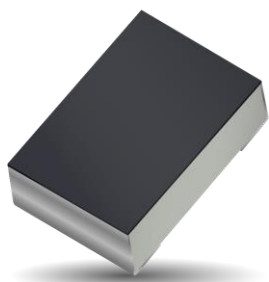


Part No. 9002133

ISM Chip Antenna

868 MHz & 915 MHz
Supports: ISM, LoRa



ISM Chip Antenna

863 - 870 MHz
902 - 928 MHz

KEY BENEFITS

Greater Flexibility with Unique Form Factors

KYOCERA AVX technology helps you deliver more advanced ergonomic designs without adverse impact on product performance.

Quicker Time-to-Market

By optimizing antenna size, performance and emissions, customer and regulatory specifications are more easily met.

Environmental Compliance

Comply with latest REACH, RoHS requirements

APPLICATIONS

- Embedded design
- Cellular, Headsets, Tablets
- Wearables
- Handheld
- Smart home
- Telematics
- Tracking
- Healthcare (FDA Class I)
- IoT, Industrial devices

This ultra-small chip antenna designed for ISM applications exhibits the high efficiency in a small footprint and delivers the key needs to the device engineers for the higher functionality and better performance in a smaller and thinner designs. It covers 868 MHz or 915 MHz or 868 and 915 MHz thanks to its tuning capability.

For further optimization to custom design and for support to integrate and test this antenna performance in your device, contact our Customer Support Team.

- 9002133-02: 868 MHz
- 9002133-12: 915 MHz
- 9002133-22: 868+915 MHz

Electrical Specifications

Typical performance on 100 x 40 mm PCB

Frequency (MHz)	863 – 870 (EU)	902 – 928 (US)	863-928 (EU + US)
Peak Gain	1.5 dBi	2 dBi	
Average Efficiency	77%	74%	
Return Loss	- 10 dB	- 12 dB	
Feed Point Impedance	50 ohms unbalanced		
Polarization	Linear		
Power Handling	0.5 Watt CW		

Refer to Appendix 1

Mechanical Specifications & Ordering Part Number

Ordering Part Number	9002133
Size (mm)	1.00 x 0.55 x 0.40
Mounting	SMT (0402)
Weight (grams)	< 0.001
Packaging	Tape & Reel 9002133 – 5,000 pieces per reel
Demo Board	9002133-02 (for 868 MHz) 9002133-12 (for 915 MHz) 9002133-22 (for 868 + 915 MHz)
Operational Temperature Range	-55 °C to +125 °C
Storage Temperature / Humidity Condition	15 °C to +35 °C / ≤ 65%

KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Environmental Specs Summary

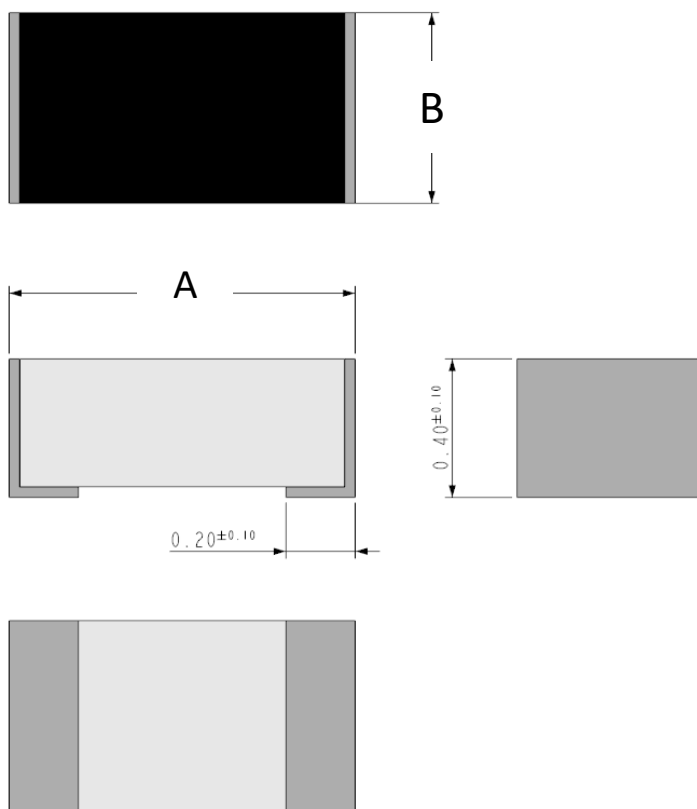
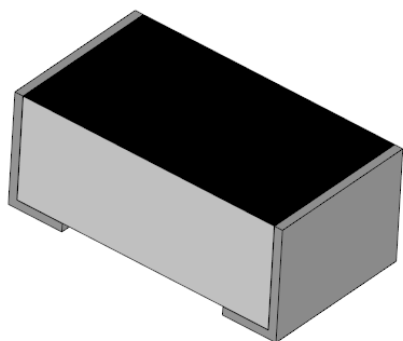
Part Number	9002133
Life (Endurance)	MIL-STD-202F Method 108A
Accelerated Damp Heat Steady State	MIL-STD-202F Method 103B
Temperature Cycling	MIL-STD-202F Method 107E MIL-STD-883D Method 1010.7
Resistance to Solder Heat	IEC-68-2-58

KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Dimensions

Typical antenna dimensions (mm)

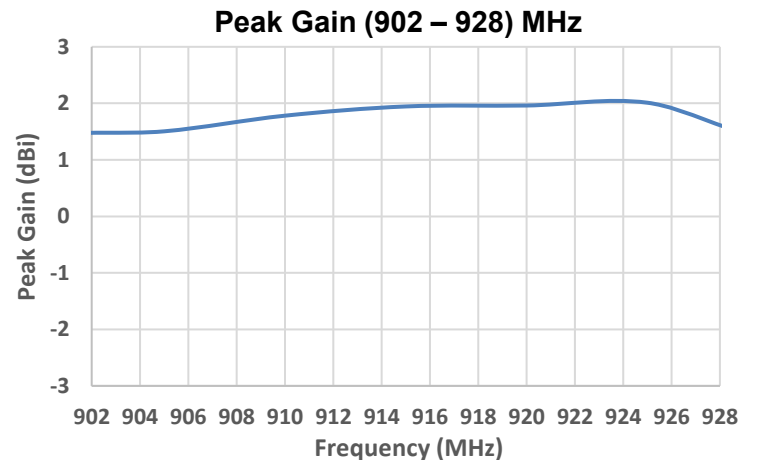
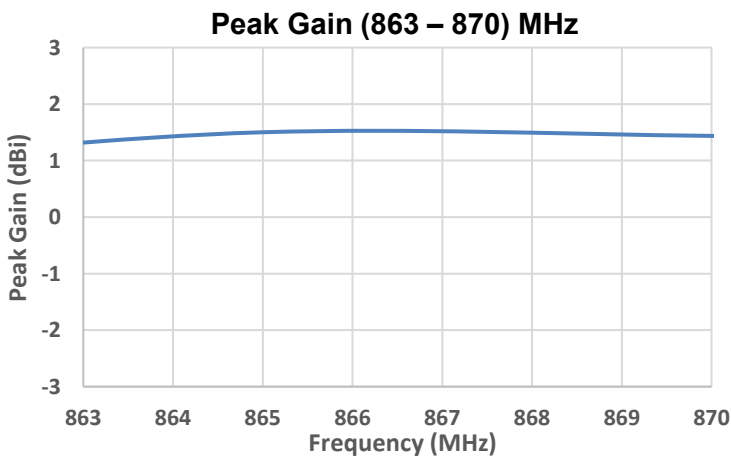
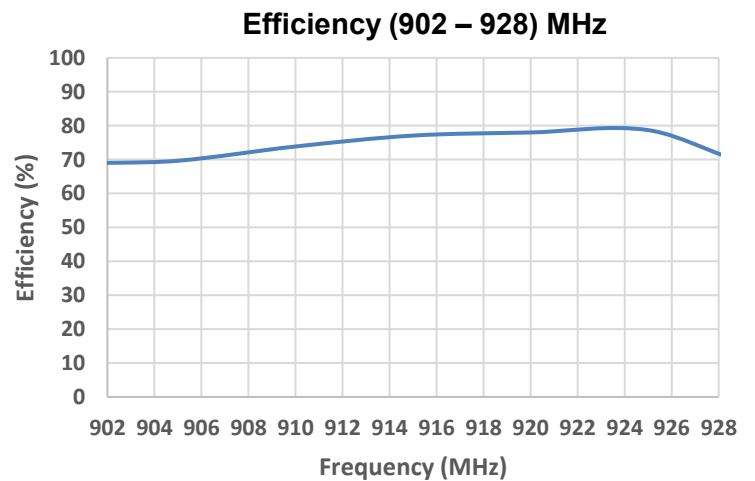
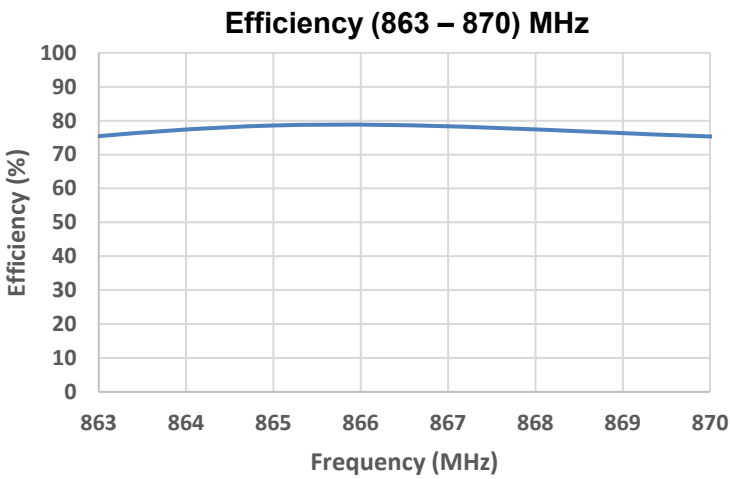
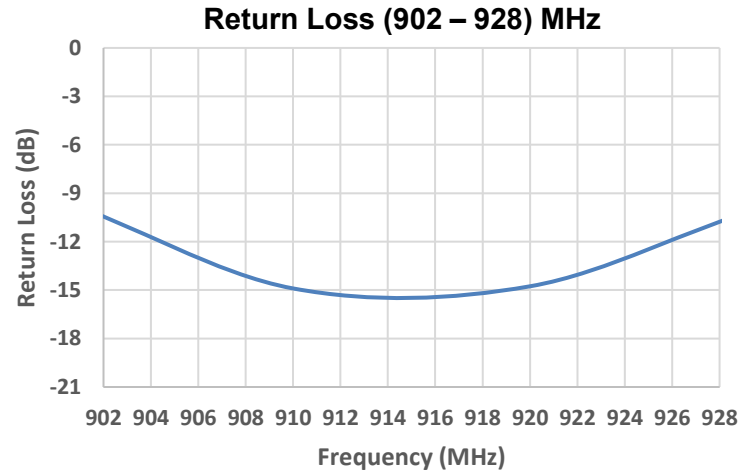
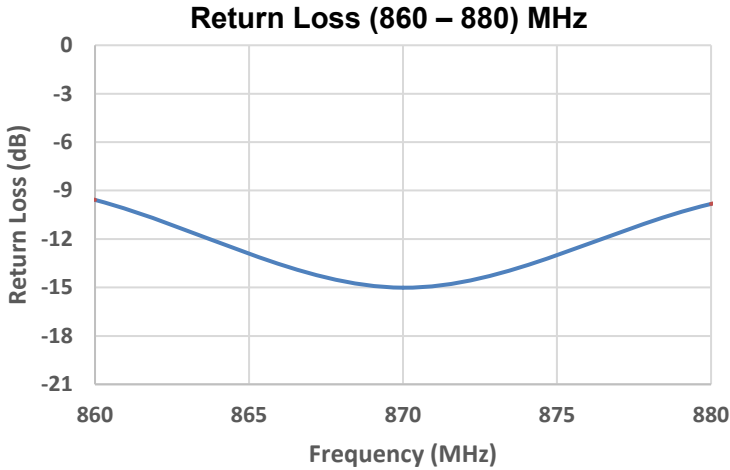
Part Number	A (mm)	B (mm)
9002133	1.00 ± 0.1	0.55 ± 0.07



KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Return Loss, Efficiency, and Peak Gain Plots

Typical Performance on 100 x 40 mm PCB



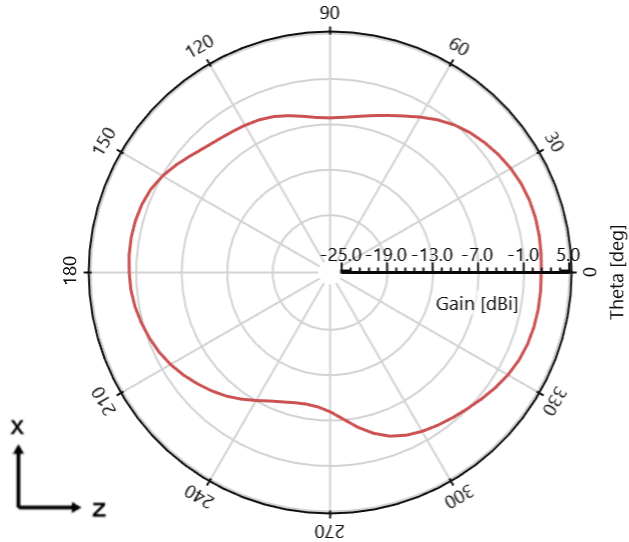
KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Radiation Patterns

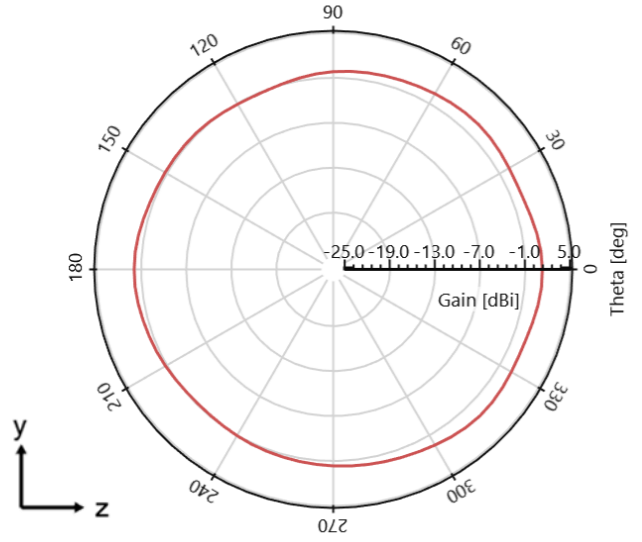
Typical Performance on 100 x 40 mm PCB
 Measured @ 870 MHz



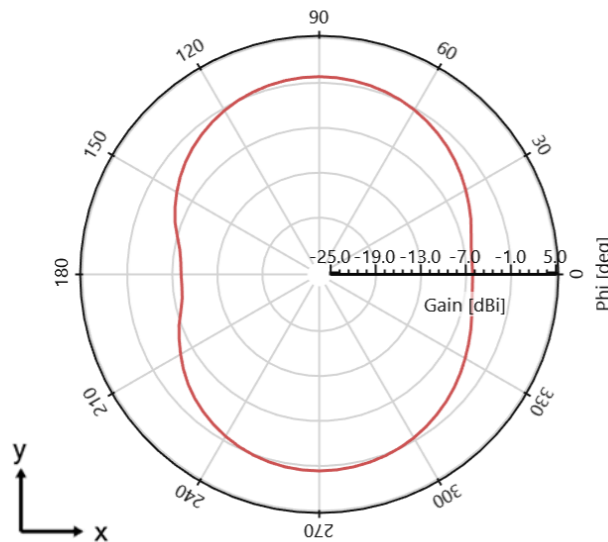
Gain (Total) - $\phi = 0$ deg - 870 MHz [Plane XZ]



Gain (Total) - $\phi = 90$ deg - 870 MHz [Plane YZ]



Gain (Total) - $\theta = 90$ deg - 870 MHz [Plane XY]



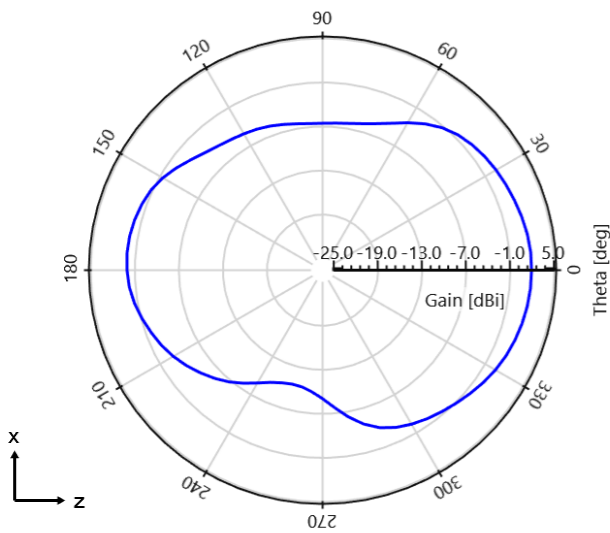
KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Radiation Patterns

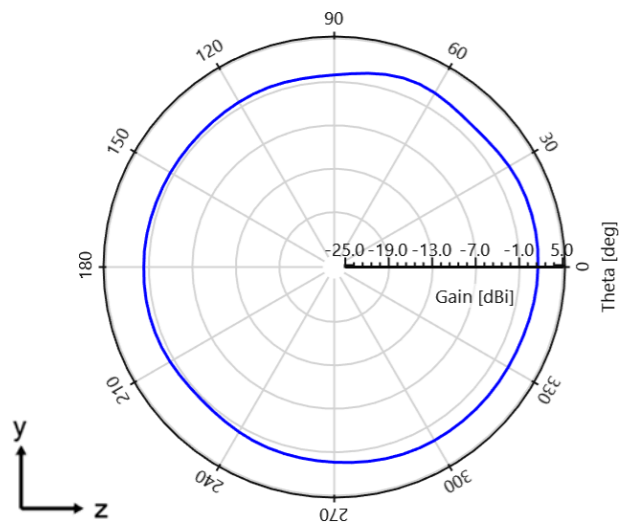
Typical Performance on 100 x 40 mm PCB
 Measured @ 915 MHz



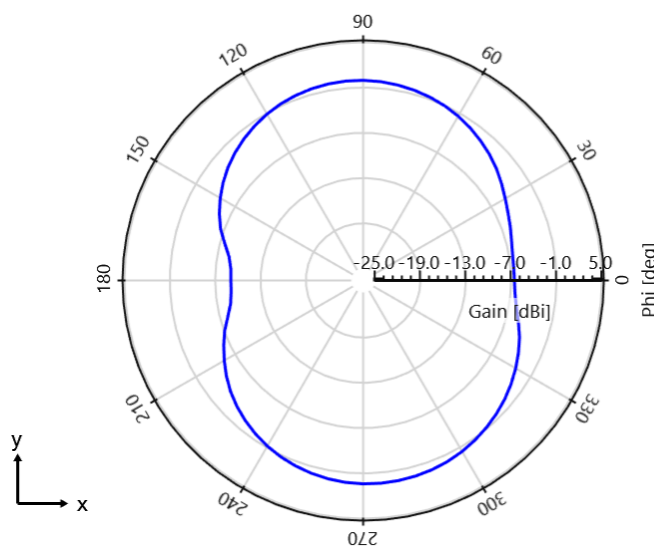
Gain (Total) - $\phi = 0$ deg - 915 MHz [Plane XZ]



Gain (Total) - $\phi = 90$ deg - 915 MHz [Plane YZ]



Gain (Total) - $\theta = 90$ deg - 915 MHz [Plane XY]

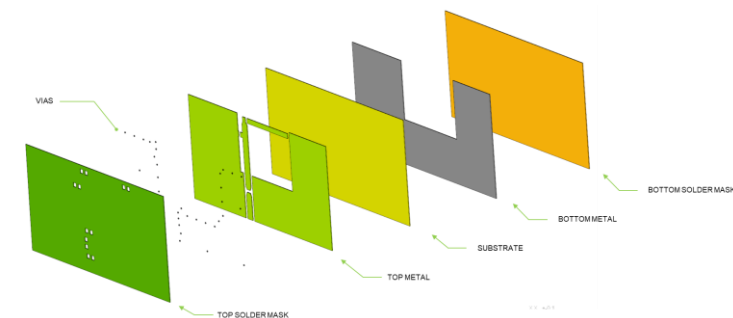


Downloaded from Arrow.com

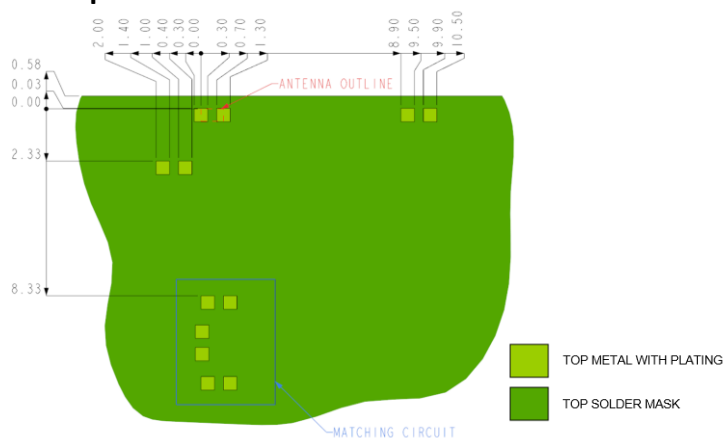
KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Layout (9002133-02 and 9002133-12)

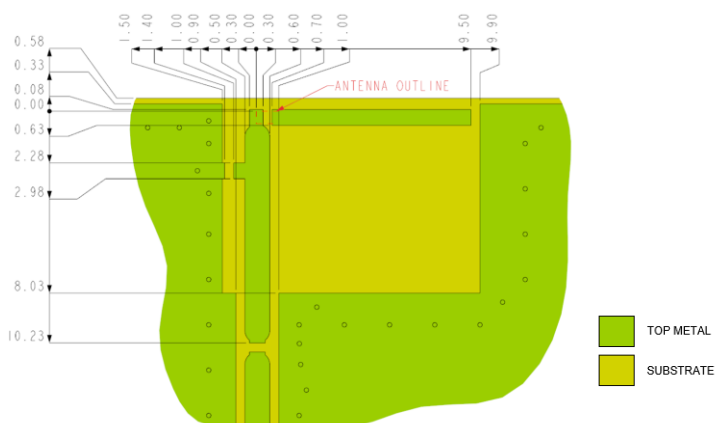
Typical layout dimensions (mm)
 PCB 2 Layers Thickness 0.8 mm



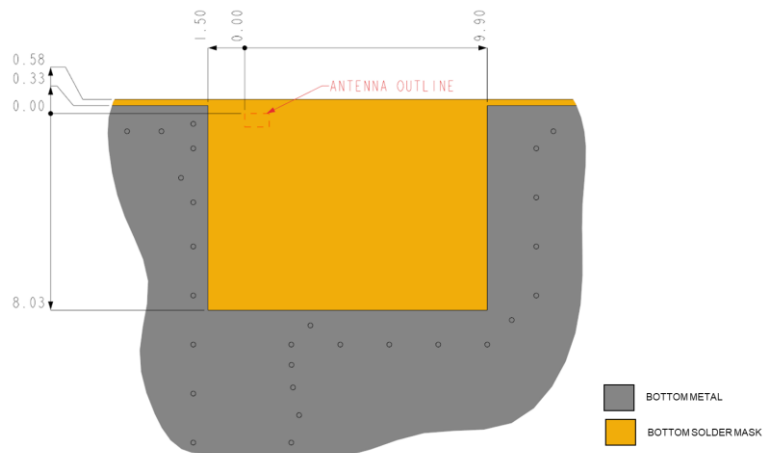
Top Solder mask :



Top Metal Part + Substrate:



Bottom Metal Part:



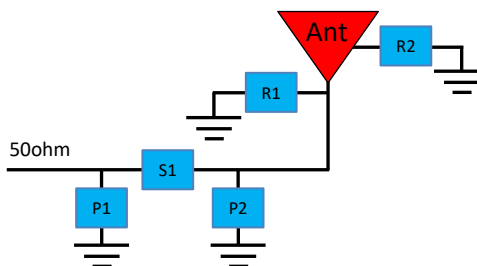
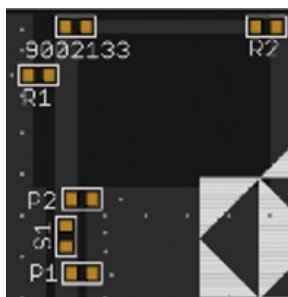
Pin Description

Pin#	Description
1	Feed
2	Ground

KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Matching circuits

Typical Performance on 100 x 40 mm PCB



Tuned at 868 MHz:

Matching Pi Network (Demo Board)

Component	Value	Tolerance
R1	100pF	±1%
R2	5.1pF	±0.1pF
P1	N/A	N/A
S1	0 ohm	N/A
P2	N/A	N/A

*Actual matching values depend on customer design

Tuned at 915 MHz:

Matching Pi Network (Demo Board)

Component	Value	Tolerance
R1	82pF	±1%
R2	3.9pF	±0.1pF
P1	N/A	N/A
S1	0 ohm	N/A
P2	N/A	N/A

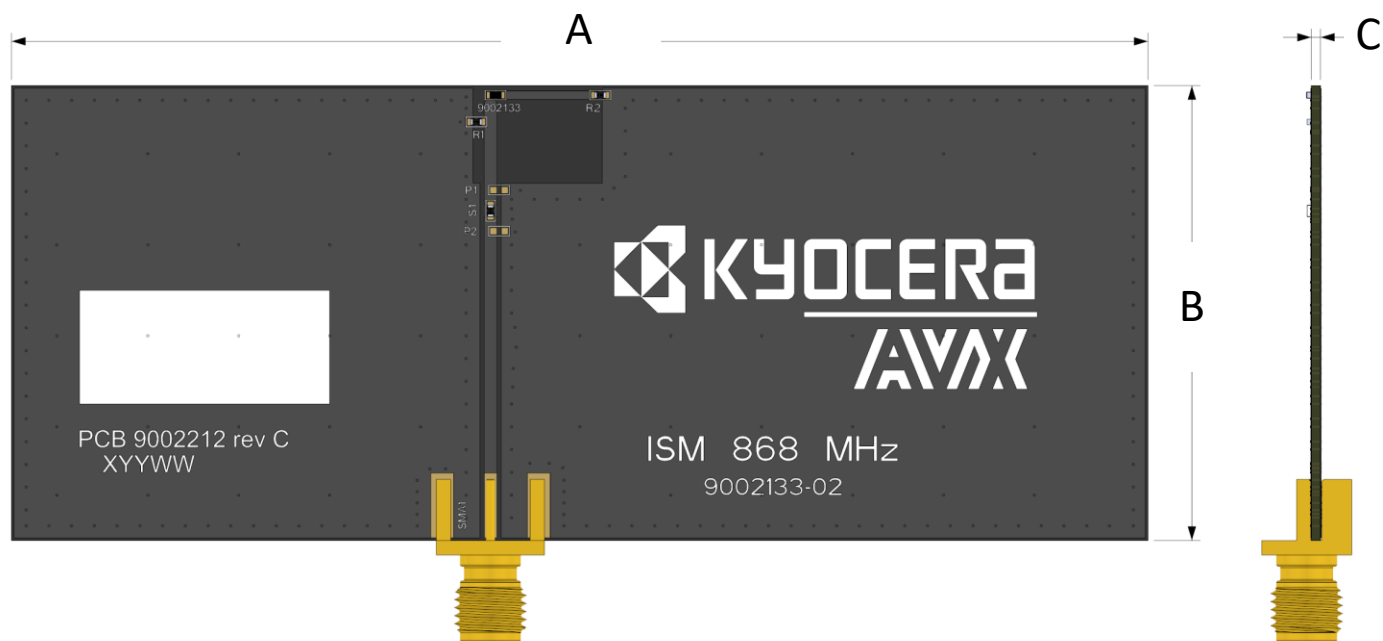
*Actual matching values depend on customer design

KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Demo Board (9002133-02)

Typical layout dimensions (mm)

Part Number	A	B	C
9002133-02	100.0 ± 0.15	40.0 ± 0.15	0.80 ± 0.10

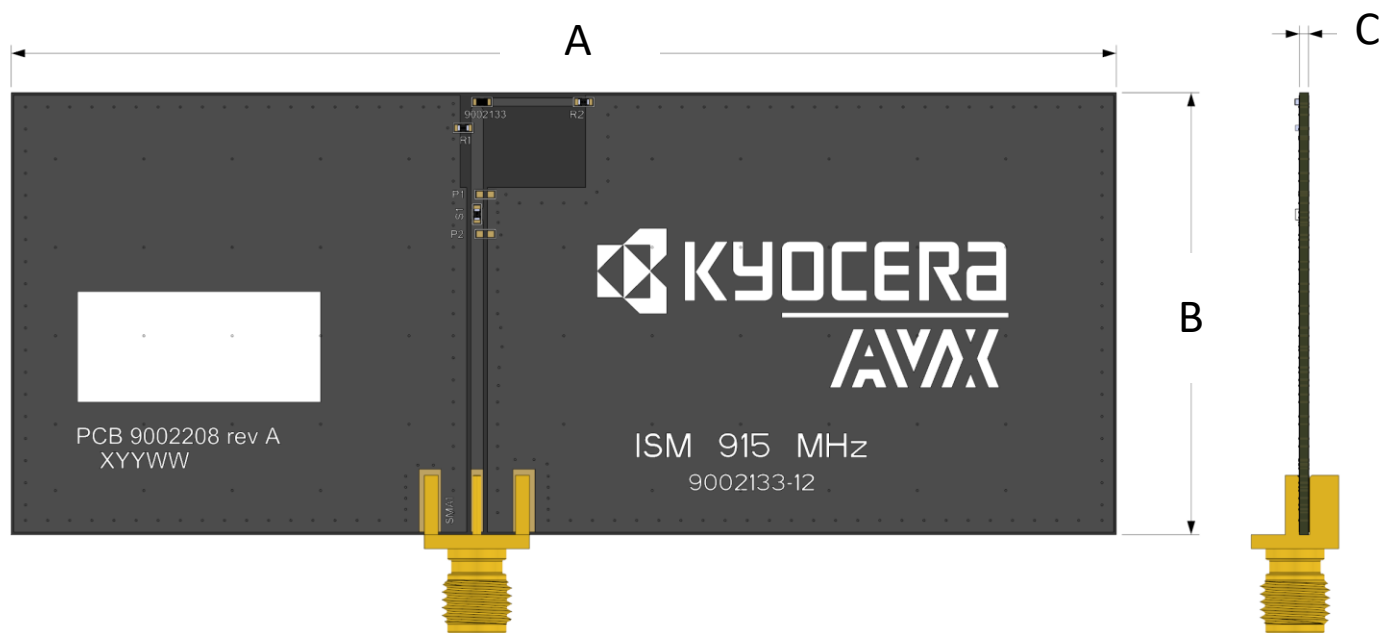


KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Demo Board (9002133-12)

Typical layout dimensions (mm)

Part Number	A	B	C
9002133-12	100.0 ± 0.15	40.0 ± 0.15	0.80 ± 0.10



Appendix 1 BT KYOCERA AVX Embedded Chip Antenna Specifications
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Appendix 1

Appendix 1 gives instructions on how to match antenna through impedance matching network to cover both ISM bands (868 / 915 MHz).

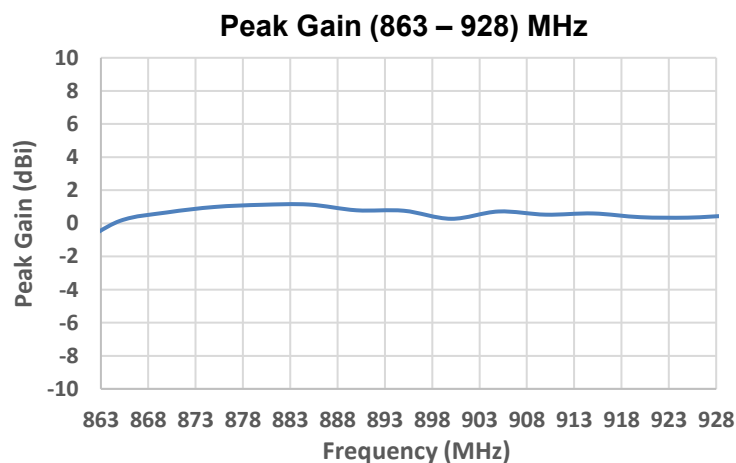
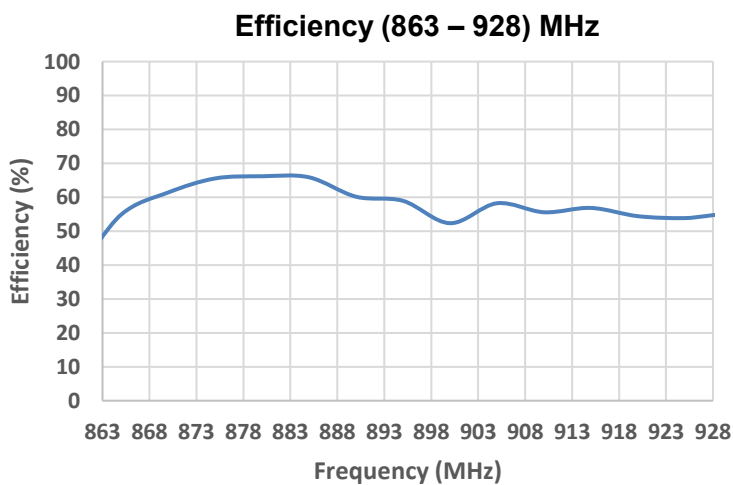
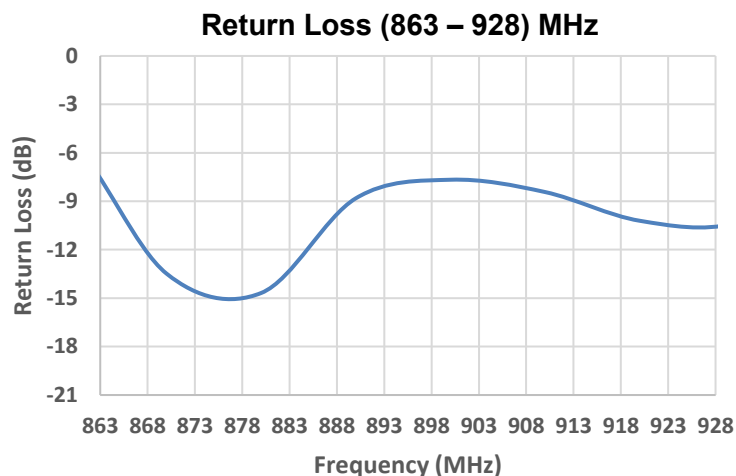
Frequency (MHz)	863-928 (US/EU)
Peak Gain (dBi)	0.7dBi
Efficiency (%)	57%
VSWR	-8 dB
Feed Point Impedance	50 Ω unbalanced

*Data shown above has Appendix 1 matching applied on 100 x 40 mm PCB.

KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Return Loss, Efficiency, and Peak Gain Plots

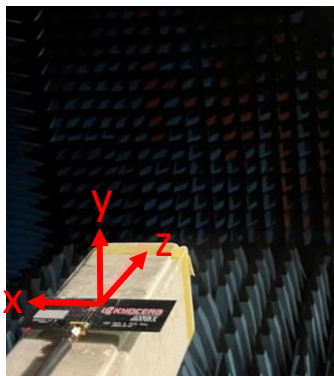
Typical Performance on 100 x 40 mm PCB



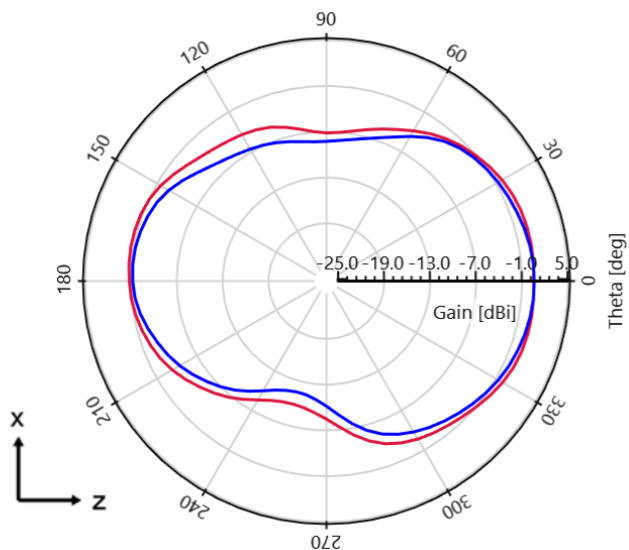
KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Radiation Patterns

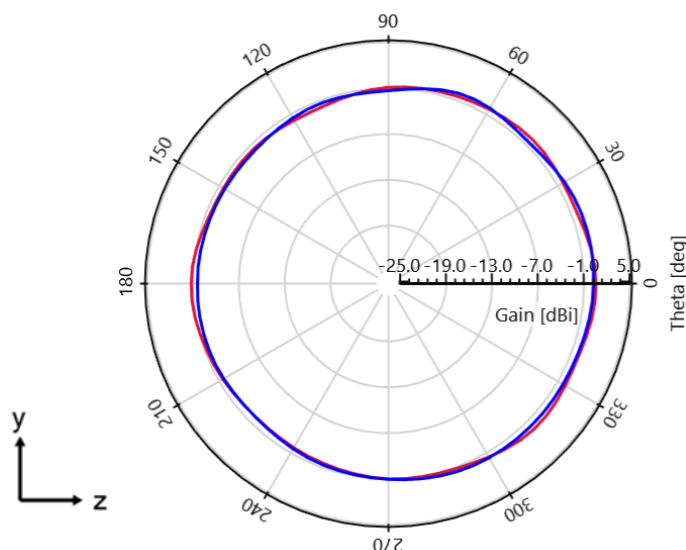
Typical Performance on 100 x 40 mm PCB
 Measured @ 870 and 915 MHz



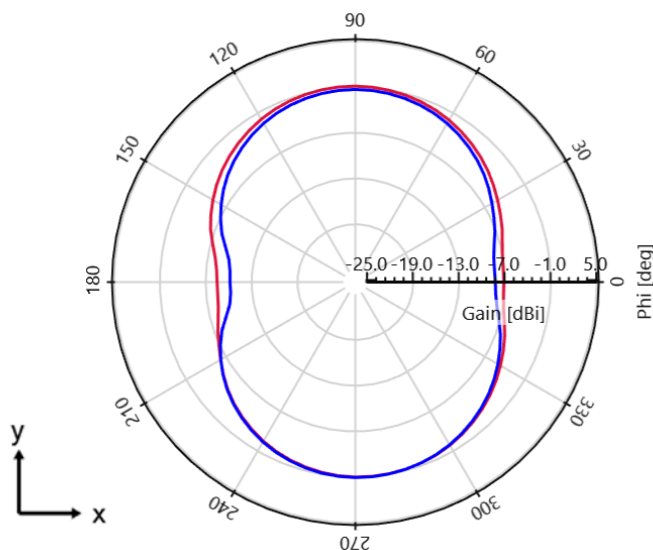
Config3: US and EU - Gain - $\phi = 0$ deg [Plane XZ]



Config3: US and EU - Gain - $\phi = 90$ deg [Plane YZ]



Config3: US and EU - Gain - $\theta = 90$ deg [Plane XY]

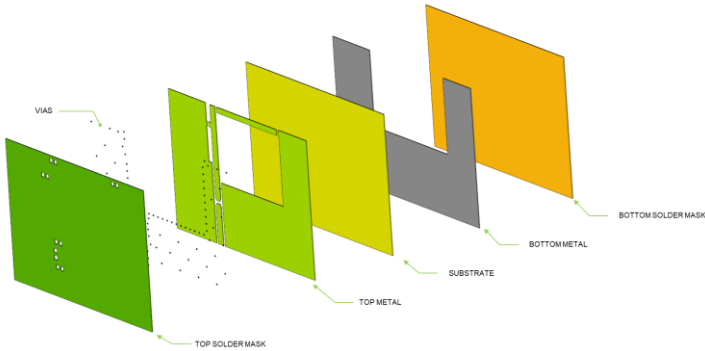


Downloaded from Arrow.com

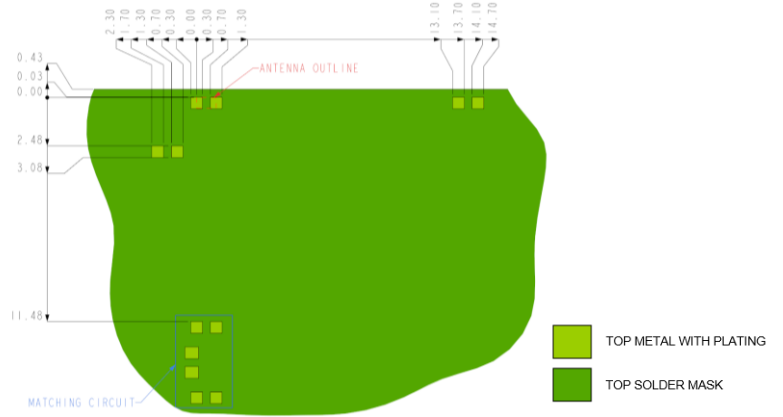
KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Layout (9002133-22)

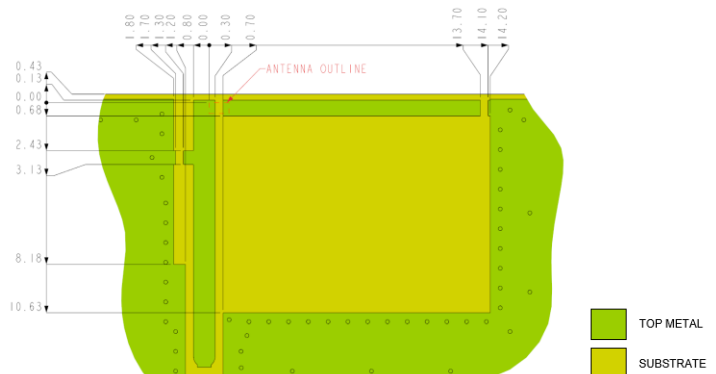
Typical layout dimensions (mm)
 PCB 2 Layers Thickness 0.8 mm



Top Solder mask :

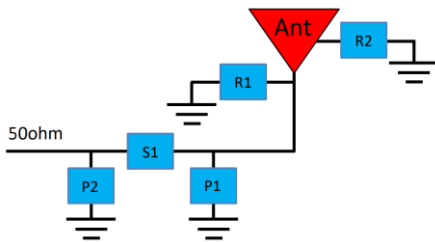


Top Metal Part + Substrate:



Pin Description

Pin#	Description
1	Feed
2	Ground

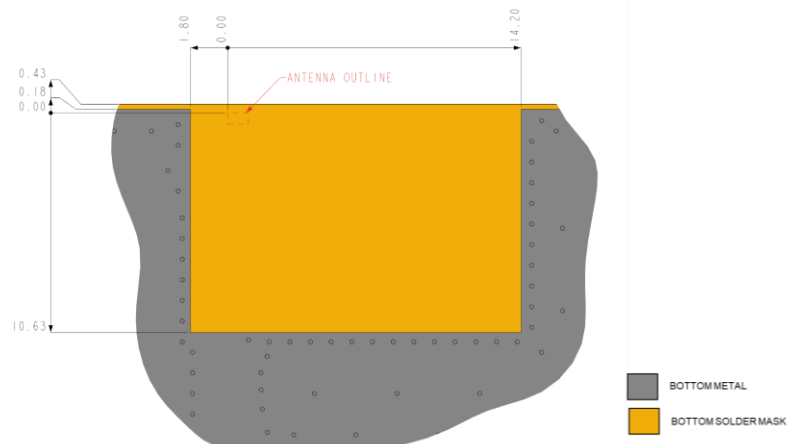


Matching Pi Network (Demo Board)

Component	Value	Tolerance
R1	7.5pF	$\pm 0.05pF$
R2	2.4pF	$\pm 0.1pF$
P1	10pF	$\pm 2\%$
S1	7.5pF	$\pm 0.05pF$
P2	NA	/

*Actual matching values depend on customer design

Bottom Metal Part:

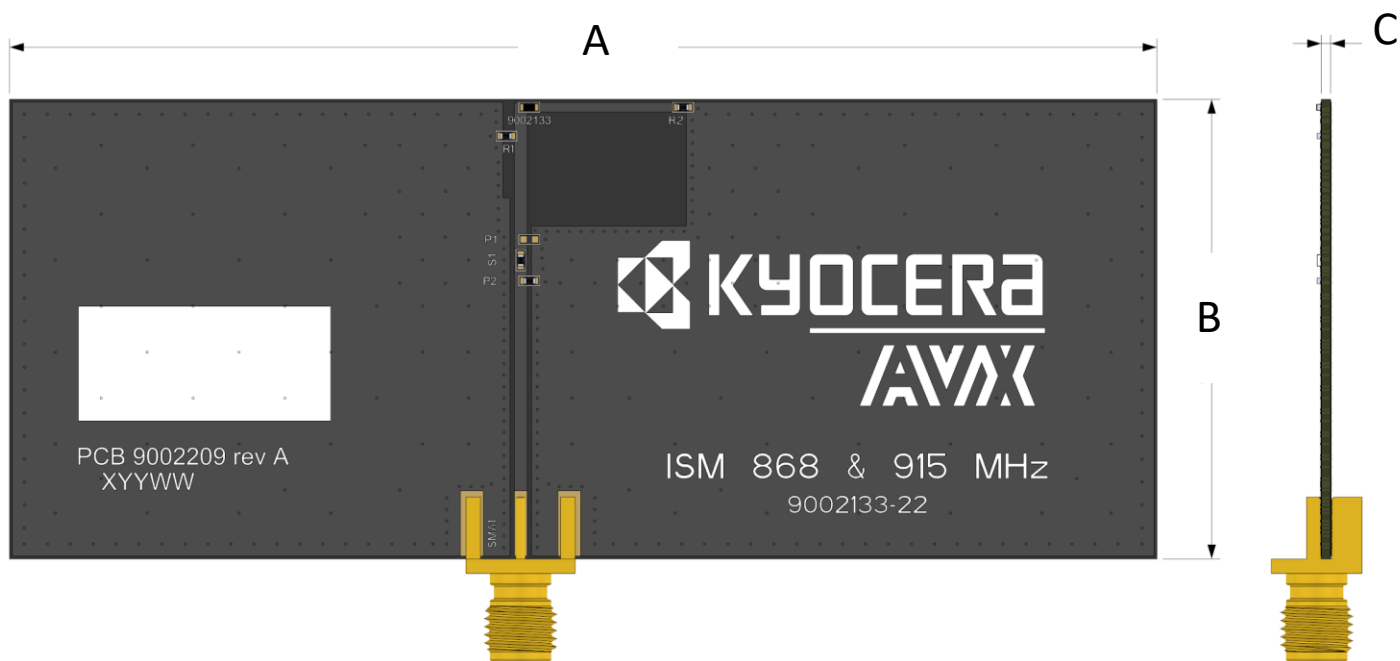


KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Demo Board (9002133-22)

Typical layout dimensions (mm)

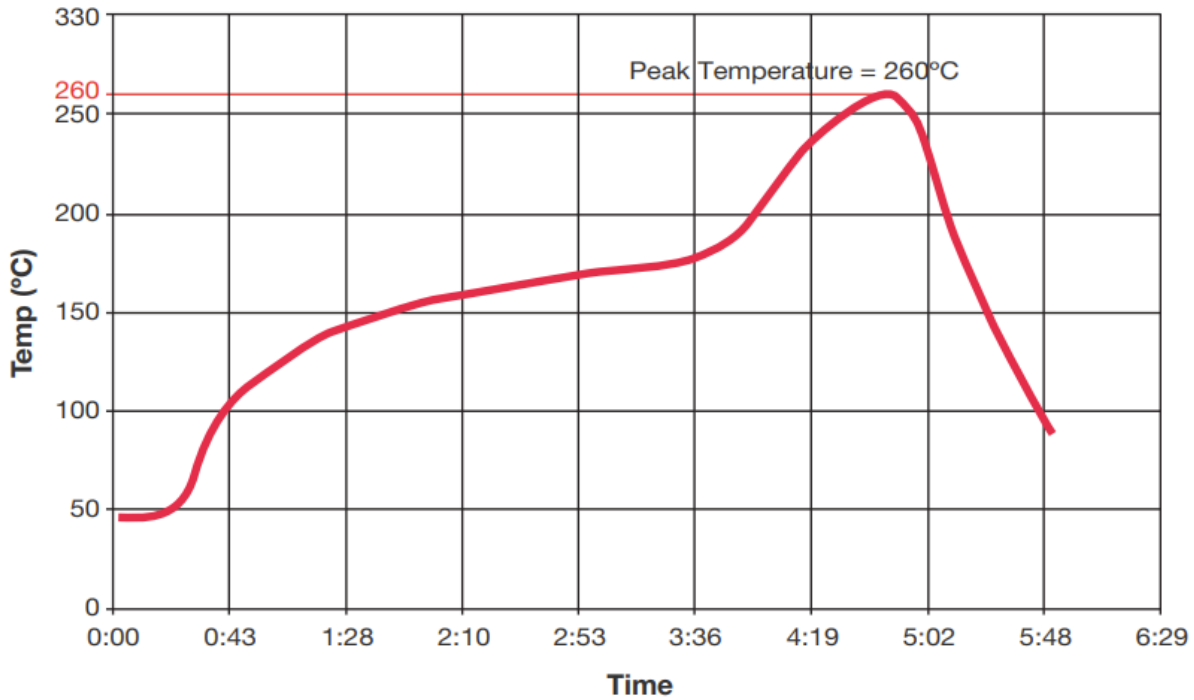
Part Number	A	B	C
9002133-22	100.0 ± 0.15	40.0 ± 0.15	0.80 ± 0.10



KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

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 chip antenna:



KYOCERA AVX Embedded ISM Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Packaging

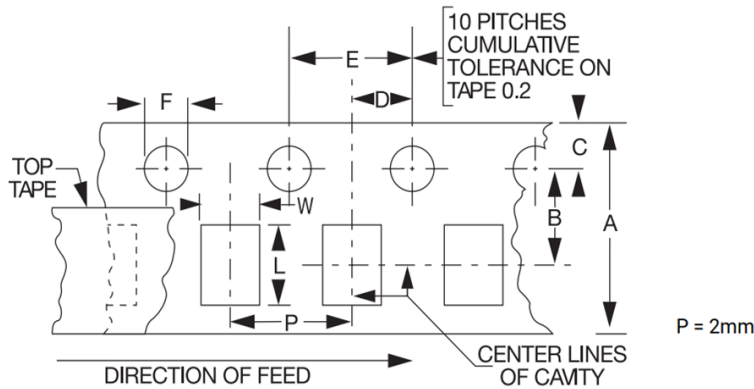
TAPE AND REEL (EMBOSSED CARRIER TAPE),

- REEL SIZE Ø180 x 14.4 mm
- CARRIER TAPE: ALL DIMENSIONS ARE IN COMPLIANCE WITH EIA 481-1-A STANDARD
- QTY/REEL: 5000 PARTS

CARRIER DIMENSIONS: millimeters (inches)

A	B	C	D	E	F
8.0 ± 0.3 (0.315 ± 0.012)	3.5 ± 0.05 (0.138 ± 0.002)	1.75 ± 0.1 (0.069 ± 0.004)	2.0 ± 0.05 (0.079 ± 0.002)	4.0 ± 0.1 (0.157 ± 0.004)	(1.5 ^{+0.1} _{0.0}) (0.059 ^{+0.004} _{0.000})

The nominal dimensions of the component compartment (W,L) are derived from the component size.



KYOCERA AVX Embedded ISM Chip Antenna Specification
KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Additional Resources – 9002133

Simulation Files

HFSS: https://www.kyocera-avx.com/download/antennas/ansys-hfss/9002133_HFSS.zip

CST: https://www.kyocera-avx.com/download/antennas/CST/9002133_CST.zip

3D Fit File:

https://www.kyocera-avx.com/download/antennas/ME-FIT/9002133_ME-FIT.zip

DXF File:

https://www.kyocera-avx.com/download/antennas/3D-DXF/9002133_3D-DXF.zip