Microsemi LAWRENCE

TECHNICAL DATA

NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/412

Devices		*Qualified Level*
2N3846	**2N3847**	**JAN JANTX JANTXV**

MAXIMUM RATINGS

Ratings	Symbol	2N3846	2N3847	Units
Collector-Emitter Voltage	V_{CEO}	200	300	Vdc
Collector-Base Voltage	V_{CBO}	300	400	Vdc
Emitter-Base Voltage	V_{EBO}	10		Vdc
Collector Current	I_C	20		Adc
Total Power Dissipation @ $T_A = +25^0C$ (1) @ $T_C = +100^0C$ (2)	P_T	4.0 150		W W
Operating & Storage Temperature Range	T_{op}, T_{stg}	-65 to +200		^0C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.5	$^0C/W$

1) Derate linearly 26.6 mW/^{0}C to +175^{0}C
2) Derate linearly 2 W/^{0}C to +175^{0}C

TO-63*

*See Appendix A for Package Outline

ELECTRICAL CHARACTERISTICS

Characteristics		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage I_C = 200 mAdc; I_B = 0	2N3846 2N3847	$V_{(BR)CEO}$	200 300		Vdc
Collector-Emitter Cutoff Current V_{CE} = 300 Vdc; V_{BE} = 0 V_{CE} = 400 Vdc; V_{BE} = 0	2N3846 2N3847	I_{CES}		2 2	mAdc
Collector-Emitter Cutoff Current V_{CE} = 200 Vdc; I_B = 0 V_{CE} = 300 Vdc; I_B = 0	2N3846 2N3847	I_{CEO}		5 5	mAdc
Emitter-Base Cutoff Current V_{BE} = 10 Vdc; I_C = 0		I_{EBO}		250	µAdc

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ELECTRICAL CHARACTERISTICS (con't)

Characteristics	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS (3)				
Forward-Current Transfer Ratio I_C = 1 Adc; V_{CE} = 3.0 Vdc I_C = 5 Adc; V_{CE} = 3.0 Vdc I_C = 10 Adc; V_{CE} = 3.0 Vdc	h_{FE}	 70 40 12	 240 60	
Base-Emitter Voltage V_{CE} = 3 Vdc; I_C = 10 Adc	V_{BE}		1.20	Vdc
Base-Emitter Saturated Voltage I_B = 1.6 Adc; I_C = 10 Adc	$V_{BE(sat)}$		1.30	Vdc
Collector-Emitter Saturated Voltage I_B = 1.6 Adc; I_C = 10 Adc	$V_{CE(sat)}$		0.75	Vdc
DYNAMIC CHARACTERISTICS				
Magnitude of Common-Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio I_C = 1.0 Adc, V_{CE} = 10 Vdc, f = 1 MHz	$\lvert h_{fe} \rvert$	10	35	
Small-Signal Short-Circuit Forward Current Transfer Ratio I_C = 5 Adc, V_{CE} = 10 Vdc, f = 1 kHz	h_{fe}	50	250	
Output Capacitance V_{CB} = 10 Vdc, I_E = 0, 100 kHz ≤ f ≤ 1.0 MHz	C_{obo}		750	pF
SWITCHING CHARACTERISTICS				
Turn-On Time $V_{BE(off)}$ ~ -7.5 Vdc; I_C = 10 Adc; I_{B1} = 2 Adc; I_{B2} = -2 Adc; R_L = 15Ω	t_{on}		4	µs
Turn-Off Time $V_{BE(off)}$ ~ -7.5 Vdc; I_C = 10 Adc; I_{B1} = 2 Adc; I_{B2} = 2 Adc; R_L = 15Ω	t_{off}		7	µs

SAFE OPERATING AREA

DC Tests

T_C = +100°C; V_{CE} = 0 Vdc, I_C = 0 Adc (See Figure 3 on Mil-PRF-19500/412)

Test 1

V_{CE} = 7.5 Vdc; I_C = 20 Adc; t_p = 1.0 s; 1 cycle

Test 2

V_{CE} = 200 Vdc; I_C = 100 mAdc; t_p = 1.0 s, 1 cycle

Test 3

V_{CE} = 58 Vdc; I_C = 1.0 Adc; t_p = 1.0 s, 1 cycle

Burnout by Pulsing (2N3847 only)

T_C = +100°C; V_{CE} = 300 Vdc; I_C = 20 mAdc; t_p = 1.0 s, 1 cycle

Unclamped Inductive Sweep

T_C = +100°C; I_C = 20 Adc; I_B = 2 Adc (See Figure 4 on Mil-PRF-19500/412)

Clamped Inductive Sweep

T_C = +100°C; I_C = 20 Adc; I_B = 2 Adc (See Figure 5 on Mil-PRF-19500/412)

3) Pulse Test: Pulse Width = 300µs, Duty Cycle ≤ 2.0%.