Part No. A1001011

Automotive GPS/GNSS (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

Automotive 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 (FDA Class I) Applications
- M2M, Industrial devices
- Smart Grid
- OBD-II

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.

Greater Flexibility

KYOCERA AVX IMD technology enables the advance antenna design that delivers superior performance in reception critical applications. A1001011 is capable for off-ground and on-ground (over metal) environments. The A1001011 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	Glonass	
Peak Gain (dBi)	0.96 / -0.26	0.87 / -0.22	0.96 / -0.18	1.00 / -0.35	Refer to Appendix 1
Efficiency (%)	72 / 47	71 / 46	70 / 45	69 / 41	
Center Frequency f_o (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	A1001011
Size (mm)	22.0 x 3.2 x 3.3
Mounting	SMT (P&P)
Weight (grams)	0.45
Packaging	Tape & Reel
Demo Board	1001011-02 (GNSS Demo Board)
	1001011-04 (ISM Demo Board)

GPS/GNSS or ISM KYOCERA AVX Automotive Embedded FR4 Antenna Specifications.
KYOCERA AVX produces a wide variety of standard and custom antennas to meet user needs.

Mechanical Specifications & Ordering Part Number cont.

Ordering Part #	A1001011
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	

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email: antenna.info@kyocera-avx.com
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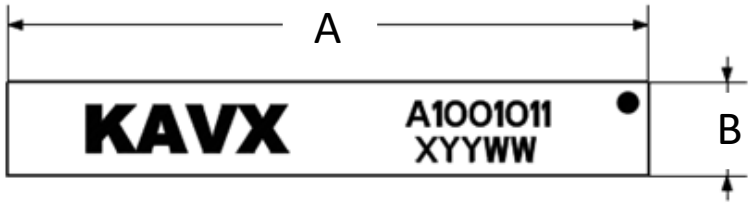
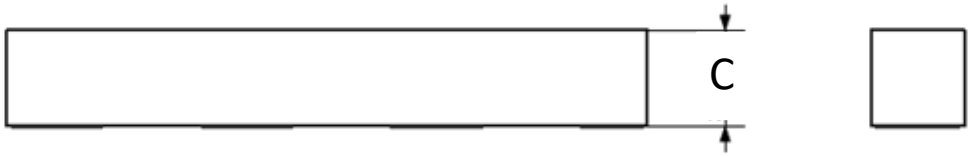
Antenna Dimensions

Typical antenna dimensions (mm)

Part Number	A	B	C
A1001011	22.0 ± 0.2	3.2 ± 0.1	3.3 ± 0.33



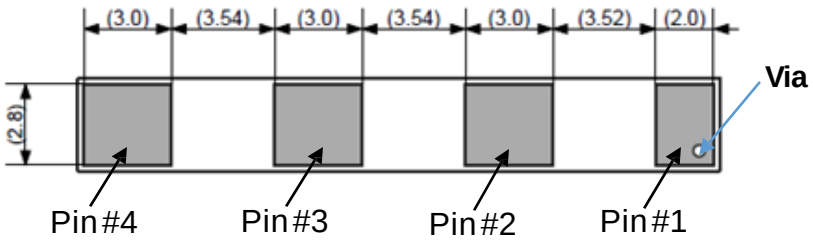
Top View



Height

Pin Descriptions

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



Bottom View

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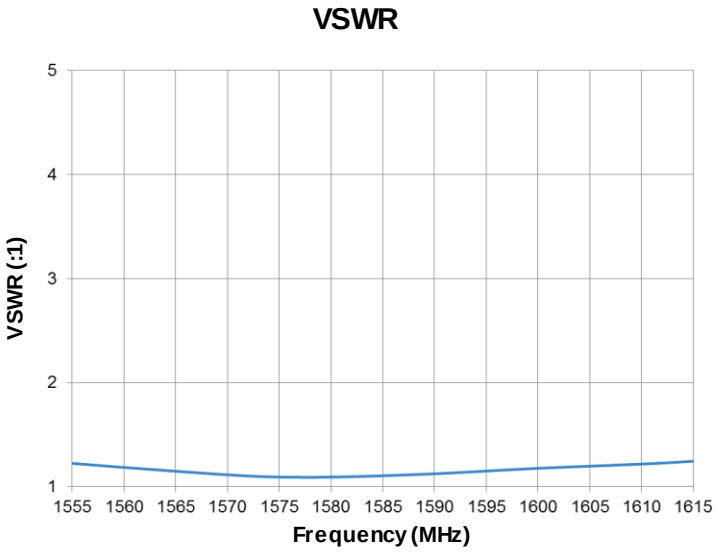
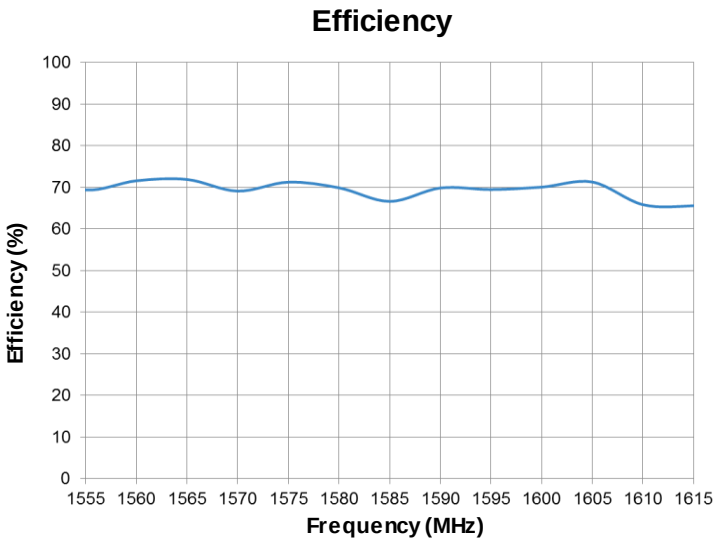
VSWR and Efficiency Plots (Off-Ground)

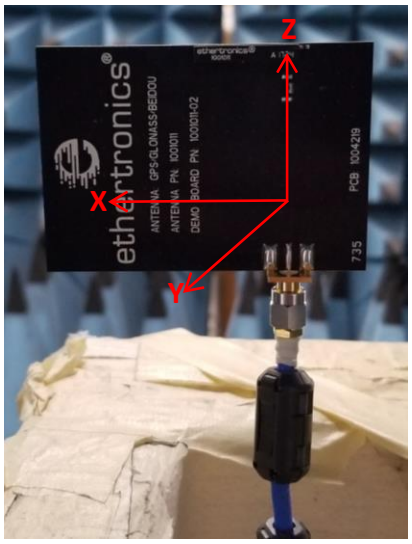
Typical Performances on 72 x 50 mm PCB

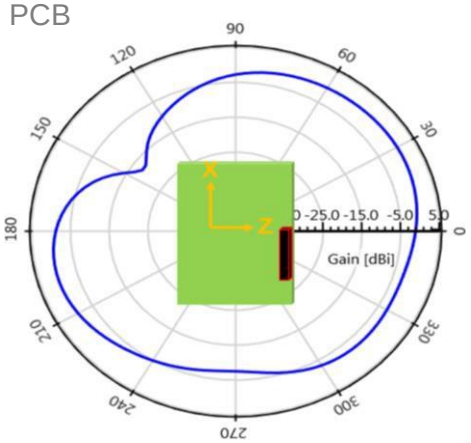


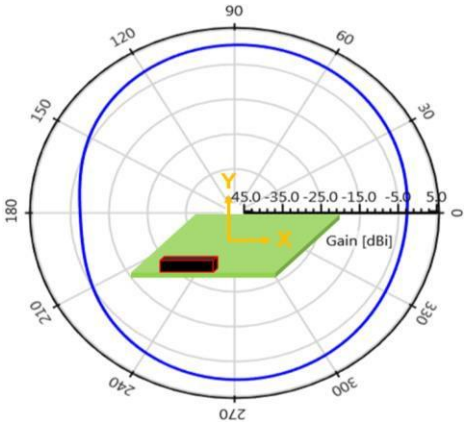


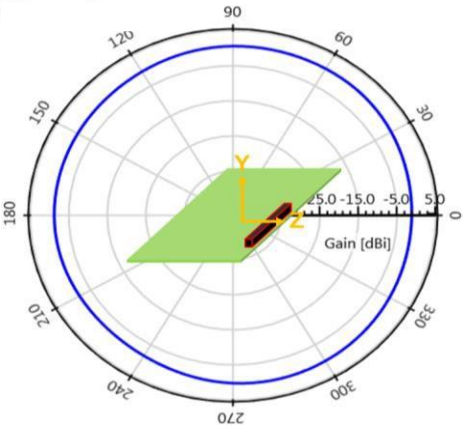
Antenna Radiation Patterns (Off-Ground)

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









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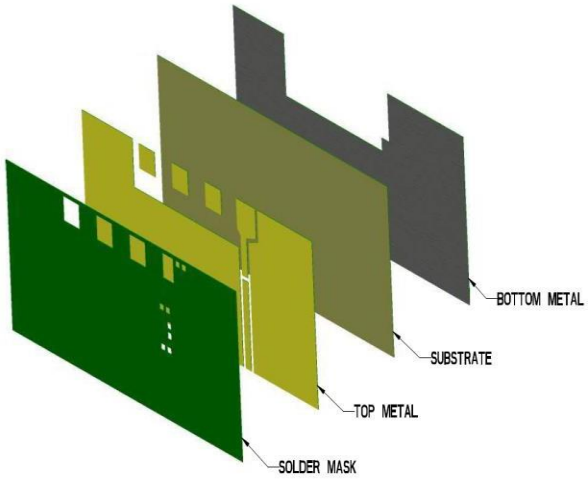
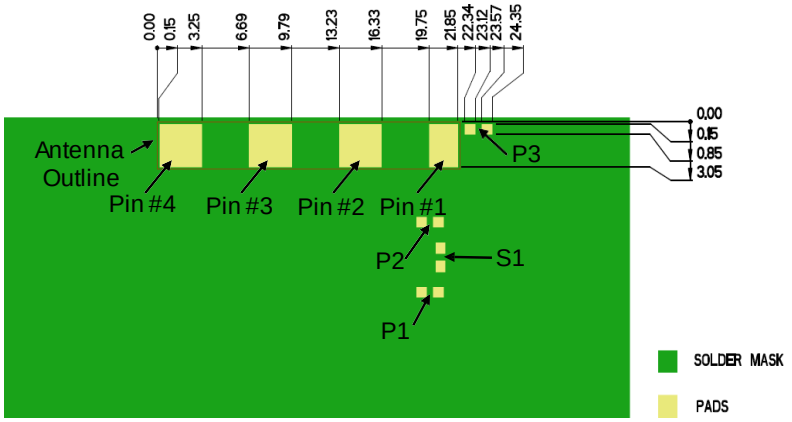
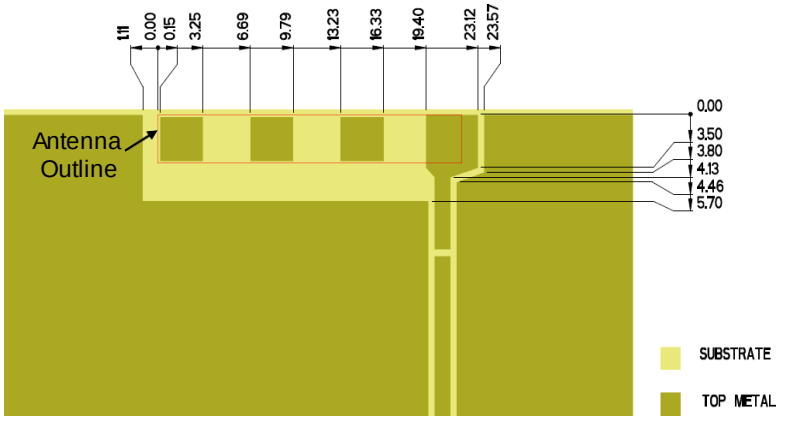
Antenna Layout (Off-Ground)

Typical layout dimensions (mm)





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



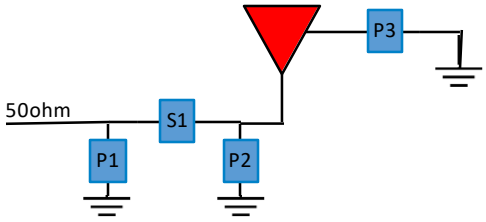
Pin Descriptions

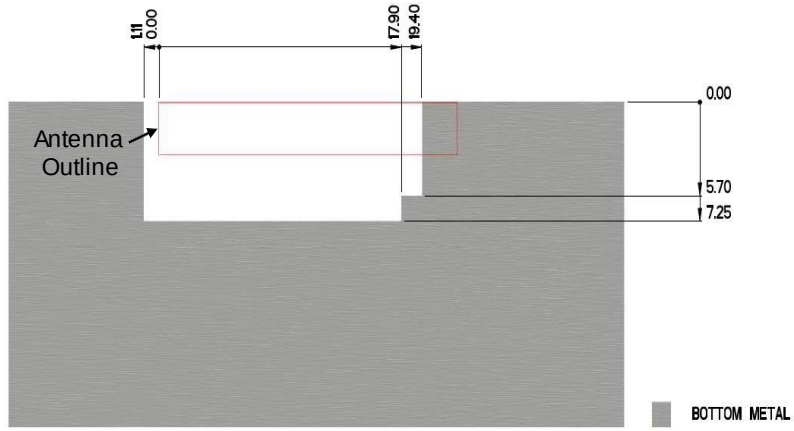
Pin#	Description
1	Feed
2	Dummy Pad
3	Dummy Pad
4	Dummy Pad

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





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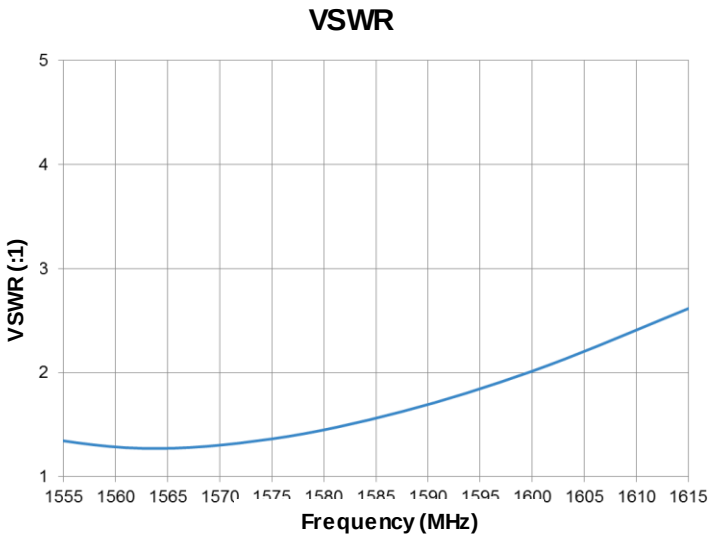
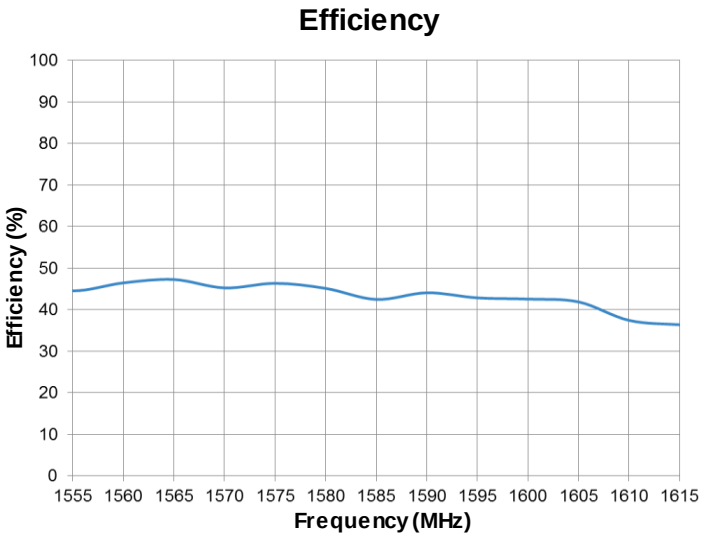
VSWR and Efficiency Plots (On-Ground)

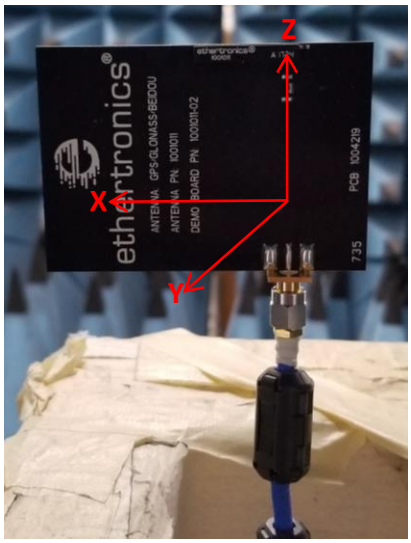
Typical Performances on 72 x 50 mm PCB

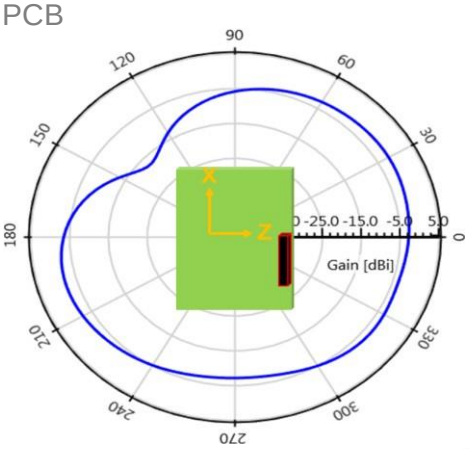


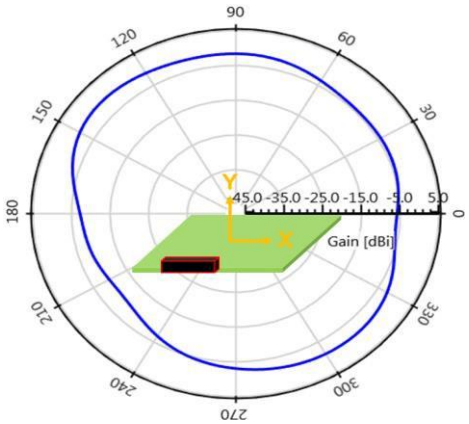


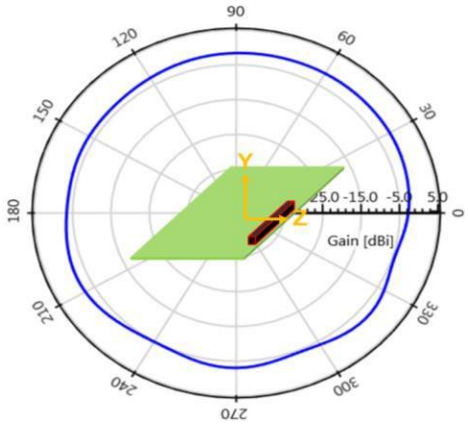
Antenna Radiation Patterns (On-Ground)

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









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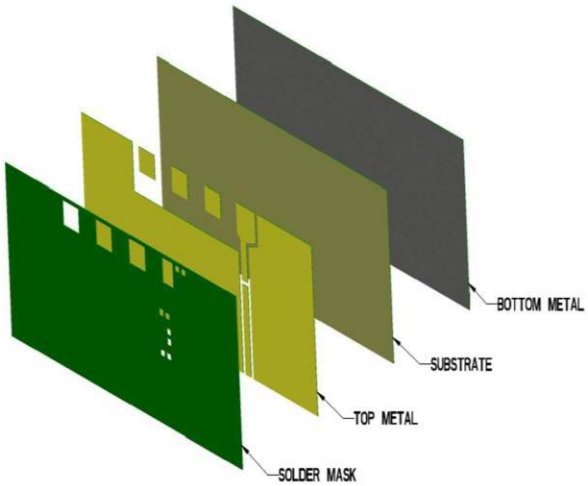
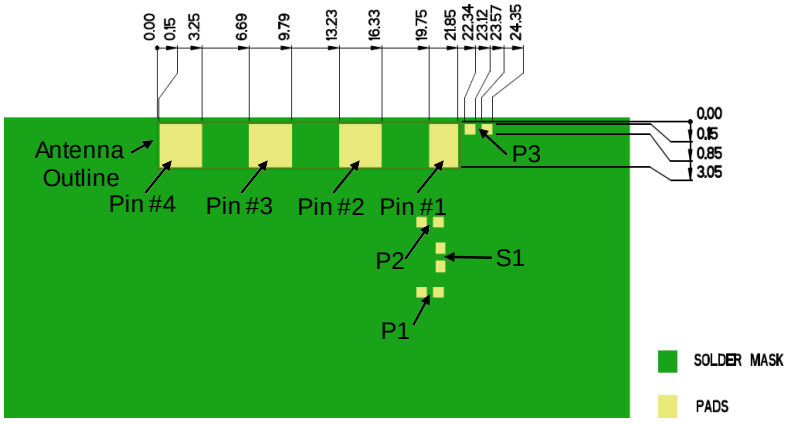
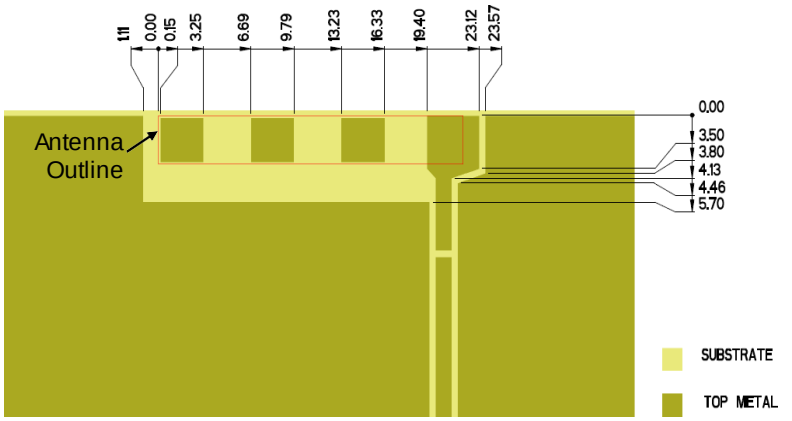
Antenna Layout (On-Ground)

Typical layout dimensions (mm)





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



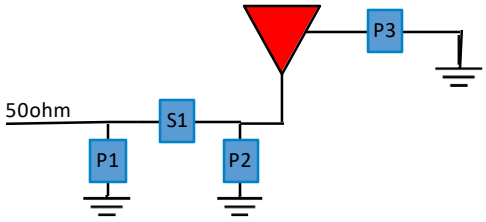
Pin Descriptions

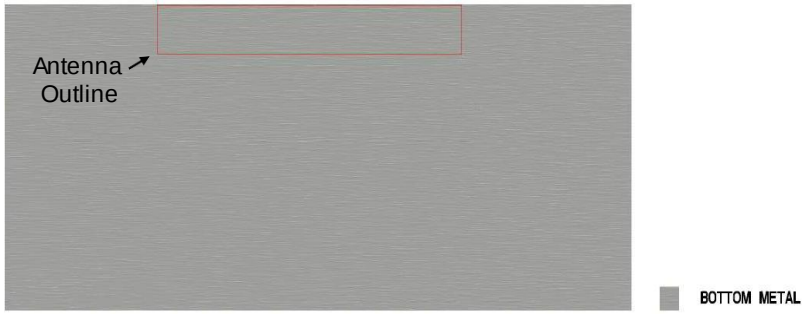
Pin#	Description
1	Feed
2	Dummy Pad
3	Dummy Pad
4	Dummy Pad

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





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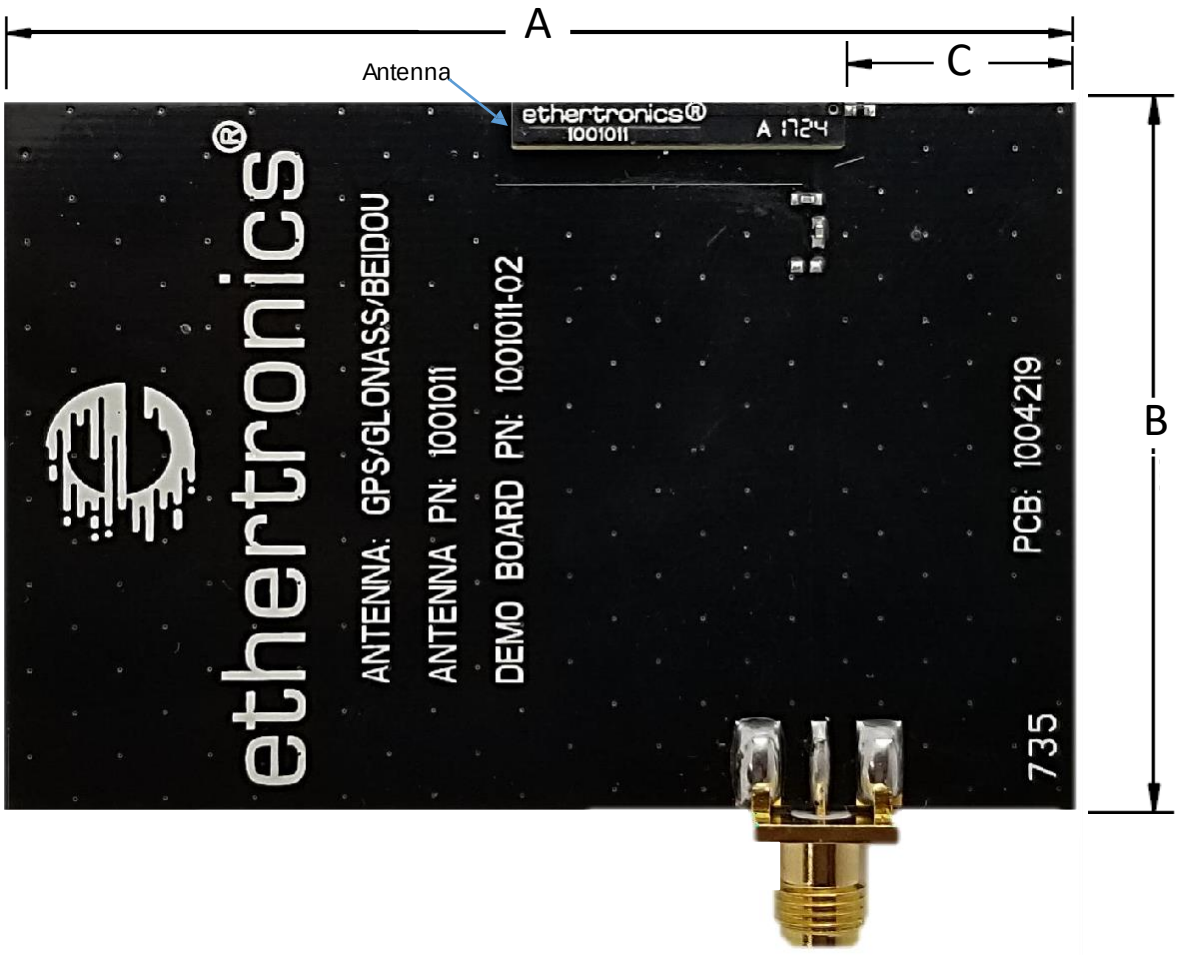
Antenna Demo Board

1001011-02 Off-Ground

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



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Appendix 1

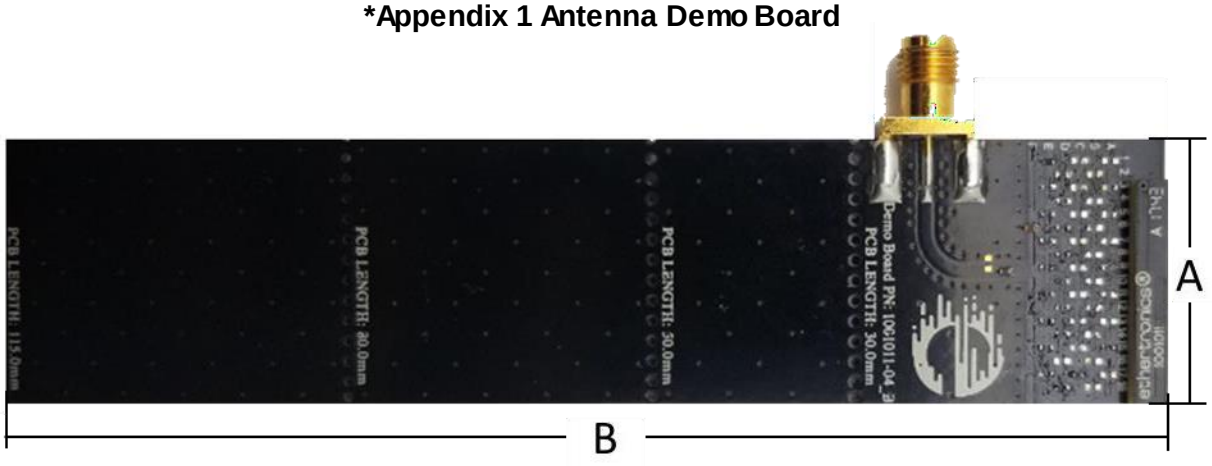
Appendix 1 gives instructions on how to match antenna through impedance matching network for ISM (868-928 MHz) only.

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**



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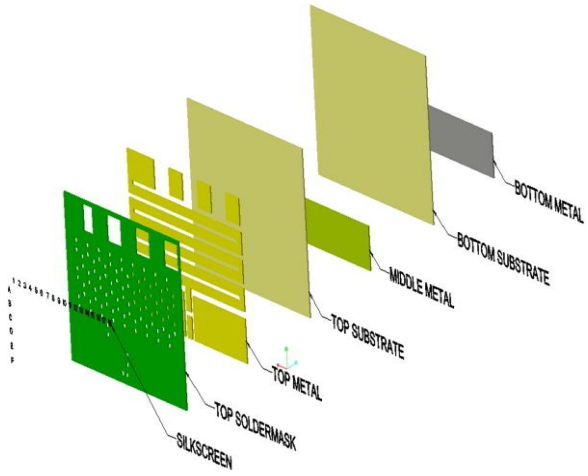
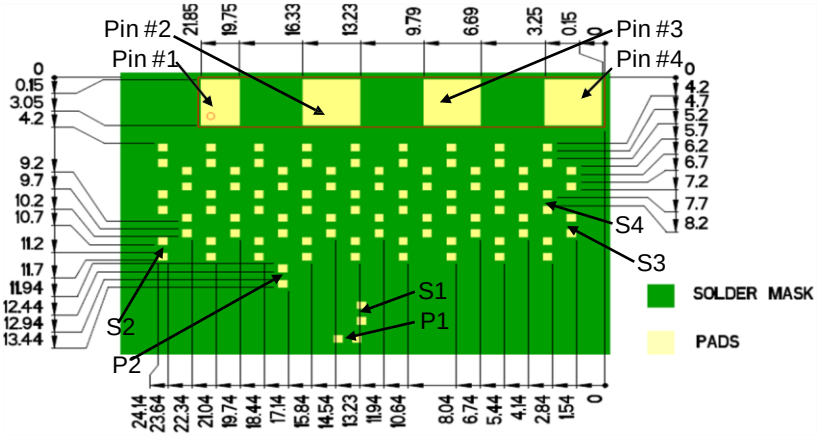
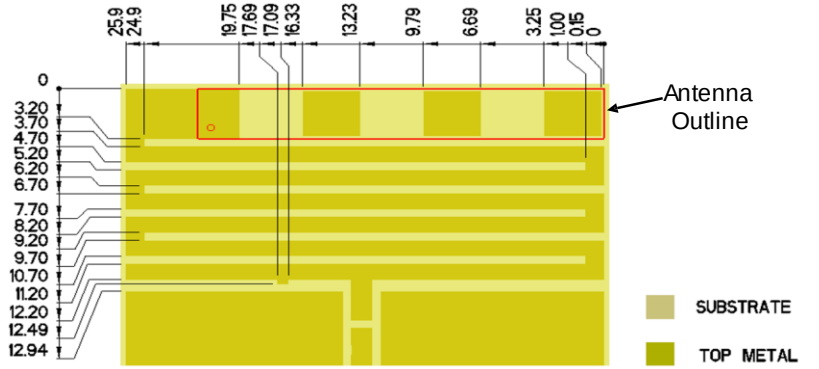
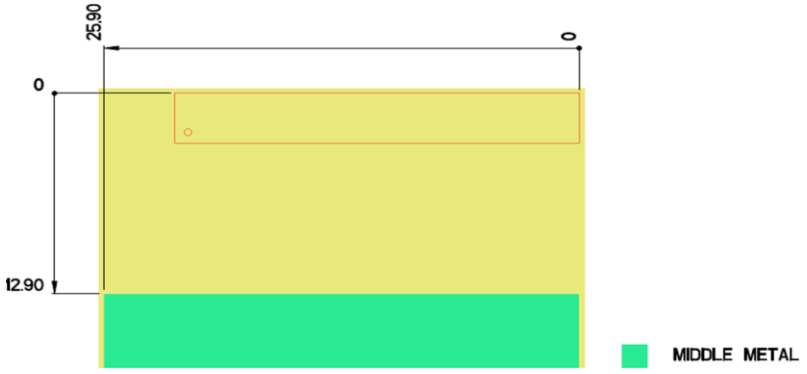
Appendix 1 ISM Antenna Layout (ISM Off-Ground)

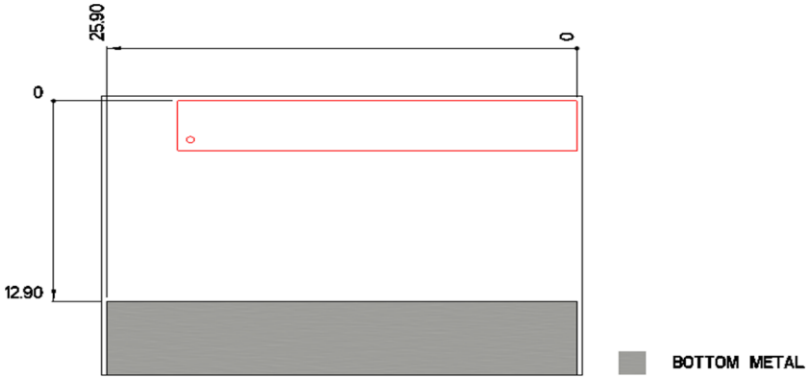
Typical layout dimensions (mm)











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

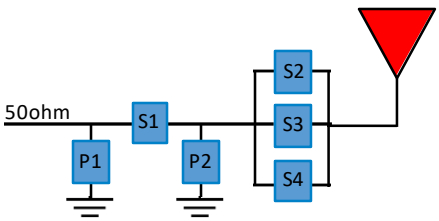
Pin Descriptions

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



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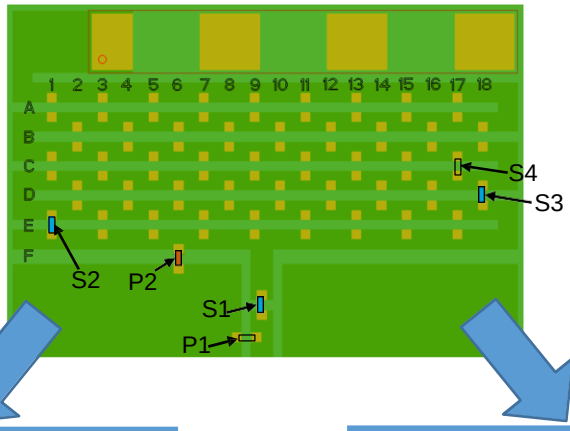
Appendix 1 ISM Antenna Tuning Structure (Off-Ground)

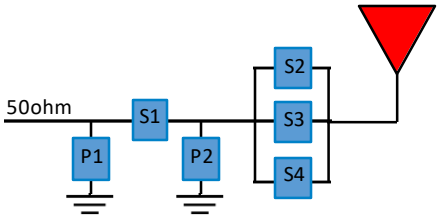
Typical layout dimensions (mm)

Baseline Configuration

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

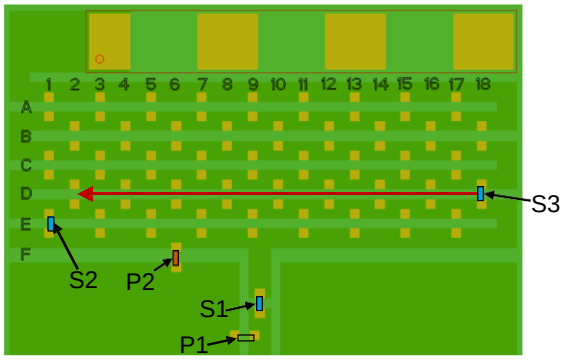
*Matching Pi Network (Baseline)

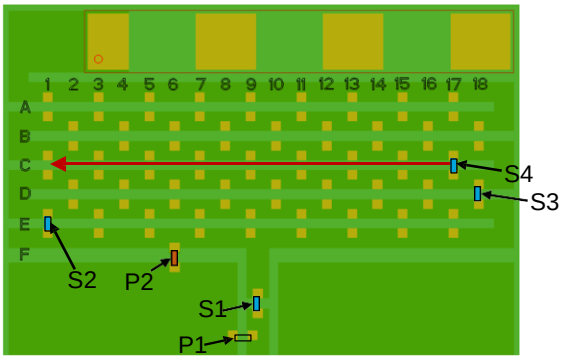




Tune Frequency Lower?	Outcome:
Move (S3) 0 Ohm from D18 towards D2 depending on requested antenna tuning. D18, D16, and D14 through D2 allows for on board tuning to shift frequency lower.	Antenna frequency will shift lower up to D2 tuning location

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

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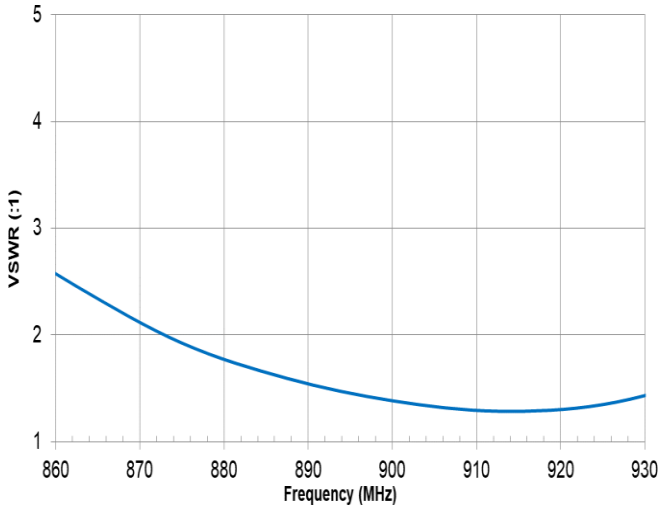
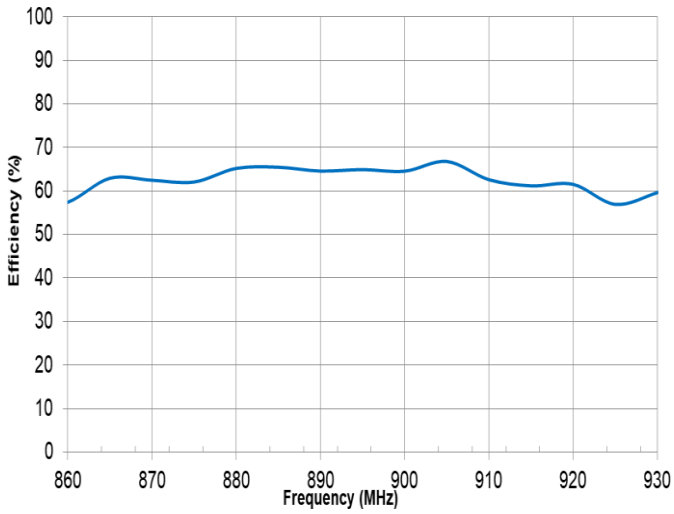
VSWR and Efficiency Plots (ISM Off-Ground)

Typical Performances on 115 x 26.5 mm PCB

VSWR

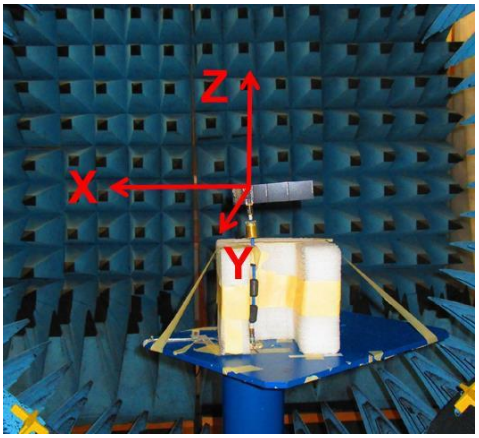


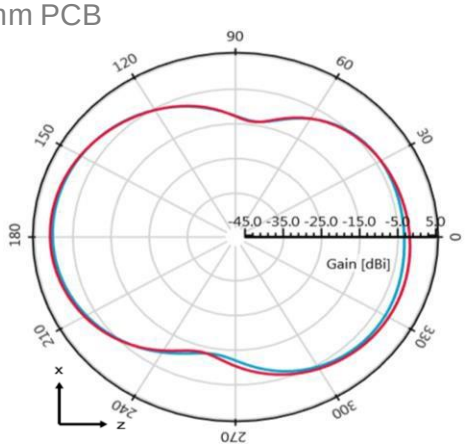
Efficiency

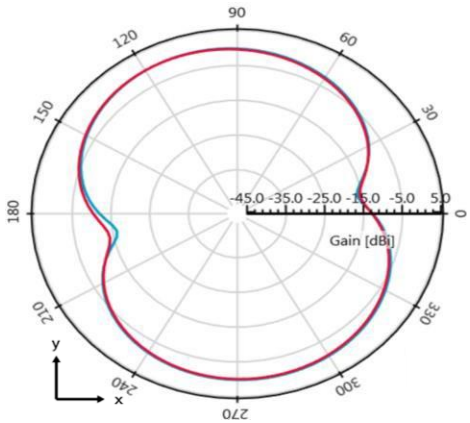


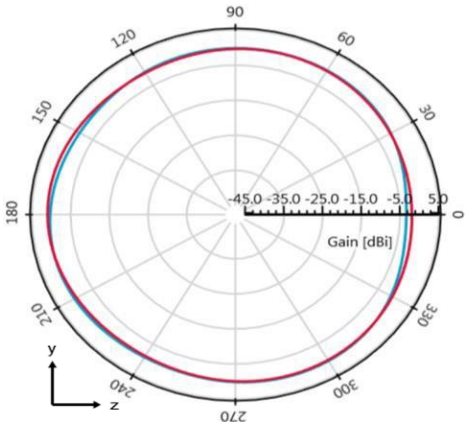
Antenna Radiation Patterns (ISM Off-Ground)

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









tel +(1) 858.550.3820
email: antenna.info@kyocera-avx.com
1 Avx Blvd, Fountain Inn, SC 29644