

# MSKSEMI

SEMICONDUCTOR



ESD



TVS



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PLED

Product data sheet

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**SOT-23**

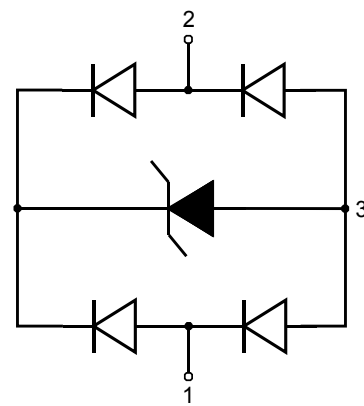


**Features**

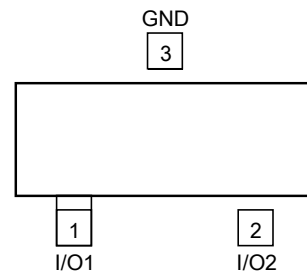
- Stand-off voltage: 5V Max
- Transient protection for each line according to IEC61000-4-2 (ESD): ±20kV (contact and air discharge)  
IEC61000-4-4 (EFT): 40A (5/50ns)  
IEC61000-4-5 (surge): 4A (8/20µs)
- Ultra-low capacitance:  $C_J = 0.4\text{pF typ.}$
- Ultra-low leakage current:  $I_R < 1\text{nA typ.}$
- Low clamping voltage:  $V_{CL} = 20\text{V @ } I_{PP} = 16\text{A(TLP)}$
- Solid-state silicon technology

**Applications**

- USB 2.0 and USB 3.0
- HDMI 1.3 and HDMI 1.4
- SATA and eSATA
- DVI
- IEEE 1394
- PCI Express
- Portable Electronics
- Notebooks



**Circuit diagram**



Parameter	Symbol	Rating	Unit
Peak pulse power ( $t_p = 8/20\mu s$ )	$P_{pk}$	60	W
Peak pulse current ( $t_p = 8/20\mu s$ )	$I_{PP}$	4	A
ESD according to IEC61000-4-2 air discharge	$V_{ESD}$	$\pm 20$	kV
ESD according to IEC61000-4-2 contact discharge		$\pm 20$	
Junction temperature	$T_J$	125	$^{\circ}C$
Operating temperature	$T_{OP}$	-40~85	$^{\circ}C$
Lead temperature	$T_L$	260	$^{\circ}C$
Storage temperature	$T_{STG}$	-55~150	$^{\circ}C$

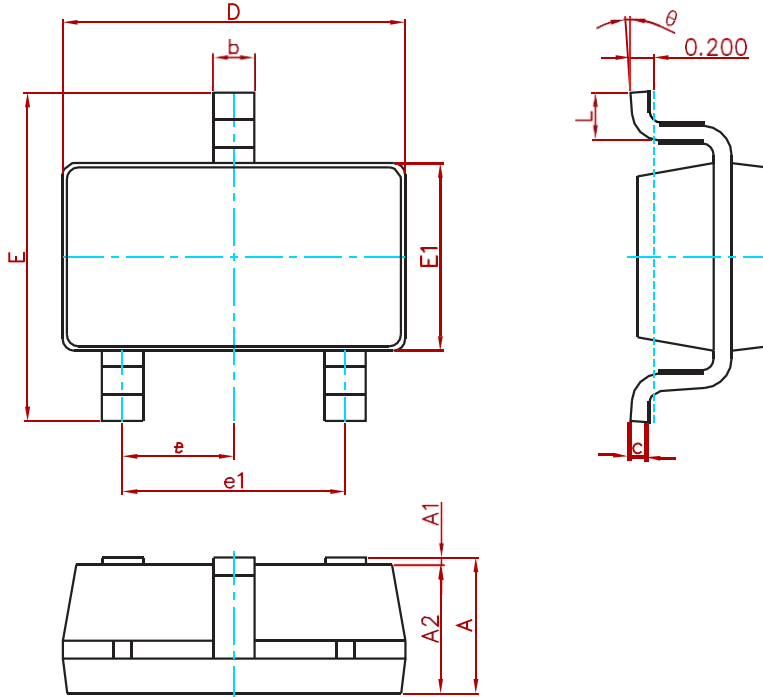
**Electrical characteristics ( $T_A=25^{\circ}C$ , unless otherwise noted)**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse maximum working voltage	$V_{RWM}$				5.0	V
Reverse leakage current	$I_R$	$V_{RWM} = 5V$		<1	100	nA
Reverse breakdown voltage	$V_{BR}$	$I_T = 1mA$	7.0	8.0	9.0	V
Forward voltage	$V_F$	$I_T = 10mA$	0.6	0.9	1.2	V
Clamping voltage <sup>1)</sup>	$V_{CL}$	$I_{PP} = 16A, t_p = 100ns$		20		V
Dynamic resistance <sup>1)</sup>	$R_{DYN}$			0.65		$\Omega$
Clamping voltage <sup>2)</sup>	$V_{CL}$	$I_{PP} = 1A, t_p = 8/20\mu s$			11	V
		$I_{PP} = 4A, t_p = 8/20\mu s$			15	V
Junction capacitance	$C_J$	$V_R = 0V, f = 1MHz$ Any I/O pin to GND		0.40	0.65	pF
		$V_R = 0V, f = 1MHz$ Between any I/O pin		0.25	0.40	pF

**Notes:**

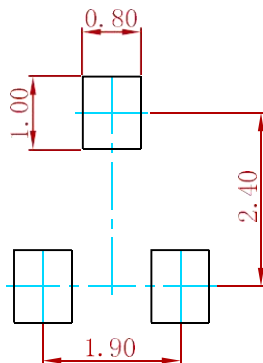
- 1) TLP parameter:  $Z_0 = 50 \Omega$ ,  $t_p = 100ns$ ,  $t_r = 2ns$ , averaging window from 60ns to 80ns.  $R_{DYN}$  is calculated from 4A to 16A.
- 2) According to IEC61000-4-5.

**PACKAGE MECHANICAL DATA**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
theta	0°	8°	0°	8°

**Suggested Pad Layout**



Note:  
 1. Controlling dimension: in millimeters.  
 2. General tolerance: ± 0.05mm.  
 3. The pad layout is for reference purposes only.

**REEL SPECIFICATION**

P/N	PKG	QTY
ESD5302F-MS	SOT-23	3000

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