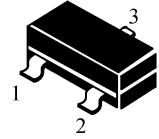


## PNP Switching Transistor

**SOT-23**

- 1. BASE
- 2. EMITTER
- 3. COLLECTOR



### ■ MAXIMUM RATINGS

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage	$V_{CEO}$	-40	Vdc
Collector-Base Voltage	$V_{CBO}$	-40	Vdc
Emitter-Base Voltage	$V_{EBO}$	-6.0	Vdc
Collector Current-Continuous	$I_c$	-200	mAdc

### ■ THERMAL CHARACTERISTICS

Characteristic	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 1.8	mW mW/ $^\circ\text{C}$
Total Device Dissipation Alumina Substrate, $T_A=25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	150 $^\circ\text{C}$ , -55to+150 $^\circ\text{C}$	

**■ ELECTRICAL CHARACTERISTICS**
**( $T_A=25^{\circ}\text{C}$  unless otherwise noted)**
**■ OFF CHARACTERISTICS**

Characteristic	Symbol	Min	Max	Unit
Collector-Emitter Breakdown Voltage(3) ( $I_C=-1.0\text{mA}_{dc}, I_B=0$ )	$V_{(BR)CEO}$	-40	—	Vdc
Collector-Base Breakdown Voltage ( $I_C=-10\mu\text{A}_{dc}, I_E=0$ )	$V_{(BR)CBO}$	-40	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E=-10\mu\text{A}_{dc}, I_C=0$ )	$V_{(BR)EBO}$	-6.0	—	Vdc
Base Cutoff Current ( $V_{CE}=-30\text{V}_{dc}, V_{EB}=-3.0\text{V}_{dc}$ )	$I_{BEX}$	—	-50	nAdc
Collector Cutoff Current ( $V_{CE}=-30\text{V}_{dc}, V_{EB}=-3.0\text{V}_{dc}$ )	$I_{CEX}$	—	-50	nAdc

**■ ON CHARCTERISTICS(2)**

Characteristic	Symbol	Min	Max	Unit
DC Current Gain	$h_{PE}$			—
( $I_C=-0.1\text{mA}_{dc}, V_{CE}=-1.0\text{V}_{dc}$ )		40	—	
( $I_C=-1.0\text{mA}_{dc}, V_{CE}=-1.0\text{V}_{dc}$ )		70	—	
( $I_C=-10\text{mA}_{dc}, V_{CE}=-1.0\text{V}_{dc}$ )		100	300	
( $I_C=-50\text{mA}_{dc}, V_{CE}=-1.0\text{V}_{dc}$ )		60	—	
( $I_C=-100\text{mA}_{dc}, V_{CE}=-1.0\text{V}_{dc}$ )		30	—	
Collector-Emitter Saturation Voltage ( $I_C=-10\text{mA}_{dc}, I_B=-1.0\text{mA}_{dc}$ ) ( $I_C=-50\text{mA}_{dc}, I_B=-5.0\text{mA}_{dc}$ )	$V_{CE(sat)}$	— —	-0.25 -0.4	Vdc
Base-Emitter Saturation Voltage ( $I_C=-10\text{mA}_{dc}, I_B=-1.0\text{mA}_{dc}$ ) ( $I_C=-50\text{mA}_{dc}, I_B=-5.0\text{mA}_{dc}$ )	$V_{BE(sat)}$	-0.65 —	-0.85 -0.95	Vdc

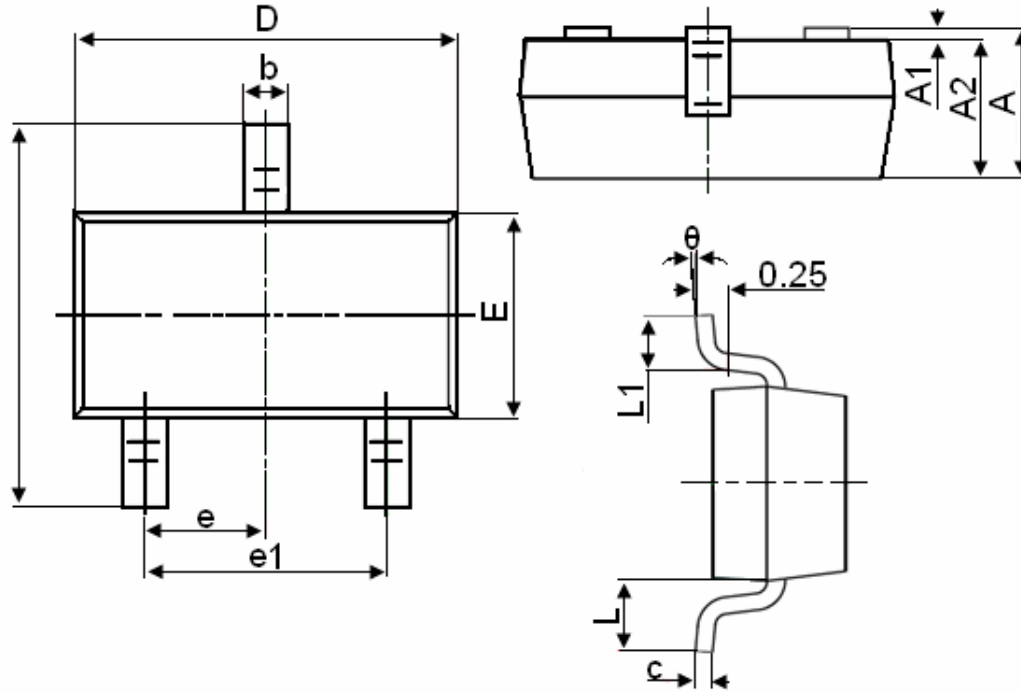
**SMALL-SIGNAL CHARACTERISTICS**

Characteristic	Symbol	Min	Max	Unit
Current-Gain-Bandwidth Product ( $I_C=-10\text{mA dc}$ , $V_{CE}=-20\text{V dc}$ , $f=100\text{MHz}$ )	$f_T$	300	—	MHz
Output Capacitance ( $V_{CB}=-5.0\text{V dc}$ , $I_E=0$ , $f=1.0\text{MHz}$ )	$C_{obo}$	—	4.0	pF
Input Capacitance ( $V_{EB}=-0.5\text{V dc}$ , $I_C=0$ , $f=1.0\text{MHz}$ )	$C_{ibo}$	—	8.0	pF
Input Impedance ( $V_{CE}=-10\text{V dc}$ , $I_C=-1.0\text{mA dc}$ , $f=1.0\text{KHz}$ )	$h_{ie}$	1.0	10	$k\Omega$
Voltage Feedback Ratio ( $V_{CE}=-10\text{V dc}$ , $I_C=-1.0\text{mA dc}$ , $f=1.0\text{KHz}$ )	$h_{re}$	0.5	8.0	$\times 10^{-4}$
Small-Signal Current Gain ( $V_{CE}=-10\text{V dc}$ , $I_C=-1.0\text{mA dc}$ , $f=1.0\text{KHz}$ )	$h_{fe}$	100	400	—
Output Admittance ( $V_{CE}=-10\text{V dc}$ , $I_C=-1.0\text{mA dc}$ , $f=1.0\text{KHz}$ )	$h_{oe}$	1.0	40	$\mu\text{ mhos}$
Noise Figure ( $V_{CE}=-5.0\text{V dc}$ , $I_C=-100\mu\text{A dc}$ , $R_s=1.0\text{ k}\Omega$ , $f=1.0\text{KHz}$ )	NF	—	5.0	dB

**SWITCHING CHARACTERISTICS**

Characteristic	Symbol	Min	Max	Unit
Delay Time	$t_d$ ( $V_{CC}=-3.0\text{V dc}$ , $V_{BE}=-0.5\text{V dc}$ , $I_C=-10\text{mA dc}$ , $I_{B1}=-1.0\text{mA dc}$ )	—	35	ns
Rise Time		$t_r$	—	
Storage Time	$t_s$ ( $V_{CC}=-3.0\text{V dc}$ , $I_C=-10\text{mA dc}$ , $I_{B1}=I_{B2}=-1.0\text{mA dc}$ )	—	225	ns
Fall Time		$t_f$	—	

- FR-5=1.0×0.75×0.062in.
- Alumina=0.4×0.3×0.024in.99.5%alumina.
- Pulse Width≤300us;Duty Cycle≤2.0%.
- Pulse Test: Pulse Width≤300us;Duty Cycle≤2.0%.

**SOT-23 Package Information**


Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
$\theta$	0°	8°