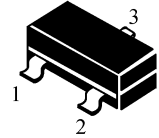


NPN Switching Transistor

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}	60	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) Derate above 25°C	P_D	225	mW
		1.8	mW/°C
Total Device Dissipation Alumina Substrate, Derate above 25°C	P_D	300	mW
		2.4	mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	°C/W
Solder Temperature/Solder Time	T/t	260/10	°C/S
Junction and Storage Temperature	T_J, T_{stg}	150°C, -55to+150°C	

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

Characteristic	Symbol	Min	Max	Unit
Collector-Emitter Breakdown Voltage(3) ($I_C=1.0\text{mA}$, $I_B=0$)	$V_{(BR)CEO}$	40	—	Vdc
Collector-Base Breakdown Voltage ($I_C=10\ \mu\text{A}$, $I_E=0$)	$V_{(BR)CBO}$	60	—	Vdc
Emitter-Base Breakdown Voltage ($I_E=10\ \mu\text{A}$, $I_C=0$)	$V_{(BR)EBO}$	6.0	—	Vdc
Base Cutoff Current ($V_{CE}=30\text{Vdc}$, $V_{EB}=3.0\text{Vdc}$)	I_{BEX}	—	50	nAdc
Collector Cutoff Current ($V_{CE}=30\text{Vdc}$, $V_{EB}=3.0\text{Vdc}$)	I_{CEX}	—	50	nAdc

■ ON CHARCTERISTICS(2)

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

■ SMALL-SIGNAL CHARACTERISTICS

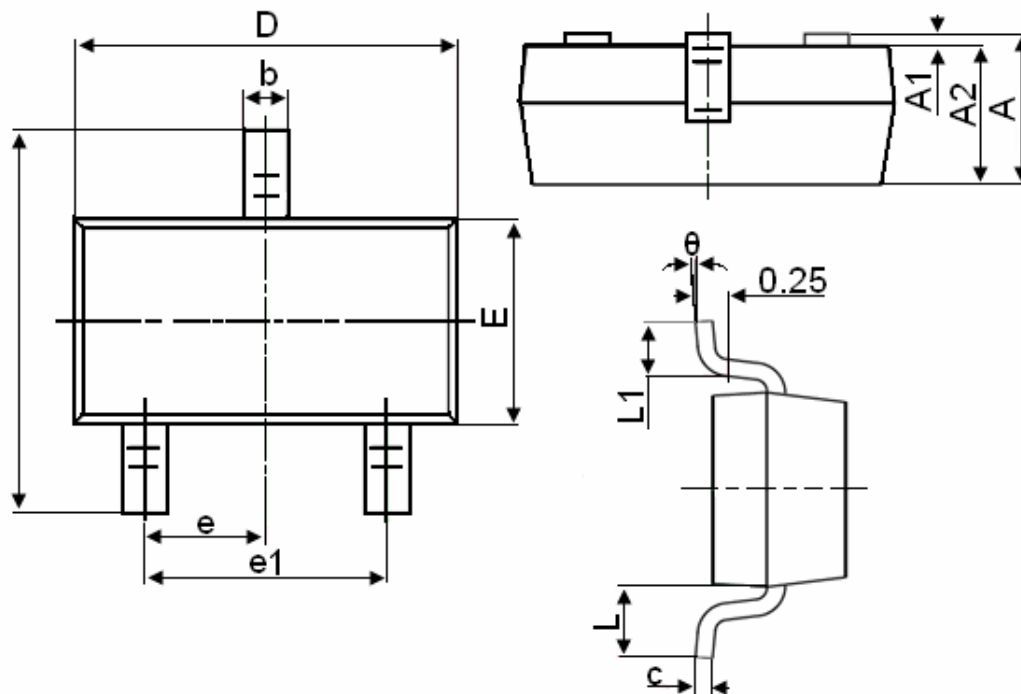
Characteristic	Symbol	Min	Max	Unit
Current-Gain-Bandwidth Product ($I_C=10\text{mA dc}$, $V_{CE}=-20\text{V dc}$, $f=100\text{MHz}$)	f_T	300	—	MHz
Output Capacitance ($V_{CB}=5.0\text{V dc}$, $I_E=0$, $f=1.0\text{MHz}$)	C_{obo}	—	4.0	pF
Input Capacitance ($V_{EB}=0.5\text{V dc}$, $I_C=0$, $f=1.0\text{MHz}$)	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	—	35	ns
Rise Time				
Storage Time	t_s	—	225	ns
Fall Time				

$(V_{CC}=3.0\text{V dc}, V_{BE}=0.5\text{V dc}, I_C=10\text{mA dc}, I_{B1}=1.0\text{mA dc})$
 $(V_{CC}=3.0\text{V dc}, I_C=10\text{mA dc}, I_{B1}=I_{B2}=1.0\text{mA dc})$

- 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
θ	0°	8°

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