

**-4.8A, -20V P-Channel Power MOSFET**

**GENERAL DESCRIPTION**

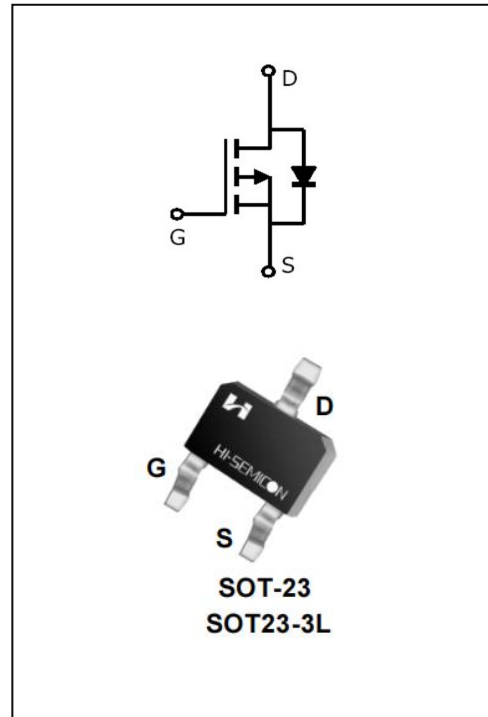
The Power MOSFET has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

**Features**

- ◆  $V_{DS} = -20V, I_D = -4.8A$
- ◆  $R_{DS(ON)}$   
 TYP:  $24m\Omega @ V_{GS} = -4.5V$   
 TYP:  $30m\Omega @ V_{GS} = -2.5V$

**Applications**

- ◆ Load Switch
- ◆ PWM Applications
- ◆ Power Management



**ORDERING INFORMATION**

Part No.	Package	Marking	Material	Packing
SFS2305B	SOT-23 SOT-23-3L	2305B	Pb Free	Reel

## ABSOLUTE MAXIMUM RATINGS (T<sub>J</sub>=25°C unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V <sub>DS</sub>	-20	V
Gate-Source Voltage		V <sub>GS</sub>	±12	V
Drain Current	T <sub>C</sub> = 25°C	I <sub>D</sub>	-4.8	A
	T <sub>C</sub> = 75°C		-3.6	
Drain Current Pulsed(Note 1)		I <sub>DM</sub>	-18	A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C		P <sub>D</sub>	1	W
Single Pulsed Avalanche Energy (Note 2)		E <sub>AS</sub>	30.5	mJ
Operation Junction Temperature Range		T <sub>J</sub>	-55~+150	°C
Storage Temperature Range		T <sub>stg</sub>	-55~+150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300	°C

## ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain -Source Breakdown Voltage	B <sub>VDSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-20	--	--	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V	--	--	1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = 12V, V <sub>DS</sub> = 0V	--	--	100	nA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = -12V, V <sub>DS</sub> = 0V	--	--	-100	
<b>On Characteristics</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250μA	-0.4	-0.65	-1.0	V
Static Drain- Source On State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5.0A	--	24	29	mΩ
		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -4.0A	--	30	37	
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -10V V <sub>GS</sub> = 0V f=1.0MHZ	--	830	--	pF
Output Capacitance	C <sub>oss</sub>		--	132	--	
Reverse Transfer Capacitance	C <sub>riss</sub>		--	85	--	
<b>Switching Characteristics</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -10V, V <sub>GS</sub> = -4.5V R <sub>G</sub> = 1 Ω, I <sub>D</sub> = -3.3A (Note 3.4)	--	10	--	nS
Turn-on Rise Time	t <sub>r</sub>		--	32	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	50	--	
Turn-off Fall Time	t <sub>f</sub>		--	51	--	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-2A V <sub>GS</sub> =-4.5V (Note 3.4)	--	8.8	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	1.4	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	1.9	--	

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	$I_S$	Integral Reverse P-N Junction Diode in the MOSFET	--	--	-4.8	A
Pulsed Source Current	$I_{SM}$		--	--	-18	
Diode Forward Voltage	$V_{SD}$	$I_S = -3A, V_{GS} = 0V$	--	-0.8	-1.2	V

NOTE:

1. Pulse width limited by maximum junction temperature
2.  $L=0.5mH, V_{DD}=-10V, V_G=-10V, R_G=25\Omega$ , starting  $T_J=25^\circ C$
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1: Output Characteristics

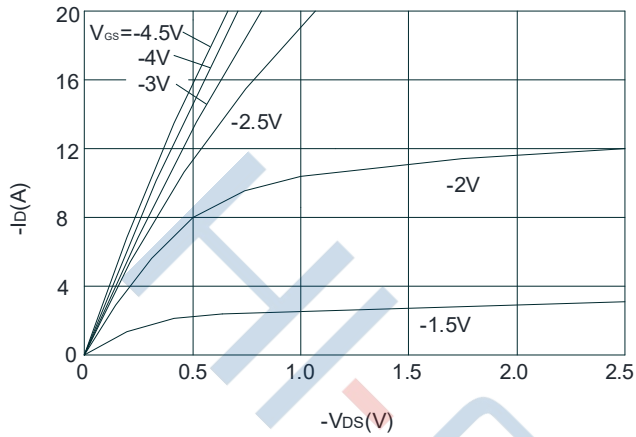


Figure 2: Typical Transfer Characteristics

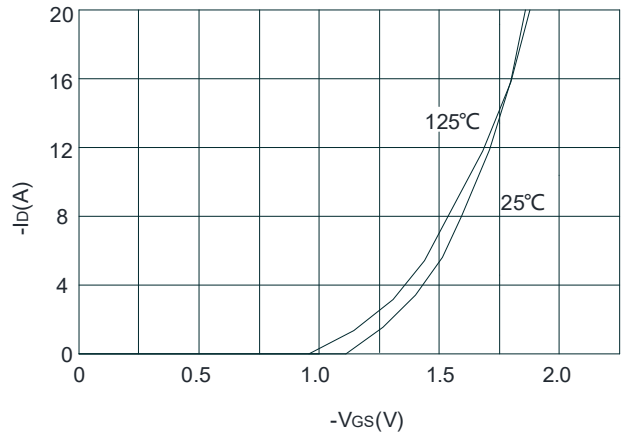


Figure 3: On-resistance vs. Drain Current

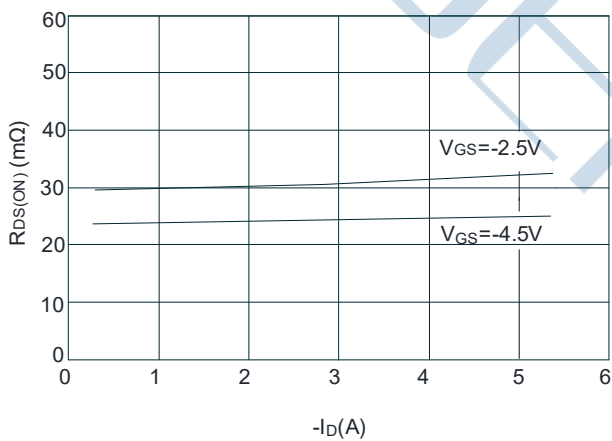


Figure 4: Body Diode Characteristics

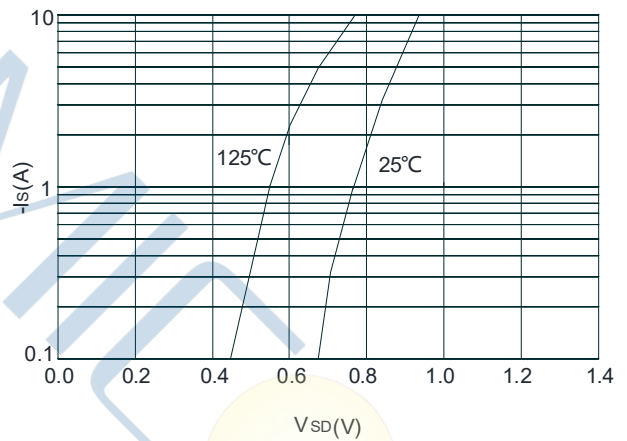


Figure 5: Gate Charge Characteristics

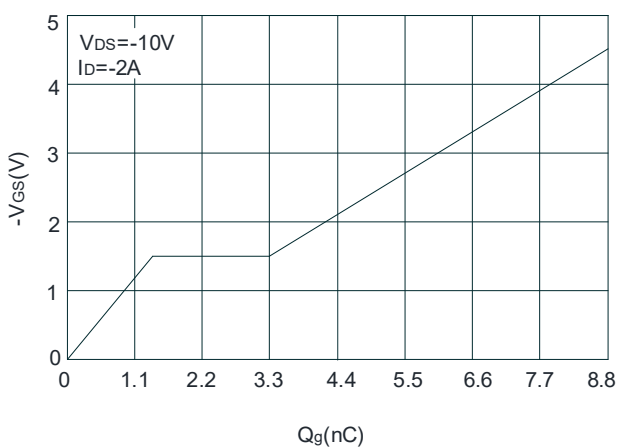
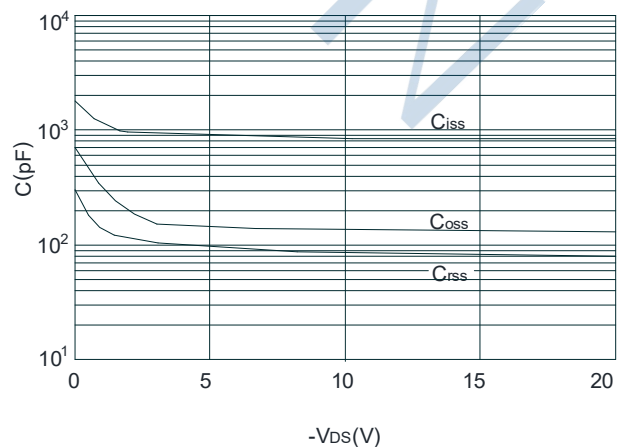
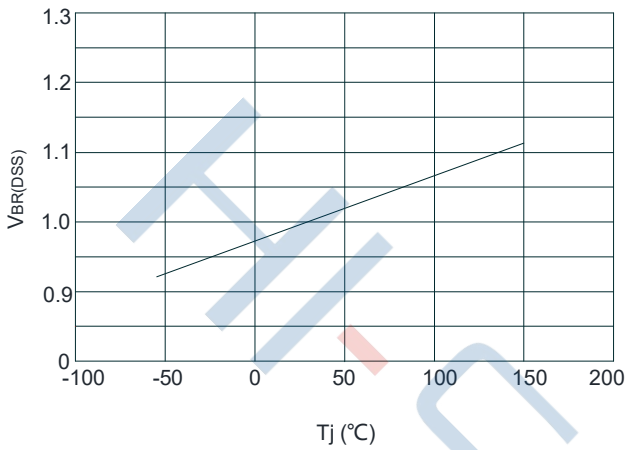


Figure 6: Capacitance Characteristics

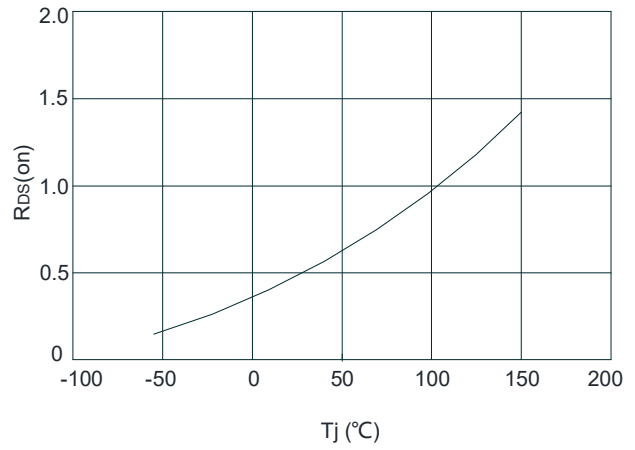


Typical Performance Characteristics

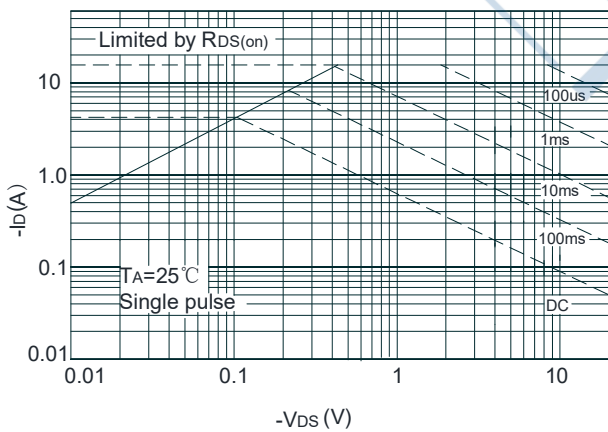
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



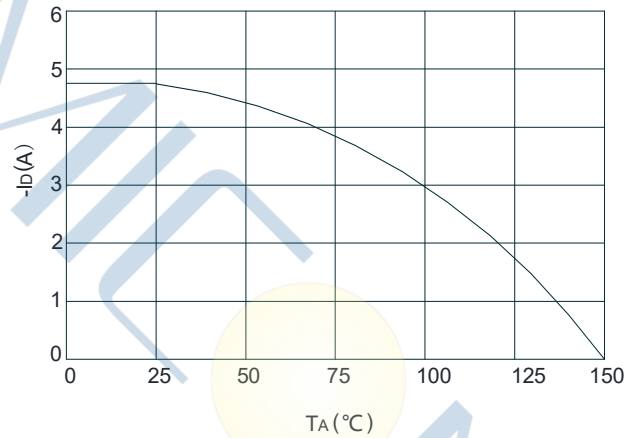
**Figure 8:** Normalized on Resistance vs. Junction Temperature



**Figure 9:** Maximum Safe Operating Area

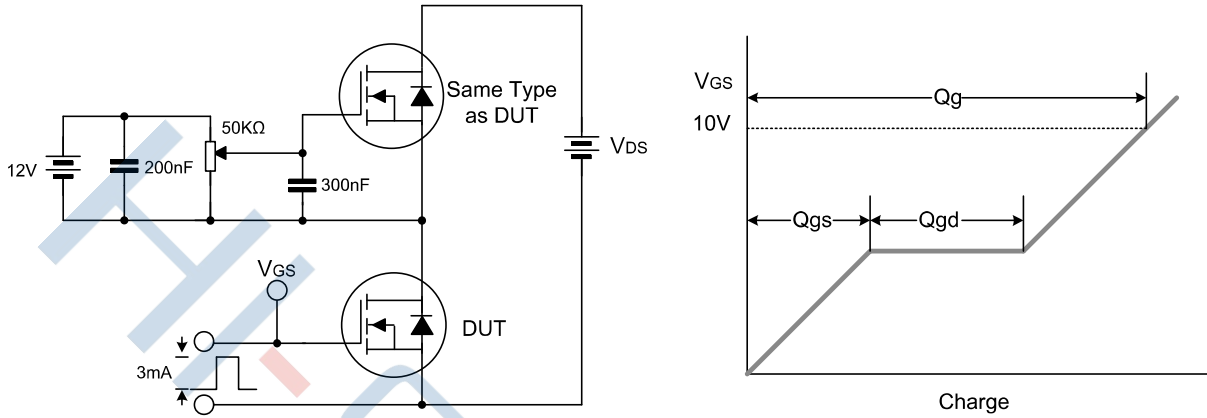


**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

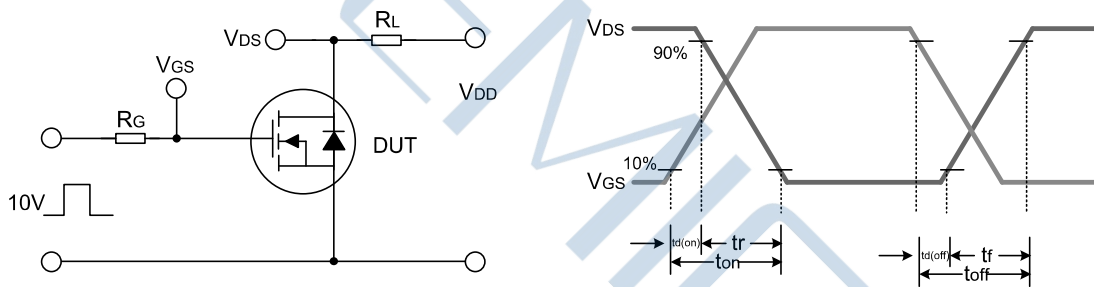


Test Circuit

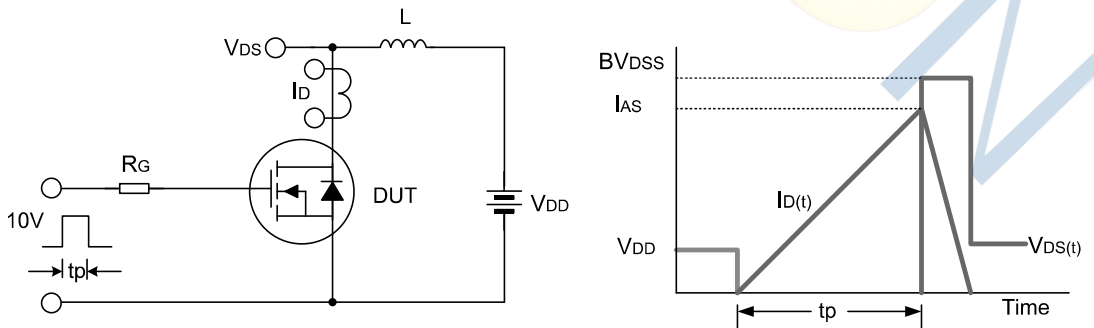
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

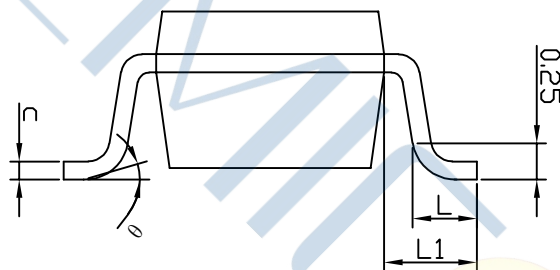
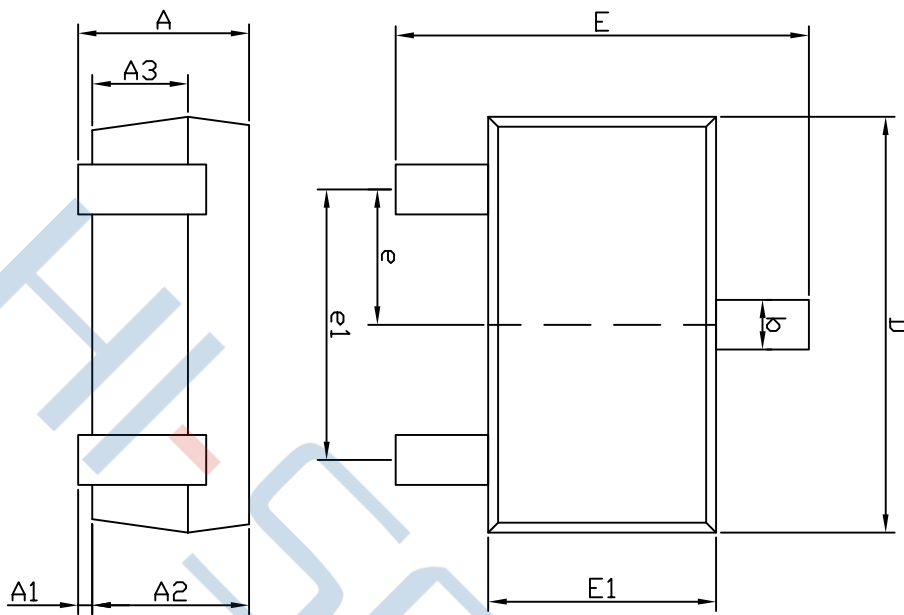


Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of SOT23-3L

Unit:mm

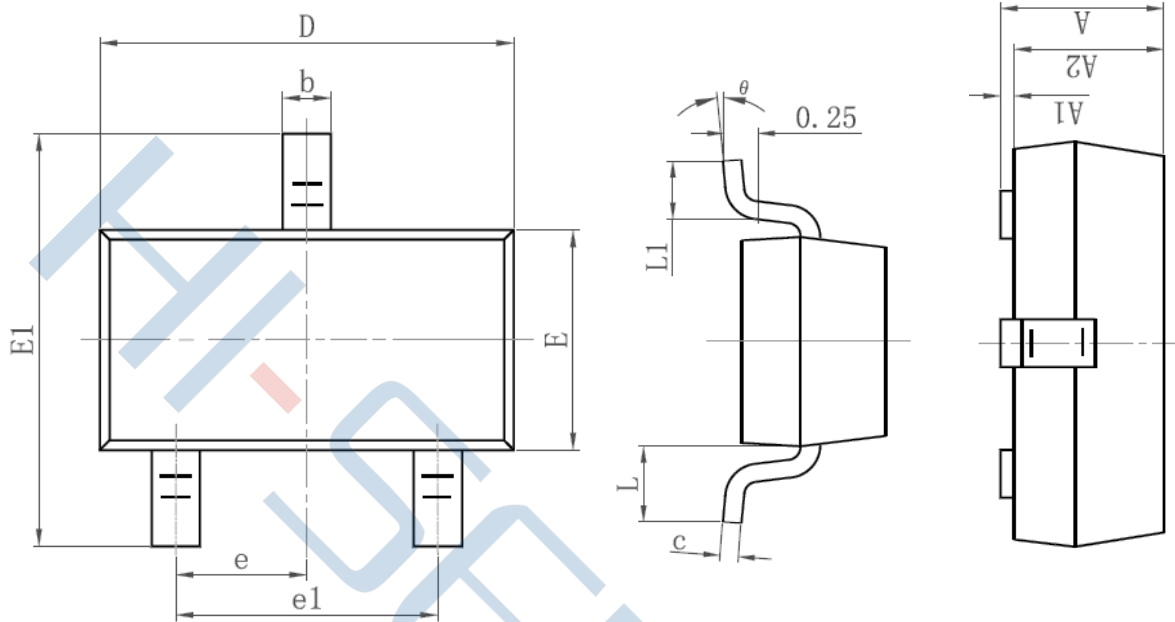


COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	-	-	1.25
A1	0.04	-	0.10
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.33	-	0.41
c	0.11	-	0.20
D	2.82	2.92	3.02
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	0.95BSC		
e1	1.90BSC		
L	0.30	-	0.60
L1	0.60REF		
θ	0°	-	8°

Package Dimensions of SOT-23

Unit:mm



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
theta	0°	8°



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