

描述 / Descriptions

SOT-223 塑封封装 PNP 半导体三极管。Silicon PNP transistor in a SOT-223 Plastic Package.

特征 / Features

高电压，低 V_{CEsat} ，电流能力强，高 h_{FE} ，无卤产品。

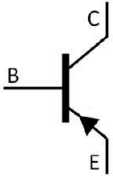
High voltage, Low collector-emitter saturation voltage V_{CEsat} , High collector current capability I_C and I_{CM} , High collector current gain h_{FE} at high I_C , Halogen-free Product.

用途 / Applications

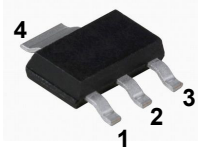
LED 模组驱动，LCD 背光源，汽车马达驱动；电源开关等应用

LED driver for LED chain module, LCD backlighting, Automotive motor management, Switch Mode Power Supply.

内部等效电路 / Equivalent Circuit



引脚排列 / Pinning



PIN1 : Base PIN 2、4 : Collector PIN 3 : Emitter

放大及印章代码 / h_{FE} Classifications & Marking

极限参数 / Absolute Maximum Ratings(Ta=25°C)

参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Collector to Base Voltage	V_{CBO}	-180	V
Collector to Emitter Voltage	V_{CEO}	-140	V
Emitter to Base Voltage	V_{EBO}	-7.0	V
Collector Current - Continuous	I_C	-4.0	A
Peak collector current	I_{CM}	-10	A
Base current	I_B	-500	mA
Total power dissipation	$P_{tot}(T_C=25^\circ\text{C})^{(1)}$	0.65	W
	$P_{tot}(T_C=25^\circ\text{C})^{(2)}$	1.0	W
	$P_{tot}(T_C=25^\circ\text{C})^{(3)}$	1.35	W
Thermal resistance from junction to ambient	$R_{th(j-a)}^{(4)}$	192	K/W
	$R_{th(j-a)}^{(5)}$	125	K/W
	$R_{th(j-a)}^{(6)}$	93	K/W
Thermal resistance from junction to solder point	$R_{th(j-sp)}$	16	K/W
Junction Temperature	T_j	150	°C
Ambient temperature	T_{amb}	-55 ~ 150	°C
Storage Temperature Range	T_{stg}	-65 ~ 150	°C

Note:

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

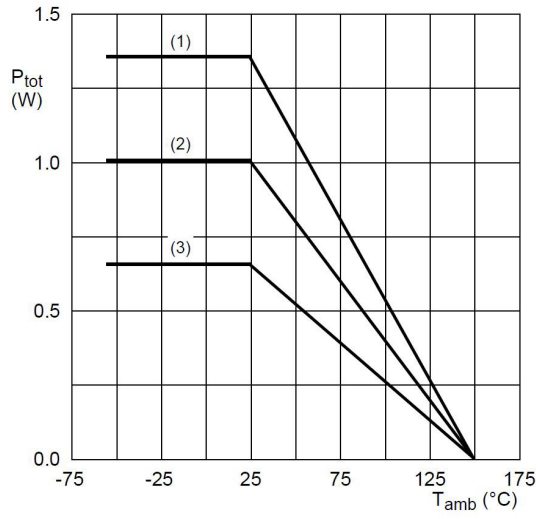
[5] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

[6] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

电性能参数 / Electrical Characteristics(Ta=25°C)

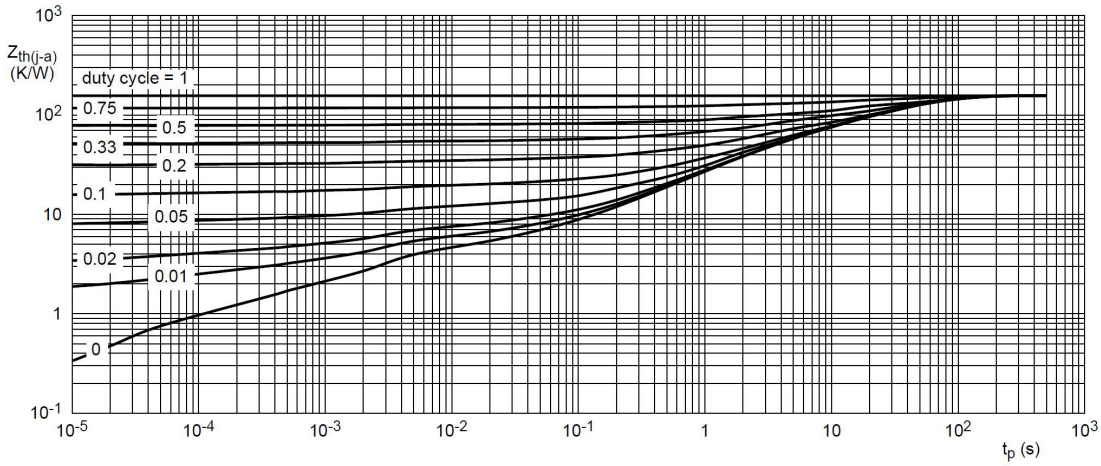
参数 Parameter	符号 Symbol	测试条件 Test Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
Collector Cut-Off Current	I_{CBO}	$V_{CB} = -150\text{ V}$ $I_E = 0\text{ A}$ $T_{amb} = 25\text{ }^\circ\text{C}$			-100	nA
		$V_{CB} = -150\text{ V}$ $I_E = 0\text{ A}$ $T_j = 150\text{ }^\circ\text{C}$			-50	uA
Collector-emitter cut-off current	I_{CES}	$V_{CE} = -115\text{ V}$ $V_{BE} = 0\text{ V}$ $T_{amb} = 25\text{ }^\circ\text{C}$			-100	nA
Emitter-base cut-off current	I_{EBO}	$V_{EB} = -6\text{ V}$ $I_C = 0\text{ A}$ $T_{amb} = 25\text{ }^\circ\text{C}$			-100	nA
DC Current Gain	$h_{FE(1)}$	$V_{CE} = -5.0\text{ V}$ $I_C = -10\text{ mA}$ $T_{amb} = 25\text{ }^\circ\text{C}$	100	160		
	$h_{FE(2)}$	$V_{CE} = -5\text{ V}$ $I_C = -1\text{ A}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$	100	150	300	
	$h_{FE(3)}$	$V_{CE} = -5\text{ V}$ $I_C = -3\text{ A}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$	75	100		
	$h_{FE(4)}$	$V_{CE} = -5\text{ V}$ $I_C = -4\text{ A}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$	35	50		
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = -100\text{ mA}$ $I_B = -5\text{ mA}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$		-45	-60	mV
		$I_C = -500\text{ mA}$ $I_B = -50\text{ mA}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$		-60	-100	mV
		$I_C = -1.0\text{ A}$ $I_B = -100\text{ mA}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$		-100	-150	mV
		$I_C = -3.0\text{ A}$ $I_B = -300\text{ mA}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$		-275	-370	mV
		$I_C = -4.0\text{ A}$ $I_B = -400\text{ mA}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$		-420	-550	mV
Collector-emitter saturation resistance	R_{CEsat}	$I_C = -1\text{ A}$ $I_B = -100\text{ mA}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$		100	150	mΩ
Base to Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = -1\text{ A}$ $I_B = -100\text{ mA}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$			-1.2	V
Base-emitter turn-on voltage	V_{BEon}	$V_{CE} = -5\text{ V}$ $I_B = -1.0\text{ A}$ $t_p \leq 300\mu\text{s}$ $\delta \leq 0.02$ $T_{amb} = 25\text{ }^\circ\text{C}$			-1.1	V

电参数曲线图 / Electrical Characteristic Curve



- (1) FR4 PCB, mounting pad for collector 6 cm²
- (2) FR4 PCB, mounting pad for collector 1 cm²
- (3) FR4 PCB, standard footprint

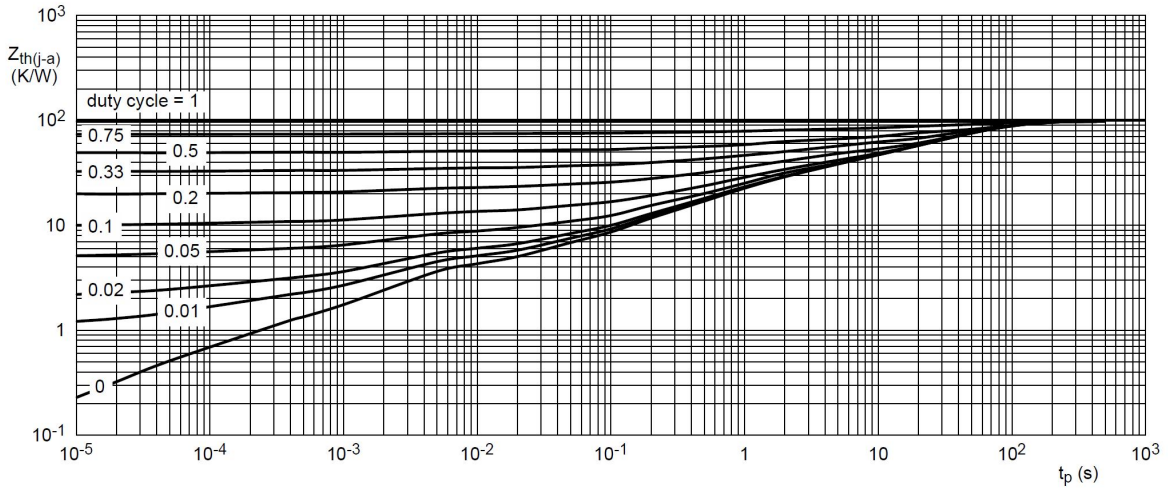
Fig. 1. Power derating curves



FR4 PCB, single-sided copper, tin-plated and standard footprint.

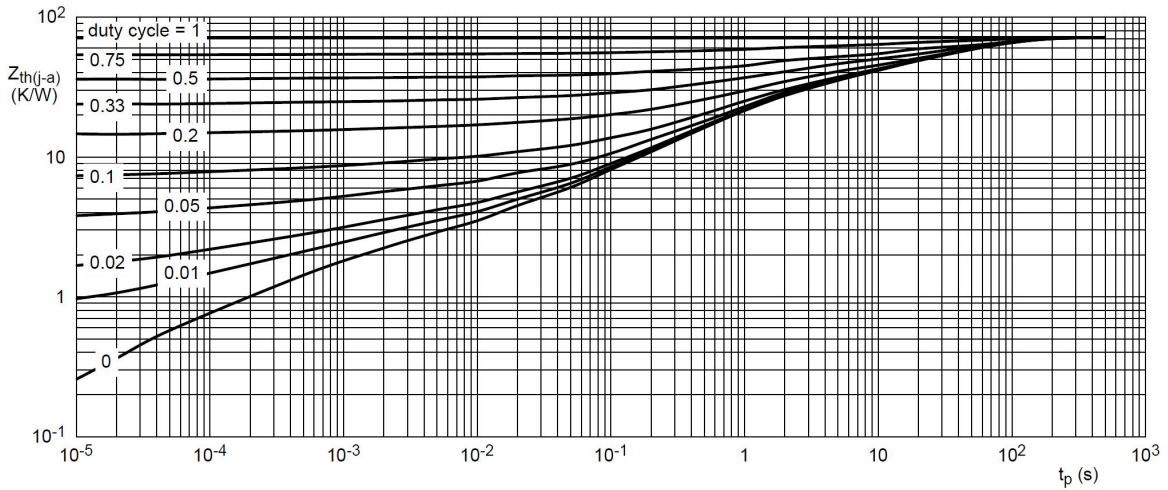
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

电参数曲线图 / Electrical Characteristic Curve



FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm²

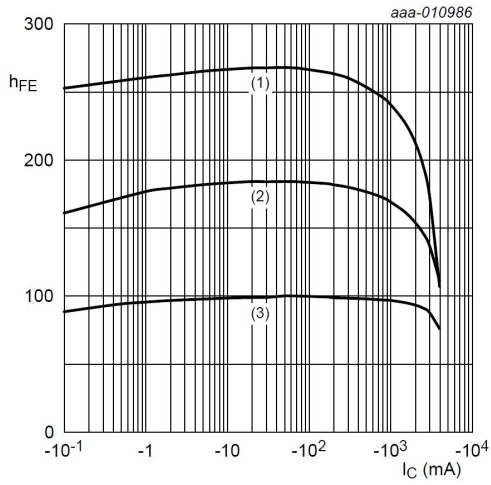
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm²

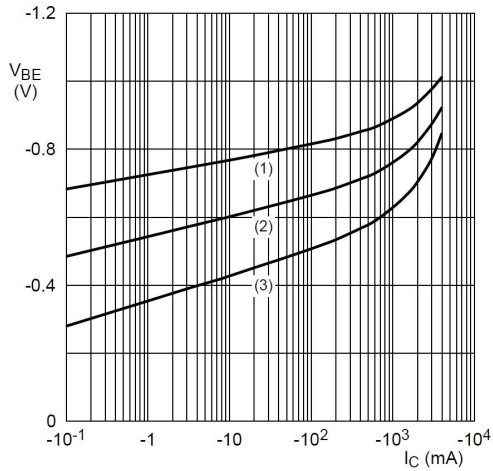
Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

电参数曲线图 / Electrical Characteristic Curve



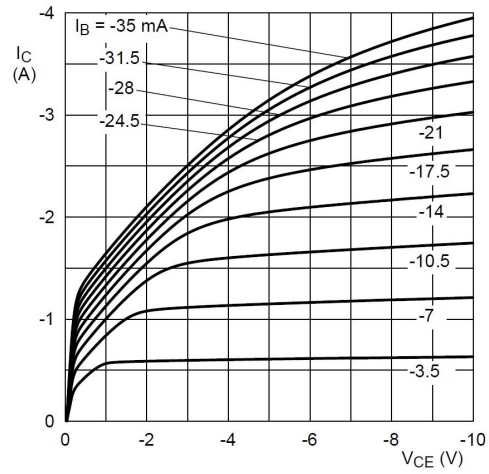
$V_{CE} = -10\text{ V}$
(1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



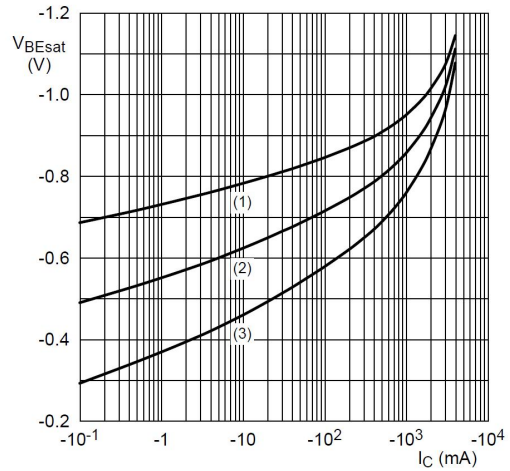
$V_{CE} = -10\text{ V}$
(1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



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

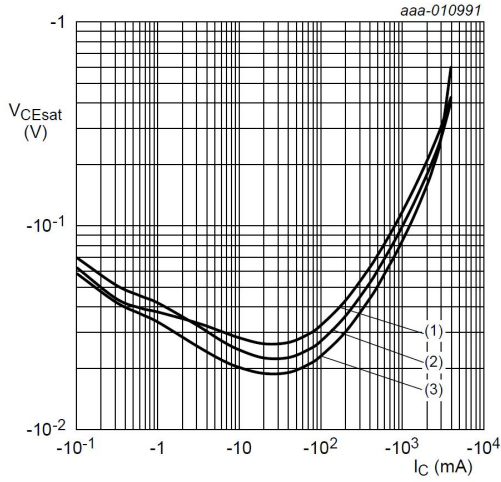
Fig. 6. Collector current as a function of collector-emitter voltage; typical values



$I_C/I_B = 20$
(1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

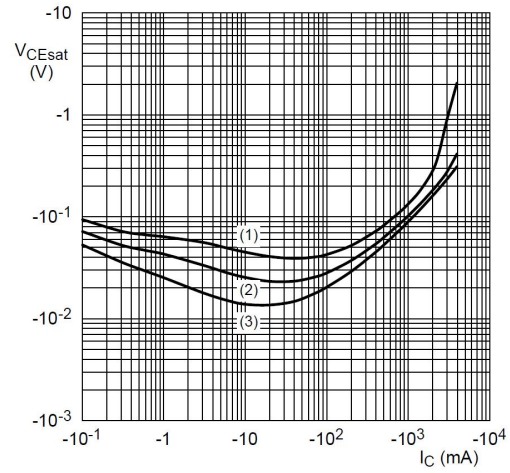
Fig. 8. Base-emitter saturation voltage as a function of collector current; typical values

电参数曲线图 / Electrical Characteristic Curve



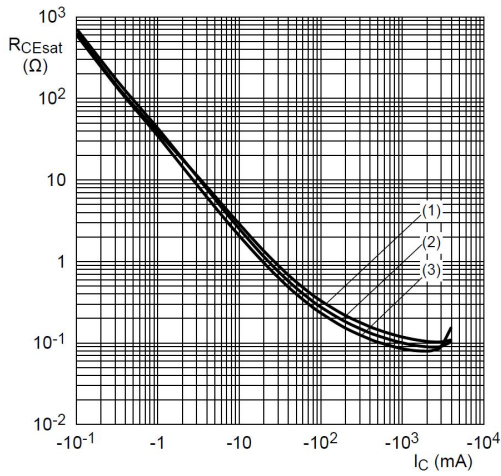
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = -55\text{ }^\circ\text{C}$

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



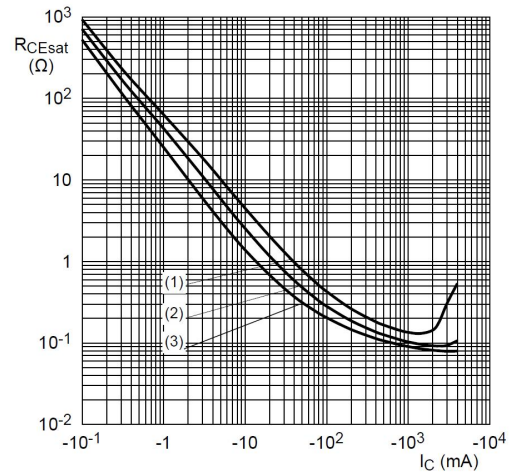
$T_{amb} = 25\text{ }^\circ\text{C}$
 (1) $I_C/I_B = 20$
 (2) $I_C/I_B = 10$
 (3) $I_C/I_B = 5$

Fig. 10. Collector-emitter saturation 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. 11. Collector-emitter saturation resistance as a function of collector current; typical values



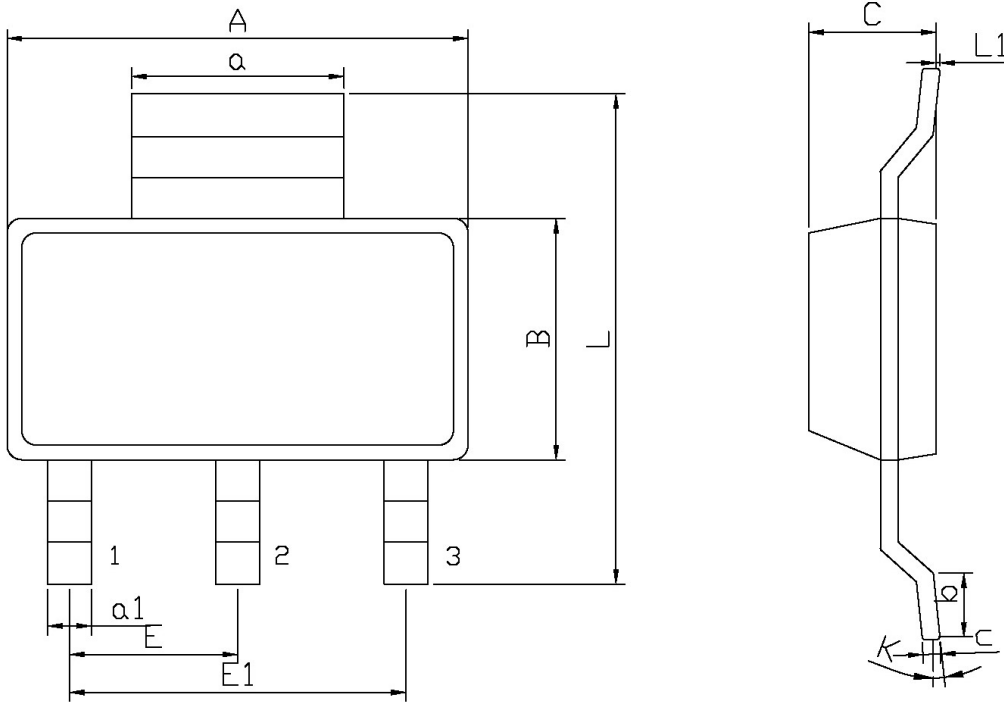
$T_{amb} = 25\text{ }^\circ\text{C}$
 (1) $I_C/I_B = 20$
 (2) $I_C/I_B = 10$
 (3) $I_C/I_B = 5$

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

外形尺寸图 / Package Dimensions

SOT-223

单位: mm



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	6.30	6.70	C	1.80Max	
a	2.90	3.10	b	0.91	-
B	3.30	3.70	c	0.24	0.32
L	6.70	7.30	K	0°	10°
a1	0.60	0.80	L1	0.02	0.10
E1	4.60				
E	2.30				

印章说明 / Marking Instructions



说明：

BR： 为公司代码

9414： 为型号代码

****： 为生产批号代码，随生产批号变化。

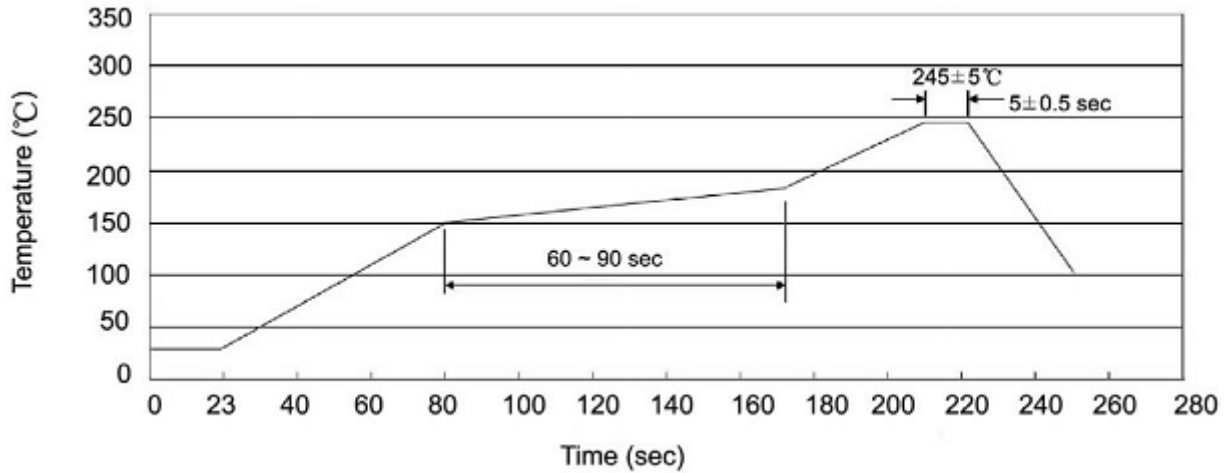
Note:

BR: Company Code.

9414: Product Type.

****: Lot No. Code, code change with Lot No.

回流焊温度曲线图(无铅) / Temperature Profile for IR Reflow Soldering(Pb-Free)



说明：

- 1、预热温度 25~150°C，时间 60~90sec;
- 2、峰值温度 245±5°C，时间持续为 5±0.5sec;
- 3、焊接制程冷却速度为 2~10°C/sec.

Note:

- 1.Preheating:25~150°C, Time:60~90sec.
- 2.Peak Temp.:245±5°C, Duration:5±0.5sec.
3. Cooling Speed: 2~10°C/sec.

耐焊接热试验条件 / Resistance to Soldering Heat Test Conditions

温度：260±5°C

时间：10±1 sec.

Temp:260±5°C

Time:10±1 sec

包装规格 / Packaging SPEC.

卷盘包装 / REEL

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm ³)		
	Units/Reel 只/卷盘	Reels/Inner Box 卷盘/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Reel	Inner Box 盒	Outer Box 箱
SOT-223	2,500	2	5000	5	25,000	13" ×12	340×340×50	385×257×392

使用说明 / Notices