

Product Datasheet AC94500

Multiband LTE Antenna for Smart Utility Applications

July -2023

Rev. 3.0



Revision History

Date	Rev.	Summary of Changes
October 2022	1.0	First version of Preliminary Product Datasheet
April 2023	2.0	Efficiency and VSWR values updated Minimum fixation torque added Mounting guidelines added
July 2023	3.0	Efficiency table updated to account for measurement tolerances

1 Multiband LTE Antenna

1.1 Scope and purpose

This document describes the AC94500 antenna and its specifications. It is intended for customers deploying infrastructure for smart utility applications:

- Smart Utility infrastructure
- High-, medium- and low-voltage substations monitoring
- Asset management, attack protection and self-healing grids
- Power plants and industry

1.2 AC94500 features

- Low profile and low visibility antenna with M18 threaded spigot for metallic surface mounting
- Excellent multiband coverage including 450-470MHz, 700-960MHz and 1700-2700MHz
- Optimized performance at 450MHz to 470MHz
 - $VSWR \leq 1.8 :1$
 - Efficiency up to 80%
 - Peak Gain $\leq 4dBi$
- Weatherized assembly for outdoor installation
 - Antenna rated IP-67
 - UV protection
 - Impact resistance rated IK10
- Unique triangular product ID and customized (optional) label designed to blend well into utility infrastructure, minimize maintenance and provide deterrence against vandalism.
 - Designed for metal plates with a maximum surface thickness of 9 mm
 - Mounting hole diameter: 20 mm

1.3 Antenna specifications

Table 1: AC94500 RF specifications

Electrical Specifications*			
Frequency Range (MHz)	450 – 470	700 – 960	1700 – 2700
VSWR	≤ 1.8:1	≤ 3.0:1	≤ 3.0:1
Efficiency (%)	62 - 80	55 - 81	60 - 77
Peak Realized Gain (dBi)	< 4.0	< 5.2	< 7.1
Reference Impedance (Ω)	50		
Radiation Pattern	Quasi-hemispherical		
Polarization	Linear		
Maximum Input Power (W)	45		
* Measured on a 50 x 50 cm metal plate			

Table 2: AC94500 physical and environmental specifications

Physical Specifications	
Dimensions W x L x H (mm)	148 x 164.7 x 50
Weight (kg)	0.47
Cable Type, Length	CFD200 compatible, 1m, 2m or 5m
Connector Type	SMA male
Materials	Radome:ABS Base:Zinc Alloy
Minimum mounting torque	10Nm

Environmental Specifications	
Operating Temperature	-40°C to +85°C
Operating relative humidity	Up to 98%
Storage Temperature	-40°C to +85°C
Storage Humidity	5% to 95% non-condensing
Material Compliance	RoHS
Ingress Protection	IP67
Impact Resistance	IK10
UV Protection	Yes
Enclosure flammability Rating	UL 94-HB
Salt Spray	MIL-STD 810F/ASTM B117

Note: For all dimensions, the ISO 2768-mK standard is followed. For the outer dimensions this means a tolerance of $\pm 0.5\text{mm}$ is applicable

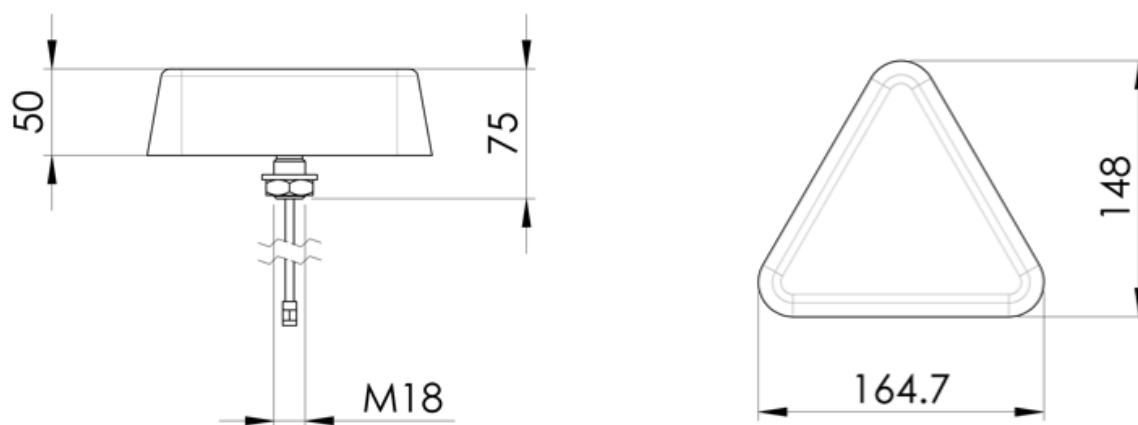


Figure 1: AC94500 dimensions in mm

1.4 RF Performance Measurements: VSWR

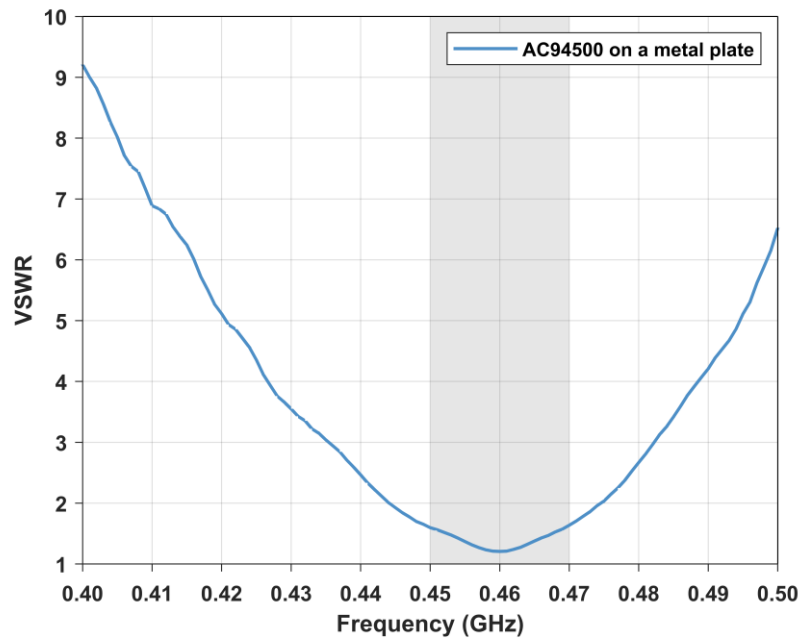


Figure 2: AC94500 VSWR measurements in the 400MHz –500MHz range

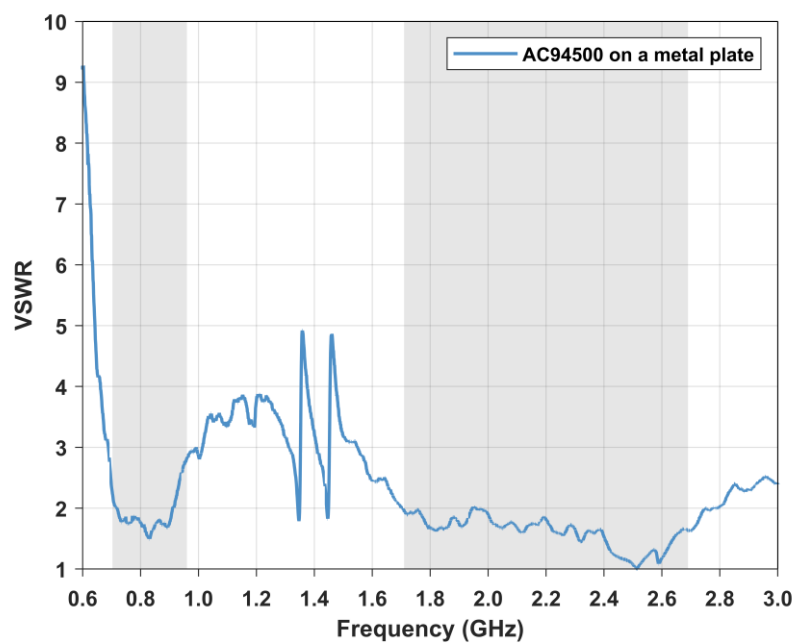


Figure 3: AC94500 VSWR measurements in the 600MHz –3000MHz range

1.5 RF Performance Measurements: Total Efficiency

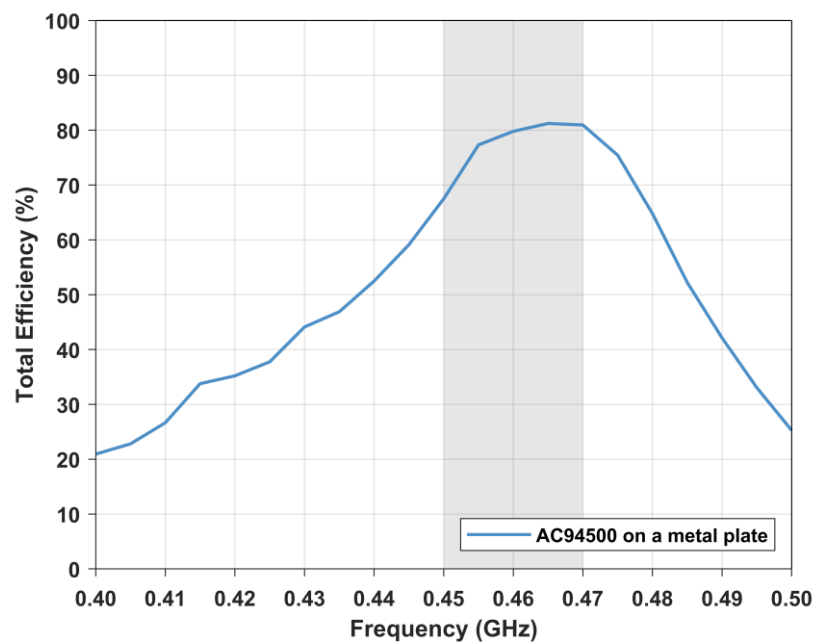


Figure 4: AC94500 efficiency measurements in the 400MHz – 500MHz range

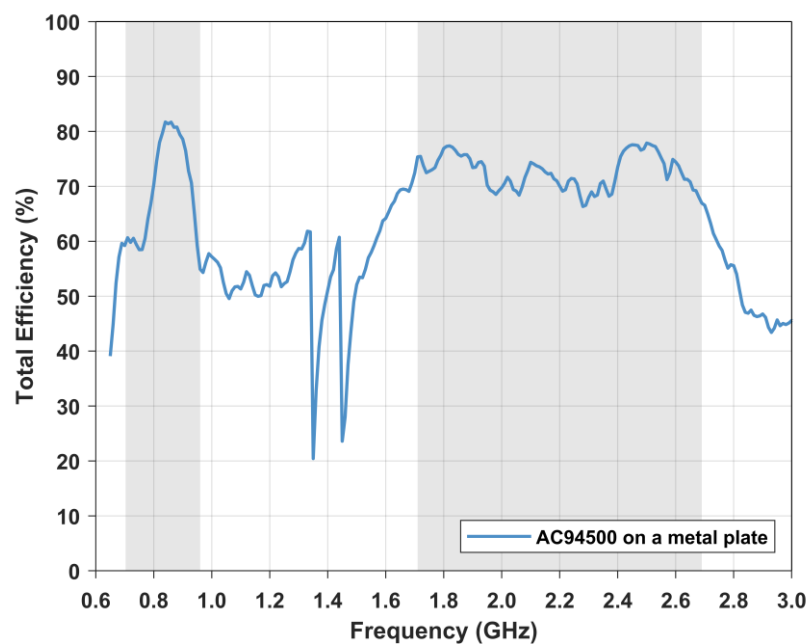


Figure 5: AC94500 efficiency measurements in the 650MHz – 3000MHz range

1.6 Radiation pattern

The table below shows the typical measured radiation patterns of the AC94500 antenna in free space on a 50 x 50cm metal plate. The patterns are evaluated along the XZ, YZ and XY planes as illustrated in below figure for panel mount.

Pictures of the test-setup are depicted in below figure.

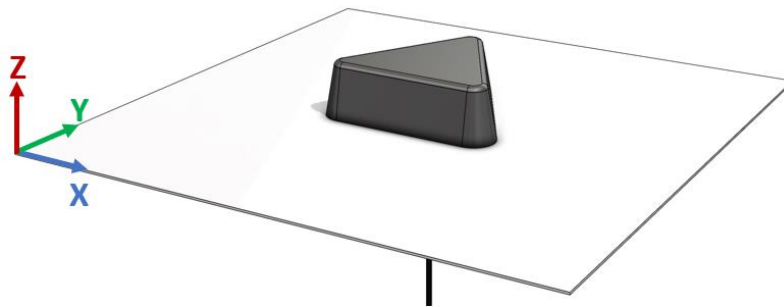
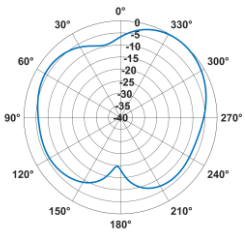
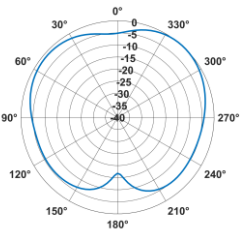
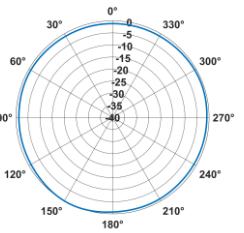
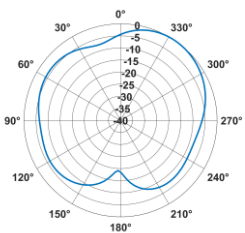
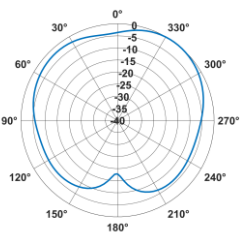
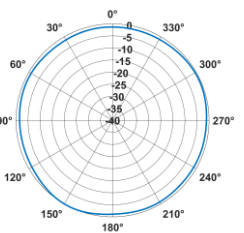
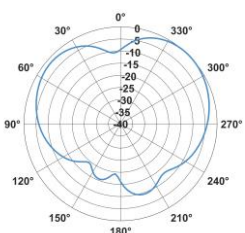
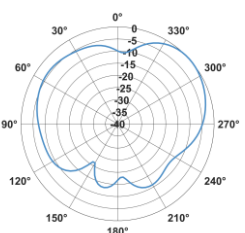
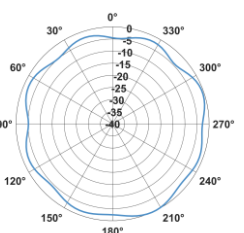
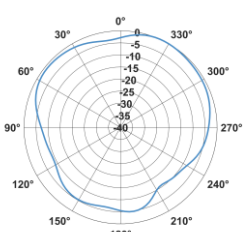
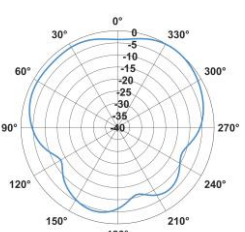
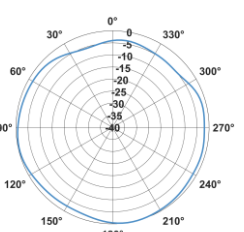


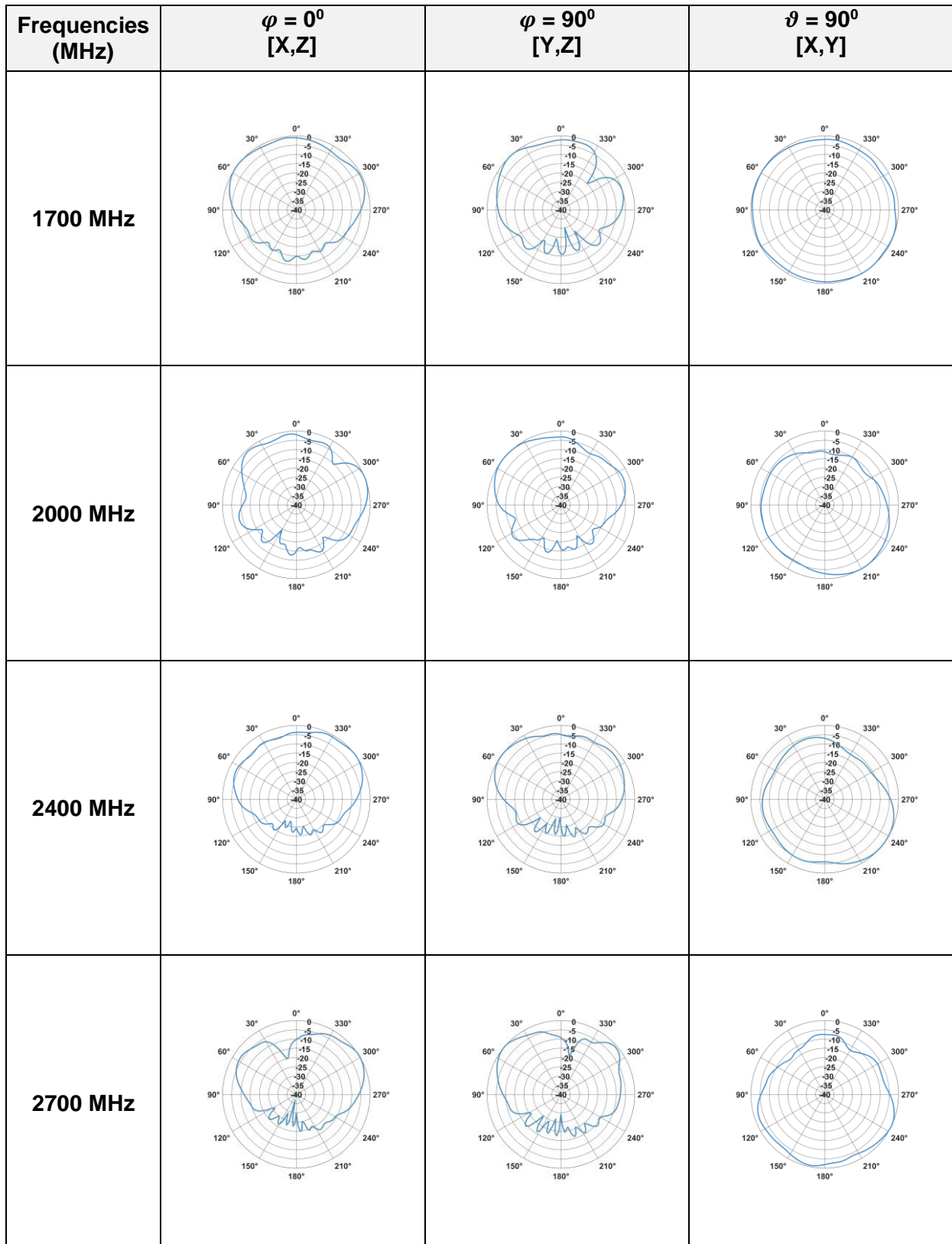
Figure 6: Illustration of evaluation planes for radiation pattern measurements



Figure 7: Test chamber pictures of the radiation pattern measurement setup

Table 3: Radiation patterns of AC94500 on a 50 x 50cm metal plate

Frequencies (MHz)	$\varphi = 0^\circ$ [X,Z]	$\varphi = 90^\circ$ [Y,Z]	$\vartheta = 90^\circ$ [X,Y]
450 MHz			
470 MHz			
700 MHz			
900 MHz			



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2 Product Handling

2.1 Assembly Recommendations

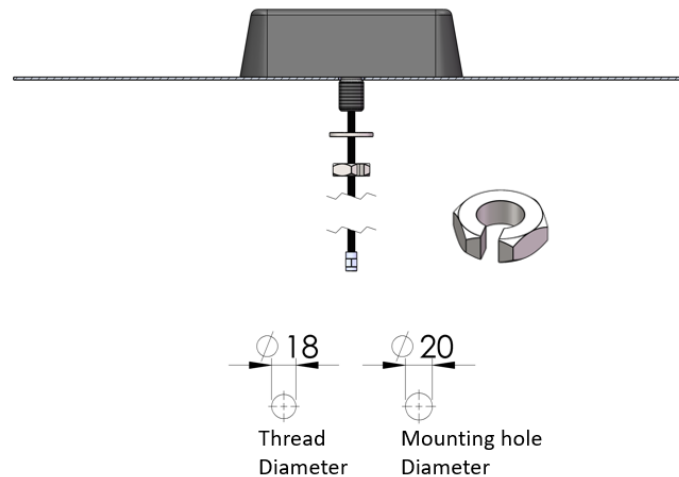


Figure 8: Assembly recommendations of the AC94500

2.2 Product Marking

The AC94500 label can be customized as shown below. The label is included as a separate accessory in the product box.


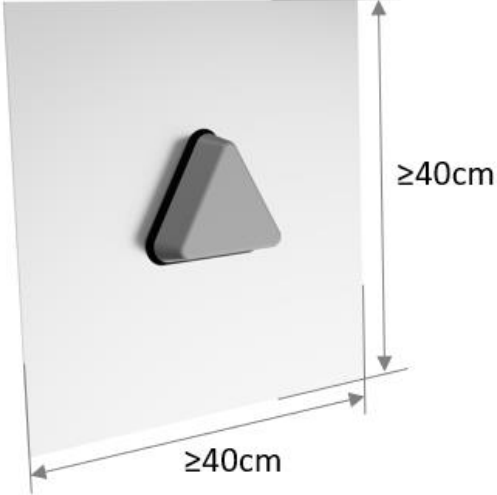
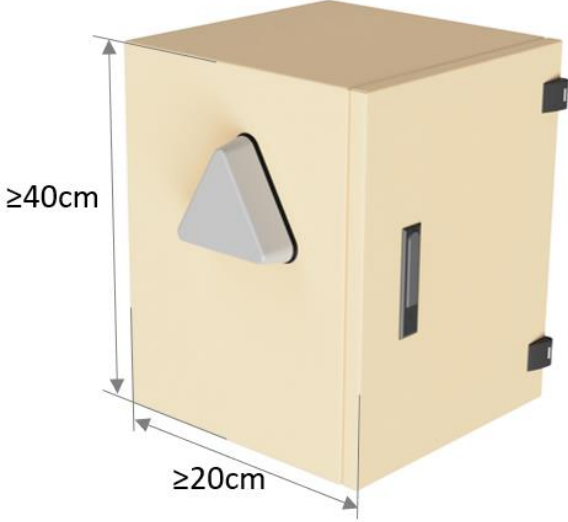
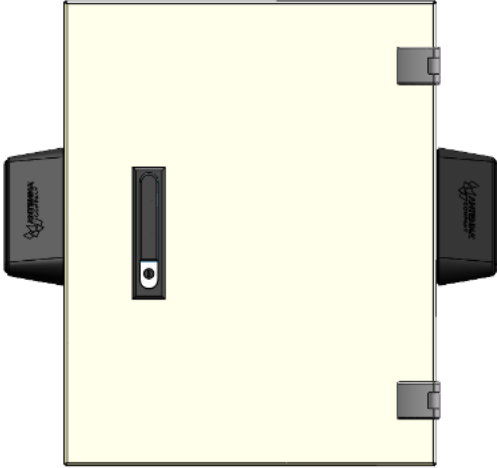


Figure 9: Illustration of the customized (optional) label that could be stuck on the top surface of the AC94500

2.3 Mounting options

The AC94500 is designed for installation on metal surfaces. The antenna can be mounted on metal walls, metal doors and metal cabinets. A metal plate with a minimum size of 40 x 40mm is required for installation on non-conductive surfaces (e.g. concrete or brick walls). The different mounting schemes are illustrated in the table below.

Table 4: mounting options of the AC94500 antenna

Wall mount on metal surface	Wall mount with metal plate
	
Cabinet mount	Cabinet mount, 2x2 MIMO
	

2.4 Mounting instructions

The installation parts are depicted in below figure.

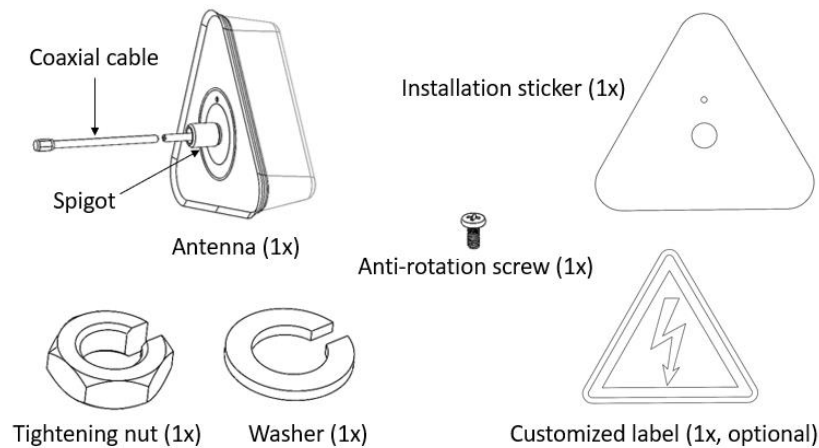
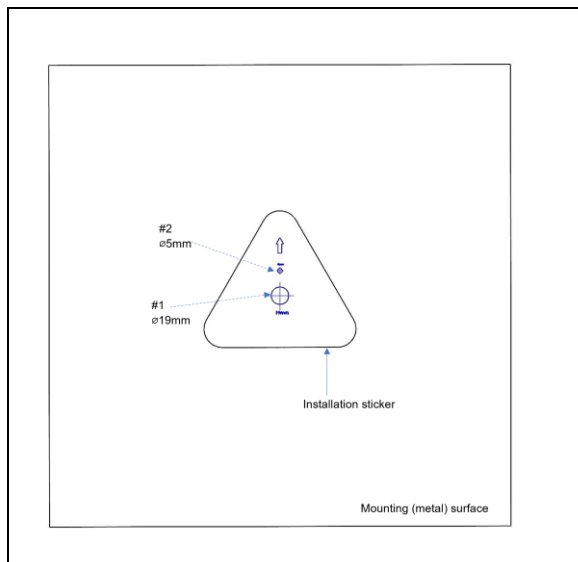
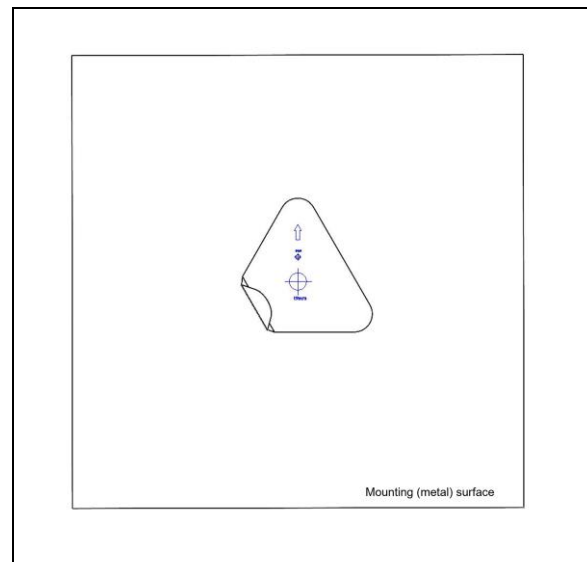


Figure 10: AC94500 installation parts

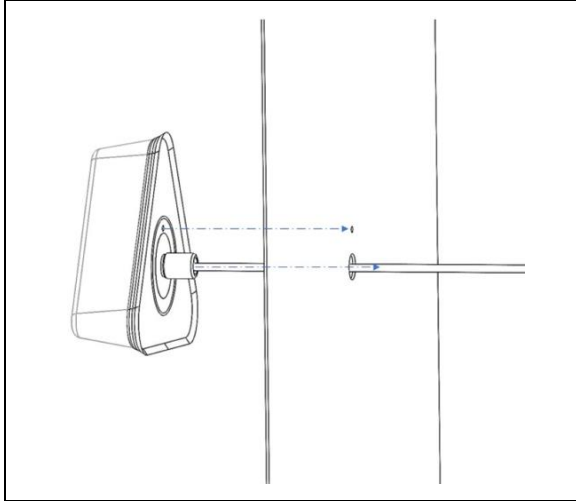
For proper installation of the antenna, follow the recommended steps 1 to 6.



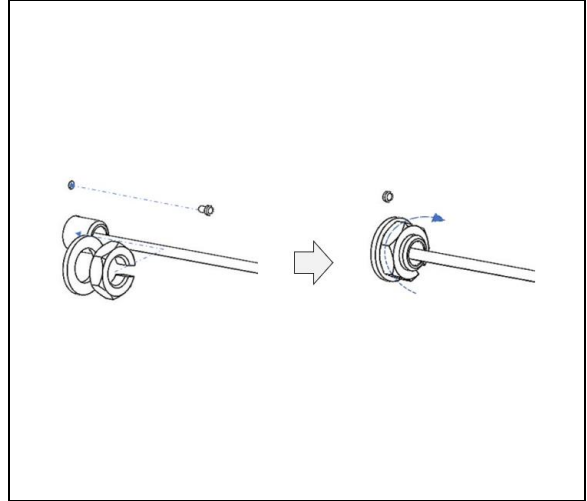
Step1: Determine the antenna location on the mounting surface. Use the provided installation sticker to drill the spigot hole (# 1) and the anti-rotation hole (# 2).



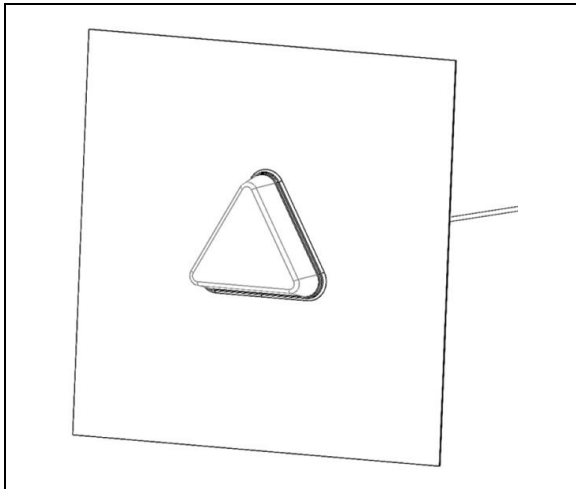
Step 2: Remove the installation sticker. Clean the mounting surface and ensure it's completely dry.



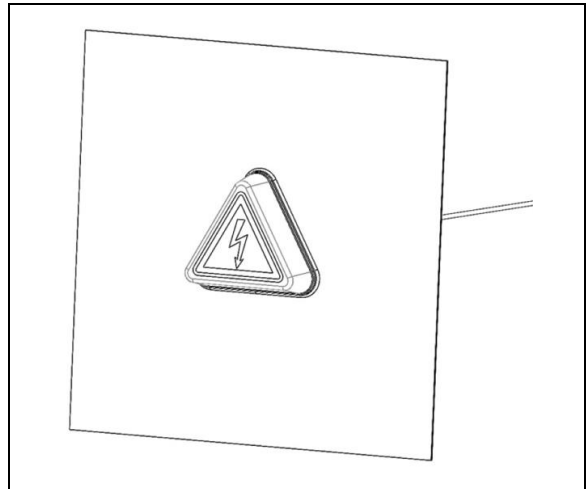
Step 3: Route the coaxial cable through the spigot hole in the mounting surface. Align the anti-rotation hole with the corresponding threaded opening in the antenna base plate. Note: avoid sharp bends when routing the coaxial cable.



Step 4: Insert the washer, the tightening nut and the anti-rotation screw to secure the antenna in place (use the split in the nut to slide it easily through the coaxial cable). Note: The minimum torque for proper ground contact with the installation surface is 10Nm.



Step 5: Completed installation



Step 6: (optional): Place the customized label

2.5 Packaging

The AC94500 is packed in a unit carton box as illustrated in below figure. For large quantities, 8 unit boxes will be packed in one outer box.

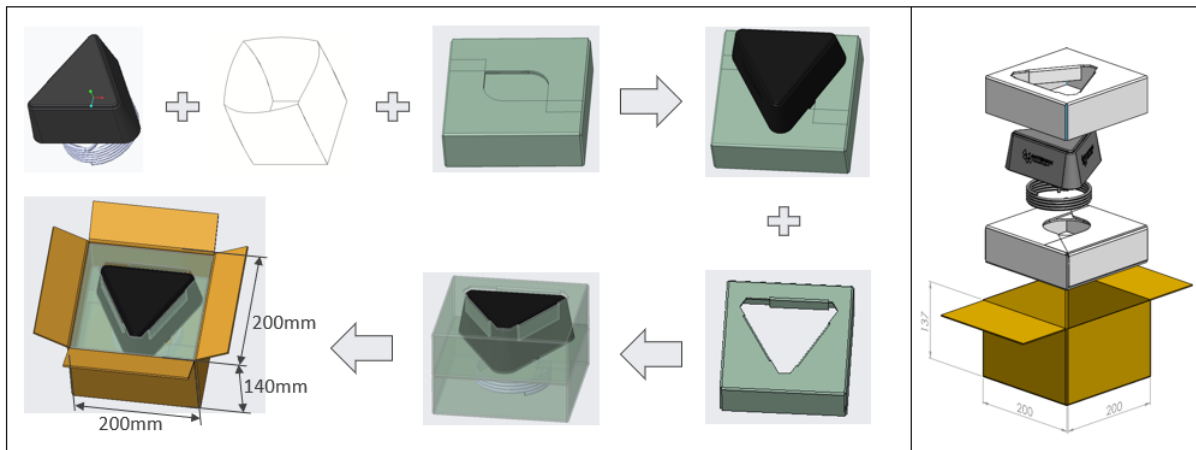


Figure 11: AC94500 Packaging Details



Figure 12: Unit box of the AC94500

2.6 Ordering Information

Orders should be placed at orders@antennacompany.com.

For purchase orders please state: Part number, description, quantity, and price

Table 5: AC94500 ordering information and MOQ (Minimum Order Quantity).

Part Number	Description	MOQ [pcs]
AC94500-100	Multi-band ruggedized low profile LTE antenna for Smart Utility Applications with 100cm cable	Contact Sales
AC94500-200	Multi-band ruggedized low profile LTE antenna for Smart Utility Applications with 200cm cable	Contact Sales
AC94500-500	Multi-band ruggedized low profile LTE antenna for Smart Utility Applications with 500cm cable	Contact Sales
AC94500-100A	Multi-band ruggedized low profile LTE antenna for Smart Utility Applications with 100cm cable and customized label as accessory	Contact Sales
AC94500-200A	Multi-band ruggedized low profile LTE antenna for Smart Utility Applications with 200cm cable and customized label as accessory	Contact Sales
AC94500-500A	Multi-band ruggedized low profile LTE antenna for Smart Utility Applications with 500cm cable and customized label as accessory	Contact Sales

2.7 Environmental Compliances

The AC94500 product complies with all international norms as listed in below table.

Table 6: AC94500 environmental compliance overview

Region	Regulation	Reference	Compliant
US	US EPA Toxic Substances Control Act amended December 2020 Declaration	TSCA Section 6(h)	✓
US	California Proposition 65 Safe Drinking Water & Toxic Enforcement Act of 1986 Declaration		✓
EU	RoHS 3	EU 2015/863	✓
EU	EU REACH	EU 1907/2006	✓
WW	Responsible Minerals Initiatives		✓
EU	Persistent Organic Pollutants	(EU) 2019/1021	✓
EU	Packaging Directive	94/62/EC	✓
EU	PFOA Free	2006/122/ECOF	✓
US	UL Mark	UL 94-HB	✓
WW	Salt spray	MIL-STD 810F/ASTM B117	✓

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