

# Part No. AP522304

## Automotive Broadband FR4 Embedded Cellular Antenna

850 / 900 / 1800 / 1900 / 2100 MHz

Supports: SigFox, LoRa, Cellular LPWA, RPMA



### Automotive FR4 Embedded Cellular Antenna

Low Band 824 – 960 MHz

High Band 1710 - 2170 MHz

#### KEY BENEFITS

##### Reduced Costs and Time-to-Market

Standard antenna eliminates design fees and cycle time associated with a custom solution; getting products to market faster.

##### Greater Flexibility with Unique Form Factors

Ethertronics' technology helps you deliver more advanced ergonomic designs without adverse impact on product performance.

##### Reliability

Comply with latest RoHS requirements

#### APPLICATIONS

- Medical applications
- Home automation
- Smart metering
- M2M, Industrial devices
- IoT
- Firstnet
- Automotive
- Healthcare (FDA Class I) Applications
- Point of Sale
- Tracking
- Cellular
- 3G Systems

KYOCERA AVX A-Series automotive antennas deliver on the key needs of device designers for higher functionality.

KYOCERA AVX has completed rigorous testing to qualify the A-series antennas for automotive applications. Although the AEC-Q200 standard does not include antenna products, all testing has been done following applicable AEC-Q200 requirements and procedures as closely as possible. Customers must provide additional quality requirements, if any, to drive additional compliance testing.

#### Electrical Specifications

Typical Characteristics, on 50 x 110 mm PCB

Frequency	824 - 960 MHz	1710 - 2170 MHz
Efficiency	62%	55%
VSWR	2.5:1 max	2.7:1 max
Peak Gain	0 dBi	0.7 dBi
Polarization	Linear	
Power Handling	2 Watts CW	
Radiation Pattern	Omni-directional	
Feed Point Impedance	50 ohms unbalanced	

#### Mechanical Specifications & Ordering Part Number

Ordering Part #	AP522304
Dimensions (mm)	35.0 x 9.0 x 3.3
Weight (grams)	2.1
Mounting	SMT (P&P)
Packaging	1,120 pcs/reel; 5,600 pcs/box
Demo Board	P522304-02
Temperature Range	-50/+125 °C
Temperature Cycle	IEC 60068-2-14
Temperature Exposure	Mil-STD-202 Method 108
High Temperature & High Humidity	MIL-STD-202
Mechanical Shock	IEC 60068-2-27
Vibration	IEC 60068-2-6

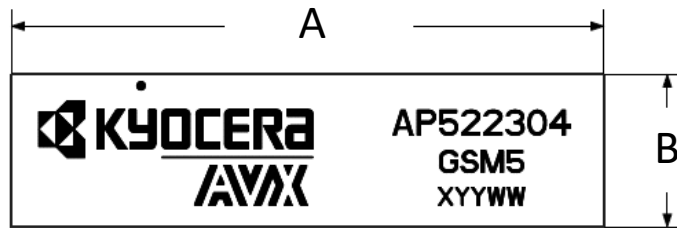
IMDS and PPAP available

Automotive AP522304 Broadband FR4 Embedded Cellular Antenna Specifications.  
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs.

### Antenna Dimensions

Typical antenna dimensions (mm)

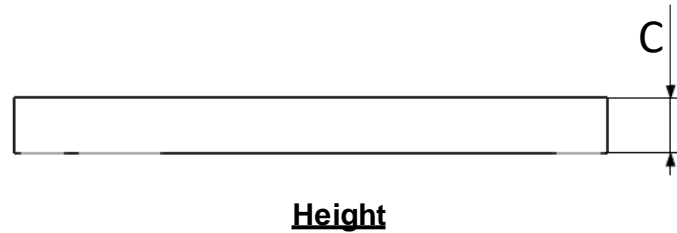
Part Number	A	B	C
AP522304	35.0 ± 0.2	9.0 ± 0.2	3.3 ± 0.33



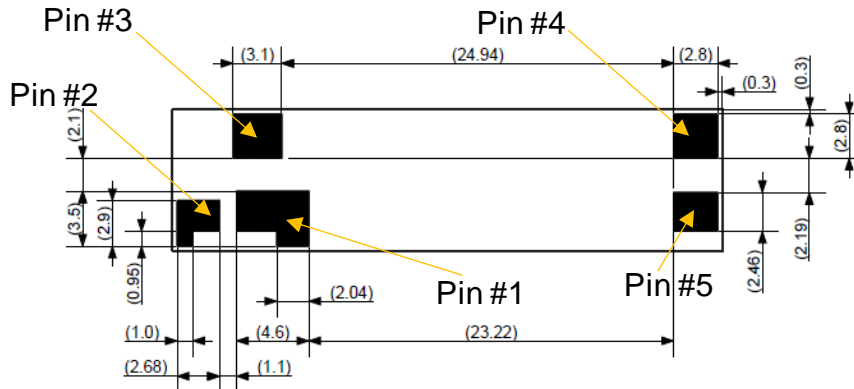
**Top View**

### Pin Descriptions

Pin#	Description
1	Feed
2	Ground
3	Dummy Pad
4	Dummy Pad
5	Low Band Tuning



**Height**



**Bottom View**

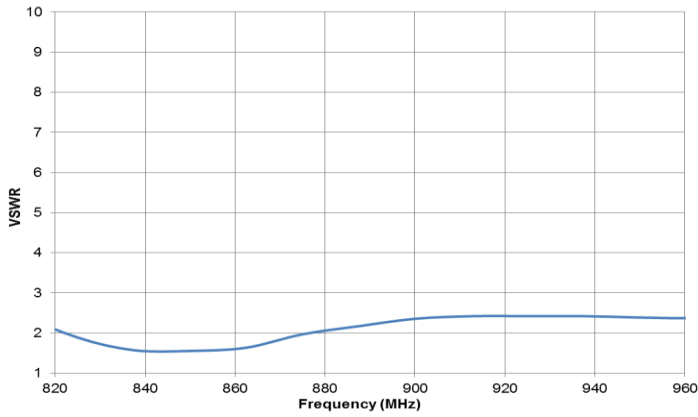
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### VSWR and Efficiency Plots

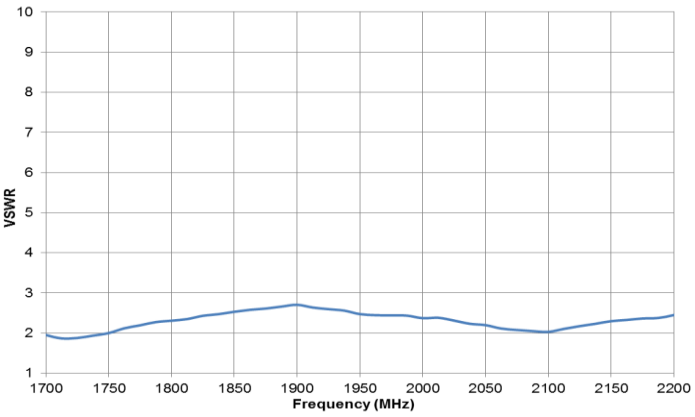
Typical Performance on 50 x 110 mm PCB



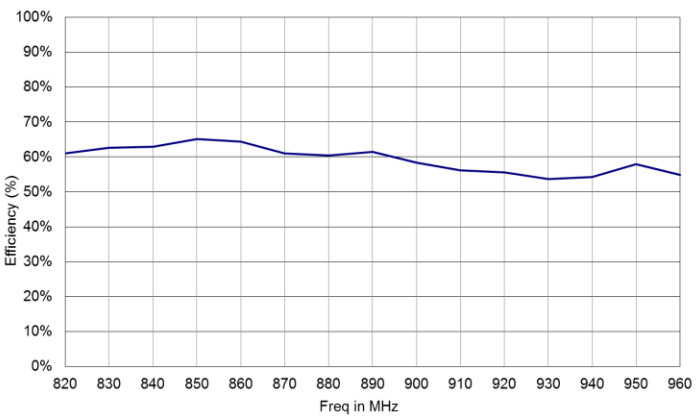
**Low Band VSWR**



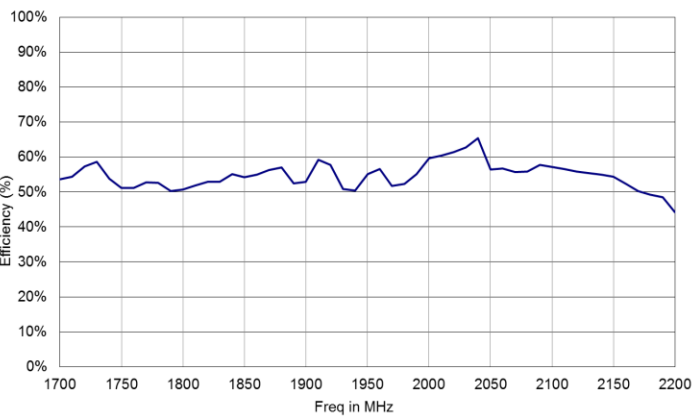
**High Band VSWR**



**Low Band Efficiency**



**High Band Efficiency**



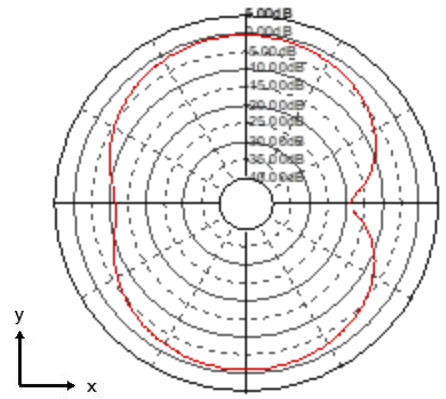
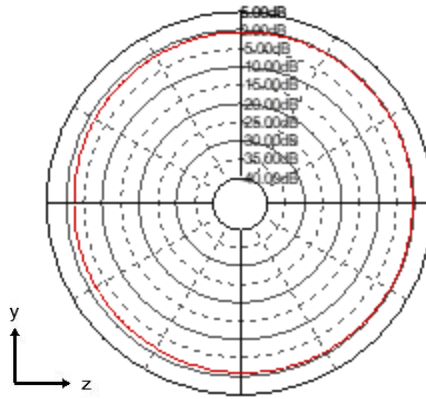
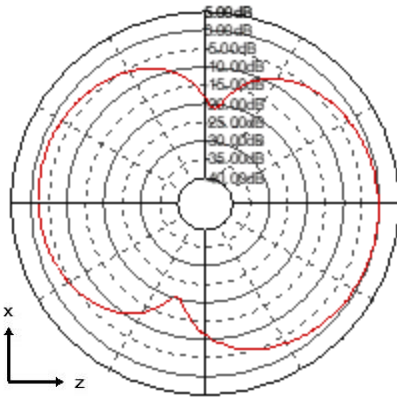
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### Antenna Radiation Patterns

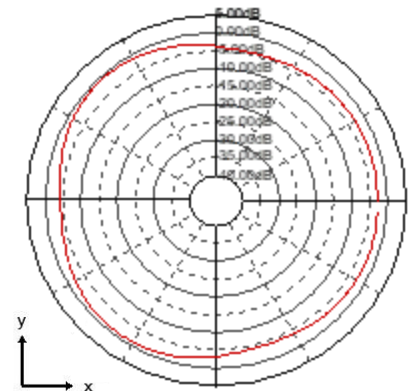
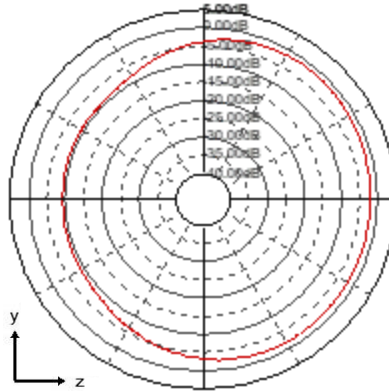
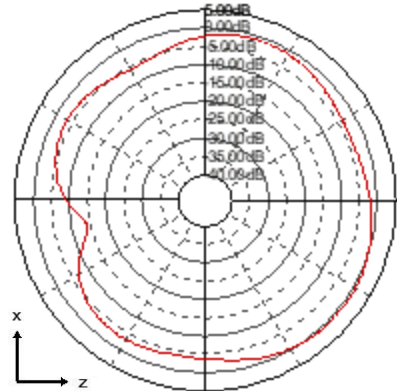
Typical Performance on 50 x 110 mm PCB  
 Measured @ 910, 1870 MHz



Measured at 910 MHz



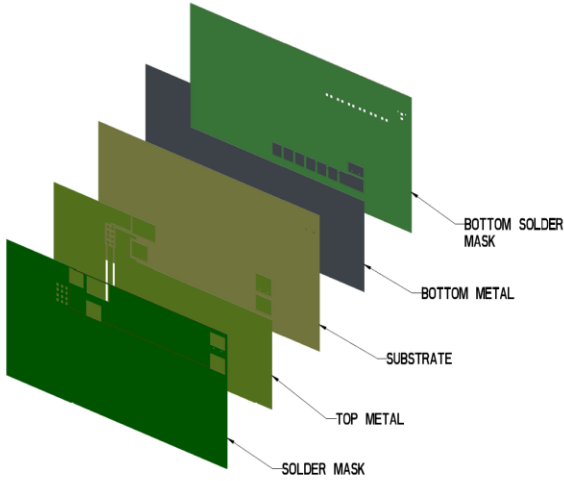
Measured at 1870 MHz



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**Antenna Layout**

Typical layout dimensions (mm)



\* VIAS: Diam. 0.2mm, (no vias on transmission lines).  
 Via holes must be covered by solder mask

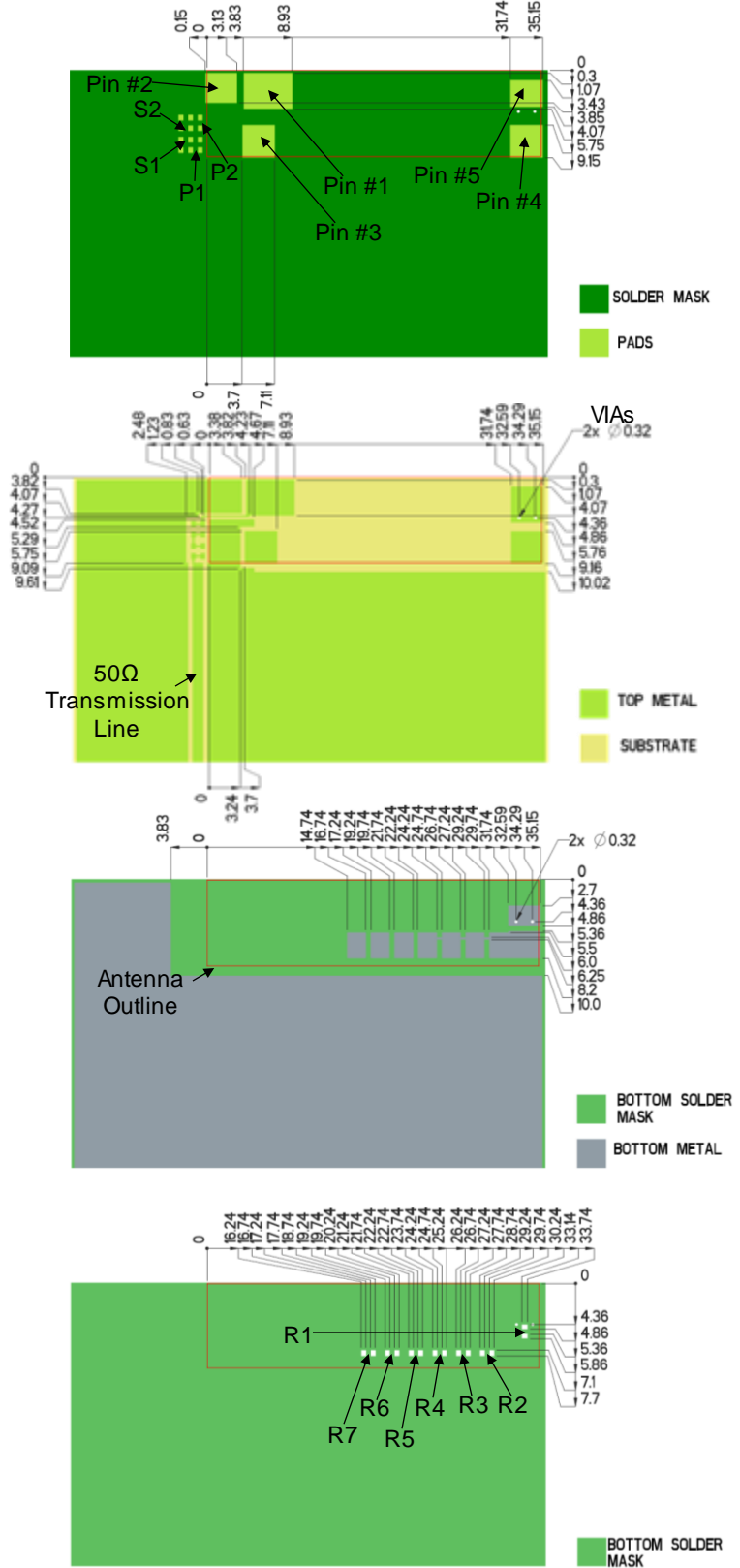
**Pin Descriptions**

Pin#	Description
1	Feed
2	Ground
3	Dummy Pad
4	Dummy Pad
5	Low Band Tuning

**Matching & Tuning Component Values**

Component	Value	Tolerance
P1	3.6nH	±0.05nH
S1	1.2pF	±0.05pF
S2	15nH	±0.3nH
P2	1.8pF	±0.05pF
R1 – R7	<b>DNI</b>	N/A

Default Pi Matching Network values and (R1- R7) tuning instructions can be found under Antenna Matching Structure..

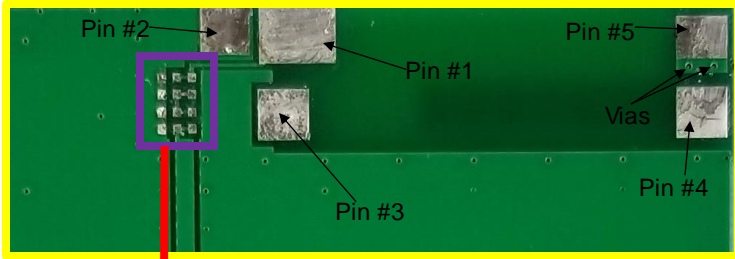


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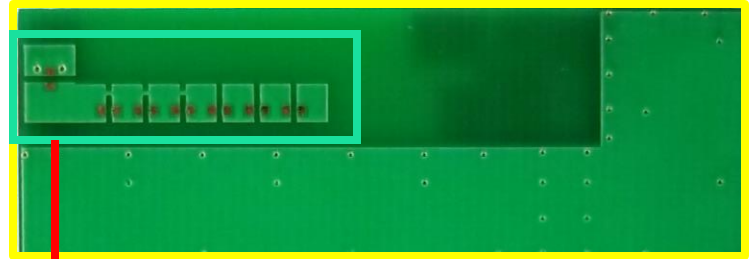
### Antenna Matching Structure

Typical matching values on 50 x 110 mm PCB

Demo Board Front View

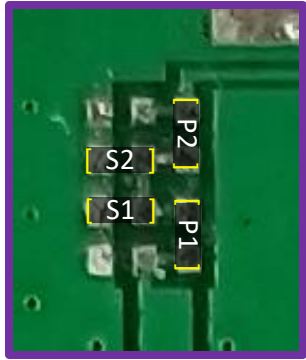


Demo Board Back View



Antenna Matching

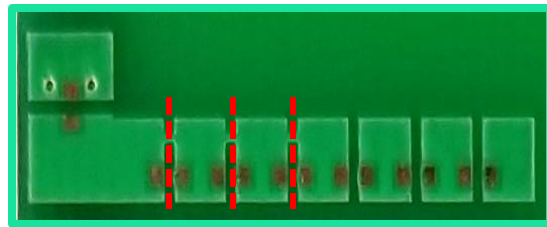
Low Band Tuning



(Antenna Matching): pads are directly inline with the antenna feed trace.

Tune Low Band Higher (Cut Bridge Trace)

Tune Low Band Lower (Add 0Ω)



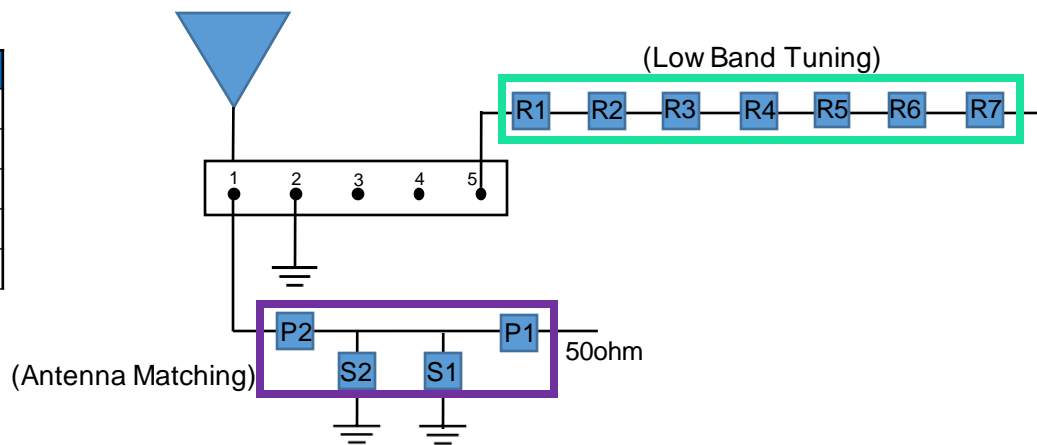
\*Cut Trace between pads shifts resonant frequency higher



\*Bridging gaps with 0 ohm resistors shifts resonant frequency lower

### Pin Descriptions

Pin#	Description
1	Feed
2	Ground
3	Dummy Pad
4	Dummy Pad
5	Low Band Tuning



	P1	S1	S2	P2	(R1 - R7)
<b>Default Matching</b>	3.6nH	1.2pF	15nH	1.8pF	DNI
<b>Tolerance</b>	±0.05nH	± 0.05pF	±0.3nH	± 0.05pF	N/A

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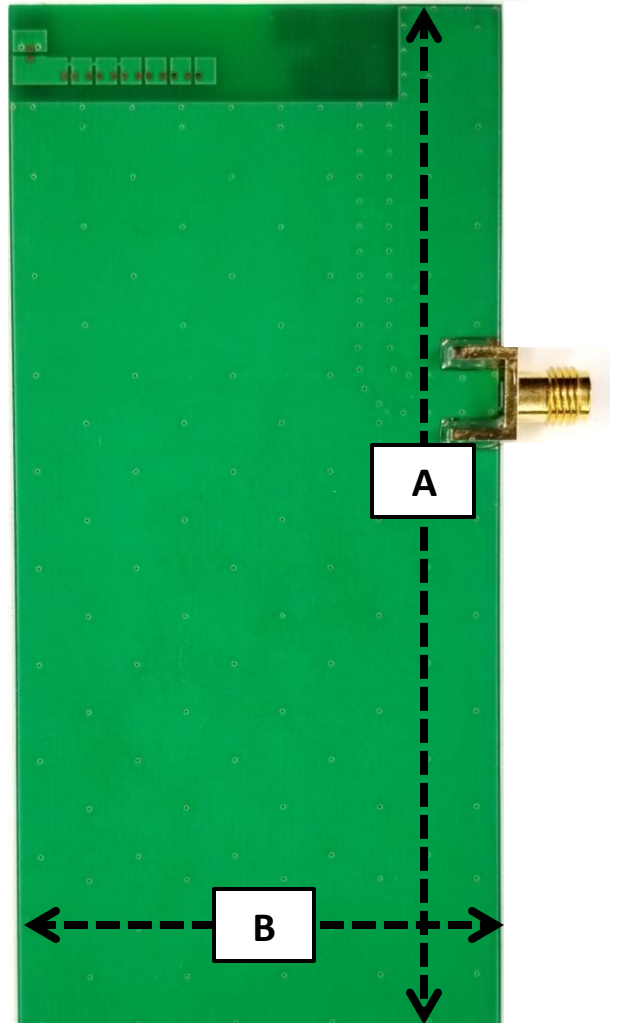
**Antenna Demo Board**

Demo Board Front View/Back View

Part Number	A	B	C
P522304-02	110	50.0	15.0



**Front View**



**Back View**