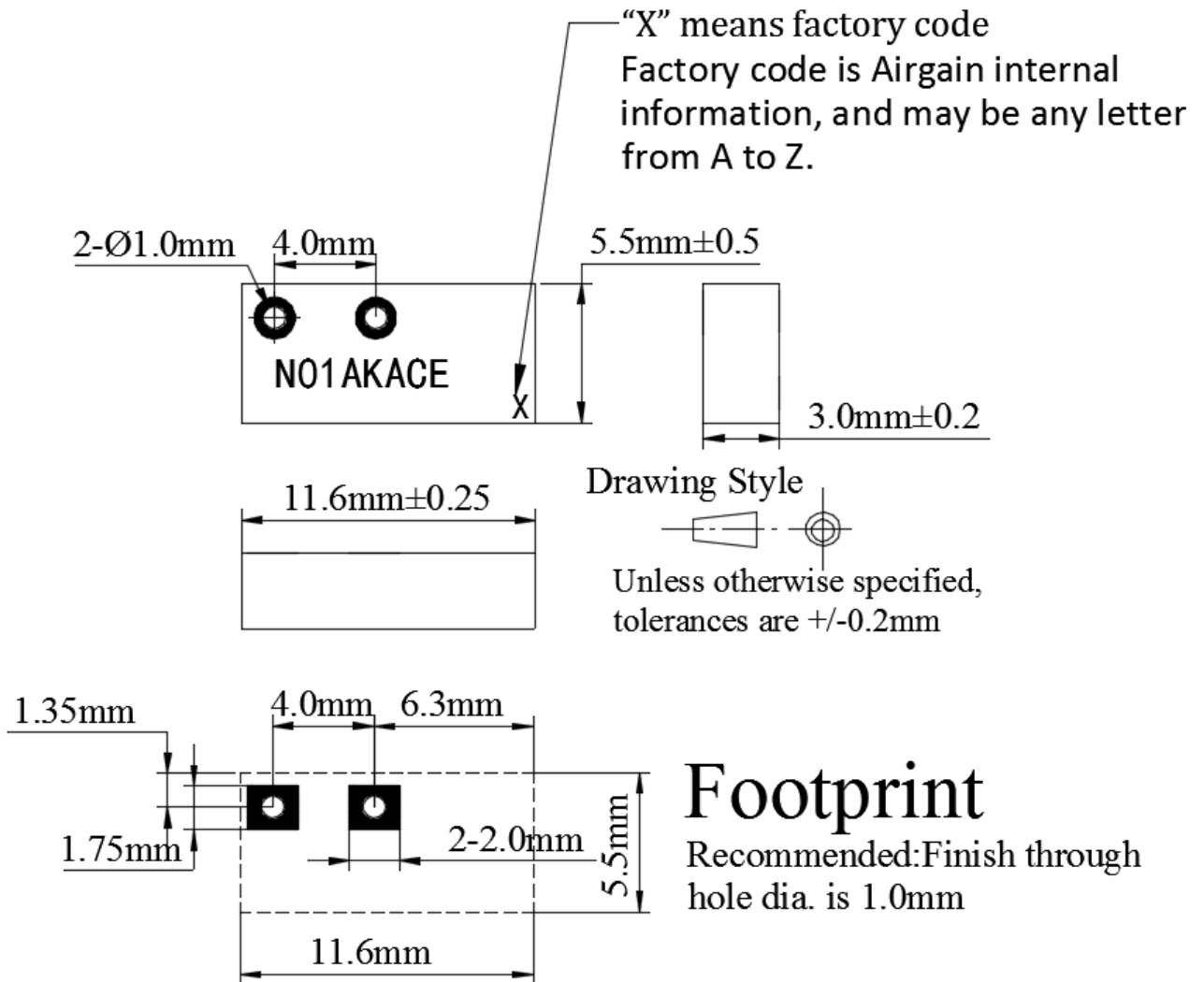


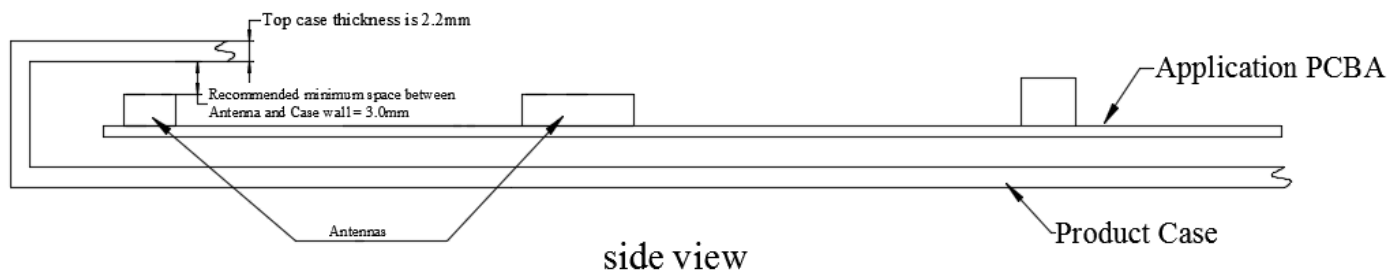
Figure 4: Model N01AKACE Dimensions and footprint

## 6. ROHS

Airgain N01AKACE embedded antennas are RoHS compliant.

## 7. Mounting Guidelines

The Model N01AKACE antenna incorporates a stable support footprint using SMT pin connections, simplifying use in new PCB designs. Airgain has developed guidelines that should be followed to achieve the best performance from the Model N01AKACE. These recommendations apply to IEEE 802.11/b/g and n applications.



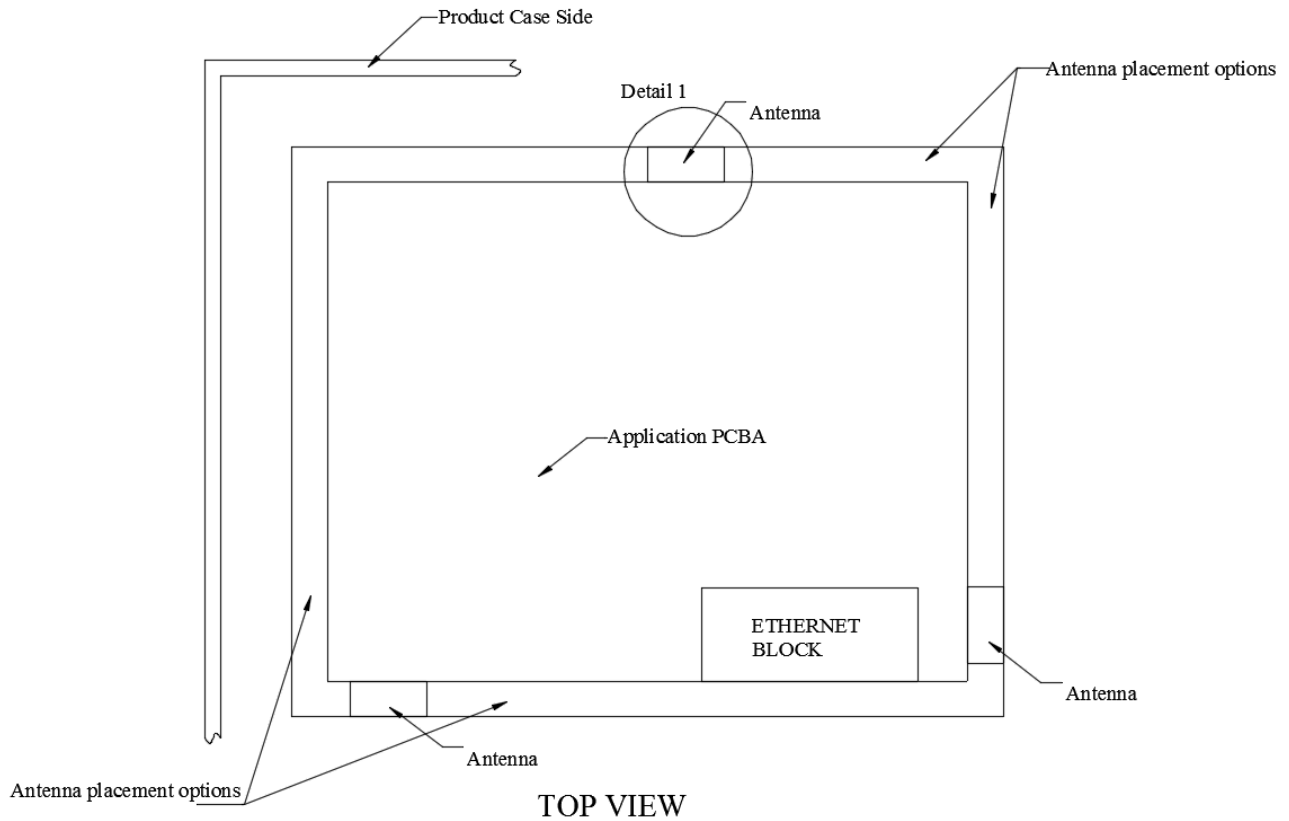
**Figure 5:** A side view illustration of a Model N01AKACE mounted on a 100 mm x 80mm PCB, showing recommended ABS Case Top thickness and 3mm airgap to antenna.

The recommended layout of a design implementation on a large PCB is shown in Figure 5 and Figure 6. N01AKACE performance is fairly independent of its location on the PCB, provided it is positioned close to a PCB edge. Place the N01AKACE parallel to, and spaced 1 mm away from the edge of the PCB. Performance tests have had the N01AKACE mounted onto a 1 mm, 4 layer, FR4 PCB. The N01AKACE is spaced 3mm beneath a 2.2 mm thick ABS plastic case top, as shown in Figure 5.

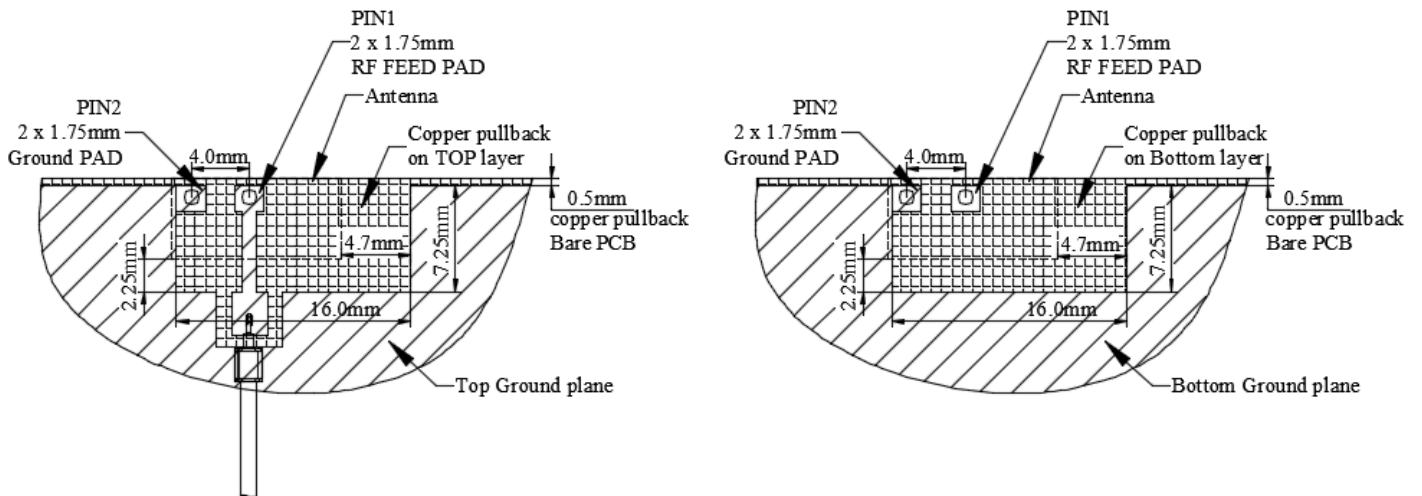
Pin 1 is designed to be 50 ohms, and feed by a 50 ohm microstripline as shown in Figure 7. Pin 2 should be a direct connection to RF ground.

The important mounting constraints on a typical PCB are shown in Figures 5, 6 and 7. This element requires a copper pullback on all pcb layers beneath the radiating element (no ground plane) to ensure best Q factor is achieved in new designs. The pullback is detailed in Figures 4 and 7.





**Figure 6:** Top View of a Design Layout



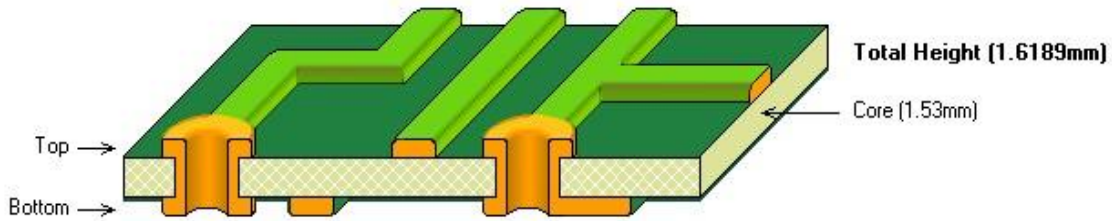
**Figure 7:** Detail 1 showing recommended RF Transmission line layout and copper pullback

In Figure 7, the RF feed trace is leaving Pin 1, at a right angle to the N01AKACE, to help avoid unintended interference between the element and the RF transmission line.

Airgain recommends this signal path for either Top Layer routing, or Bottom layer routing of the RF transmission line.

RF signal routing on an internal layer has not been tested, and is not recommended.

The PCB layer stackup in Figure 8 below has provided the best performance in testing the N01AKACE at Airgain.



**Figure 8:** The PCB layer stackup for the examples above

Some Important Notes to remember:

- A 3 mm airgap from the Model N01AKACE to nearby case features and case top.
- For Components taller than 3.0 mm, a 5.5 mm keepout area alongside the N01AKACE is recommended.

## 8. Part Number Conventions

Airgain uses a two-staged standard number system for our part numbers, which serially define the antenna type, packaging type, as described below:

Antenna #	Packaging type -xx
N01AKACE	RT= Reel and Tape packaging

\* Standard cable lengths listed in RF Cable Datasheet