

NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/412

Devices

2N3846

2N3847

Qualified Level

JAN
JANTX
JANTXV

MAXIMUM RATINGS

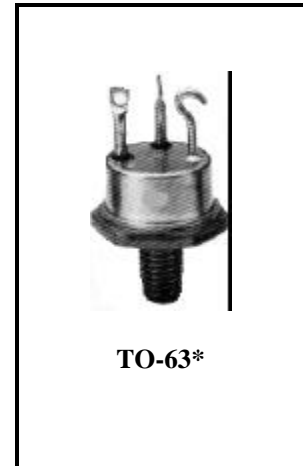
Ratings	Symbol	2N3846	2N3847	Units
Collector-Emitter Voltage	V_{CEO}	200	300	Vdc
Collector-Base Voltage	V_{CBO}	300	400	Vdc
Emitter-Base Voltage	V_{EBO}	10		Vdc
Collector Current	I_C	20		Adc
Total Power Dissipation	P_T	@ $T_A = +25^{\circ}\text{C}$ ⁽¹⁾	4.0	W
		@ $T_C = +100^{\circ}\text{C}$ ⁽²⁾	150	W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

THERMAL CHARACTERISTICS

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

1) Derate linearly 26.6 mW/ $^{\circ}\text{C}$ to +175 $^{\circ}\text{C}$

2) Derate linearly 2 W/ $^{\circ}\text{C}$ to +175 $^{\circ}\text{C}$



*See Appendix A for Package Outline

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage $I_C = 200 \text{ mAdc}; I_B = 0$	2N3846 2N3847	$V_{(BR)CEO}$	200 300	Vdc
Collector-Emitter Cutoff Current $V_{CE} = 300 \text{ Vdc}; V_{BE} = 0$ $V_{CE} = 400 \text{ Vdc}; V_{BE} = 0$	2N3846 2N3847	I_{CES}	2 2	mAdc
Collector-Emitter Cutoff Current $V_{CE} = 200 \text{ Vdc}; I_B = 0$ $V_{CE} = 300 \text{ Vdc}; I_B = 0$	2N3846 2N3847	I_{CEO}	5 5	mAdc
Emitter-Base Cutoff Current $V_{BE} = 10 \text{ Vdc}; I_C = 0$		I_{EBO}	250	μAdc

ELECTRICAL CHARACTERISTICS (con't)

Characteristics	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS ⁽³⁾				
Forward-Current Transfer Ratio $I_C = 1 \text{ Adc}; V_{CE} = 3.0 \text{ Vdc}$ $I_C = 5 \text{ Adc}; V_{CE} = 3.0 \text{ Vdc}$ $I_C = 10 \text{ Adc}; V_{CE} = 3.0 \text{ Vdc}$	h_{FE}	70 40 12	240 60	
Base-Emitter Voltage $V_{CE} = 3 \text{ Vdc}; I_C = 10 \text{ Adc}$	V_{BE}		1.20	Vdc
Base-Emitter Saturated Voltage $I_B = 1.6 \text{ Adc}; I_C = 10 \text{ Adc}$	$V_{BE(sat)}$		1.30	Vdc
Collector-Emitter Saturated Voltage $I_B = 1.6 \text{ Adc}; I_C = 10 \text{ Adc}$	$V_{CE(sat)}$		0.75	Vdc

DYNAMIC CHARACTERISTICS

Magnitude of Common-Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 1.0 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 1 \text{ MHz}$	$ h_{fe} $	10	35	
Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 5 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 1 \text{ kHz}$	h_{fe}	50	250	
Output Capacitance $V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	C_{obo}		750	pF

SWITCHING CHARACTERISTICS

Turn-On Time $V_{BE(off)} \sim -7.5 \text{ Vdc}; I_C = 10 \text{ Adc};$ $I_{B1} = 2 \text{ Adc}; I_{B2} = -2 \text{ Adc}; R_L = 15\Omega$	t_{on}		4	μs
Turn-Off Time $V_{BE(off)} \sim -7.5 \text{ Vdc}; I_C = 10 \text{ Adc};$ $I_{B1} = 2 \text{ Adc}; I_{B2} = 2 \text{ Adc}; R_L = 15\Omega$	t_{off}		7	μs

SAFE OPERATING AREA

DC Tests $T_C = +100^\circ\text{C}; V_{CE} = 0 \text{ Vdc}, I_C = 0 \text{ Adc}$ (See Figure 3 on Mil-PRF-19500/412)
Test 1 $V_{CE} = 7.5 \text{ Vdc}; I_C = 20 \text{ Adc}; t_p = 1.0 \text{ s}; 1 \text{ cycle}$
Test 2 $V_{CE} = 200 \text{ Vdc}; I_C = 100 \text{ mAdc}; t_p = 1.0 \text{ s}, 1 \text{ cycle}$
Test 3 $V_{CE} = 58 \text{ Vdc}; I_C = 1.0 \text{ Adc}; t_p = 1.0 \text{ s}, 1 \text{ cycle}$
Burnout by Pulsing (2N3847 only) $T_C = +100^\circ\text{C}; V_{CE} = 300 \text{ Vdc}; I_C = 20 \text{ mAdc}; t_p = 1.0 \text{ s}, 1 \text{ cycle}$
Unclamped Inductive Sweep $T_C = +100^\circ\text{C}; I_C = 20 \text{ Adc}; I_B = 2 \text{ Adc}$ (See Figure 4 on Mil-PRF-19500/412)
Clamped Inductive Sweep $T_C = +100^\circ\text{C}; I_C = 20 \text{ Adc}; I_B = 2 \text{ Adc}$ (See Figure 5 on Mil-PRF-19500/412)

3) Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.