

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 $T_C = +63.5^{\circ}C$



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 = 25⁰C unless otherwise noted)

Characteristics	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage I _C = 10 mA _{dc}	V _{(BR)CEO}	15		V _{dc}
Collector-Emitter Cutoff Current V _{CE} = 20 V _{dc}	I _{CES}		0.4	μA _{dc}
Emitter-Base Breakdown Voltage V _{EB} = 4.5 V _{dc}	I _{EBO}		10	μA _{dc}
Emitter-Base Cutoff Current V _{EB} = 4.0 V _{dc}			0.25	
Collector-Base Breakdown Voltage V _{CB} = 40 V _{dc}	I _{CBO}		10	μA _{dc}
Collector-Base Cutoff Current V _{CB} = 32 V _{dc}			0.2	

ON CHARACTERISTICS (1)

Forward-Current Transfer Ratio I _C = 10 mA _{dc} , V _{CE} = 0.35 V _{dc} I _C = 30 mA _{dc} , V _{CE} = 0.4 V _{dc} I _C = 10 mA _{dc} , V _{CE} = 1.0 V _{dc} I _C = 100 mA _{dc} , V _{CE} = 1.0 V _{dc}	h _{FE}		40	120	
			30	120	
			40	120	
			20	120	
Collector-Emitter Saturation Voltage I _C = 10 mA _{dc} , I _B = 1.0 mA _{dc} I _C = 30 mA _{dc} , I _B = 3.0 mA _{dc} I _C = 100 mA _{dc} , I _B = 10 mA _{dc}	V _{CE(sat)}			0.20	V _{dc}
			0.25		
			0.45		
Base-Emitter Saturation Voltage I _C = 10 mA _{dc} , I _B = 1.0 mA _{dc} I _C = 30 mA _{dc} , I _B = 3.0 mA _{dc} I _C = 100 mA _{dc} , I _B = 10 mA _{dc}	V _{BE(sat)}		0.70	0.85	V _{dc}
			0.80	0.90	
				1.20	

DYNAMIC CHARACTERISTICS

Forward Current Transfer Ratio I _C = 10 mA _{dc} , V _{CE} = 10 V _{dc} , f = 100 MHz	h _{fe}	5.0	10	
Output Capacitance V _{CB} = 5.0 V _{dc} , I _E = 0, 100 kHz ≤ f ≤ 1.0 MHz	C _{obo}		4.0	pF
Input Capacitance V _{EB} = 0.5 V _{dc} , I _C = 0, 100 kHz ≤ f ≤ 1.0 MHz	C _{ibo}		5.0	pF

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

SWITCHING CHARACTERISTICS

Turn-On Time I _C = 10 mA _{dc} ; I _{B1} = 3.0 mA _{dc} , I _{B2} = 1.5 mA _{dc}	t _{on}		12	ns
Turn-Off Time I _C = 10 mA _{dc} ; I _{B1} = 3.0 mA _{dc} , I _{B2} = 1.5 mA _{dc}	t _{off}		18	ns
Charge Storage Time I _C = 10 mA _{dc} ; I _{B1} = 10 mA _{dc} , I _{B2} = 10 mA _{dc}	t _s		13	ns