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## 2N2904 Silicon PNP Transistor General Purpose TO-39 Type Package

**Description:**

The 2N2904 is a silicon PNP transistor in a TO-39 type package designed for small signal, general purpose and switching applications.

**Absolute Maximum Ratings:** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Collector-Base Voltage, $V_{CBO}$ .....	60V
Collector-Emitter Voltage, $V_{CEO}$ .....	40V
Emitter-Base Voltage, $V_{EBO}$ .....	5V
Continuous Collector Current, $I_C$ .....	600mA
Total Device Dissipation, $P_D$	
$T_A = +25^\circ\text{C}$ .....	800mW
$T_C = +25^\circ\text{C}$ .....	3W

**Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = 50V$	-	-	20	nA
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 10\mu A$	60	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 10mA$	40	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10\mu A$	5	-	-	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150mA, I_B = 15mA$	-	-	0.4	V
		$I_C = 500mA, I_B = 50mA$	-	-	1.6	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 150mA, I_B = 15mA$	-	-	1.3	V
		$I_C = 500mA, I_B = 50mA$	-	-	2.6	V
DC Current Gain	$h_{FE}$	$I_C = 100\mu A, V_{CE} = 10V$	20	-	-	
		$I_C = 1mA, V_{CE} = 10V$	25	-	-	
		$I_C = 10mA, V_{CE} = 10V$	35	-	-	
		$I_C = 150mA, V_{CE} = 10V$	40	-	120	
		$I_C = 500mA, V_{CE} = 10V$	20	-	-	

**Electrical Characteristics (Cont'd):**  $T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Current-Gain - Bandwidth Product	$f_T$	$I_C = 50\text{mA}, V_{CE} = 20\text{V}, f = 100\text{MHz}$	200	-	-	MHz
Output Capacitance	$C_{obo}$	$V_{CB} = 10\text{V}, f = 100\text{kHz}$	-	-	8	pF
Turn-On Time	$t_{on}$	$V_{CC} = 30\text{V}, I_C = 150\text{mA}, I_B = 15\text{mA}$	-	-	45	ns
Turn-Off Time	$t_{off}$	$V_{CC} = 6\text{V}, I_C = 150\text{mA}, I_{B1} = I_{B2} = 15\text{mA}$	-	-	180	ns

