



ELECTRONICS, INC.
 44 FARRAND STREET
 BLOOMFIELD, NJ 07003
 (973) 748-5089
<http://www.nteinc.com>

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°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°C	12mW/ $^\circ\text{C}$
Operating Junction Temperature Range, T_J	-55° to $+150^\circ\text{C}$
Storage Temperature Range, T_{stg}	-55° 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	
OFF Characteristics							
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	
ON Characteristics (Note 1)							
DC Current Gain	h_{FE}	$V_{CE} = 1\text{V}$, $I_C = 0.1\text{mA}$	30	–	–		
2N3905			60	–	–		
2N3906		$V_{CE} = 1\text{V}$, $I_C = 1\text{mA}$	40	–	–		
2N3905			80	–	–		
2N3906		$V_{CE} = 1\text{V}$, $I_C = 10\text{mA}$	50	–	150		
2N3905			100	–	300		
2N3906		$V_{CE} = 1\text{V}$, $I_C = 50\text{mA}$	30	–	–		
2N3905			60	–	–		
2N3906		$V_{CE} = 1\text{V}$, $I_C = 100\text{mA}$	15	–	–		
2N3905			30	–	–		
2N3906							

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
ON Characteristics (Cont'd) (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
Small–Signal Characteristics						
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
Switching Characteristics						
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 $\leq 2\%$.

