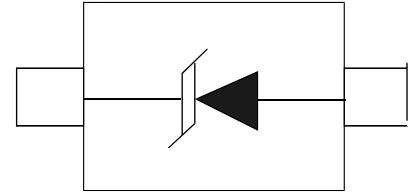


General description

Unidirectional ESD protection diode in a SOD523 plastic package designed to protect one transmission or data line from the damage caused by ESD (ElectroStatic Discharge) and other transients.



Features

- Unidirectional ESD protection of one line
- Max. peak pulse power: $P_{PP} = 330 \text{ W}$ at $t_p = 8/20 \mu\text{s}$
- Low clamping voltage: $V_{CL} = 20 \text{ V}$ at $I_{PP} = 18 \text{ A}$
- Ultra low leakage current: $I_{RM} < 700 \text{ nA}$
- ESD protection $> 23 \text{ kV}$
- IEC 61000-4-2, level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 18 \text{ A}$ at $t_p = 8/20 \mu\text{s}$

Applications

- Computers and peripherals
- Communication systems
- Audio and video equipment
- Data lines
- CAN bus protection

Quick reference data

Quick reference data

Symbol	Parameter	Conditions	Value	Unit
V_{RWM}	reverse standoff voltage			
	PESD3V3S1UB		3.3	V
	PESD5V0S1UB		5	V
	PESD12VS1UB		12	V
	PESD15VS1UB		15	V
	PESD24VS1UB		24	V

Quick reference data ...continued

Symbol	Parameter	Conditions	Value	Unit
C _d	diode capacitance	V _R = 0 V; f = 1 MHz		
	PESD3V3S1UB		207	pF
	PESD5V0S1UB		152	pF
	PESD12VS1UB		38	pF
	PESD15VS1UB		32	pF
	PESD24VS1UB		23	pF
	number of protected lines		1	

Limiting values
Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
P _{PP}	peak pulse power	8/20 μs	[1]			
	PESD3V3S1UB			-	330	W
	PESD5V0S1UB			-	260	W
	PESD12VS1UB			-	180	W
	PESD15VS1UB			-	160	W
	PESD24VS1UB			-	160	W
I _{PP}	peak pulse current	8/20 μs	[1]			
	PESD3V3S1UB			-	18	A
	PESD5V0S1UB			-	15	A
	PESD12VS1UB			-	5	A
	PESD15VS1UB			-	5	A
	PESD24VS1UB			-	3	A
T _j	junction temperature			-	150	°C
T _{amb}	operating ambient temperature			-65	+150	°C
T _{stg}	storage temperature			-65	+150	°C

[1] Non-repetitive current pulse 8/20 μs exponentially decay waveform; see Figure 1.

ESD maximum ratings

Symbol	Parameter	Conditions	Min	Max	Unit
ESD	electrostatic discharge capability	IEC 61000-4-2 (contact discharge)	[1]		
	PESD3V3S1UB		-	30	kV
	PESD5V0S1UB		-	30	kV
	PESD12VS1UB		-	30	kV
	PESD15VS1UB		-	30	kV
	PESD24VS1UB		-	23	kV
	PESDxS1UB series	HBM MIL-STD883	-	10	kV

[1] Device stressed with ten non-repetitive ElectroStatic Discharge (ESD) pulses; see Figure 2.

ESD standards compliance

Standard	Conditions
IEC 61000-4-2, level 4 (ESD)	> 15 kV (air); > 8 kV (contact)
HBM MIL-STD883, class 3	> 4 kV

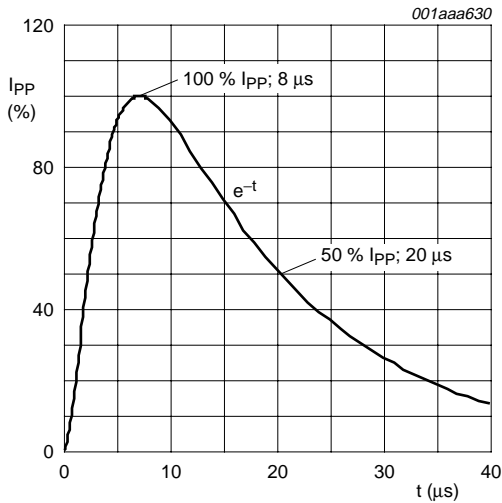


Fig 1. 8/20 μ s pulse waveform according to IEC 61000-4-5

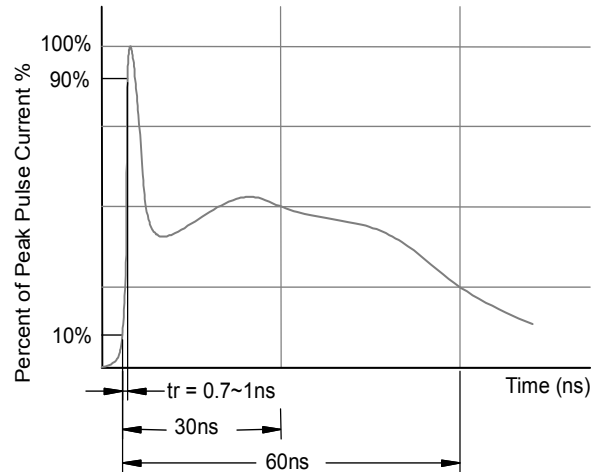


Fig 2. ElectroStatic Discharge (ESD) pulse waveform according to IEC 61000-4-2

Characteristics

Characteristics

T_{amb} = 25 °C unless otherwise specified

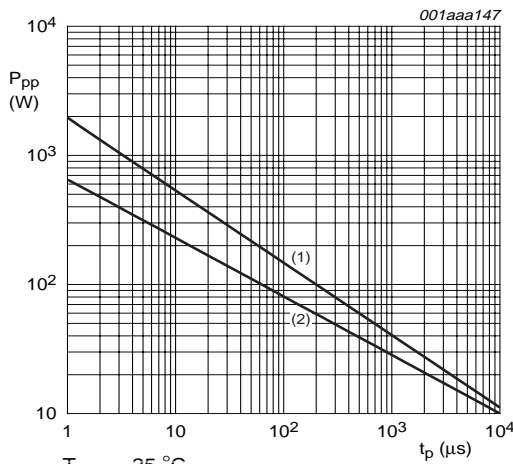
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{RWM}	reverse standoff voltage					
	PESD3V3S1UB		-	-	3.3	V
	PESD5V0S1UB		-	-	5	V
	PESD12VS1UB		-	-	12	V
	PESD15VS1UB		-	-	15	V
	PESD24VS1UB		-	-	24	V
I _{RM}	reverse leakage current	see Figure 7				
	PESD3V3S1UB	V _{RWM} = 3.3 V	-	0.7	2	μA
	PESD5V0S1UB	V _{RWM} = 5 V	-	0.1	1	μA
	PESD12VS1UB	V _{RWM} = 12 V	-	< 1	50	nA
	PESD15VS1UB	V _{RWM} = 15 V	-	< 1	50	nA
	PESD24VS1UB	V _{RWM} = 24 V	-	< 1	50	nA
V _{BR}	breakdown voltage	I _R = 5 mA				
	PESD3V3S1UB		5.2	5.6	6.0	V
	PESD5V0S1UB		6.4	6.8	7.2	V
	PESD12VS1UB		14.7	15.0	15.3	V
	PESD15VS1UB		17.6	18.0	18.4	V
	PESD24VS1UB		26.5	27.0	27.5	V
C _d	diode capacitance	V _R = 0 V; f = 1 MHz; see Figure 5 and 6				
	PESD3V3S1UB		-	207	300	pF
	PESD5V0S1UB		-	152	200	pF
	PESD12VS1UB		-	38	75	pF
	PESD15VS1UB		-	32	70	pF
	PESD24VS1UB		-	23	50	pF
V _(CLR)	clamping voltage		[1]			
	PESD3V3S1UB	I _{PP} = 1 A	-	-	7	V
		I _{PP} = 18 A	-	-	20	V
	PESD5V0S1UB	I _{PP} = 1 A	-	-	9	V
		I _{PP} = 15 A	-	-	20	V
	PESD12VS1UB	I _{PP} = 1 A	-	-	19	V
		I _{PP} = 5 A	-	-	35	V
	PESD15VS1UB	I _{PP} = 1 A	-	-	23	V
		I _{PP} = 5 A	-	-	40	V
	PESD24VS1UB	I _{PP} = 1 A	-	-	36	V
I _{PP} = 3 A		-	-	70	V	

Characteristics...continued

$T_{amb} = 25\text{ °C}$ unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R_{diff}	differential resistance					
	PESD3V3S1UB	$I_R = 1\text{ mA}$	-	-	400	Ω
	PESD5V0S1UB	$I_R = 1\text{ mA}$	-	-	80	Ω
	PESD12VS1UB	$I_R = 1\text{ mA}$	-	-	200	Ω
	PESD15VS1UB	$I_R = 1\text{ mA}$	-	-	225	Ω
	PESD24VS1UB	$I_R = 0.5\text{ mA}$	-	-	300	Ω

[1] Non-repetitive current pulse 8/20 μs exponentially decay waveform; see Figure 1.



$t_p = 8/20\text{ }\mu\text{s}$ exponentially decay waveform, see Figure 1

- (1) PESD3V3S1UB and PESD5V0S1UB
- (2) PESD12VS1UB, PESD15VS1UB; PESD24VS1UB

Fig 3. Peak pulse power dissipation as a function of pulse time; typical values

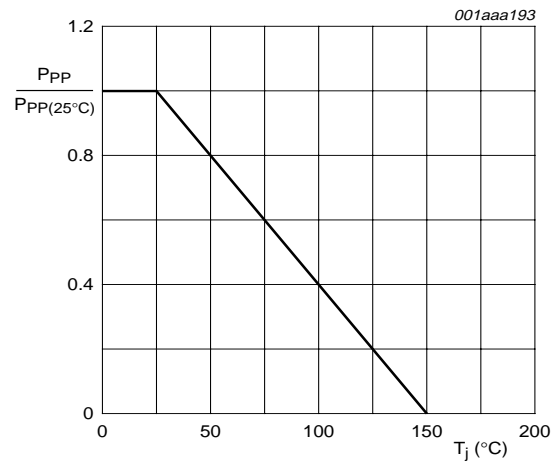
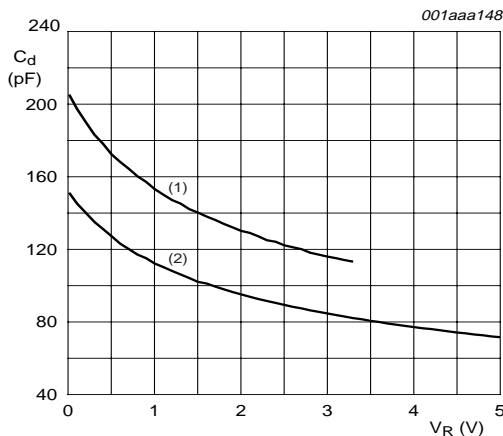


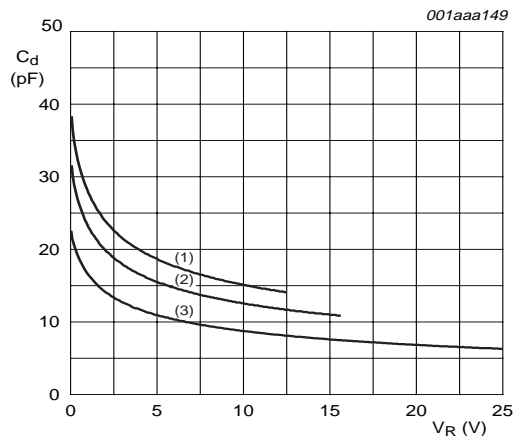
Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values



$f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$

- (1) PESD3V3S1UB
- (2) PESD5V0S1UB

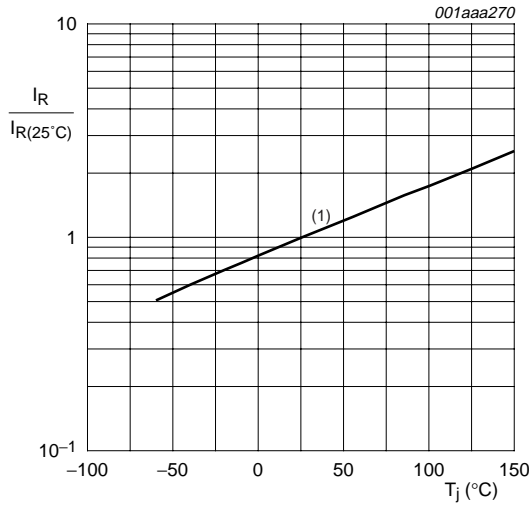
Fig 5. Diode capacitance as a function of reverse voltage; typical values



$f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$

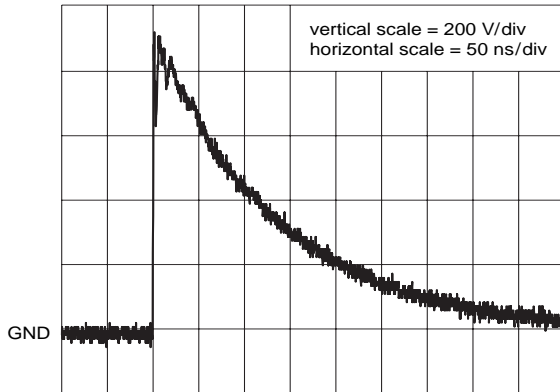
- (1) PESD12VS1UB
- (2) PESD15VS1UB
- (3) PESD24VS1UB

Fig 6. Diode capacitance as a function of reverse voltage; typical values

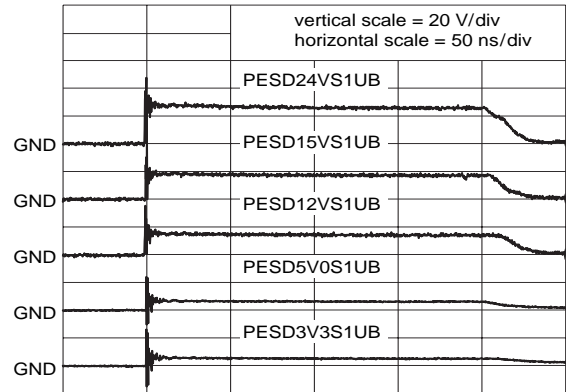


- (1) PESD3V3S1UB; $V_{RWM} = 3.3$ V
 PESD5V0S1UB; $V_{RWM} = 5$ V
 I_R is less than 10 nA at 150 °C for:
 PESD12VS1UB; $V_{RWM} = 12$ V
 PESD15VS1UB; $V_{RWM} = 15$ V
 PESD24VS1UB; $V_{RWM} = 24$ V

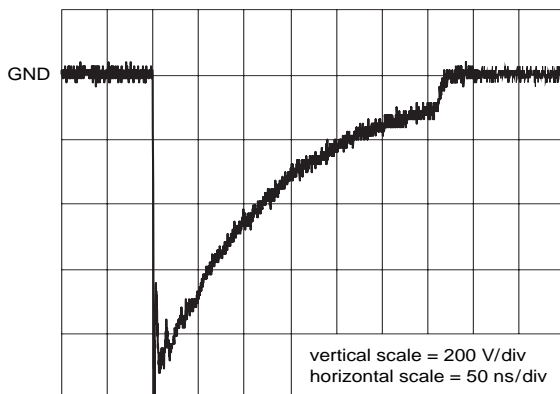
Fig 7. Relative variation of reverse leakage current as a function of junction temperature; typical values



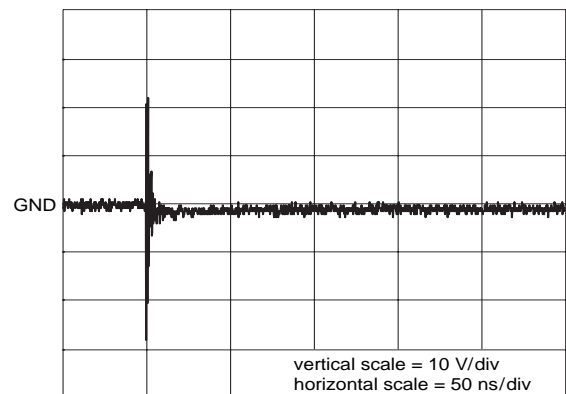
unclamped +1 kV ESD voltage waveform
(IEC61000-4-2 network)



clamped +1 kV ESD voltage waveform
(IEC61000-4-2 network)



unclamped -1 kV ESD voltage waveform
(IEC61000-4-2 network)

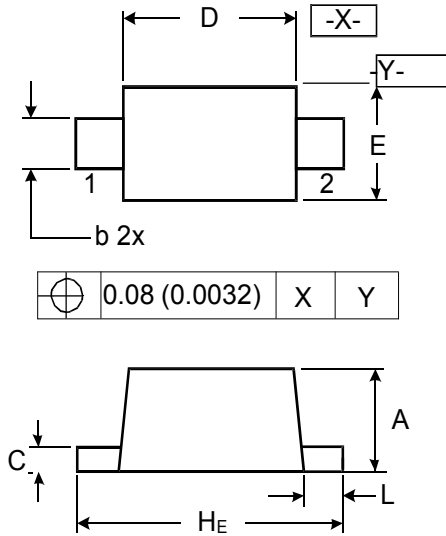


clamped -1 kV ESD voltage waveform
(IEC61000-4-2 network)

006aaa001

Fig 8. ESD clamping test setup and waveforms

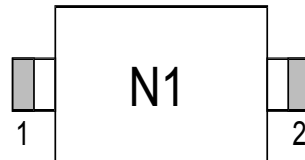
Outline Drawing – SOD-523



DIMENSIONS

SYMBOL	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	0.50	0.70	0.020	0.028
b	0.25	0.35	0.010	0.014
C	0.07	0.20	0.0028	0.0079
D	1.10	1.30	0.043	0.051
E	0.70	0.90	0.028	0.035
HE	1.50	1.70	0.059	0.067
L	0.15	0.25	0.006	0.010

Marking



Ordering information

Order code	Marking	Package	Baseqty	Deliverymode
PESD3V3S1UB	N1	SOD-523	3000	Tape and reel
PESD5V0S1UB	N2	SOD-523	3000	Tape and reel
PESD12VS1UB	N3	SOD-523	3000	Tape and reel
PESD15VS1UB	N4	SOD-523	3000	Tape and reel
PESD24VS1UB	N5	SOD-523	3000	Tape and reel