



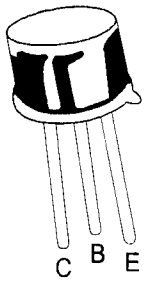
# SOLID STATE INC.

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## PNP SILICON PLANAR SWITCHING TRANSISTORS

2N2904 2N2905



TO-39  
Metal Can Package

### General Purpose Transistor

#### ABSOLUTE MAXIMUM RATINGS

DESCRIPTION	SYMBOL	VALUE	UNIT
Collector Emitter Voltage	$V_{CEO}$	40	V
Collector Base Voltage	$V_{CBO}$	60	V
Emitter Base Voltage	$V_{EBO}$	5	V
Collector Current Continuous	$I_C$	600	mA
Power Dissipation @ $T_a=25^\circ\text{C}$	$P_D$	600	mW
Derate Above $25^\circ\text{C}$		3.43	mW/°C
Power Dissipation @ $T_c=25^\circ\text{C}$	$P_D$	3.0	W
Derate Above $25^\circ\text{C}$		17.2	mW/°C
Operating And Storage Junction Temperature Range	$T_J, T_{stg}$	- 65 to +200	°C

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

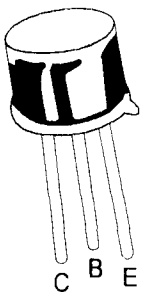
DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Collector Emitter Voltage	$*V_{CEO}$	$I_C=10\text{mA}, I_B=0$	40			V
Collector Base Voltage	$V_{CBO}$	$I_C=10\mu\text{A}, I_E=0$	60			V
Emitter Base Voltage	$V_{EBO}$	$I_E=10\mu\text{A}, I_C=0$	5			V
Collector Cut off Current	$I_{CEX}$	$V_{CE}=30\text{V}, V_{BE}=0.5\text{V}$			50	nA
Collector Cut off Current	$I_{CBO}$	$V_{CB}=50\text{V}, I_E=0$			20	nA
		$V_{CB}=50\text{V}, I_E=0,$ $T_a=150^\circ\text{C}$			20	$\mu\text{A}$
Base Current	$I_B$	$V_{CE}=30\text{V}, V_{BE}=0.5\text{V}$			50	nA

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DC Current Gain	$h_{FE}$	$I_C=0.1\text{mA}, V_{CE}=10\text{V}$	2N2904		2N2905	
		$I_C=1\text{mA}, V_{CE}=10\text{V}$	>20		>35	
		$I_C=10\text{mA}, V_{CE}=10\text{V}$	>25		>50	
		$I_C=10\text{mA}, V_{CE}=10\text{V}$	>35		>75	
		$*I_C=150\text{mA}, V_{CE}=10\text{V}$	40 - 120		100 - 300	
		$*I_C=500\text{mA}, V_{CE}=10\text{V}$	>20		>30	

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



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

**SMALL SIGNAL CHARACTERISTICS**

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Collector Emitter Saturation Voltage	$*V_{CE(sat)}$	$I_C=150\text{mA}, I_B=15\text{mA}$			0.4	V
		$I_C=500\text{mA}, I_B=50\text{mA}$			1.6	V
Base Emitter Saturation Voltage	$*V_{BE(sat)}$	$I_C=150\text{mA}, I_B=15\text{mA}$			1.3	V
		$I_C=500\text{mA}, I_B=50\text{mA}$			2.6	V
Transition Frequency	$**f_T$	$I_C=50\text{mA}, V_{CE}=20\text{V},$ $f=100\text{MHz}$	200			MHz
Output Capacitance	$C_{obo}$	$V_{CB}=10\text{V}, I_E=0,$ $f=100\text{KHz}$			8.0	pF
Input Capacitance	$C_{ibo}$	$V_{BE}=2\text{V}, I_C=0,$ $f=100\text{KHz}$			30	pF

**SWITCHING TIME**

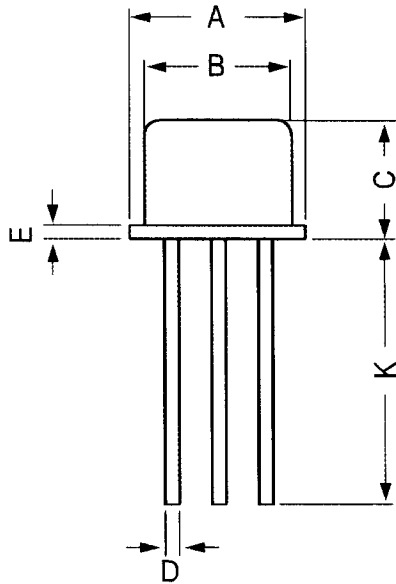
DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Delay Time	$t_d$	$I_C=150\text{mA}, I_{B1}=15\text{mA},$ $V_{CC}=30\text{V}$			10	ns
Rise Time	$t_r$				40	ns
Turn on Time	$t_{on}$				45	ns
Storage time	$t_s$	$I_C=150\text{mA}, I_{B1}=$ $I_{B2}=15\text{mA}, V_{CC}=6\text{V}$			80	ns
Fall Time	$t_f$				30	ns
Turn off Time	$t_{off}$				100	ns

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

\*\*  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.

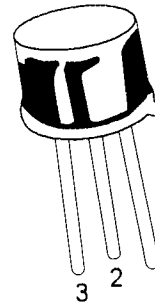
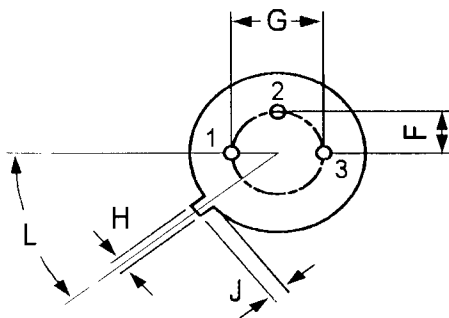
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**Metal Can Package**

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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