

### Description

The SM712 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 pack-age. The SM712 complies with the IEC 61000-4-2 (ESD) 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.

### Features

- 325W peak pulse power (8/20us)
- 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:  $\pm 30\text{kV}$
  - IEC61000-4-5 (Lightning)
- RoHS Compliant

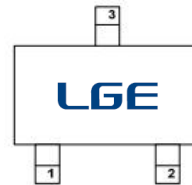
### Mechanical Characteristics

- 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

### Applications

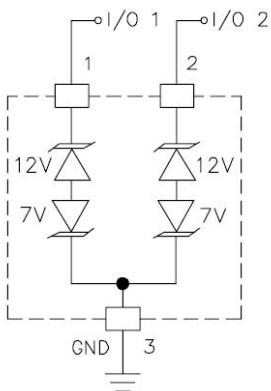
- Wireless System
- Networks
- Portable Instrumentation
- RS485 Ports

### Marking Information

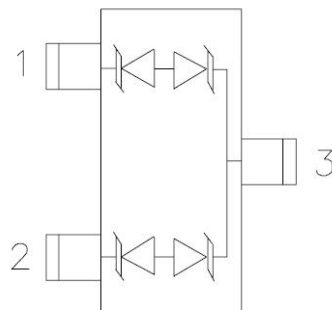


Details marking code reference specification of approval list

### Dimensions & Symbol (Unit: mm Max)



Circuit Schematic



Pin Schematic



# SM712

TVS Diode Array



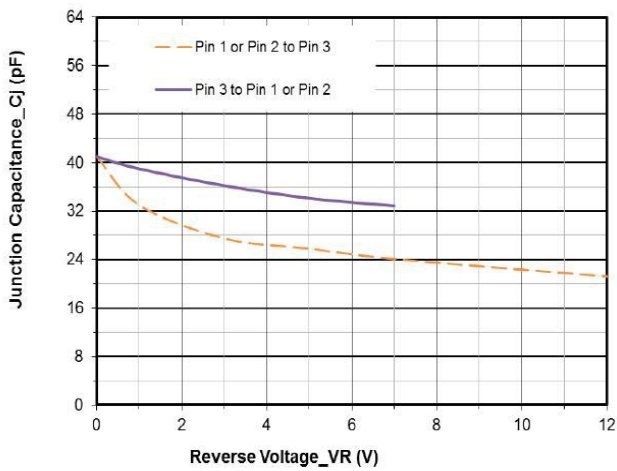
## Absolute Maximum Ratings ( $T_A=25^{\circ}\text{C}$ , RH=45%-75%, unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 $\mu\text{s}$ )	Ppk	325	W
Peak Pulse Current (8/20 $\mu\text{s}$ )	Ipp	13	A
ESD per IEC 61000-4-2 (Air)	VESD	$\pm 20$	kV
ESD per IEC 61000-4-2 (Contact)		$\pm 15$	
Operating Temperature Range	TJ	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	Tstg	-55 to +150	$^{\circ}\text{C}$

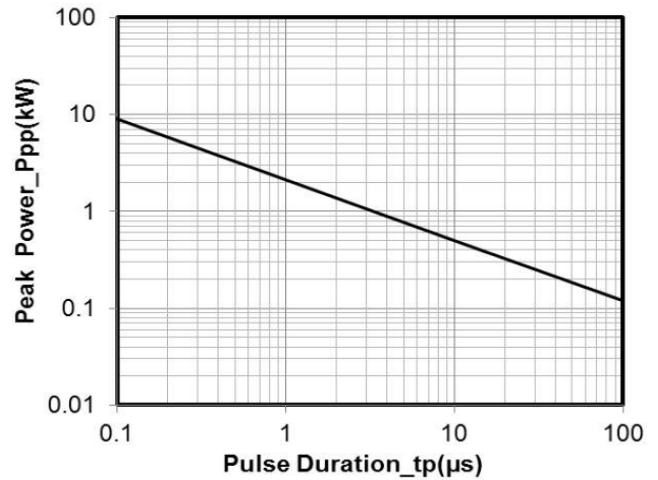
## Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ )

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	VRWM			12			7	V	
Breakdown Voltage	VBR	13.3			7.5			V	$I_T = 1\text{mA}$
Reverse Leakage Current	IR			0.05			2.0	$\mu\text{A}$	$V_R = V_{RWM}$
Clamping Voltage	VC			20			10	V	$I_{PP} = 5\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Clamping Voltage	VC			26			16	V	$I_{PP} = 13\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Junction Capacitance	CJ			75			75	pF	$V_R = 0\text{V}$ , $f = 1\text{MHz}$
Junction Capacitance	CJ		45			45		pF	$V_R = V_{RWM}$ , $f = 1\text{MHz}$

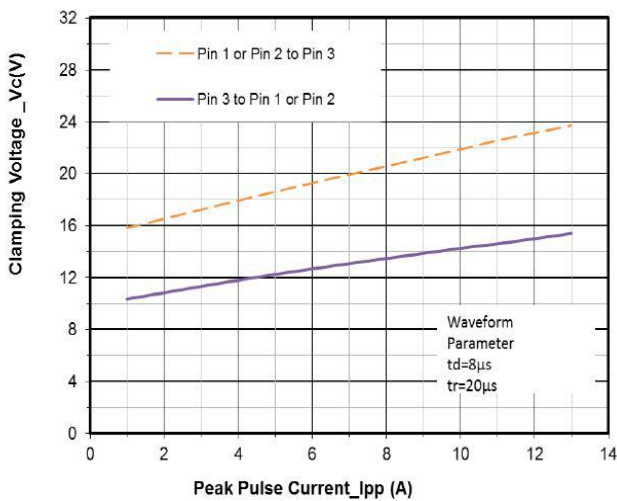
### Typical Performance Characteristics (TA=25°C unless otherwise Specified)



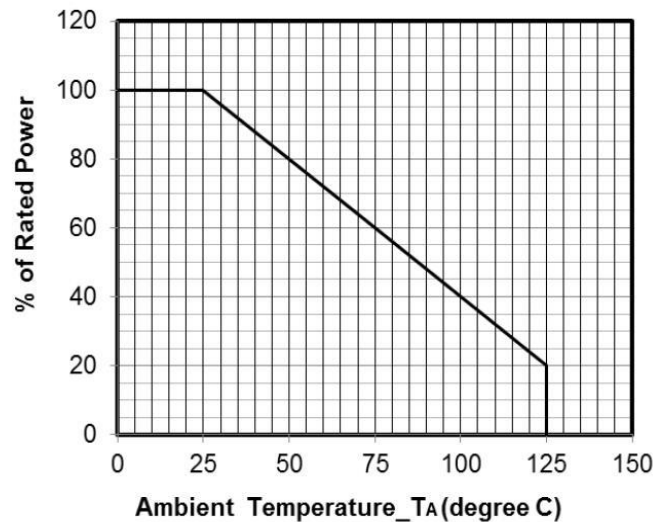
Junction Capacitance vs. Reverse Voltage



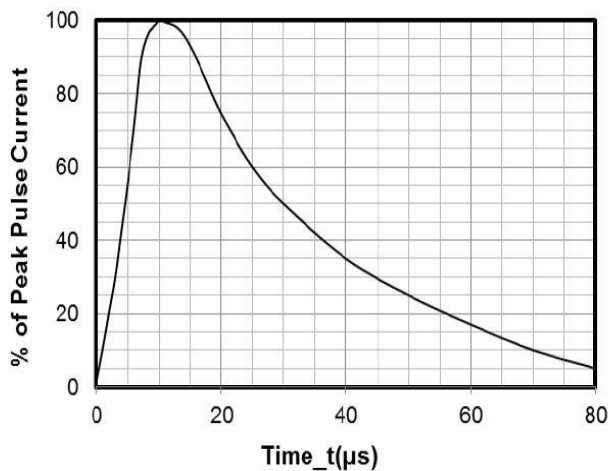
Peak Pulse Power vs. Pulse Time



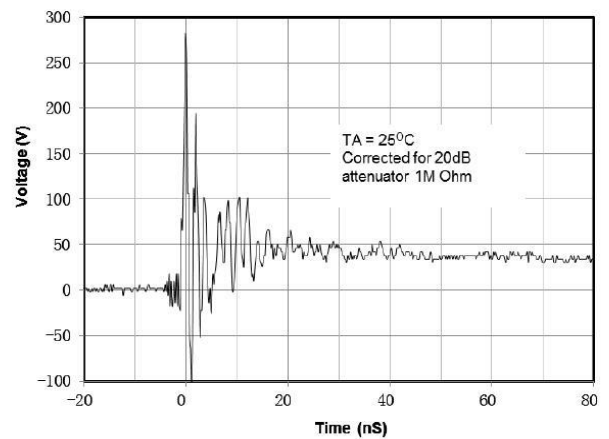
Clamping Voltage vs. Peak Pulse Current



Power Derating Curve



8 X 20μs Pulse Waveform

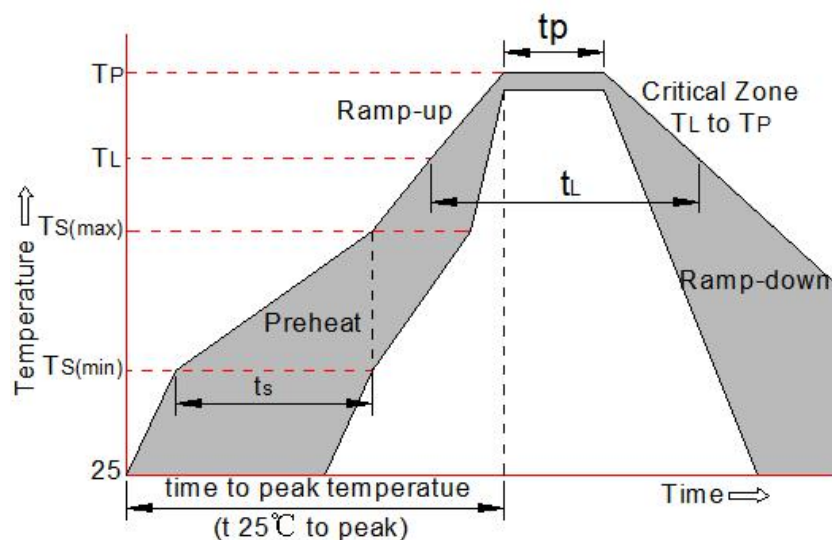


ESD Clamping Voltage

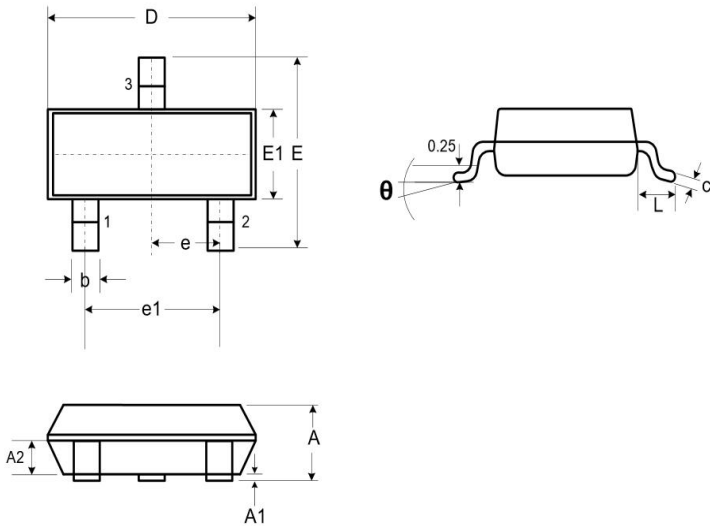
8 kV Contact per IEC61000-4-2

**Soldering Parameters**

Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) ( $t_s$ )	60-180 secs.
Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature( $T_L$ ) (Liquid us)	+217°C
	-Temperature( $t_L$ )	60-150 secs.
Peak Temp ( $T_p$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp ( $T_p$ )		8 min. Max
Do not exceed		+260°C

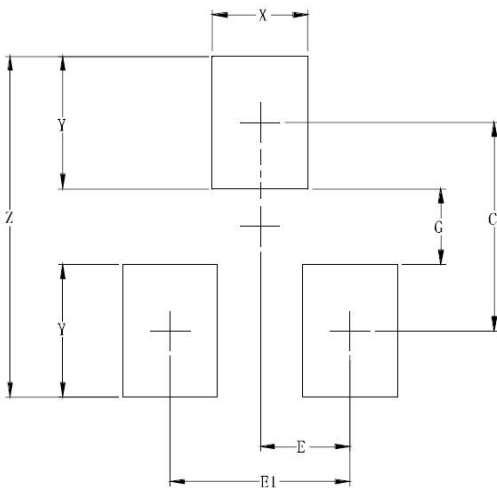


### Package Mechanical Data



SYM	DIMENSIONS					
	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.035	-	.044	0.89	-	1.12
A1	.000	-	.004	0.01	-	0.10
A2	.035	.037	.040	0.88	0.95	1.02
b	0.012	-	.020	0.30	-	0.51
c	0.03	-	.007	0.08	-	0.18
D	.110	.114	.120	2.80	2.90	3.04
E	.082	.093	.104	2.10	2.37	2.64
E1	.047	.051	.055	1.20	1.30	1.40
e	.075			1.90		
e1	.037			0.95		
L	.015	.020	.024	0.40	0.50	0.60
L1	.022			0.55		
N	3			3		
$\theta$	0°	-	8°	0°	-	8°

### Suggested Land Pattern



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
C	.087	2.20
E	.037	0.95
E1	.075	1.90
G	.031	0.80
X1	.039	1.00
Y	.055	1.40
Z	.141	3.60

Device	Package	Shipping
SM712	SOT-23	3000/Tape&Reel

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