

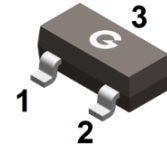
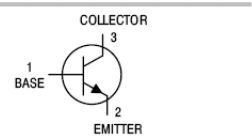
### Features

- High collector current
- Complimentary to S9012
- Excellent  $h_{FE}$  linearity

HF

### Mechanical Data

- Case: SOT-23
- Molding compound: UL flammability classification rating 94V-0
- Terminals: Tin-plated; solderability per MIL-STD-202, Method 208



SOT-23

### Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
S9013	SOT-23	3000 pcs / Tape & Reel	J3

### Maximum Ratings (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Collector-Base Breakdown Voltage	$V_{CBO}$	40	V
Collector-Emitter Breakdown Voltage	$V_{CEO}$	25	V
Emitter-Base Breakdown Voltage	$V_{EBO}$	5	V
Collector Current (Continuous)	$I_C$	0.5	A
Collector Current (Peak)	$I_{CM}$	1	A
Power Dissipation	$P_D$	0.3	W
Junction Temperature Range	$T_J$	-55 ~ +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Air <sup>*1</sup>	$R_{\theta JA}$	-	-	220	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Case <sup>*1</sup>	$R_{\theta JC}$	-	-	130	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Lead <sup>*1</sup>	$R_{\theta JL}$	-	-	140	$^\circ\text{C/W}$

Note 1: The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper

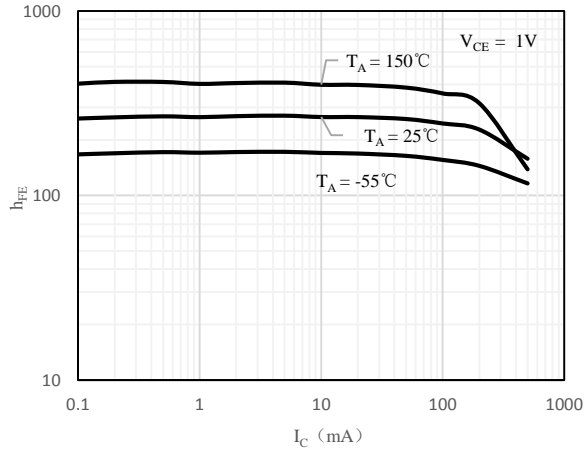
### Electrical Characteristics (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 100\mu\text{A}, I_E = 0$	40	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 0.1\text{mA}, I_B = 0$	25	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 100\mu\text{A}, I_C = 0$	5	-	-	V
Collector Cut-off Current	$I_{CBO}$	$V_{CB} = 40\text{V}, I_E = 0$	-	-	0.1	$\mu\text{A}$
Collector Cut-off Current	$I_{CEO}$	$V_{CE} = 20\text{V}, I_B = 0$	-	-	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	$h_{FE}$	$V_{CE} = 1\text{V}, I_C = 50\text{mA}$	120	-	400	-
		$V_{CE} = 1\text{V}, I_C = 500\text{mA}$	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
Transition Frequency	$f_T$	$I_C = 20\text{mA}, V_{CE} = 6\text{V}, f = 30\text{MHz}$	150	-	-	MHz

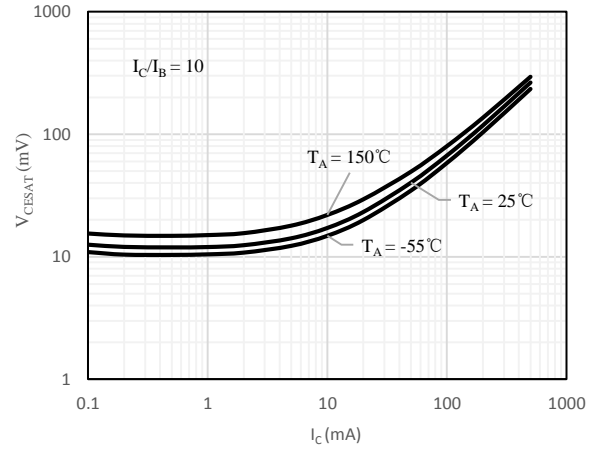
### CLASSIFICATION OF $h_{FE}$

Rank	L	H	J
Range	120-200	200-350	300-400

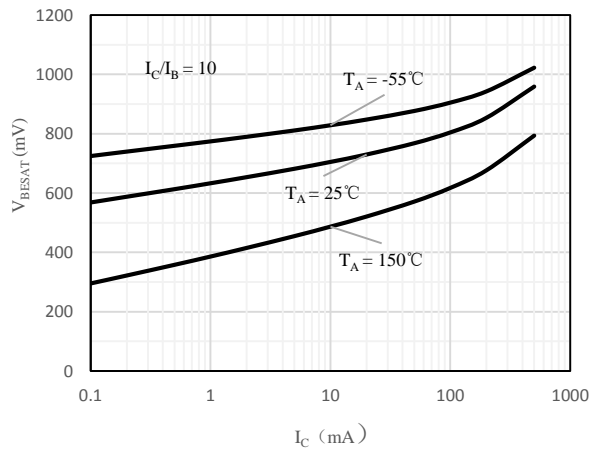
**Ratings and Characteristics Curves** (@  $T_A = 25^\circ\text{C}$  unless otherwise specified)



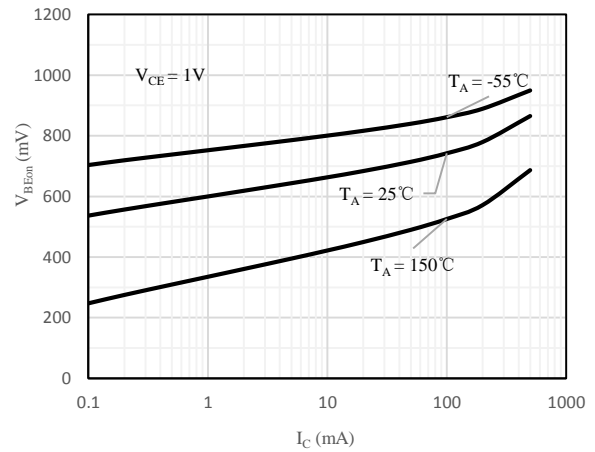
**Fig 1**  $h_{FE}$  vs.  $I_C$  (H)



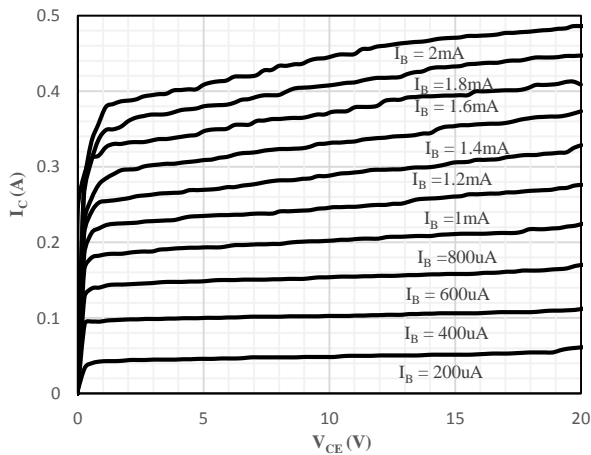
**Fig 2**  $V_{CE(sat)}$  vs.  $I_C$



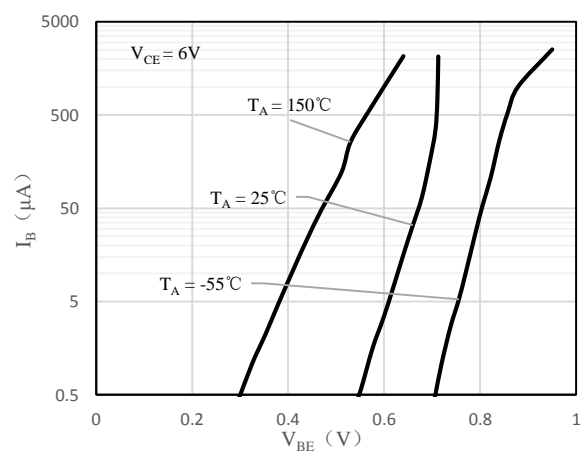
**Fig 3**  $V_{BE(sat)}$  vs.  $I_C$



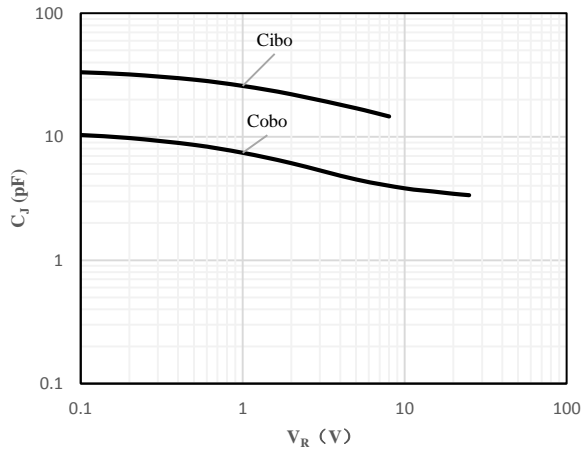
**Fig 4**  $V_{BE(on)}$  vs.  $I_C$



**Fig 5**  $I_C$  vs.  $V_{CE}$

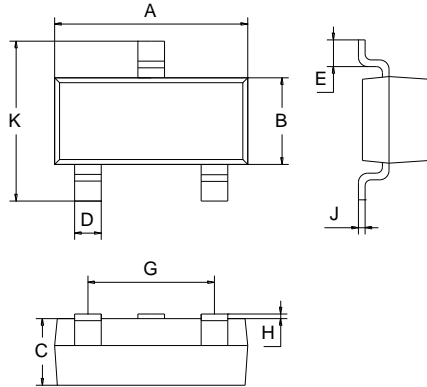


**Fig 6**  $I_B$  vs.  $V_{BE}$



**Fig 7**  $C_J$  vs.  $V_R$

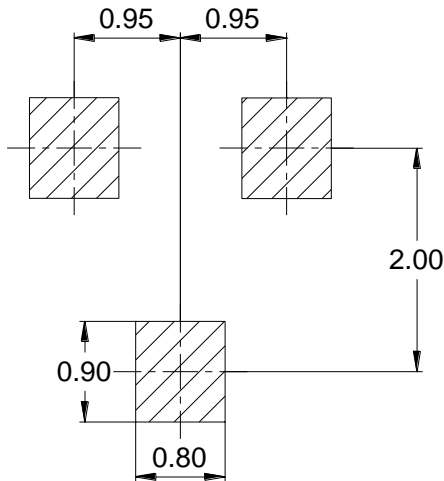
## Package Outline Dimensions (Unit: mm)



SOT-23		
Dimension	Min.	Max.
A	2.70	3.10
B	1.10	1.50
C	0.90	1.10
D	0.30	0.50
E	0.35	0.48
G	1.80	2.00
H	0.02	0.10
J	0.05	0.15
K	2.20	2.60

## Package Outline Dimensions (Unit: mm)

### SOT-23



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