Features

- Small package for use in portable electronics
- Two devices will protect one line
- Low capacitance for high-speed data lines
- Working Voltages: 5V, 12V, 15V and 24V
- Solid-state silicon avalanche technology

SOT-23

IEC Compatibility (EN61000-4)

- IEC 61000-4-2 (ESD) ±15kV (air), ±8kV (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)

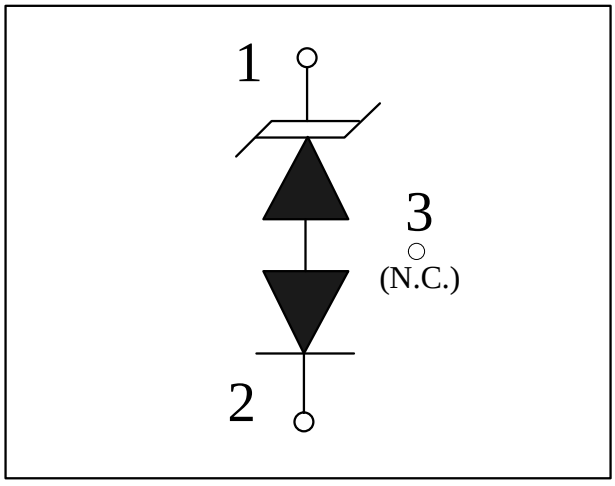
Mechanical Characteristics

- JEDEC SOT-23 package
- Molding compound flammability rating:
- UL 94V-0
- Marking : Marking Code
- Packaging : Tape and Reel per EIA 481
- RoHS Compliant

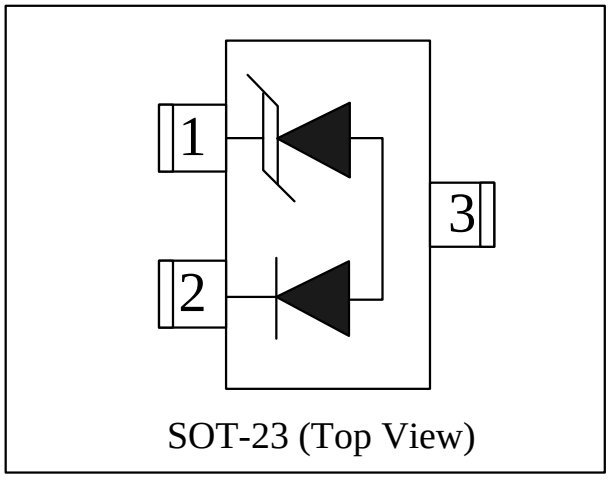
Applications

- High-speed data lines
- Cellular Handsets And Accessories
- Universal Serial Bus (USB) port protection
- Portable Electronics
- LAN/WAN equipment
- Desktop PC and Peripherals

Circuit Diagram



Schematic & PIN Configuration

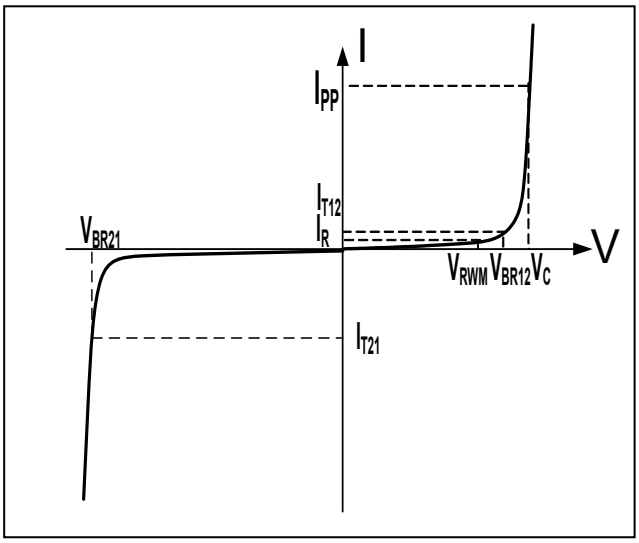


SOT-23 (Top View)

Absolute Maximum Rating			
Rating	Symbol	Value	Units
Peak Pulse Power（t_p=8/20μs）	P_{PP}	450	Watts
Lead Soldering Temperature	T_L	260(10sec)	℃
Operating Temperature	T_J	-55 to + 125	℃
Storage Temperature	T_{STG}	-55 to +150	℃

Electrical Parameters (T=25℃)

Symbol	Parameter
I_{PP}	Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Reverse Stand-Off Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR12}	Pin 1 to 2 Breakdown Voltage @ I_{T12}
I_{T12}	Pin 1 to 2 Test Current
V_{BR21}	Pin 2 to 1 Breakdown Voltage @ I_{T21}
I_{T21}	Pin 2 to 1 Test Current



Electrical Characteristics

DW05L-S						
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RWM}				5	V
Pin 1 to 2 Breakdown Voltage	V_{BR12}	I_{T12}=1mA	6			V
Pin 2 to 1 Breakdown Voltage	V_{BR21}	I_{T21}=1mA	40			V
Reverse Leakage Current	I_R	V_{RWM}=5V,T=25℃			500	nA
Peak Pulse Current	I_{PP}	t_p =8/20μs			17	A
Clamping Voltage	V_C	I_{PP}=1A,tp=8/20μs			9.8	V
Maximum Clamping Voltage	V_C	I_{PP}=17A,tp=8/20μs			18.5	V
Junction Capacitance	C_j	Pin 1 to 2 V_R = 0V, f = 1MHz		1	2	pF

Electrical Characteristics (Continued)

DW12L-S						
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RWM}				12	V
Pin 1 to 2 Breakdown Voltage	V_{BR12}	I_{T12}=1mA	13.3			V
Pin 2 to 1 Breakdown Voltage	V_{BR21}	I_{T21}=1mA	40			V
Reverse Leakage Current	I_R	V_{RWM}=12V,T=25℃			500	nA
Peak Pulse Current	I_{PP}	t_p =8/20μs			10	A
Clamping Voltage	V_C	I_{PP}=1A,tp=8/20μs			19	V
Maximum Clamping Voltage	V_C	I_{PP}=10A,tp=8/20μs			40	V
Junction Capacitance	C_j	Pin 1 to 2 V_R = 0V, f = 1MHz		1	2	pF

DW15L-S						
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RWM}				15	V
Pin 1 to 2 Breakdown Voltage	V_{BR12}	I_{T12}=1mA	16.7			V
Pin 2 to 1 Breakdown Voltage	V_{BR21}	I_{T21}=1mA	40			V
Reverse Leakage Current	I_R	V_{RWM}=15V,T=25℃			500	nA
Peak Pulse Current	I_{PP}	t_p =8/20μs			9	A
Clamping Voltage	V_C	I_{PP}=1A,tp=8/20μs			24	V
Maximum Clamping Voltage	V_C	I_{PP}=9A,tp=8/20μs			50	V
Junction Capacitance	C_j	Pin 1 to 2 V_R = 0V, f = 1MHz		1	2	pF

Electrical Characteristics (Continued)

DW24L-S						
Parameter	**Symbol**	**Conditions**	**Minimum**	**Typical**	**Maximum**	**Units**
Reverse Stand-Off Voltage	V_{RWM}				24	V
Pin 1 to 2 Breakdown Voltage	V_{BR12}	I_{T12}=1mA	26.7			V
Pin 2 to 1 Breakdown Voltage	V_{BR21}	I_{T21}=1mA	40			V
Reverse Leakage Current	I_R	V_{RWM}=24V,T=25℃			500	nA
Peak Pulse Current	I_{PP}	t_p =8/20μs			5	A
Clamping Voltage	V_C	I_{PP}=1A,tp=8/20μs			43	V
Maximum Clamping Voltage	V_C	I_{PP}=5A,tp=8/20μs			60	V
Junction Capacitance	C_j	Pin 1 to 2 V_R = 0V, f = 1MHz		1	2	pF

Typical Characteristics

Figure 1: Peak Pulse Power Vs Pulse Time

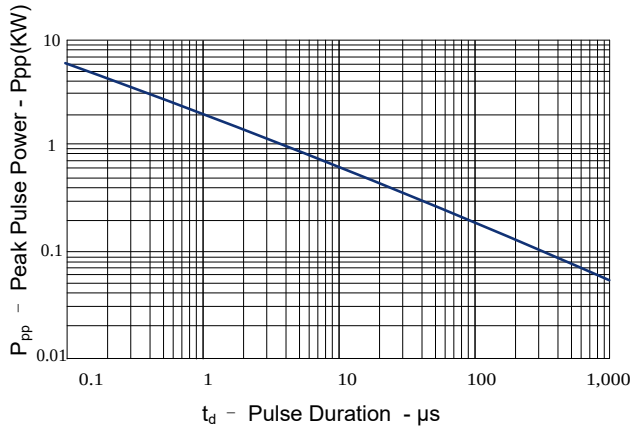


Figure 2: Power Derating Curve

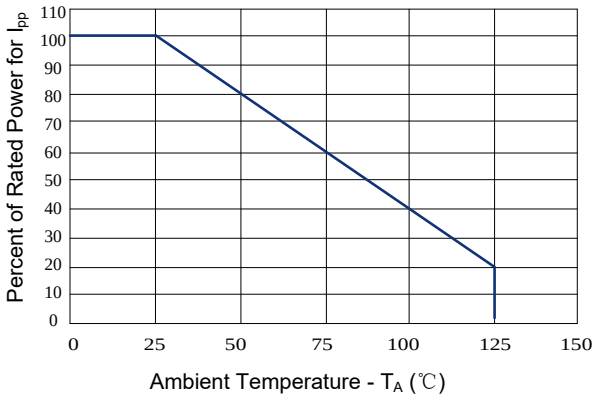


Figure 3: Pulse Waveform

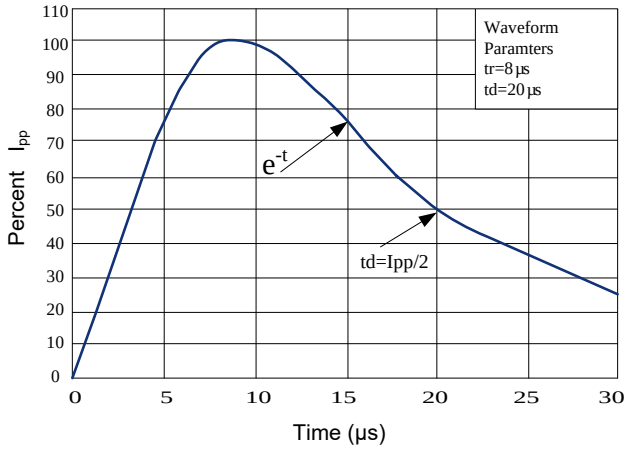
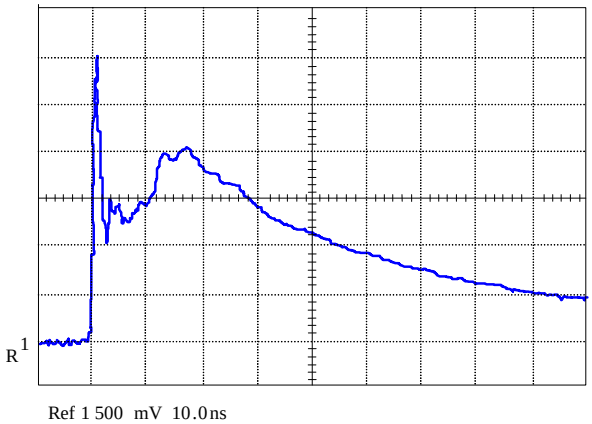


Figure 4: IEC 61000-4-2 Discharge Parameters

Level	First Peak Current (A)	Peak Current at 30 ns (A)	Peak Current at 60 ns (A)	Test Voltage (Contact Discharge) (kV)	Test Voltage (Air Discharge) (kV)
1	7.5	4	2	2	2
2	15	8	4	4	4
3	22.5	12	6	6	8
4	30	16	8	8	15

Figure 5: ESD Clamping(8kV Contact per IEC 61000-4-2)

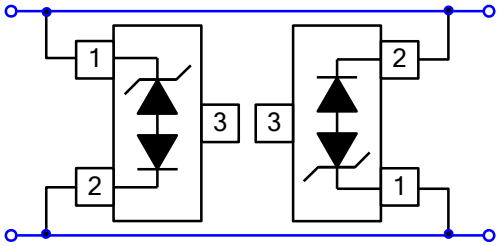


Application Information

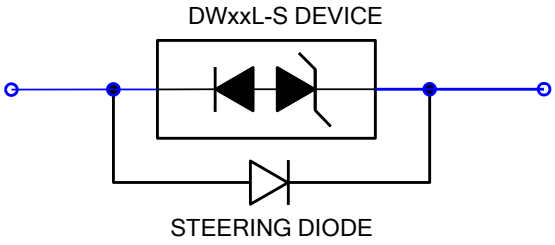
The DWxxL-S Series devices are designed to protect high speed data lines. The DWxxL-S utilizes a low capacitance compensation diode in series with, but in opposite polarity to a TVS diode in each line to achieve an effective capacitance of less than 1.5pF per device. During a transient event, the internal rectifier must be forward biased (TVS is reversed biased). Therefore, each device will only suppress transient events in one polarity. To achieve protection in both positive and negative polarity, a second device is connected in anti-parallel to the first. On unidirectional lines, a fast switching steering diode may be used as an alternative to using two DWxxL-S devices.

Protection of one unidirectional or bidirectional high-speed line is achieved by connecting two devices in anti-parallel. Pin 1 of the first device is connected to the line and pin 2 is connected to ground (or to a second line for differential protection). Pin 2 of the second device is connected to line 1 and pin 1 is connected to ground (or line 2) as shown. Pin 3 is not connected.

An alternative solution to protect unidirectional lines, is to connect a fast switching steering diode in parallel with the DWxxL-S Series device. When the steering diode is forward-biased, the TVS will avalanche and conduct in reverse direction. It is important to note that by adding a steering diode, the effective capacitance in the circuit will be increased, therefore the impact of adding a steering diode must be taken in consideration to establish whether the incremental capacitance will affect the circuit functionality or not.

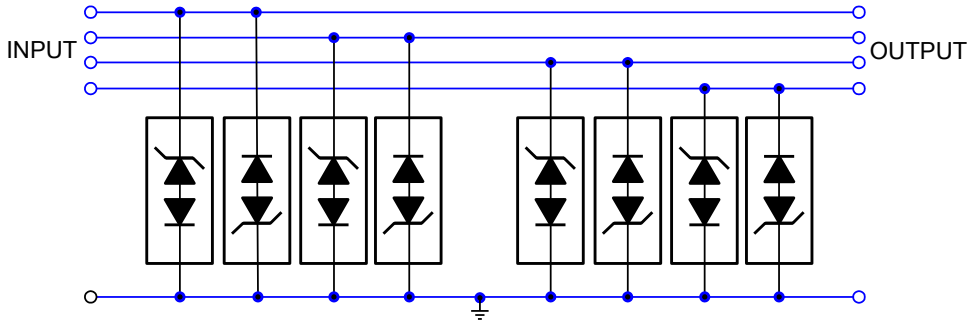


Two Devices: Bidirectional or Unidirectional



One Device: Unidirectional Line

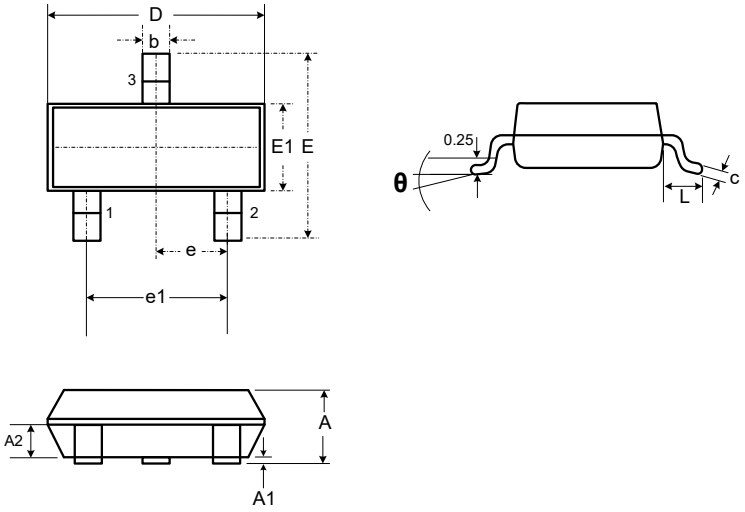
Another typical application, in which the DWxxL-S Series device can be utilized, is to protect multiple I/O lines. The protection in each of the I/O lines is achieved by connecting two devices inverse-parallel

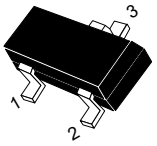


I/O Line Protection

Outline Drawing – SOT-23

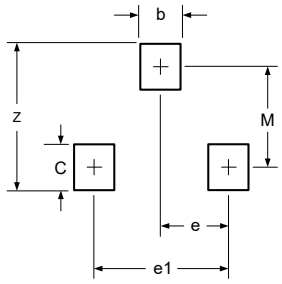
PACKAGE OUTLINE





SOT-23

DIMENSIONS				
SYMBOL	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.15	0.035	0.045
A1	0.00	0.10	0.000	0.004
A2	0.60	0.70	0.0236	0.0275
b	0.30	0.50	0.012	0.020
c	0.08	0.15	0.003	0.006
D	2.80	3.00	0.110	0.118
E	2.25	2.55	0.089	0.100
E1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 BSC	
e1	1.80	2.00	0.071	0.079
L	0.30	0.50	0.012	0.020
θ	0	8°	0	8°



DIMENSIONS		
DIM	INCHES	MILLIMETERS
M	0.0795	2.02
C	0.0315	0.80
Z	0.111	2.82
e	0.037 BSC	0.95 BSC
e1	0.075 BSC	1.9 BSC
b	0.0315	0.80

Notes

1. Dimensioning and tolerances per ANSI Y14.5M, 1985.
2. Controlling Dimension: Inches
3. Pin 3 is the cathode (Unidirectional Only).
4. Dimensions are exclusive of mold flash and metal burrs.

Marking Codes

Part Number	DW05L-S	DW12L-S	DW15L-S	DW24L-S
Marking Code	L05	L12	L15	L24

Package Information

Qty：3k/Reel