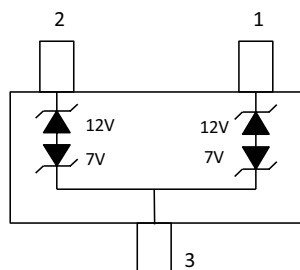


# SC712-02HTG

## 640 W Asymmetrical TVS Diode Array, General Purpose ESD Protection

HF  **Pinout and Functional Block Diagram**

### 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  $\mu$ s induced surge current (IEC 61000-4-5) with very low clamping voltages.

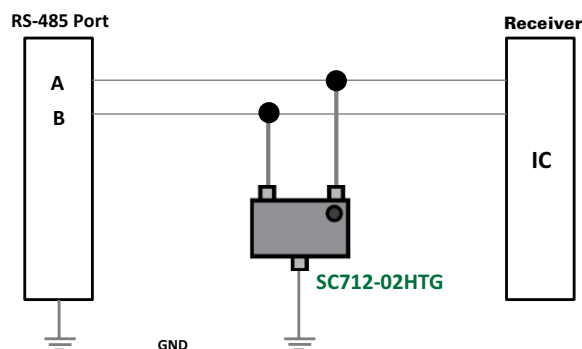
### Features

- ESD, IEC 61000-4-2,  $\pm 30$  kV contact,  $\pm 30$  kV air
- EFT, IEC 61000-4-4, 50 A (5/50 ns)
- Maximum surge tolerance, IEC 61000-4-5 2<sup>nd</sup> 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

- Communication
- 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.

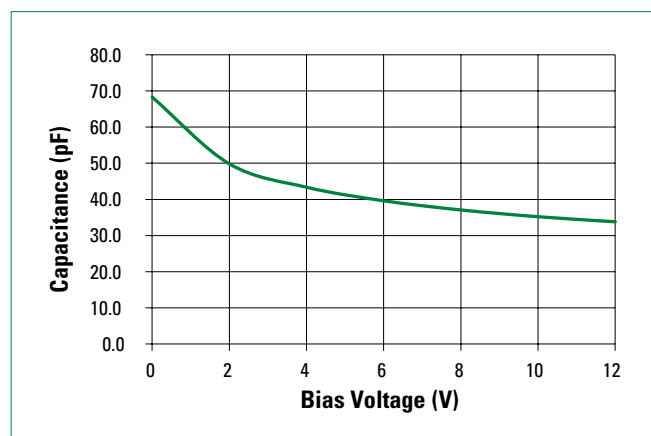
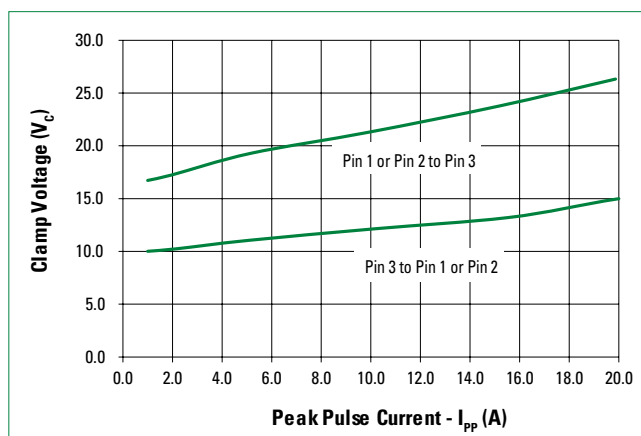
Electrical Characteristics ( $T_{OP} = 25 \text{ }^\circ\text{C}$ )

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	$\mu A$
		$V_R = 12V$			1	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP} = 1 \text{ A}$ , $t_p = 8/20 \mu s$ , 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 <sup>2</sup>	$R_{DYN}$	TLP, $t_p = 100 \text{ ns}$		0.26		$\Omega$
ESD Withstand Voltage <sup>3</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 30$			kV
		IEC 61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	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 ( $R = 330 \Omega$ ,  $C = 150 \text{ pF}$ ).

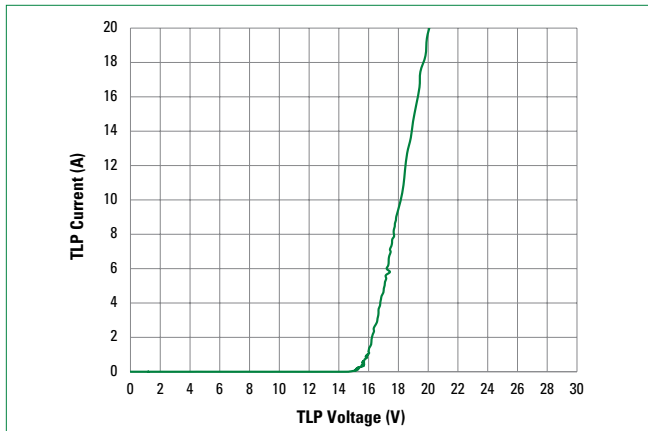
Capacitance vs. Reverse Bias

Clamping Voltage vs  $I_{PP}$ 

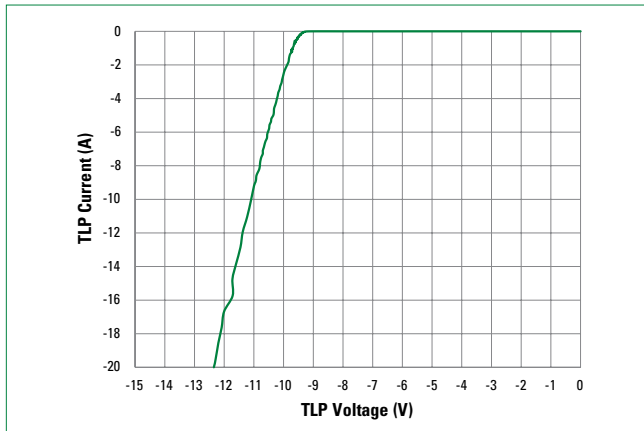
# SC712-02HTG

## 640 W Asymmetrical TVS Diode Array, General Purpose ESD Protection

Positive Transmission Line Pulsing (TLP) Plot



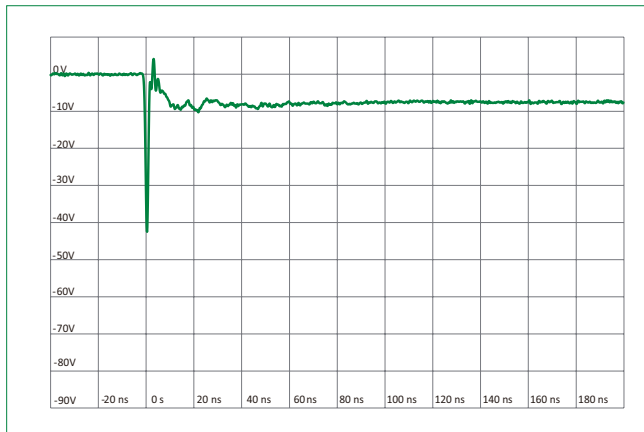
Negative Transmission Line Pulsing (TLP) Plot



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



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

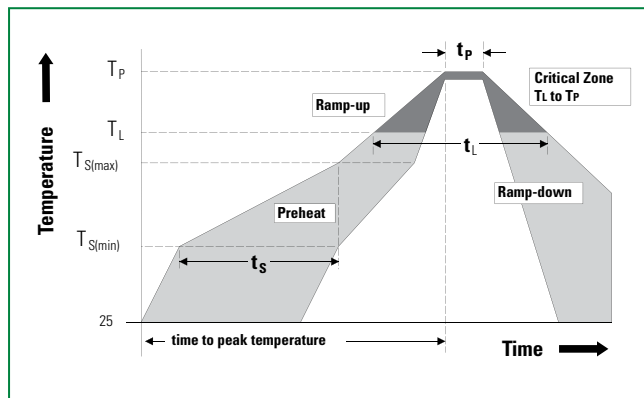


# SC712-02HTG

## 640 W Asymmetrical TVS Diode Array, General Purpose ESD Protection

### Soldering Parameters

<b>Reflow Condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150 °C
	- Temperature Max ( $T_{s(max)}$ )	200 °C
	- Time (min to max) ( $t_s$ )	60 – 120 seconds
<b>Average Ramp up Rate (Liquidus) Temp (<math>T_L</math>) to Peak</b>		3 °C/second max
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		3 °C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217 °C
	- Temperature ( $t_L$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5 °C of Actual Peak Temperature (<math>t_p</math>)</b>		30 seconds max
<b>Ramp-down Rate</b>		6 °C/second max
<b>Time 25 °C to Peak Temperature (<math>T_p</math>)</b>		8 minutes max
<b>Do not exceed</b>		260 °C



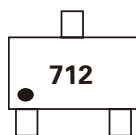
### Product Characteristics

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

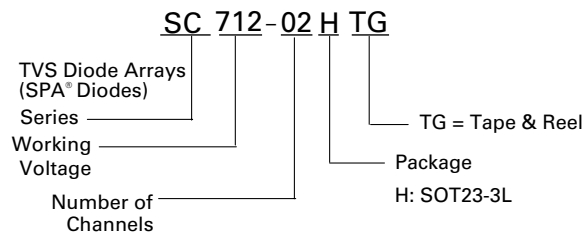
### Ordering Information

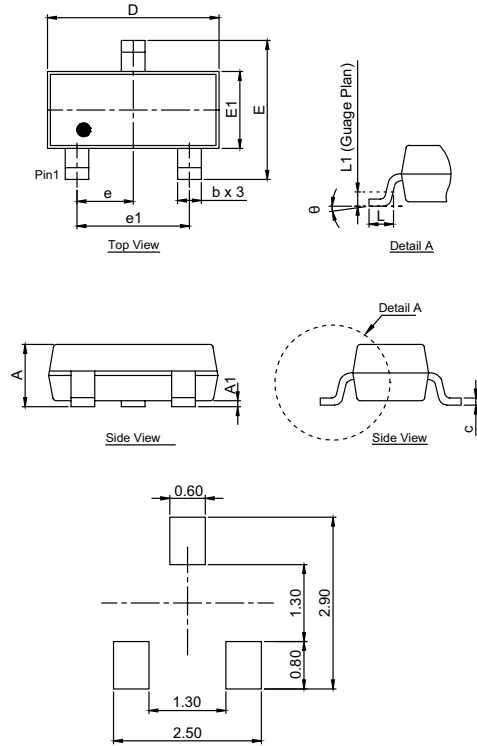
Part Number	Package	Min. Order Qty.
SC712-02HTG	SOT23-3L	3000

### Part Marking System



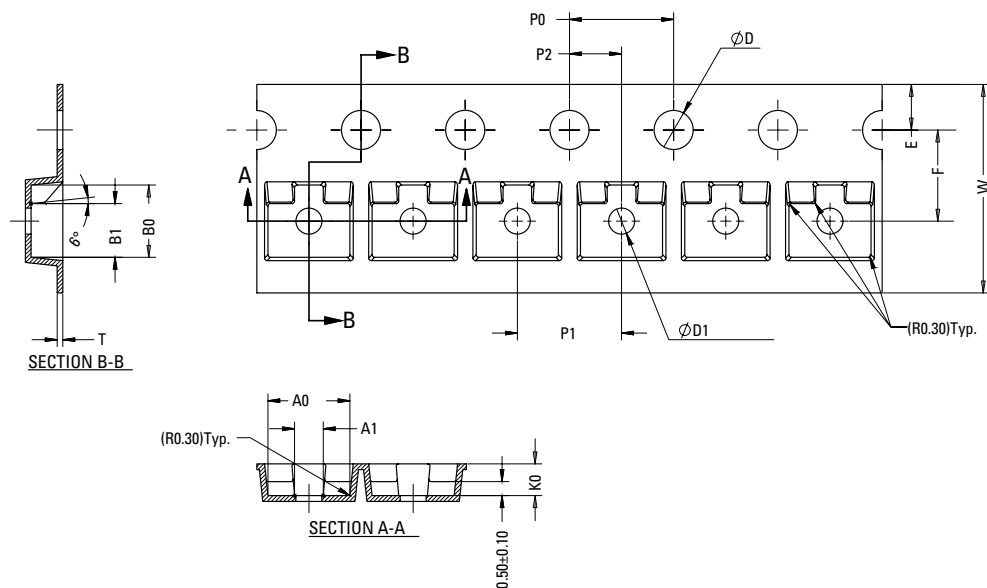
### Part Numbering System



**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	
theta	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

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