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## MMBT3906 Silicon PNP Transistor General Purpose Amp, Surface Mount

**Absolute Maximum Ratings:** ( $T_A = +25^\circ\text{C}$ , Note 1 unless otherwise specified)

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 (Note 2), $P_D$ .....	350mW
Derate above $+25^\circ\text{C}$ .....	2.8mW/ $^\circ\text{C}$
Thermal Resistance, Junction–to–Ambient (Note 2), $R_{thJA}$ .....	375 $^\circ\text{C}/\text{W}$
Operating Junction Temperature Range, $T_J$ .....	$-55^\circ$ to $+150^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+150^\circ\text{C}$

Note 1. These are steady–state limits and are based on a maximum junction temperature of  $+150^\circ\text{C}$ .

Note 2. Device is mounted on FR–4 PCB 1.6 inch x 1.6 inch x 0.06 inch.

**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 3	40	–	–	V
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 10\mu\text{A}$ , $I_E = 0$	40	–	–	V
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10\mu\text{A}$ , $I_C = 0$	5	–	–	V
Base Cut–Off Current	$I_{BL}$	$V_{CE} = 30\text{V}$ , $V_{BE} = 3\text{V}$	–	–	50	nA
Collector Cutoff Current	$I_{CEX}$	$V_{CE} = 30\text{V}$ , $V_{BE} = 3\text{V}$	–	–	50	nA
<b>ON Characteristics</b>						
DC Current Gain (Note 3)	$h_{FE}$	$V_{CE} = 1\text{V}$ , $I_C = 0.1\text{mA}$	60	–	–	
		$V_{CE} = 1\text{V}$ , $I_C = 1\text{mA}$	80	–	–	
		$V_{CE} = 1\text{V}$ , $I_C = 10\text{mA}$	100	–	300	
		$V_{CE} = 1\text{V}$ , $I_C = 50\text{mA}$	60	–	–	
		$V_{CE} = 1\text{V}$ , $I_C = 100\text{mA}$	30	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 10\text{mA}$ , $I_B = 1\text{mA}$	–	–	0.25	V
		$I_C = 50\text{mA}$ , $I_B = 5\text{mA}$	–	–	0.40	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

Note 3. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , 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>Small-Signal Characteristics</b>						
Current Gain-Bandwidth Product	$f_T$	$I_C = 10\text{mA}, V_{CE} = 20\text{V}, f = 100\text{MHz}$	250	-	-	MHz
Output Capacitance	$C_{obo}$	$V_{CB} = 5\text{V}, I_E = 0, f = 100\text{kHz}$	-	-	4.5	pF
Input Capacitance	$C_{ibo}$	$V_{EB} = 0.5\text{V}, I_C = 0, f = 100\text{kHz}$	-	-	10	pF
Noise Figure	NF	$V_{CE} = 5\text{V}, I_C = 100\mu\text{A}, R_S = 1\text{k}\Omega, f = 10\text{Hz to } 15.7\text{kHz}$	-	-	4	dB
<b>Switching Characteristics</b>						
Delay Time	$t_d$	$V_{CC} = 3\text{V}, V_{BE} = 0.5\text{V}, I_C = 10\text{mA}, I_{B1} = 1\text{mA}$	-	-	35	ns
Rise Time	$t_r$		-	-	35	ns
Storage Time	$t_s$	$V_{CC} = 3\text{V}, I_C = 10\text{mA}, I_{B1} = I_{B2} = 1\text{mA}$	-	-	225	ns
Fall Time	$t_f$		-	-	75	ns

Note 3. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

