



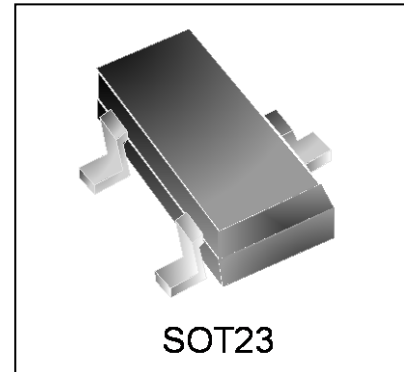
Transient Voltage Suppressor

Features

- 400 watts peak pulse power ($t_p = 8/20\mu s$)
- Protects two $\pm 7V$ to $12V$ lines
- Low capacitance
- Low clamping voltage
- Solid-state silicon avalanche technology

IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD) $\pm 15kV$ (air), $\pm 8kV$ (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 12A (8/20 μs)



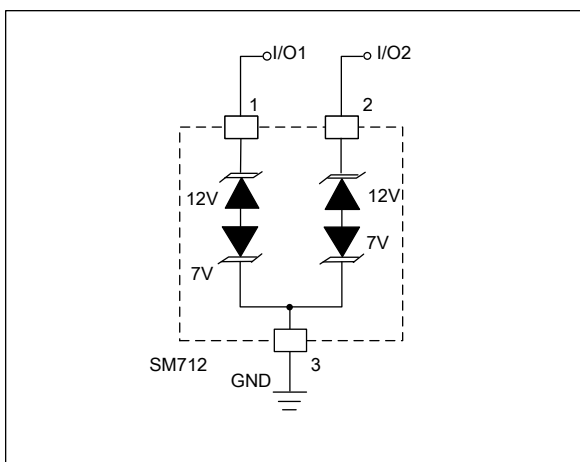
Mechanical Characteristics

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

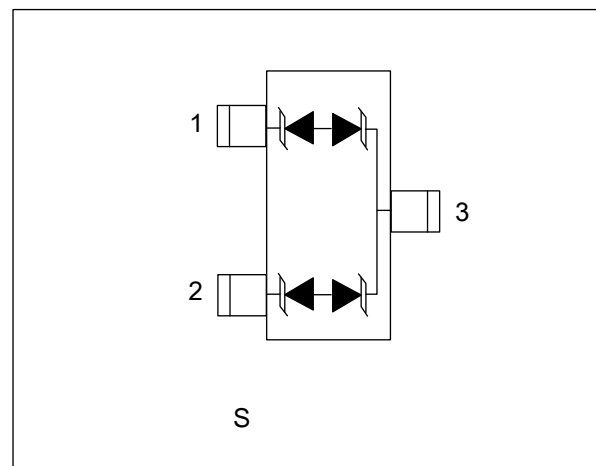
Applications

- Protection of RS-485 transceivers with extended common-mode range
- Security systems
- Automatic Teller Machines
- HFC systems
- Net works

Circuit Diagram



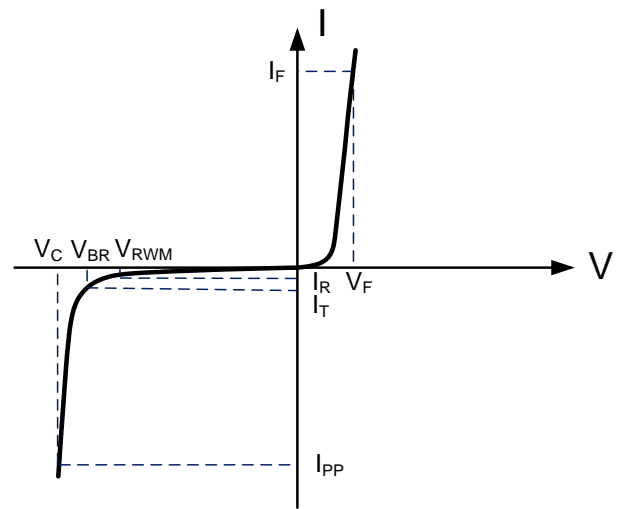
Schematic & PIN Configuration



| Absolute Maximum Rating | | | |
|--|-----------|--------------|-------|
| Rating | Symbol | Value | Units |
| Peak Pulse Power ($t_p = 8/20\mu s$) | P_{PP} | 400 | Watts |
| Lead Soldering Temperature | T_L | 260(10 sec.) | °C |
| Peak Pulse Current ($t_p = 8/20\mu s$) | I_{pp} | 17 | A |
| Operating Temperature | T_J | -55 to + 125 | °C |
| Storage Temperature | T_{STG} | -55 to +150 | °C |

Electrical Parameters (T=25°C)

| Symbol | Parameter |
|-----------|------------------------------------|
| I_{PP} | Maximum Reverse Peak Pulse Current |
| V_C | Clamping Voltage @ I_{PP} |
| V_{RWM} | Working Peak Reverse Voltage |
| I_R | Maximum Reverse Leakage Current @ |
| V_{BR} | Breakdown Voltage @ I_T |
| I_T | Test Current |
| I_F | Forward Current |
| V_F | Forward Voltage @ I_F |



Electrical Characteristics

| SM712M | | | | | | | | | |
|---------------------------|-----------|---------------------------------------|-------------------------------------|-----|-----|------------------------------------|-----|-----|---------|
| | | | Pins 1 to 3 and 2 to 3 (12V TVS) | | | Pins 3 to 1 and 3 to 2 (7V TVS) | | | |
| Parameter | Symbol | Conditions | Min | Typ | Max | Min | Typ | Max | Units |
| Reverse Stand-Off Voltage | V_{RWM} | Pin 3 to 1 or Pin 2 to 1 | | | 12 | | | 7 | V |
| Reverse Breakdown Voltage | V_{BR} | $I_{PT} = 1mA$ | 13.3 | | | 7.5 | | | V |
| Reverse Leakage Current | I_R | $V_R = V_{RWM}$ | | | 1 | | | 20 | μA |
| Clamping Voltage | V_C | $I_{PP} = 5A$, $t_p = 8/20\mu s$ | | | 20 | | | 10 | V |
| Clamping Voltage | V_C | $I_{PP} = 17A$, $t_p = 8/20\mu s$ | | | 26 | | | 12 | V |
| Junction Capacitance | C_j | $V_R = 0V$, $f = 1MHz$ | | | 75 | | | 75 | pF |
| | | $V_R = V_{RWM}$, $f = 1MHz$ | | 45 | | | 45 | | pF |

Typical Characteristics

Figure 1 Non-Repetitive Peak Pulse Power vs. Pulse Time

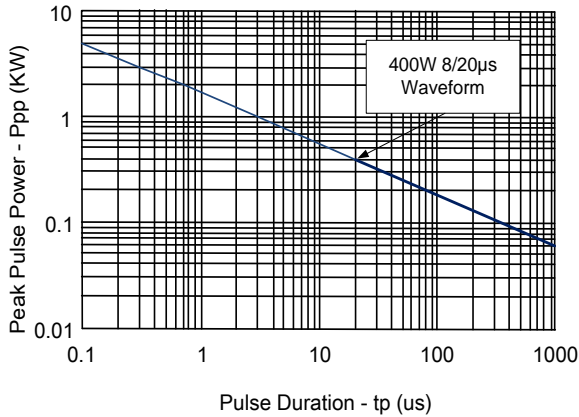


Figure 2 Power Derating curve

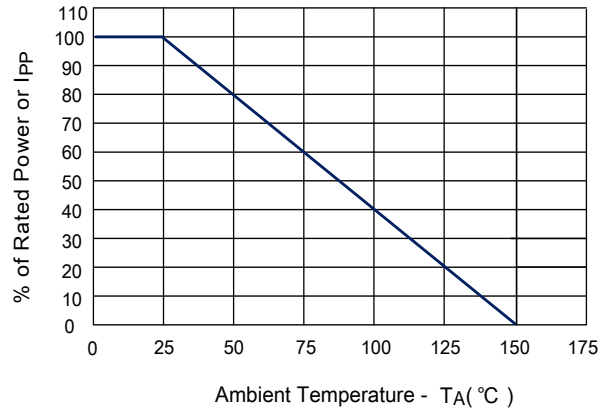


Figure 3 Pulse Waveform

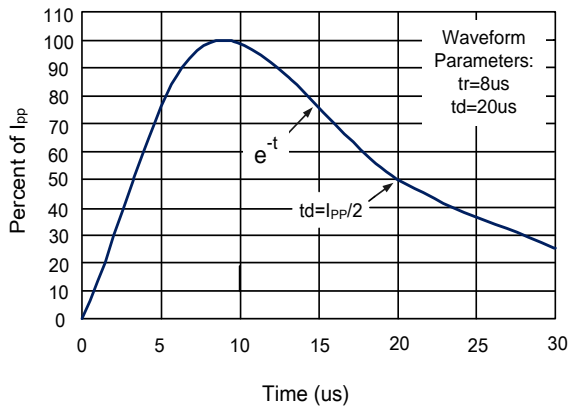


Figure 4 Clamping Voltage vs. Peak Pulse Current

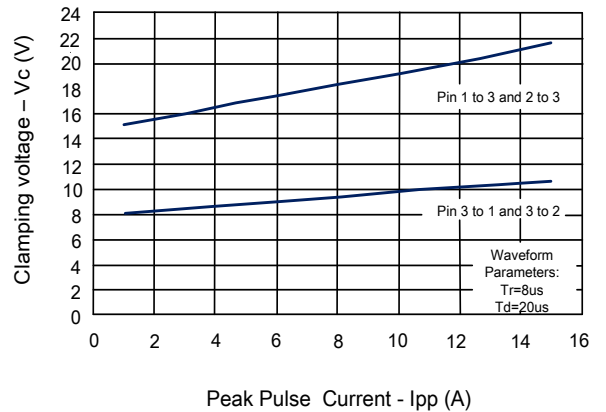
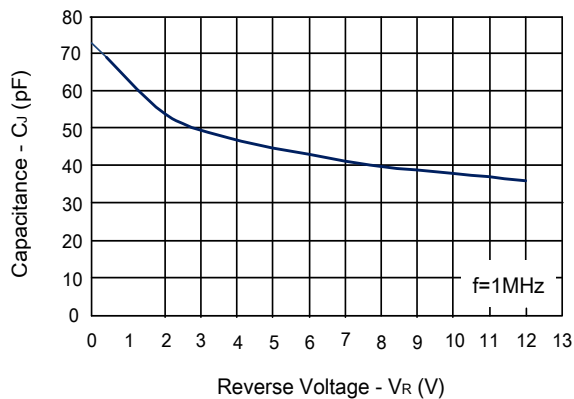


Figure 5 Capacitance vs. Reverse Voltage



Application Information

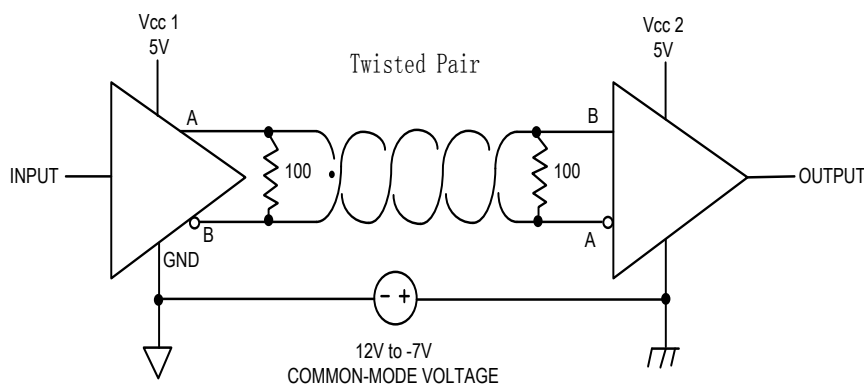
Device Connection for Protection of Two RS-485 Data Lines

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).

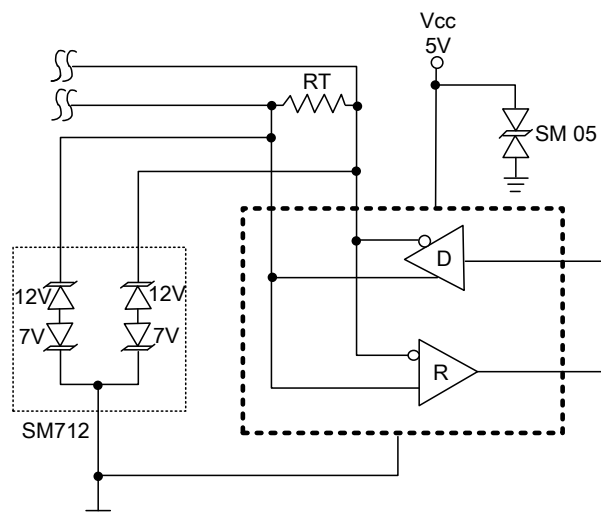
The SM712M is designed to protect two RS-485 data lines in extended common mode applications. The SM712M may be used to protect devices from transient voltages resulting from ESD, EFT, and lightning. The device is designed with asymmetrical operating voltages for optimum protection. The TVS diodes at 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 WS712M will protect the transceiver input from positive transient voltage spikes greater than 12V and Negative spikes greater than 7V.

A series current limiting resistor may be added in applications requiring enhanced surge immunity.

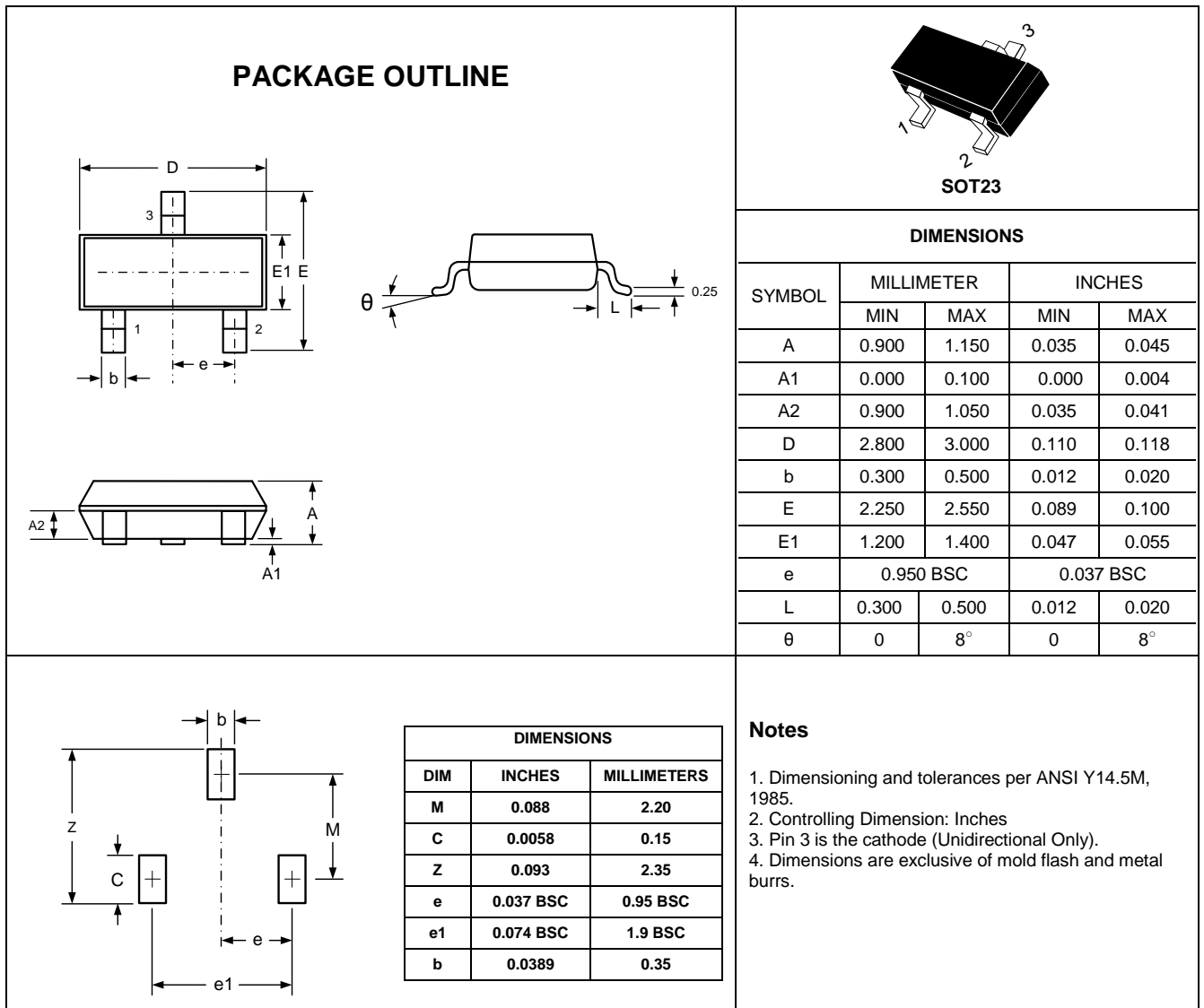
RS-485 Common Mode Voltages



RS-485 Protection Circuit



Outline Drawing – SOT23



Marking Codes

| | |
|--------------|--------|
| Part Number | SM712M |
| Marking Code | 7AM |