

**SOT-323 BIPOLAR TRANSISTORS**  
**TRANSISTOR (NPN)**

**FEATURES**

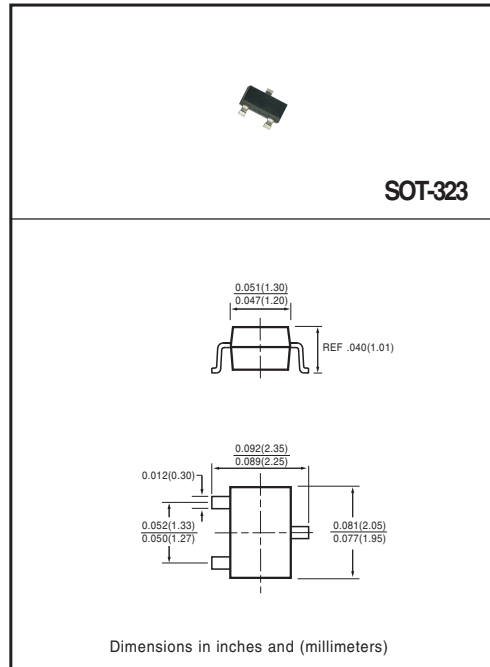
- \* Power dissipation  
Pcm: 0.2 W (Tamb=25°C)
- \* Collector current  
Icm: 0.2 A
- \* Collector-base voltage  
V(BR)CBO: 60 V
- \* Operating and storage junction temperature range  
Tj,Tstg: -55°C to +150°C

**MECHANICAL DATA**

- \* Case: Molded plastic
- \* Epoxy: UL 94V-O rate flame retardant
- \* Lead: MIL-STD-202E method 208C guaranteed
- \* Mounting position: Any
- \* Weight: 0.006 gram

**MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS**

Ratings at 25 °C ambient temperature unless otherwise specified.



Dimensions in inches and (millimeters)

**MAXIMUM RATINGS** ( @ TA = 25°C unless otherwise noted )

RATINGS	SYMBOL	VALUE	UNITS
Zener Current ( see Table "Characteristics" )	-	-	-
Max. Steady State Power Dissipation (1)	P <sub>D</sub>	200	mW
Max. Operating Temperature Range	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C

**ELECTRICAL CHARACTERISTICS** ( @ TA = 25°C unless otherwise noted )

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS
Thermal Resistance Junction to Ambient (1)	R θ <sub>JA</sub>	-	-	625	°C/W
Max. Instantaneous Forward Voltage at I <sub>F</sub> = 10mA	V <sub>F</sub>	-	-	-	Volts

NOTES : 1.Valid provided that terminals are kept at ambient temperature.

**ELECTRICAL CHARACTERISTICS** (@TA=25°C unless otherwise noted)

Chatacteristic	Symbol	Min	Max	Unit
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**OFF CHARACTERISTICS (2)**

Collector-Emitter Breakdown Voltage ( $I_C= 1.0\text{mA}$ , $I_B= 0$ )	$V_{(BR)CEO}$	40	-	Vdc
Collector-Base Breakdown Voltage ( $I_C= 10\mu\text{A}$ , $I_E= 0$ )	$V_{(BR)CBO}$	60	-	Vdc
Emitter-Base Breakdown Voltage ( $I_E= 10\mu\text{A}$ , $I_C= 0$ )	$V_{(BR)EBO}$	5.0	-	Vdc
Collector Cutoff Current ( $V_{CE}= 40\text{Vdc}$ , $I_B=0$ )	$I_{CEO}$	-	0.1	nAdc
Collector Cutoff Current ( $V_{CB}= 60\text{Vdc}$ , $I_E= 0$ )	$I_{CBO}$	-	0.1	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB}= 5\text{Vdc}$ , $I_C= 0$ )	$I_{EBO}$	-	0.1	$\mu\text{Adc}$
Base Cutoff Current ( $V_{CE}= 60\text{Vdc}$ , $V_{EB(off)}= 3.0\text{Vdc}$ )	$I_{BL}$	-	50	nAdc

**ON CHARACTERISTICS (2)**

DC Current Gain ( $I_C= 100\mu\text{A}$ , $V_{CE}= 1.0\text{Vdc}$ )	hFE	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 ( $I_C= 10\text{mA}$ , $I_B= 1.0\text{mA}$ )	$V_{CE(sat)}$	-	0.25	Vdc
( $I_C= 50\text{mA}$ , $I_B= 5.0\text{mA}$ )		-	0.30	
Base-Emitter Saturation Voltage ( $I_C= 10\text{mA}$ , $I_B= 1.0\text{mA}$ )	$V_{BE(sat)}$	0.65	0.85	Vdc
( $I_C= 50\text{mA}$ , $I_B= 5.0\text{mA}$ )		-	0.95	

**SMALL-SIGNAL CHARACTERISTICS**

Current-Gain-Bandwidth Product (3) ( $I_C= 10\text{mA}$ , $V_{CE}= 20\text{Vdc}$ , $f= 100\text{MHz}$ )	$f_T$	250	-	MHz
Output Capacitance ( $V_{CE}=0.5\text{Vdc}$ , $I_C= 0$ , $f= 1.0\text{MHz}$ )	$C_{obo}$	-	4.0	pF
Input Capacitance ( $V_{EB}=0.5\text{Vdc}$ , $I_C= 0$ , $f= 1.0\text{MHz}$ )	$C_{ibo}$	-	8.0	pF
Input Impedance ( $I_C= 1.0\text{mA}$ , $V_{CE}=10\text{Vdc}$ , $f=1.0\text{kHz}$ )	$h_{ie}$	1.0	10	k $\Omega$
Voltage Feedback Ratio ( $I_C= 1.0\text{mA}$ , $V_{CE}= 10\text{Vdc}$ , $f= 1.0\text{kHz}$ )	$h_{re}$	0.5	8.0	$\times 10^{-4}$
Small-Signal Current Gain ( $I_C= 1.0\text{mA}$ , $V_{CE}= 10\text{Vdc}$ , $f= 1.0\text{kHz}$ )	$h_{fe}$	100	400	-
Output Admittance ( $I_C= 10\text{mA}$ , $V_{CE}= 10\text{Vdc}$ , $f= 1.0\text{kHz}$ )	$h_{oe}$	1.0	40	$\mu\text{s}$
Noise Figure ( $I_C= 100\mu\text{A}$ , $V_{CE}= 5.0\text{Vdc}$ , $R_S= 1.0\text{k}\Omega$ , $f= 1.0\text{kHz}$ )	NF	-	5.0	dB

**SWITCHING CHARACTERISTICS**

Delay Time	$(V_{CC}= 3\text{Vdc}$ , $V_{BE}= 0.5\text{Vdc}$ , $I_C= 10\text{mA}$ , $I_{B1}= 1\text{mA}$ )	$t_d$	-	35	ns
Rise Time		$t_r$	-	35	
Storage Time	$(V_{CC}= 3\text{Vdc}$ , $I_C= 10\text{mA}$ , $I_{B1}= I_{B2}= 1\text{mA}$ )	$t_s$	-	200	ns
Fall Time		$t_f$	-	50	

NOTES : 2. Pulse Test: Pulse Width $\leq$ 300 $\mu\text{s}$ , Duty Cycle $\leq$ 2.0%