

RoHS Compliant Product  
A suffix of "-C" specifies halogen & lead-free

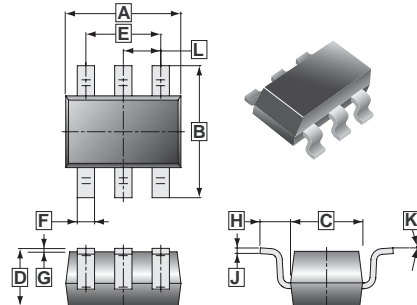
## DESCRIPTION

- Designed to protect voltage sensitive components from ESD
- Excellent clamping capability, low leakage and fast response
- Cellular phones, MP3 players, digital cameras ... etc.
- Suitable for electronics where board space is a major design consideration

## FEATURES

- Response time is typically < 1 ns
- Low leakage
- Stand-off voltage: 3.3 V
- ESD rating of class 3 (> 15 kV) per human body model
- IEC61000-4-2 level 4 ESD protection

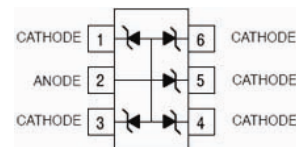
## SOT-363



| REF. | Millimeter |      | REF. | Millimeter |      |
|------|------------|------|------|------------|------|
|      | Min.       | Max. |      | Min.       | Max. |
| A    | 2.00       | 2.20 | G    | 0.100      | REF. |
| B    | 2.15       | 2.45 | H    | 0.525      | REF. |
| C    | 1.15       | 1.35 | J    | 0.08       | 0.15 |
| D    | 0.90       | 1.10 | K    | 8°         |      |
| E    | 1.20       | 1.40 | L    | 0.650 TYP. |      |
| F    | 0.15       | 0.35 |      |            |      |

## MARKING CODE

33K5



## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

| Symbol          | Parameter  | Value             | Units                       |
|-----------------|--|-------------------|-----------------------------|
| $V_{ESD}$       | ESD Voltage IEC61000-4-2 (ESD)                   | air discharge     | 15                          |
|                 |  | contact discharge | 8                           |
| $P_D$           | Total Power Dissipation on FR-5 board (Note 2)   | 150               | mW                          |
| $T_L$           | Lead Solder Temperature - Max. (10 sec duration) | 260               | $^\circ\text{C}$            |
| $R_{\theta JA}$ | Thermal Resistance Junction-to-ambient           | 833               | $^\circ\text{C} / \text{W}$ |
| $T_J, T_{STG}$  | Junction and Storage Temperature Range           | -55 ~ +150        | $^\circ\text{C}$            |

Stresses exceeding "Maximum Ratings" may damage the device. "Maximum Ratings" are stress ratings only. Functional operation above the recommended. Operating conditions is not implied. Extended exposure to stresses above the recommended operating conditions may affect device reliability.

1. FR-5 = 1.0 x 0.75 x 0.62 in.

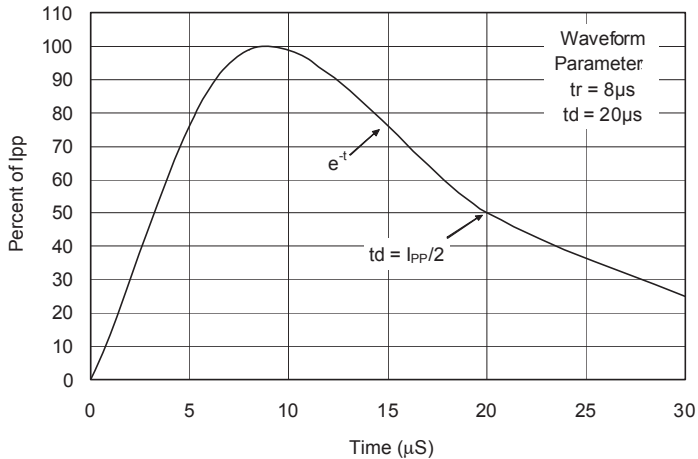
2. Only 1 diode under power. For all 5 diodes under power,  $P_D$  will be 20%. Mounted on FR-4 board with min pad.

## ELECTRICAL CHARACTERISTICS ( $T = 25^\circ\text{C}$ unless otherwise specified)

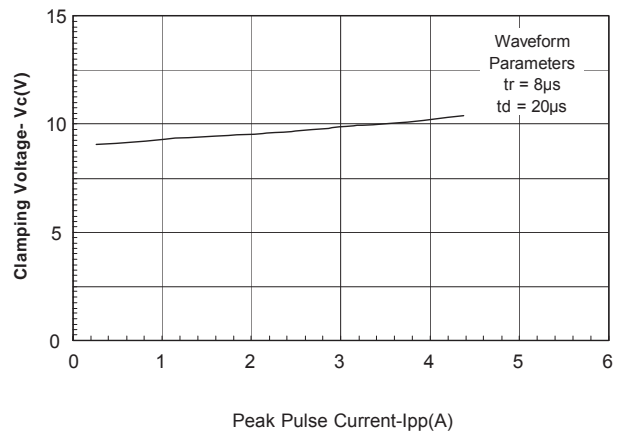
| Type Number               | Symbol    | Min. | Typ. | Max. | Unit | Test Conditions  |
|---------------------------|-----------|------|------|------|------|--|
| Reverse Stand-Off Voltage | $V_{RWM}$ | -    | -    | 3.3  | V    |  |
| Reverse Leakage Current   | $I_R$     | -    | 80   | 250  | nA   | $V_{RWM} = 3.3 \text{ V}$  |
| Peak Pulse Current        | $I_{PP}$  | -    | -    | 3.5  | A    |  |
| Clamping Voltage          | $V_C$     | -    | -    | 9.0  | V    | $I_{PP} = 1 \text{ A}$   |
| Clamping Voltage          | $V_C$     | -    | -    | 12.0 | V    | $I_{PP} = 3.5 \text{ A}$   |
| Reverse Breakdown Voltage | $V_{BR}$  | 5.35 | 5.7  | 5.85 | V    | $I_T = 1 \text{ mA}, T_{AMB} = 25^\circ\text{C}$   |
| Test Current              | $I_T$     | -    | 1.0  | -    | mA   |  |
| Junction Capacitance      | C         | -    | 30   | 40   | pF   | $F = 1 \text{ MHz}, T_{AMB} = 25^\circ\text{C}$  |
| Peak Power Dissipation    | $P_{PK}$  | -    | -    | 40   | W    | (@8x20 $\mu\text{S}$ , @ $T_A \leq 25^\circ\text{C}$ ;<br>Non-repetitive current per<br>Figure 1. Derate per Figure 2) |

**RATINGS AND CHARACTERISTICS CURVES**

Pulse Waveform

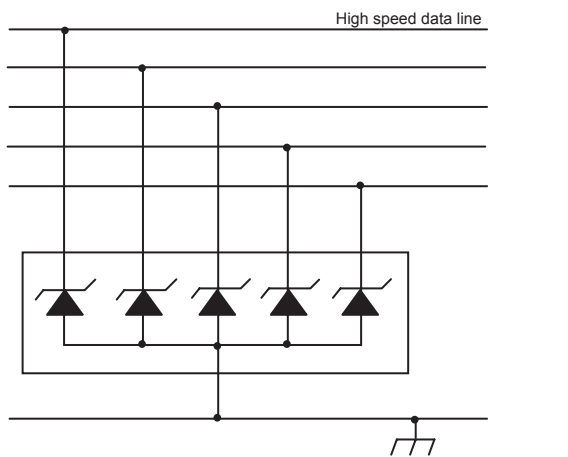


Clamping Voltage vs. Peak Pulse Current

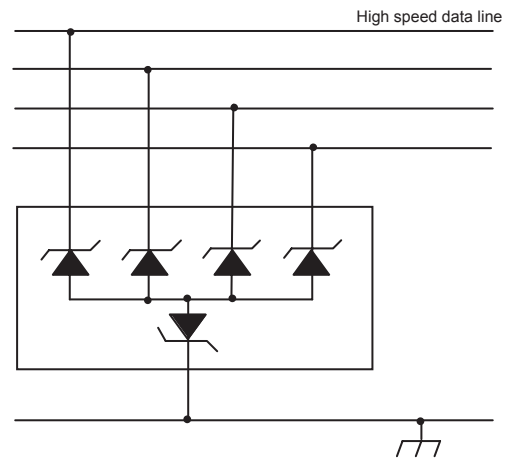


**APPLICATION NOTE**

The KS33K5 is designed for the uni-direction of up to five lines of bi-direction protection of four lines from the damage caused by Electronic Discharge (ESD) and surge pulses. The KS33K5 may be used on line where the signal polarities are above or below ground. KS33K5 can withstand and provides protection from a surge of 40 watts peak pulse power per line for a 8/20 µs waveform



Typical application for uni-directional protection of five lines.



Typical application for bi-directional protection of four lines.