

### PROTECTION PRODUCTS

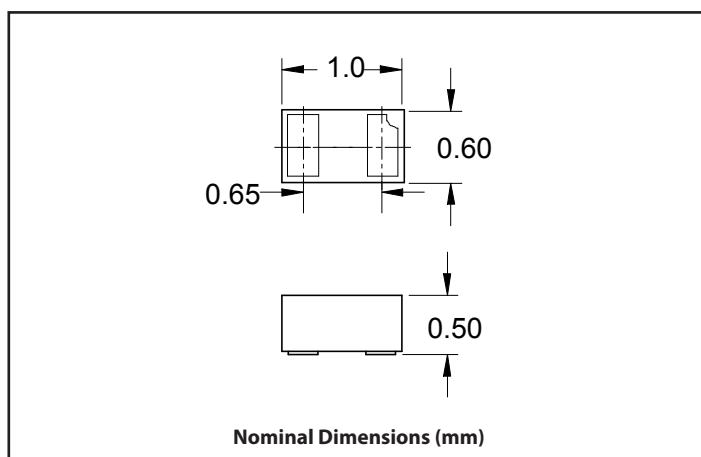
## Description

RailClamp® TVS arrays are ultra low capacitance ESD protection devices designed to protect high speed data interfaces. This series has been specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from over voltage caused by ESD (electrostatic discharge), CDE (Cable Discharge Events), and EFT (electrical fast transients).

RClamp®0551PQ has a maximum capacitance of only 0.50pF. This allows it to be used on circuits operating in excess of 5GHz without appreciable signal attenuation. They exceed the ESD immunity requirements of IEC 61000-4-2, Level 4.

RClamp0551PQ is in a 2-pin SLP1006P2 package and is qualified to AEC-Q100, Grade 1 (-40 to +125 °C) for automotive applications. It measures 1.0 x 0.6 mm with a nominal height of only 0.5 mm. Each device will protect one high-speed line operating at 5 volts. It gives the designer the flexibility to protect single lines in applications where arrays are not practical.

## Dimensions



## Features

- High ESD withstand voltage: +/- 25kV (contact & air) per IEC 61000-4-2
- Protects one data line
- Low capacitance: 0.50pF Maximum
- Dynamic Resistance: 0.84 Ω Typical
- Operating voltage: 5V
- Qualified to AEC-Q100, Grade 1
- Solid-state silicon-avalanche technology

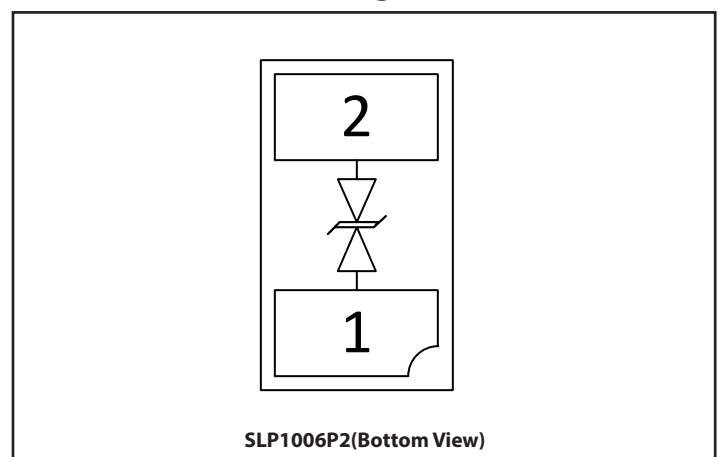
## Mechanical Characteristics

- SLP1006P2 package
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Nominal Dimensions: 1.0 x 0.6 x 0.5mm
- Lead Finish: NiPdAu
- Marking: Marking code
- Packaging: Tape and Reel

## Applications

- Automotive Applications
- Industrial Equipment
- USB 3.0
- HDMI
- GPS Antenna
- FM Antenna

## Schematic & Pin Configuration



## Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power (tp=8/20μs)	P <sub>PK</sub>	45	W
Maximum Peak Pulse Current (tp=8/20μs)	I <sub>PP</sub>	3	A
ESD per IEC 61000-4-2 (Contact) <sup>(1)</sup> ESD per IEC 61000-4-2 (Air) <sup>(1)</sup>	V <sub>ESD</sub>	±25 ±25	kV
Operating Temperature	T <sub>J</sub>	-40 to +125	°C
Storage Temperature	T <sub>STG</sub>	-55 to +150	°C

## Electrical Characteristics (T=25°C unless otherwise specified)

RClamp0551PQ						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Stand-Off Voltage	V <sub>RWM</sub>	-40°C to 125°C			5	V
Reverse Breakdown Voltage	V <sub>BR</sub>	I <sub>BR</sub> = 1mA	6	9.3	11	V
Reverse Leakage Current	I <sub>R</sub>	V <sub>RWM</sub> = 5V		0.01	0.100	μA
Clamping Voltage <sup>2</sup>	V <sub>C</sub>	t <sub>p</sub> = 8/20μs	I <sub>PP</sub> = 1A	10.7	13	V
			I <sub>PP</sub> = 3A	13.3	15	
ESD Clamping Voltage <sup>3</sup>	V <sub>C</sub>	t <sub>p</sub> = 100ns	I <sub>PP</sub> = 4A	15		V
			I <sub>PP</sub> = 16A	25		
Dynamic Resistance <sup>3,4</sup>	R <sub>DYN</sub>	tp = 0.2/100ns		0.84		Ω
Junction Capacitance	C <sub>J</sub>	V <sub>R</sub> = 0V, f = 1MHz		0.45	0.50	pF

Notes:

(1): ESD Gun return path to Ground Reference Plane (GRP).

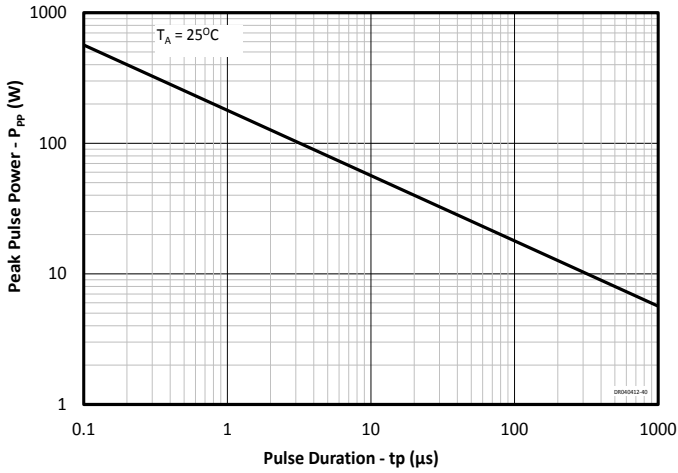
(2): Measured using an 8/20μs constant current source.

(3): Transmission Line Pulse Test (TLP) Settings: tp = 100ns, tr = 0.2ns, I<sub>TLP</sub> and V<sub>TLP</sub> averaging window: t<sub>1</sub> = 70ns to t<sub>2</sub> = 90ns.

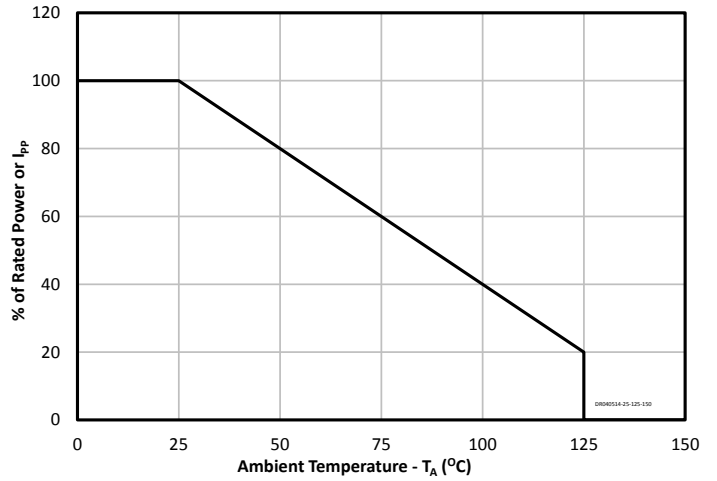
(4): Dynamic resistance calculated from I<sub>TLP</sub> = 4A to I<sub>TLP</sub> = 16A.

# Typical Characteristics

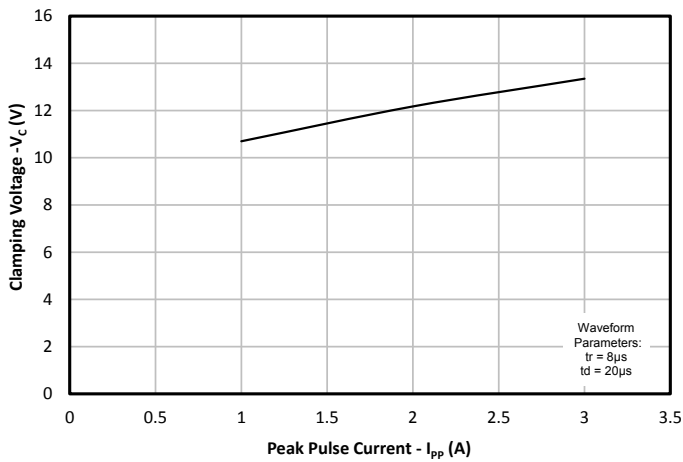
### Non-Repetitive Peak Pulse Power vs. Pulse Time



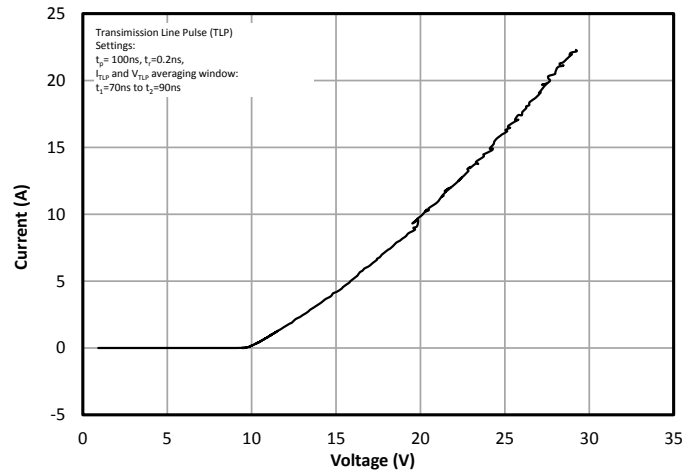
### Power Derating Curve



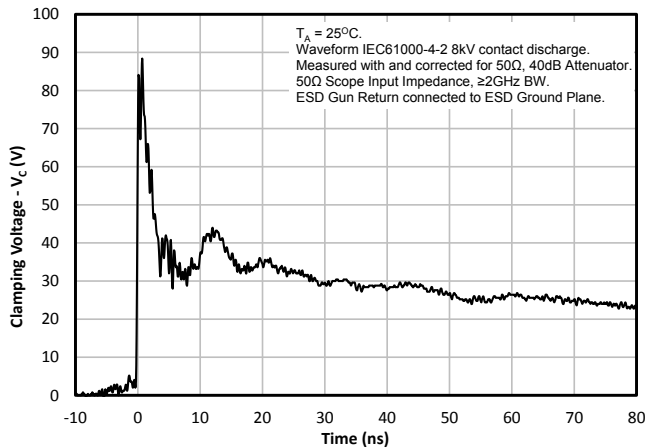
### Clamping Voltage vs. Peak Pulse Current (8/20μs)



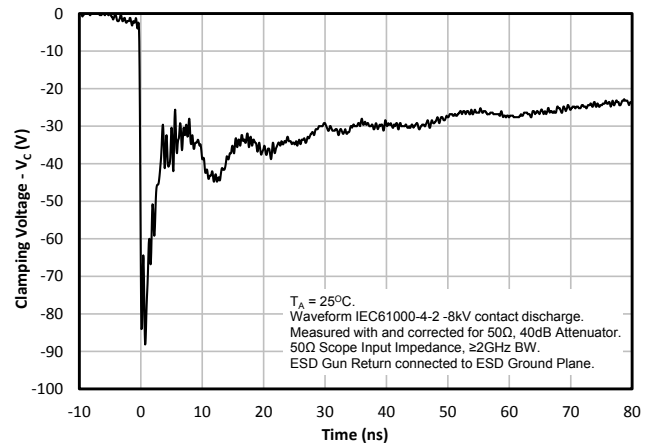
### TLP IV Curve (Positive Pulse)



### ESD Clamping (+8kV Contact per IEC 61000-4-2)

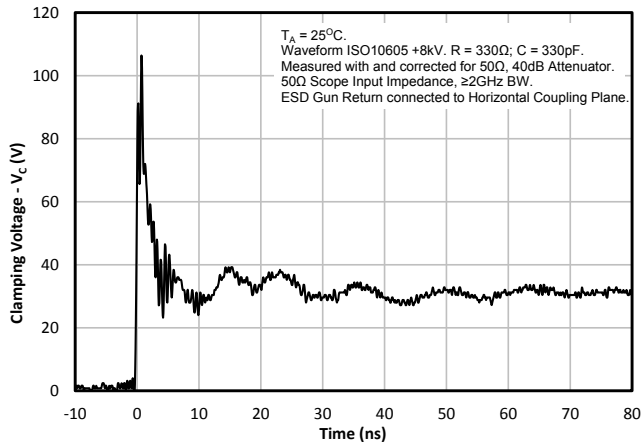


### ESD Clamping (-8kV Contact per IEC 61000-4-2)

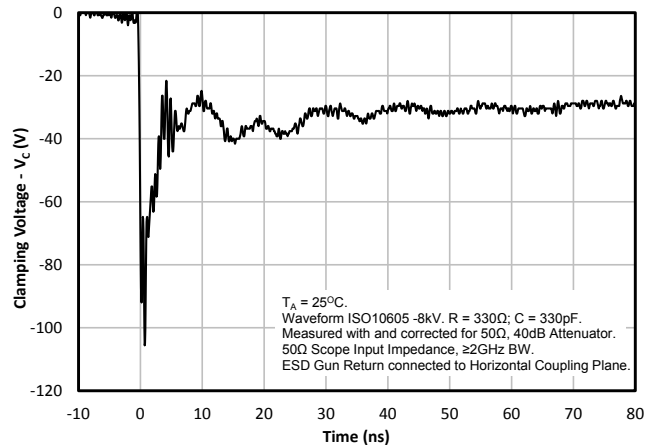


# Typical Characteristics (Continued)

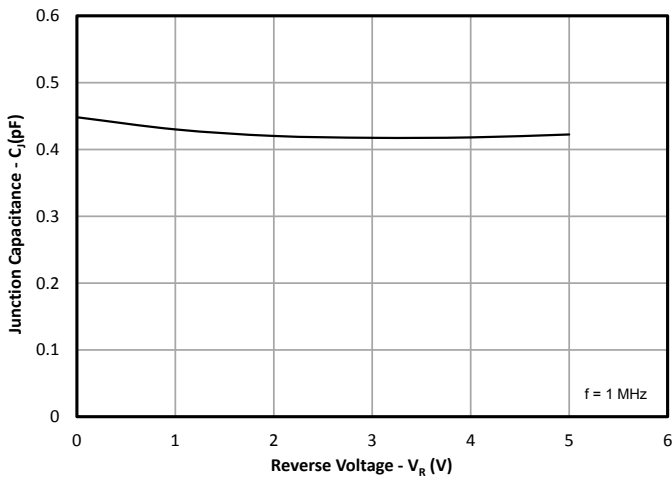
**ESD Clamping (+8kV Contact per ISO-10605 330pF, 330Ω)**



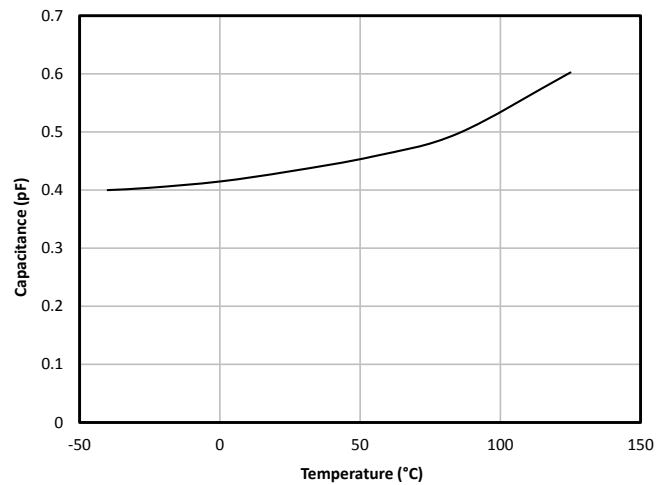
**ESD Clamping (-8kV Contact per ISO-10605 330pF, 330Ω)**



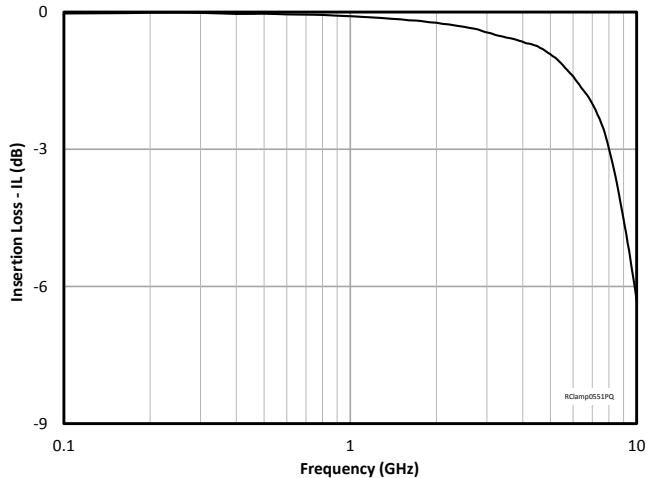
**Capacitance vs. Reverse Voltage ( $T = 25^\circ\text{C}$ )**



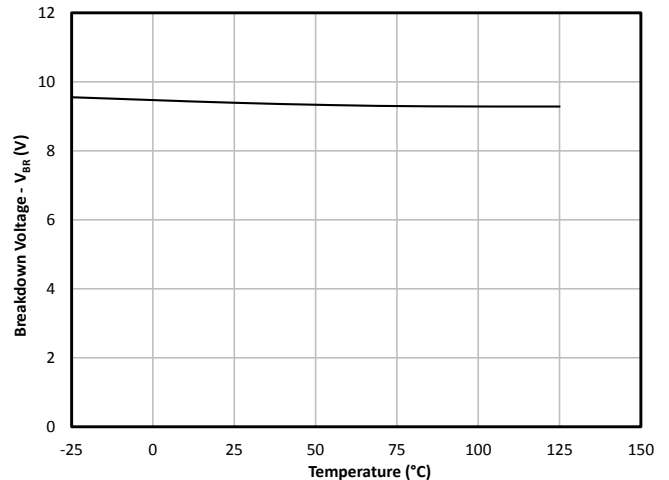
**Capacitance vs. Temperature**



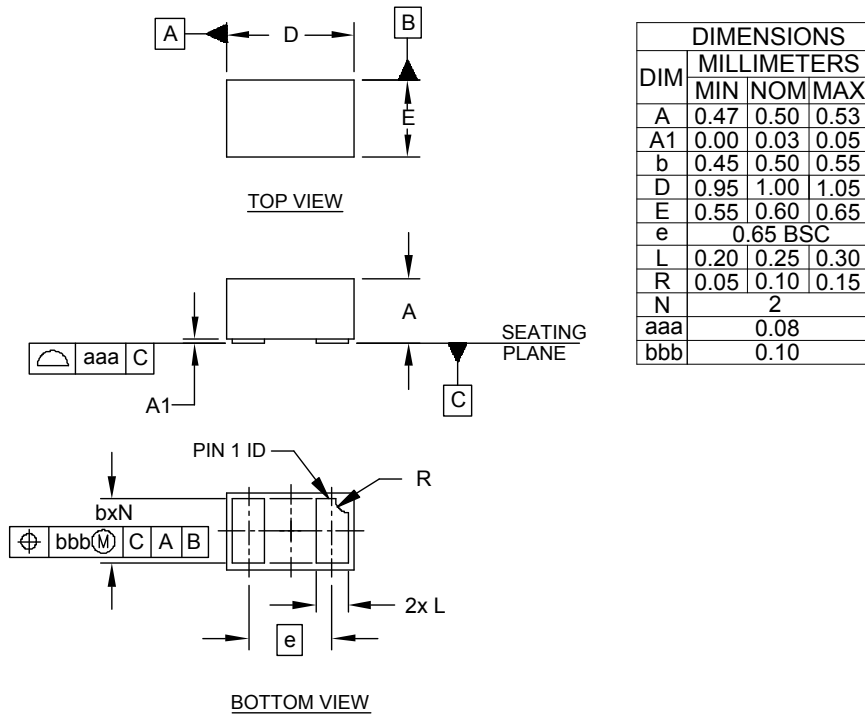
**Insertion Loss - S21**



**Breakdown Voltage ( $V_{BR}$ ) vs. Temperature**



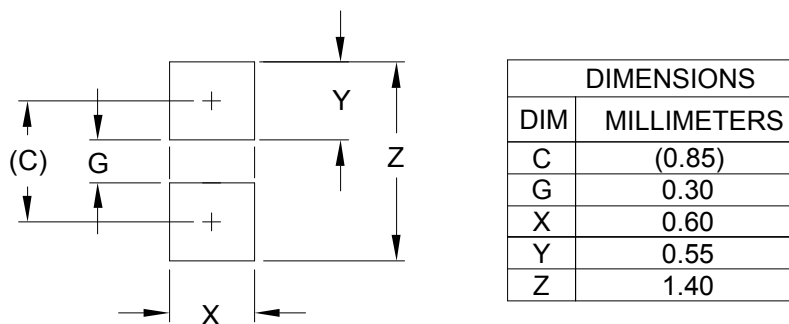
## Outline Drawing - SLP1006P2



**NOTES:**

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).

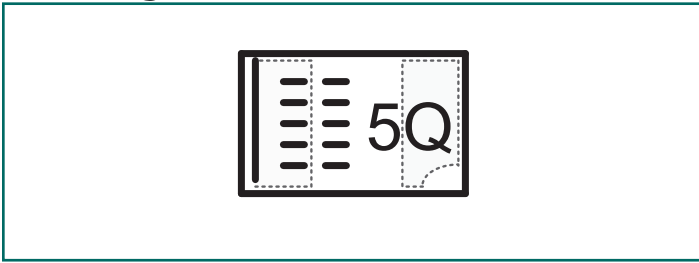
## Land Pattern - SLP1006P2



**NOTES:**

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

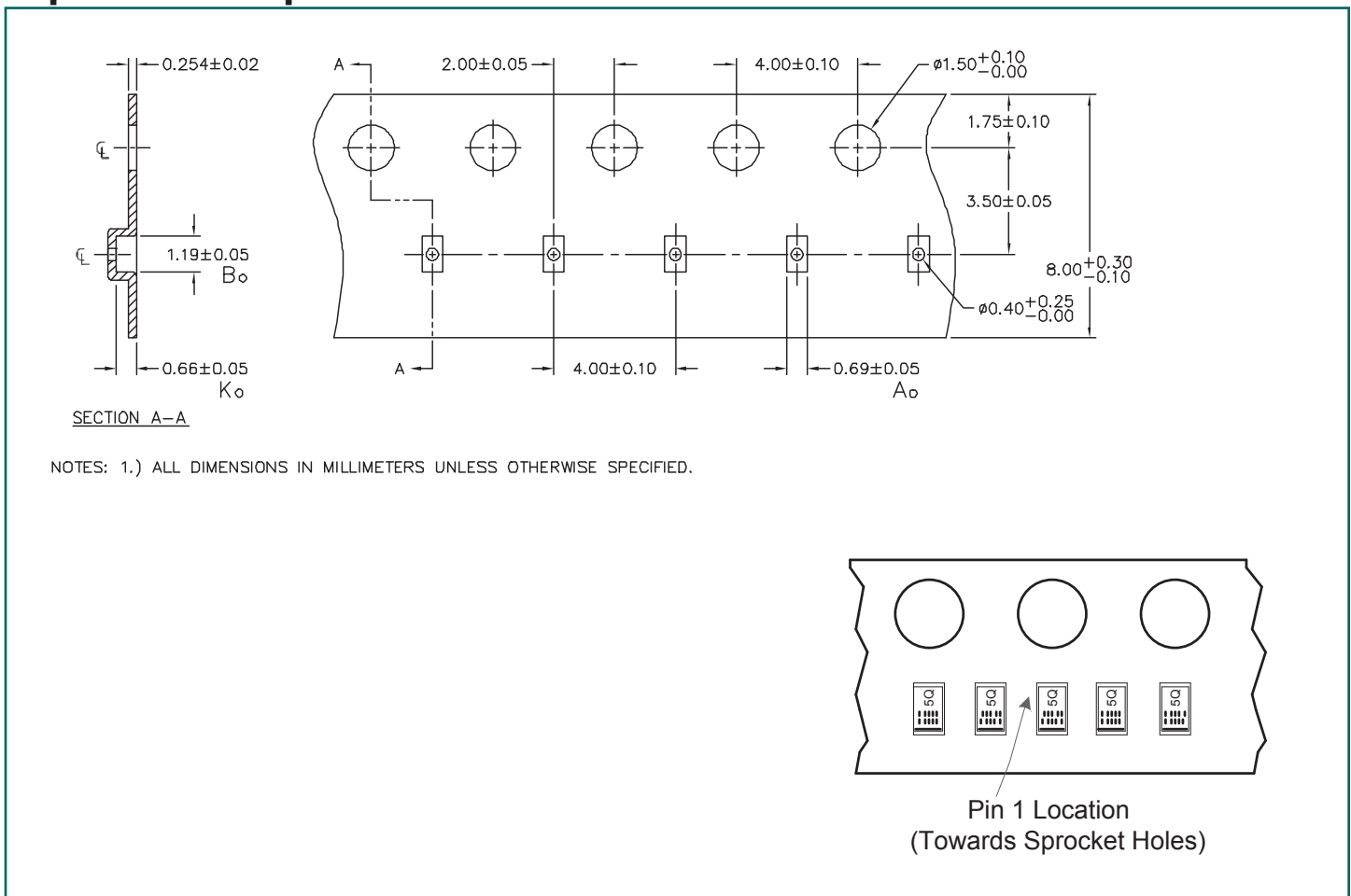
## Marking



Notes:

1. Device is electrically symmetrical.
2. Marking will also indicate line matrix date code.

## Tape and Reel Specification



## Ordering Information

Part Number	Qty per Reel	Reel Size
RClamp0551PQTCT	3,000	7"
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