

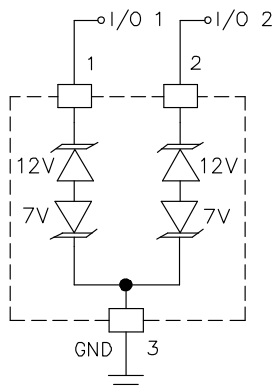
Description

The DCSM712 is designed for asymmetrical (12V to -7V) protection in multi-point data transmission application. The DCSM712 replace four discrete components by integrating two 12V and two 7V TVS diodes in a single package. The DCSM712 complies with the IEC 61000-4-2 (ESD) standard with $\pm 30\text{kV}$ air and $\pm 30\text{kV}$ 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.

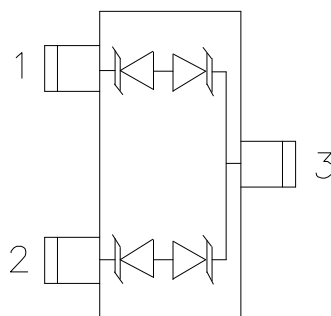
Mechanical Characteristics

- ◆ Package: SOT-23
- ◆ Lead Finish: Matte Tin
- ◆ Case Material: "Green" Molding Compound.
- ◆ UL Flammability Classification Rating 94V-0
- ◆ Moisture Sensitivity: Level 3 per J-STD-020
- ◆ Terminal Connections: See Diagram Below
- ◆ Marking Information: See Below

Dimensions and Pin Configuration



Circuit Schematic



Pin Schematic

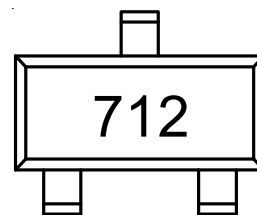
Features

- ◆ 400W peak pulse power(8/20 μs)
- ◆ 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: $\pm 30\text{kV}$
 - Contact discharge: $\pm 30\text{kV}$
 - IEC61000-4-4 (EFT) 40A (5/50ns)
 - IEC61000-4-5 (Lightning) 17A (8/20 μs)
- ◆ RoHS Compliant

Applications

- ◆ Wireless System
- ◆ Networks
- ◆ Portable Instrumentation
- ◆ RS485 Ports

Marking Information



Ordering Information

| Part Number | Marking | Packaging | Reel Size |
|-------------|---------|------------------|-----------|
| DCSM712 | 712 | 3000/Tape & Reel | 7 inch |

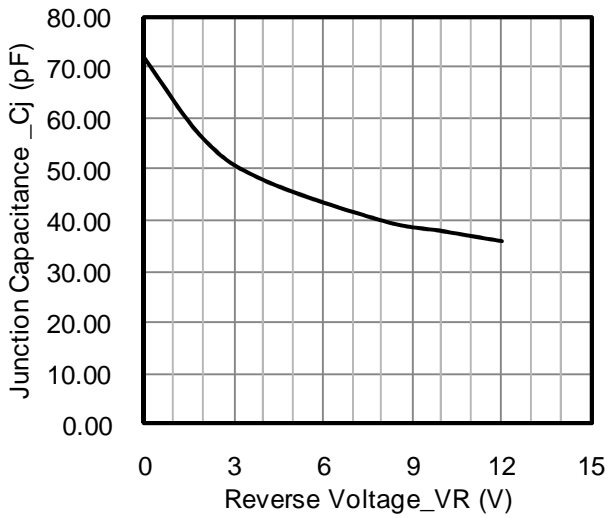
Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|------------------|-------------|--------------------|
| Peak Pulse Power(8/20 μs) | Ppk | 400 | W |
| Peak Pulse Current(8/20 μs) | I _{PP} | 17 | A |
| ESD per IEC 61000-4-2 (Air) | V _{ESD} | ± 30 | kV |
| ESD per IEC 61000-4-2 (Contact) | | ± 30 | |
| Operating Temperature Range | T _J | -55 to +125 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T _{stg} | -55 to +150 | $^{\circ}\text{C}$ |

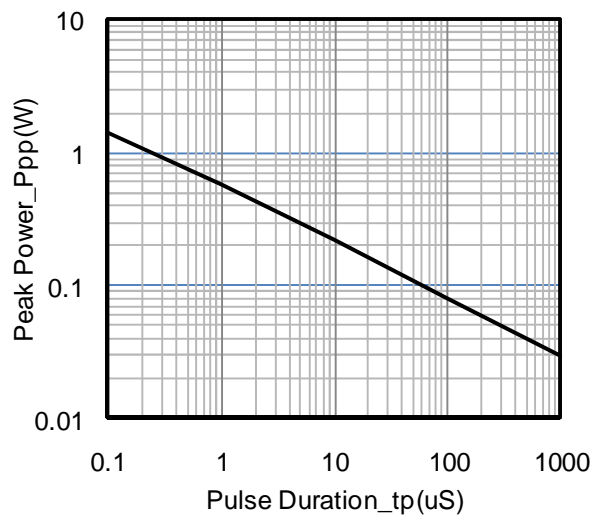
Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter | Symbol | Pin 1 to 3 and 2 to 3(12V TVS) | | | Pin 3 to 1 and 3 to 2(7V TVS) | | | Unit | Test Condition |
|-------------------------|------------------|--------------------------------|------|-----|-------------------------------|------|-----|---------------|--|
| | | Min | Typ | Max | Min | Typ | Max | | |
| 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 | | 0.01 | 0.5 | | 0.01 | 0.5 | μA | V _R = V _{RWM} |
| Clamping Voltage | V _C | | | 20 | | | 10 | V | I _{PP} = 5A (8 x 20 μs pulse) |
| Clamping Voltage | V _C | | | 26 | | | 12 | V | I _{PP} = 17A (8 x 20 μs pulse) |
| Junction Capacitance | C _J | | | 75 | | | 75 | pF | V _R =0, f=1MHz |
| Junction Capacitance | C _J | | 45 | | | 45 | | pF | V _R =V _{RWM} , f=1MHz |

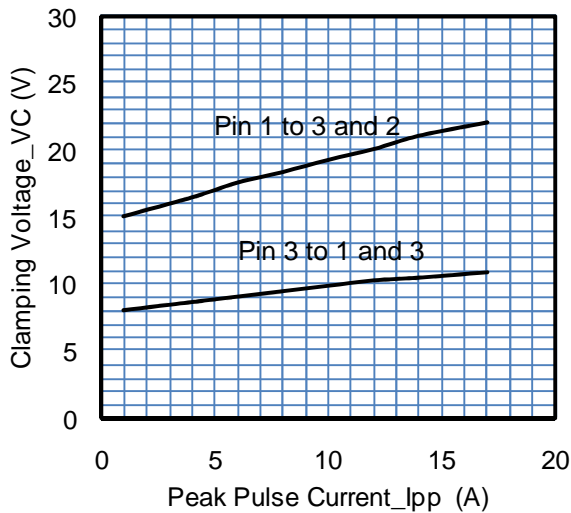
Typical Performance Characteristics (TA=25°C unless otherwise Specified)



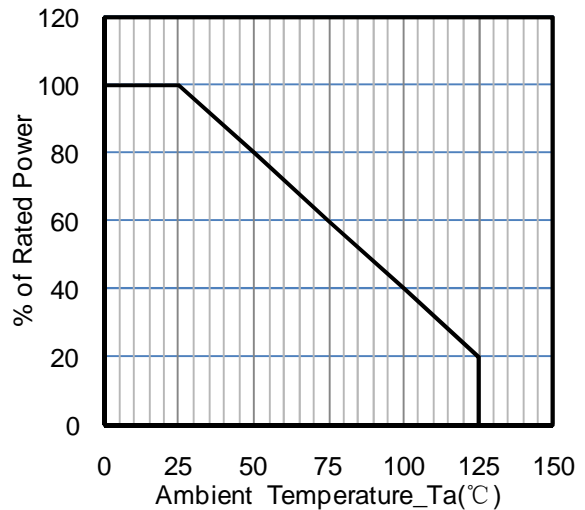
Junction Capacitance vs. Reverse Voltage



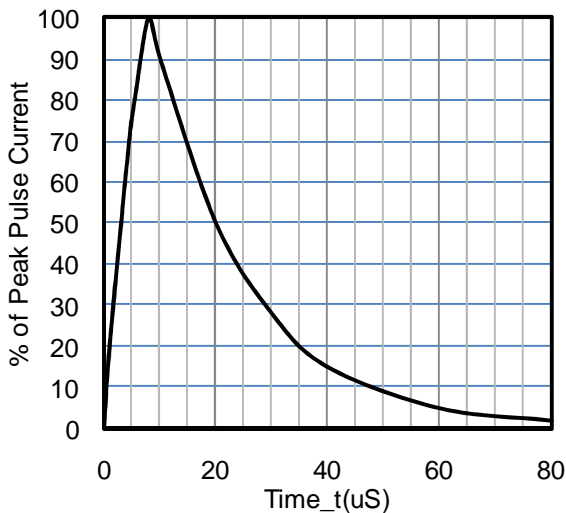
Peak Pulse Power vs. Pulse Time



Clamping Voltage vs. Peak Pulse Current



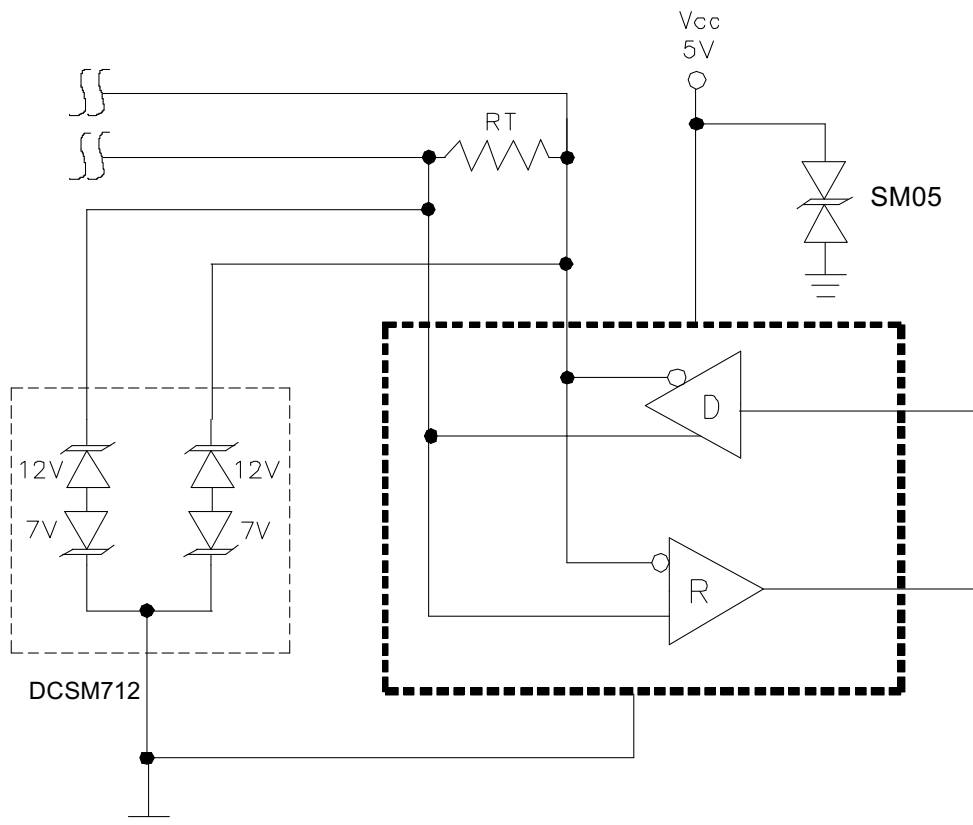
Power Derating Curve



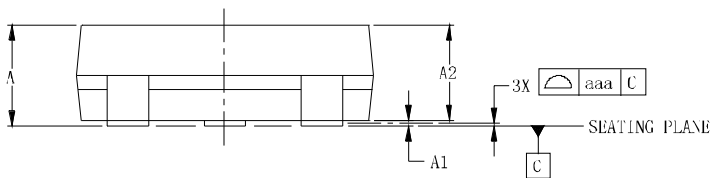
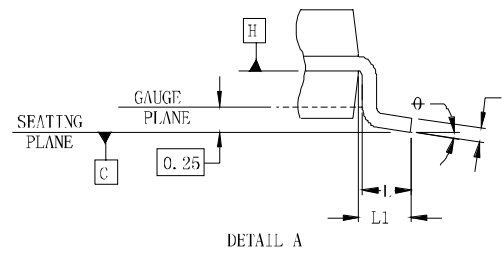
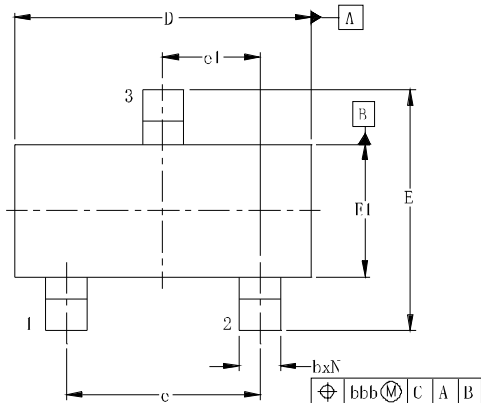
8X 20µs Pulse Waveform

DCSM712 on RS-485 Data Lines Application

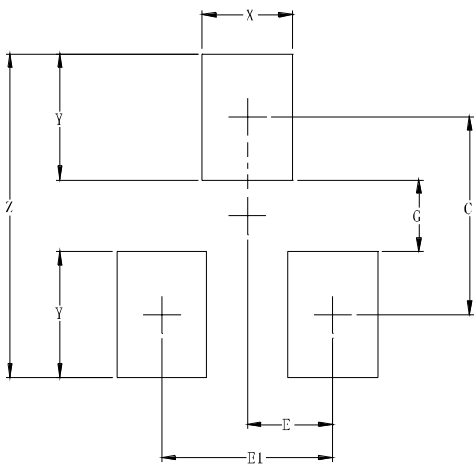
EIA RS-485 specifies a $\pm 7V$ ground difference between devices on the bus. This permits the bus voltage to range from +12V (5V + 7V) to -7V (0 - 7V). The DCSM712 is designed to protect two RS-485 data lines in extended common mode applications. The DCSM712 may be used to protect devices from transient voltages resulting from ESD, EFT, and lightning. The device is designed with asymmetrical operating voltages for optimum protection. The TVS diodes at pins 1 and 2 have a working voltage of 12 volts. These pins are connected to the differential data line pairs. The TVS diodes at pin 3 have a working voltage of 7 volts. Pin 3 is connected to ground. The internal TVS diodes of the DCSM712 will protect the transceiver input from positive transient voltage spikes greater than 12V and negative spikes greater than 7V.



SOT-23 Package Outline Drawing



Suggested Land Pattern



Contact Information

Changzhou D-first Electronics CO.,Ltd.

www.first-electronic.com

Email: yf@first-electronic.cn

Phone: +86 (0519) 8817 1671

| DIMENSIONS | | | | | | |
|------------|--------|-------|-------|-------------|------|------|
| SYM | INCHES | | | MILLIMETERS | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.035 | - | 0.044 | 0.89 | - | 1.12 |
| A1 | 0.000 | - | 0.004 | 0.01 | - | 0.10 |
| A2 | 0.035 | 0.037 | 0.040 | 0.88 | 0.95 | 1.02 |
| b | 0.012 | - | 0.020 | 0.30 | - | 0.51 |
| c | 0.003 | - | 0.007 | 0.08 | - | 0.18 |
| D | 0.110 | 0.114 | 0.120 | 2.80 | 2.90 | 3.04 |
| E | 0.082 | 0.093 | 0.104 | 2.10 | 2.37 | 2.64 |
| E1 | 0.047 | 0.051 | 0.055 | 1.20 | 1.30 | 1.40 |
| e | 0.075 | | | 1.90BSC | | |
| e1 | 0.037 | | | 0.95BSC | | |
| L | 0.015 | 0.020 | 0.024 | 0.40 | 0.50 | 0.60 |
| L1 | 0.022 | | | 0.55 | | |
| N | 3 | | | 3 | | |
| ϕ | 0° | - | 8° | 0° | - | 8° |
| aaa | 0.004 | | | 0.10 | | |
| bbb | 0.008 | | | 0.20 | | |

| DIMENSIONS | | |
|------------|--------|-------------|
| SYM | 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 |