SD Series 450W Discrete Unidirectional TVS Diode

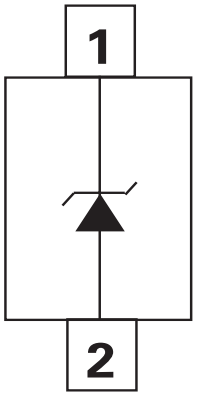
AUTOMOTIVE GRADE | RoHS | Pb | GREEN

Description

The SD series is designed to replace multilayer varistors (MLVs) in electronic equipment for low speed and DC applications. It will protect any sensitive equipment from damage due to electrostatic discharge (ESD) and other transient events.

The SD series can safely absorb repetitive ESD strikes at ±30kV (contact discharge, IEC 61000-4-2) without performance degradation and safely dissipate 30A (SD05) of 8/20μs induced surge current (IEC61000-4-5) with very low clamping voltages.

Pinout and Functional Block Diagram



Features

- ESD, IEC61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC61000-4-4, 40A (5/50ns)
- Lightning, IEC61000-4-5, 30A (t_p=8/20μs, SD05)
- Low clamping voltage
- Low leakage current
- Small SOD323 package fits 0805 footprints
- AEC-Q101 qualified

Applications

- Switches / Buttons
- Test Equipment / Instrumentation
- Point-of-Sale Terminals
- Medical Equipment
- Notebooks / Desktops / Servers
- Computer Peripherals
- Automotive Electronics

Revision: 04/15/14

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
P_{pk}	Peak Pulse Power (t_p=8/20µs)	450	W
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 device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Thermal Information

Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

SD05 Electrical Characteristics (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R≤1µA			5.0	V
Reverse Voltage Drop	V_R	I_R=1mA	6.0			V
Leakage Current	I_{LEAK}	V_R=5V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			9.8	V
		I_{PP}=10A, t_p=8/20µs, Fwd			13.0	V
Dynamic Resistance[2]	R_{DYN}	TLP, tp=100ns, I/O to Ground		0.22		Ω
Peak Pulse Current	I_{pp}	t_p=8/20µs			30.0	A
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact Discharge)	±30			kV
		IEC61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	C_D	Reverse Bias=0V, f=1MHz			350	pF

SD12 Electrical Characteristics (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R≤1µA			12.0	V
Reverse Voltage Drop	V_R	I_R=1mA	13.3			V
Leakage Current	I_{LEAK}	V_R=12V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			18.5	V
		I_{PP}=10A, t_p=8/20µs, Fwd			22.5	V
Dynamic Resistance[2]	R_{DYN}	TLP, tp=100ns, I/O to Ground		0.29		Ω
Peak Pulse Current	I_{pp}	t_p=8/20µs			17.0	A
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact Discharge)	±30			kV
		IEC61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	C_{D-GND}	Reverse Bias=0V, f=1MHz			150	pF

SD15 Electrical Characteristics (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R≤1µA			15.0	V
Reverse Voltage Drop	V_R	I_R=1mA	16.7			V
Leakage Current	I_{LEAK}	V_R=15V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			24.0	V
		I_{PP}=10A, t_p=8/20µs, Fwd			30.0	V
Dynamic Resistance[2]	R_{DYN}	TLP, tp=100ns, I/O to Ground		0.34		Ω
Peak Pulse Current	I_{pp}	t_p=8/20µs			12.0	A
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact Discharge)	±30			kV
		IEC61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V, f=1MHz			100	pF

SD24 Electrical Characteristics (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R≤1µA			24.0	V
Reverse Voltage Drop	V_R	I_R=1mA	26.7			V
Leakage Current	I_{LEAK}	V_R=24V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			36.0	V
		I_{PP}=5A, t_p=8/20µs, Fwd			42.0	V
Dynamic Resistance[2]	R_{DYN}	TLP, tp=100ns, I/O to Ground		0.49		Ω
Peak Pulse Current	I_{pp}	t_p=8/20µs			7.0	A
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact Discharge)	±30			kV
		IEC61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V, f=1MHz			65	pF

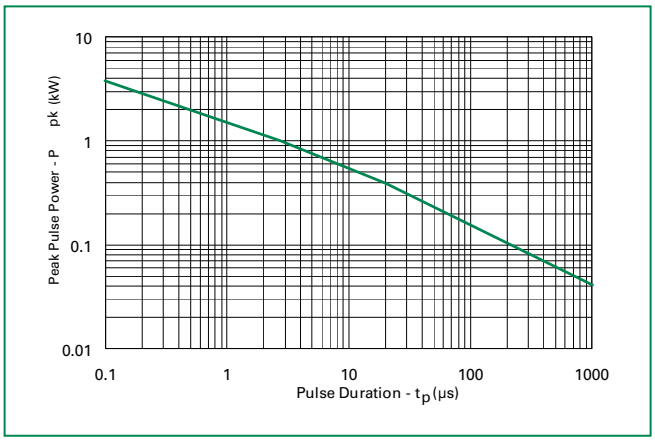
SD36 Electrical Characteristics (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R≤1µA			36.0	V
Reverse Voltage Drop	V_R	I_R=1mA	40.0			V
Leakage Current	I_{LEAK}	V_R=36V			1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd			52.0	V
		I_{PP}=4A, t_p=8/20µs, Fwd			62.0	V
Dynamic Resistance[2]	R_{DYN}	TLP, tp=100ns, I/O to Ground		0.61		Ω
Peak Pulse Current	I_{pp}	t_p=8/20µs			5.0	A
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact Discharge)	±30			kV
		IEC61000-4-2 (Air Discharge)	±30			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V, f=1MHz			50	pF

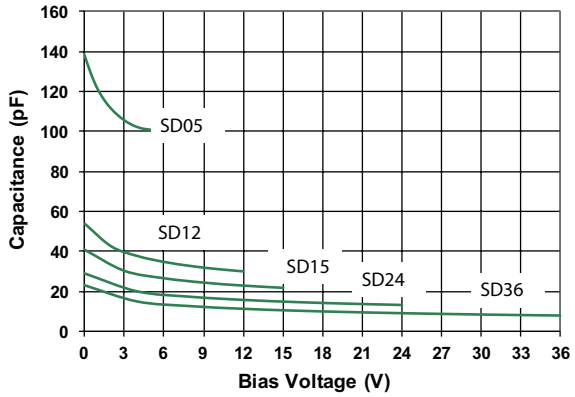
Note:
1. Parameter is guaranteed by design and/or device characterization.
2.Transmission Line Pulse (TLP) with 100ns width and 200ps rise time.

Revision: 04/14/14

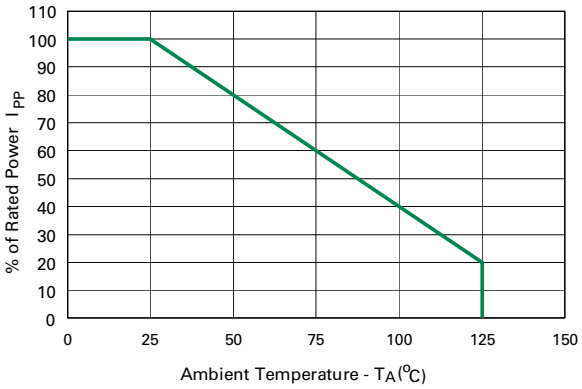
Non-Repetitive Peak Pulse Power vs. Pulse Time



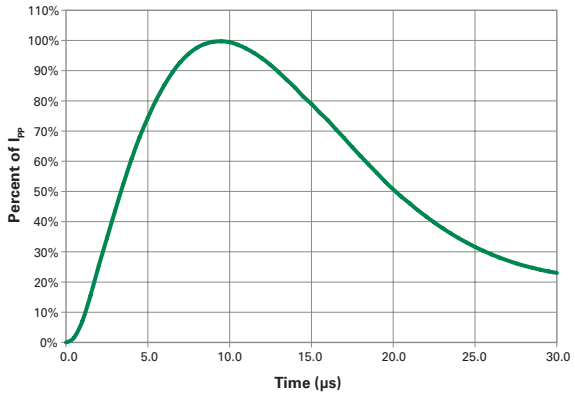
Capacitance vs. Bias



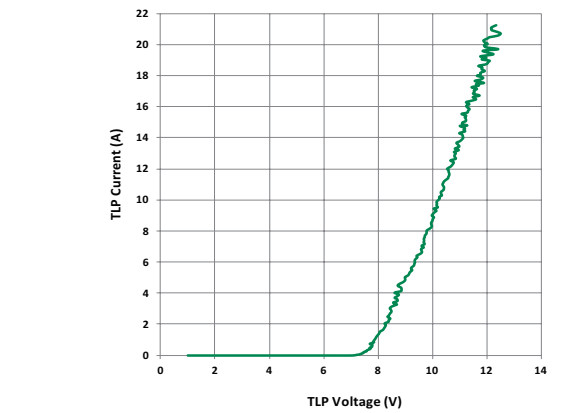
Power Derating Curve



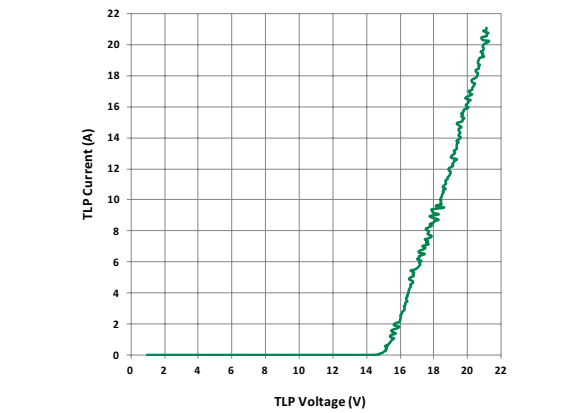
Pulse Waveform



SD05 Transmission Line Pulsing(TLP) Plot

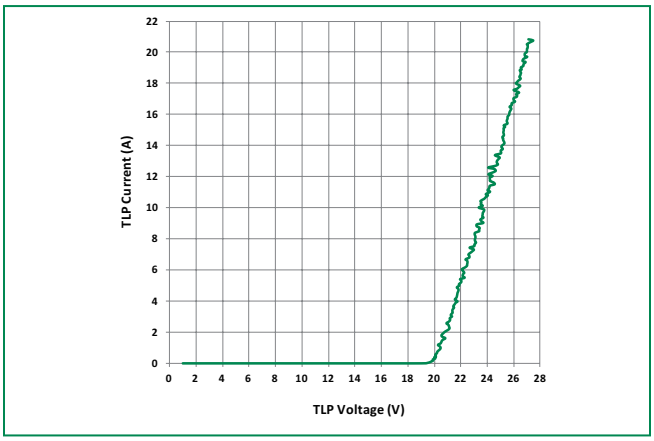


SD12 Transmission Line Pulsing(TLP) Plot

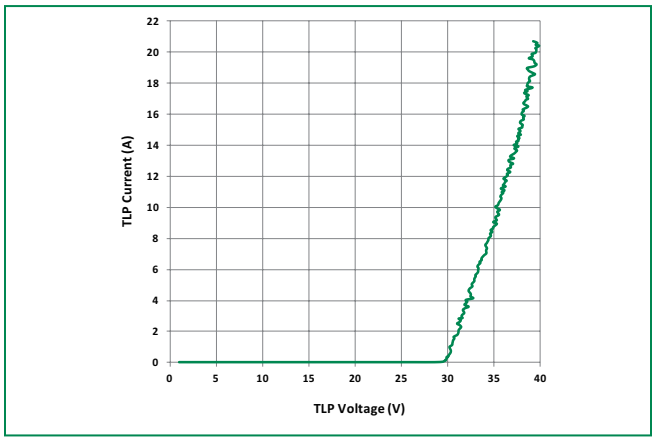


Revision: 04/14/14

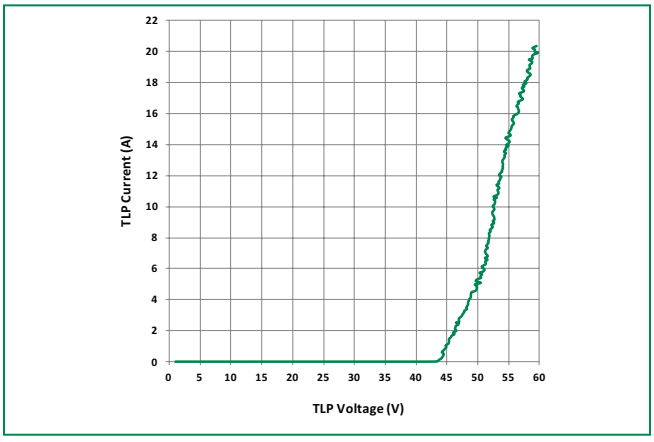
SD15 Transmission Line Pulsing(TLP) Plot



SD24 Transmission Line Pulsing(TLP) Plot

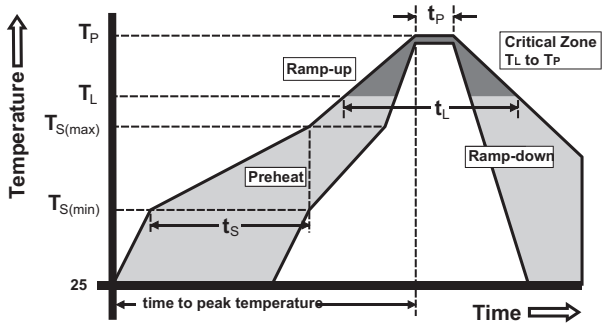


SD36 Transmission Line Pulsing(TLP) Plot



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



Product Characteristics

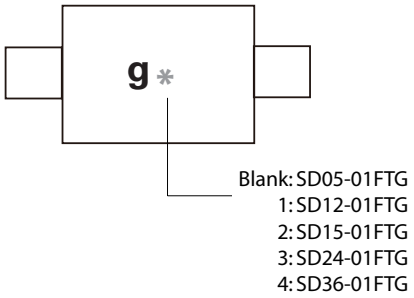
Lead Plating	Matte Tin
Lead Material	Copper Alloy
Lead Coplanarity	0.0004 inches (0.102mm)
Substrate material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

Notes :
1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.

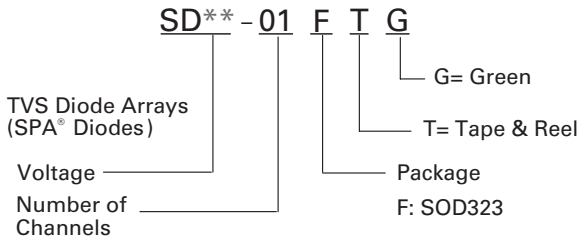
Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SD05-01FTG	SOD323	g	3000
SD12-01FTG	SOD323	g1	3000
SD15-01FTG	SOD323	g2	3000
SD24-01FTG	SOD323	g3	3000
SD36-01FTG	SOD323	g4	3000

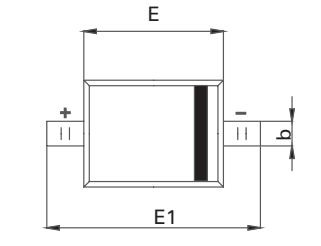
Part Marking System

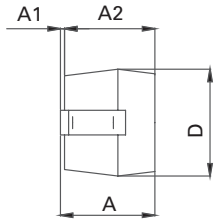


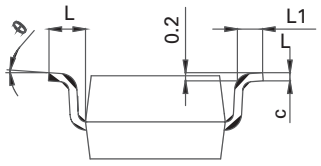
Part Numbering System

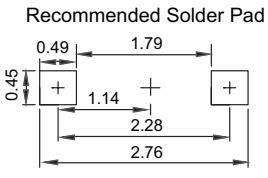


Package Dimensions -SOD323









Unit: mm

Symbol	SOD323			
	Millimeters		Inches	
	Min	Max	Min	Max
A		1.00		0.039
A1	0.00	0.10	0.000	0.004
A2	0.80	0.90	0.031	0.035
b	0.25	0.35	0.010	0.014
c	0.08	0.15	0.003	0.006
D	1.20	1.40	0.047	0.055
E	1.60	1.80	0.063	0.071
E1	2.50	2.70	0.098	0.106
L	0.475 REF		0.019 REF	
L1	0.25	0.40	0.010	0.016
Ø	0°	8°	0°	8°