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.

Environmental Compliance

Comply with latest RoHS requirements

APPLICATIONS

- Medical applications
- Home automation
- Smart metering
- M2M, Industrial devices
- IoT
- Firstnet
- Automotive
- 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

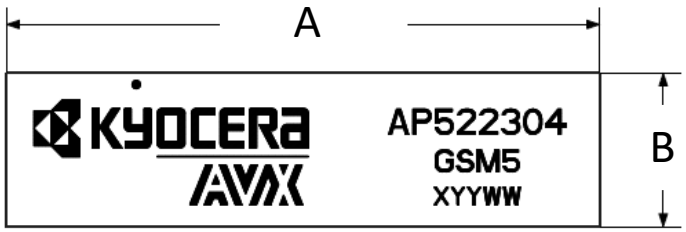
Ordering Part #	AP522304
Dimensions (mm)	35.0 x 9.0 x 3.3
Weight (grams)	2.1
Mounting	SMT (P&P)
Packaging	1,120 pcs/reel; 5,600 pcs/box
Demo Board	P522304-02
Temperature Range	-50/+125 °C
Temperature Cycle	IEC 60068-2-14
Temperature Exposure	Mil-STD-202 Method 108
High Temperature & High Humidity	MIL-STD-202
Mechanical Shock	IEC 60068-2-27
Vibration	IEC 60068-2-6
IMDS and PPAP available	
Additional Resources	Download DXF, Gerber and 3D FIT Files

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

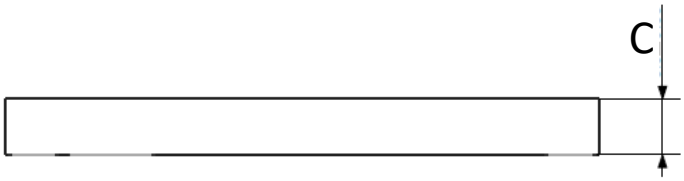
Antenna Dimensions

Typical antenna dimensions (mm)

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



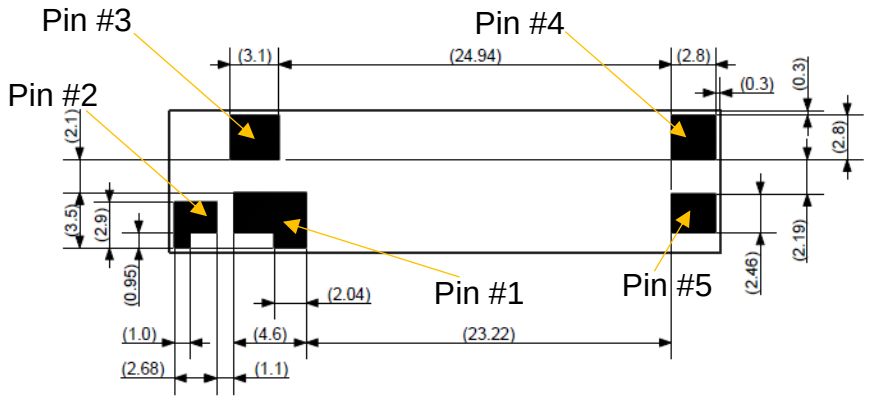
Top View



Height

Pin Descriptions

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



Bottom View

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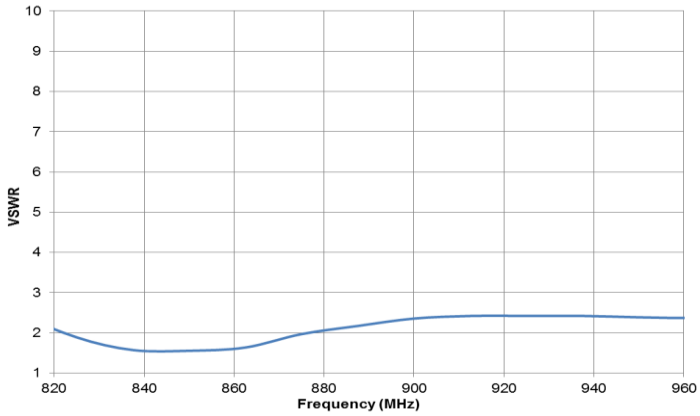
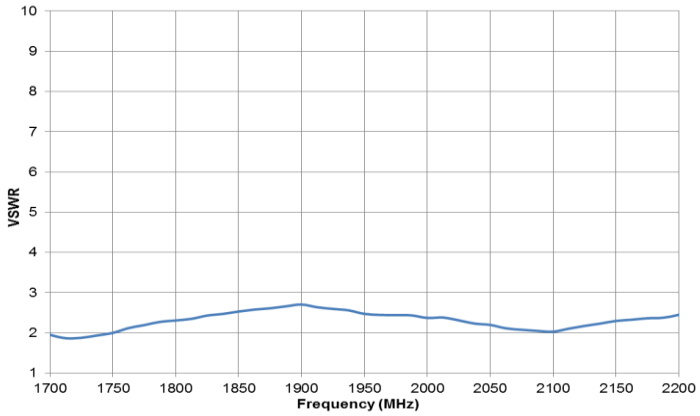
VSWR and Efficiency Plots

Typical Performance on 50 x 110 mm PCB

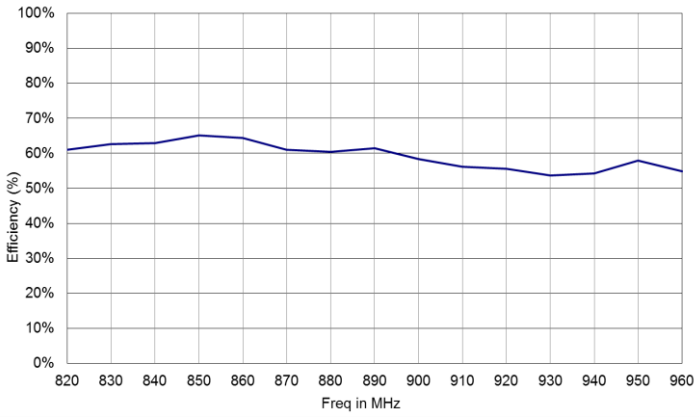
Low Band VSWR



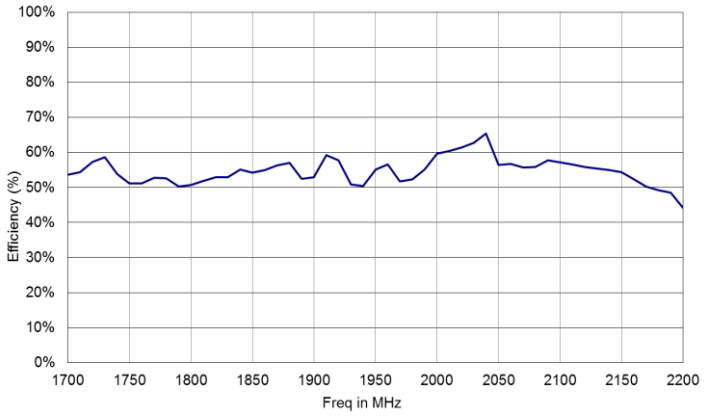
High Band VSWR



Low Band Efficiency



High Band Efficiency



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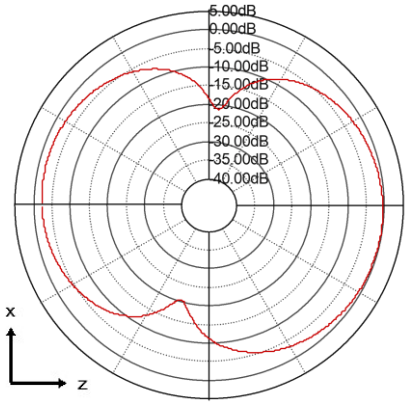
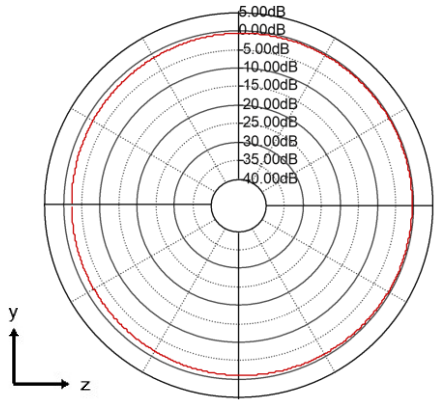
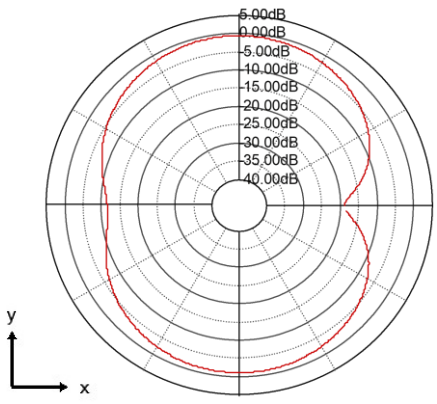
Antenna Radiation Patterns

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

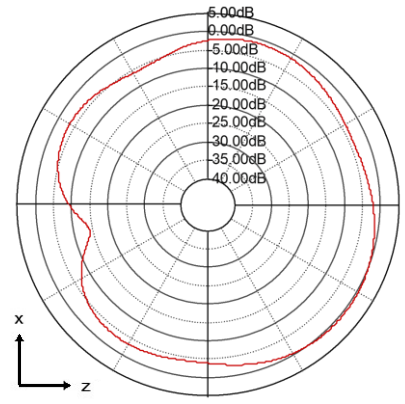
Measured at 910 MHz

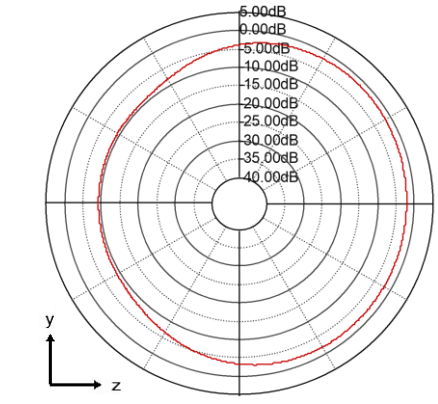


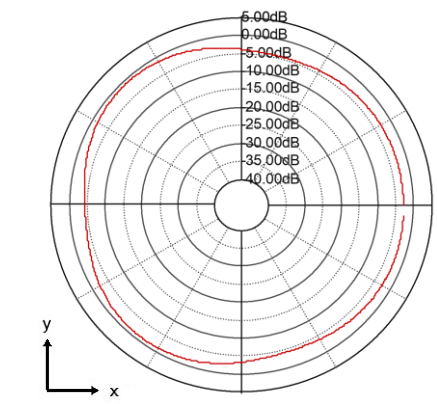




Measured at 1870 MHz







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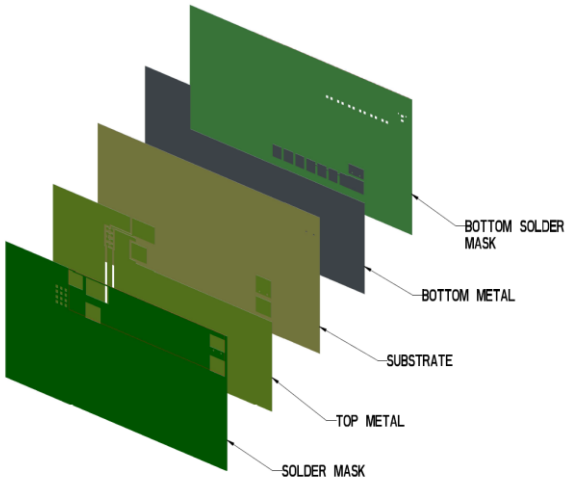
Antenna Layout

Typical layout dimensions (mm)



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

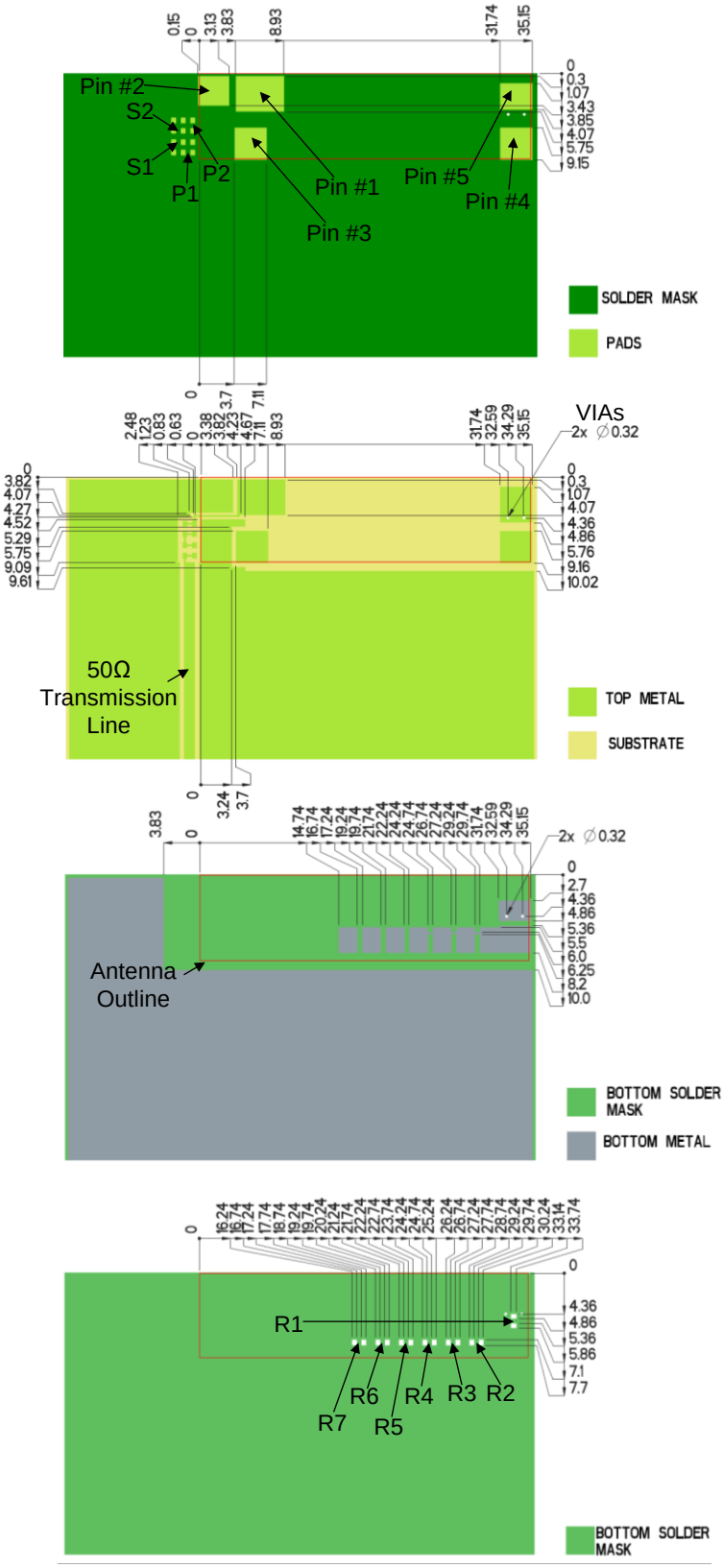
Pin Descriptions

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	DNI	N/A

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



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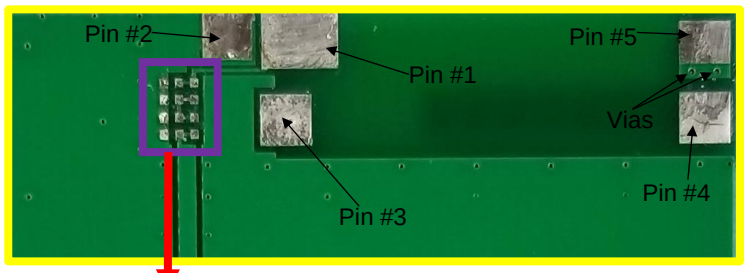
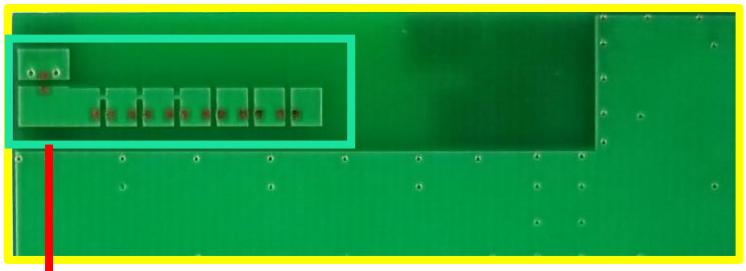
Antenna Matching Structure

Typical matching values on 50 x 110 mm PCB

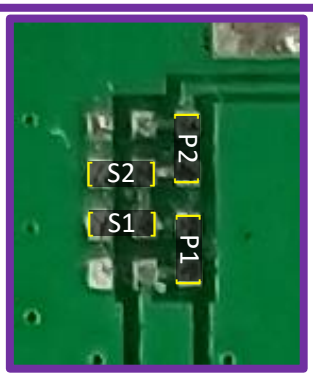
Demo Board Front View



Demo Board Back View



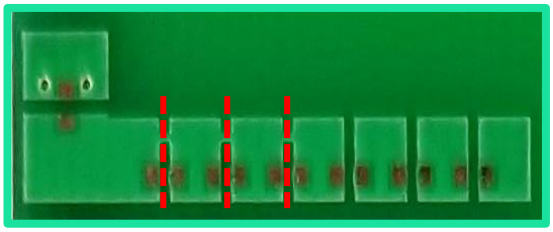
Antenna Matching



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

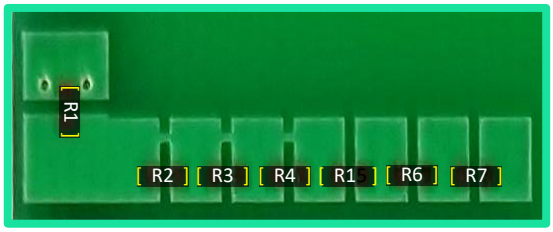
Low Band Tuning

Tune Low Band Higher (Cut Bridge Trace)



***Cut Trace between pads shifts resonant frequency higher**

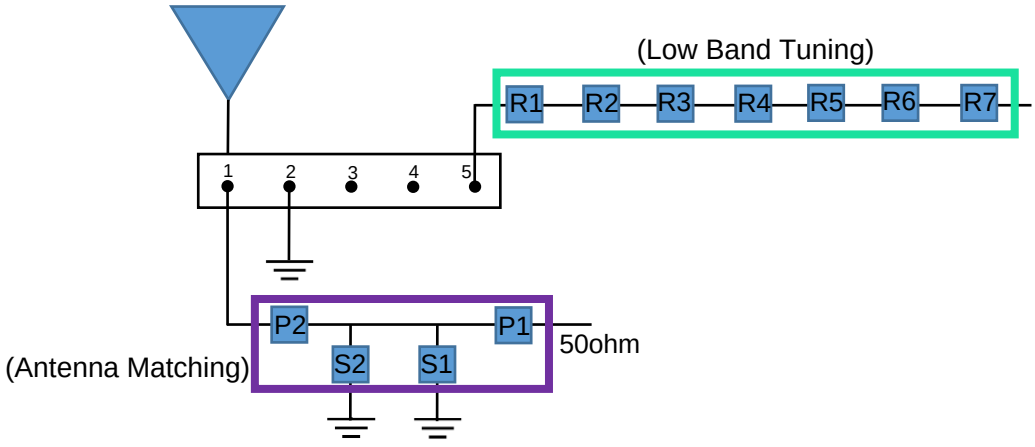
Tune Low Band Lower (Add 0Ω)



***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)
Default Matching	3.6nH	1.2pF	15nH	1.8pF	DNI
Tolerance	±0.05nH	± 0.05pF	±0.3nH	± 0.05pF	N/A

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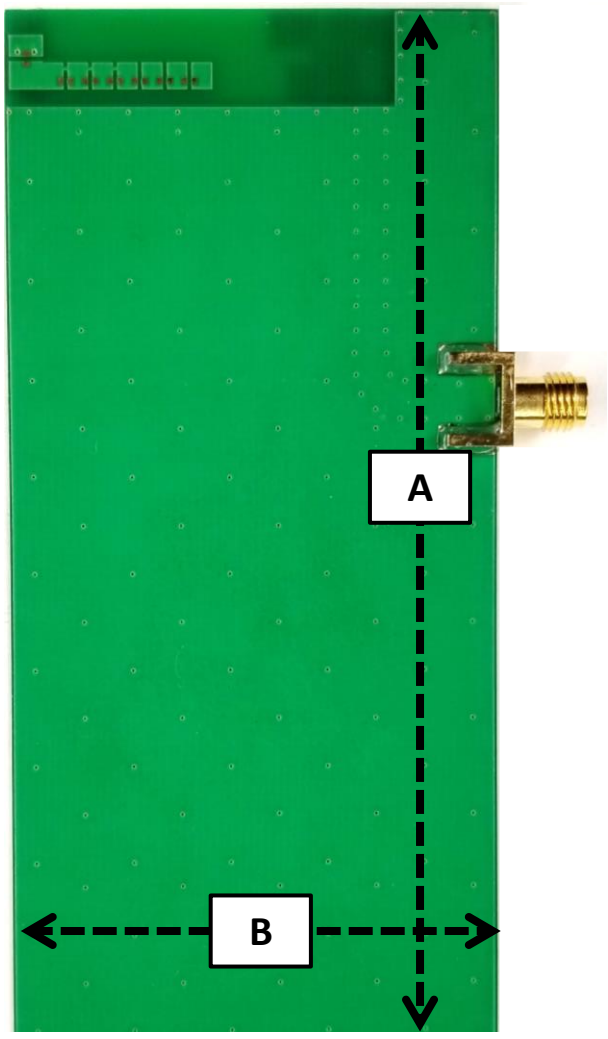
Antenna Demo Board

Demo Board Front View/Back View

Part Number	A	B	C
P522304-02	110	50.0	15.0

Front View



Back View

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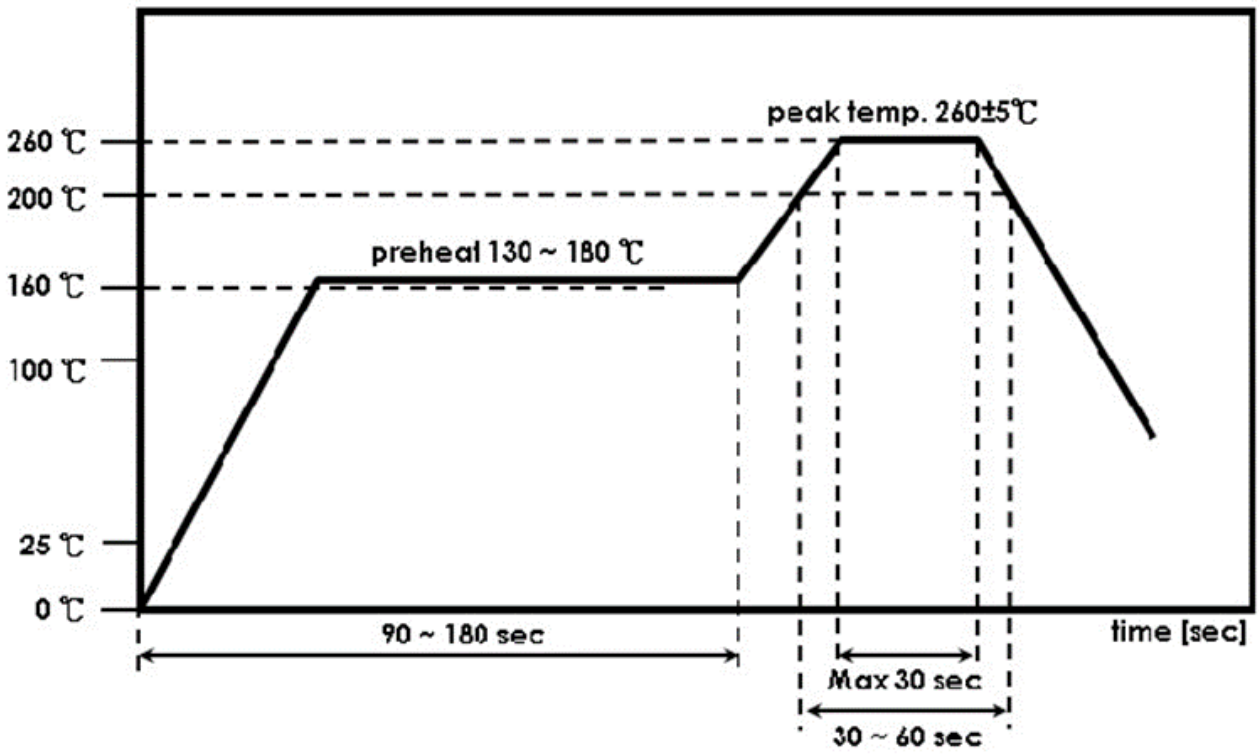
Recommended Reflow Soldering Profile

The recommended method for soldering the antenna to the board is forced convection reflow soldering. The following suggestions provide information on how to optimize the reflow process for the FR4 antenna:



*Adjust the reflow duration to create good solder joints without raising the antenna temperature beyond the allowed maximum of 260° C.

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Additional Resources – AP522304

3D FIT File:
https://www.kyocera-avx.com/download/antennas/ME-FIT/P522304_ME_fit.zip

DXF File:
https://www.kyocera-avx.com/download/antennas/3D-DXF/P522304-02_3D-DXF.zip

Gerber File:
https://www.kyocera-avx.com/download/antennas/GERBER/P522304-02_GERBERS.zip

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