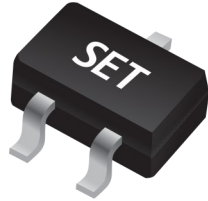


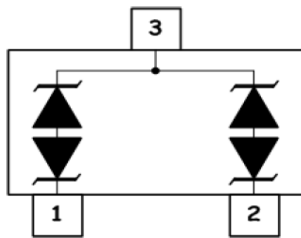
# ESD Protection Diodes

Bi-directional ESD and Transient Voltage Protection Diodes Array

GSM24CCAN SOT23



## Pinout and Functional Block Diagram



## Applications

- Low and High-speed CAN bus
- Industrial control networks
- Smart Distribution Systems (SDS)
- DeviceNet™
- Factory and process automation systems
- Power Train Control Units
- ADAS Control Units
- Portable Instrumentation
- Networking and Telecom
- Serial and Parallel Ports.

## Order Information

| Type      | Package | Marking Code | Delivery Form | Delivery Quantity |
|-----------|---------|--------------|---------------|-------------------|
| GSM24CCAN | SOT23   | C24 or CB2   | 7" T&R        | 3000 PCS          |

## Limiting Values

(T<sub>A</sub> = 25 °C, unless otherwise specified)

| Symbol           | Parameter                       | Conditions  | Min | Max | Unit |
|------------------|---------------------------------|---|-----|-----|------|
| V <sub>ESD</sub> | Electrostatic Discharge Voltage | IEC 61000-4-2; Contact Discharge                  | -   | 30  | kV   |
|                  |                                 | IEC 61000-4-2; Air Discharge                      | -   | 30  | kV   |
| P <sub>PP</sub>  | Peak Pulse Power (8 / 20 μs)    | I <sub>PP</sub> =8.0 A, t <sub>p</sub> =8 / 20 μs | -   | 350 | W    |
| T <sub>A</sub>   | Operating Temperature Range     | -   | -55 | 150 | °C   |
| T <sub>stg</sub> | Storage Temperature Range       | -   | -55 | 150 | °C   |

## Description

GSM24CCAN in a small SOT23 Surface-Mounted Device (SMD) plastic package is specifically designed to protect automotive Controller Area Network (CAN) lines from damage due to electrostatic discharge (ESD), electrical fast transient (EFT), and other overvoltage transients.

The product can absorb repetitive ESD strikes above the maximum level specified in the IEC 61000-4-2 international standard without performance degradation and safely dissipate 8 A of 8 / 20 μs surge current (IEC 61000-4-5, 2nd Edition) with very low clamping voltages.

The low capacitance and low leakage current of the GSM24CCAN minimizes impact on signal integrity and is compatible with high-speed CAN.

## Features

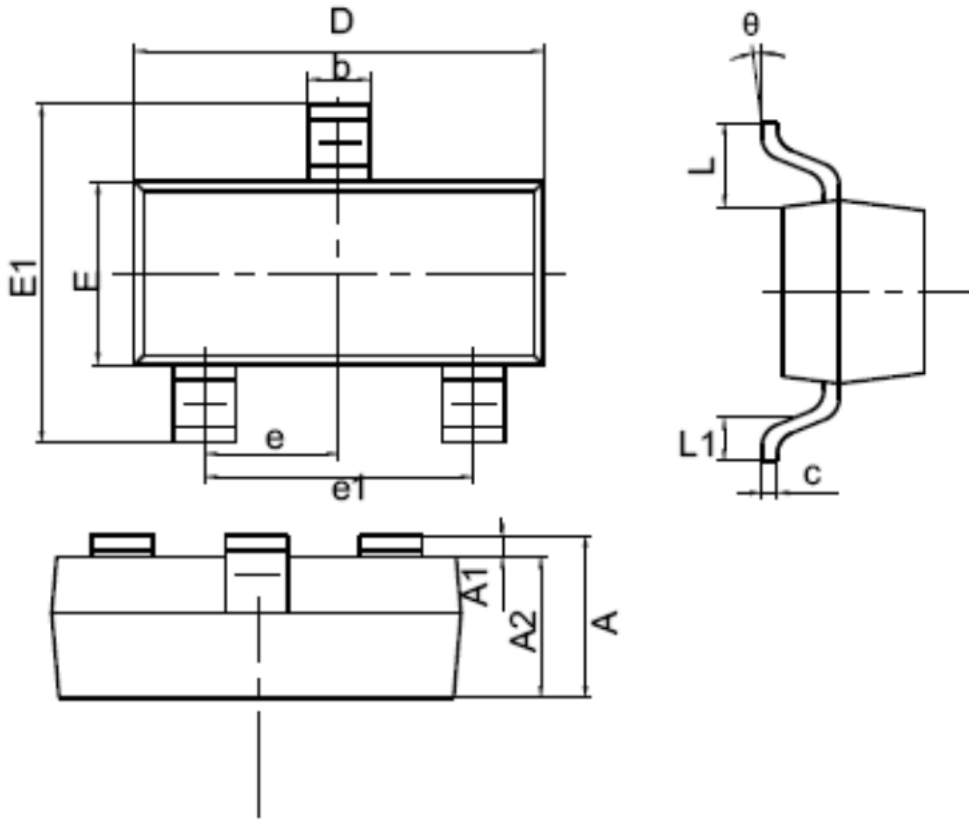
- AEC-Q 101 Qualified
- IEC61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
- IEC61000-4-4 (EFT) 40 A (5 / 50 ns)
- Peak Power Dissipation: 350 W@8 / 20 μs
- Protects Two Bidirectional Lines
- Working Voltages : 24 V
- Low Clamping Voltage
- Low Leakage Current
- High Temperature Soldering Guaranteed: 260 °C / 10 sec
- Device Meets MSL 1 Requirements
- Flammability Rating: UL 94 V-0
- Halogen Free and RoHS Compliant

# ESD Protection Diodes

Bi-directional ESD and Transient Voltage Protection Diodes Array

GSM24CCAN SOT23

## Package Dimensions - SOT23



| Symbol | Millimeters |      | Inches     |       |
|--------|-------------|------|------------|-------|
|        | Min.        | Max. | Min.       | Max.  |
| A      | 0.90        | 1.15 | 0.035      | 0.045 |
| A1     | 0.00        | 0.10 | 0.000      | 0.004 |
| A2     | 0.90        | 1.05 | 0.035      | 0.041 |
| b      | 0.30        | 0.50 | 0.012      | 0.020 |
| c      | 0.08        | 0.15 | 0.003      | 0.006 |
| D      | 2.80        | 3.00 | 0.110      | 0.118 |
| E      | 1.20        | 1.40 | 0.047      | 0.055 |
| E1     | 2.25        | 2.55 | 0.089      | 0.100 |
| e      | 0.95 Ref.   |      | 0.037 Ref. |       |
| e1     | 1.80        | 2.00 | 0.071      | 0.079 |
| L      | 0.55 Ref.   |      | 0.022 Ref. |       |
| L1     | 0.30        | 0.50 | 0.012      | 0.020 |
| θ      | 0 °         | 8 °  | 0 °        | 8 °   |

# ESD Protection Diodes

Bi-directional ESD and Transient Voltage Protection Diodes Array

GSM24CCAN SOT23

## Electrical Characteristics

( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified)

| Symbol    | Parameter               | Conditions  | Min  | Typ. | Max | Unit |
|-----------|-------------------------|---|------|------|-----|------|
| $V_{RWM}$ | Reverse Working Voltage | $T_A = 25\text{ }^\circ\text{C}$                        | -    | -    | 24  | V    |
| $V_{BR}$  | Breakdown Voltage       | $I_R = 1\text{ mA}; T_A = 25\text{ }^\circ\text{C}$     | 26.2 | -    | 32  | V    |
| $I_R$     | Reverse Leakage Current | $V_{RWM} = 24\text{ V}; T_A = 25\text{ }^\circ\text{C}$ | -    | -    | 100 | nA   |
| $V_C$     | Clamping Voltage        | $I_{PP}=1\text{ A}, t_p=8 / 20\text{ }\mu\text{s}$      | -    | -    | 35  | V    |
|           |                         | $I_{PP}=5.0\text{ A}, t_p=8 / 20\text{ }\mu\text{s}$    | -    | -    | 40  | V    |
|           |                         | $I_{PP}=8.0\text{ A}, t_p=8 / 20\text{ }\mu\text{s}$    | -    | -    | 44  | V    |
| $C_J$     | Junction Capacitance    | $V_R = 0\text{ V}, f = 1\text{ MHz}$                    | -    | -    | 30  | pF   |

## Performance Curve for Reference

( $T_A=25\text{ }^\circ\text{C}$  unless otherwise noted)

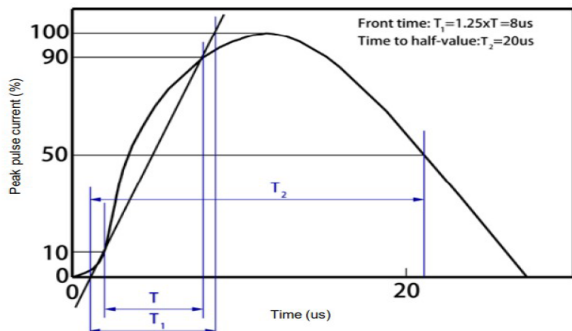


FIGURE 1

8 / 20  $\mu\text{s}$  Waveform Per IEC61000-4-5

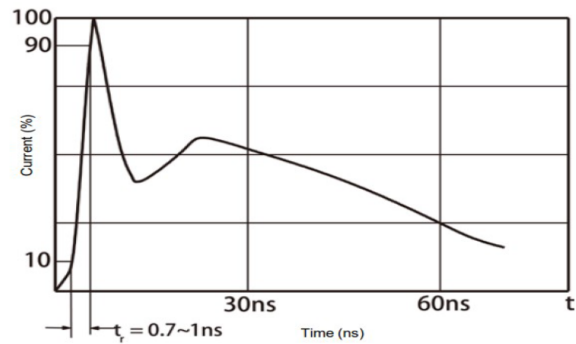


FIGURE 2

Contact Discharge Current Waveform Per IEC 61000-4-2

# ESD Protection Diodes

Bi-directional ESD and Transient Voltage Protection Diodes Array

GSM24CCAN SOT23

## Performance Curve for Reference

( $T_A=25\text{ }^\circ\text{C}$  unless otherwise noted)

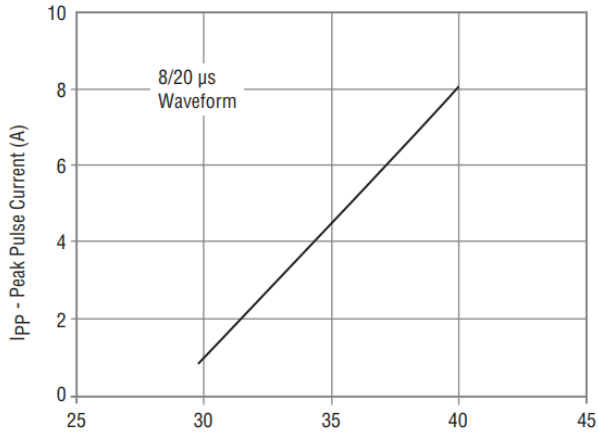


FIGURE 3

Clamping Voltage VS. Peak Pulse Current

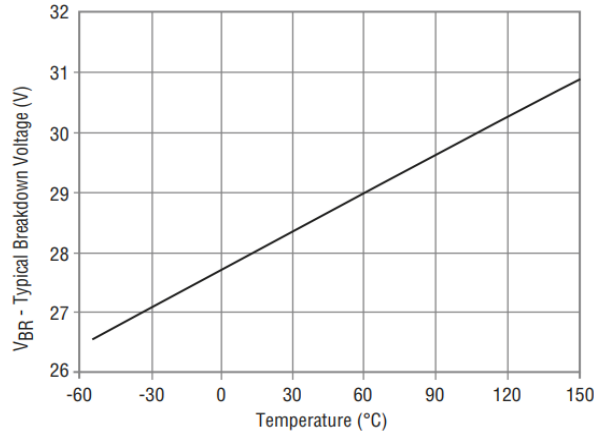


FIGURE 4

Breakdown Voltage VS. Temperature

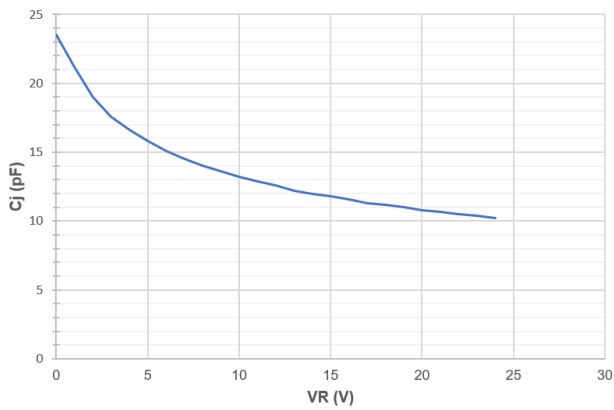


FIGURE 5

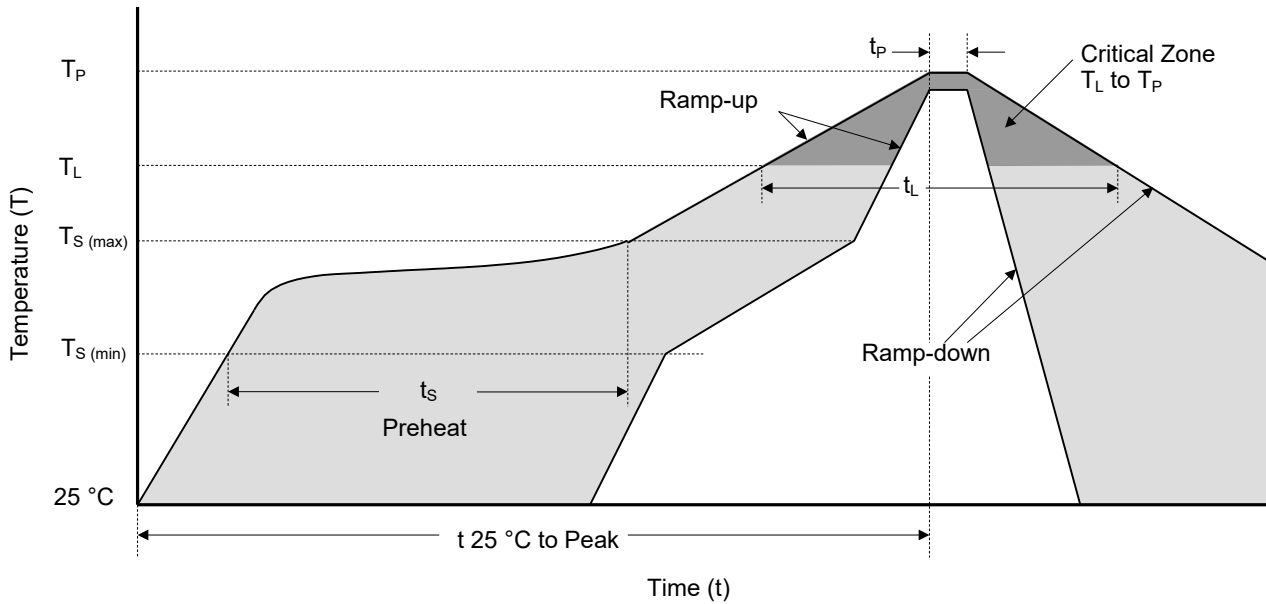
Junction capacitance versus reverse voltage

# ESD Protection Diodes

Bi-directional ESD and Transient Voltage Protection Diodes Array

GSM24CCAN SOT23

## Soldering Parameters



Reflowing Condition

| Reflow Soldering Parameters                              |                                   | Lead-Free Assembly      |
|--|-----------------------------------|-------------------------|
| Pre-heat   | Temperature Min ( $T_{S (min)}$ ) | 150 °C                  |
|  | Temperature Max ( $T_{S (max)}$ ) | 200 °C                  |
|  | Time (min to max) ( $t_s$ )       | 60 ~ 120 seconds        |
| Average Ramp Up Rate (Liquidus Temp ( $T_L$ ) to Peak)   |                                   | 3 °C / second max.      |
| $T_{S (max)}$ to $T_L$ Ramp-up Rate                      |                                   | 3 °C / second max.      |
| Reflow   | Temperature ( $T_L$ ) (Liquidus)  | 217 °C                  |
|  | Time (min to max) ( $t_L$ )       | 60 ~ 150 seconds        |
| Peak Temperature ( $T_P$ )                               |                                   | 260 <sup>+0/-5</sup> °C |
| Time of within 5 °C of Actual Peak Temperature ( $t_p$ ) |                                   | 20 ~ 40 seconds         |
| Ramp-down Rate   |                                   | 6 °C / second max.      |
| Time from 25 °C to Peak Temperature                      |                                   | 8 Minutes max.          |
| Do Not Exceed  |                                   | 260 °C                  |



# ATTENTION

## Usage

1. TVS must be operated in the specified ambient temp.
2. Do not clean the TVS with strong polar solvent such as ketone, esters, benzene and halogenated hydrocarbon, to avoid damaging the encapsulating layer.
3. Please do not apply severe vibration, shock or pressure to TVS, to avoid element cracking.

## Replacement

1. If TVS is visually damaged, please replace it.
2. TVS is a non-repairable product. For safety sake, please use equivalent TVS for replacement.

## Storage

1. Storage Temp. Range: (-55 to 150) °C.
2. Do not store the TVS at the high temp., high humidity or corrosive gas environment, to avoid influencing the solder-ability of the lead wires. The product shall be used up within 1 year after receiving the goods.

## Environmental Conditions

1. TVS should not be exposed to the open air, nor direct sunshine.
2. TVS should avoid rain, water vapor or other condition of high temp. and high humidity.
3. TVS should avoid sand dust, salt mist, or other harmful gases.













































## Max. Typical Capacitance of TVS

The typical capacitance of TVS is listed in the specifications. Designers may refer to it when designing TVS in High frequency circuit.

## Installation Mechanical Stress

1. Do not knock TVS when installing, to avoid mechanical damage.
2. Please do not apply severe vibration, shock or pressure to TVS, to avoid surface resin or element cracking.

## Package Outline      Circuit Diagram

|   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|
|    |    |    |    |    |    |    |    |    |    |    |
| DFN0603   | DFN1006   | DFN1006-3L  | DFN1610   | DFN2020-3L  | 1CH/UNI   | 1CH/BI  | 2CH/UNI   | 2CH/BI  | 1CH/BI  | 1CH/UNI   |
|    |    |    |    |    |    |    |    |    |    |    |
| DFN1610-6L  | DFN2010-8L  | DFN2510   | DFN2626-10L   | DFN3810-9L  | 1CH/UNI   | 1CH/BI  | 1CH/UNI   | 1CH/BI  | 2CH/UNI   | 2CH/BI  |
|    |    |    |    |    |    |    |    |    |    |    |
| SOD-923   | SOD-523   | SOD-323   | SOD-123   | SOT-143   | 1CH/UNI   | 2CH/UNI   | 2CH/UNI   | 4CH/UNI   | 5CH/UNI   | 4CH/UNI   |
|  |  |  |  |  |  |  |  |  |  |  |
| SOT-523   | SOT-323   | SOT-23  | SOT-363   | SOT-23-6L   | 2CH/BI  | 4CH/UNI   | 4CH/UNI   | 8CH/UNI   | 8CH/UNI   | 8CH/UNI   |