

New Jersey Semi-Conductor Products, Inc.

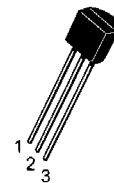
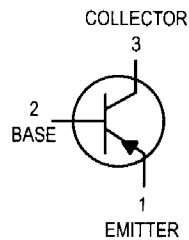
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## General Purpose Transistor

### PNP Silicon

# MPS3906



TO-92

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	-40	Vdc
Collector-Base Voltage	$V_{CBO}$	-40	Vdc
Emitter-Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current — Continuous	$I_C$	-200	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.5 12	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Max	Unit
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#### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage <sup>(1)</sup> ( $I_C = -1.0$ mAdc, $I_B = 0$ )	$V_{(BR)CEO}$	-40	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = -10$ $\mu$ Adc, $I_E = 0$ )	$V_{(BR)CBO}$	-40	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = -10$ $\mu$ Adc, $I_C = 0$ )	$V_{(BR)EBO}$	-5.0	—	Vdc
Collector Cutoff Current ( $V_{CE} = -30$ Vdc, $V_{EB(off)} = -3.0$ Vdc)	$I_{CEX}$	—	-50	nAdc
Base Cutoff Current ( $V_{CE} = -30$ Vdc, $V_{EB(off)} = -3.0$ Vdc)	$I_{BL}$	—	-50	nAdc

1. Pulse Test: Pulse Width = 300  $\mu$ s; Duty Cycle = 2.0%.

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**Quality Semi-Conductors**

**MPS3906****ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS(1)</b>				
DC Current Gain ( $I_C = -0.1 \text{ mAdc}$ , $V_{CE} = -1.0 \text{ Vdc}$ ) ( $I_C = -1.0 \text{ mAdc}$ , $V_{CE} = -1.0 \text{ Vdc}$ ) ( $I_C = -10 \text{ mAdc}$ , $V_{CE} = -1.0 \text{ Vdc}$ ) ( $I_C = -50 \text{ mAdc}$ , $V_{CE} = -1.0 \text{ Vdc}$ ) ( $I_C = -100 \text{ mAdc}$ , $V_{CE} = -1.0 \text{ Vdc}$ )	$h_{FE}$	60 80 100 60 30	— — 300 — —	—
Collector–Emitter Saturation Voltage ( $I_C = -10 \text{ mAdc}$ , $I_B = -1.0 \text{ mAdc}$ ) ( $I_C = -50 \text{ mAdc}$ , $I_B = -5.0 \text{ mAdc}$ )	$V_{CE(sat)}$	— —	—0.25 —0.4	Vdc
Base–Emitter Saturation Voltage ( $I_C = -10 \text{ mAdc}$ , $I_B = -1.0 \text{ mAdc}$ ) ( $I_C = -50 \text{ mAdc}$ , $I_B = -5.0 \text{ mAdc}$ )	$V_{BE(sat)}$	—0.65 —	—0.85 —0.95	Vdc

**SMALL–SIGNAL CHARACTERISTICS**

Current–Gain — Bandwidth Product ( $I_C = -10 \text{ mAdc}$ , $V_{CE} = -20 \text{ V}$ , $f = 100 \text{ MHz}$ )	$f_T$	250	—	MHz
Output Capacitance ( $V_{CB} = -5.0 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{obo}$	—	4.5	pF
Input Capacitance ( $V_{EB} = -0.5 \text{ Vdc}$ , $I_C = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ibo}$	—	10	pF
Input Impedance ( $I_C = -1.0 \text{ mAdc}$ , $V_{CE} = -10 \text{ Vdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{ie}$	2.0	12	k $\Omega$
Voltage Feedback Ratio ( $I_C = -1.0 \text{ mAdc}$ , $V_{CE} = -10 \text{ Vdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{re}$	1.0	10	$\times 10^{-4}$
Small–Signal Current Gain ( $I_C = -1.0 \text{ mAdc}$ , $V_{CE} = -10 \text{ Vdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{fe}$	100	400	—
Output Admittance ( $I_C = -1.0 \text{ mAdc}$ , $V_{CE} = -10 \text{ Vdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{oe}$	3.0	60	$\mu\text{mhos}$
Noise Figure ( $I_C = -100 \mu\text{Adc}$ , $V_{CE} = -5.0 \text{ Vdc}$ , $R_S = 1.0 \text{ k}\Omega$ , $f = 1.0 \text{ kHz}$ )	NF	—	4.0	dB

**SWITCHING CHARACTERISTICS**

Delay Time	( $V_{CC} = -3.0 \text{ Vdc}$ , $V_{BE(off)} = +0.5 \text{ Vdc}$ , $I_C = -10 \text{ mAdc}$ , $I_{B1} = 1.0 \text{ mAdc}$ )	$t_d$	—	35	ns
Rise Time		$t_r$	—	50	ns
Storage Time	( $V_{CC} = -3.0 \text{ Vdc}$ , $I_C = -10 \text{ mAdc}$ , $I_{B1} = I_{B2} = -1.0 \text{ mAdc}$ )	$t_s$	—	600	ns
Fall Time		$t_f$	—	90	ns

1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ ; Duty Cycle = 2.0%.