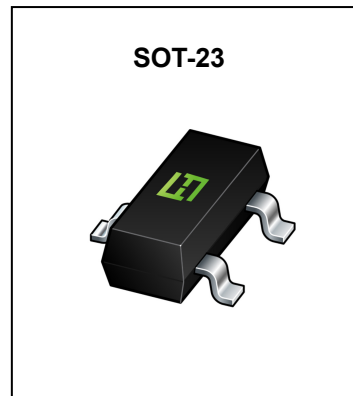


## FEATURES

- High Collector Current.
- Complementary to S9012.
- Excellent  $h_{FE}$  Linearity.

## MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
$V_{CB0}$	Collector-Base Voltage	40	V
$V_{CE0}$	Collector-Emitter Voltage	25	V
$V_{EB0}$	Emitter-Base Voltage	5	V
$I_C$	Collector Current	500	mA
$P_C$	Collector Power Dissipation	300	mW
$R_{\theta JA}$	Thermal Resistance From Junction To Ambient	416	$^\circ\text{C}/\text{W}$
$T_J, T_{stg}$	Operation Junction and Storage Temperature Range	-55~+150	$^\circ\text{C}$

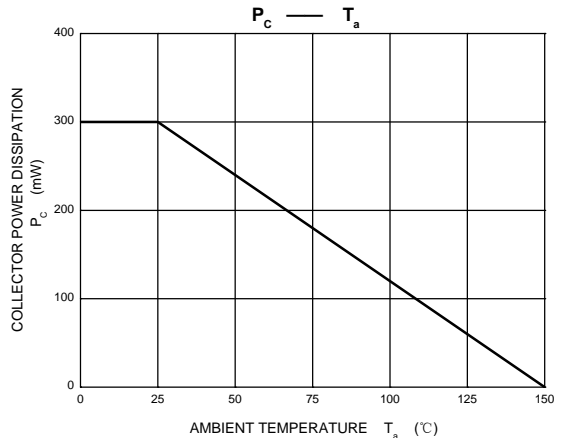
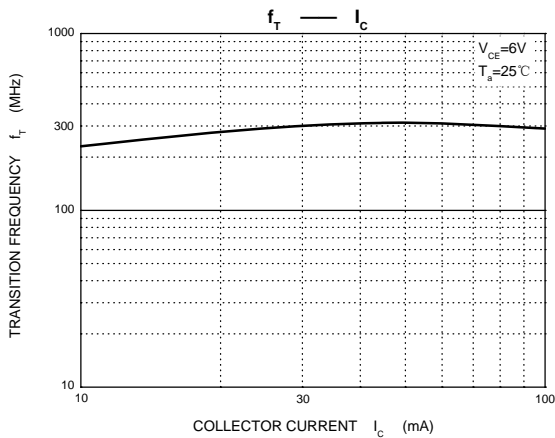
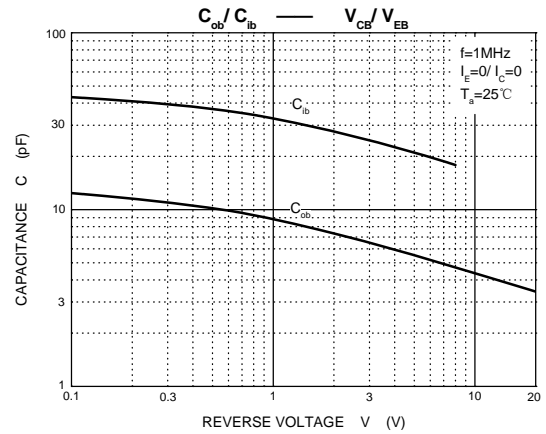
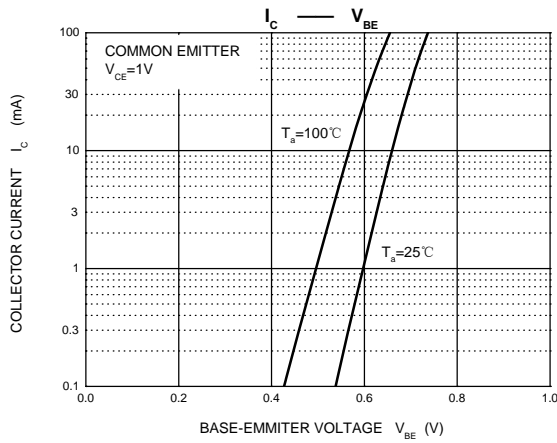
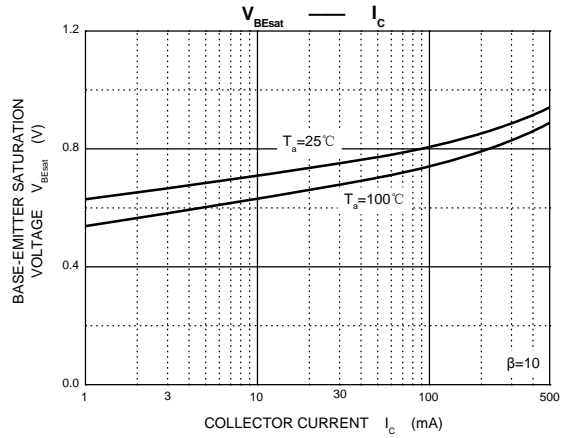
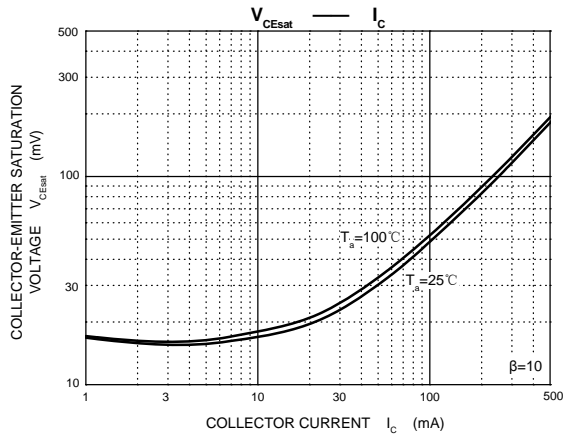
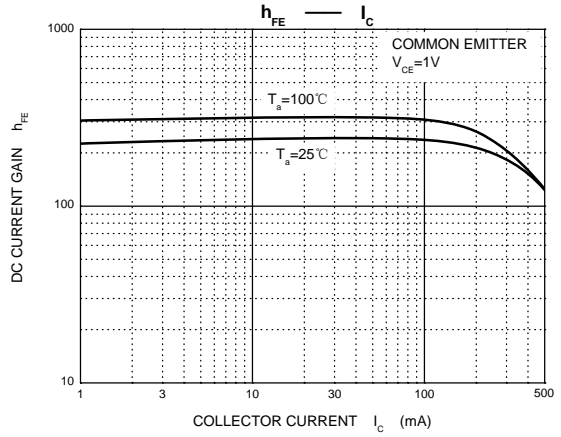
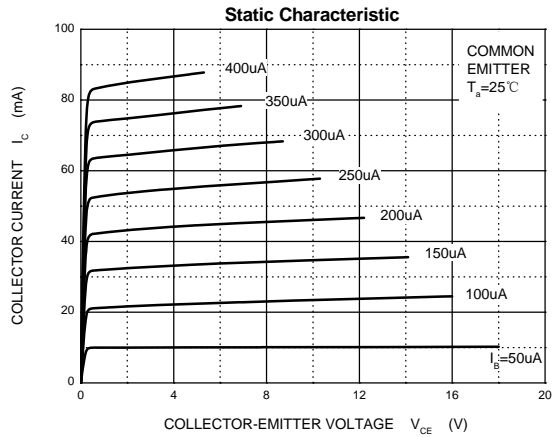


## ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$ unless otherwise specified)

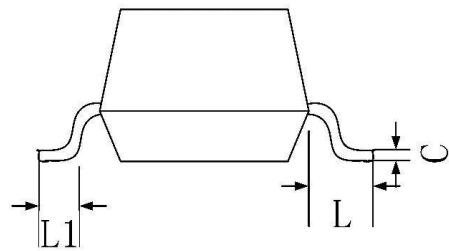
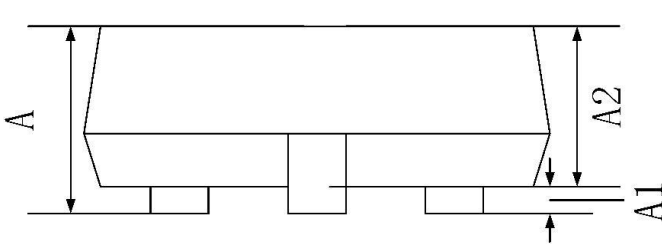
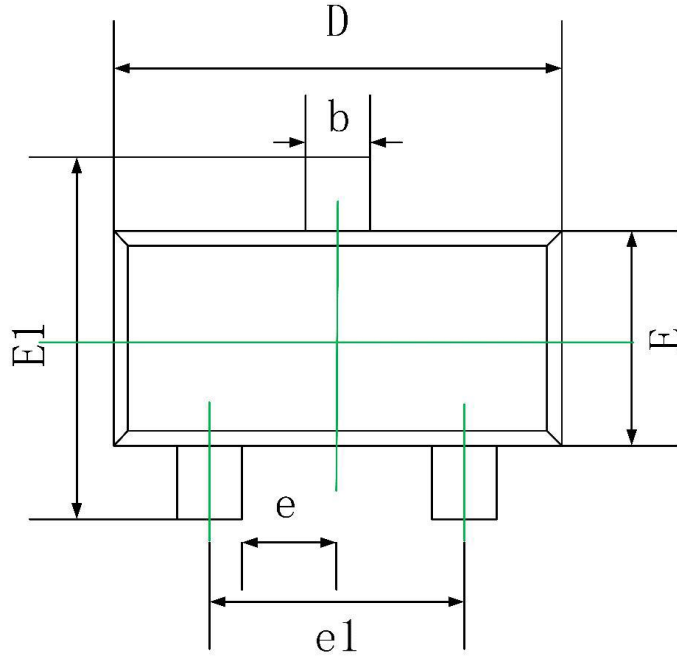
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CB0}$	$I_C=0.1\text{mA}, I_E=0$	40			V
Collector-emitter breakdown voltage	$V_{(BR)CE0}$	$I_C=1\text{mA}, I_B=0$	25			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=0.1\text{mA}, I_C=0$	5			V
Collector cut-off current	$I_{CB0}$	$V_{CB}=40\text{V}, I_E=0$			0.1	$\mu\text{A}$
Collector cut-off current	$I_{CE0}$	$V_{CE}=20\text{V}, I_B=0$			0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB}=5\text{V}, I_C=0$			0.1	$\mu\text{A}$
DC current gain	$h_{FE(1)}$	$V_{CE}=1\text{V}, I_C=50\text{mA}$	120		400	
	$h_{FE(2)}$	$V_{CE}=1\text{V}, I_C=500\text{mA}$	40			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=500\text{mA}, I_B=50\text{mA}$			0.6	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C=500\text{mA}, I_B=50\text{mA}$			1.2	V
Base-emitter voltage	$V_{BE}$	$V_{CB}=1\text{V}, I_C=10\text{mA}$			0.7	V
Transition frequency	$f_T$	$V_{CE}=6\text{V}, I_C=20\text{mA}, f=30\text{MHz}$	150			MHz
Collector output capacitance	$C_{ob}$	$V_{CB}=6\text{V}, I_E=0, f=1\text{MHz}$			8	pF

## CLASSIFICATION OF $h_{FE(1)}$

RANK	L	H	J
RANGE	120-200	200-350	300-400



**SOT-23 Package Information**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020

## Pinning information

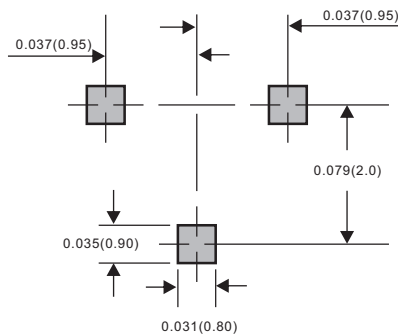
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

## Marking

Type number	Marking code
S9013	J3

## Suggested solder pad layout

### SOT-23



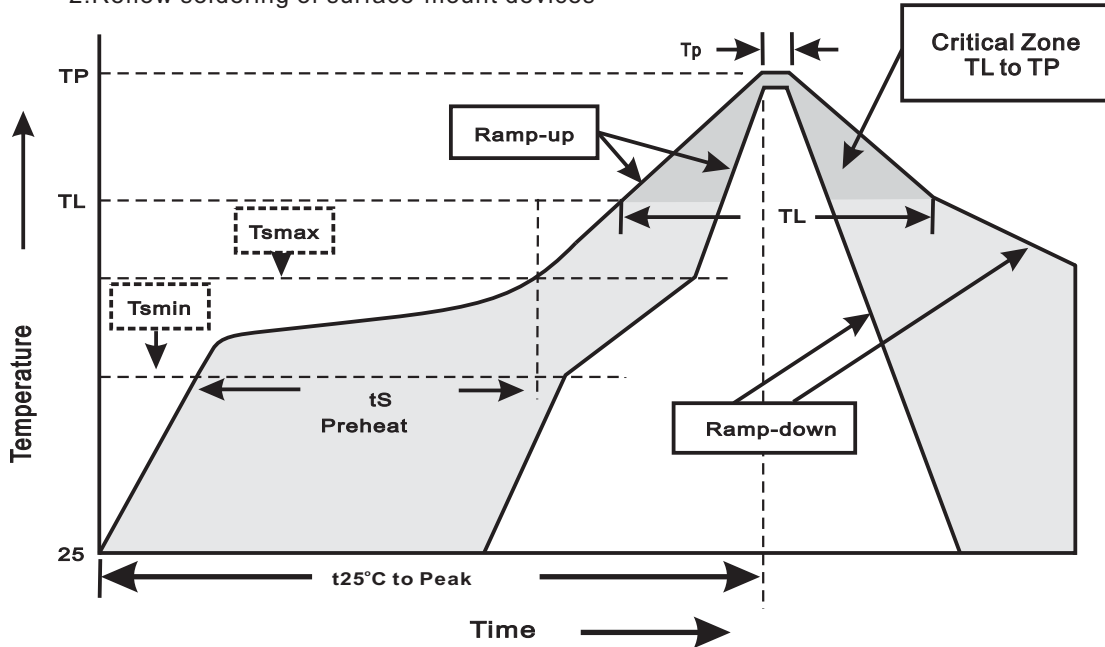
Dimensions in inches and (millimeters)

## Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

**Suggested thermal profiles for soldering processes**

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T <sub>L</sub> to T <sub>P</sub> )	<3°C/sec
Preheat -Temperature Min(T <sub>smmin</sub> ) -Temperature Max(T <sub>smmax</sub> ) -Time(min to max)(t <sub>s</sub> )	150°C 200°C 60~120sec
T <sub>smmax</sub> to T <sub>L</sub> -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T <sub>L</sub> ) -Time(t <sub>L</sub> )	217°C 60~260sec
Peak Temperature(T <sub>P</sub> )	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t <sub>P</sub> )	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes