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June 2015

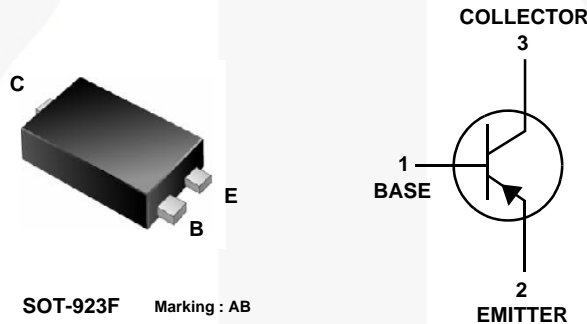


MMBT3906SL — PNP Epitaxial Silicon Transistor

# MMBT3906SL PNP Epitaxial Silicon Transistor

## Features

- General-Purpose Amplifier Transistor
- Ultra Small Surface Mount Package for All Types (Max. 0.43mm Tall)
- Suitable for General Switching and Amplification
- Well Suited for Portable Application
- As Complementary type, NPN MMBT3904SL is Recommended.
- Pb Free



## Ordering Information

Part Number	Top Mark	Package	Packing Method
MMBT3906SL	AB	SOT-923F 3L	Tape and Reel

## Absolute Maximum Ratings<sup>(1)</sup>

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage	-40	V
$V_{CEO}$	Collector-Emitter Voltage	-40	V
$V_{EBO}$	Emitter-Base Voltage	-5	V
$I_C$	Collector Current	-200	mA
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to +150	$^\circ\text{C}$

### Note:

1. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty-cycle operations.

## Thermal Characteristics

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$P_D$	Power Dissipation, by $R_{\theta JA}$	227	mW
	Derate Above $25^\circ\text{C}$	1.81	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient <sup>(2)</sup>	550	$^\circ\text{C}/\text{W}$

### Note:

2. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

## Electrical Characteristics<sup>(3)</sup>

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Max.	Unit
$BV_{CBO}$	Collector-Base Breakdown Voltage	$I_C = -10 \mu\text{A}$ , $I_E = 0$	-40		V
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = -1 \text{ mA}$ , $I_B = 0$	-40		V
$BV_{EBO}$	Emitter-Base Breakdown Voltage	$I_E = -10 \mu\text{A}$ , $I_C = 0$	-5		V
$I_{CEX}$	Collector Cut-Off Current	$V_{CE} = -30 \text{ V}$ , $V_{EB(OFF)} = -0.3 \text{ V}$		-50	nA
$h_{FE}$	DC Current Gain	$V_{CE} = -1.0 \text{ V}$ , $I_C = -0.1 \text{ mA}$	60		
		$V_{CE} = -1.0 \text{ V}$ , $I_C = -1 \text{ mA}$	80		
		$V_{CE} = -1.0 \text{ V}$ , $I_C = -10 \text{ mA}$	100	300	
		$V_{CE} = -1.0 \text{ V}$ , $I_C = -50 \text{ mA}$	60		
		$V_{CE} = -1.0 \text{ V}$ , $I_C = -100 \text{ mA}$	30		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = -10 \text{ mA}$ , $I_B = -1.0 \text{ mA}$		-0.25	V
		$I_C = -50 \text{ mA}$ , $I_B = -5.0 \text{ mA}$		-0.40	
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = -10 \text{ mA}$ , $I_B = -1.0 \text{ mA}$	-0.65	-0.85	V
		$I_C = -50 \text{ mA}$ , $I_B = -5.0 \text{ mA}$		-0.95	
$f_T$	Current Gain-Bandwidth Product	$V_{CE} = -20 \text{ V}$ , $I_C = -10 \text{ mA}$ , $f = 100 \text{ MHz}$	250		MHz
$C_{ob}$	Output Capacitance	$V_{CB} = -5 \text{ V}$ , $I_E = 0$ , $f = 1 \text{ MHz}$		7.0	pF
$C_{ib}$	Input Capacitance	$V_{EB} = -0.5 \text{ V}$ , $I_C = 0$ , $f = 1 \text{ MHz}$		15	pF
$t_d$	Delay Time	$V_{CC} = -3 \text{ V}$ , $I_C = -10 \text{ mA}$ , $I_{B1} = -I_{B2} = -1 \text{ mA}$		35	ns
$t_r$	Rise Time			35	ns
$t_s$	Storage Time			225	ns
$t_f$	Fall Time			75	ns

### Note:

3. DC Item are tested by pulse test: pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2.0\%$ .

Typical Performance Characteristics

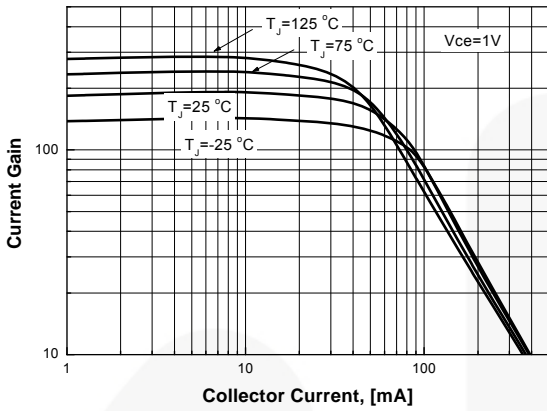


Figure 1. DC Current Gain

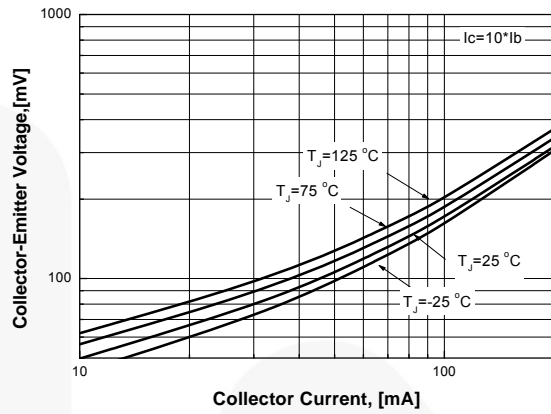


Figure 2. Collector-Emitter Saturation Voltage

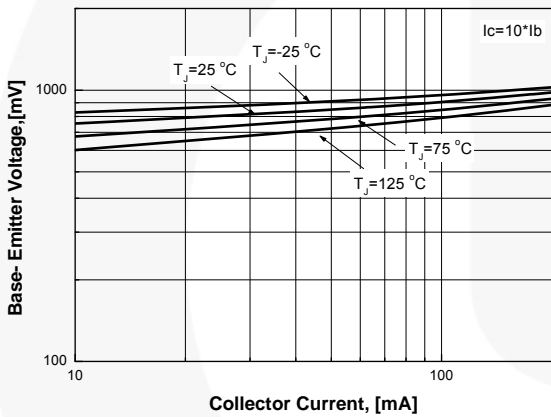


Figure 3. Base- Emitter Saturation Voltage

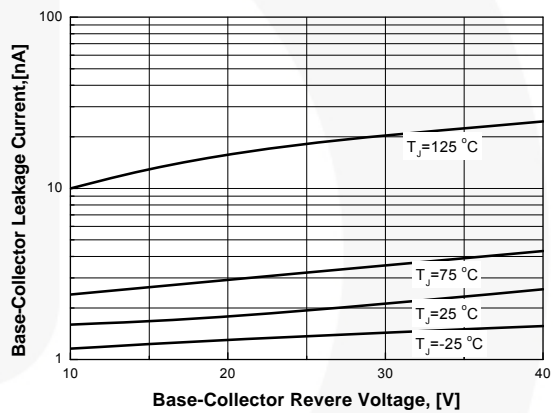


Figure 4. Collector- Base Leakage Current

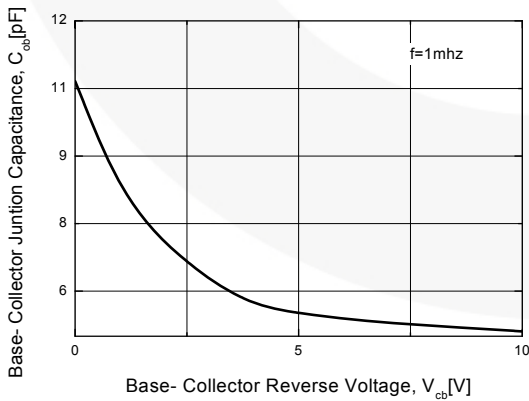


Figure 5. Collector- Base Capacitance

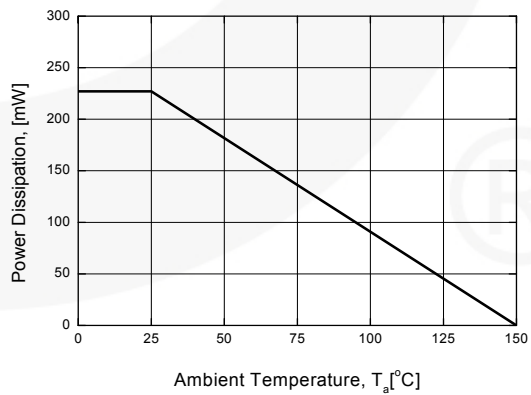
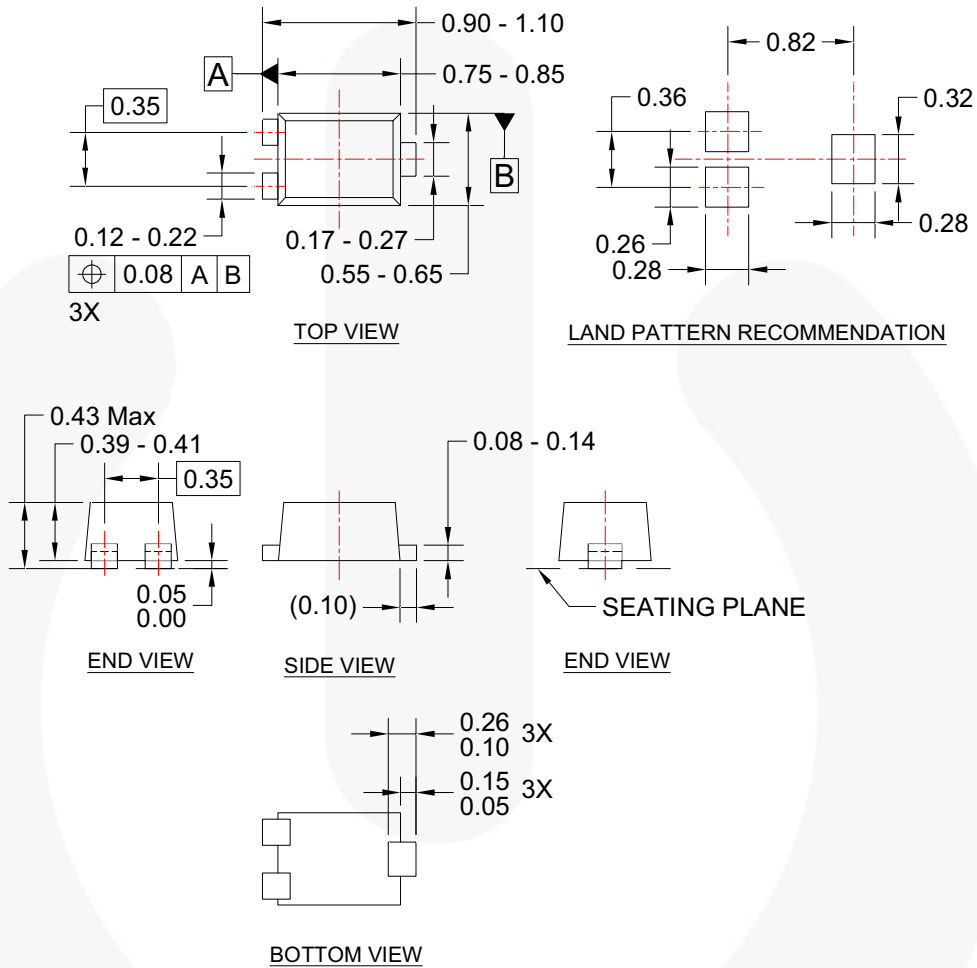


Figure 6. Power Derating

Physical Dimensions



NOTES:






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Figure 7. 3-LEAD, SOT923F, 0.4 mm TALL, FLAT TERMINAL



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