

PROTECTION PRODUCTS

Description

The SDC36 is a high-surge transient voltage suppressor (TVS) optimized for protection of sensitive digital sensors used in proximity switches and industrial control applications. The SDC36 protects the components from over-voltages caused by **electrostatic discharge (ESD)**, **electrical fast transients (EFT)**, and tertiary **lightning**.

The unique design of the SDC36 incorporates two TVS diodes in a compact SOT23 package for applications where board space is at a premium. The single package provides protection for the I/O line and power supply rail with high surge capabilities (2 Amps at $t_p=1.2/50\mu s$) and an exceptionally low clamping voltage of <45V.

The SDC36 replaces up to two large discrete diodes providing the designer an easy to implement integrated solution. The features of the SDC36 are ideal for protection of two, three, and four wire DC high-side proximity switches.

Features

- ◆ 350 watts peak pulse power ($t_p = 8/20\mu s$)
- ◆ Transient protection for data and power lines to **IEC 61000-4-2 (ESD) $\pm 15kV$ (air), $\pm 8kV$ (contact)**
IEC 61000-4-4 (EFT) 40A (5/50ns)
IEC 61000-4-5 (Lightning) 2A (1.2/50 μs)
- ◆ Replaces two discrete devices
- ◆ Low clamping voltage
- ◆ Low leakage current
- ◆ High surge capability
- ◆ Solid-state silicon avalanche technology

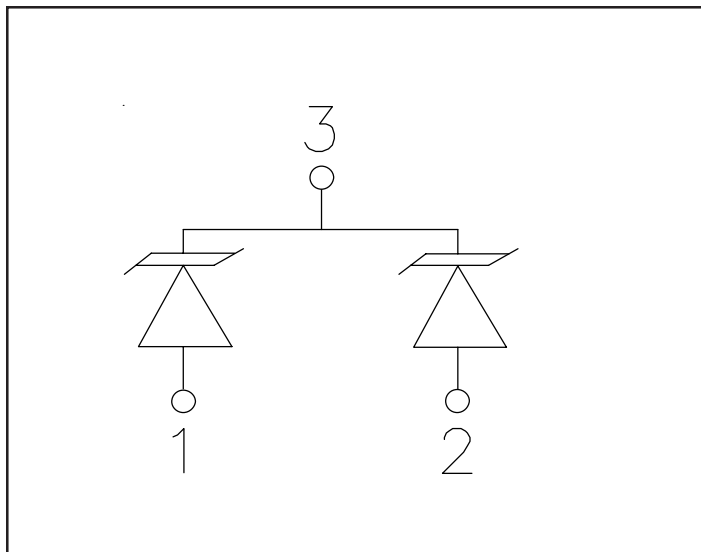
Mechanical Characteristics

- ◆ JEDEC SOT23 package
- ◆ Molding compound flammability rating: UL 94V-0
- ◆ Marking : DC36
- ◆ Packaging : Tape and Reel per EIA 481

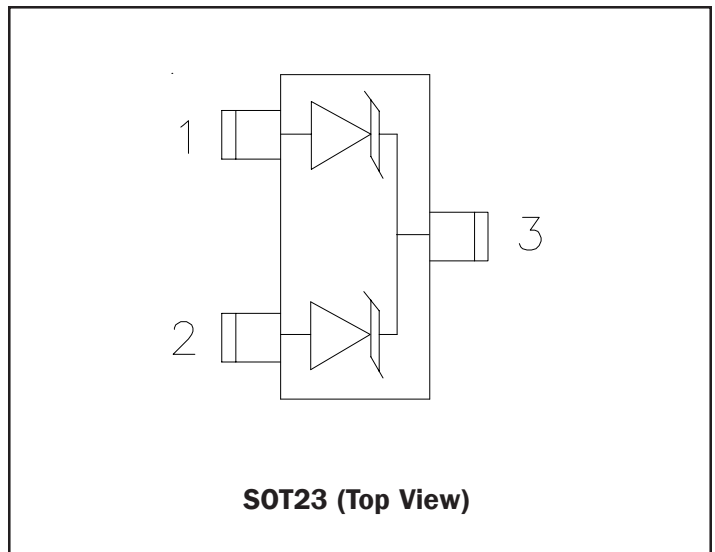
Applications

- ◆ Two, Three, and Four Wire DC High-Side Proximity Switches
- ◆ Digital Sensor Input Protection
- ◆ Industrial Controls
- ◆ 24V - 33V DC Supply Protection

Circuit Diagram



Schematic & PIN Configuration



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Absolute Maximum Rating

| Rating | Symbol | Value | Units |
|--------------------------------------------------------|-------------|---------------|-------|
| Peak Pulse Power ($t_p = 8/20\mu s$) | P_{pk} | 350 | Watts |
| Peak Pulse Power ($t_p = 1.2/50\mu s$) | P_{pk} | 200 | Watts |
| Peak Pulse Current ($t_p = 1.2/50\mu s$) | I_{pp} | 4 | A |
| Non-Repetitive Peak Forward Current ($t_p=100\mu s$) | I_{FSMAX} | 4 | A |
| Lead Soldering Temperature | T_L | 260 (10 sec.) | °C |
| Operating Temperature | T_J | -55 to +125 | °C |
| Storage Temperature | T_{STG} | -55 to +150 | °C |

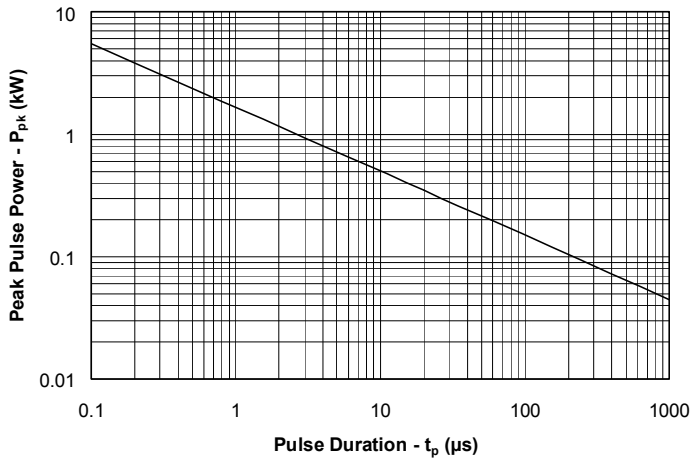
Electrical Characteristics

| SDC36 | | | | | | |
|---------------------------|--------------|---------------------------------------|---------|---------|---------|---------|
| Parameter | Symbol | Conditions | Minimum | Typical | Maximum | Units |
| Reverse Stand-Off Voltage | V_{RWM} | Pin 3 to 1 or Pin 2 to 1 | | | 33 | V |
| Reverse Breakdown Voltage | V_{BR} | $I_t = 1mA$ | 36 | | | V |
| Reverse Leakage Current | I_R | $V_{RWM} = 33V, T=25^\circ C$ | | | 5 | μA |
| Reverse Leakage Current | $I_{R(HOT)}$ | $V_{RWM} = 33V, T=85^\circ C$ | | | 25 | μA |
| Forward Voltage | V_F | $I_F = 100mA$ | | | 1.3 | V |
| Clamping Voltage | V_C | $I_{pp} = 2A,$ $t_p = 1.2/50\mu s$ | | | 45 | V |
| Junction Capacitance | C_J | $V_R = 0V, f = 1MHz$ | | | 45 | pF |

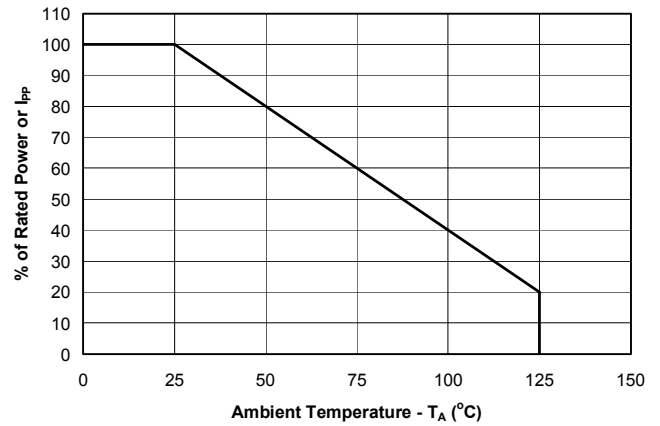
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Typical Characteristics

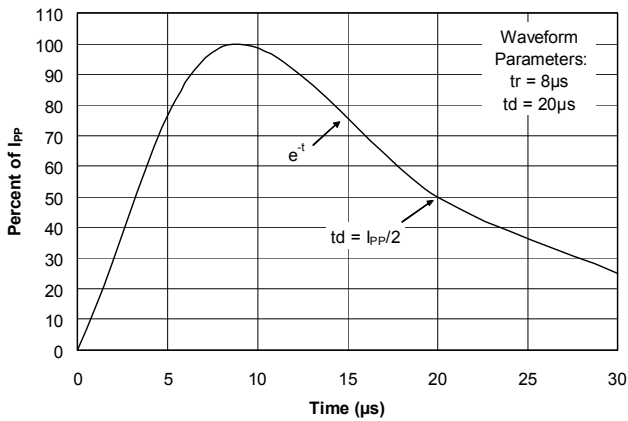
Non-Repetitive Peak Pulse Power vs. Pulse Time



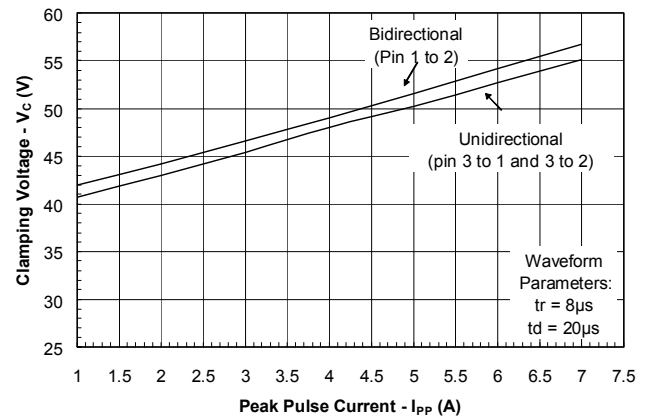
Power Derating Curve



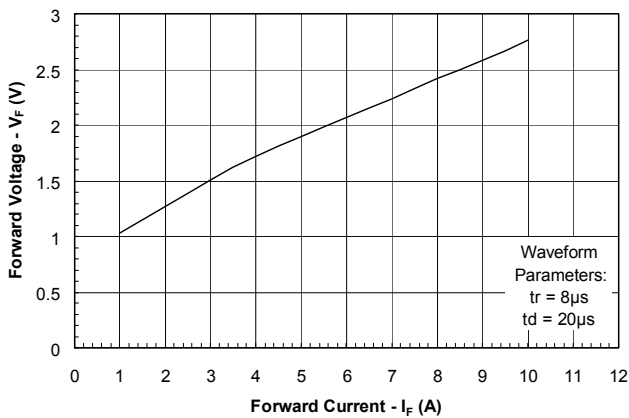
Pulse Waveform



Clamping Voltage vs. Peak Pulse Current



Forward Voltage vs. Forward Current



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Applications Information

Device Connection for Protection of Two, Three, and Four Wire Proximity Switches

Digital sensors help to bridge the gap between the physical world and the digital world in applications such as computer controlled factory automation. In such environments, transient voltages can easily disrupt or damage sensitive sensor inputs. The SDC36 provides transient voltage protection for the digital sensors to ensure their operation is not disrupted by the physical world.

The SDC36 is designed to meet the high surge capability and low clamping voltage needed to protect the ASIC and control logic used in proximity switches. The SDC36 provides protection for the power and I/O lines. Typical configurations for the protection of two, three, and four wire switches are as follows:

1. Two-Wire Switch: Connect pin 1 to the I/O line and pin 2 to the DC supply (since the device is symmetrical, these connections can be reversed). Pin 3 is not connected.

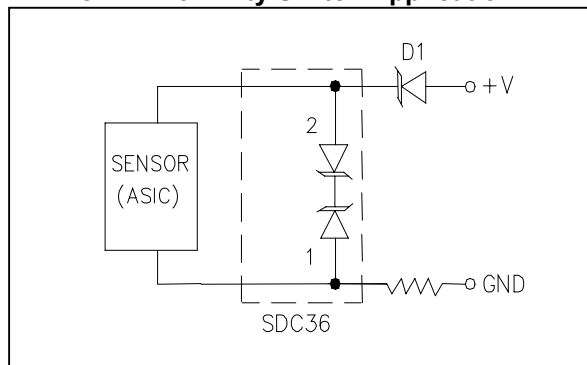
2. Three-Wire Switch: Either pin 1 or pin 2 is connected to the I/O line with the other connected to ground. Pin 3 must be connected to the DC supply.

3. Four-Wire Switch: Two devices are required to protect four wire switches. Pin 3 of each device is connected to the DC supply line. Pins 1 and 2 are connected to the I/O lines and ground as shown.

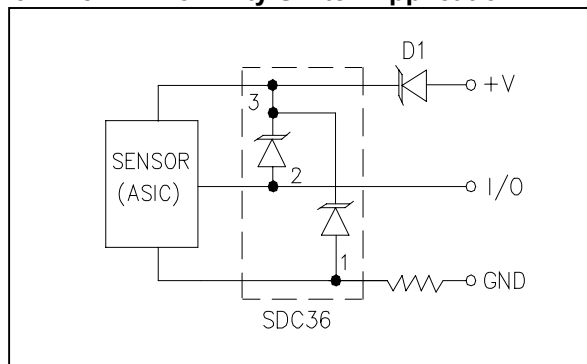
Matte Tin Lead Finish

Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

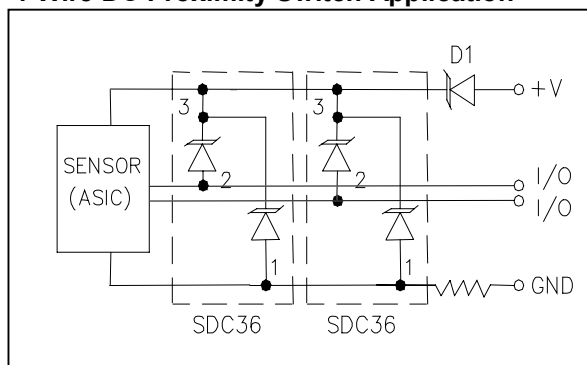
2-Wire DC Proximity Switch Application



3-Wire DC Proximity Switch Application

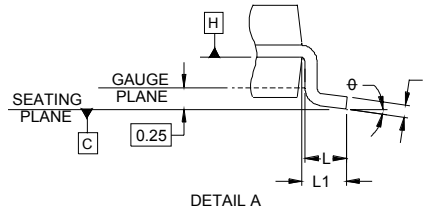
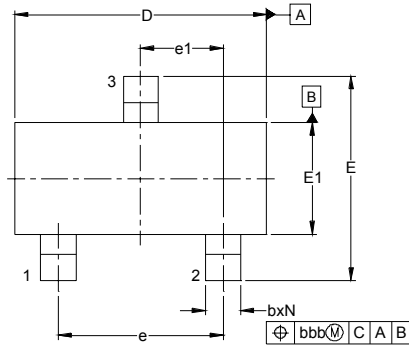


4-Wire DC Proximity Switch Application

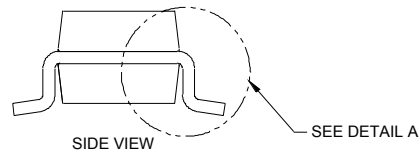
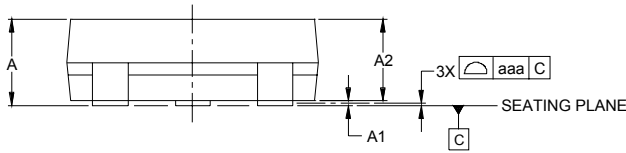


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Outline Drawing - SOT23



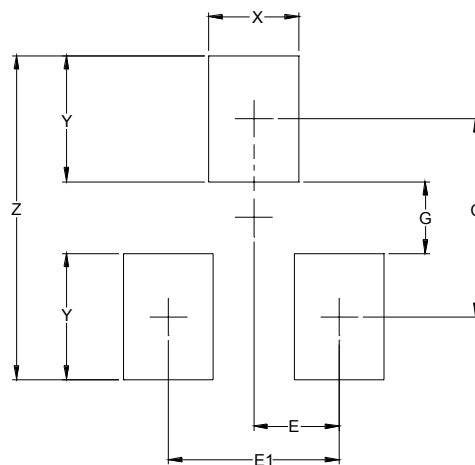
| DIM | INCHES | | | MILLIMETERS | | |
|-----|--------|------|------|-------------|------|------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | .035 | - | .044 | 0.89 | - | 1.12 |
| A1 | .000 | - | .004 | 0.01 | - | 0.10 |
| A2 | .035 | .037 | .040 | 0.88 | 0.95 | 1.02 |
| b | .012 | - | .020 | 0.30 | - | 0.51 |
| c | .003 | - | .007 | 0.08 | - | 0.18 |
| D | .110 | .114 | .120 | 2.80 | 2.90 | 3.04 |
| E | .082 | .093 | .104 | 2.10 | 2.37 | 2.64 |
| E1 | .047 | .051 | .055 | 1.20 | 1.30 | 1.40 |
| e | .075 | | | 1.90 BSC | | |
| e1 | .037 | | | 0.95 BSC | | |
| L | .015 | .020 | .024 | 0.40 | 0.50 | 0.60 |
| L1 | .022 | | | (0.55) | | |
| N | 3 | | | 3 | | |
| φ | 0° | - | 8° | 0° | - | 8° |
| aaa | .004 | | | 0.10 | | |
| bbb | .008 | | | 0.20 | | |



NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DATUMS [-A-] AND [-B-] TO BE DETERMINED AT DATUM PLANE [-H-]
3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

Land Pattern - SOT23



| DIMENSIONS | | |
|------------|--------|-------------|
| DIM | INCHES | MILLIMETERS |
| C | (.087) | (2.20) |
| E | .037 | 0.95 |
| E1 | .075 | 1.90 |
| G | .031 | 0.80 |
| X | .039 | 1.00 |
| Y | .055 | 1.40 |
| Z | .141 | 3.60 |

NOTES:

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.
2. REFERENCE IPC-SM-782A.

PROTECTION PRODUCTS

Ordering Information

| Part Number | Lead Finish | Qty per Reel | Reel Size |
|-------------|-------------|--------------|-----------|
| SDC36.TC | SnPb | 3,000 | 7 Inch |
| SDC36.TCT | Pb Free | 3,000 | 7 Inch |

Contact Information for Semtech International AG

| | | | |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------------|
| Taiwan Branch | Tel: 886-2-2748-3380 Fax: 886-2-2748-3390 | Semtech Switzerland GmbH Japan Branch | Tel: 81-3-6408-0950 Fax: 81-3-6408-0951 |
| Korea Branch | Tel: 82-2-527-4377 Fax: 82-2-527-4376 | Semtech Limited (U.K.) | Tel: 44-1794-527-600 Fax: 44-1794-527-601 |
| Shanghai Office | Tel: 86-21-6391-0830 Fax: 86-21-6391-0831 | Semtech France SARL | Tel: 33-(0)169-28-22-00 Fax: 33-(0)169-28-12-98 |
| Semtech International AG is a wholly-owned subsidiary of Semtech Corporation, which has its headquarters in the U.S.A. | | Semtech Germany GmbH | Tel: 49-(0)8161-140-123 Fax: 49-(0)8161-140-124 |