

NPN SILICON SWITCHING TRANSISTOR

Qualified per MIL-PRF-19500/317

Devices

2N2369A	2N4449
2N2369AU	2N4449U
2N2369AUA	2N4449UA
2N2369AUB	2N4449UB

Qualified Level

JAN
JANTX
JANTXV

MAXIMUM RATINGS

Ratings	Symbol	All UB	All others	Unit	
Collector-Emitter Voltage	V_{CEO}	20	15	Vdc	
Emitter-Base Voltage	V_{EBO}	6.0	4.5	Vdc	
Collector-Base Voltage	V_{CBO}	40		Vdc	
Collector-Emitter Voltage	V_{CES}	40		Vdc	
		@ $T_A = +25^{\circ}C$	@ $T_C = +25^{\circ}C$		
Total Power Dissipation	P_T	2N2369A; 2N4449	0.50 ⁽¹⁾	1.2 ⁽²⁾	W
		All UA	0.50 ⁽⁵⁾	1.2 ⁽²⁾	W
		All UB	0.40 ⁽⁶⁾	1.4 ⁽⁷⁾	
		All U	0.60 ⁽³⁾	1.5 ⁽⁴⁾	
Operating & Storage Junction Temperature Range	T_{op}, T_{stg}	-65 to +200		$^{\circ}C$	

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2N2369A; 2N4449	146	$^{\circ}C/mW$
		All UA	125	
		All UB	135	
		All U	117	
Thermal Resistance, Ambient-to-Case	$R_{\theta JA}$	2N2369A; 2N4449	325	$^{\circ}C/mW$
		All UA	350	
		All UB	437	
		All U	291	

1) Derate linearly 3.08 mW/ $^{\circ}C$ above $T_A = +37.5^{\circ}C$

2) Derate linearly 6.85 mW/ $^{\circ}C$ above $T_C = +25^{\circ}C$

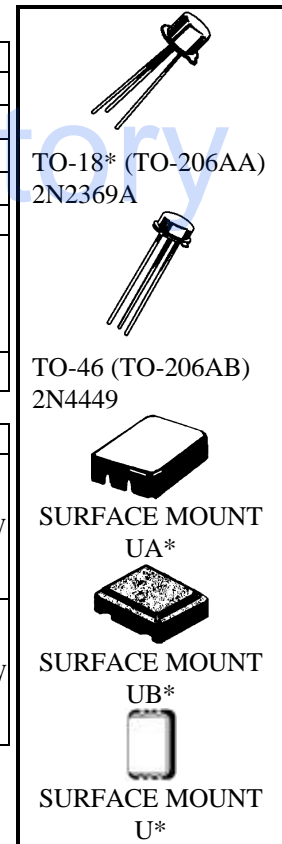
3) Derate linearly 3.44 mW/ $^{\circ}C$ above $T_A = +63.5^{\circ}C$

4) Derate linearly 8.55 mW/ $^{\circ}C$ above $T_C = +63.5^{\circ}C$

5) Derate linearly 2.86 mW/ $^{\circ}C$ above $T_C = +63.5^{\circ}C$

6) Derate linearly 2.29 mW/ $^{\circ}C$ above $T_C = +63.5^{\circ}C$

7) Derate linearly 8.00 mW/ $^{\circ}C$ above $T_C = +63.5^{\circ}C$



*See appendix A for package outline

ELECTRICAL CHARACTERISTICS ($T_A = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage $I_C = 10 \text{ mAdc}$	$V_{(BR)CEO}$	15		Vdc
Collector-Emitter Cutoff Current $V_{CE} = 20 \text{ Vdc}$	I_{CES}		0.4	μA dc
Emitter-Base Breakdown Voltage $V_{EB} = 4.5 \text{ Vdc}$	I_{EBO}		10	μA dc
Emitter-Base Cutoff Current $V_{EB} = 4.0 \text{ Vdc}$			0.25	
Collector-Base Breakdown Voltage $V_{CB} = 40 \text{ Vdc}$	I_{CBO}		10	μA dc
Collector-Base Cutoff Current $V_{CB} = 32 \text{ Vdc}$			0.2	

ON CHARACTERISTICS (1)

Forward-Current Transfer Ratio $I_C = 10 \text{ mAdc}, V_{CE} = 0.35 \text{ Vdc}$ $I_C = 30 \text{ mAdc}, V_{CE} = 0.4 \text{ Vdc}$ $I_C = 10 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$ $I_C = 100 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$	h_{FE}	40 30 40 20	120 120 120 120	
Collector-Emitter Saturation Voltage $I_C = 10 \text{ mAdc}, I_B = 1.0 \text{ mAdc}$ $I_C = 30 \text{ mAdc}, I_B = 3.0 \text{ mAdc}$ $I_C = 100 \text{ mAdc}, I_B = 10 \text{ mAdc}$	$V_{CE(sat)}$		0.20 0.25 0.45	Vdc
Base-Emitter Saturation Voltage $I_C = 10 \text{ mAdc}, I_B = 1.0 \text{ mAdc}$ $I_C = 30 \text{ mAdc}, I_B = 3.0 \text{ mAdc}$ $I_C = 100 \text{ mAdc}, I_B = 10 \text{ mAdc}$	$V_{BE(sat)}$	0.70 0.80	0.85 0.90 1.20	Vdc

DYNAMIC CHARACTERISTICS

Forward Current Transfer Ratio $I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 100 \text{ MHz}$	$ h_{fe} $	5.0	10	
Output Capacitance $V_{CB} = 5.0 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	C_{obo}		4.0	pF
Input Capacitance $V_{EB} = 0.5 \text{ Vdc}, I_C = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	C_{ibo}		5.0	pF

(1)Pulse Test: Pulse Width = 300 μs , Duty Cycle \leq 2.0%.**SWITCHING CHARACTERISTICS**

Turn-On Time $I_C = 10 \text{ mAdc}; I_{B1} = 3.0 \text{ mAdc}, I_{B2} = 1.5 \text{ mAdc}$	t_{on}		12	ηs
Turn-Off Time $I_C = 10 \text{ mAdc}; I_{B1} = 3.0 \text{ mAdc}, I_{B2} = 1.5 \text{ mAdc}$	t_{off}		18	ηs
Charge Storage Time $I_C = 10 \text{ mAdc}; I_{B1} = 10 \text{ mAdc}, I_{B2} = 10 \text{ mAdc}$	t_s		13	ηs