



## PROTECTION PRODUCTS

### Description

RailClamp® TVS diodes are 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 RClamp2431TQ has a typical capacitance of only 0.35pF. This allows it to be used on Wi-Fi, RFID, and other circuits operating in excess of 3GHz without signal attenuation. It may be used to meet the ESD immunity requirements of IEC 61000-4-2.

The RClamp2431TQ 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 up to 24 volts. It gives the designer the flexibility to protect single lines in applications where arrays are not practical.

The RClamp2431TQ is qualified to AEC-Q100 Grade1 for use in automotive environments.

### Features

- Transient protection for data lines to IEC 61000-4-2 (ESD)  $\pm 15\text{kV}$  (air),  $\pm 15\text{kV}$  (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: 0.35pF (Typical)
- Low clamping voltage
- Working Voltage: 24V
- Solid-state silicon-avalanche technology
- Qualified for AEC-Q100 Grade 1

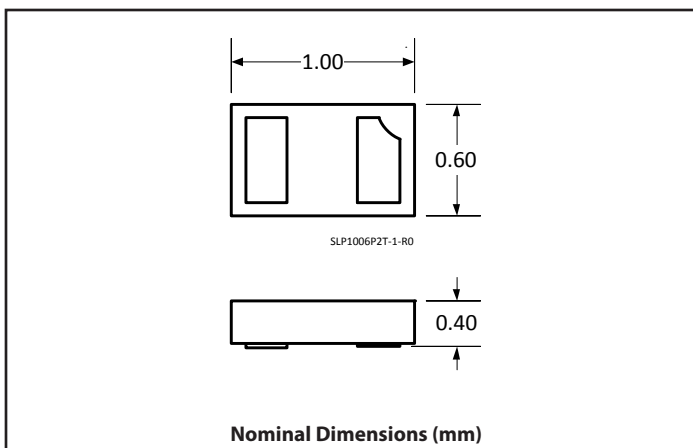
### Mechanical Characteristics

- 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

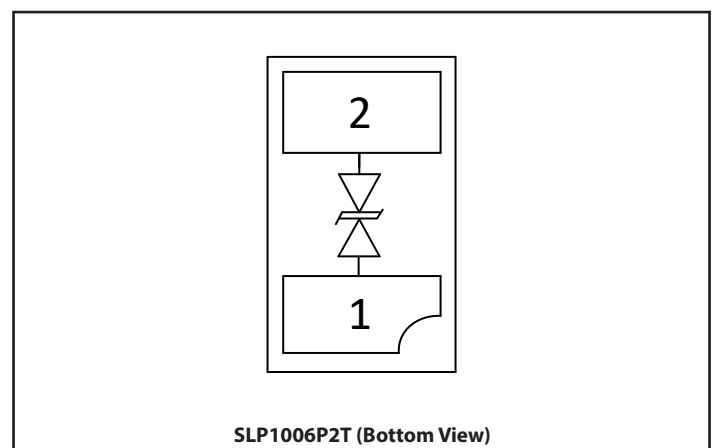
### Applications

- Automobile Antenna
- CAN Bus Ports
- Wi-Fi Interfaces
- RFID

### Package Dimension



### Schematic & Pin Configuration



## Absolute Maximum Rating

| Rating   | Symbol           | Value       | Units |
|--|------------------|-------------|-------|
| Peak Pulse Power (tp = 8/20μs)   | P <sub>PK</sub>  | 100         | W     |
| Peak Pulse Current (tp = 8/20μs)   | I <sub>PP</sub>  | 2           | A     |
| ESD per IEC 61000-4-2 (Air) <sup>(1)(2)</sup><br>ESD per IEC 61000-4-2 (Contact) <sup>(1)(2)</sup> | V <sub>ESD</sub> | ±15<br>±15  | 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)

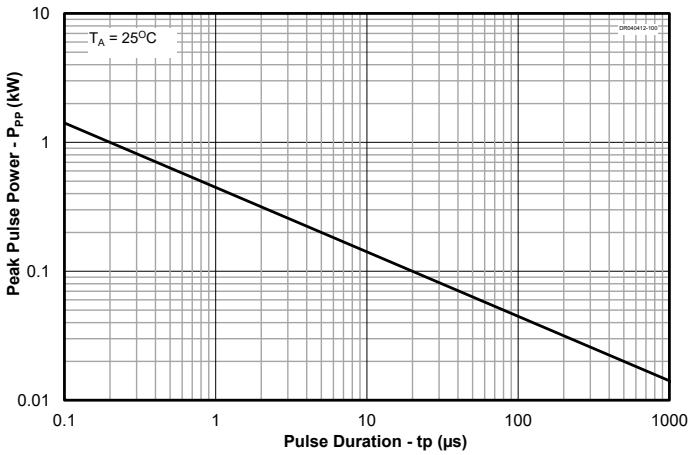
| Parameter                 | Symbol           | Conditions                    | Min.                 | Typ. | Max. | Units |
|---------------------------|------------------|-------------------------------|----------------------|------|------|-------|
| Reverse Stand-Off Voltage | V <sub>RWM</sub> |                               |                      |      | 24   | V     |
| Reverse Breakdown Voltage | V <sub>BR</sub>  | I <sub>BR</sub> = 1 mA        | 26.7                 |      | 36   | V     |
| Reverse Leakage Current   | I <sub>R</sub>   | V <sub>RWM</sub> = 24V        | T=25°C               | 5    | 50   | nA    |
|                           |                  |                               | T=125°C              |      | 500  |       |
| Clamping Voltage          | V <sub>C</sub>   | tp = 8/20μs                   | I <sub>PP</sub> = 1A |      | 45   | V     |
|                           |                  |                               | I <sub>PP</sub> = 2A |      | 50   |       |
| Junction Capacitance      | C <sub>J</sub>   | V <sub>R</sub> = 0V, f = 1MHz | T=25°C               | 0.35 | 0.5  | pF    |
|                           |                  |                               | T=125°C              |      | 1.0  |       |

Notes:

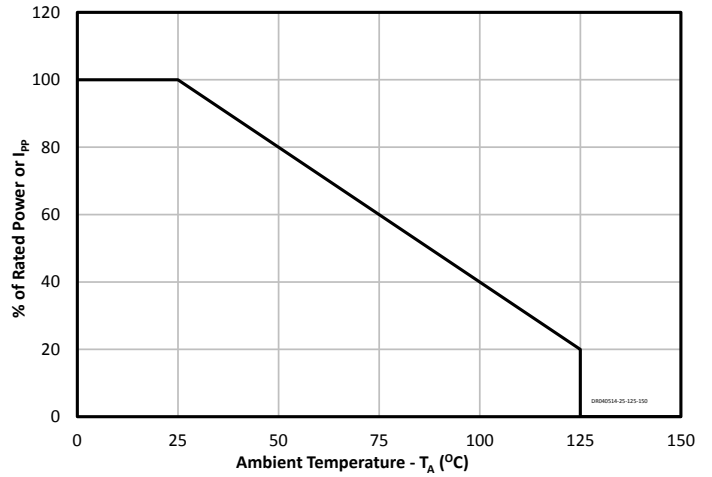
- 1) ESD gun return path connected to ESD ground plane.
- 2) In-system ESD withstand voltage

# Typical Characteristics

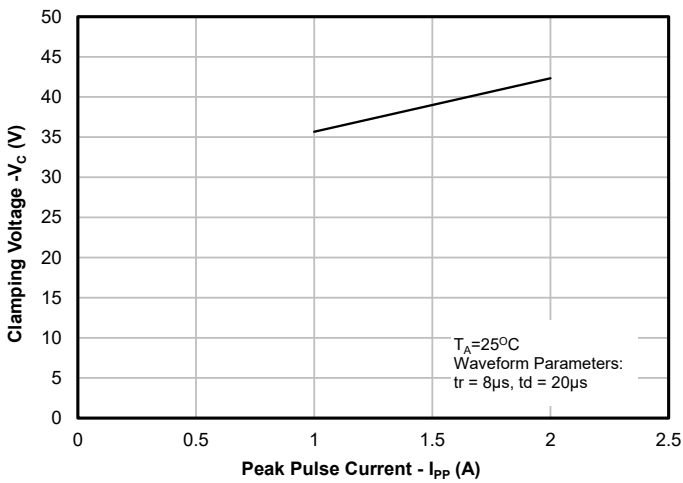
### Non-Repetitive Peak Pulse Power vs. Pulse Time



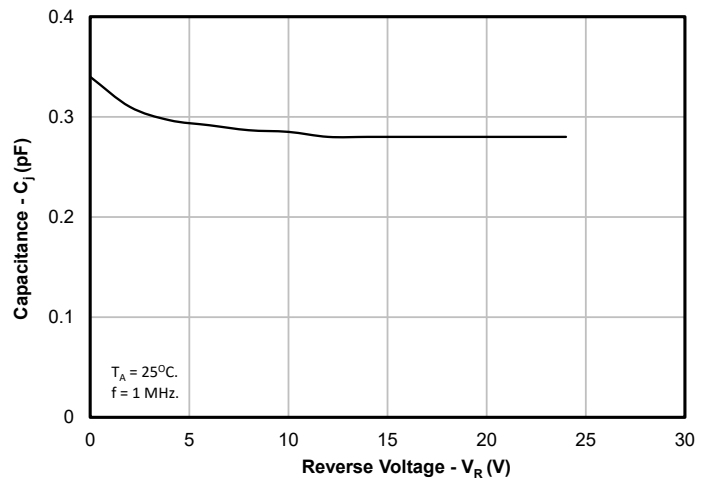
### Power Derating Curve



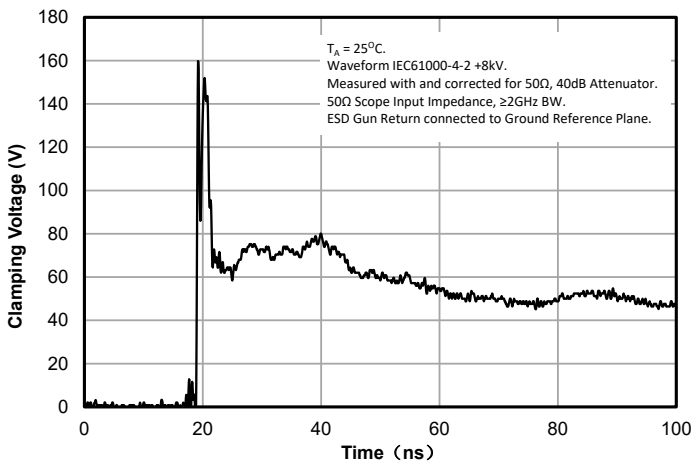
### Clamping Voltage vs. Peak Pulse Current



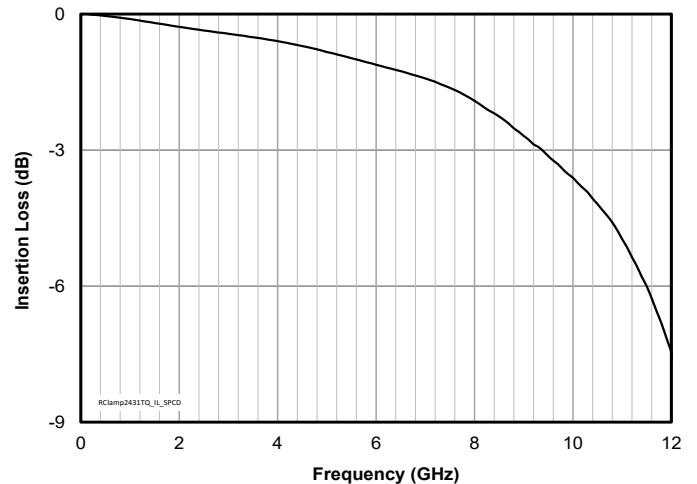
### Junction Capacitance vs. Reverse Voltage



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

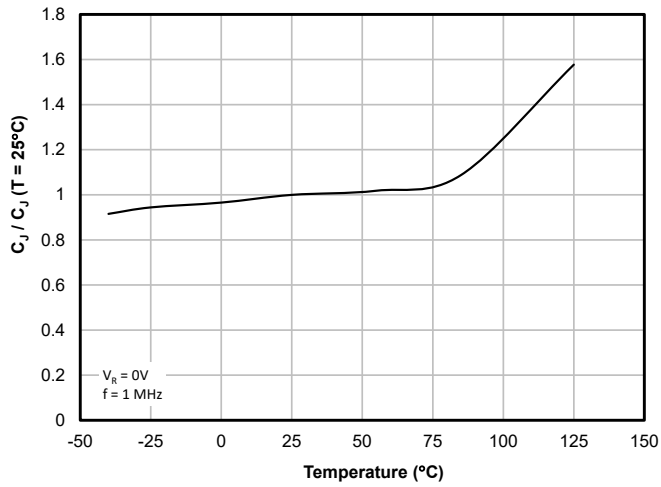


### Insertion Loss (S21)

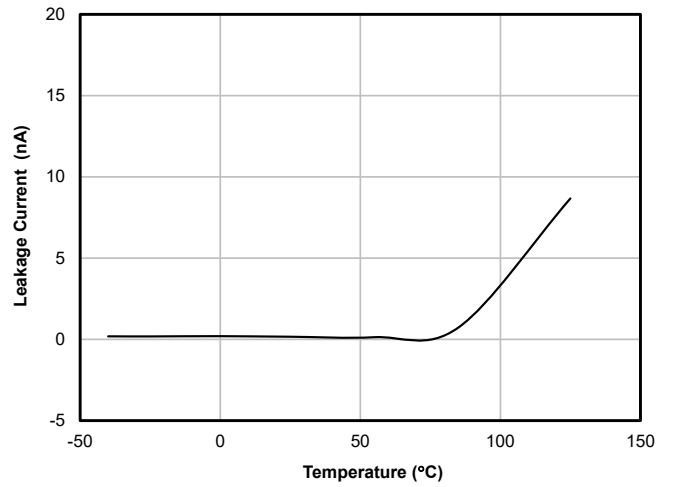


# Typical Characteristics

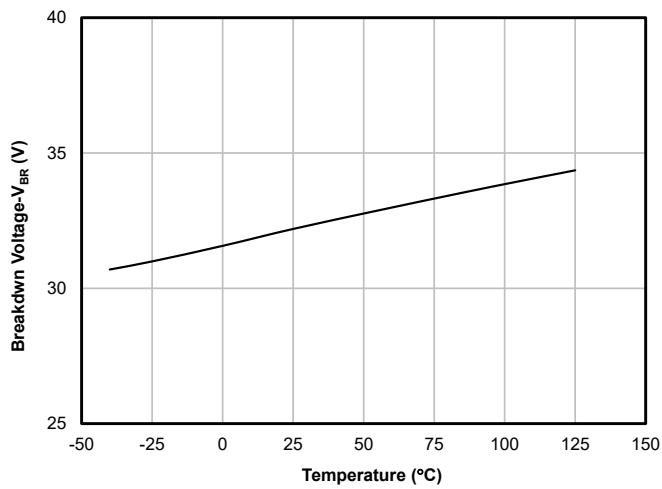
### Normalized Capacitance vs. Temperature



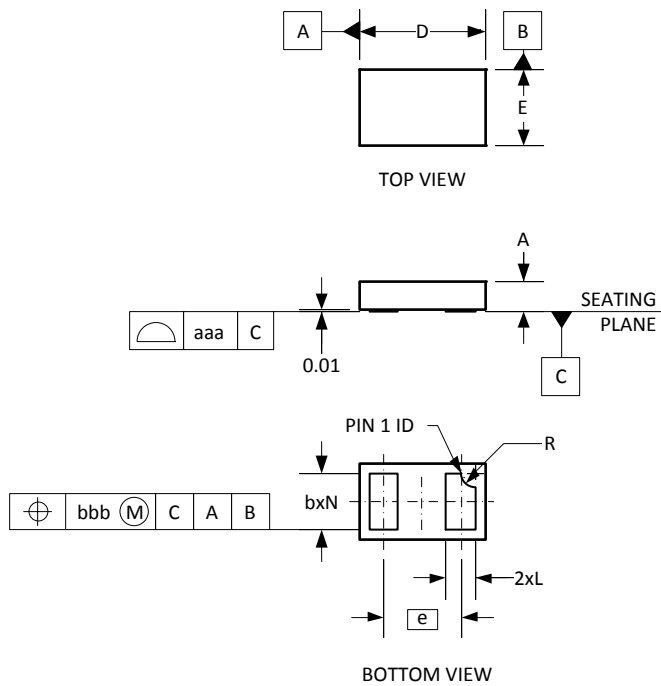
### Typical Reverse Leakage Current vs. Temperature



### Typical Breakdown Voltage vs. Temperature



# Outline Drawing - SLP1006P2T



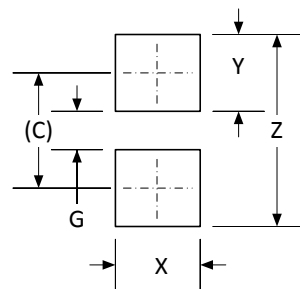
| DIM | DIMENSIONS |      |      |             |      |      |
|-----|------------|------|------|-------------|------|------|
|     | INCHES     |      |      | MILLIMETERS |      |      |
|     | MIN        | NOM  | MAX  | MIN         | NOM  | MAX  |
| A   | .015       | .016 | .017 | 0.37        | 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



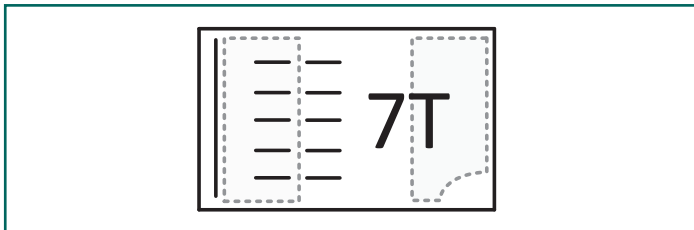
| DIM | DIMENSIONS |             |
|-----|------------|-------------|
|     | INCHES     | MILLIMETERS |
| C   | (.033)     | (0.85)      |
| G   | .012       | 0.30        |
| X   | .024       | 0.60        |
| Y   | .022       | 0.55        |
| Z   | .055       | 1.40        |

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.

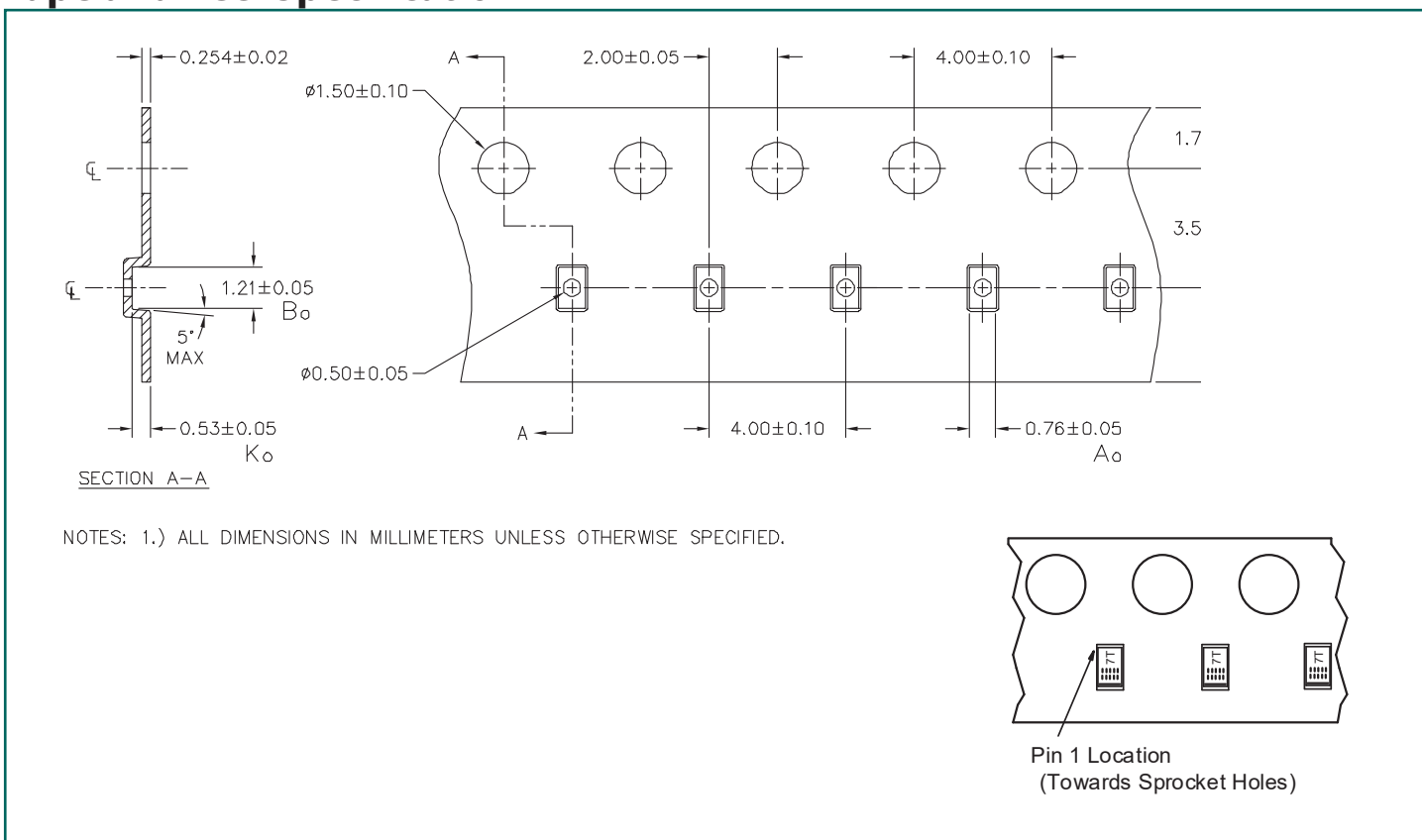
## Marking Code



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 |
|----------------|--------------|-----------|
| RClamp2431TQCT | 3,000        | 7"        |



---

#### IMPORTANT NOTICE

Information relating to this product and the application or design described herein is believed to be reliable, however such information is provided as a guide only and Semtech assumes no liability for any errors in this document, or for the application or design described herein. Semtech reserves the right to make changes to the product or this document at any time without notice. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. Semtech warrants performance of its products to the specifications applicable at the time of sale, and all sales are made in accordance with Semtech's standard terms and conditions of sale.

SEMTECH PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS, OR IN NUCLEAR APPLICATIONS IN WHICH THE FAILURE COULD BE REASONABLY EXPECTED TO RESULT IN PERSONAL INJURY, LOSS OF LIFE OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. INCLUSION OF SEMTECH PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE UNDERTAKEN SOLELY AT THE CUSTOMER'S OWN RISK. Should a customer purchase or use Semtech products for any such unauthorized application, the customer shall indemnify and hold Semtech and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs damages and attorney fees which could arise.

The Semtech name and logo are registered trademarks of the Semtech Corporation. All other trademarks and trade names mentioned may be marks and names of Semtech or their respective companies. Semtech reserves the right to make changes to, or discontinue any products described in this document without further notice. Semtech makes no warranty, representation or guarantee, express or implied, regarding the suitability of its products for any particular purpose. All rights reserved.

© Semtech 2018

---

#### Contact Information

Semtech Corporation  
200 Flynn Road, Camarillo, CA 93012  
Phone: (805) 498-2111, Fax: (805) 498-3804  
[www.semtech.com](http://www.semtech.com)

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View RCLAMP2431TQ.TCT on WIN SOURCE](#)
- ⊖ [Semtech Corporation](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management