

SM712 Series 600W Asymmetrical TVS Diode Array

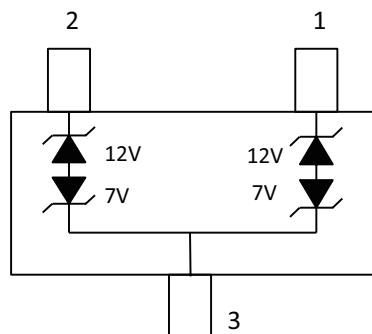


Description

The SM712 TVS Diode Array is designed to protect RS-485 applications with asymmetrical working voltages (-7V to 12V) from damage due to electrostatic discharge (ESD), electrical fast transients (EFT), and lightning induced surges.

The SM712 can absorb repetitive ESD strikes above the maximum level specified in the IEC 61000-4-2 international standard without performance degradation and safely dissipate up to 19A of 8/20us induced surge current (IEC-61000-4-5 2nd edition) with very low clamping voltages.

Pinout and Functional Block Diagram



Life Support Note:

Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

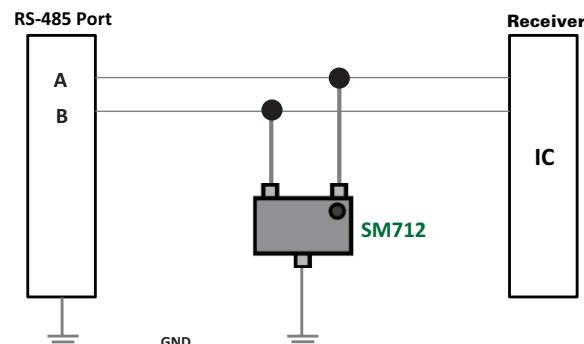
Features

- RoHS compliant and lead-free
- Working Voltages: -7V to 12V
- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- Low clamping voltage
- EFT, IEC 61000-4-4, 50A (5/50ns)
- Low leakage current
- AEC-Q101 Qualified
- Lightning, IEC 61000-4-5 2nd edition, 19A ($t_p=8/20\mu s$)
- Moisture Sensitivity Level (MSL-1)

Applications

- RS-485
- Security Systems
- Fieldbus
- Modbus
- Profibus
- DMX512
- ATMs
- Lighting Control - DALI
- Communication Equipments

RS-485 Application Example



Additional Information



Datasheet



Resources



Samples

Absolute Maximum Ratings

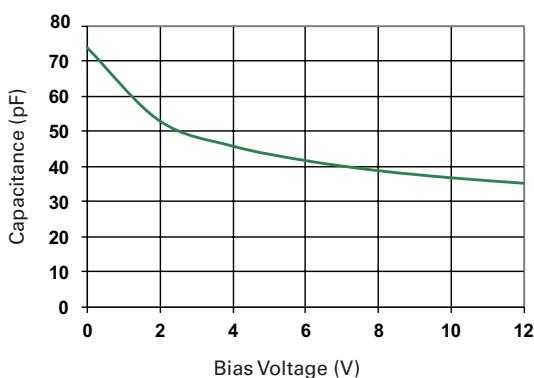
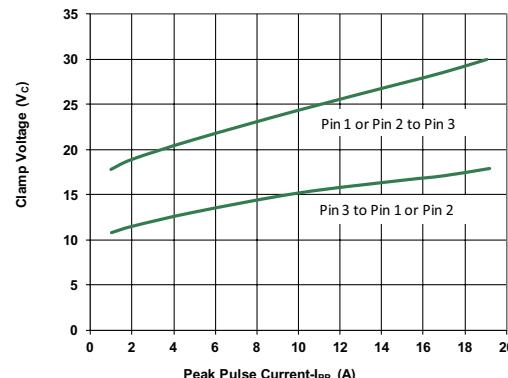
Symbol	Parameter	Value	Units
P _{pk}	Peak Pulse Power ($t_p=8/20\mu s$)	600	W
I _{pp}	Peak Pulse Current ($t_p=8/20\mu s$)	19	A
T _{OP}	Operating Temperature	-40 to 125	°C
T _{STOR}	Storage Temperature	-55 to 150	°C

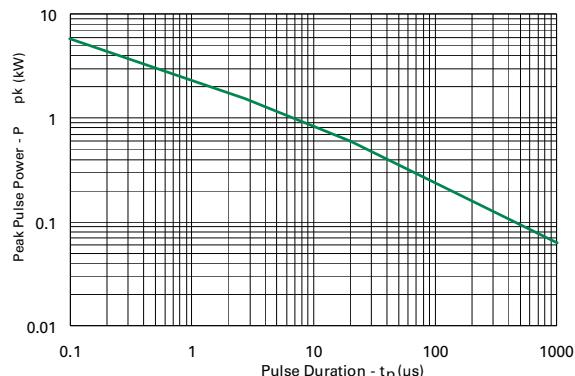
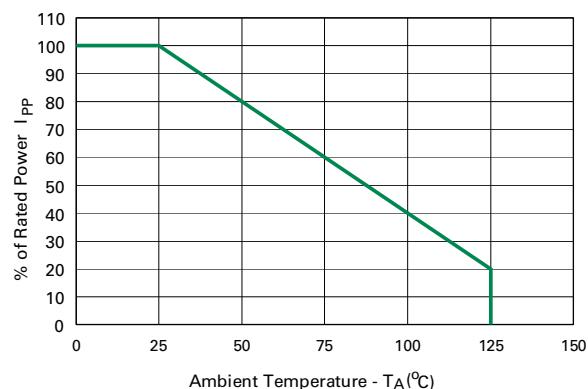
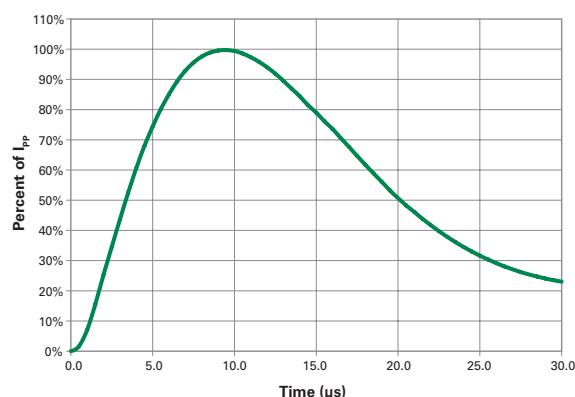
Notes:
 CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

SM712 Electrical Characteristics (T_{OP}=25°C)

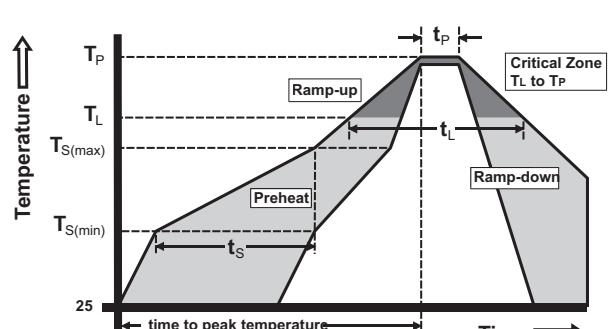
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V _{RWM}	I _R ≤1μA, Pin 3 to Pin 1 or Pin 2			7.0	V
		I _R ≤1μA, Pin 1 or Pin 2 to Pin 3			12.0	V
Reverse Breakdown Voltage	V _R	I _R =1mA, Pin 3 to Pin 1 or Pin 2	7.5			V
		I _R =1mA, Pin 1 or Pin 2 to Pin 3	13.3			V
Leakage Current	I _{LEAK}	V _R =7V			20	μA
		V _R =12V			1	μA
Clamp Voltage ¹	V _C	I _{PP} =1A, t _p =8/20μs, Pin 1 or Pin 2 to Pin 3			19	V
		I _{PP} =1A, t _p =8/20μs, Pin 3 to Pin 1 or Pin 2			11	V
		I _{PP} =19A, t _p =8/20μs, Pin 1 or Pin 2 to Pin 3			31	V
		I _{PP} =19A, t _p =8/20μs, Pin 3 to Pin 1 or Pin 2			19	V
Dynamic Resistance ¹	R _{DYN}	(V _{C2} - V _{C1}) / (I _{PP2} - I _{PP1})		0.5		Ω
ESD Withstand Voltage ¹	V _{ESD}	IEC 61000-4-2 (Contact Discharge)	±30			kV
		IEC 61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance ¹	C _{IO-GND}	Reverse Bias=0V, f=1MHz; Pin 1 or Pin 2 to Pin 3			75	pF

Notes : 1. Parameter is guaranteed by design and/or device characterization.

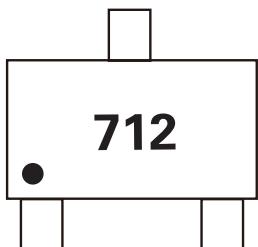
Capacitance vs. Reverse Bias

Clamping Voltage vs. I_{pp}


Non-Repetitive Peak Pulse Power vs. Pulse Time**Power Derating Curve****Pulse Waveform****Soldering Parameters**

Reflow Condition		Pb – Free assembly
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 (Liquidus) Temp (T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		260°C



Part Marking System



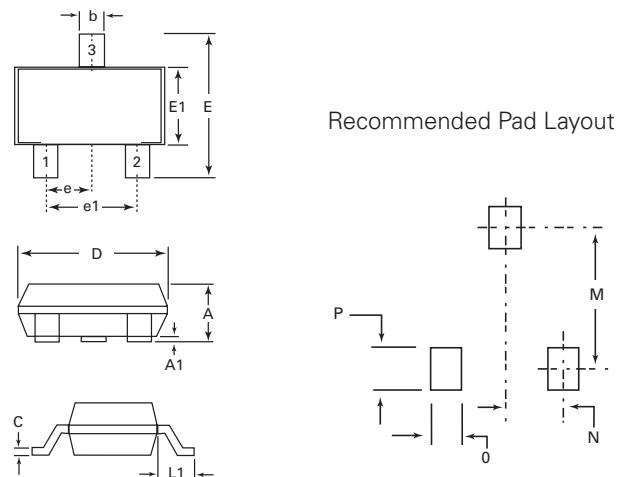
Part Numbering System

SM	712	-02	H	T	G
TVS Diode Arrays (SPA® Diodes)				G = Green	
Series _____				T = Tape & Reel	
Working Voltage _____				Package	
Number of Channels _____				H: SOT23-3	

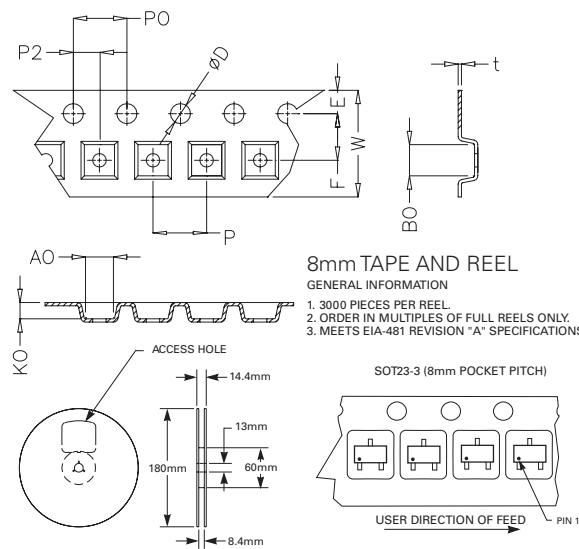
Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SM712-02HTG	SOT23-3	712	3000

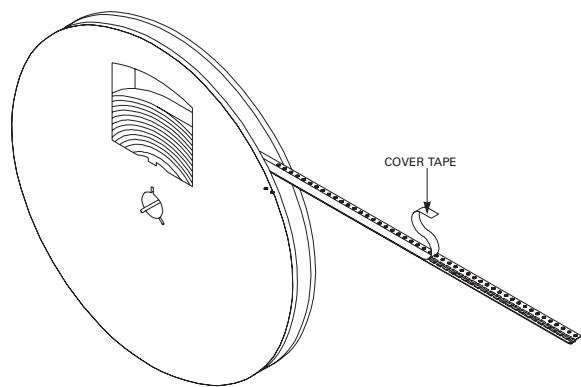
Package Dimensions – SOT23-3



Package	SOT23-3			
	Millimeters		Inches	
Pins	3			
JEDEC	TO-236			
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A1	0.01	0.1	0.0004	0.004
b	0.3	0.5	0.012	0.020
c	0.08	0.2	0.003	0.008
D	2.8	3.04	0.110	0.120
E	2.1	2.64	0.083	0.104
E1	1.2	1.4	0.047	0.055
e	0.95 BSC		0.038 BSC	
e1	1.90 BSC		0.075 BSC	
L1	0.54 REF		0.021 REF	
M	–	2.29	–	.090
N	–	0.95	–	0.038
O	–	0.78	–	.030TYP
P	–	0.78	–	.030TYP

Embossed Carrier Tape & Reel Specification – SOT23-3

Symbol	Millimetres		Inches	
	Min	Max	Min	Max
E	1.65	1.85	0.065	0.073
F	3.40	3.60	0.134	0.142
P2	1.90	2.10	0.075	0.083
D	1.40	1.60	0.055	0.063
P0	3.90	4.10	0.154	0.161
W	7.70	8.30	0.303	0.327
P	3.90	4.10	0.154	0.161
A0	3.05	3.25	0.120	0.128
B0	2.67	2.87	0.105	0.113
K0	1.12	1.32	0.044	0.052
t	0.22	0.24	0.009	0.009



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