



ELECTRONICS, INC.  
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## 2N3905 & 2N3906 Silicon PNP Transistor General Purpose TO92 Type Package

### Absolute Maximum Ratings:

Collector–Emitter Voltage, $V_{CEO}$ .....	40V
Collector–Base Voltage, $V_{CBO}$ .....	40V
Emitter–Base Voltage, $V_{EBO}$ .....	5V
Continuous Collector Current, $I_C$ .....	200mA
Total Device Dissipation ( $T_A = +25^\circ\text{C}$ ), $P_D$ .....	625mW
Derate Above $25^\circ\text{C}$ .....	5.0mW/ $^\circ\text{C}$
Total Device Dissipation ( $T_A = +60^\circ\text{C}$ ), $P_D$ .....	250mW
Total Device Dissipation ( $T_C = +25^\circ\text{C}$ ), $P_D$ .....	1.5W
Derate Above $25^\circ\text{C}$ .....	12mW/ $^\circ\text{C}$
Operating Junction Temperature Range, $T_J$ .....	$-55^\circ$ to $+150^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+150^\circ\text{C}$
Thermal Resistance, Junction to Case, $R_{thJC}$ .....	83.3 $^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient, $R_{thJA}$ .....	200 $^\circ\text{C}/\text{W}$

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

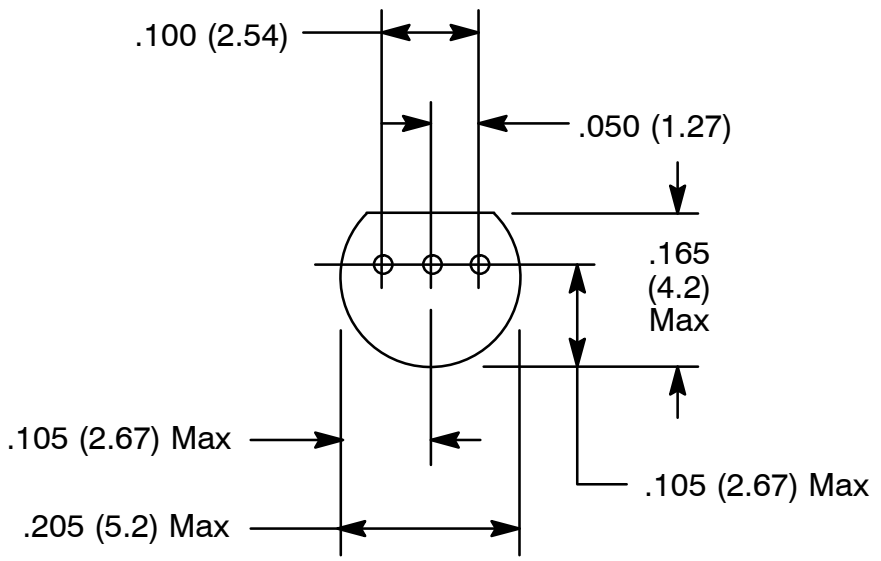
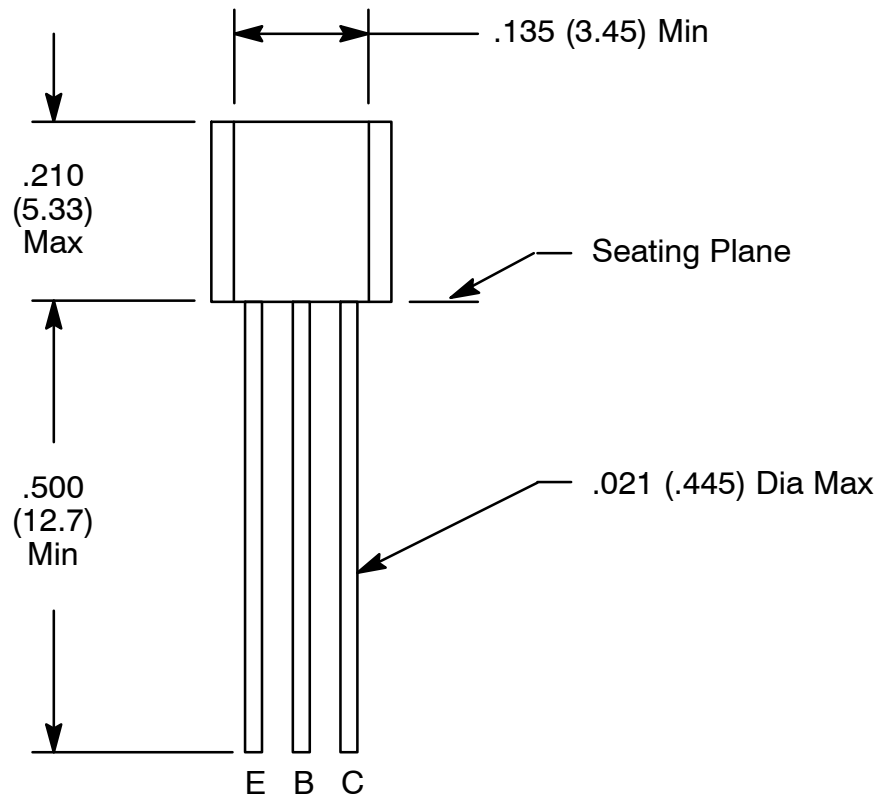
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}$ , $I_B = 0$ , Note 1	40	–	–	V
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 10^\circ\text{A}$ , $I_E = 0$	40	–	–	V
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10^\circ\text{A}$ , $I_C = 0$	5	–	–	V
Collector Cutoff Current	$I_{CEX}$	$V_{CE} = 30\text{V}$ , $V_{EB} = 3\text{V}$	–	–	50	nA
Base Cutoff Current	$I_{BL}$	$V_{CE} = 30\text{V}$ , $V_{EB} = 3\text{V}$	–	–	50	nA
<b>ON Characteristics (Note 1)</b>						
DC Current Gain	$h_{FE}$	$V_{CE} = 1\text{V}$ , $I_C = 0.1\text{mA}$	30	–	–	
2N3905						
2N3906		$V_{CE} = 1\text{V}$ , $I_C = 1\text{mA}$	40	–	–	
2N3905						
2N3906		$V_{CE} = 1\text{V}$ , $I_C = 10\text{mA}$	80	–	–	
2N3905						
2N3906		$V_{CE} = 1\text{V}$ , $I_C = 10\text{mA}$	50	–	150	
2N3905						
2N3906		$V_{CE} = 1\text{V}$ , $I_C = 50\text{mA}$	100	–	300	
2N3905						
2N3906	$V_{CE} = 1\text{V}$ , $I_C = 50\text{mA}$	30	–	–		
2N3905						
2N3906	$V_{CE} = 1\text{V}$ , $I_C = 100\text{mA}$	60	–	–		
2N3905						
2N3906	$V_{CE} = 1\text{V}$ , $I_C = 100\text{mA}$	15	–	–		
2N3905						
2N3906	$V_{CE} = 1\text{V}$ , $I_C = 100\text{mA}$	30	–	–		
2N3905						

Note 1. Pulse Test: Pulse Width  $\leq 300^\circ\text{s}$ , Duty Cycle  $\leq 2\%$ .

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>ON Characteristics (Cont'd)</b> (Note 1)						
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 10\text{mA}, I_B = 1\text{mA}$	–	–	0.25	V
		$I_C = 50\text{mA}, I_B = 5\text{mA}$	–	–	0.4	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 10\text{mA}, I_B = 1\text{mA}$	0.65	–	0.85	V
		$I_C = 50\text{mA}, I_B = 5\text{mA}$	–	–	0.95	V
<b>Small–Signal Characteristics</b>						
Current Gain–Bandwidth Product 2N3905	$f_T$	$I_C = 10\text{mA}, V_{CE} = 20\text{V}, f = 100\text{MHz}$	200	–	–	MHz
			250	–	–	MHz
Output Capacitance	$C_{obo}$	$V_{CB} = 5\text{V}, I_E = 0, f = 1\text{MHz}$	–	–	4.5	pF
Input Capacitance	$C_{ibo}$	$V_{CB} = 0.5\text{V}, I_C = 0, f = 100\text{kHz}$	–	–	10.0	pF
Input Impedance 2N3905	$h_{ie}$	$I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	0.5	–	8.0	$k\Omega$
			2.0	–	12	$k\Omega$
Voltage Feedback Ratio 2N3905	$h_{re}$	$I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	0.1	–	5.0	$\times 10^{-4}$
			0.1	–	10	$\times 10^{-4}$
Small–Signal Current Gain 2N3905	$h_{fe}$	$I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	50	–	200	
			100	–	400	
Output Admittance 2N3905	$h_{oe}$	$I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$	1.0	–	40	$^\circ\text{mhos}$
			3.0	–	60	$^\circ\text{mhos}$
Noise Figure 2N3905	NF	$I_C = 100^\circ\text{A}, V_{CE} = 5\text{V}, R_S = 1k\Omega, f = 10\text{Hz to } 15.7\text{kHz}$	–	–	5.0	db
			–	–	4.0	db
<b>Switching Characteristics</b>						
Delay Time	$t_d$	$V_{CC} = 3\text{V}, V_{EB} = 0.5\text{V}, I_C = 10\text{mA}, I_{B1} = 1\text{mA}$	–	–	35	ns
Rise Time	$t_r$		–	–	35	ns
Storage Time 2N3905	$t_s$	$V_{CC} = 3\text{V}, I_C = 10\text{mA}, I_{B1} = I_{B2} = 1\text{mA}$	–	–	200	ns
			–	–	225	ns
Fall Time 2N3905	$t_f$		–	–	60	ns
			–	–	75	ns

Note 1. Pulse Test: Pulse Width  $\leq 300^\circ\text{s}$ , Duty Cycle  $\leq 2\%$ .



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