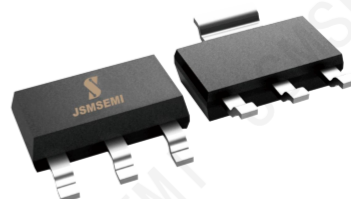


■ Features

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability: I_C and I_{CM}
- Higher efficiency leading to less heat generation
- Reduced printed-circuit board requirements.



SOT-223

■ Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Rating	Unit
Collector - base voltage		V_{CBO}	-50	V
Collector - emitter voltage		V_{CEO}	-50	
Emitter - base voltage		V_{EBO}	-5	
Collector current (DC)	Note 4	I_C	-3	A
Peak collector current	Limited by $T_{j(max)}$	I_{CM}	-5	
Base current (DC)		I_B	-0.5	
Collector power dissipation	Note 1	P_{tot}	0.55	W
	Note 2		1	
	Note 3		1.4	
	Note 4		1.6	
Thermal resistance junction to ambient	Note 1	$R_{th(j-a)}$	225	$^\circ\text{C/W}$
	Note 2		125	
	Note 3		90	
	Note 4		80	
Thermal resistance from junction to soldering point		$R_{th(j-s)}$	16	
Junction temperature		T_J	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-65 to 150	

Notes:

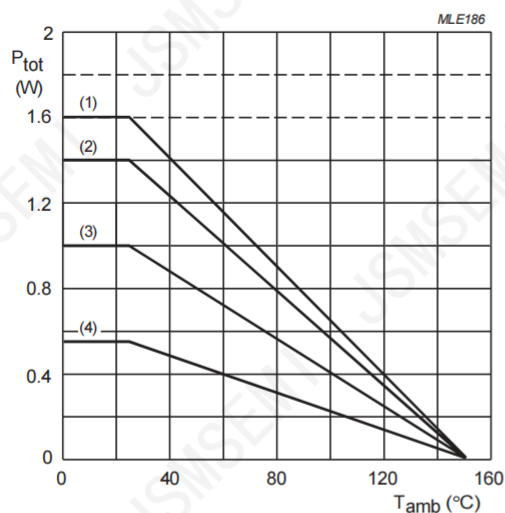
1. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm².
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 6 cm².
4. Device mounted on a ceramic printed-circuit board 7 cm², single-sided copper, tin-plated.

■ Electrical Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector- base breakdown voltage	V_{CB0}	$I_C = -100\ \mu\text{A}$, $I_E = 0$	-50			V
Collector- emitter breakdown voltage	V_{CEO}	$I_C = -1\ \text{mA}$, $I_B = 0$	-50			
Emitter - base breakdown voltage	V_{EBO}	$I_E = -100\ \mu\text{A}$, $I_C = 0$	-5			
Collector-base cut-off current	I_{CBO}	$V_{CB} = -50\ \text{V}$, $I_E = 0$			-100	nA
		$V_{CB} = -50\ \text{V}$, $I_E = 0$; $T_j = 150^\circ\text{C}$			-50	μA
Collector- emitter cut-off current	I_{CES}	$V_{CB} = -50\ \text{V}$, $V_{BE} = 0\ \text{V}$			-100	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = -5\ \text{V}$, $I_C = 0$			-100	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -0.5\ \text{A}$, $I_B = -50\ \text{mA}$			-90	mV
		$I_C = -1\ \text{A}$, $I_B = -50\ \text{mA}$			-180	
		$I_C = -2\ \text{A}$, $I_B = -100\ \text{mA}$			-320	
		$I_C = -2\ \text{A}$, $I_B = -200\ \text{mA}$; Note 1			-270	
		$I_C = -3\ \text{A}$, $I_B = -300\ \text{mA}$; Note 1			-390	
Base - emitter saturation voltage	$V_{BE(sat)}$	$I_C = -2\ \text{A}$, $I_B = -100\ \text{mA}$			-1.1	V
		$I_C = -3\ \text{A}$, $I_B = -300\ \text{mA}$; Note 1			-1.2	
Base-emitter turn-on voltage	$V_{BE(on)}$	$V_{CE} = -2\ \text{V}$, $I_C = -1\ \text{A}$	-1.1			
Equivalent on-resistance	R_{CEsat}	$I_C = -2\ \text{A}$, $I_B = -200\ \text{mA}$; Note 1			135	$\text{m}\Omega$
DC current gain	h_{FE}	$V_{CE} = -2\ \text{V}$, $I_C = -0.1\ \text{A}$	200			
		$V_{CE} = -2\ \text{V}$, $I_C = -0.5\ \text{A}$	200			
		$V_{CE} = -2\ \text{V}$, $I_C = -1\ \text{A}$; Note 1	200		450	
		$V_{CE} = -2\ \text{V}$, $I_C = -2\ \text{A}$; Note 1	130			
		$V_{CE} = -2\ \text{V}$, $I_C = -3\ \text{A}$; Note 1	80			
Transition frequency	f_r	$I_C = -100\ \text{mA}$; $V_{CE} = -5\ \text{V}$; $f = 100\ \text{MHz}$	100			MHz
Collector capacitance	C_c	$V_{CB} = -10\ \text{V}$; $I_E = I_C = 0\ \text{A}$; $f = 1\ \text{MHz}$			35	pF

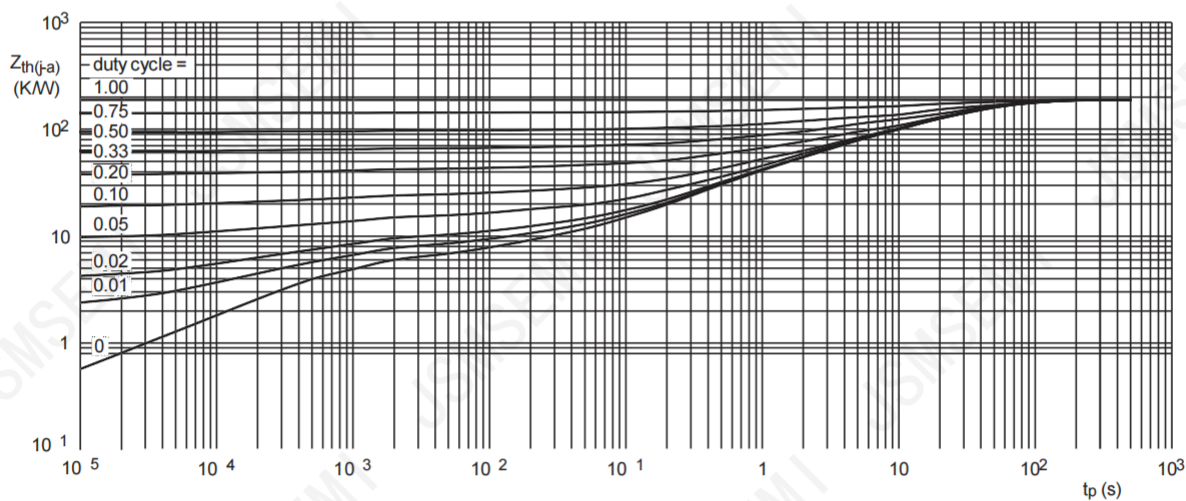
 Note 1. Pulse test: $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$.

■ Typical Characteristics



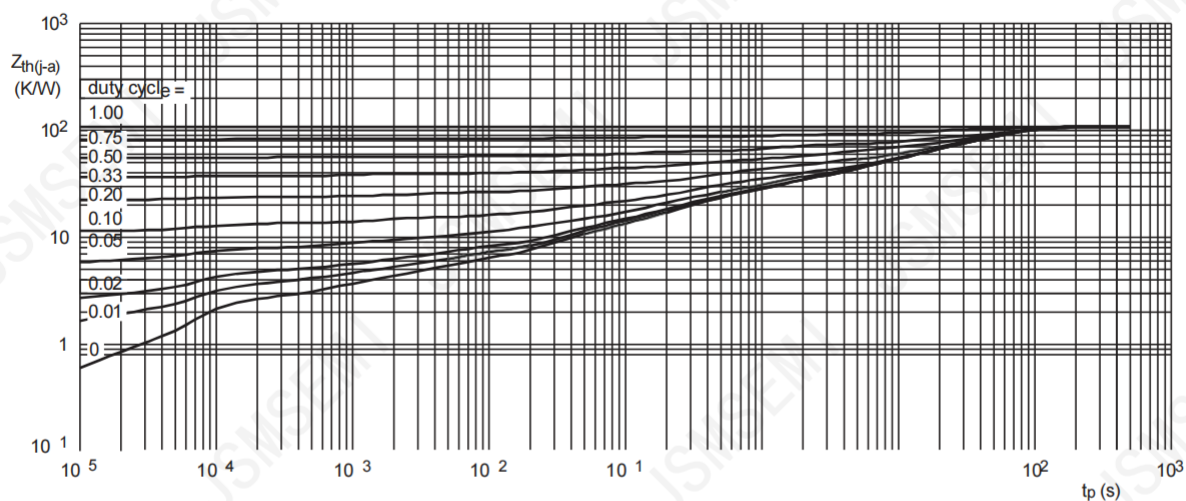
- (1) Ceramic PCB; 7 cm² mounting pad for collector.
- (2) FR4 PCB; 6 cm² copper mounting pad for collector.
- (3) FR4 PCB; 1 cm² copper mounting pad for collector.
- (4) Standard footprint.

Fig.1 Power derating curves.



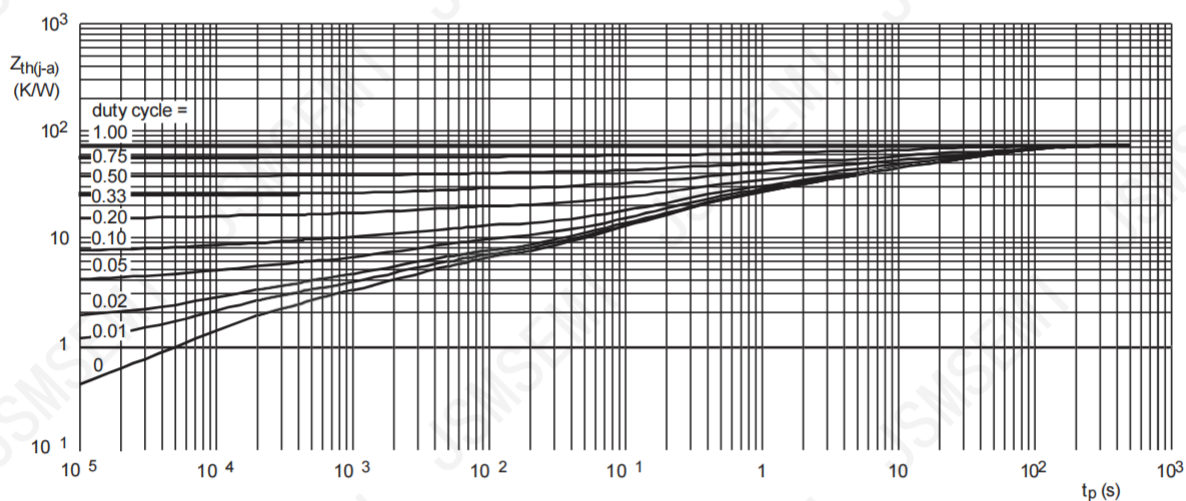
Mounted on FR4 printed-circuit board; standard footprint.

Fig.2 Transient thermal impedance as a function of pulse time; typical values.



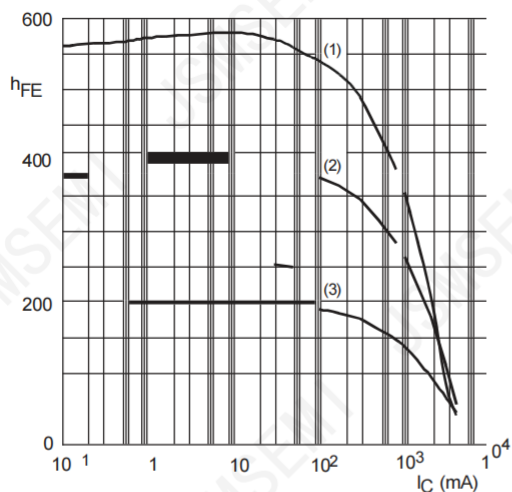
Mounted on FR4 printed-circuit board; mounting pad for collector 1 cm².

Fig.3 Transient thermal impedance as a function of pulse time; typical values.



Mounted on FR4 printed-circuit board; mounting pad for collector 6 cm².

Fig.4 Transient thermal impedance as a function of pulse time; typical values.



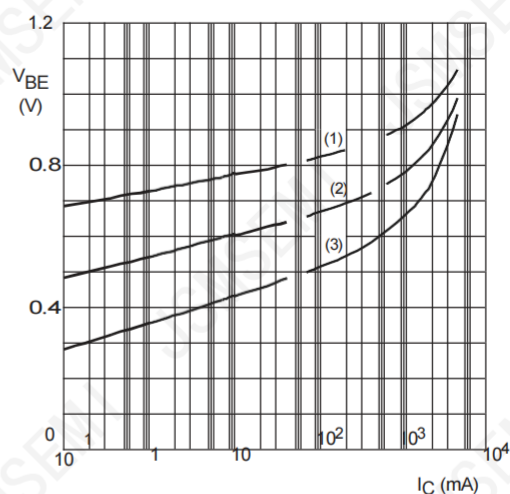
$V_{CE} = -2 \text{ V.}$

(1) $T_{amb} = 100 \text{ }^{\circ}\text{C.}$

(2) $T_{amb} = 25 \text{ }^{\circ}\text{C.}$

(3) $T_{amb} = -55 \text{ }^{\circ}\text{C.}$

Fig.5 DC current gain as a function of collector current; typical values.



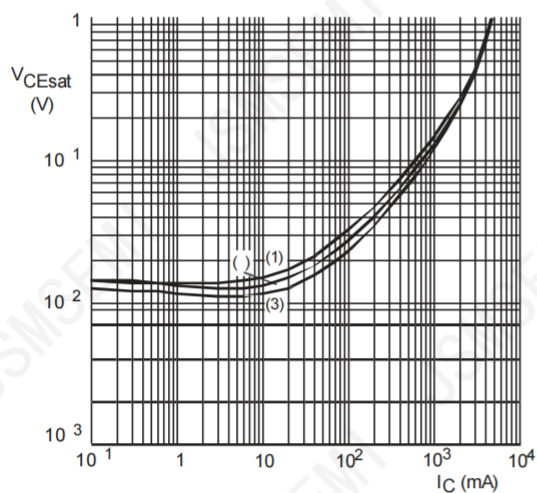
$V_{CE} = -2 \text{ V.}$

(1) $T_{amb} = -55 \text{ }^{\circ}\text{C.}$

(2) $T_{amb} = 25 \text{ }^{\circ}\text{C.}$

(3) $T_{amb} = 100 \text{ }^{\circ}\text{C.}$

Fig.6 Base-emitter voltage as a function of collector current; typical values.



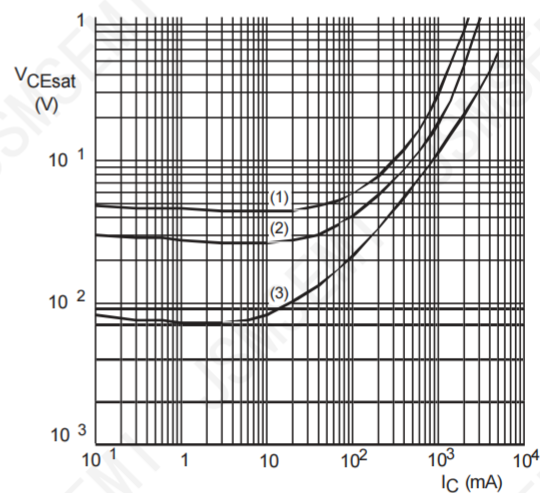
$I_C/I_B = 20.$

(1) $T_{amb} = 100 \text{ }^{\circ}\text{C.}$

(2) $T_{amb} = 25 \text{ }^{\circ}\text{C.}$

(3) $T_{amb} = -55 \text{ }^{\circ}\text{C.}$

Fig.7 Collector-emitter saturation voltage as a function of collector current; typical values.



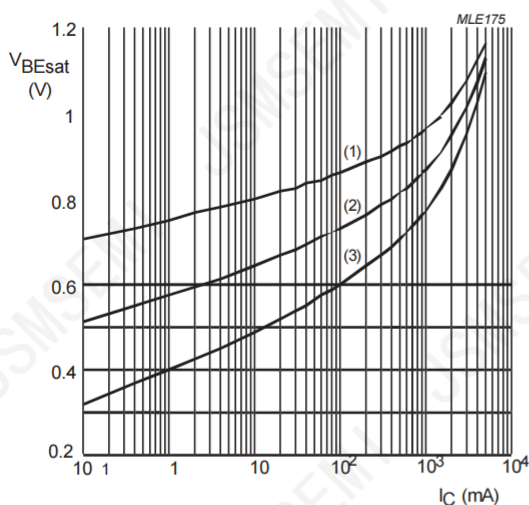
$T_{amb} = 25 \text{ }^{\circ}\text{C.}$

(1) $I_C/I_B = 100.$

(2) $I_C/I_B = 50.$

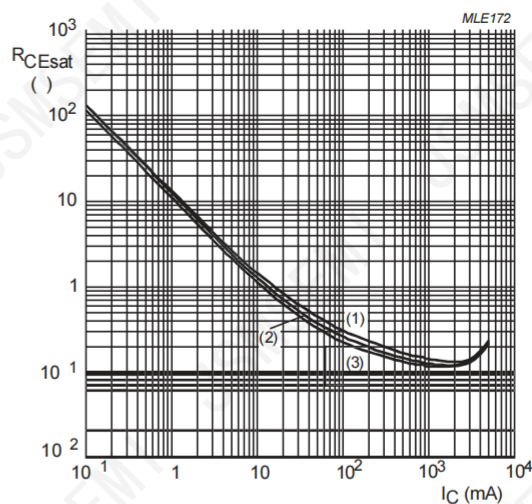
(3) $I_C/I_B = 10.$

Fig.8 Collector-emitter saturation voltage as a function of collector current; typical values.


 $I_C/I_B = 20$.

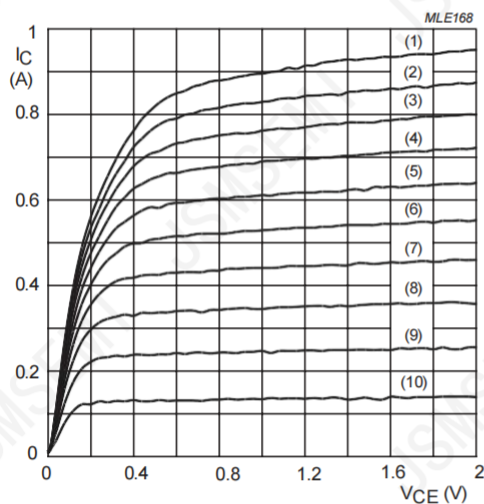
 (1) $T_{amb} = -55\text{ }^{\circ}\text{C}$. (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$. (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$.

Fig.9 Base-emitter saturation voltage as a function of collector current; typical values.


 $I_C/I_B = 20$.

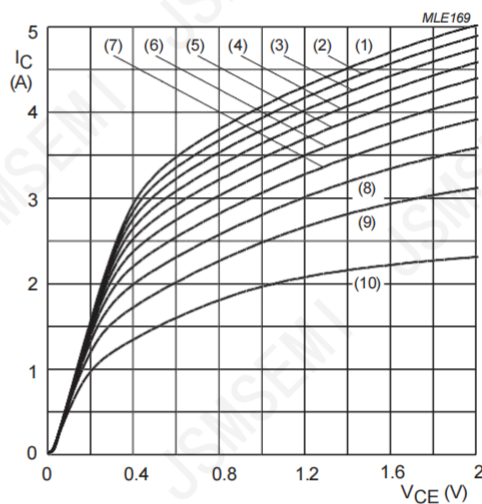
 (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$. (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$. (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$.

Fig.10 Equivalent on-resistance as a function of collector current; typical values.


 $T_{amb} = 25\text{ }^{\circ}\text{C}$.

(1) $I_B = -3500\text{ }\mu\text{A}$.	(5) $I_B = -2100\text{ }\mu\text{A}$.	(9) $I_B = -700\text{ }\mu\text{A}$.
(2) $I_B = -3150\text{ }\mu\text{A}$.	(6) $I_B = -1750\text{ }\mu\text{A}$.	(10) $I_B = -350\text{ }\mu\text{A}$.
(3) $I_B = -2800\text{ }\mu\text{A}$.	(7) $I_B = -1400\text{ }\mu\text{A}$.	
(4) $I_B = -2450\text{ }\mu\text{A}$.	(8) $I_B = -1050\text{ }\mu\text{A}$.	

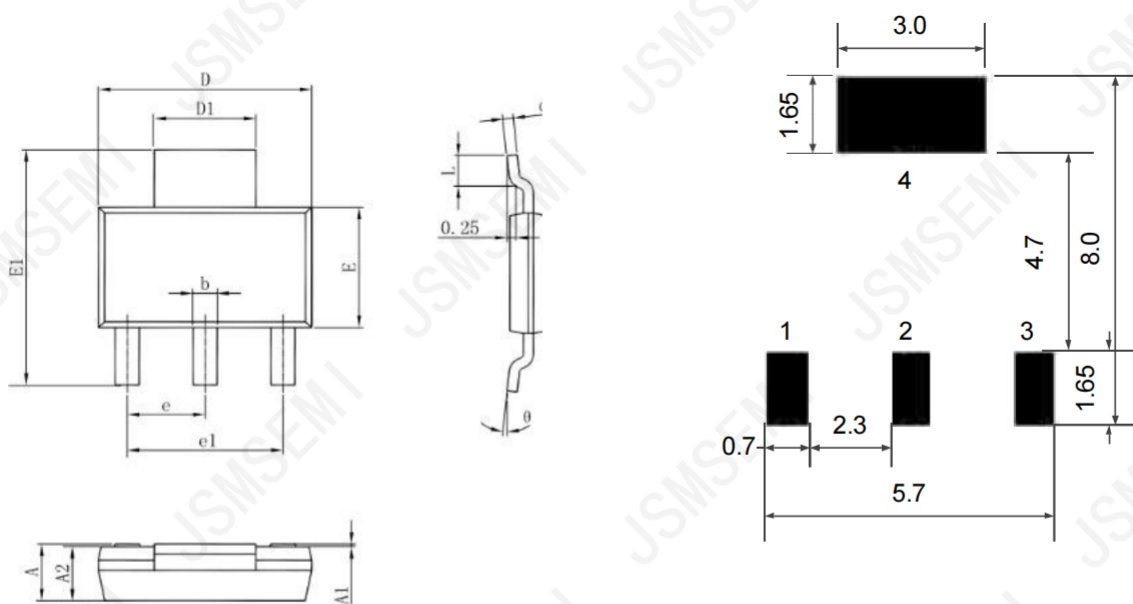
Fig.11 Collector current as a function of collector-emitter voltage; typical values.


 $T_{amb} = 25\text{ }^{\circ}\text{C}$.

(1) $I_B = -140\text{ mA}$.	(5) $I_B = -84\text{ mA}$.	(9) $I_B = -28\text{ mA}$.
(2) $I_B = -126\text{ mA}$.	(6) $I_B = -70\text{ mA}$.	(10) $I_B = -14\text{ mA}$.
(3) $I_B = -112\text{ mA}$.	(7) $I_B = -56\text{ mA}$.	
(4) $I_B = -98\text{ mA}$.	(8) $I_B = -42\text{ mA}$.	

Fig.12 Collector current as a function of collector-emitter voltage; typical values.

SOT223 Package



PCB Board

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.200	6.400	0.244	0.252
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	7.070	0.269	0.278
e	2.300(BSC)		0.091(BSC)	
e1	4.500	4.700	0.177	0.185
L	0.900	1.150	0.035	0.045
θ	0°	10°	0°	10°

Revision History

Rev.	Change	Date
V2.0	Initial version	2/23/2024

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