

## Asymmetrical TVS Diode for Extended Common-Mode RS-485

### DESCRIPTION

The SM712 transient voltage suppressor (TVS) diode is designed for asymmetrical (12V to -7V) protection in multi-point data transmission standard RS-485 applications. The SM712 may be used to protect devices from transient voltages resulting from electrostatic discharge (ESD), electrical fast transients (EFT), and lightning.

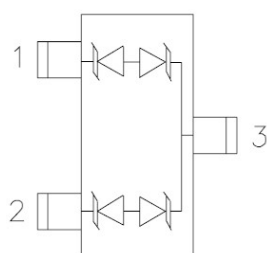
The SM712 features 400 Watts ( $t_p=8/20\mu s$ ) of power handling capability to accommodate the higher transient voltage levels which may be expected in extended common mode applications. This provides higher equipment reliability and eliminates the “guess work” required when using zener diodes that are not rated to handle such transient conditions.

The integrated design aids in reducing voltage over-shoot associated with trace inductance. The low clamping voltage of the SM712 minimizes the stress on the protected transceiver. The SOT-23 package allows flexibility in the design of “crowded” circuit boards.

### ORDERING INFORMATION

- ✧ Device: SM712
- ✧ Package: SOT-23
- ✧ Marking: 712 or C72
- ✧ Material: Halogen free
- ✧ Packing: Tape & Reel
- Quantity per reel: 3,000pcs

### PIN CONFIGURATION & SCHEMATIC



**SOT23 (Top View)**

### FEATURES

- ✧ 400 watts peak pulse power ( $t_p=8/20\mu s$ )
- ✧ Transient protection for asymmetrical data lines to
  - 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 $\mu s$ )
- ✧ Protects two +12V to -7V lines
- ✧ Low capacitance
- ✧ Low leakage current
- ✧ Low clamping voltage
- ✧ Solid-state silicon avalanche technology
- ✧ RoHS compliant

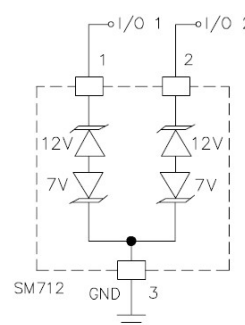
### MACHANICAL DATA

- ✧ SOT-23 package
- ✧ Flammability Rating: UL 94V-0
- ✧ Terminal: Matte tin plated.
- ✧ Packaging: Tape and Reel
- ✧ High temperature soldering guaranteed:
  - 260°C/10s
- ✧ Reel size: 7 inch

### APPLICATIONS

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

### CIRCUIT DIAGRAM



## Asymmetrical TVS Diode for Extended Common-Mode RS-485

### ABSOLUTE MAXIMUM RATING

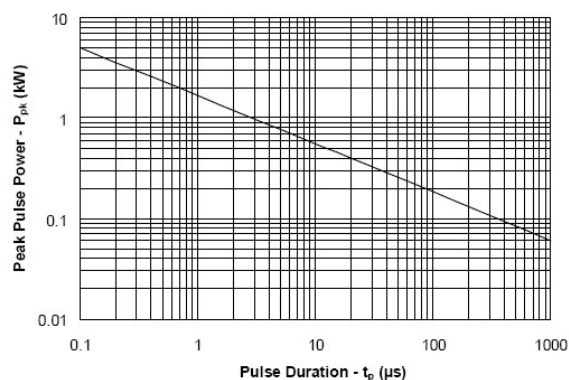
Symbol	Parameter	Value	Units
$P_{PP}$	Peak Pulse Power (8/20 $\mu$ s)	400	W
$I_{PP}$	Peak Pulse Current (8/20 $\mu$ s)	17	A
$V_{ESD}$	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$\pm 15$ $\pm 8$	kV
$T_{OPT}$	Operating Temperature	-55/+150	°C
$T_{STG}$	Storage Temperature	-55/+150	°C

### ELECTRICAL CHARACTERISTICS (T<sub>amb</sub>=25°C)

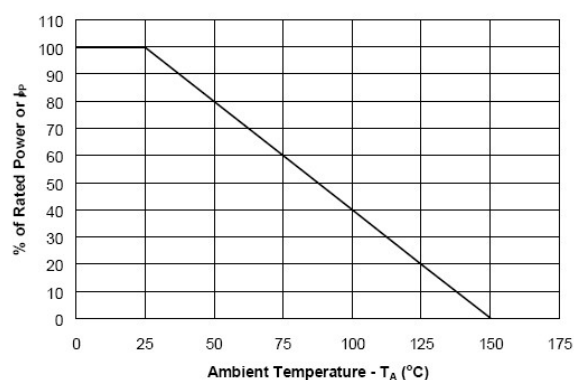
Symbol	Parameter	Test Condition	Pin 1 to 3 and Pin 2 to 3 (12V) TVS			Pin 3 to 1 and Pin 3 to 2 (7V) TVS			Units
			Min	Typ	Max	Min	Typ	Max	
$V_{RWM}$	Reverse Working Voltage	Pin 3 to 1 or Pin 2 to 1			12			7	V
$V_{BR}$	Reverse Breakdown Voltage	$I_T = 1\text{mA}$	13.3			7.5			V
$I_R$	Reverse Leakage Current	$V_R = V_{RWM}$			1			20	$\mu$ A
$V_{C1}$	Clamping Voltage 1	$I_{PP} = 5\text{A}$ , $t_p = 8/20\mu\text{s}$			20			12	V
$V_{C2}$	Clamping Voltage 2	$I_{PP} = 17\text{A}$ , $t_p = 8/20\mu\text{s}$			26			16	V
$C_{J1}$	Junction Capacitance 1	$V_R = 0\text{V}$ , $f = 1\text{MHz}$			75			75	pF
$C_{J2}$	Junction Capacitance 2	$V_R = V_{RWM}$ , $f = 1\text{MHz}$		45			45		pF

## ELECTRICAL CHARACTERISTICS CURVE

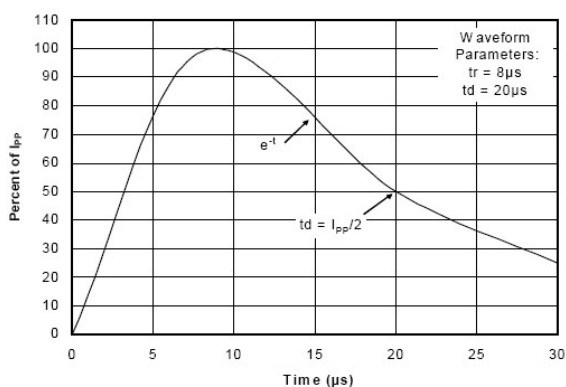
**Non-Repetitive Peak Pulse Power vs. Pulse Time**



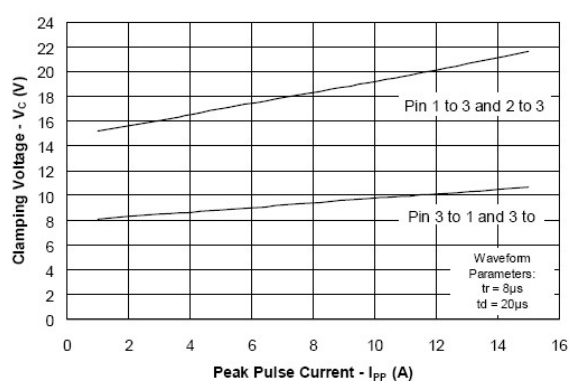
**Power Derating Curve**



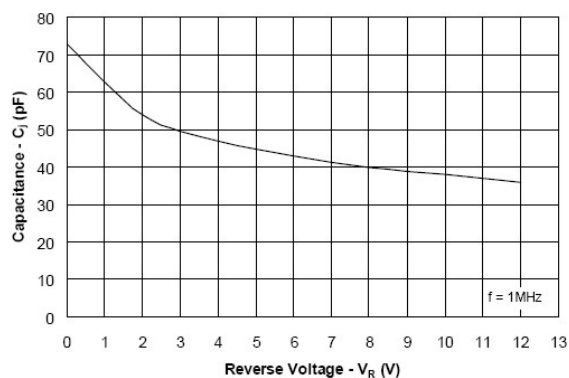
**Pulse Waveform**



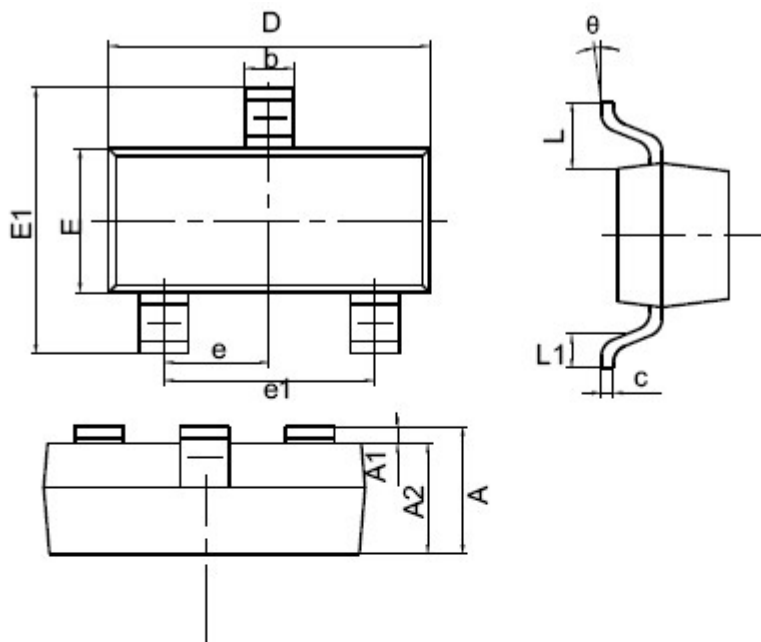
**Clamping Voltage vs. Peak Pulse Current**



**Capacitance vs. Reverse Voltage**



## SOT-23 PACKAGE OUTLINE DIMENSIONS



symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950REF.		0.037REF.	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°