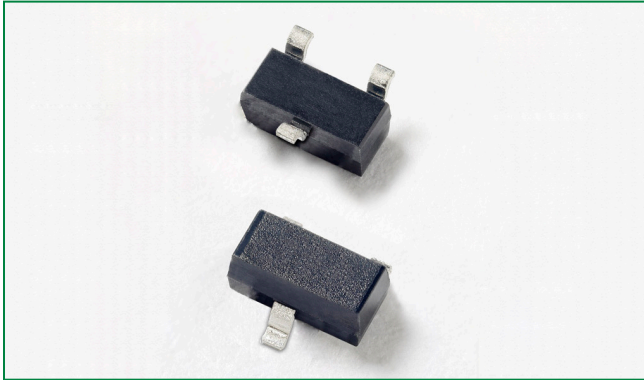


SC712-02HTG

640 W Asymmetrical TVS Diode Array, General Purpose ESD Protection

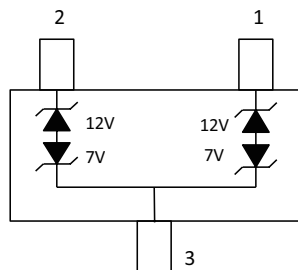
HF  

Description

The SC712-02HTG TVS Diode Array is designed to protect RS-485 applications with asymmetrical working voltages (-7 V to 12 V) from damage due to electrostatic discharge (ESD), electrical fast transients (EFT), and lightning induced surges.

The SC712-02HTG can absorb repetitive ESD strikes above the maximum level specified in IEC 61000-4-2 international standard without performance degradation and safely dissipate up to 20 A of 8/20 μ s induced surge current (IEC 61000-4-5) with very low clamping voltages.

Pinout and Functional Block Diagram



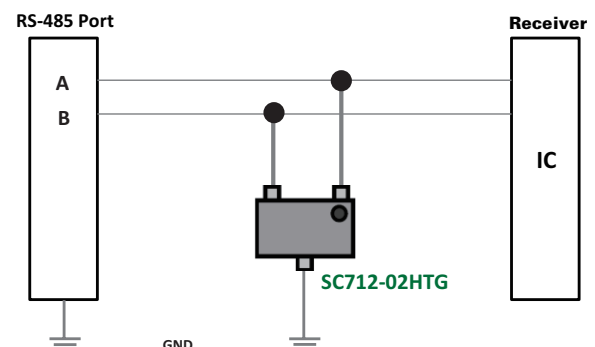
Features

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

Applications

- Automated Teller Machines (ATMs)
- Communication
- DMX512
- Equipments
- Fieldbus
- Lighting Control - DALI
- Modbus
- Profibus
- RS-485
- Security Systems

RS-485 Application Example



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.

SC712-02HTG

640 W Asymmetrical TVS Diode Array, General Purpose ESD Protection

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
P_{Pk}	Peak Pulse Power ($t_p = 8/20 \mu s$)	640	W
I_{PP}	Peak Current ($t_p = 8/20 \mu s$)	20	A
T_{OP}	Operating Temperature	-40 to 150	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

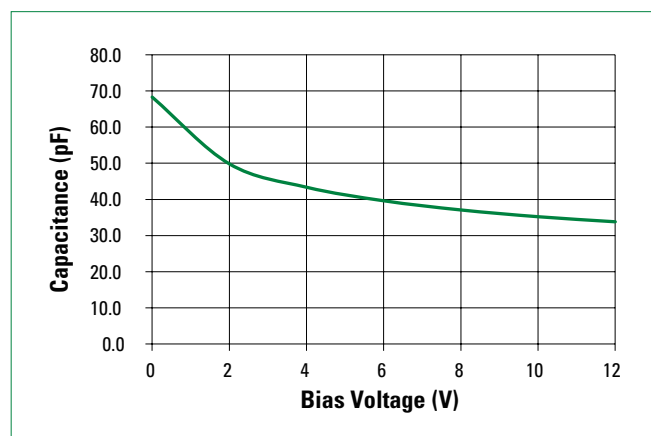
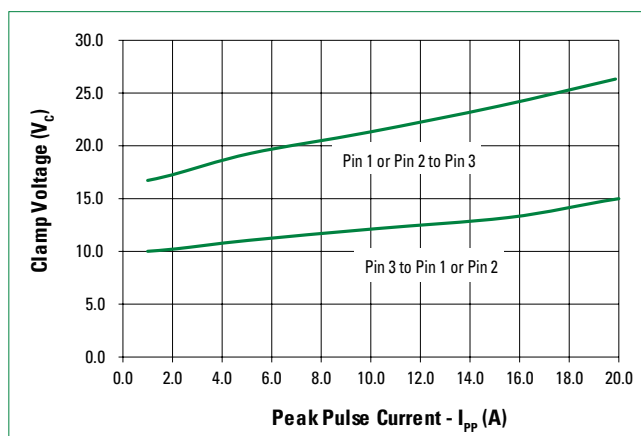
CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics ($T_{OP} = 25 \text{ }^\circ\text{C}$)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	$I_R = 1 \mu A$, Pin 3 to Pin 1 or Pin 2			7.0	V
		$I_R = 1 \mu A$, Pin 1 or Pin 2 to Pin 3			12.0	V
Breakdown Voltage	V_{BR}	$I_R = 1 \text{ mA}$, Pin 3 to Pin 1 or Pin 2	7.5	9		V
		$I_R = 1 \text{ mA}$, Pin 1 or Pin 2 to Pin 3	13.3	14.5		V
Reverse Leakage Current	I_{LEAK}	$V_R = 7V$			20	μA
		$V_R = 12V$			1	μA
Clamp Voltage ¹	V_C	$I_{PP} = 1 \text{ A}$, $t_p = 8/20 \mu s$, Pin 1 or Pin 2 to Pin 3		17	19	V
		$I_{PP} = 1 \text{ A}$, $t_p = 8/20 \mu s$, Pin 3 to Pin 1 or Pin 2		10	11	V
		$I_{PP} = 20 \text{ A}$, $t_p = 8/20 \mu s$, Pin 1 or Pin 2 to Pin 3		28	32	V
		$I_{PP} = 20 \text{ A}$, $t_p = 8/20 \mu s$, Pin 3 to Pin 1 or Pin 2		17	20	V
Dynamic Resistance ²	R_{DYN}	TLP, $t_p = 100 \text{ ns}$		0.26		Ω
ESD Withstand Voltage ³	V_{ESD}	IEC 61000-4-2 (Contact Discharge)	± 30			kV
		IEC 61000-4-2 (Air Discharge)	± 30			kV
Diode Capacitance ¹	$C_{I/O-GND}$	Reverse Bias = 0 V, $f = 1 \text{ MHz}$; Pin 1 or Pin 2 to Pin 3			75	pF

Note:

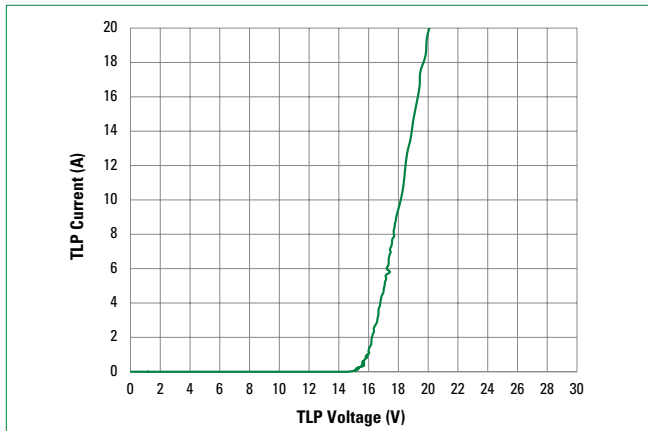
- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100 ns width, 0.2 ns rise time, and average window $t_1 = 70 \text{ ns}$ to $t_2 = 90 \text{ ns}$
- Device stressed with ten non-repetitive ESD pulses according to IEC61000-4-2 ($R = 330 \Omega$, $C = 150 \text{ pF}$).

Capacitance vs. Reverse Bias**Clamping Voltage vs I_{PP}** 

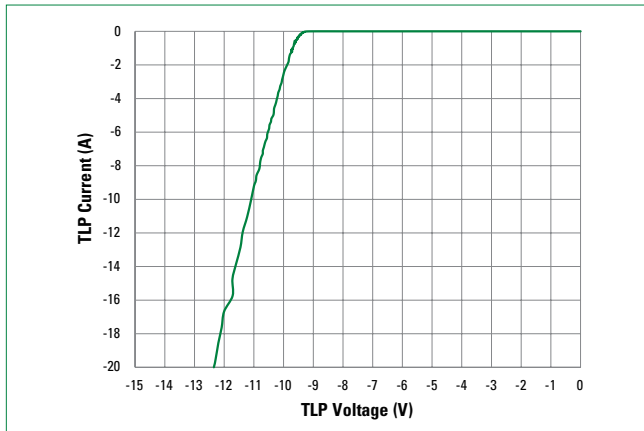
SC712-02HTG

640 W Asymmetrical TVS Diode Array, General Purpose ESD Protection

Positive Transmission Line Pulsing (TLP) Plot



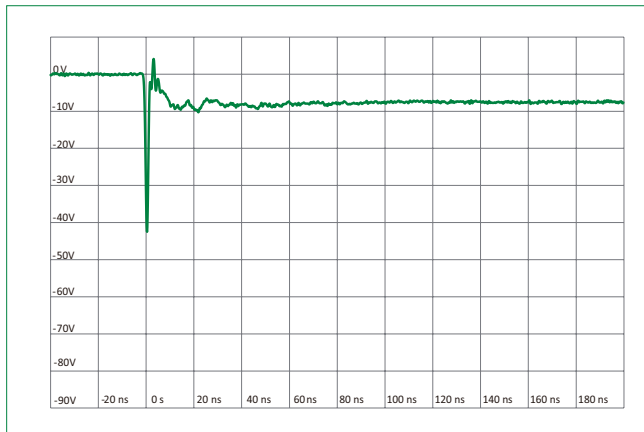
Negative Transmission Line Pulsing (TLP) Plot



IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage



IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage

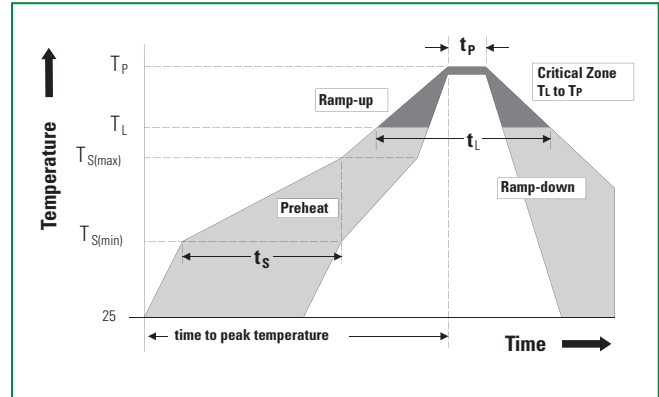


SC712-02HTG

640 W Asymmetrical TVS Diode Array, General Purpose ESD Protection

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 – 120 seconds
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)		30 seconds max
Ramp-down Rate		6 °C/second max
Time 25 °C to Peak Temperature (T_p)		8 minutes max
Do not exceed		260 °C



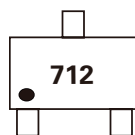
Product Characteristics

Lead Plating	Matte tin
Lead Material	Copper alloy
Lead Coplanarity	0.004 inches (0.102 mm)
Body Material	Molded compound
Flammability	UL recognized compound meeting flammability rating V-0

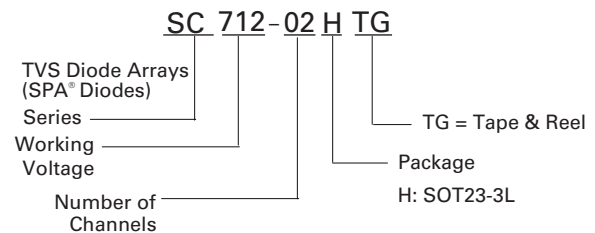
Ordering Information

Part Number	Package	Min. Order Qty.
SC712-02HTG	SOT23-3L	3000

Part Marking System



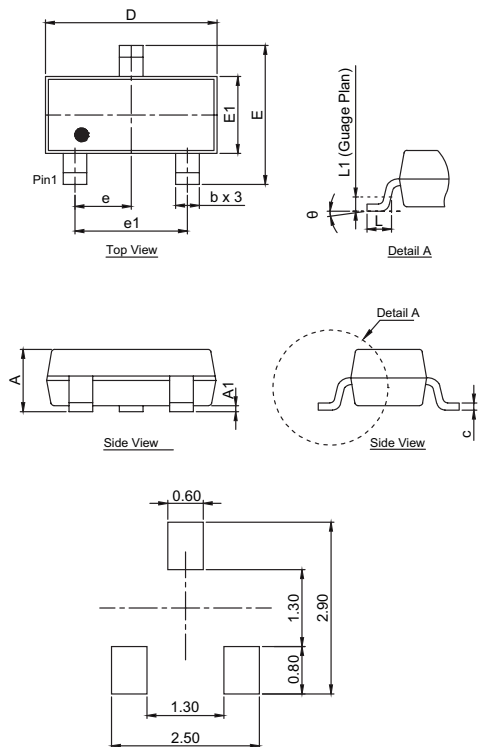
Part Numbering System



SC712-02HTG

640 W Asymmetrical TVS Diode Array, General Purpose ESD Protection

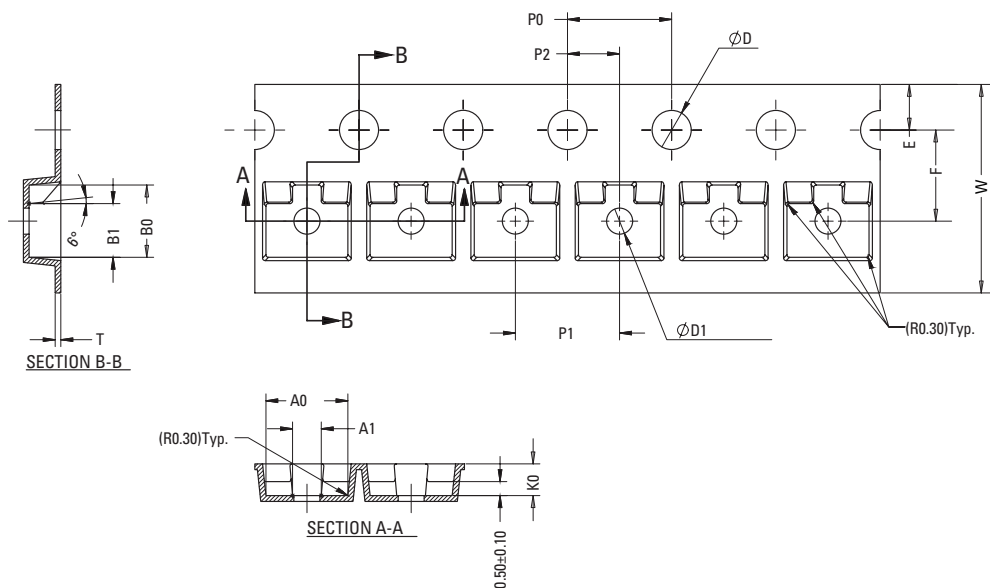
Package Dimensions - SOT23-3



Recommended soldering pad layout (unit :mm)

Package	SOT23-3			
Pins	3			
JEDEC	TO-236			
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.90	1.15	0.035	0.045
A1	0.00	0.10	0.000	0.004
b	0.30	0.51	0.012	0.020
c	0.08	0.20	0.003	0.008
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.038 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.30	0.55	0.012	0.022
L1	0.25 BSC		0.010 BSC	
θ	0°	8°	0°	8°

Embossed Carrier Tape & Reel Specification – SOT23-3



Symbol	Millimeters
A0	3.15+/-0.10
A1	0.99+/-0.20
B0	2.77+/-0.10
B1	2.06+/-0.10
D	1.50+0.10/-0.00
D1	1.00+0.25/-0.00
E	1.75+/-0.10
F	3.50+/-0.10
W	8.00+0.30/-0.10
P0	4.00+/-0.10
P1	4.00+/-0.10
P2	2.00+/-0.05
K0	1.22+/-0.10
T	0.22+/-0.04

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.