

Airgain Embedded Antenna Product Datasheet

Ultra45

Model M2445J Series



Coverage. Performance. Smart.

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Revision history

Revision	Date	Note
067-02-00-001-1 Rev A	November 13, 2007	Initial Draft
067-02-00-001-1 Rev B	August 14, 2008	Update model number
067-02-00-001-1 Rev C	September 9, 2008	Update photos and dimensions for mounting.
067-02-00-001-1 Rev D	September 9, 2008	Add cable information
067-02-00-001-1 Rev E	January 5, 2009	Update cable information
067-02-00-001-1 Rev F	March 3, 2009	Rewrite mounting guidelines
067-02-00-001-1 Rev G	April 3, 2009	Rewrite Feature and Options Section 9
067-02-00-001-1 Rev H	May 15, 2009	Update Cover Sheet
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067-02-00-001-1 Rev K	January 11, 2010	Update ordering number information For -T0 and -T2
067-02-00-001-1 Rev L	January 18, 2010	Update ordering number information Remove 50mm cable Add 150mm cable

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1. Model M2445J Embedded Antenna

Based on Airgain's patented technology, the Model M2445J Embedded Antenna provides a high gain, embedded antenna solution for Wi-Fi and ISM band applications. As embedded antenna solutions become the focus of next generation wireless product design, the Model M2445J provides the flexibility of an embedded antenna with top performance. This antenna was designed to accommodate most WLAN access point applications, such as routers and gateways. The M2445J can be easily integrated onto a board or into an ID design.

2. Features

The Model M2445J Embedded Antenna is defined by the following features:

- IEEE 802.11 b/g/n standard
- On-board mount or case mounting
- 4.5 dBi peak gain,
- High performance
- Quick integration

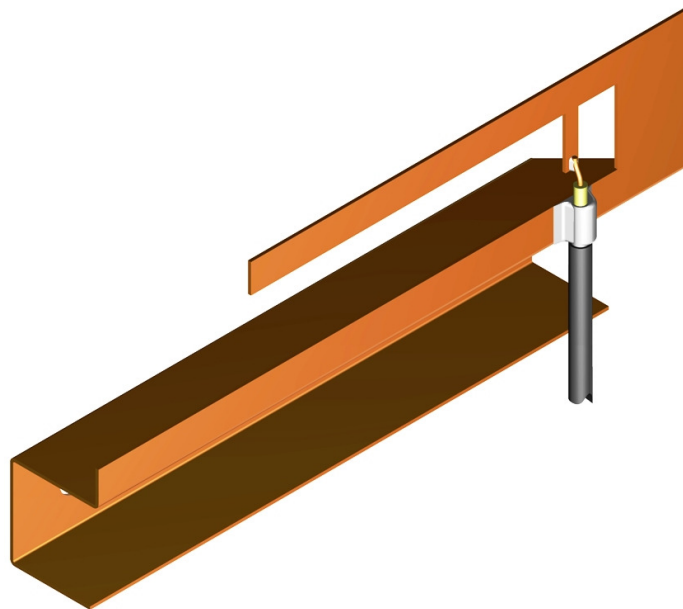


Figure 1

Model M2445J Embedded Antenna.

The length of the micro coax cable shown is customer selectable.

3. Specification and Interface

Standard	IEEE 802.11n and 802.11 b/g
Frequency Range	2.4 to 2.49 GHz
Peak Gain	4.5 dBi
VSWR	2:1
Feed Impedance	50 Ohms
Power Handling	30 dBm
Interface	50 ohm, 1.13mm diameter, micro coax cable, U.FL compatible Plug termination (optional) Cable mounted EMI ferrites (optional)
Antenna Dimensions L x W x H	39 x 5.3 x 14.7 (mm)
Weight	1.4 g (0.04 oz)

4. Radiation Patterns

4.1. Patterns for Free Standing Antenna

Patterns taken with Model M2445J mounted on 90 mm x 90 mm x 2.2 mm thick, ABS Plastic sheet with 1.6 mm double sided tape.

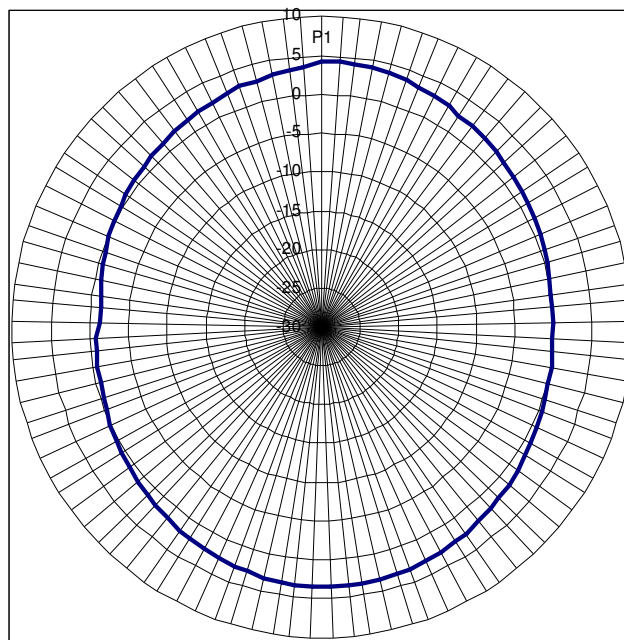


Figure 2

Model M2445J Embedded Antenna
 Measured Azimuth Radiation Pattern

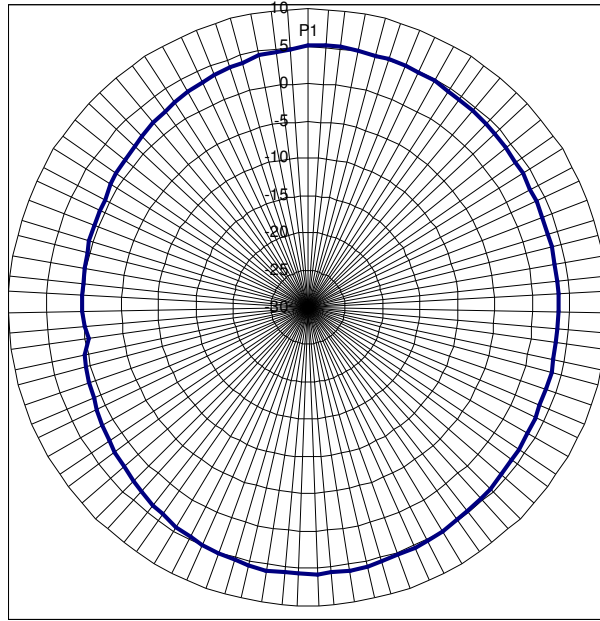
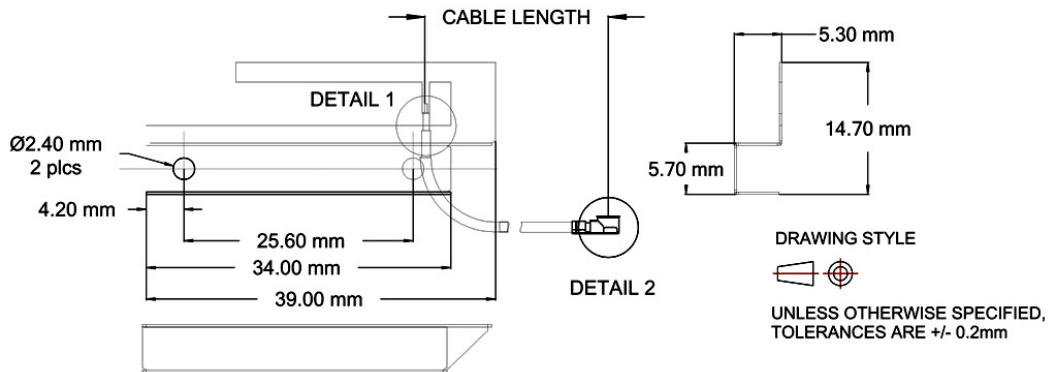


Figure 3
Model M2445J Embedded Antenna
Measured Elevation Radiation Pattern

5. Dimensions



Detail 1 and detail 2 show correct cable connection and orientation

Figure 4
Model M2445J Dimensions

6. ROHS

Model M2445J Embedded Antennas are RoHS compliant.

7. Mounting Guidelines

Model M2445J antennas can be easily mounted on a PCB, or in a product enclosure. This simplifies ID design and shortens product cycle. In Figure 5, PCB mounting is presented. In Figures 6a, 6b, 6c, and Figures 7a, 7b, 7c, 7d, case mounting recommendations are presented.

7.1. PCB Mounting the M2445J

Mount a M2445J on an application PCBA by using a 5 mm x 34.55 mm piece of 1.6 mm thick double sided tape placed underneath the lowest horizontal antenna feature, as shown in Fig. 5. M2445J performance is fairly independent of its location on the PCB, provided it is positioned close to a PCB edge. Place the M2445J with the RF cable toward the board center, parallel to, and less than 1 mm away from the edge of the PCB. Pull back the top copper approximately 0.5 mm from under the antenna on the top layer. Maintain a 10 mm keepout area alongside the M2445J when placing components taller than 2.5 mm on the PCB.

A 3 mm space from the antenna element to the case top is needed to optimize performance.

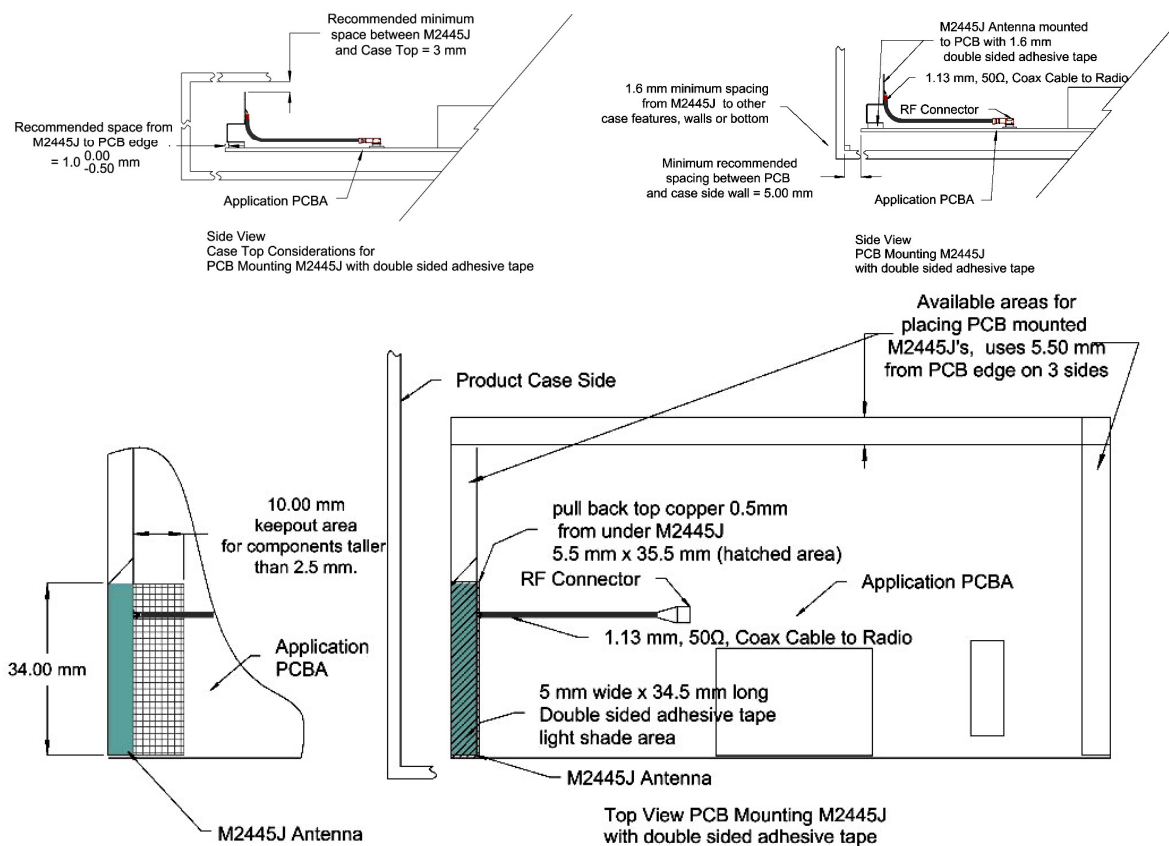


Figure 5

An illustration of a PCB mounted Model M2445J

7.2. Case Mounting the M2445J with plastic posts

The M2445J antenna is fabricated with 2, 2.4 mm mounting holes shown in Figure 6a, which may be used to secure the antenna to the product case side wall if 2 mm plastic posts are integrated in the case side wall design. A 1.6 mm tall, 3 mm shoulder on these posts is recommended to maintain minimum separation between the antenna and case walls.

To minimize stress on the RF Cable, and ensure quality antenna operation, mounting posts should be placed at a height on the case wall so the lowest horizontal antenna feature is at least 1.6 mm above the top plane of the PCB (Fig. 6b). 10 mm spacing between the PCB and the case wall (Fig. 6b), and a 3 mm space from the antenna element to the case top (Fig. 6a) are needed to optimize performance.

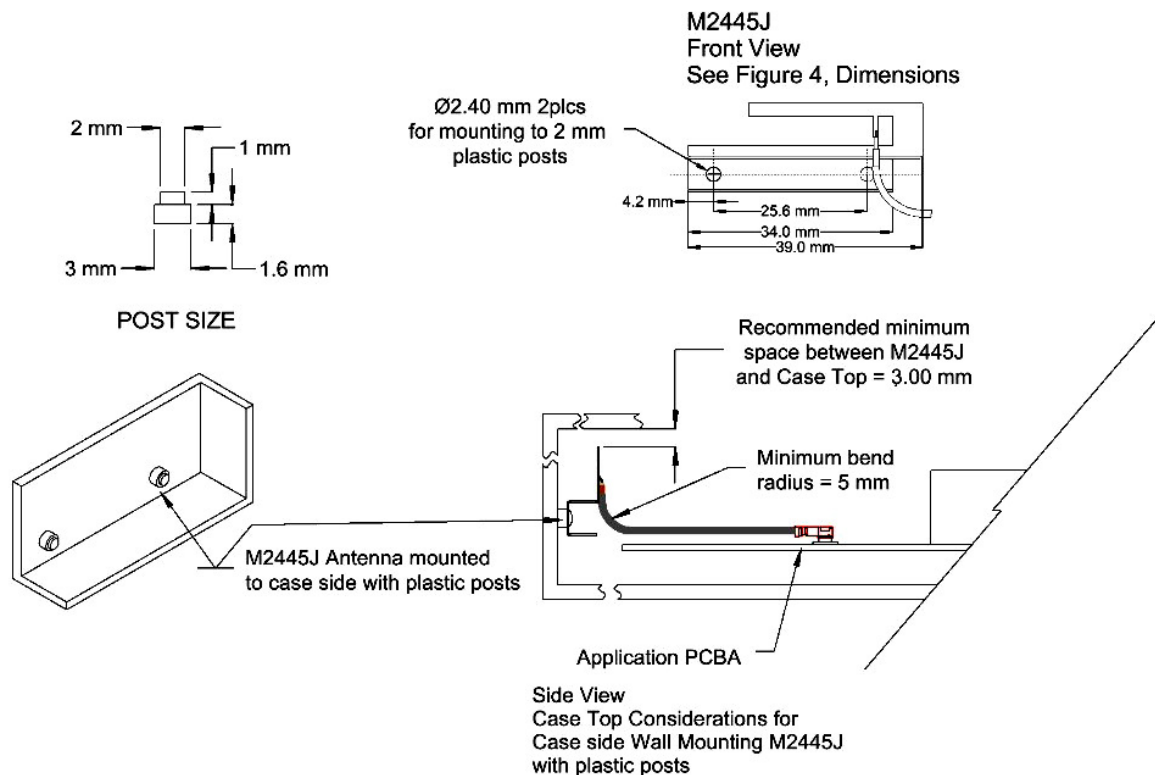


Figure 6a

ILLUSTRATION 1: Side view. Post size and case top clearance considerations when using plastic posts to mount M2445J

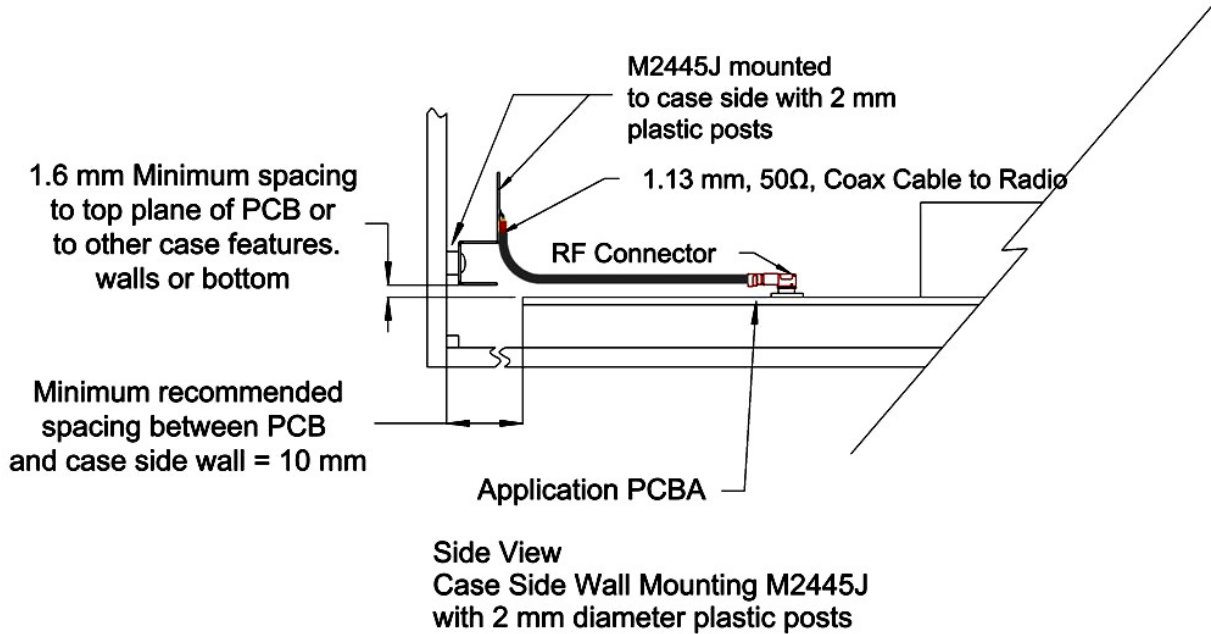


Figure 6b

ILLUSTRATION 2: Side view. Using plastic posts to mount M2445J

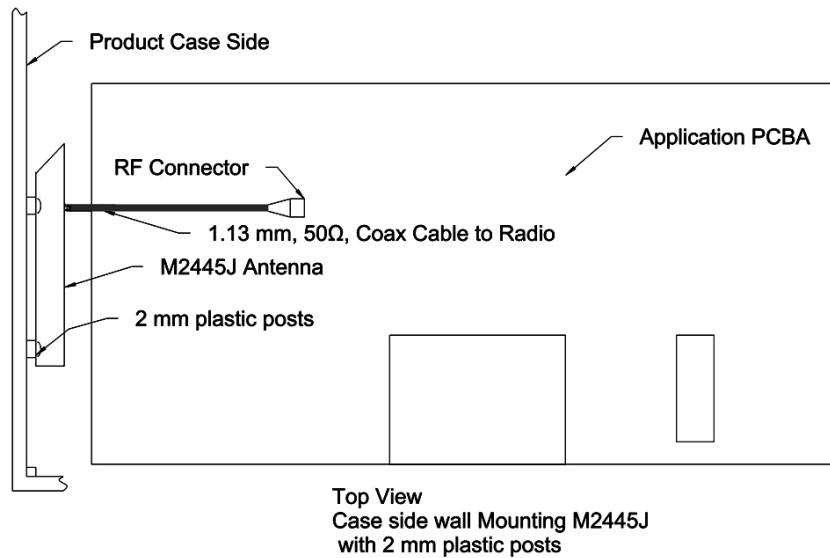


Figure 6c

ILLUSTRATION 3: Top view. Using plastic posts to mount M2445J

7.3. Case Mounting the M2445J with double sided tape

For a case wall mount, tape mount a M2445J in an application case by using a 5 mm x 34.5 mm piece of 1.6 mm thick double sided tape placed behind the lowest vertical antenna feature, as shown in Figure 7a.

Place the M2445J on the case side wall at a height where the lowest horizontal antenna feature is 1.6 mm above the PCB top plane. A space of 10 mm is recommended between the PCB edge near the M2445J and the case wall mounting location.(Figure 7a)

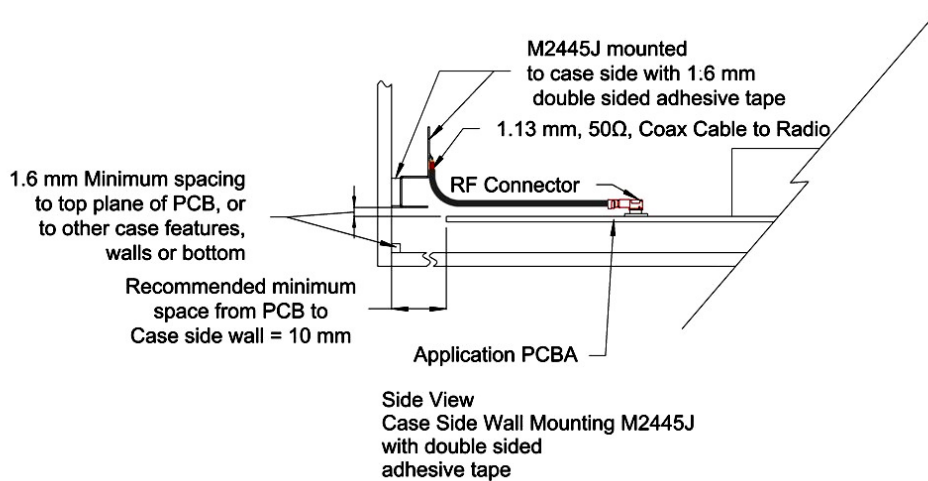


Figure 7a

Case side wall mounting considerations for Model M2445J

Ensure that a space of 3 mm minimum is maintained between the case top and the M2445J as shown in Figure 7b.

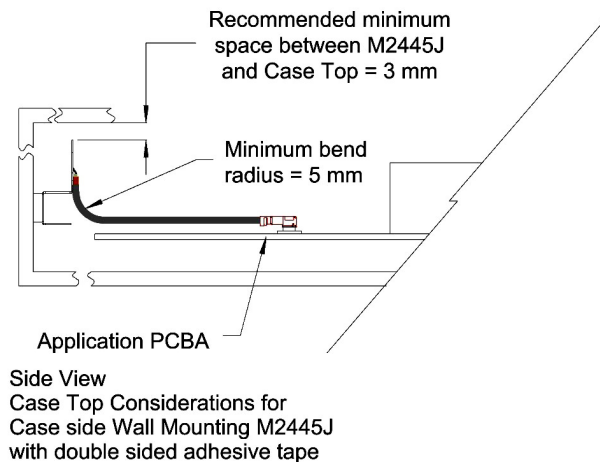


Figure 7b

Case Top clearance considerations for Model M2445J

For a case bottom mount, use a 5 mm x 34.55 mm piece of 1.6 mm thick double sided tape placed under the lowest horizontal antenna feature, as shown in Figure 7c and Figure 7d.

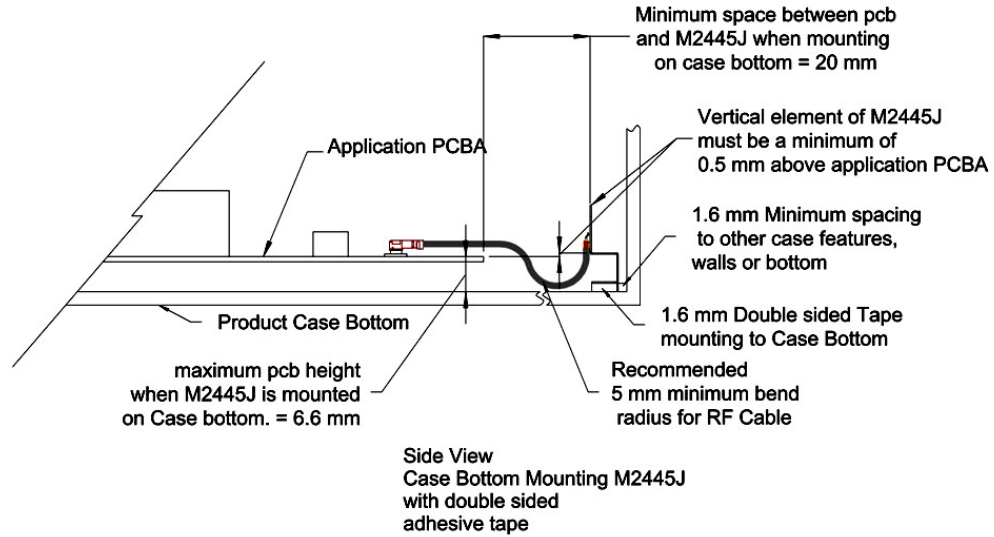


Figure 7c

An Illustration of a Case bottom mounted Model M2445J

A space of 20 mm is recommended between the PCB edge near the M2445J and the case bottom mounting location to minimize bending stress on the RF cable. (Figure 7c)

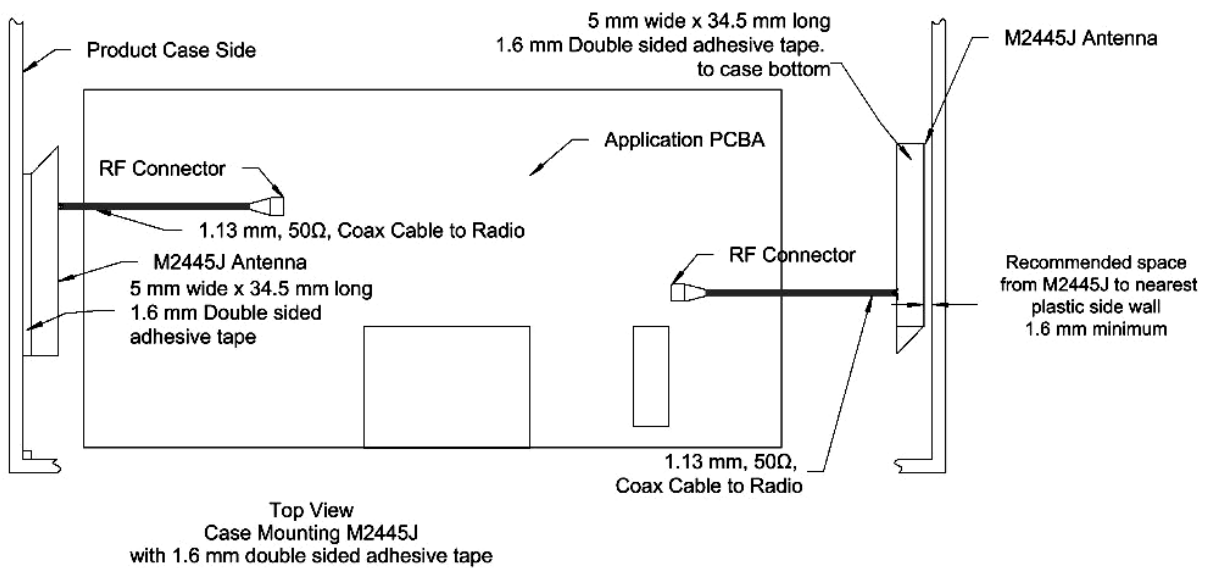


Figure 7d

An illustration of Case mounted Model M2445J's with double sided adhesive tape.

8. Supporting Documents

The following design documents are used as references for design implementation of Airgain Model M2445J Embedded Antenna product:

Dimension Drawing	067-15-00-001-1_ASSY.pdf

9. Feature and Options Information

Airgain Model M2445J Series antennas are equipped with a RF cable I/O interface. Optional cable termination such as U.FL compatible micro coax connectors and cable mounted EMI ferrite cores are available. To aid mounting the M2445J, pre-applied double sided adhesive tape is available in several mounting styles on the M2445J-Tx Series.

9.1. Pre-applied Mounting Tape Information

Airgain Model M2445J-Tx Series antennas are supplied with pre-applied double sided adhesive tape. This mounting method has been tested and verified at Airgain Inc. to provide a RF interference-free attachment technique. A -Tx- suffix specifies tape, typically 1.6 mm thick, applied for mounting in desired orientations as described in Sections 7 and 9.3, and shown in the diagram below.

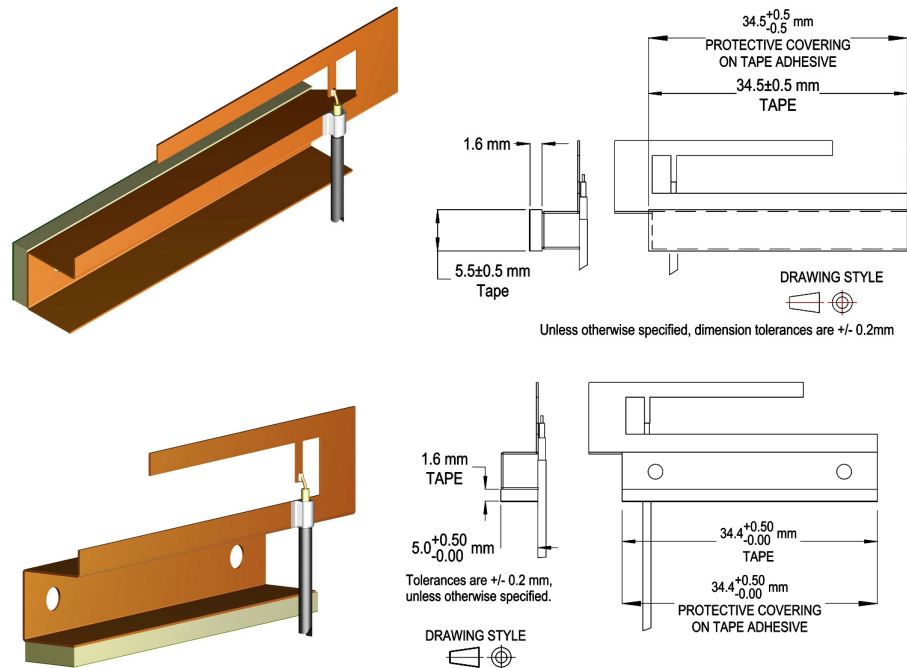


Fig. 8
Example of a M2445J-T0 (top) and a M2445J-T2 (bottom)

9.2. Cable Information

The Model M2445J series antennas are equipped with an RF cable I/O interface attached to the antenna. Airgain standard RF cables use 1.13 mm diameter, micro coax cables, and are available in a variety of lengths and interface options.

9.3. Part number information

Airgain uses a four-staged standard number system for our part numbers, which serially define the antenna type, cable length and connector type/interface, as described below:

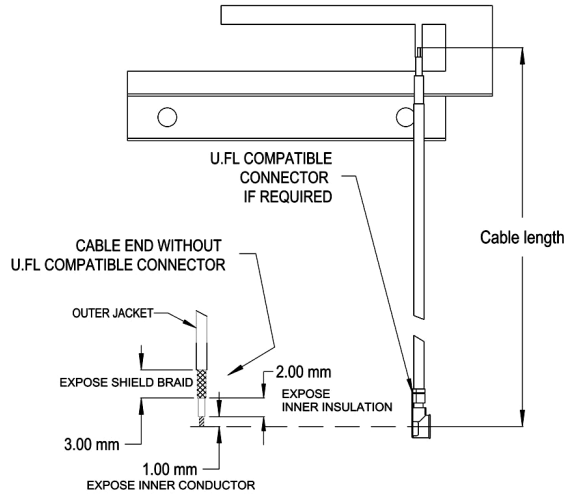
M2445J	-Tx	-100	U
Antenna #	Tape Type (if required)	Cable Length (mm)	Connector Type

Our standard cables are available in the following lengths (in mm): 65, 100, 130, 150, 190, 230, 250, 300, and 400. An example of our standard product offerings and numbering system for 100mm cables is detailed below.

ORDERING NUMBER	PRODUCT INFO
M2445J-100	M2445J antenna and 100mm cable with stripped and tinned end
M2445J-100U	M2445J antenna and 100mm cable with U.FL compatible plug
M2445J-R100U	M2445J antenna and 100mm cable, rotated 30° CCW, with U.FL compatible plug
M2445J-T0-100	M2445J antenna with double-sided tape applied to the vertical mounting surface, and 100mm cable with stripped and tinned end
M2445J-T0-100U	M2445J antenna with double-sided tape applied to the vertical mounting surface, and 100mm cable with U.FL compatible plug
M2445J-T2-100	M2445J antenna with double-sided tape applied to the bottom horizontal mounting surface, and 100mm cable with stripped and tinned end
M2445J-T2-100U	M2445J antenna with double-sided tape applied to the bottom horizontal mounting surface, and 100mm cable with U.FL compatible plug
M2445J-100C	M2445J antenna and 100mm cable with mounted ferrite core and U.FL compatible plug
M2445J-100CS	M2445J antenna and 100mm cable with mounted ferrite core and stripped and tinned end

Other cable lengths, terminations, mounting tapes, and cable mounted ferrite cores can be made available.

A drawing and a data sheet for the interface cable is included in this document, next for reference.



10. Cable Documents

Cable Specification	
A. Material List	
1. Coaxial Cable Type	OD1.13
2. Length of Coaxial Cable/	L= see ordering part numbers
3. Color of Coaxial Cable/	Grey
4. Strip Process/	Tin-coated
5. Strip Dimension/	Shielding:2.0 mm Dielectric:0.6mm Conductor:1.5 mm
6. Strip Process/	Tin-coated □□
7. Strip Dimension/	Shielding:2.0 mm Dielectric:0.6 mm Conductor:1.5 mm
8. Other Parts	None
B. Electrical Testing Data	
9. Application Frequency Range/	DC ~ 6GHz
10. V.S.W.R.	< 1.3 @ DC ~ 3.0 GHz < 1.8 @ 3.0 ~ 6.0 GHz
11. S11 Return Loss	> 20dB @ DC ~ 3.0 GHz > 12dB @ 3.0 ~ 6.0 GHz
12. Impedance	50 ohm

Cable Specification cont'd	
13. Operation Temperature Range	- 40 degree C ~ + 90 degree C
14. Maximum Power	33dBm / 2 W
15. Pull Strength of I-PEX MHF 20278-111R-13	<= 0.4 Kgw

Cable Reliability Testing		
Test Item	Test Condition	Request
1. Low Temperature	Temp.: -40 degree C Time: 48 hrs Recover Time: 2 hrs	1. No Visible Damage 2. V.S.W.R. Tolerance is less 5%
2. High Temperature	Temp.: +90 degree C Time: 48 hrs Recover Time: 2 hrs	1. No Visible Damage 2. V.S.W.R. Tolerance is less 5%
3. Rapid of changing temperature	-40 degree C (30 min) +90 degree C (30 min) 10 cycles	1. No Visible Damage 2. V.S.W.R. Tolerance is less 5%
4. Damp Heat	Temp.:+40 degree C Humidity: 90 % Time: 48 hrs Recover Time: 2 hrs	1. No Visible Damage 2. V.S.W.R. Tolerance is less 5%
5. Salt Moist	5% Salt water Time: 48 hrs Recover Time: 2hrs	1. No Visible Damage 2. V.S.W.R. Tolerance is less 5%

Cable Data Sheet

O.D. 1.13 mm (AWG32) Coaxial Cable Specification		
1. Cable Type	O.D. 1.13 mm (AWG32)	
2. Impedance	50 ± 3 ohm	
3. Inner Conductor	Material	silver-coated cooper
	Conductor Numbers	7
	Conductor Size	0.08 mm
	Outer Diameter	0.24 mm
4. Dielectric Layer	Material	FEP
	Color	Clear
	Average Thickness	0.22 mm
	Diameter	0.68 mm
5. Braid (Shielding)	Material	silver-coated cooper
	Construction	16-4-0.05 mm
	Coverage	90 %
6. Outer Cover	Material	FEP
	Color	Black / white / gray
	Average Thickness	0.10 mm
	Diameter	1.13 ± 0.05 mm
7. V.S.W.R. Testing	< 1.3	
8. Attenuation (dB / 1 meter)	100 MHz	0.60
	400 MHz	1.25
	1800 MHz	2.23
	2400 MHz	2.70
	5200 MHz	4.15
9. Capacitance	97 ± 3 (pF / meter)	
10. Maximum Power	33 dBm	
11. Spark Test	500 V	
12. Rating Temp. and Voltage	200°C / 30V	
13. Conductor Resistance	520 ohm / KM / 20°C max.	
14. Dielectric Resistance	1500 M ohm / KM / 20°C min.	