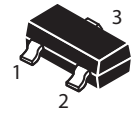
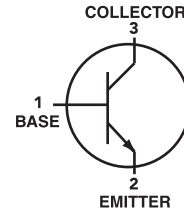


### NPN General Purpose Transistors

 Lead(Pb)-Free



**SOT-23**

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	20	Vdc
Collector-Base Voltage	$V_{CBO}$	40	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0	Vdc
Collector Current-Continuous	$I_C$	500	mAdc

#### THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (1) $T_A=25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	225	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Total Device Dissipation Alumina Substrate, (2) $T_A=25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction and Storage, Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

#### DEVICE MARKING

S9013PLT1=13P	S9013QLT1=13Q	S9013RLT1=13R	S9013SLT1=13S
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#### ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min	Max	Unit
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#### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ( $I_C=0.1\text{ mAdc}, I_E=0$ )	$V_{(BR)CEO}$	20	-	Vdc
Collector-Base Breakdown Voltage ( $I_C=100\text{ }\mu\text{Adc}, I_E=0$ )	$V_{(BR)CBO}$	40	-	Vdc
Emitter-Base Breakdown Voltage ( $I_E=100\text{ }\mu\text{Adc}, I_C=0$ )	$V_{(BR)EBO}$	5.0	-	Vdc
Collector Cutoff Current ( $V_{CB}=35\text{ Vdc}, I_E=0$ )	$I_{CBO}$	-	0.15	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB}=4.0\text{ Vdc}, I_C=0$ )	$I_{EBO}$	-	0.15	$\mu\text{Adc}$

1.FR-5=1.0 x 0.75 x 0.062 in

2.Alumina=0.4 x 0.3 x 0.024 in. 99.5% alumina

## ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}\text{C}$ unless otherwise noted) (Countinued)

Characteristics	Symbol	Min	Max	Unit
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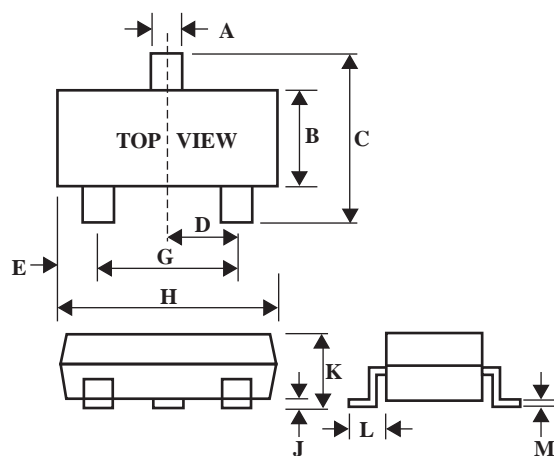
### ON CHARACTERISTICS

DC Current Gain ( $I_C=50\text{ mAdc}, V_{CE}=1.0\text{ Vdc}$ )	$h_{FE}$	100	600	-
Collector-Emitter Saturation Voltage ( $I_C=500\text{ mAdc}, I_B=50\text{ mAdc}$ )	$V_{CE(sat)}$	-	0.6	Vdc

### CLASSIFICATION OF $h_{FE}$

Rank	P	Q	R	S
Range	100-200	150-300	200-400	300-600

## SOT-23 Outline Dimension



SOT-23		
Dim	Min	Max
A	0.35	0.51
B	1.19	1.40
C	2.10	3.00
D	0.85	1.05
E	0.46	1.00
G	1.70	2.10
H	2.70	3.10
J	0.01	0.13
K	0.89	1.10
L	0.30	0.61
M	0.076	0.25