

Part No. 1001011 GPS/GLONASS/Beidou/Galileo (On/Off Ground) or ISM FR4 Antenna

1.561, 1.575, 1.603 GHz or 868-928 MHz

Supports: Tracking, Smart Home, Agriculture, Automotive, Healthcare, Digital Signage, Wearables, Industrial Devices



*ISM layout offered in Appendix 1

GPS / GLONASS / Beidou / Galileo FR4 Antenna

1.559 – 1.610 GHz or
ISM 868 – 928 MHz

KEY BENEFITS

Stay-in-Tune

IMD antenna technology provides superior RF field containment, resulting in less interaction with surrounding components.

Quicker Time-to-Market

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

Reliability

Products are the latest RoHS version compliant.

APPLICATIONS

- Embedded design
- Cellular, Headsets, Tablets
- Gateway, Access Point
- Handheld
- Telematics
- Tracking
- Healthcare
- M2M, Industrial devices
- Smart Grid
- OBD-II

Real-World Performance and Implementation

Antennas may look alike on the outside, but the important difference is inside. Other antennas may contain simple PIFA or monopole designs that interact with their surroundings, complicating layout or changing performance with use position. KYOCERA AVX antennas utilize patented Isolated Magnetic Dipole (IMD) technology to deliver a unique size and performance combination.

Greater Flexibility

KYOCERA AVX IMD technology enables the advance antenna design that delivers superior performance in reception critical applications. 1001011 is capable for off-ground and on-ground (over metal) environments. The 1001011 can also achieve ISM performance with proper layout shown on Appendix 1.

Electrical Specifications

Typical Characteristics, on 72 x 50 mm PCB

| Frequency (GHz) | 1.559 - 1.563 | 1.575 | 1.559 - 1.591 | 1.593 - 1.610 | *868 – 928 MHz |
|------------------------------|------------------------|--------------|---------------|---------------|---------------------|
| Mounting | Off Ground / On Ground | | | | Off Ground |
| GNSS Bands | Beidou | GPS | Galileo | Glomass | Refer to Appendix 1 |
| Peak Gain (dBi) | 0.96 / -0.26 | 0.87 / -0.22 | 0.96 / -0.18 | 1.00 / -0.35 | |
| Efficiency (%) | 72 / 47 | 71 / 46 | 70 / 45 | 69 / 41 | |
| Center Frequency f_0 (GHz) | 1.561 | 1.575 | 1.575 | 1.603 | |
| VSWR | 1.5:1 / 2.5:1 | | | | |
| Feed Point Impedance | 50 Ω unbalanced | | | | |

Mechanical Specifications & Ordering Part Number

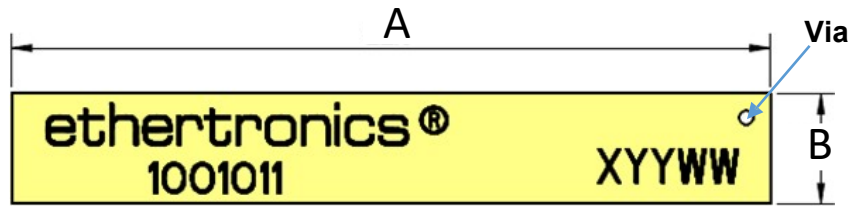
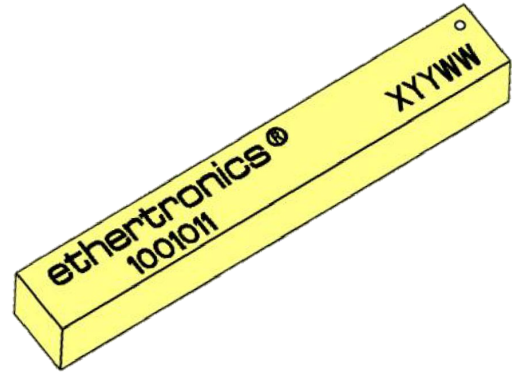
| Ordering Part Number | 1001011 |
|----------------------|------------------------------|
| Size (mm) | 22.0 x 3.2 x 3.3 |
| Mounting | Surface mounted to the PCB |
| Weight (grams) | 0.45 |
| Packaging | Tape & Reel |
| Demo Board | 1001011-02 (GNSS Demo Board) |
| | 1001011-04 (ISM Demo Board) |

1.575 GHz KYOCERA AVX Embedded Antenna Specifications.
KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs.

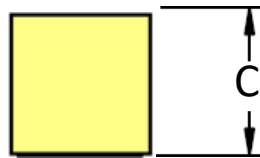
Antenna Dimensions

Typical antenna dimensions (mm)

| Part Number | A (mm) | B (mm) | C (mm) |
|-------------|------------|-----------|-----------|
| 1001011 | 22.0 ± 0.3 | 3.2 ± 0.2 | 3.3 ± 0.3 |



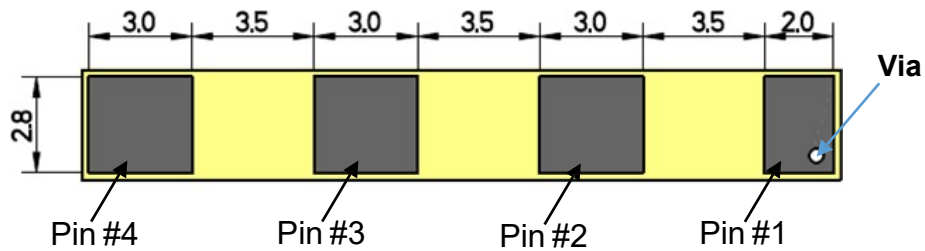
Top View



Height

Pin Descriptions

| Pin# | Description |
|------|-------------|
| 1 | Feed |
| 2 | Dummy Pad |
| 3 | Dummy Pad |
| 4 | Dummy Pad |

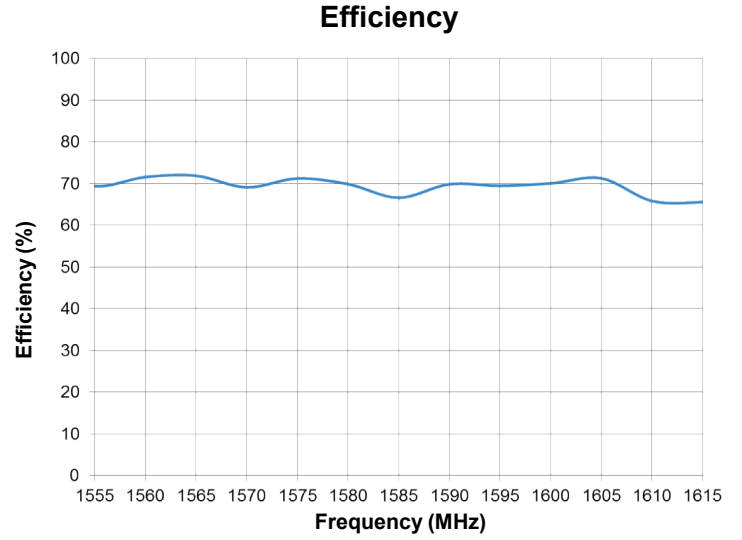
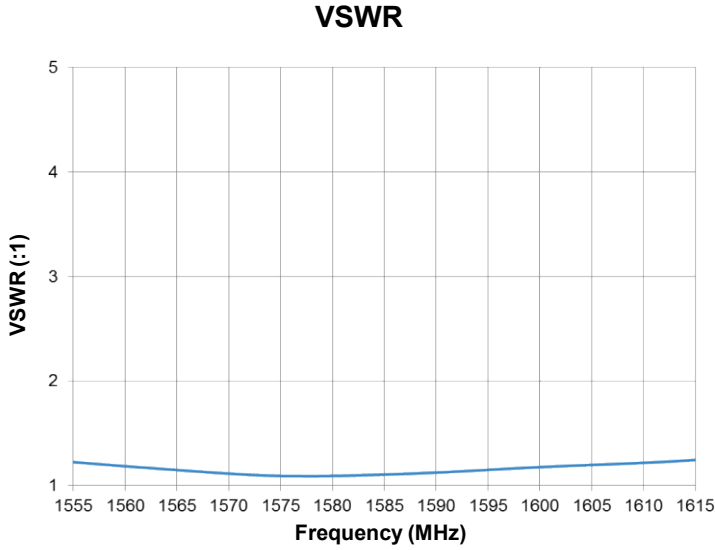


Bottom View

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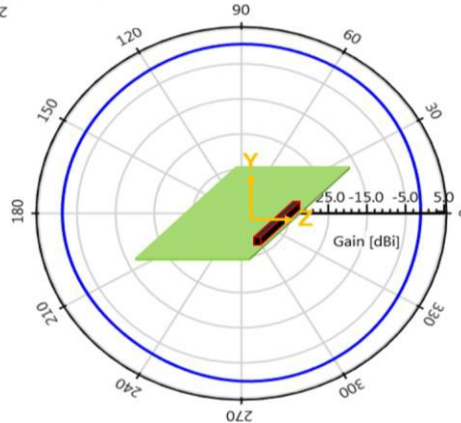
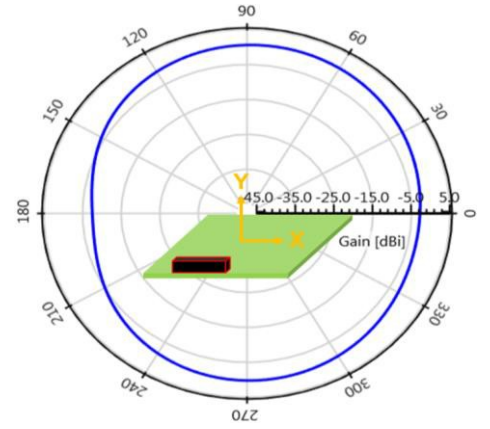
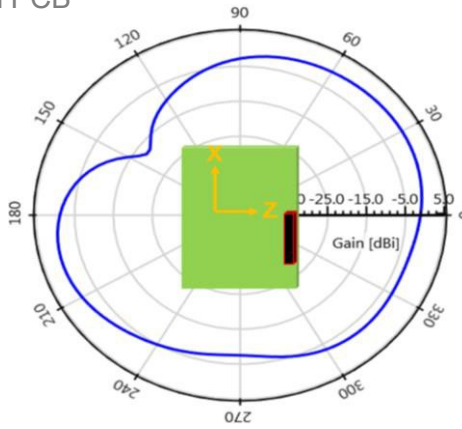
VSWR and Efficiency Plots (Off-Ground)

Typical Performances on 72 x 50 mm PCB



Antenna Radiation Patterns (Off-Ground)

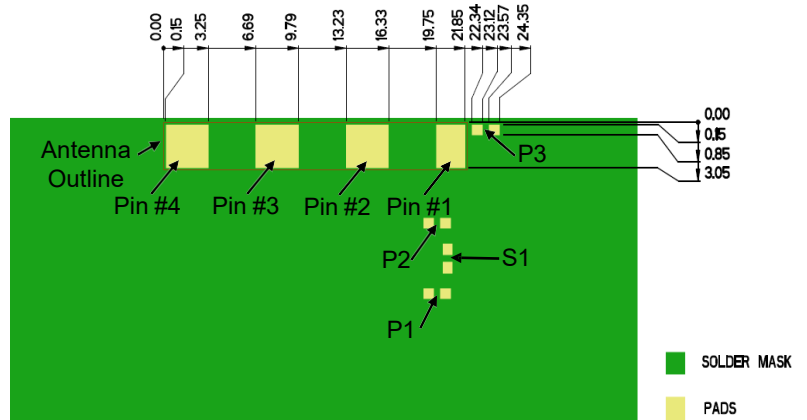
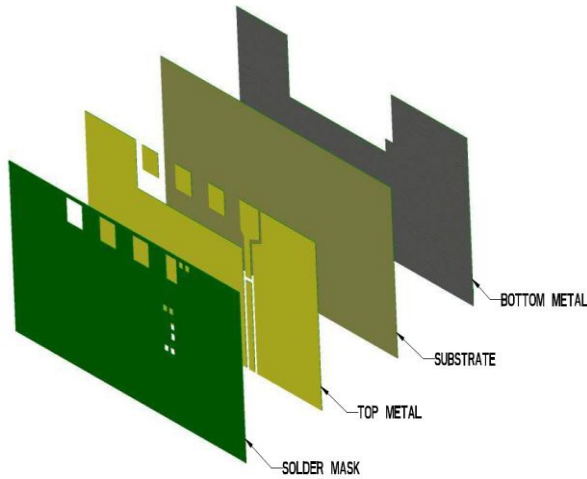
Typical Performances on 72 x 50 mm PCB
 measured @ 1.575 GHz



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Antenna Layout (Off-Ground)

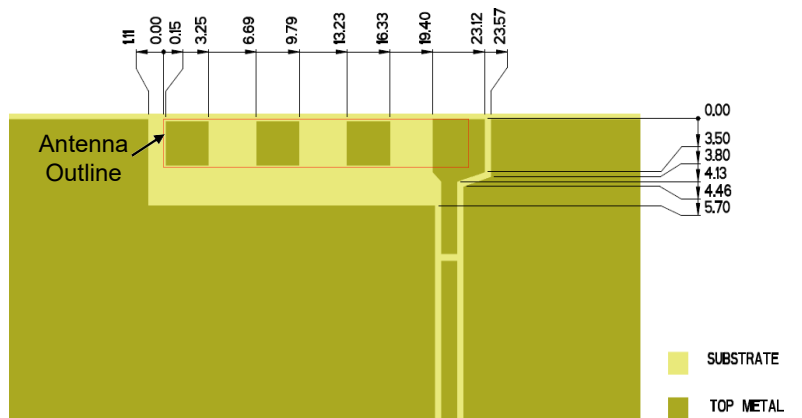
Typical layout dimensions (mm)



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

Pin Descriptions

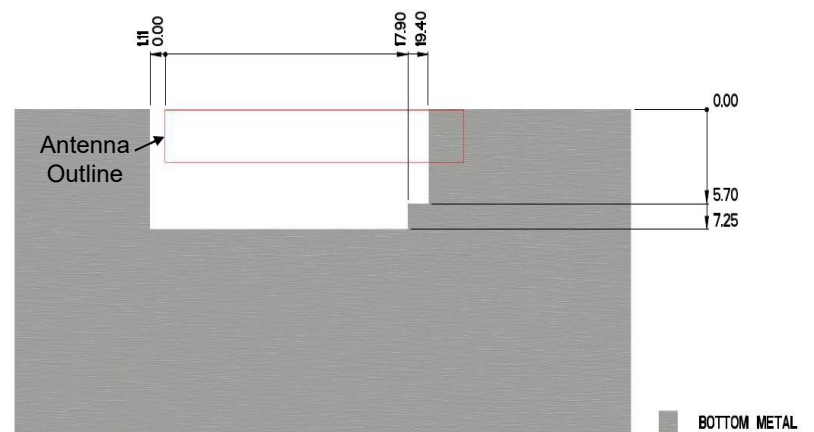
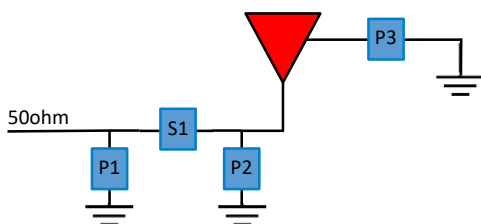
| Pin# | Description |
|------|-------------|
| 1 | Feed |
| 2 | Dummy Pad |
| 3 | Dummy Pad |
| 4 | Dummy Pad |



Matching Pi Network (Demo Board)

| Component | Value | Tolerance |
|-----------|-------|-----------|
| P1 | DNI | N/A |
| S1 | 4.3pF | ±0.25pF |
| P2 | 1pF | ±0.5pF |
| P3 | 0Ω | N/A |

*Actual matching values depend on customer design

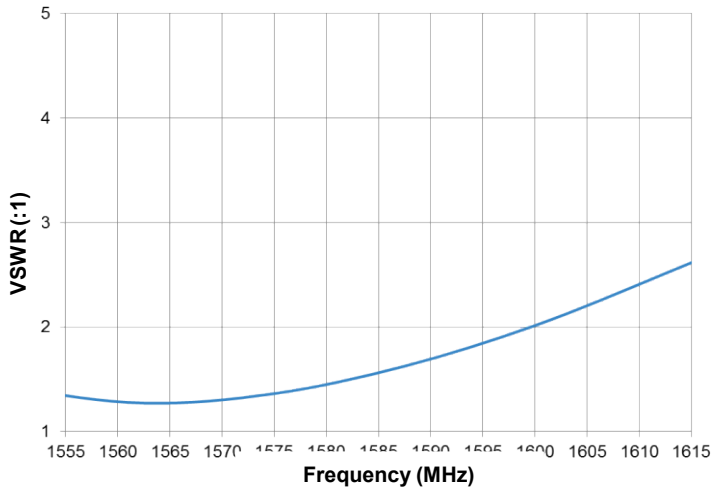


1.575 GHz KYOCERA AVX Embedded Antenna Specifications.
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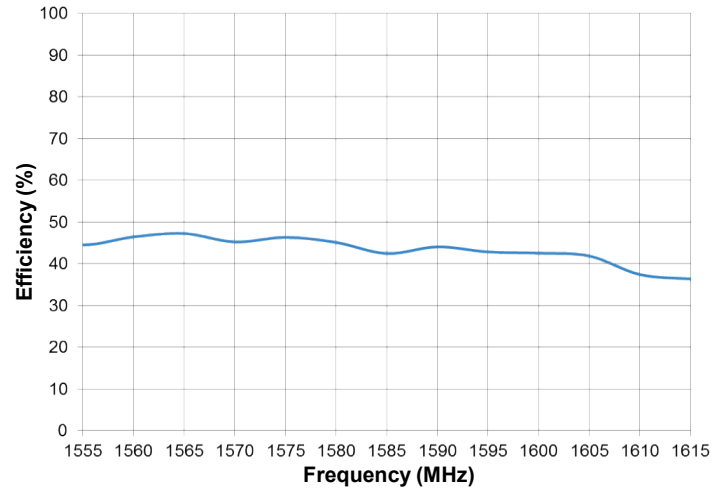
VSWR and Efficiency Plots (On-Ground)

Typical Performances on 72 x 50 mm PCB

VSWR

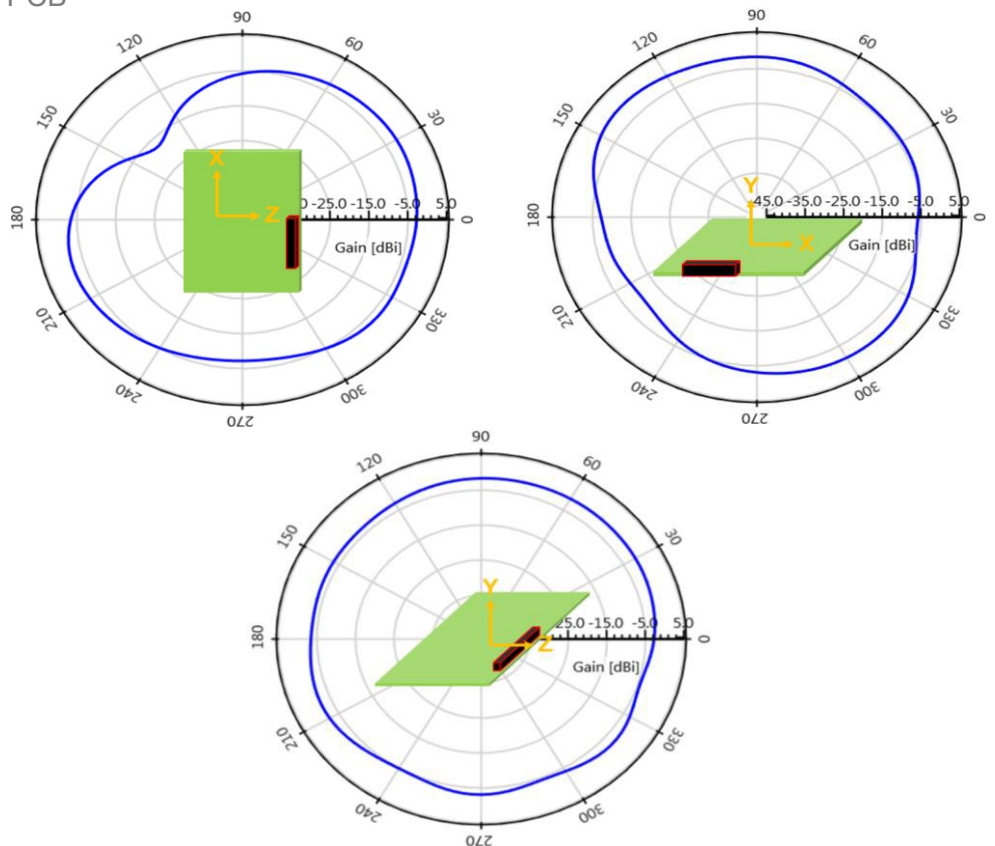


Efficiency



Antenna Radiation Patterns (On-Ground)

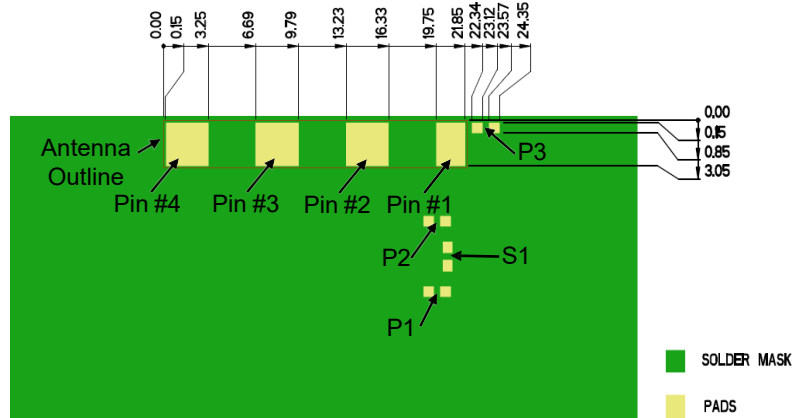
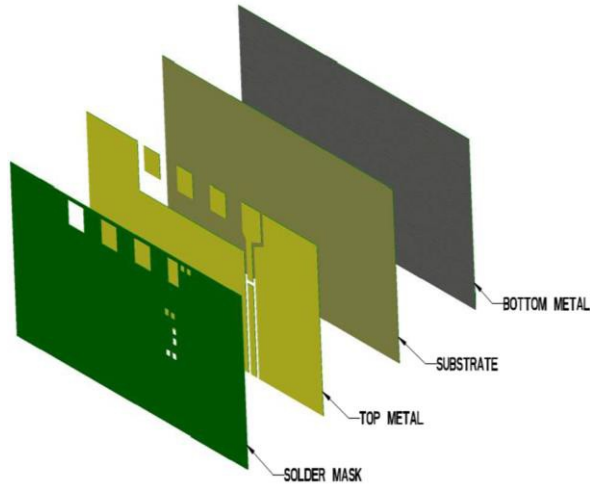
Typical Performances on 50 x 72 mm PCB
 measured @ 1.575 GHz



1.575 GHz KYOCERA AVX Embedded Antenna Specifications.
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Antenna Layout (On-Ground)

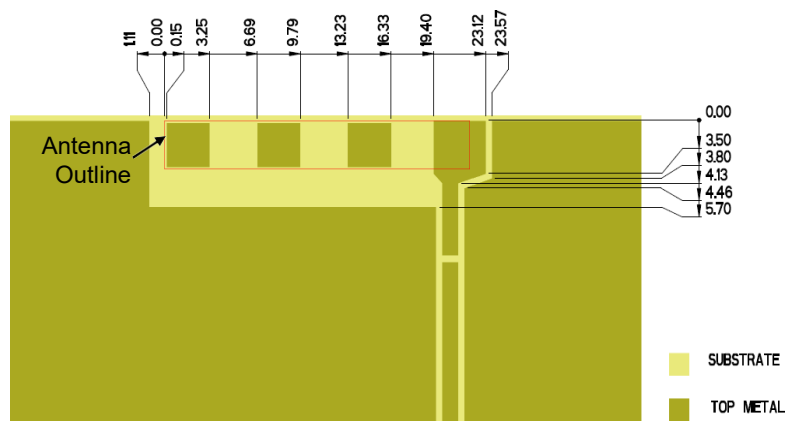
Typical layout dimensions (mm)



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

Pin Descriptions

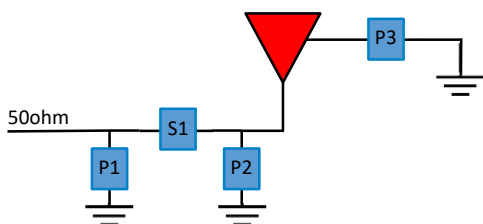
| Pin# | Description |
|------|-------------|
| 1 | Feed |
| 2 | Dummy Pad |
| 3 | Dummy Pad |
| 4 | Dummy Pad |



Matching Pi Network (Demo Board)

| Component | Value | Tolerance |
|-----------|-------|-----------|
| P1 | 2.4pF | ±0.1pF |
| S1 | 0Ω | N/A |
| P2 | DNI | N/A |
| P3 | 0Ω | N/A |

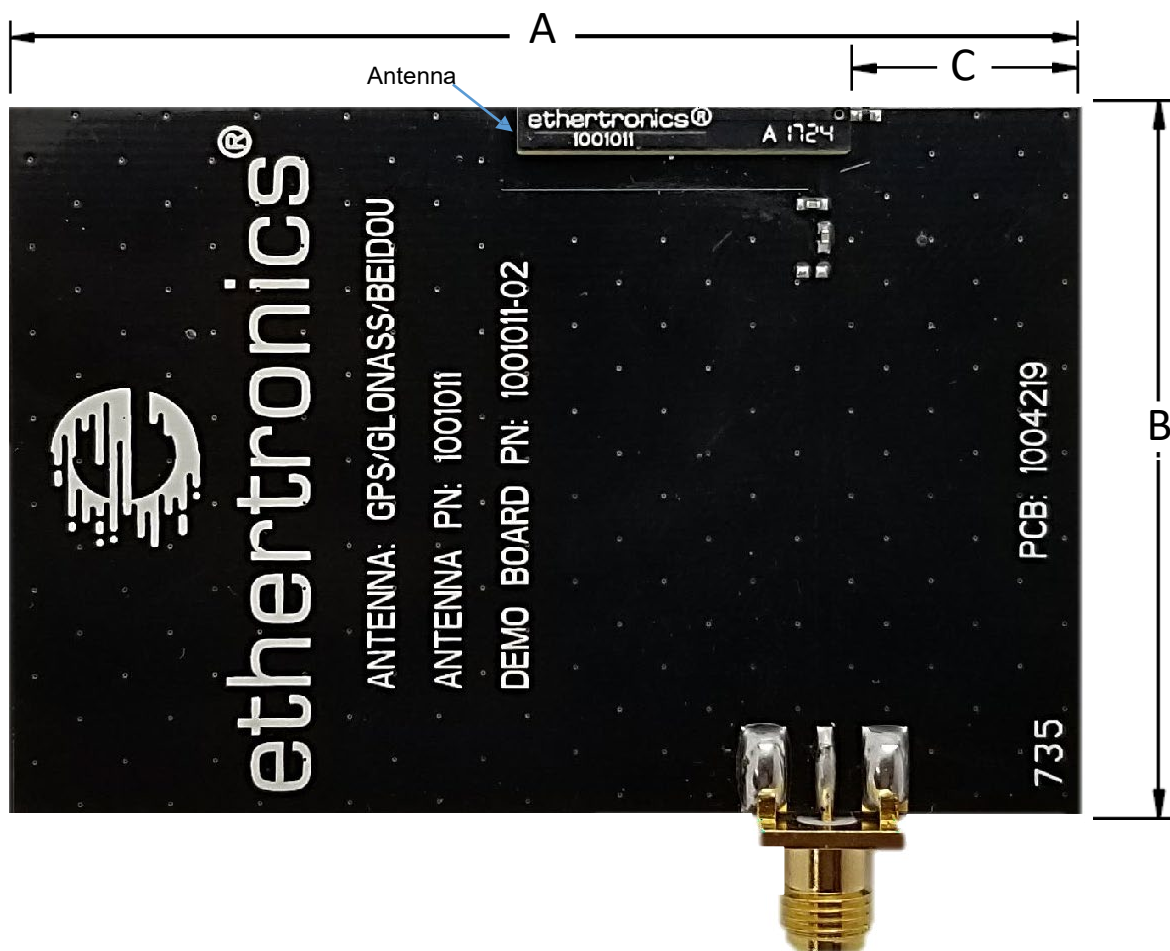
*Actual matching values depend on customer design



1.575 GHz KYOCERA AVX Embedded Antenna Specifications.
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Antenna Demo Board
 1001011-02 Off-Ground

| Part Number | A (mm) | B (mm) | C (mm) |
|-------------|--------|--------|--------|
| 1001011-02 | 72.0 | 50.0 | 15.0 |



Appendix 1 ISM KYOCERA AVX Embedded Antenna Specifications.
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Appendix 1

Appendix 1 gives instructions on how to match antenna through impedance matching network for ISM (868-928 MHz) only.

| Frequency (MHz) | 868 - 928 |
|----------------------|------------------------|
| Mounting | Off Ground |
| Peak Gain (dBi) | 1.0 |
| Efficiency (%) | 64 |
| VSWR | <2.5:1 |
| Feed Point Impedance | 50 Ω unbalanced |

*Data shown above has Appendix 1 matching applied on 115 x 26.5 mm pcb.

| Part Number | A (mm) | B (mm) |
|-------------|--------|--------|
| 1001011-04 | 26.5 | 115.0 |

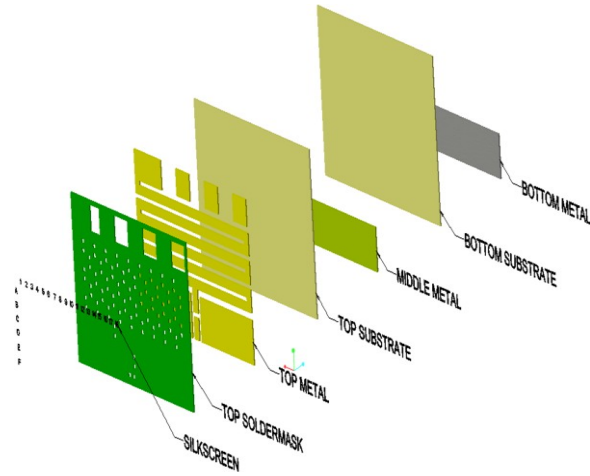
*Appendix 1 Antenna Demo Board



Appendix 1 ISM KYOCERA AVX Embedded Antenna Specifications.
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Appendix 1 ISM Antenna Layout (Off-Ground)

Typical layout dimensions (mm)



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

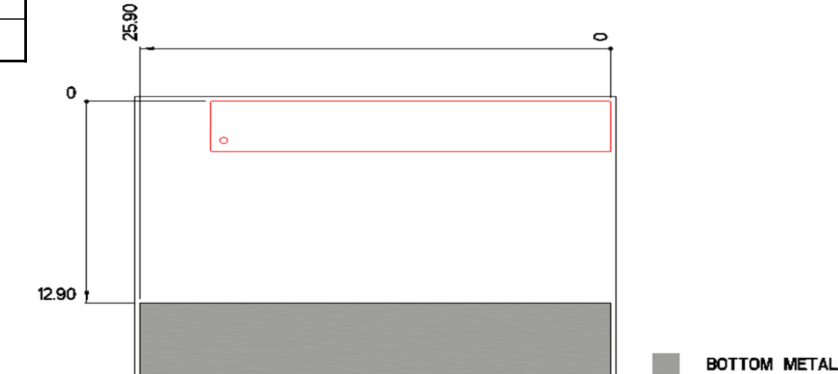
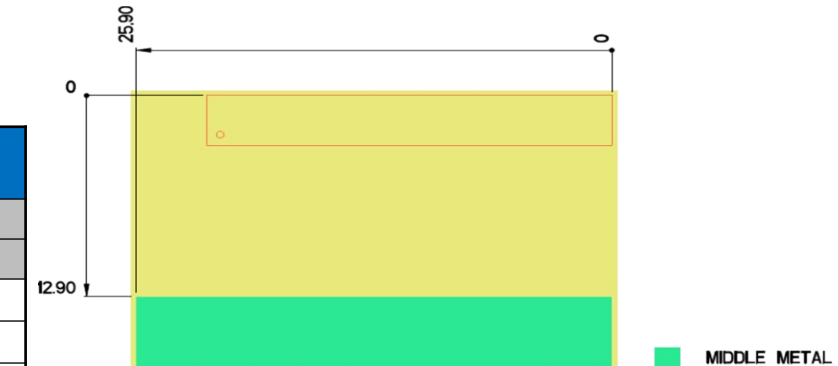
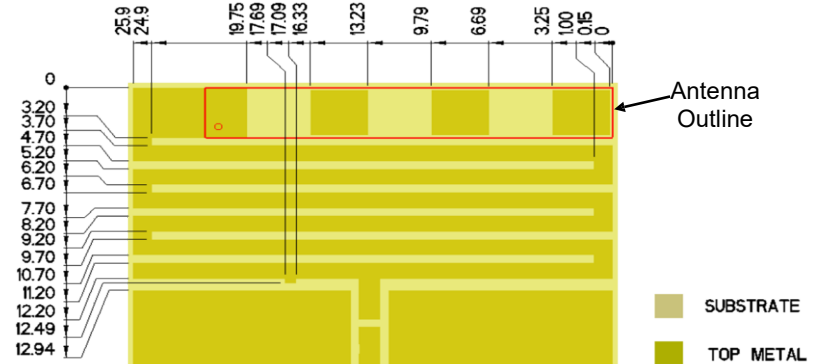
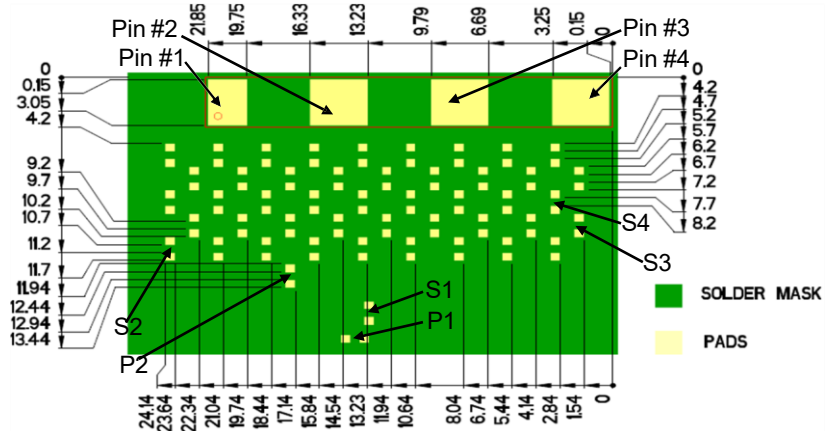
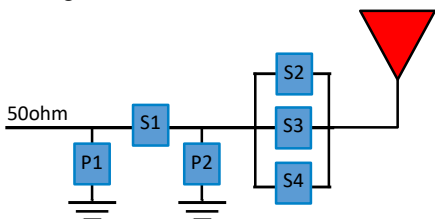
Pin Descriptions

| Pin# | Description |
|------|-------------|
| 1 | Feed |
| 2 | Dummy Pad |
| 3 | Dummy Pad |
| 4 | Dummy Pad |

Matching Pi Network (Demo Board)

| Component | Value | Tolerance | Board Label |
|-----------|-------|-----------|-------------|
| P1 | DNI | N/A | |
| S1 | 0Ω | N/A | |
| P2 | 18nH | ±2% | F6 |
| S2 | 0Ω | N/A | E1 |
| S3 | 0Ω | N/A | D18 |
| S4 | DNI | N/A | C17 |

*Actual matching values depend on customer design



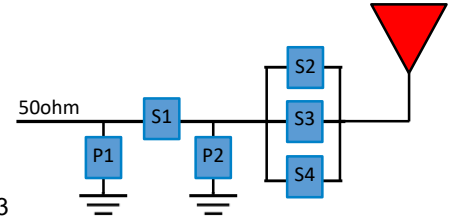
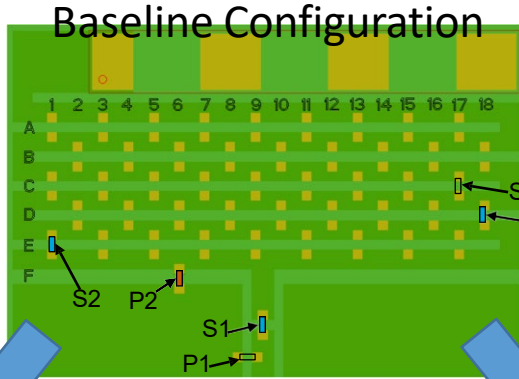
Appendix 1 ISM KYOCERA AVX Embedded Antenna Specifications.
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Appendix 1 ISM Tuning Structure (Off-Ground)

Typical layout dimensions (mm)

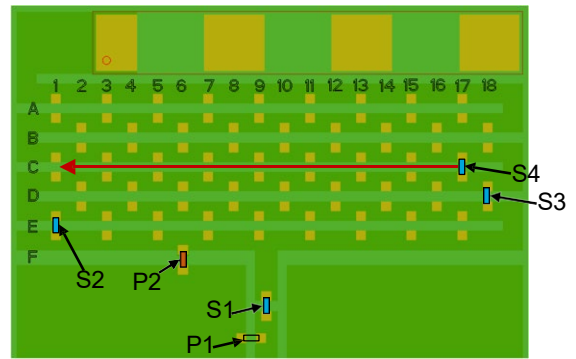
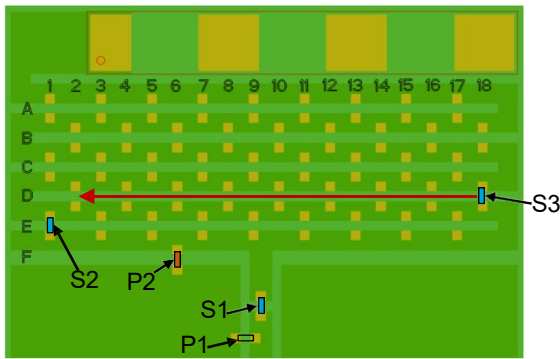
| Component | Value | Tolerance | Board Label |
|-----------|-------|-----------|-------------|
| P1 | DNI | N/A | |
| S1 | 0Ω | N/A | |
| P2 | 18nH | ±2% | F6 |
| S2 | 0Ω | N/A | E1 |
| S3 | 0Ω | N/A | D18 |
| S4 | DNI | N/A | C17 |

*Matching Pi Network (Baseline)



| Tune Frequency Lower? | Outcome: |
|--|---|
| Move (S3) 0 Ohm from D18 towards D2 depending on requested antenna tuning. D18, D16, and D14 through D2 allows for on board tuning to shift frequency lower. | Antenna frequency will shift lower up to D2 tuning location |

| Tune Frequency Higher? | Outcome: |
|---|--|
| Keep (S3) 0 Ohm on D18. Add (S4) 0 Ohm on C17 to shift resonant frequency slightly higher. Continue to move C17 component towards C1 for more drastic tuning. | Antenna frequency will shift higher up to C1 tuning location |



| Component | Value | Tolerance | Board Label |
|-----------|-------|-----------|-------------|
| P1 | DNI | N/A | |
| S1 | 0Ω | N/A | |
| P2 | 18nH | ±2% | F6 |
| S2 | 0Ω | N/A | E1 |
| S3 | 0Ω | N/A | D18-D2 |
| S4 | DNI | N/A | C17 |

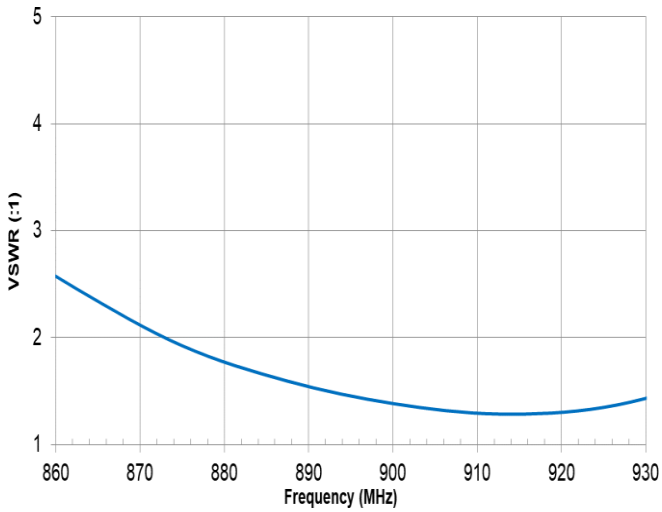
| Component | Value | Tolerance | Board Label |
|-----------|-------|-----------|-------------|
| P1 | DNI | N/A | |
| S1 | 0Ω | N/A | |
| P2 | 18nH | ±2% | F6 |
| S2 | 0Ω | N/A | E1 |
| S3 | 0Ω | N/A | D18 |
| S4 | 0Ω | N/A | C17- C1 |

Appendix 1 ISM KYOCERA AVX Embedded Antenna Specifications.
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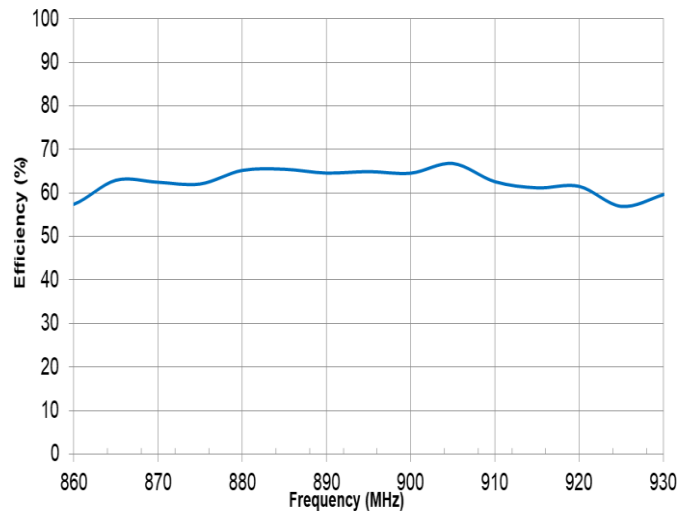
Appendix 1 VSWR and Efficiency Plots (Off-Ground)

Typical Performances on 115 x 26.5 mm PCB

VSWR



Efficiency



Antenna Radiation Patterns (Off-Ground)

Typical Performances on 115 x 26.5 mm PCB measured @ 870, 910 MHz

- 870 MHz
- 910 MHz

