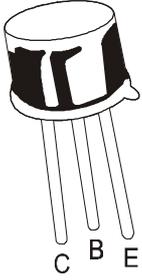


**PNP SILICON PLANAR SWITCHING TRANSISTORS**

**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 @ $T_a=25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	600 3.43	mW mW/ $^\circ\text{C}$
Power Dissipation @ $T_c=25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	3.0 17.2	W mW/ $^\circ\text{C}$
Operating And Storage Junction Temperature Range	$T_j, T_{stg}$	- 65 to +200	$^\circ\text{C}$

**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

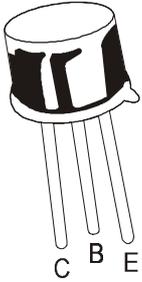
**2N2904**

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DC Current Gain	$h_{FE}$	$I_C=0.1\text{mA}, V_{CE}=10\text{V}$	<b>2N2904</b>		<b>2N2905</b>	
			MIN	TYP	MIN	TYP
		$I_C=1\text{mA}, V_{CE}=10\text{V}$	>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  $\leq 300\text{ms}$ , Duty Cycle  $\leq 2\%$**

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TO-39  
Metal Can Package

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

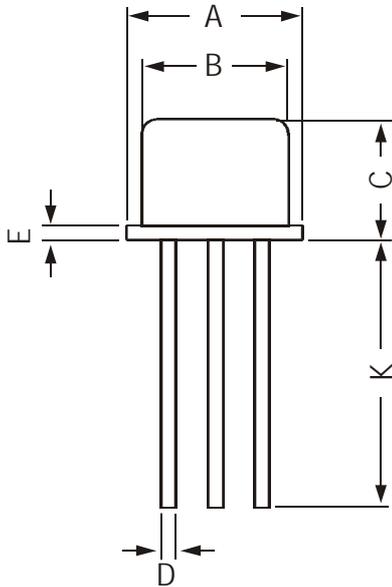
\*Pulse Test: Pulse Width  $\leq 300\text{ms}$ , Duty Cycle  $\leq 2\%$

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

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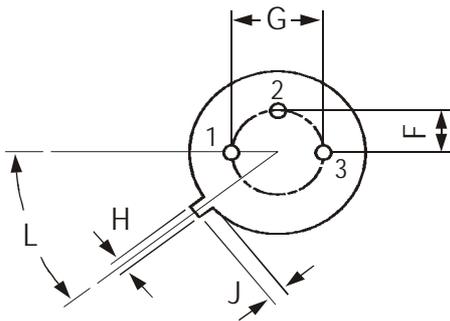
**TO-39  
Metal Can Package**

**TO-39 Metal Can Package**



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

All dimensions are in mm



**PIN CONFIGURATION**

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

**Packing Detail**

PACKAGE	STANDARD PACK		INNER CARTON BOX		OUTER CARTON BOX		
	Details	Net Weight/Qty	Size	Qty	Size	Qty	Gr Wt
TO-39	500 pcs/polybag	540 gm/500 pcs	3" x 7.5" x 7.5"	20K	17" x 15" x 13.5"	32K	40 kgs

### Component Disposal Instructions

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

### Disclaimer

The product information and the selection guides facilitate selection of the CDIL's Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD are believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s).

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