

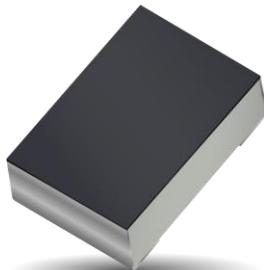


Part No. 9001978

Wi-Fi Dual Band or BT Chip Antenna or UWB Antenna

2.4 GHz, 5.0 GHz, 6.0 GHz - 8.5 GHz

Supports: Wi-Fi applications,, Bluetooth, Zigbee, WLAN, UWB



KYOCERA AVX series of chip antennas deliver on the key needs of device designers for higher functionality and performance in smaller/thinner designs.

This antenna designed for Wi-Fi, BT, or UWB 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.

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

Electrical Specifications

Typical performance on 55 x 25 mm PCB

Wi-Fi Dual Band or BT Chip Antenna or UWB Antenna:
9001978-03: Wi-Fi Dual Band
9001978-01: BT
9001978-04:UWB

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 RoHS requirements

APPLICATIONS

- Embedded design
- Telematics
- Cellular, Headsets, Tablets
- Tracking
- Healthcare (FDA Class I)
- M2M, Industrial devices
- Gateway, Access Point
- Smart Grid
- Handheld
- OBD-II
- UWB

Frequency (MHz)	2400 – 2485	5150 – 5850	2400 – 2485 (BT ONLY)	6000 – 8500 (UWB ONLY)
Peak Gain	3.0 dBi	3.0 dBi		
Average Efficiency	65%	50%	Refer to Appendix 1	Refer to Appendix 2
VSWR	2.1:1 max	7:1 max	Refer to Appendix 1	Refer to Appendix 2
Feed Point Impedance		50 ohms unbalanced		
Polarization		Linear		
Power Handling		0.5 Watt CW		
Additional Resources		Download Simulation Files		

Mechanical Specifications & Ordering Part Number

Ordering Part Number	9001978
Size (mm)	1.00 x 0.55 x 0.40
Mounting	SMT (0402)
Weight (grams)	< 0.001
Packaging	Tape & Reel 9001978 – 5,000 pieces per reel
Demo Board	9001978-03 (Wi-Fi Dual Band) 9001978-01 (BT) Appendix 1 9001978-04 (UWB) Appendix 2
Operational Temperature Range	-55 °C to +125 °C
Storage Temperature / Humidity Condition	15 °C to +35 °C / ≤ 65%
Additional Resources	Download DXF file

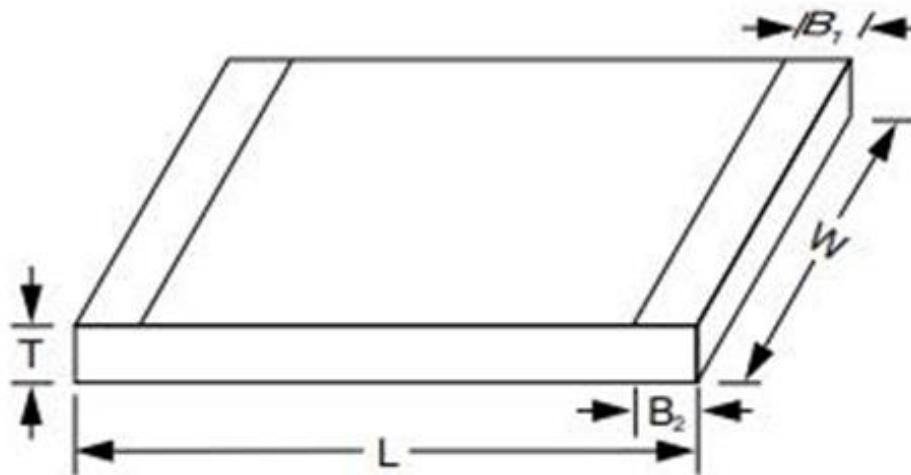
Wi-Fi Dual Band or BT KYOCERA AVX Embedded Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Dimensions

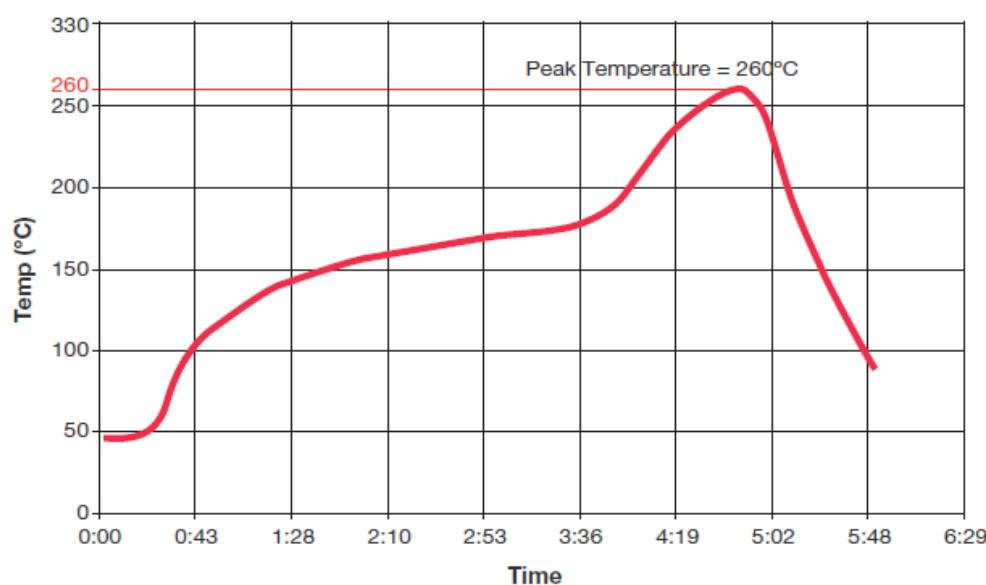
Typical antenna dimensions (mm)

Part Number	L	W	T	B ₁	B ₂
9001978	1.00±0.1	0.55±0.07	0.40±0.1	0.00+0.1	0.20±0.1

*Antenna can be mounted both ways.



Lead Free Solder SMT Reflow Temperature Profile



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Environmental Specs Summary

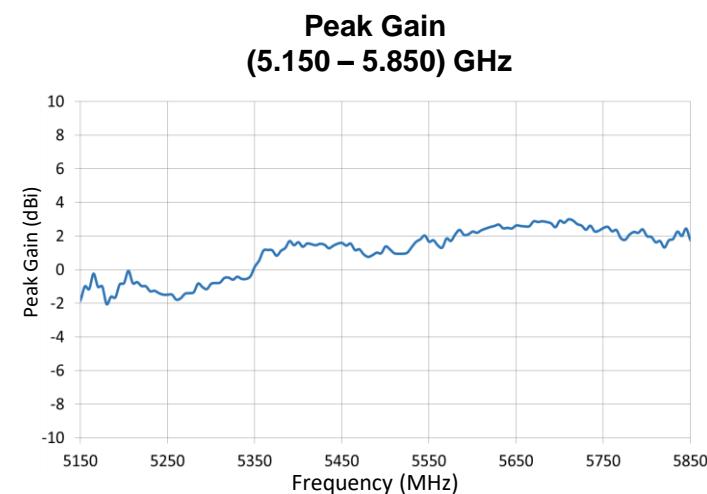
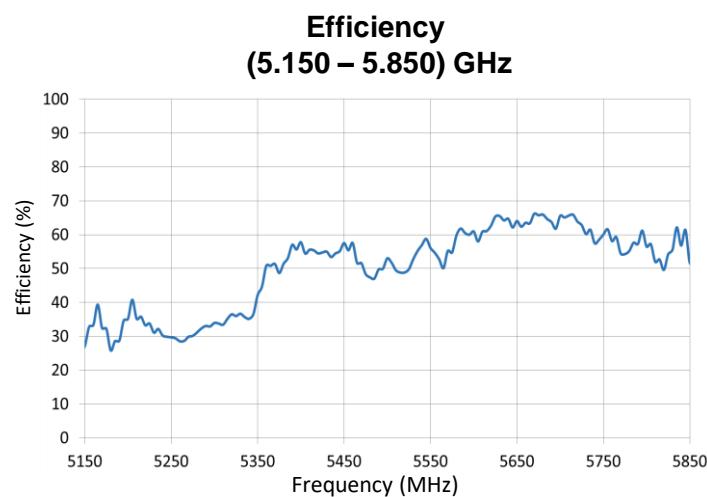
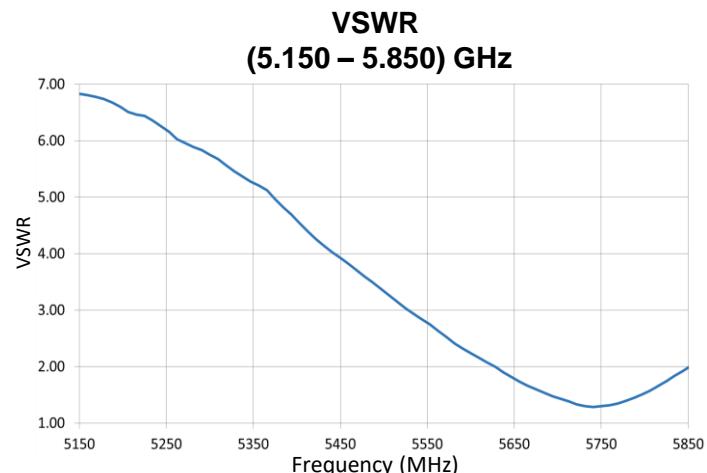
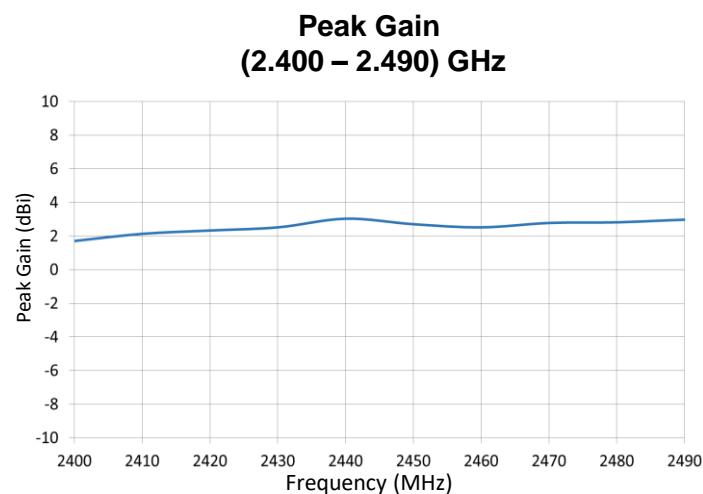
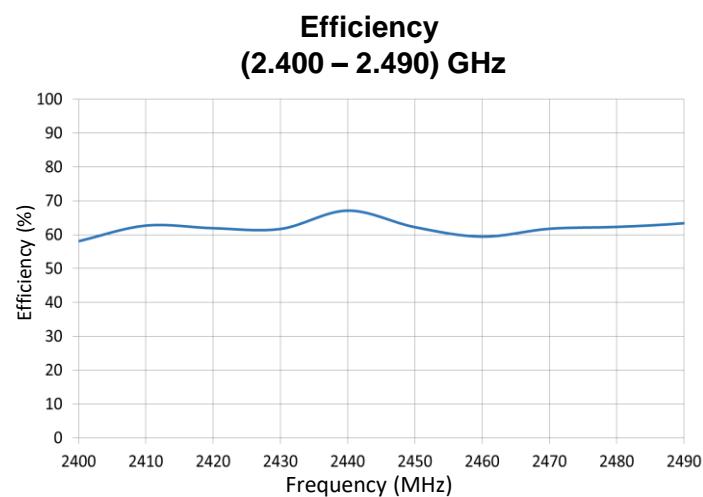
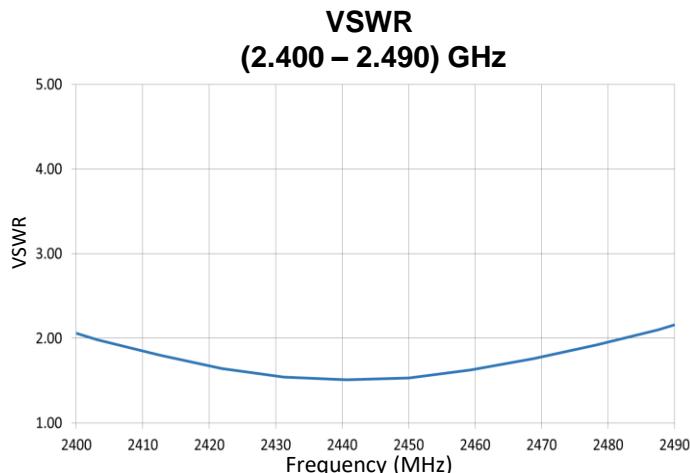
Typical antenna dimensions (mm)

Life (Endurance) MIL-STD-202F Method 108A	Conditions: 125°C, 2UR, 1000 hours Acceptance Criteria: No visible damage, $\Delta C/C \leq 2\%$ for $C \geq 5\text{pF}$ $\Delta C \leq 0.25\text{pF}$ for $C < 5\text{pF}$.
Accelerated Damp Heat Steady State MIL-STD-202F Method 103B	Conditions: 85°C, 85% RH, UR, 1000 hours Acceptance Criteria: No visible damage, $\Delta C/C \leq 2\%$ for $C \geq 5\text{pF}$, $\Delta C \leq 0.25\text{pF}$ for $C < 5\text{pF}$.
Temperature Cycling MIL-STD-202F Method 107E MIL-STD-883D Method 1010.7	Conditions: -55°C to +125°C, 15 cycles Acceptance Criteria: No visible damage, $\Delta C/C \leq 2\%$ for $C \geq 5\text{pF}$, $\Delta C \leq 0.25\text{pF}$ for $C < 5\text{pF}$
Resistance to Solder Heat IEC-68-2-58	Conditions: 260°C $\pm 5^\circ\text{C}$ for 10 secs Acceptance Criteria: C remains within initial limits

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VSWR, Efficiency, and Peak Gain Plots

Typical Performance on 55 x 25 mm PCB

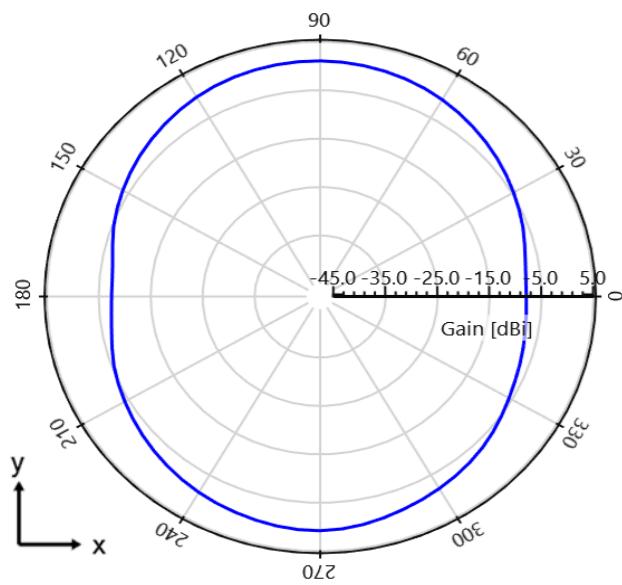
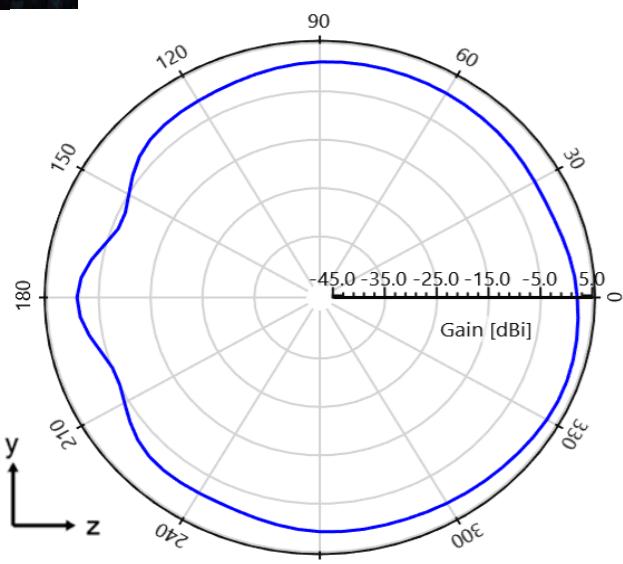
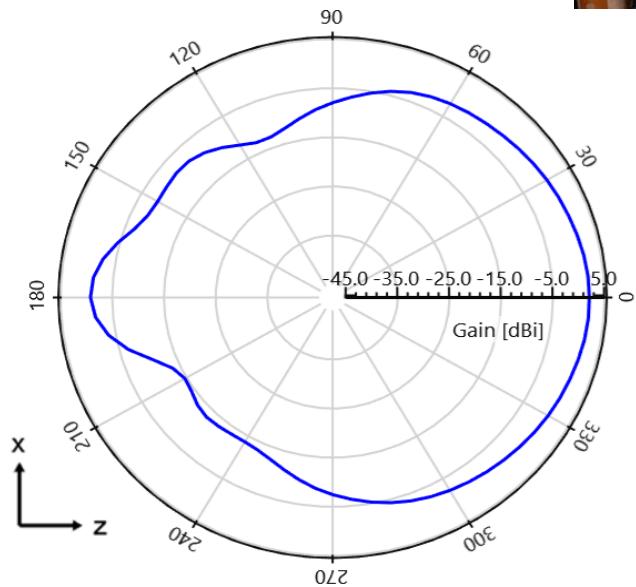


Wi-Fi Dual Band or BT KYOCERA AVX Embedded Chip Antenna Specification
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Antenna Radiation Patterns

Typical Performance on 55 x 25 mm PCB

Measured @ 2.440 GHz

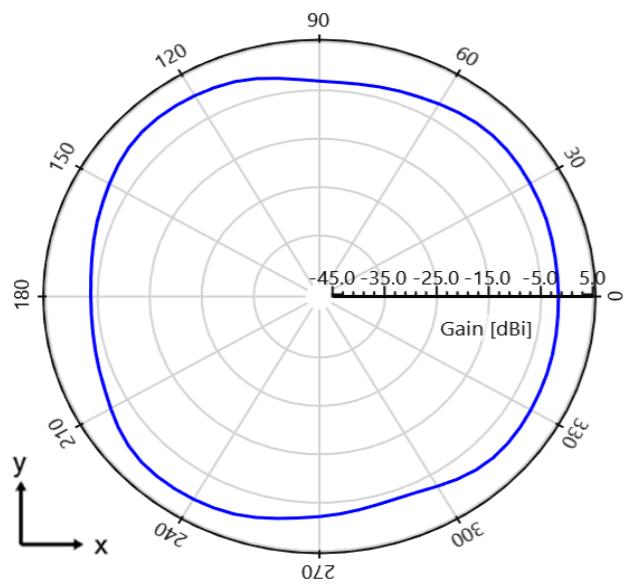
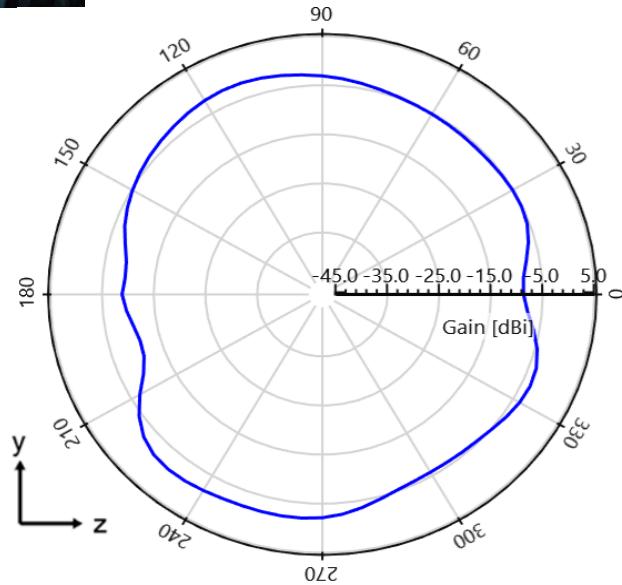
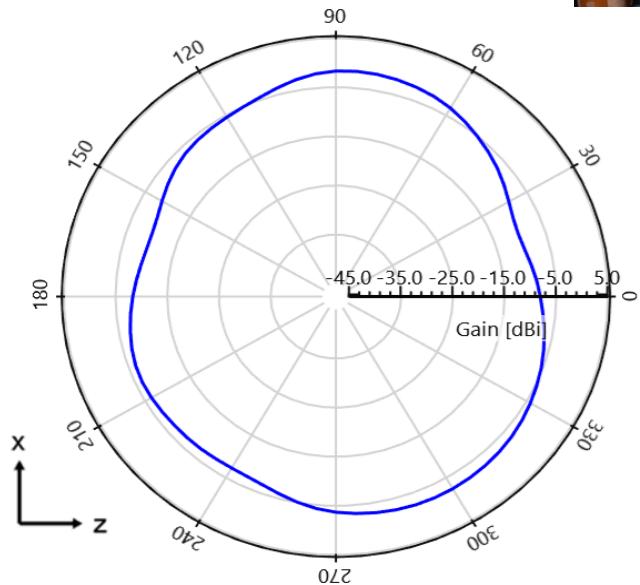


Wi-Fi Dual Band or BT KYOCERA AVX Embedded Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Radiation Patterns

Typical Performance on 55 x 25 mm PCB

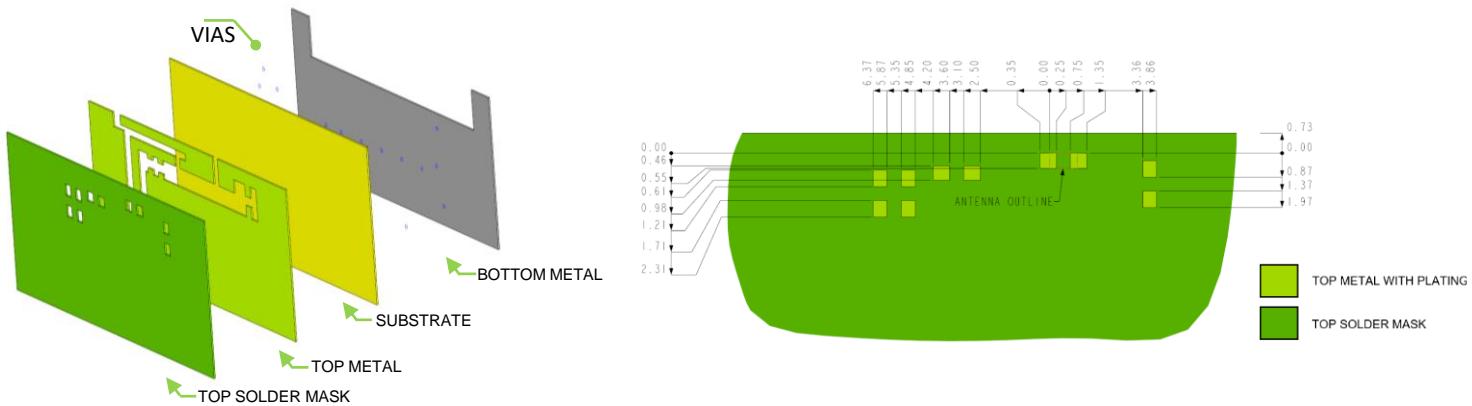
Measured @ 5.550 GHz



Wi-Fi Dual Band or BT KYOCERA AVX Embedded Chip Antenna Specification
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Antenna Layout (9001978-03)

Typical layout dimensions (mm)



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

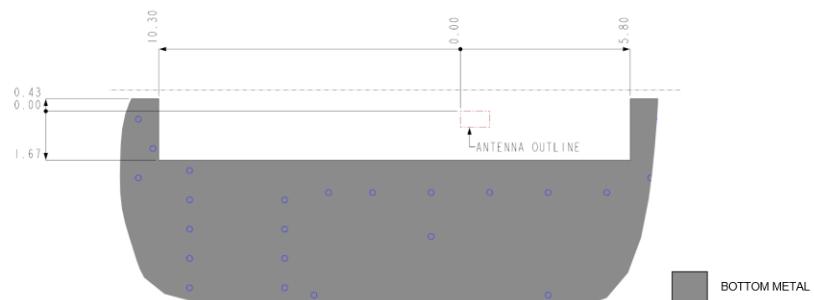
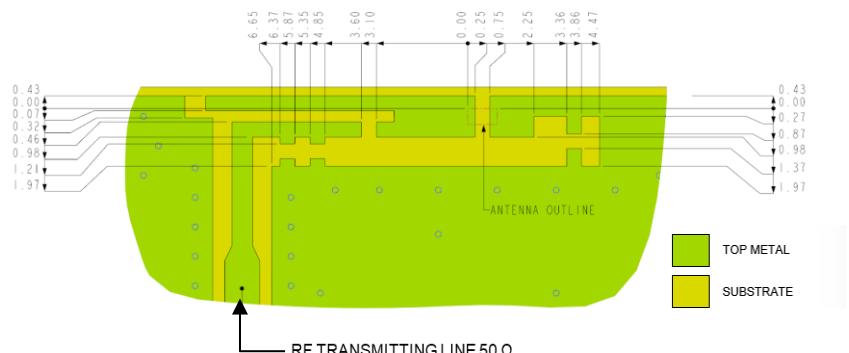
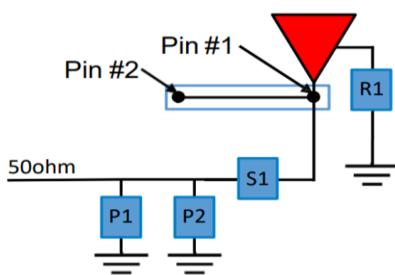
Pin Description

Pin#	Description
1	Feed
2	Ground

Matching Pi Network (Demo Board)

Component	Value	Tolerance
P1	1.8nH	$\pm 0.05\text{nH}$
S1	2.4pF	$\pm 0.1\text{pF}$
P2	N/A	N/A
R1	N/A	N/A

*Actual matching values depend on customer design



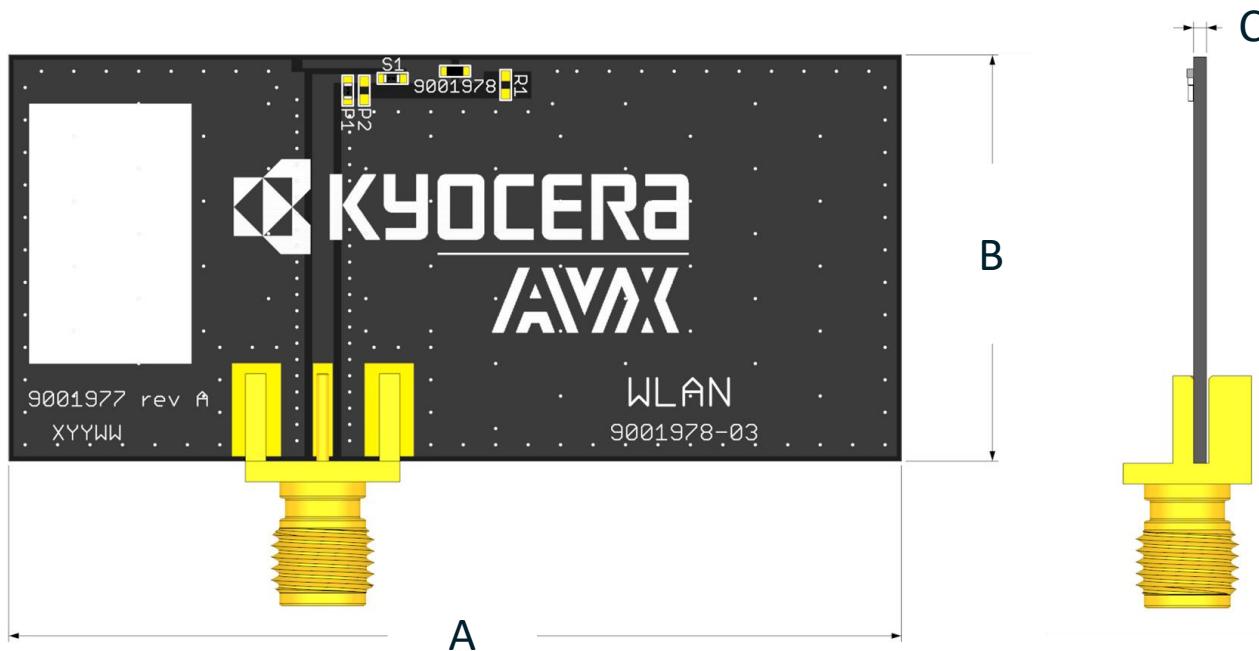
Wi-Fi Dual Band or BT KYOCERA AVX Embedded Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Demo Board (9001978-03)

Typical layout dimensions (mm)

Part Number	A	B	C
9001978-03	(55.0)	(25.0)	(0.80)

*Dimensions in () parenthesis are Reference Only.



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

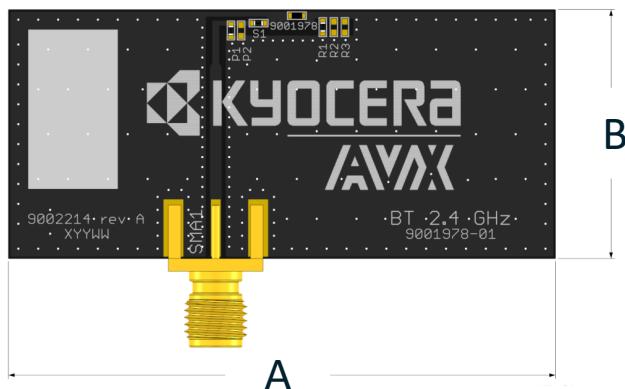
Appendix 1 gives instructions on how to match antenna through impedance matching network for BT (2400-2485 MHz) only.

Frequency (MHz)	2400-2485
Peak Gain (dBi)	3.45
Efficiency (%)	68
VSWR	<2.5:1
Feed Point Impedance	50 Ω unbalanced

*Data shown above has Appendix 1 matching applied on 55 x 25 mm pcb.

Part Number	A (mm)	B (mm)
9001978-01	(55)	(25)

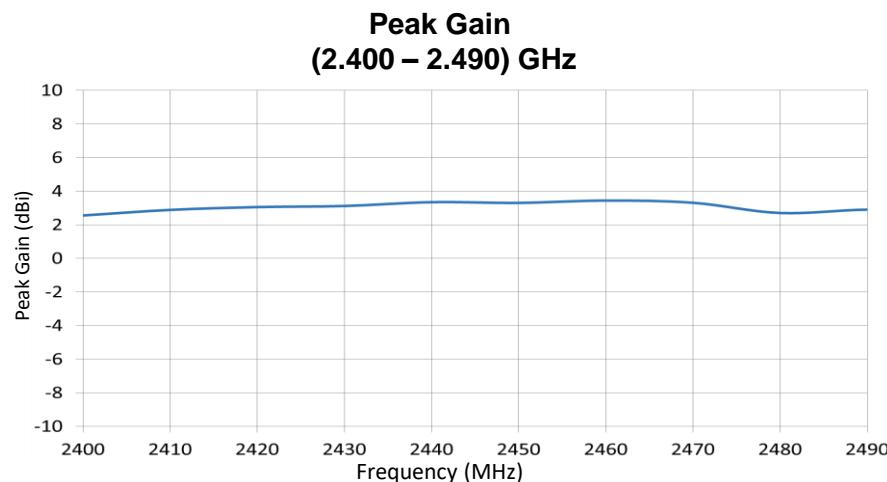
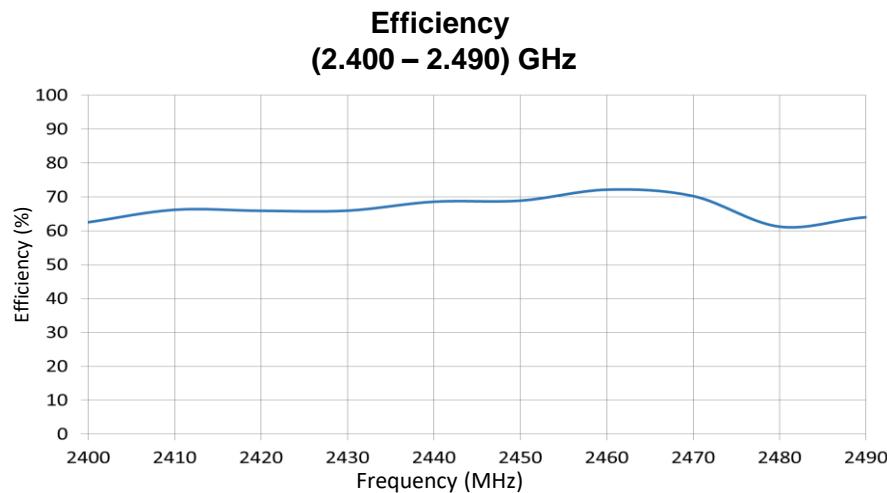
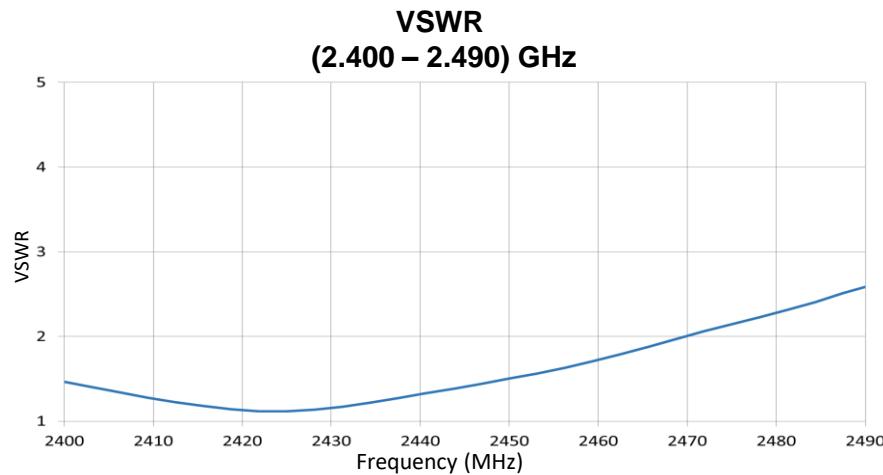
*Dimensions in () parenthesis are Reference Only.



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

VSWR, Efficiency, and Peak Gain Plots

Typical Performance on 55 x 25 mm PCB

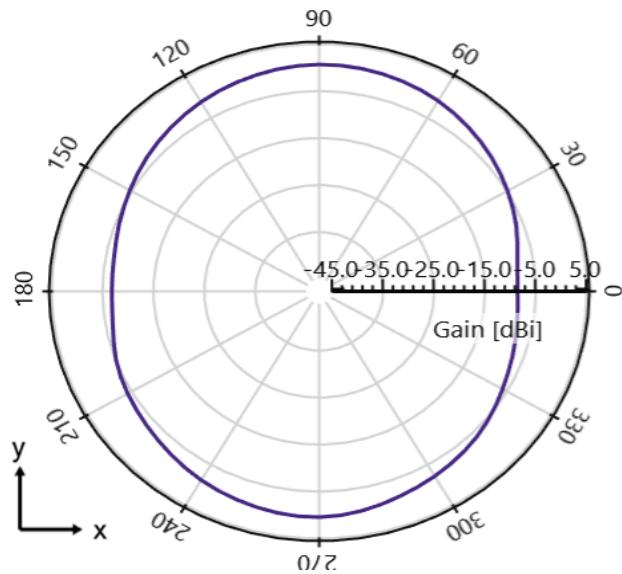
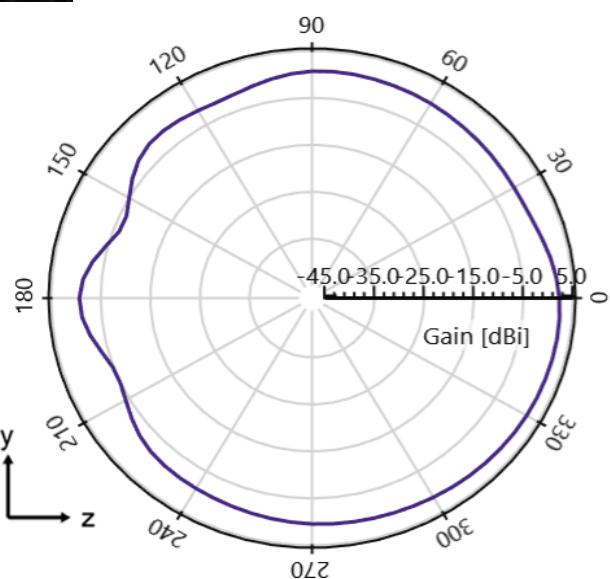
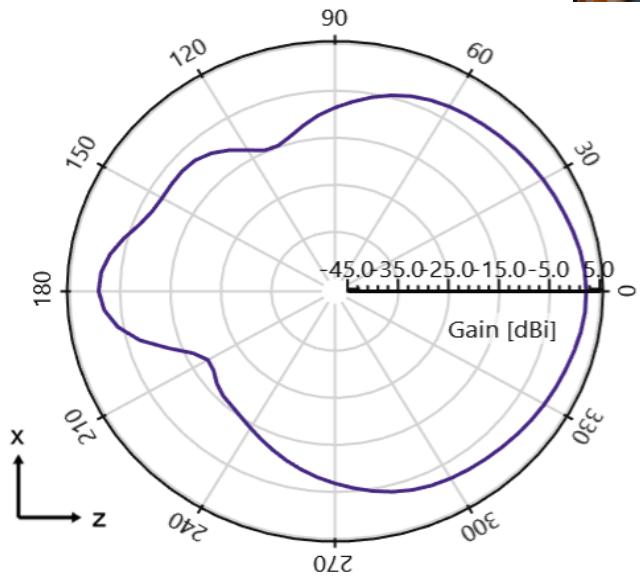


Appendix 1 BT KYOCERA AVX Embedded Chip Antenna Specifications
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Radiation Patterns

Typical Performance on 55 x 25 mm PCB

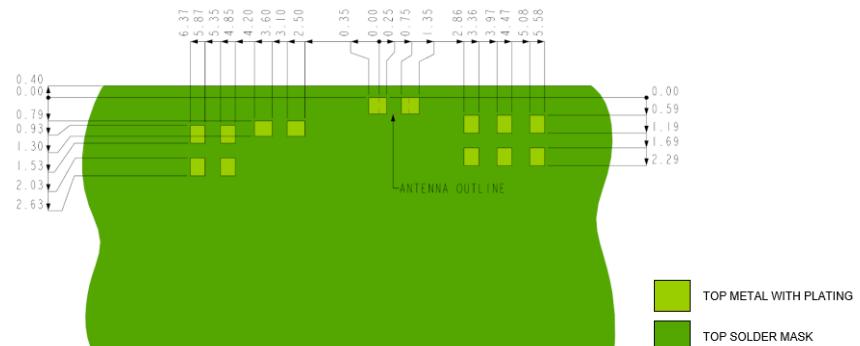
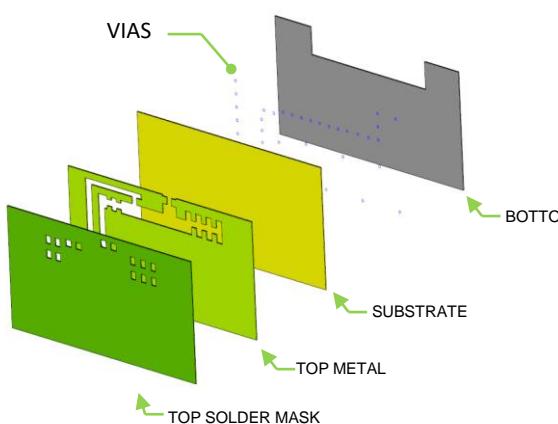
Measured @ 2.440 GHz



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

Antenna Layout (9001978-01)

Typical layout dimensions (mm)



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

Pin Description

Pin#	Description
1	Feed
2	Ground

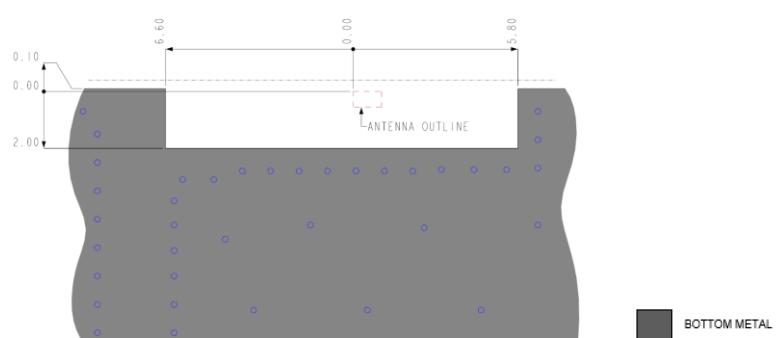
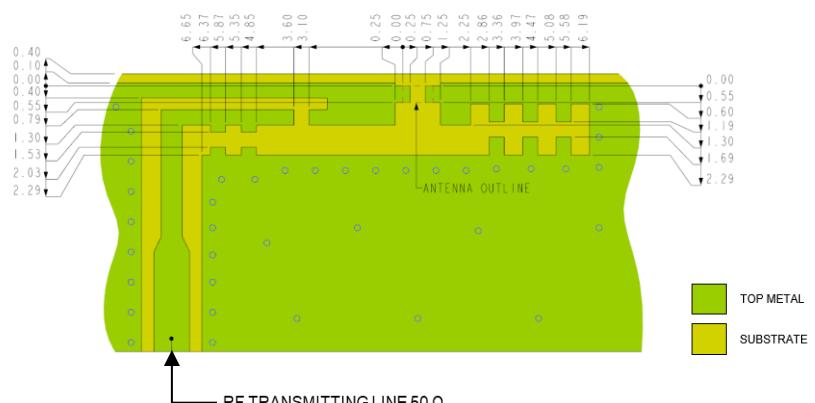
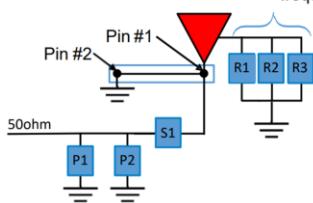
Matching Pi Network (Demo Board)

Component	Value	Tolerance
P1	4.7nH	$\pm 0.1\text{nH}$
S1	0Ω	N/A
P2	N/A	N/A
R1	0Ω	N/A
R2	N/A	N/A
R3	N/A	N/A

*Actual matching values depend on customer design



*0Ω may be added to shift frequency higher



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

Antenna Demo Board (9001978-01)

Typical layout dimensions (mm)

Part Number	A	B	C
9001978-01	(55.0)	(25.0)	(0.80)

*Dimensions in () parenthesis are Reference Only.



Appendix 2 UWB KYOCERA AVX Embedded Chip Antenna Specifications
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Appendix 2

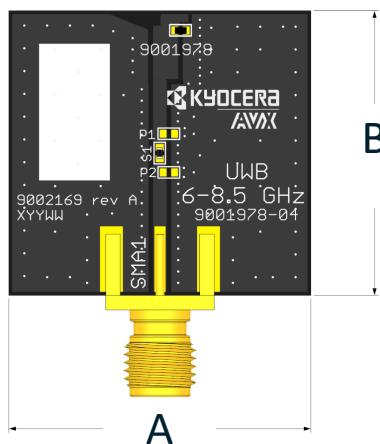
Appendix 2 gives instructions on how to match antenna through updated layout and impedance matching network for UWB (6000-8500 MHz)

Frequency (MHz)	6000 - 8500
Peak Gain (dBi)	5.7
Efficiency (%)	80
VSWR	<2.6:1
Feed Point Impedance	50 Ω unbalanced

*Data shown above has Appendix 2 matching applied on 26.5 x 25.0 mm pcb.

Part Number	A (mm)	B (mm)
9001978-04	(26.5)	(25.0)

*Dimensions in () parenthesis are Reference Only.

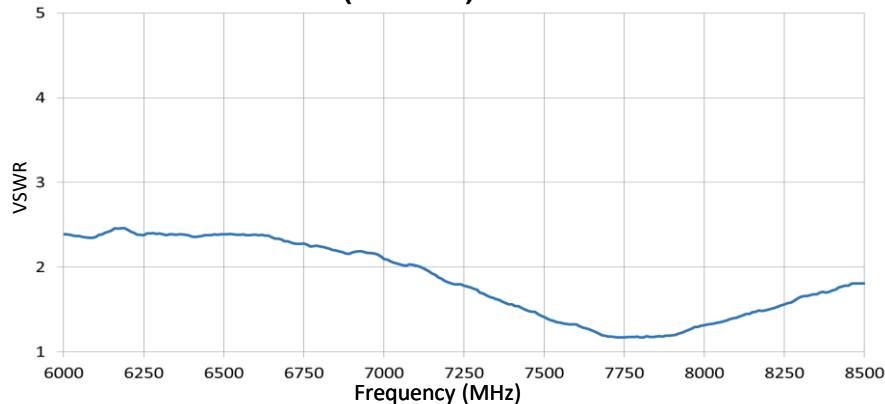


Appendix 2 UWB KYOCERA AVX Embedded Chip Antenna Specifications
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

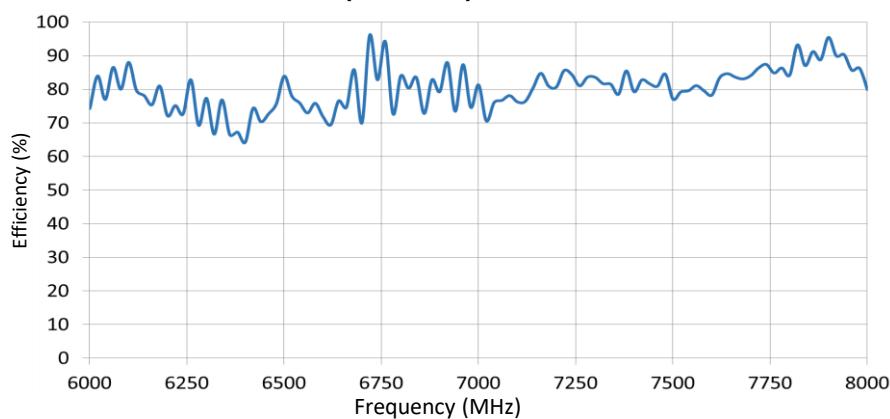
VSWR, Efficiency, and Peak Gain Plots (9001978-04)

Typical Performance on 26.5 x 25.0 mm PCB

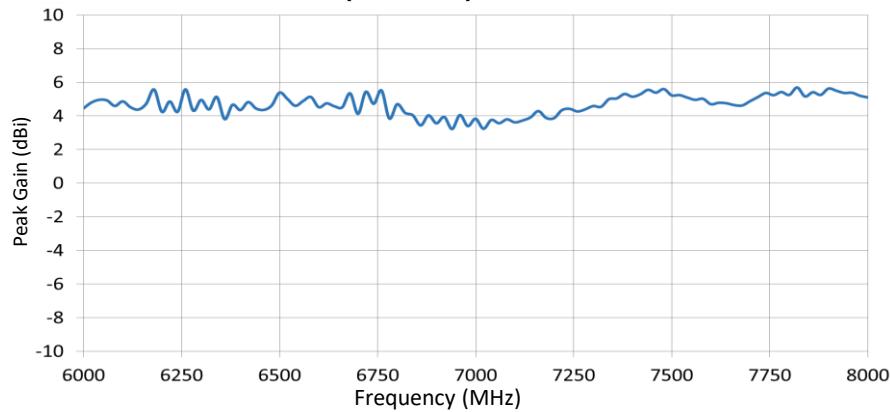
**VSWR
(6.0 – 8.5) GHz**



**Efficiency
(6.0 – 8.0) GHz**



**Peak Gain
(6.0 – 8.0) GHz**



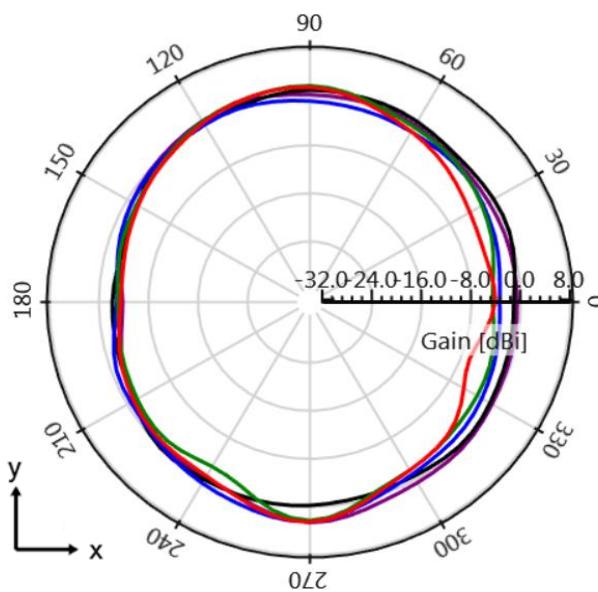
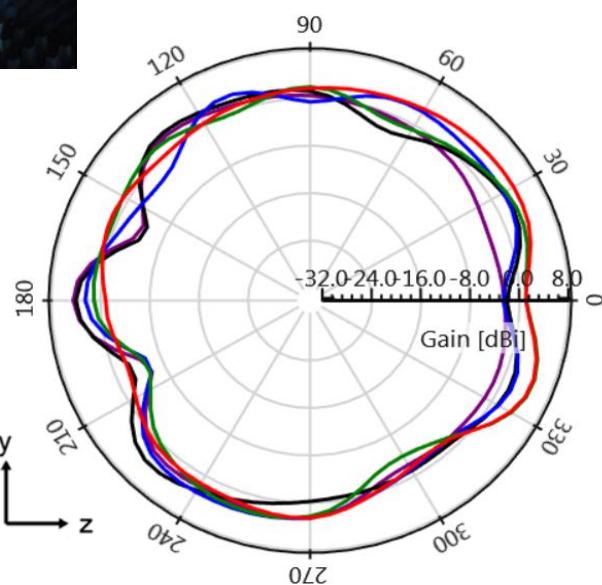
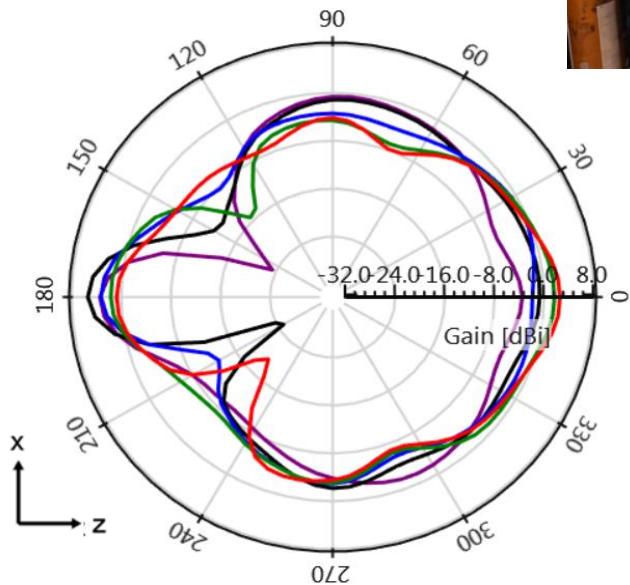
Appendix 2 UWB KYOCERA AVX Embedded Chip Antenna Specifications
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Radiation Patterns (9001978-04)

Typical Performance on 26.5 x 25.0 mm PCB

Measured @ 6000, 6500, 7000, 7500, 8000 MHz

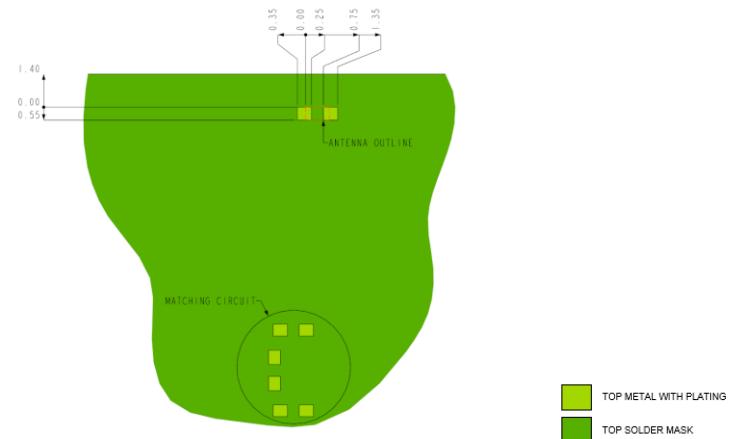
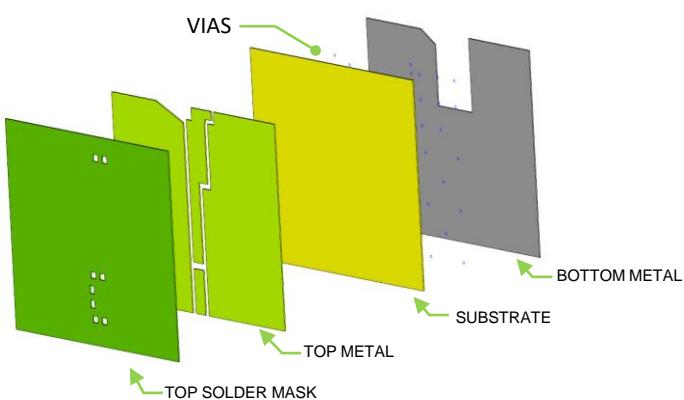
- 6000 MHz
- 6500 MHz
- 7000 MHz
- 7500 MHz
- 8000 MHz



Appendix 2 UWB KYOCERA AVX Embedded Chip Antenna Specifications
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Layout (9001978-04)

Typical layout dimensions (mm)



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

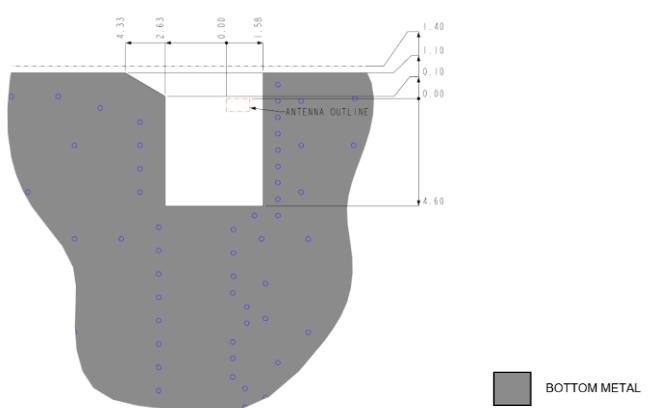
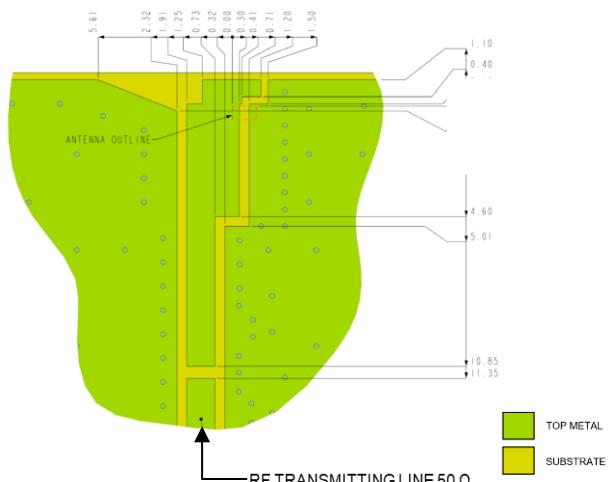
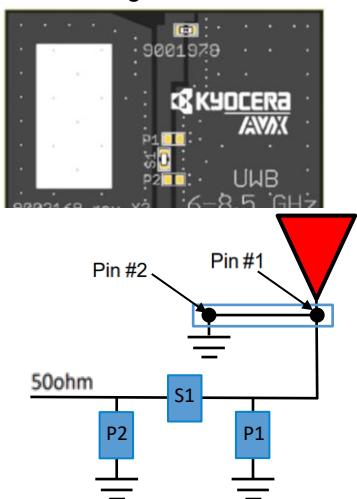
Pin Description

Pin#	Description
1	Feed
2	Ground

Matching Pi Network (Demo Board)

Component	Value	Tolerance
P1	DNI	N/A
S1	0Ω	N/A
P2	DNI	N/A

*Actual matching values depend on customer design



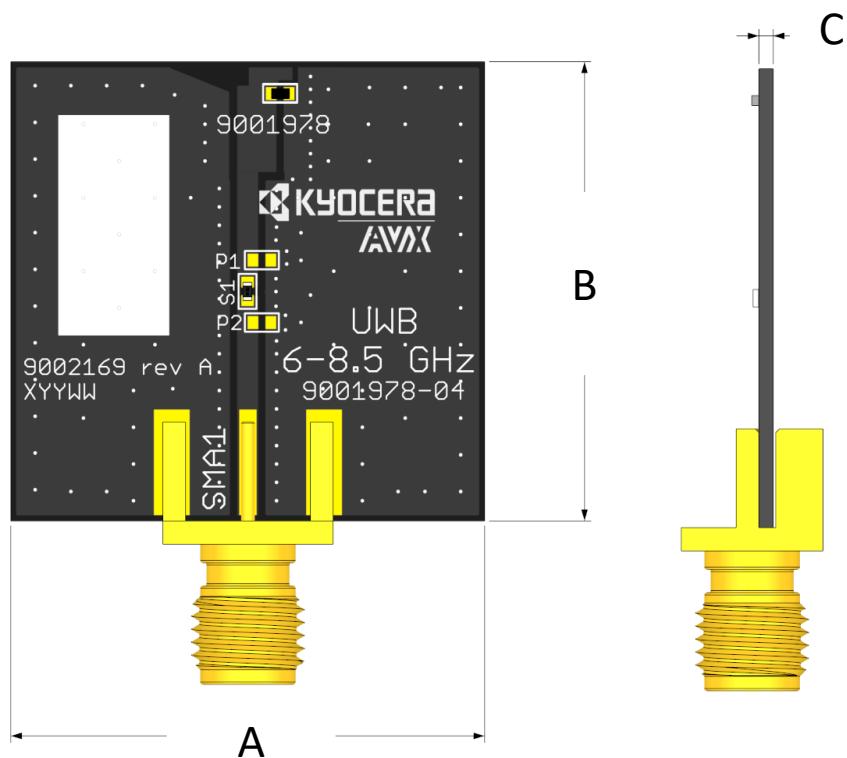
Appendix 2 UWB KYOCERA AVX Embedded Chip Antenna Specifications
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Antenna Demo Board (9001978-04)

Typical layout dimensions (mm)

Part Number	A	B	C
9001978-04	(26.5)	(25.0)	(0.80)

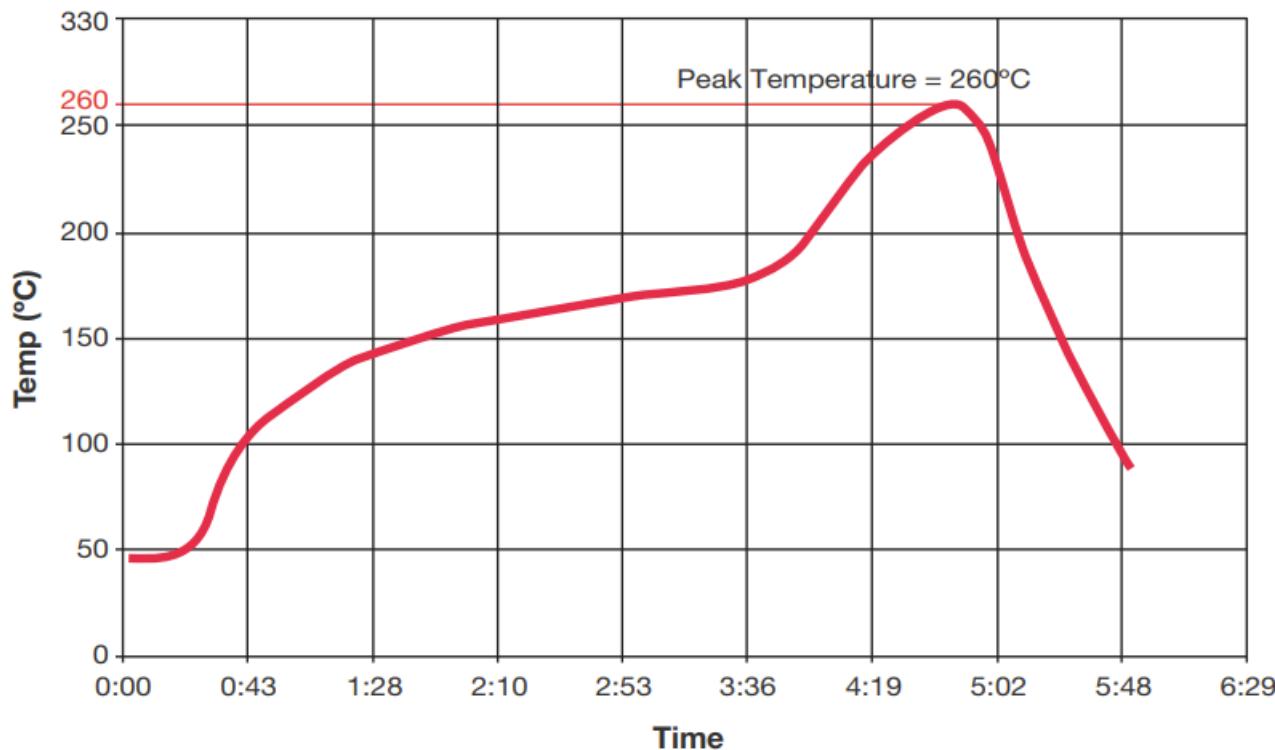
*Dimensions in () parenthesis are Reference Only.



Wi-Fi Dual Band or BT or UWB KYOCERA AVX Embedded 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 LDS antenna:



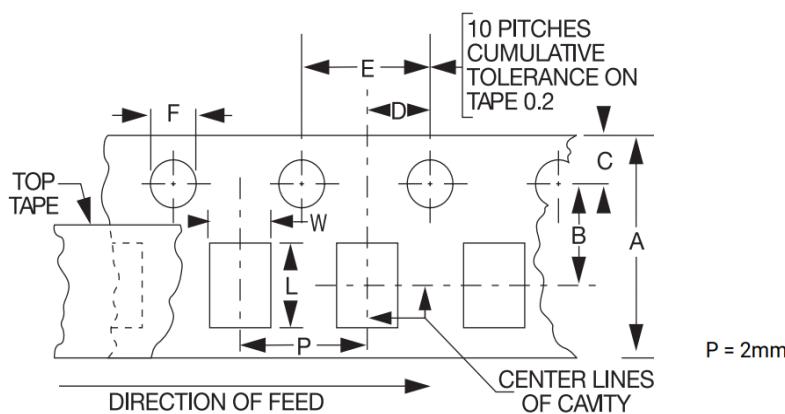
Wi-Fi Dual Band or BT or UWB KYOCERA AVX Embedded Chip Antenna Specification
 KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs

Packaging

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.



Wi-Fi Dual Band or BT or UWB KYOCERA AVX Embedded Chip Antenna Specification
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Additional Resources – 9001978-01 Ultra-Small Wi-Fi Dual-Band Chip Antenna

DXF File:

https://www.kyocera-avx.com/download/antennas/3D-DXF/9001978-01-BT_3D-DXF.zip

Simulation File:

HFSS : [https://www.kyocera-avx.com/download/antennas/ansys-hfss/9001978_\(Antenna&EVB-01\)_HFSS_011524.zip](https://www.kyocera-avx.com/download/antennas/ansys-hfss/9001978_(Antenna&EVB-01)_HFSS_011524.zip)

Additional Resources – 9001978-03 Ultra-Small Wi-Fi Dual-Band Chip Antenna

DXF File:

https://www.kyocera-avx.com/download/antennas/3D-DXF/9001978-03-WLAN_3D-DXF.zip

Simulation File:

HFSS : [https://www.kyocera-avx.com/download/antennas/ansys-hfss/9001978_\(Antenna&EVB-03\)_HFSS_011524.zip](https://www.kyocera-avx.com/download/antennas/ansys-hfss/9001978_(Antenna&EVB-03)_HFSS_011524.zip)

Additional Resources – 9001978-04 Ultra-Small UWB Chip Antenna

DXF File:

https://www.kyocera-avx.com/download/antennas/3D-DXF/9001978-04-UWB_3D-DXF.zip

Simulation File:

HFSS : [https://www.kyocera-avx.com/download/antennas/ansys-hfss/9001978_\(Antenna&EVB-04\)_HFSS_010524.zip](https://www.kyocera-avx.com/download/antennas/ansys-hfss/9001978_(Antenna&EVB-04)_HFSS_010524.zip)