

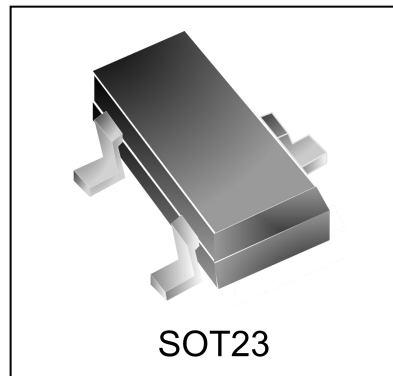
**Transient Voltage Suppressor**

**Features**

- 400 watts peak pulse power ( $t_p = 8/20\mu s$ )
- Protects two -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 $\mu s$ )



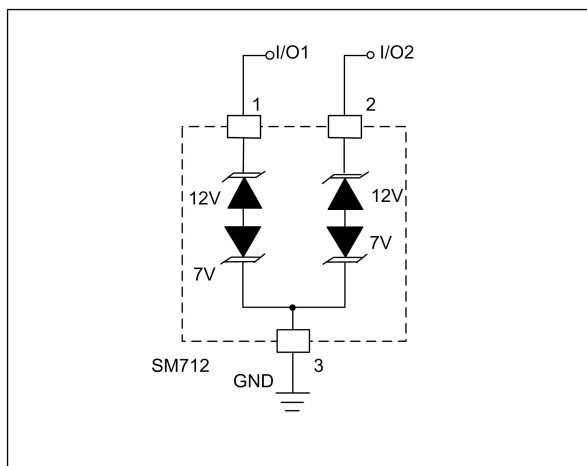
**Mechanical Characteristics**

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

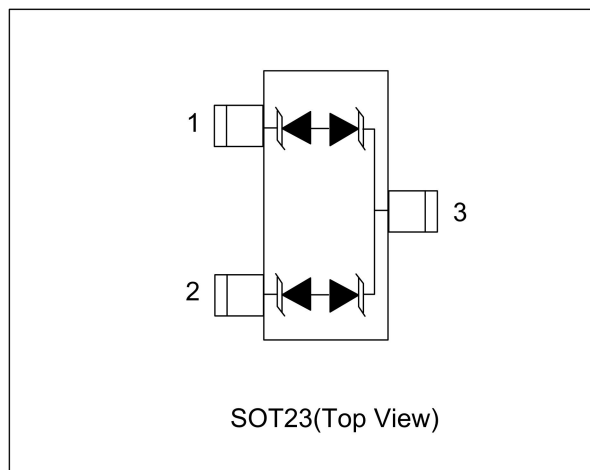
**Applications**

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

**Circuit Diagram**



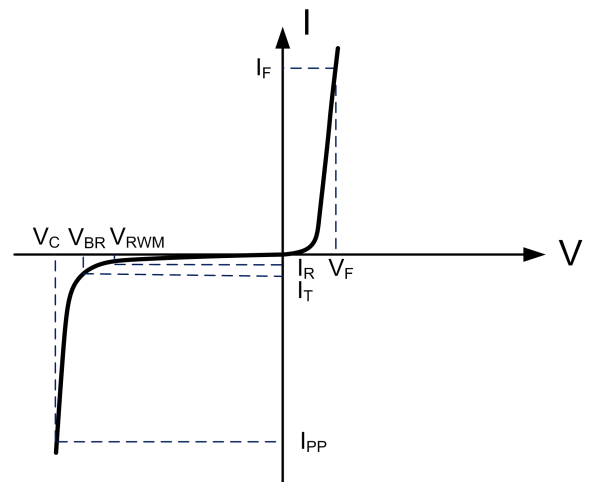
**Schematic & PIN Configuration**



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 ( $t_p = 8/20\mu s$ )	$I_{pp}$	12	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

WS712M									
			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			1	$\mu A$
Clamping Voltage	$V_C$	$I_{PP} = 5A, t_p = 8/20\mu s$			20			10	V
Clamping Voltage	$V_C$	$I_{PP} = 12A, t_p = 8/20\mu s$			26				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

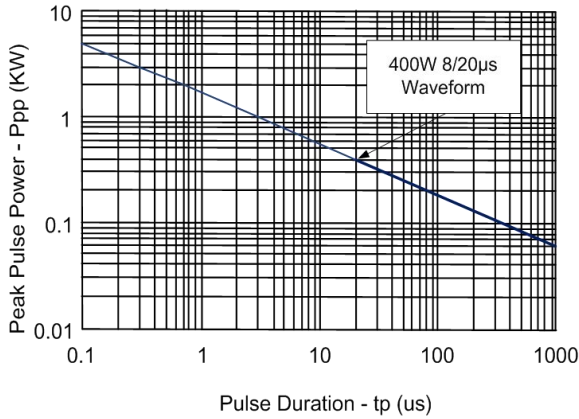


Figure 2 Power Derating curve

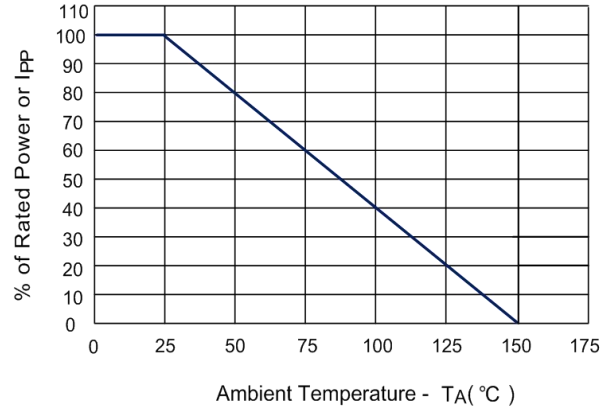


Figure 3 Pulse Waveform

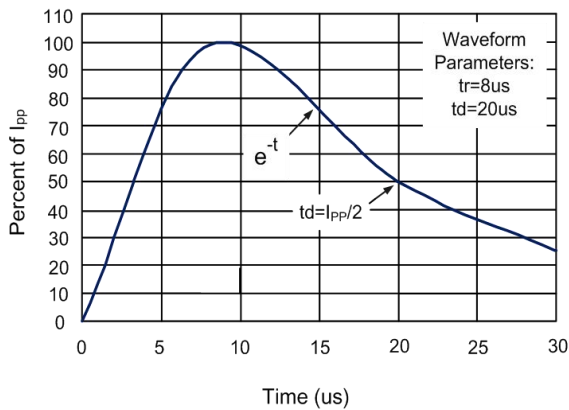


Figure 4 Clamping Voltage vs. Peak Pulse Current

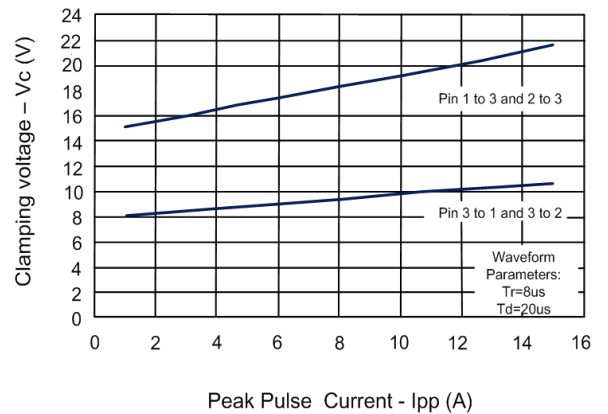
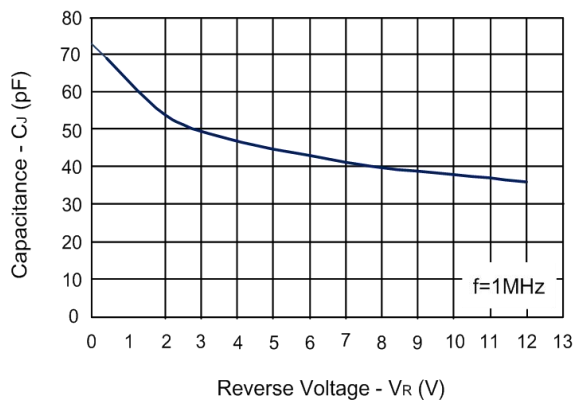


Figure 5 Capacitance vs. Reverse Voltage



Application Information

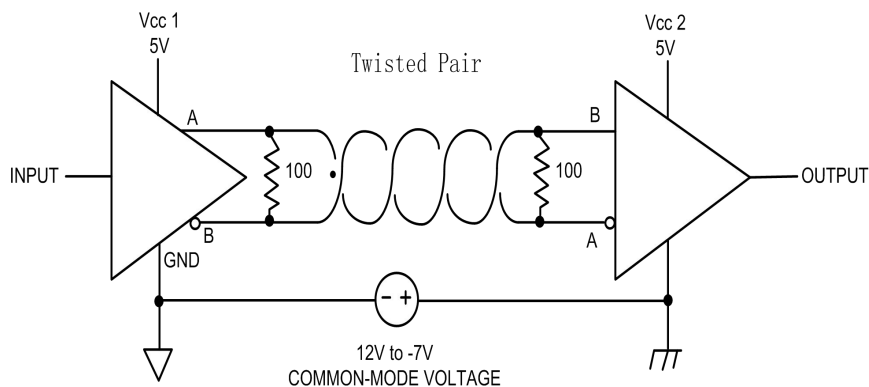
Device Connection for Protection of Two RS-485 Data Lines

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).

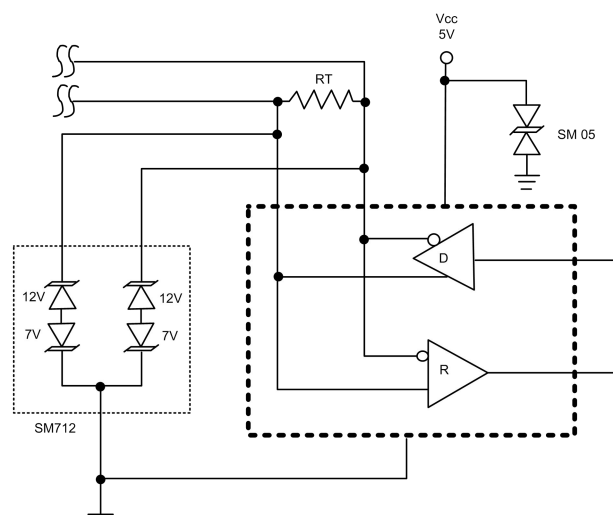
The WS712M is designed to protect two RS-485 data lines in extended common mode applications. The WS712M may be used to protect devices from transient voltages resulting from ESD, EFT, and lightning. The device is designed with asymmetrical operating voltages for optimum protection. The TVS diodes at 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

### PACKAGE OUTLINE

**SOT-23**

SYMBOL	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.15	0.035	0.045
A1	0.00	0.10	0.000	0.004
A2	0.60	0.70	0.0236	0.0275
D	2.80	3.00	0.110	0.118
E	2.25	2.55	0.089	0.100
E1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 BSC	
L	0.30	0.50	0.012	0.020
θ	0	8°	0	8°

DIMENSIONS		
DIM	INCHES	MILLIMETERS
M	0.0795	2.02
C	0.0315	0.80
Z	0.111	2.82
e	0.037 BSC	0.95 BSC
e1	0.075 BSC	1.9 BSC
b	0.0315	0.80

**Notes**

1. Dimensioning and tolerances per ANSI Y14.5M, 1985.
2. Controlling Dimension: Inches
3. Pin 3 is the cathode (Unidirectional Only).
4. Dimensions are exclusive of mold flash and metal burrs.

**Marking Codes**

Part Number	WS712M
Marking Code	7AM

**Package Information**

Qty: 3k/Ree

**CONTACT INFORMATION**

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For additional information, please contact your local Sales Representative.

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