

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
@ $T_A = +25^{\circ}\text{C}$ @ $T_C = +25^{\circ}\text{C}$				
Total Power Dissipation 2N2369A; 2N4449 All UA All UB All U	P_T	0.50 ⁽¹⁾	1.2 ⁽²⁾	W
		0.50 ⁽⁵⁾	1.2 ⁽²⁾	W
		0.40 ⁽⁶⁾	1.4 ⁽⁷⁾	
		0.60 ⁽³⁾	1.5 ⁽⁴⁾	
Operating & Storage Junction Temperature Range	T_{op}, T_{stg}	-65 to +200		$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

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

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

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

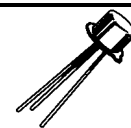
3) Derate linearly 3.44 mW/ $^{\circ}\text{C}$ above $T_A = +63.5^{\circ}\text{C}$

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

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

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

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



TO-18* (TO-206AA)
2N2369A



TO-46 (TO-206AB)
2N4449



SURFACE MOUNT
UA*



SURFACE MOUNT
UB*



SURFACE MOUNT
U*

*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	μAdc
Emitter-Base Breakdown Voltage $V_{EB} = 4.5 \text{ Vdc}$	I_{EBO}		10	μAdc
Emitter-Base Cutoff Current $V_{EB} = 4.0 \text{ Vdc}$			0.25	
Collector-Base Breakdown Voltage $V_{CB} = 40 \text{ Vdc}$	I_{CBO}		10	μAdc
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	120	
		30	120	
		40	120	
		20	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