

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 @ $T_A = +25^{\circ}\text{C}$ ⁽¹⁾ @ $T_C = +100^{\circ}\text{C}$ ⁽²⁾	P_T	4.0 150		W 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	$^{\circ}\text{C/W}$

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

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



TO-63*

*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

2N3846, 2N3847 JAN SERIES

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	h _{fe}	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%.