RClamp0531TQ

Ultra-Low Capacitance RClamp®
1-Line, 5V ESD Protection

PROTECTION PRODUCTS

Description

RailClamp is an ultra low capacitance Transient Voltage Suppressor (TVS) designed to protect high speed data interfaces. This device has been specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from overvoltage caused by ESD (electrostatic discharge), CDE (Cable Discharge Events), and EFT (electrical fast transients).

The RClamp™0531TQ has a maximum capacitance of only 0.80pF. This allows it to be used on circuits operating in excess of 2.5GHz without signal attenuation. They may be used to meet the ESD immunity requirements of IEC 61000-4-2.

The RClamp0531TQ is in a 2-pin SLP1006P2T package measuring 1.0 x 0.6 x 0.4mm. The leads are spaced at a pitch of 0.65mm and feature a lead-free finish. 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. The combination of small size, low capacitance, and high ESD surge capability makes them ideal for use in applications such as cellular phones and digital video interfaces.

The RClamp0531TQ is AEC-Q100 Grade 1 qualified for Automotive use.

Features

- Transient protection for data lines to
  - IEC 61000-4-2 (ESD) ±20kV (air), ±12kV (contact)
  - IEC 61000-4-4 (EFT) 40A (tp = 5/50ns)
  - Cable Discharge Event (CDE)
- Ultra-small package (1.0 x 0.6 x 0.4mm)
- Protects one I/O line
- Low capacitance: 0.8pF
- Low clamping voltage
- Solid-state silicon-avalanche technology
- AEC-Q100 Grade 1 qualified

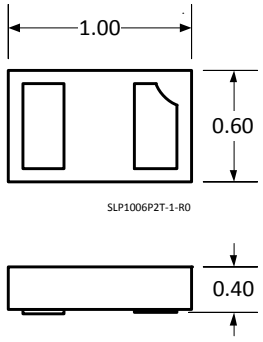
Mechanical Characteristics

- SLP1006P2T package
- Molding compound flammability rating: UL 94V-0
- Marking: Marking code + date code
- Packaging : Tape and Reel
- Lead Finish: NiPdAu
- Pb-Free, Halogen Free, RoHS/WEEE Compliant

Applications

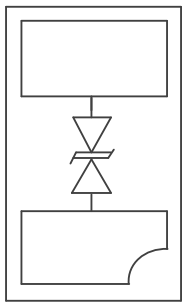
- Cellular Handsets & Accessories
- Digital Visual Interface (DVI)
- FM Antenna
- MDDI Ports
- USB Ports
- PCI Express
- Serial ATA
- Automotive Applications

Package Dimension



Nominal Dimensions (mm)

Schematic & Pin Configuration



SLP1006P2T (Bottom View)

Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20µs)	P_{PK}	80	W
Peak Pulse Current (tp = 8/20µs)	I_{PP}	4	A
ESD per IEC 61000-4-2 (Air) (1) ESD per IEC 61000-4-2 (Contact) (1)	V_{ESD}	±20 ±12	kV
Operating Temperature	T_J	-40 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

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

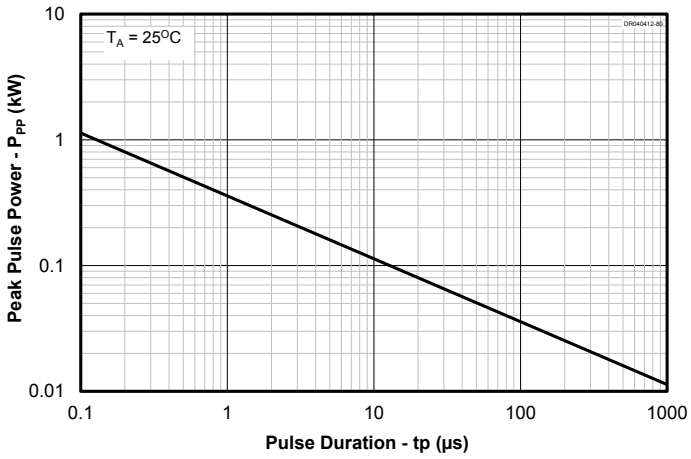
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Reverse Stand-Off Voltage	V_{RWM}					5	V
Reverse Breakdown Voltage	V_{BR}	I_{BR} = 1 mA		6	9.3	11	V
Reverse Leakage Current	I_R	V_{RWM} = 5V, T = 25 °C			0.010	0.100	µA
		V_{RWM} = 5V, T = 125 °C			0.020	0.200	
Clamping Voltage	V_C	tp = 8/20µs	I_{PP} = 1A			12	V
			I_{PP} = 4A			20	
Junction Capacitance	C_J	V_R = 0V to 5V, f = 1MHz, T = 25 °C			0.50	0.80	pF
		V_R = 0V to 5V, f = 1GHz, T = 125 °C			0.85	1.5	

Notes

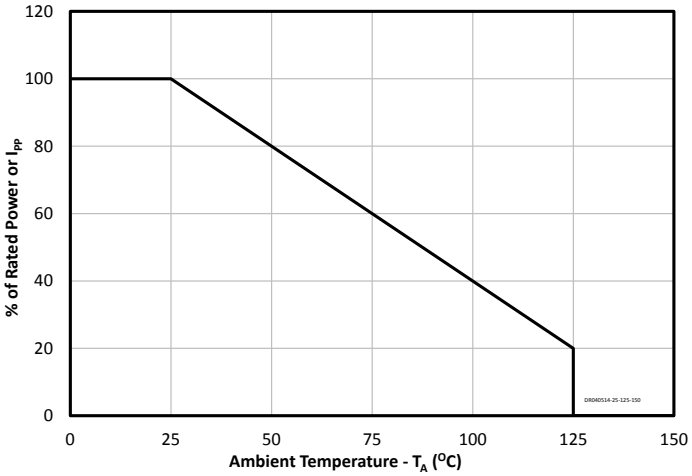
1) ESD gun return path connected to ESD ground plane.

Typical Characteristics

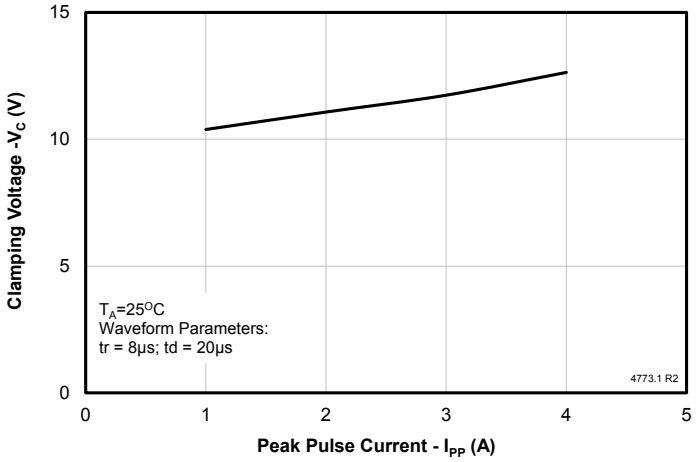
Non-Reptitive Peak Pulse Power vs. Pulse Time



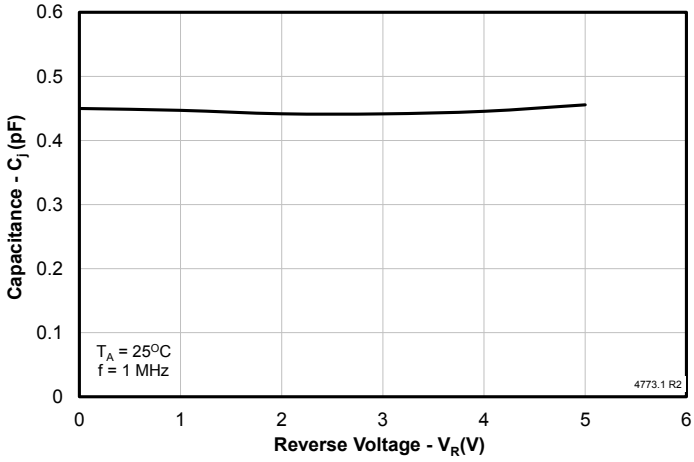
Power Derating Curve



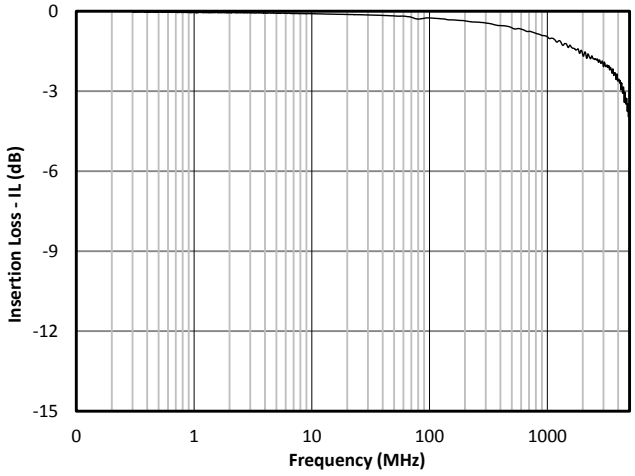
Clamping Voltage vs. Peak Pulse Current



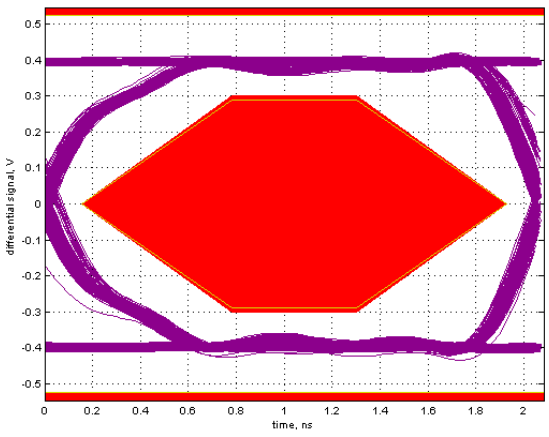
Junction Capacitance vs. Reverse Voltage



Insertion Loss (S21)

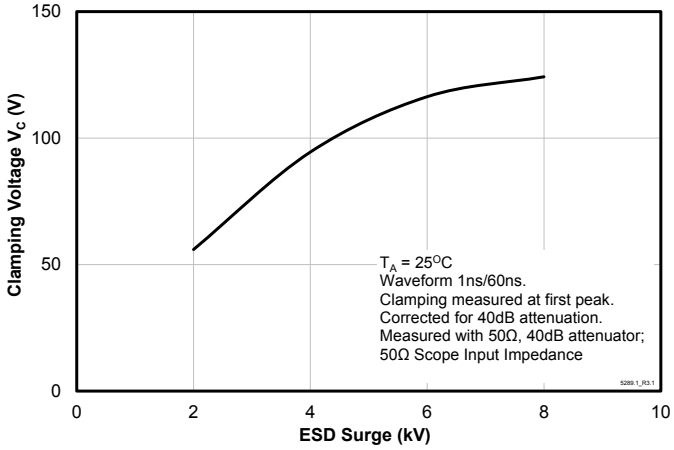


USB 2.0 Eye Pattern with RClamp0531TQ

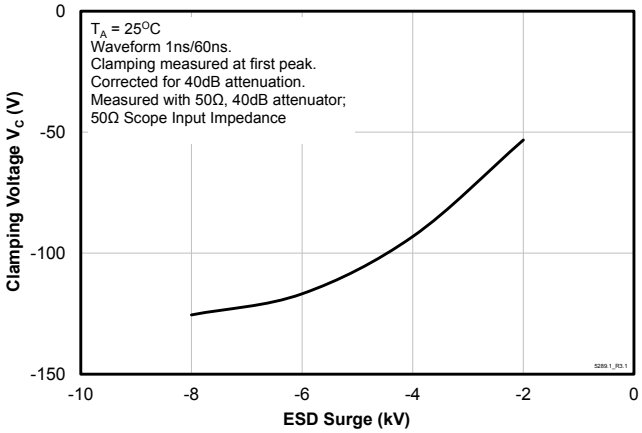


Typical Characteristics

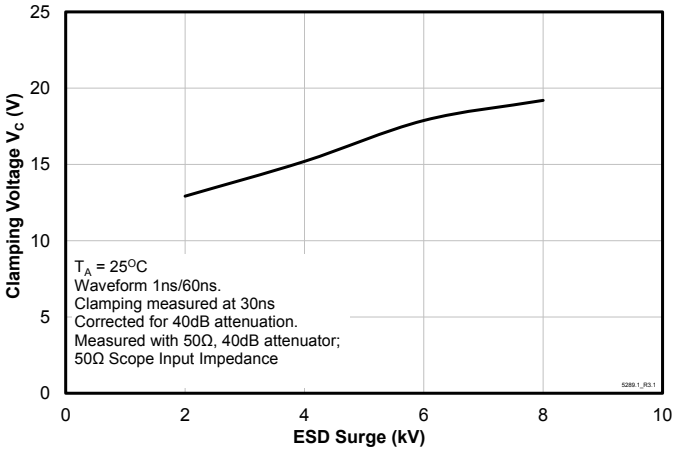
ESD Clamping per IEC61000-4-2
Positive clamping voltage at first peak



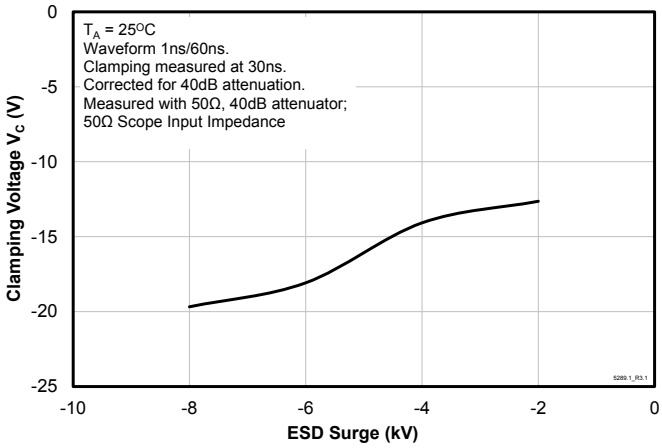
ESD Clamping per IEC61000-4-2
Negative clamping voltage at first peak



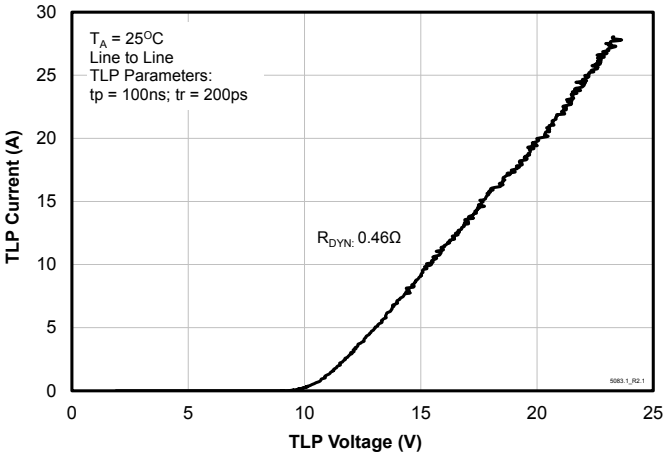
ESD Clamping per IEC61000-4-2
Positive clamping voltage at 30ns



ESD Clamping per IEC61000-4-2
Negative clamping voltage at 30ns

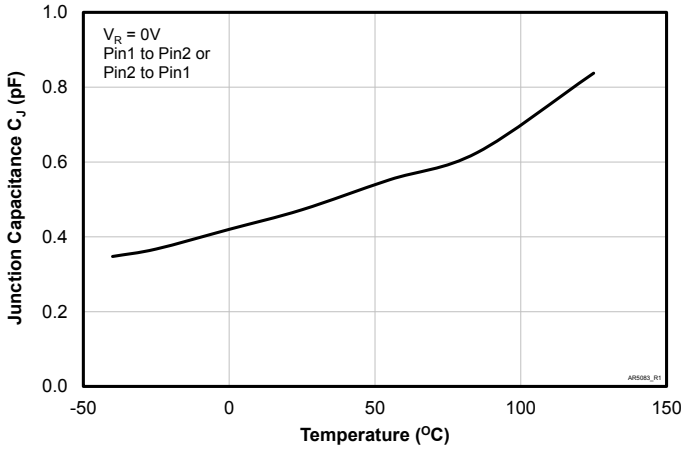


Typical TLP Characteristics

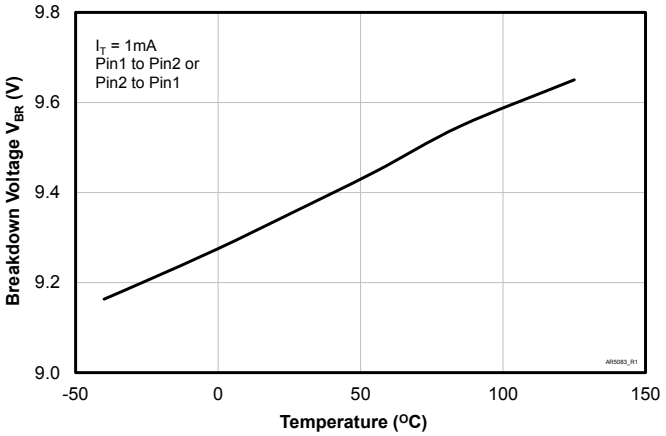


Typical Characteristics

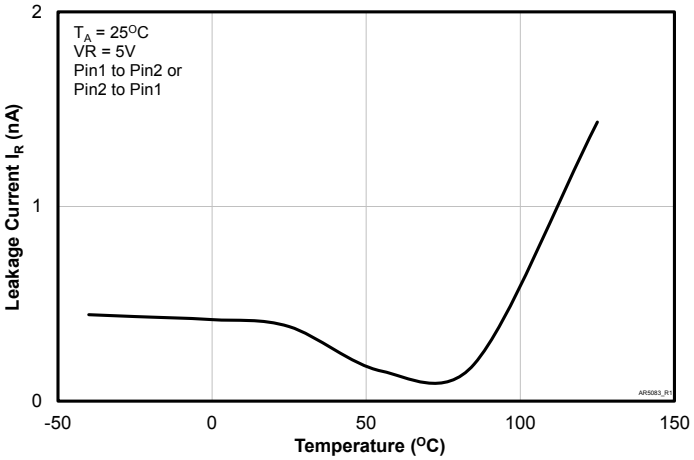
Typical Capacitance vs. Temperature



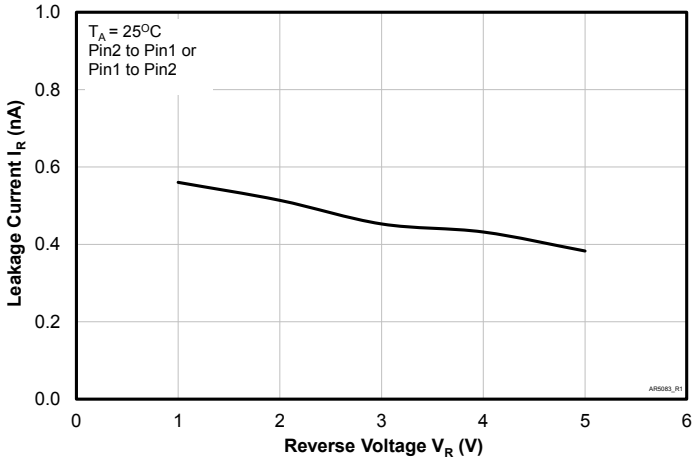
Typical Breakdown Voltage vs. Temperature



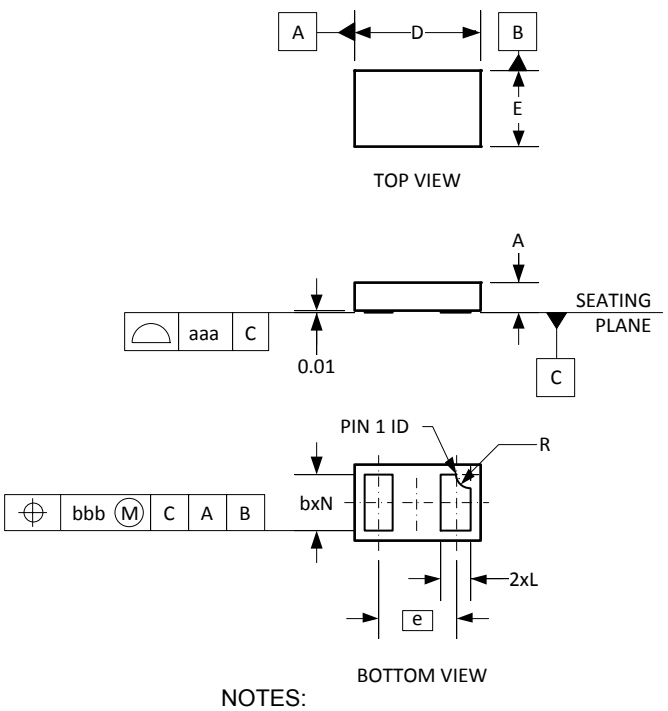
Typical Leakage Current vs. Temperature



Typical Leakage Current vs. Reverse Voltage



Outline Drawing - SLP1006P2T



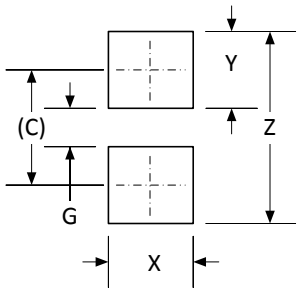
DIMENSIONS						
DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.015	.016	.017	0.37	0.40	0.43
A1	.000	.001	.002	0.00	0.03	0.05
b	.018	.020	.022	0.45	0.50	0.55
D	.035	.039	.043	0.90	1.00	1.10
E	.020	.024	.028	0.50	0.60	0.70
e	.026 BSC			0.65 BSC		
L	.008	.010	.012	0.20	0.25	0.30
R	.002	.004	.006	0.05	0.10	0.15
N	2			2		
aaa	.003			0.08		
bbb	.004			0.10		

SLP1006P2T-2-R0

NOTES:

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

Land Pattern - SLP1006P2T



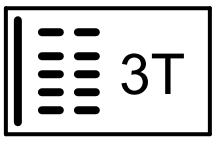
DIMENSIONS		
DIM	INCHES	MILLIMETERS
C	(.033)	(0.85)
G	.012	0.30
X	.024	0.60
Y	.022	0.55
Z	.055	1.40

SLP1006P2T-3-R0

NOTES:

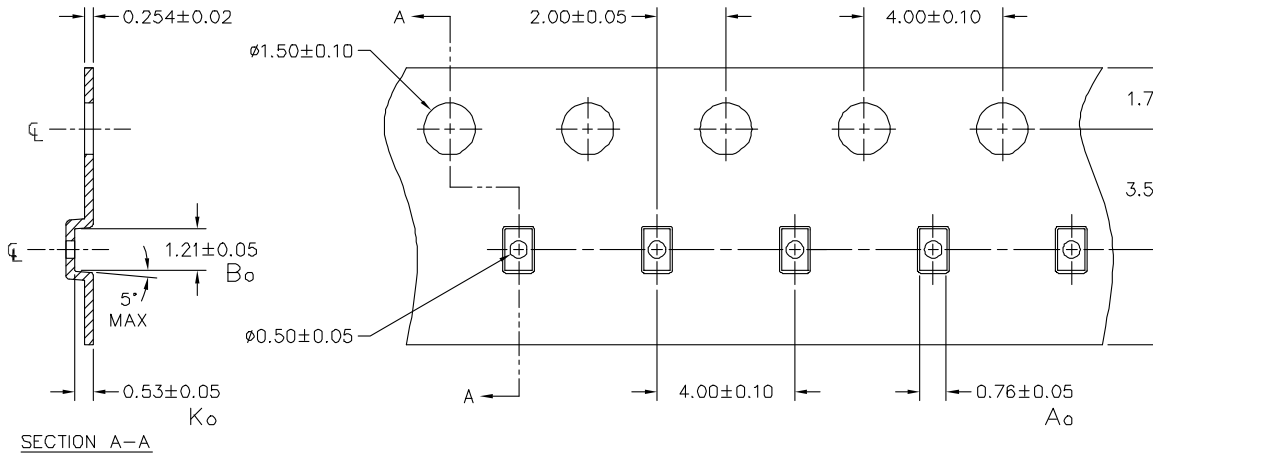
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY.CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

Marking Code



Notes:
1. Marking will also include line matrix date code.
2. Device is electrically symmetrical.

Tape and Reel Specification



Ordering Information

Part Number	Qty per Reel	Reel Size
RClamp0531TQTCT	3,000	7”



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RCLAMP2504N.TCT ECLAMP2378P.TCT RCLAMP01831ZA.F RCLAMP3346P.TNT RCLAMP3346PQTNT
RCLAMP3371ZCTFT SD15C.TCT UCLAMP0871P.TNT ECLAMP2454P.TCT GS9068-CKA
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