

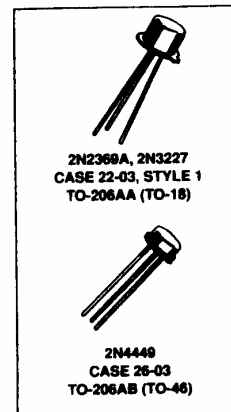
**SEMICONDUCTOR
TECHNICAL DATA**

**2N2369A
2N3227
2N4449**

**NPN Silicon
Small-Signal Transistors**

...designed for general-purpose switching applications.

MAXIMUM RATINGS					
Rating	Symbol	2N2369A	2N3227	2N4449	Unit
Collector-Emitter Voltage	V _{CEO}	15	20	15	V _{dc}
Collector-Emitter Voltage	V _{CES}	40	40	40	V _{dc}
Collector-Base Voltage	V _{CBO}	40	40	40	V _{dc}
Emitter-Base Voltage	V _{EBO}	4.5	6.0	4.5	V _{dc}
Total Device Dissipation @ T _A = 25°C	P _T	360	360	300	mW
Derate above 25°C		2.06	2.06	1.71	mW/°C
@ T _C = 25°C		1.2	1.2	1.5	Watts
Derate above 25°C		6.85	6.85	8.56	mW/°C
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-65 to 200			°C



ELECTRICAL CHARACTERISTICS (T _A = 25°C unless otherwise noted.)					
Characteristic	Symbol	Min	Max	Unit	
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ⁽¹⁾ (I _C = 10 mA _{dc} , I _B = 0)	2N2369A, 2N4449 2N3227	V _{(BR)CEO}	15 20	—	V _{dc}
Collector-Emitter Breakdown Voltage (I _C = 10 μA _{dc} , I _E = 0)		V _{(BR)CES}	40	—	V _{dc}
Collector-Base Breakdown Voltage (I _C = 10 μA _{dc} , I _E = 0)		V _{(BR)CBO}	40	—	V _{dc}
Emitter-Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0)	2N2369A, 2N4449 2N3227	V _{(BR)EBO}	4.5 6.0	—	V _{dc}
Collector Cutoff Current (V _{CB} = 20 V _{dc} , I _E = 0)		I _{CBO}	—	0.2	μA _{dc}
(V _{CB} = 20 V _{dc} , I _E = 0, T _A = 150°C)			—	30	

(1) Pulsed. Pulse Width 250 to 350 μs. Duty Cycle 10 to 2.0%.

(continued)

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2N2369A, 2N4449, 2N3227 SERIES

ELECTRICAL CHARACTERISTICS — continued (T _A = 25°C unless otherwise noted.)				
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS (continued)				
Collector Cutoff Current (V _{CE} = 10 Vdc, V _{BE} = 0.25 Vdc) (V _{CE} = 10 Vdc, V _{BE} = 0.25 Vdc, T _A = 125°C)	I _{CEX}	—	0.3 30	μAdc
Collector Cutoff Current (V _{CE} = 20 Vdc, I _E = 0)	I _{CES}	—	0.4	μAdc
Emitter Cutoff Current (V _{BE} = 4.0 Vdc, I _C = 0)	I _{EBO}	—	0.25	μAdc
ON CHARACTERISTICS				
DC Current Gain ⁽¹⁾ (I _C = 10 mAdc, V _{CE} = 0.35 Vdc)	2N2369A, 2N4449 2N3227	h _{FE}	40 70	120 250
(I _C = 30 mAdc, V _{CE} = 0.4 Vdc)	2N2369A, 2N4449 2N3227		30 40	120 250
(I _C = 10 mAdc, V _{CE} = 1.0 Vdc)	2N2369A, 2N4449 2N3227		40 100	120 300
(I _C = 100 mAdc, V _{CE} = 1.0 Vdc)	2N2369A, 2N4449 2N3227		20 30	120 150
(I _C = 10 mAdc, V _{CE} = 1.0 Vdc, T _A = -55°C)	2N2369A, 2N4449 2N3227		20 40	— —
Collector-Emitter Saturation Voltage (I _C = 10 mAdc, I _B = 1.0 mAdc) (I _C = 30 mAdc, I _B = 3.0 mAdc) (I _C = 100 mAdc, I _B = 10 mAdc) (I _C = 10 mAdc, I _B = 1.0 mAdc, T _A = 125°C)		V _{CE(sat)}	— — — —	0.2 0.25 0.45 0.3
Base-Emitter Saturation Voltage (I _C = 10 mAdc, I _B = 1.0 mAdc) (I _C = 30 mAdc, I _B = 3.0 mAdc) (I _C = 100 mAdc, I _B = 10 mAdc) (I _C = 10 mAdc, I _B = 1.0 mAdc, T _A = 125°C) (I _C = 10 mAdc, I _B = 1.0 mAdc, T _A = -55°C)	2N2369A, 2N4449 2N3227	V _{BE(sat)}	0.7 — 0.8 0.59 0.50	0.85 0.9 1.2 — 1.02
SMALL-SIGNAL CHARACTERISTICS				
Collector-Base Capacitance (V _{CB} = 5.0 Vdc, I _E = 0, f = 0.1 to 1.0 MHz)		C _{obo}	—	4.0
Input Capacitance (V _{BE} = 0.5 Vdc, I _C = 0, f = 0.1 to 1.0 MHz)	2N2369A, 2N4449 2N3227	C _{ibo}	—	5.0 4.0
Small-Signal Current Transfer Ratio, Magnitude (I _C = 10 mAdc, V _{CE} = 10 Vdc, f = 100 MHz)		h _{fe}	5.0	10
SWITCHING CHARACTERISTICS (See Figures 12 and 13)				
Storage Time	2N2369A, 2N4449 2N3227	t _s	—	13 18
Turn On Time		t _(on)	—	12
Turn Off Time	2N2369A, 2N4449 2N3227	t _(off)	—	18 25

⁽¹⁾ Pulsed Pulse Width 750 to 100 μs, Duty Cycle 1.0 to 2.0%

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2N2369AJAN, 2N3227JAN, 2N4449JAN SERIES

ASSURANCE TESTING (Pre/Post Burn-in)				
Burn-in Conditions: $T_A = 25 \pm 3^\circ\text{C}$, $V_{CB} = 12 \text{ Vdc}$				
$P_T = 360 \text{ mW } 2N2369A, 2N3227, 300 \text{ mW } 2N4449$				
Characteristics Tested	Symbol	Initial and End Point Limits		Unit
		Min	Max	
Collector Cutoff Current ($V_{CE} = 20 \text{ Vdc}$)	I_{CES}	—	0.4	μAdc
DC Current Gain ⁽¹⁾ ($I_C = 10 \mu\text{Adc}$, $V_{CE} = 1.0 \text{ Vdc}$)	h_{FE} 2N2369A, 2N4449 2N3227	40 100	120 300	—

Delta from Pre-Burn-in Measured Values		Min	Max	
Delta Collector Cutoff Current	ΔI_{CES}	—	± 100 or ± 25 whichever is greater	% of Initial Value μAdc
Delta DC Current Gain ⁽¹⁾	Δh_{FE}	—	± 15	% of Initial Value

⁽¹⁾ Pulsed. Pulse Width 250 to 350 μs . Duty Cycle 1.0 to 2.0%



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