

## NPN SILICON TRANSISTOR

Qualified per MIL-PRF-19500/317

### DEVICES

2N2369A                      2N2369AUB                      2N4449  
 2N2369AU                      2N2369AUBC \*  
 2N2369AUA

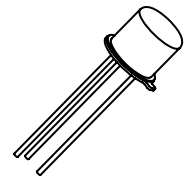
### LEVELS

JAN  
 JANTX  
 JANTXV  
 JANS

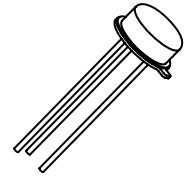
\* Available to JANS quality level only.

### ABSOLUTE MAXIMUM RATINGS ( $T_C = +25^\circ\text{C}$ unless otherwise noted)

Parameters / Test Conditions	Symbol	Value	Unit
Collector-Emitter Voltage 2N2369A / U / UA 2N4449 / UB / UBC	$V_{CEO}$	15 20	Vdc
Emitter-Base Voltage 2N2369A / U / UA 2N4449 / UB / UBC	$V_{EBO}$	4.5 6.0	Vdc
Collector-Base Voltage	$V_{CBO}$	40	Vdc
Collector-Emitter Voltage	$I_{CES}$	40	Vdc
Total Power Dissipation @ $T_A = +25^\circ\text{C}$	$P_T$	0.36 <sup>(1)</sup> 0.36 <sup>(1,5)</sup> 0.50 <sup>(4)</sup>	W
Operating & Storage Junction Temperature Range	$T_{op}, T_{stg}$	-65 to +200	$^\circ\text{C}$



TO-18 (TO-206AA)  
2N2369A



TO-46 (TO-206AB)  
2N4449

### THERMAL CHARACTERISTICS

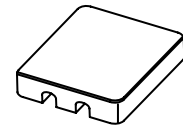
Parameters / Test Conditions	Symbol	Value	Unit
Thermal Resistance, Ambient-to-Case 2N2369A; 2N4449 UA, UB, UBC U	$R_{\theta JA}$	400 400 <sup>(5)</sup> 350	$^\circ\text{C}/\text{W}$

#### Note:

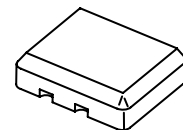
- Derate linearly 2.06 mW/ $^\circ\text{C}$  above  $T_A = +25^\circ\text{C}$ .
- Derate linearly 4.76 mW/ $^\circ\text{C}$  above  $T_C = +95^\circ\text{C}$ .
- Derate linearly 3.08 mW/ $^\circ\text{C}$  above  $T_C = +70^\circ\text{C}$ .
- Derate linearly 3.44 mW/ $^\circ\text{C}$  above  $T_A = +54.5^\circ\text{C}$ .
- Mounted on FR-4 PCB (10z. Cu) with contacts 20 mils larger than package pads.

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

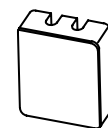
Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage $I_C = 10\text{mA}$	$V_{(BR)CEO}$	15		Vdc
Collector-Base Cutoff Current $V_{CE} = 20\text{Vdc}$	$I_{CES}$		0.4	$\mu\text{A}$



SURFACE MOUNT  
UA



SURFACE MOUNT  
UB & UBC  
(UBC = Ceramic Lid Version)



SURFACE MOUNT  
U (Dual Transistor)

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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS</b>				
Emitter-Base Breakdown Voltage $V_{EB} = 4.5\text{Vdc}$ Emitter-Base Cutoff Current $V_{EB} = 4.0\text{Vdc}$	$I_{EBO}$		10 0.25	$\mu\text{Adc}$
Collector-Base Breakdown Voltage $V_{CB} = 40\text{Vdc}$ Collector-Base Cutoff Current $V_{CB} = 32\text{Vdc}$	$I_{CBO}$		10 0.2	$\mu\text{Adc}$
<b>ON CHARACTERISTICS <sup>(1)</sup></b>				
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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
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

### SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time $I_C = 10\text{mAdc}$ ; $I_{B1} = 3.0\text{mAdc}$ , $I_{B2} = -1.5\text{mAdc}$	$t_{on}$		12	$\eta\text{s}$
Turn-Off Time $I_C = 10\text{mAdc}$ ; $I_{B1} = 3.0\text{mAdc}$ , $I_{B2} = -1.5\text{mAdc}$	$t_{off}$		18	$\eta\text{s}$
Charge Storage Time $I_C = 10\text{mAdc}$ ; $I_{B1} = 10\text{mAdc}$ , $I_{B2} = 10\text{mAdc}$	$t_s$		13	$\eta\text{s}$

(1) Pulse Test: Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .