



SOLID STATE INC.

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NPN SILICON PLANAR TRANSISTOR

2N2102



TO-39
Metal Can Package

Amplifier Transistor

ABSOLUTE MAXIMUM RATINGS

DESCRIPTION	SYMBOL	VALUE	UNIT
Collector Emitter Voltage	V_{CEO}	65	V
Collector Emitter Voltage, $R_{BE} \leq 10\Omega$	V_{CER}	80	V
Collector Base Voltage	V_{CBO}	120	V
Emitter Base Voltage	V_{EBO}	7.0	V
Collector Current Continuous	I_C	1.0	A
Power Dissipation @ $T_a=25^\circ\text{C}$	P_D	1.0	mW
Derate Above 25°C		5.71	mW/°C
Power Dissipation @ $T_c=25^\circ\text{C}$	P_D	5.0	W
Derate Above 25°C		28.6	mW/°C
Operating and Storage Junction Temperature Range	T_j, T_{stg}	- 65 to +200	°C

THERMAL RESISTANCE

Junction to Ambient in free air	** $R_{th(j-a)}$	175	°C/W
Junction to Case	$R_{th(j-c)}$	35	°C/W

ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$ unless specified otherwise)

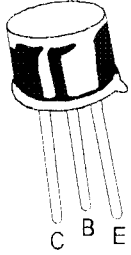
DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Collector Emitter Voltage	V_{CER}	$I_C=1\text{mA}, R_{BE}=10\Omega$	80			V
Collector Emitter Voltage	V_{CEO}	$I_C=1\text{mA}, I_B=0$	65			V
Collector Emitter Voltage	V_{CEX}	$I_C=100\mu\text{A}, V_{EB}=1.5\text{V}$	120			V
Collector Base Voltage	V_{CBO}	$I_C=100\mu\text{A}, I_E=0$	120			V
Emitter Base Voltage	V_{EBO}	$I_E=100\mu\text{A}, I_C=0$	7			V
Collector Cut Off Current	I_{CBO}	$V_{CB}=60\text{V}, I_E=0$			2	nA
		$V_{CB}=60\text{V}, I_E=0, T_a=150^\circ\text{C}$			2	μA
Emitter Cut Off Current	I_{EBO}	$V_{EB}=5\text{V}, I_C=0$			2	nA
DC Current Gain	h_{FE}	$I_C=0.1\text{mA}, V_{CE}=10\text{V}$	20			
		* $I_C=10\text{mA}, V_{CE}=10\text{V}$	35			
		* $I_C=10\text{mA}, V_{CE}=10\text{V}, T_a=55^\circ\text{C}$	20			
		* $I_C=150\text{mA}, V_{CE}=10\text{V}$	40		120	
		* $I_C=500\text{mA}, V_{CE}=10\text{V}$	25			
		* $I_C=1\text{A}, V_{CE}=10\text{V}$	10			

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

** $R_{th(j-a)}$ is measured with the device soldered into a typical printed circuit board

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ELECTRICAL CHARACTERISTICS (T_a=25°C unless specified otherwise)

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Collector Emitter Saturation Voltage	*V _{CE (sat)}	I _C =150mA, I _B =15mA			0.5	V
Base Emitter Saturation Voltage	*V _{BE (sat)}	I _C =150mA, I _B =15mA			1.1	V

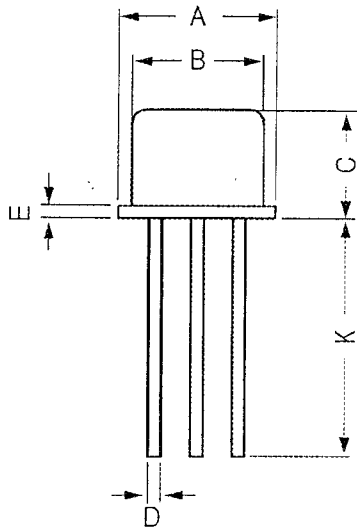
SMALL SIGNAL CHARACTERISTICS

Transition Frequency	f _T	I _C =50mA, V _{CE} =10V, f=20MHz	60			MHz
Output Capacitance	C _{obo}	V _{CB} =10V, I _E =0, f=1MHz			15	pF
Input Capacitance	C _{ibo}	V _{EB} =0.5V, I _C =0, f=1MHz			80	pF
Input Impedance	h _{ib}	I _C =1mA, V _{CE} =5V, f=1KHz	24		34	Ω
		I _C =5mA, V _{CE} =10V, f=1KHz	4.0		8.0	Ω
Voltage Feedback Ratio	h _{rb}	I _C =1mA, V _{CE} =5V, f=1KHz			3.0	x10 ⁻⁴
		I _C =5mA, V _{CE} =10V, f=1KHz			3.0	x10 ⁻⁴
Small Signal Current Gain	h _{re}	I _C =1mA, V _{CE} =5V, f=1KHz	30		100	
		I _C =5mA, V _{CE} =10V, f=1KHz	35		150	
Output Impedance	h _{ob}	I _C =1mA, V _{CE} =5V, f=1KHz	0.01		0.5	μmho
		I _C =5mA, V _{CE} =10V, f=1KHz	0.01		1.0	μmho
Noise Figure	NF	I _C =300μA, V _{CE} =10V, f=1KHz, Bandwidth=1.0 Hz R _S =1kΩ			6.0	dB

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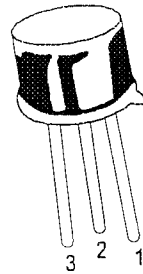
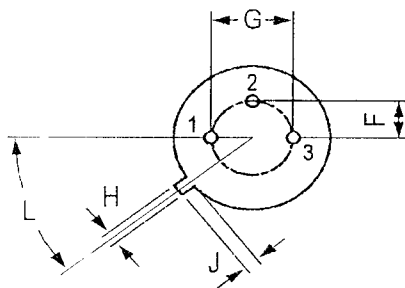
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All dimensions are in mm

DIM	MIN	MAX
A	8.50	9.39
B	7.74	8.50
C	6.09	6.60
D	0.40	0.53
E	—	0.88
F	2.41	2.66
G	4.82	5.33
H	0.71	0.86
J	0.73	1.02
K	12.70	—
L	42 DEG	48 DEG



PIN CONFIGURATION

1. EMITTER
2. BASE
3. COLLECTOR