## Description

The ASM712 is designed for asymmetrical (12V to –7V) protection in multi-point data transmission application, The ASM712 replace four discrete components by integrating two 12V and two 7V TVS diodes in a single package. The ASM712 complies with the IEC 61000-4-2 (ESD) with ±30kV air and ±30kV contact discharge. It is assembled into a lead-free SOT-23 package. It is designed to protect components which are connected to data and transmission lines from voltage surges.

## Features

- 325W peak pulse power (8/20μs)
- Ultra low leakage: nA level
- Operating voltage: 7V or 12V
- Low clamping voltage
- Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test
    - Air discharge: ±30kV
    - Contact discharge: ±30kV
  - IEC61000-4-5 (Lightning) 13A (8/20μs)
- RoHS Compliant

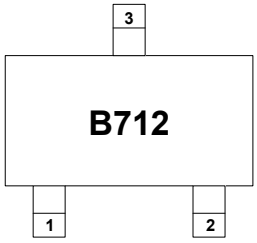
## Mechanical Characteristics

- Package: SOT-23
- Lead Finish: Matte Tin
- Case Material: “Green” Molding Compound.
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram Below
- Marking Information: See Below

## Applications

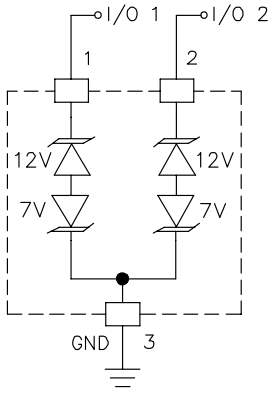
- Wireless System
- Networks
- Portable Instrumentation
- RS485 Ports

## Marking Information

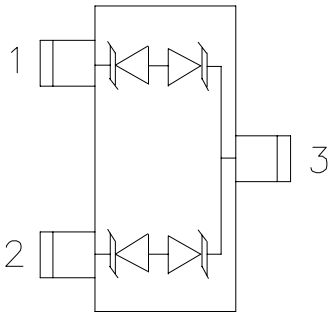



B712 = Device Marking Code

## Dimensions and Pin Configuration




Circuit Schematic




Pin Schematic

## Ordering Information

| Part Number | Packaging | Reel Size |
|---|---|---|
| ASM712 | 3000/Tape & Reel | 7 inch |



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## Absolute Maximum Ratings ($T_A$=25°C unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Peak Pulse Power (8/20μs) | Ppk | 325 | W |
| Peak Pulse Current (8/20μs) | Ipp | 13 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | $V_{ESD}$ | ±30<br>±30 | kV |
| Operating Temperature Range | $T_J$ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

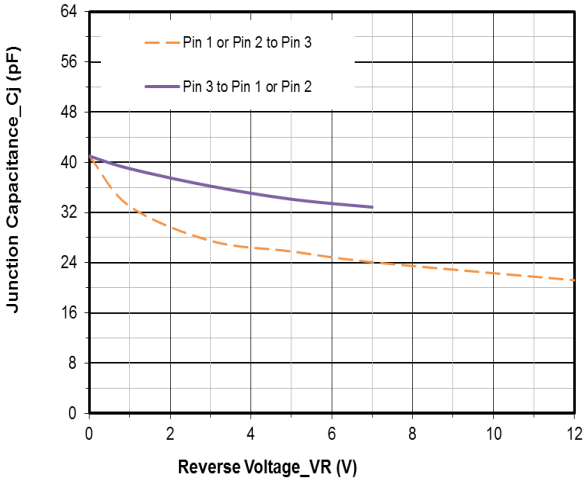
## Electrical Characteristics ($T_A$=25°C unless otherwise specified)

| | | Pin 1 to 3 and 2 to 3 (12V TVS) | | | Pin 3 to 1 and 3 to 2 (7V TVS) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Min** | **Typ** | **Max** | **Unit** | **Test Condition** |
| Reverse Working Voltage | $V_{RWM}$ | | | 12 | | | 7 | V | |
| Breakdown Voltage | $V_{BR}$ | 13.3 | | | 7.5 | | | V | $I_T$ = 1mA |
| Reverse Leakage Current | $I_R$ | | | 0.5 | | | 0.5 | μA | $V_R$ = $V_{RWM}$ |
| Clamping Voltage | $V_C$ | | | 20 | | | 14 | V | $I_{PP}$ = 5A (8 x 20μs pulse) |
| Clamping Voltage | $V_C$ | | | 25 | | | 16 | V | $I_{PP}$ = 13A (8 x 20μs pulse) |
| Junction Capacitance | $C_J$ | | 40 | | | 40 | | pF | VR = 0V, f = 1MHz |
| Junction Capacitance | $C_J$ | | 20 | | | 30 | | pF | VR = $V_{RWM}$, f = 1MHz |

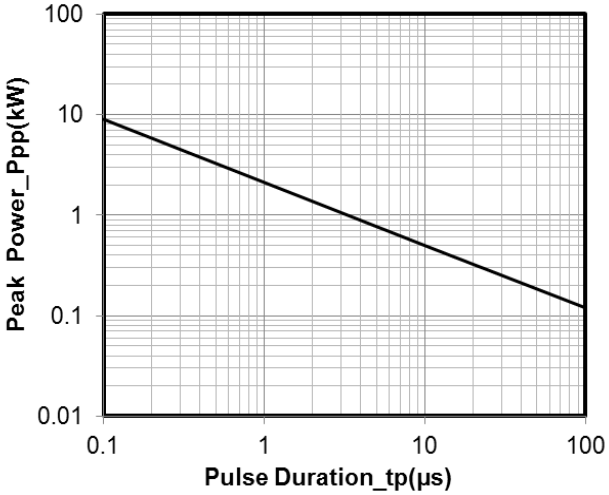


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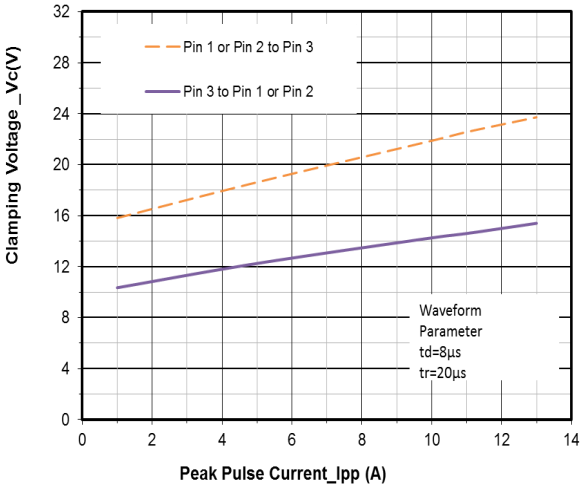
## Typical Performance Characteristics ($T_A$=25°C unless otherwise Specified)



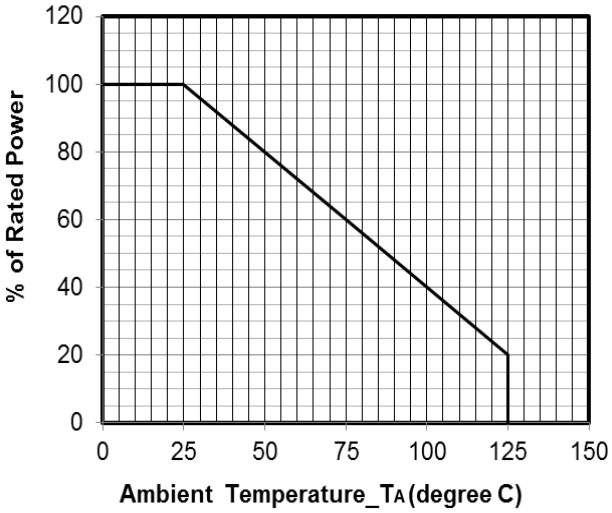

**Junction Capacitance vs. Reverse Voltage**



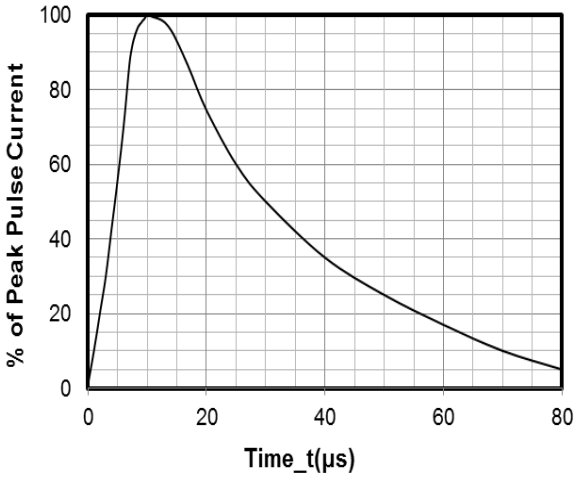

**Peak Pulse Power vs. Pulse Time**



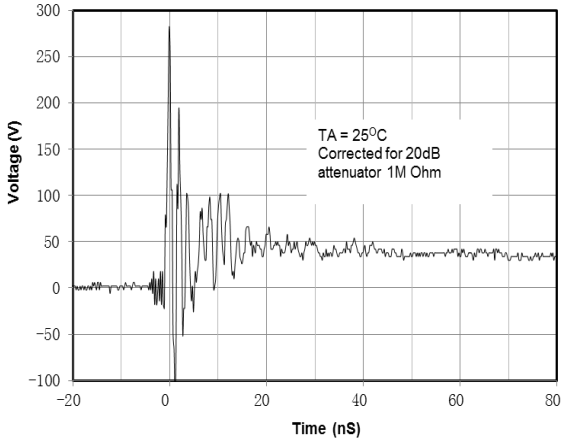

**Clamping Voltage vs. Peak Pulse Current**




**Power Derating Curve**




**8 X 20µs Pulse Waveform**




**ESD Clamping Voltage**

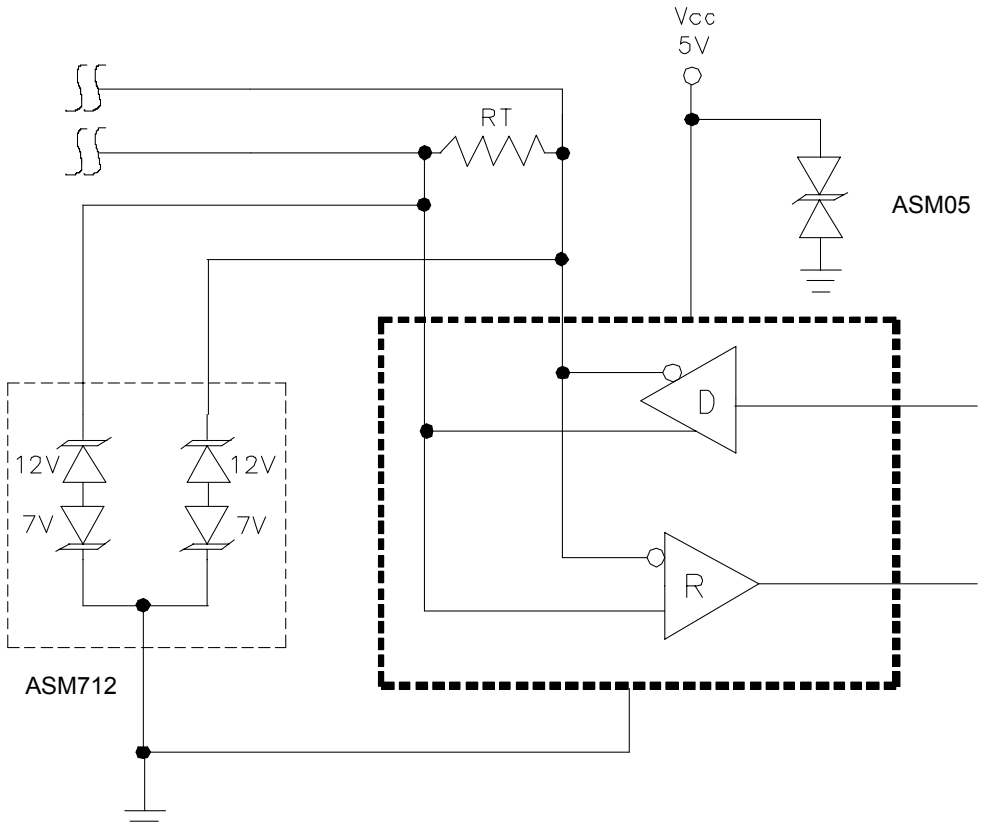
**8 kV Contact per IEC61000−4−2**



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## ASM712 on RS-485 Data Lines Application

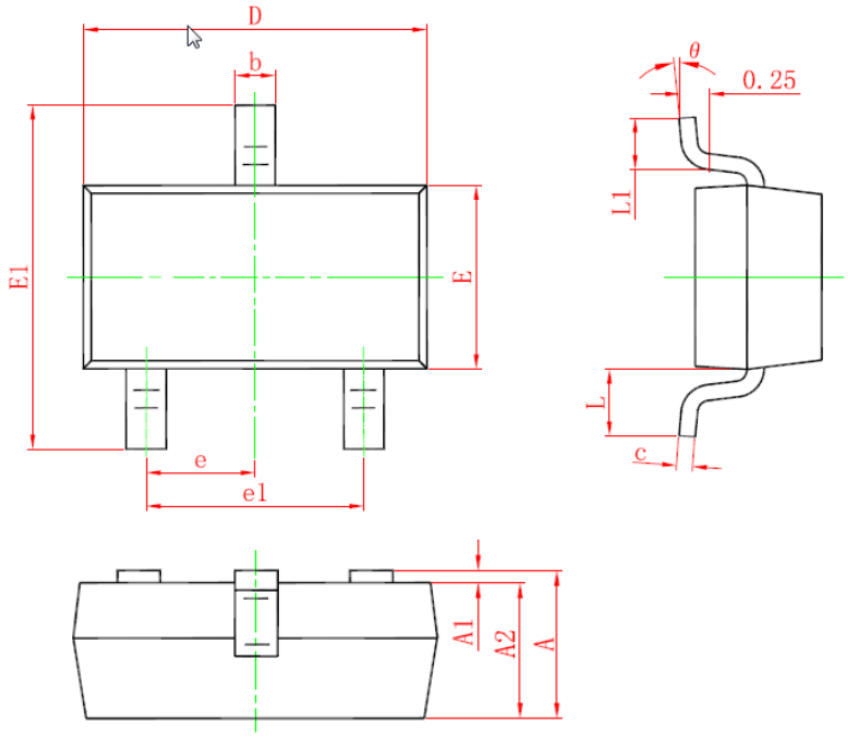
EIA RS-485 specifies a ±7V ground difference between devices on the bus. This permits the bus voltage to range from +12V (5V + 7V) to -7V (0 - 7V). The ASM712 is designed to protect two RS-485 data lines in extended common mode applications. The ASM712 may be used to protect devices from transient voltages resulting from ESD, EFT, and light ning. The device is designed with asymmetrical operating voltages for optimum protection. The TVS diodes at pins 1 and 2 have a working voltage of 12volts. These pins are connected to the differential data line pairs. The TVS diodes at pin 3 have a working voltage of 7volts. Pin 3 is connected to ground. The internal TVS diodes of the ASM712 will protect the transceiver input from positive transient voltage spikes greater than 12V and negative spikes greater than 7V.






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## SOT-23 Package Outline Drawing

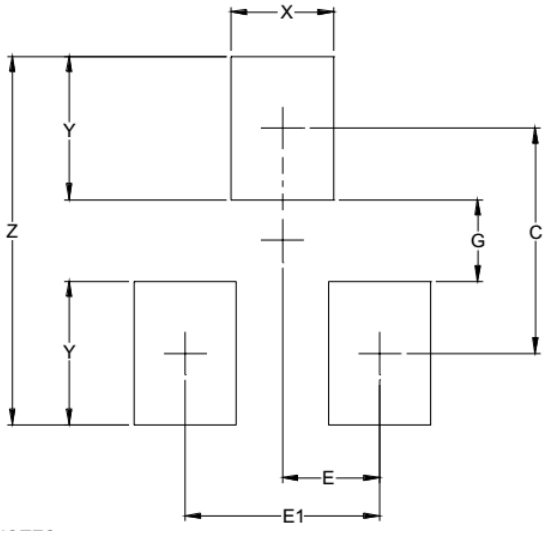



| SYM | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | MILLIMETERS | | | INCHES | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.90 | - - | 1.15 | 0.035 | - - | 0.045 |
| A1 | 0.00 | - - | 0.10 | 0.000 | - - | 0.004 |
| A2 | 0.90 | - - | 1.05 | 0.035 | - - | 0.041 |
| b | 0.30 | - - | 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 | - - | 2.25 | 0.089 | | 0.100 |
| e | 0.95TYP | | | 0.037TYP | | |
| e1 | 1.80 | - - | 2.00 | 0.071 | - - | 0.079 |
| L | 0.55REF | | | 0.022REF | | |
| L1 | 0.30 | - - | 0.50 | 0.012 | - - | 0.020 |
| Θ | 0° | - - | 8° | 0° | - - | 8° |



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## Suggested Land Pattern




| SYM | DIMENSIONS | |
|---|---|---|
| | INCHES | MILLIMETERS |
| C | 0.087 | (2.20) |
| E | 0.037 | 0.95 |
| E1 | 0.075 | 1.90 |
| G | 0.031 | 0.80 |
| X | 0.039 | 1.00 |
| Y | 0.055 | 1.40 |
| Z | 0.141 | 3.60 |

## Contact Information

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