

## NPN LOW POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/368

### Devices

**2N3439**                      **2N3440**  
**2N3439L**                    **2N3440L**

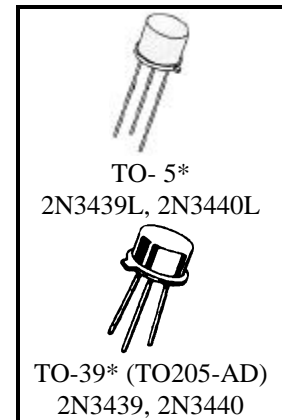
### Qualified Level

**JANTX**  
**JANTXV**

### MAXIMUM RATINGS

Ratings	Symbol	2N3439	2N3440	Units
Collector-Emitter Voltage	$V_{CE0}$	350	250	Vdc
Collector-Base Voltage	$V_{CB0}$	450	300	Vdc
Emitter-Base Voltage	$V_{EBO}$	7.0		Vdc
Collector Current	$I_C$	1.0		Adc
Total Power Dissipation	$P_T$	@ $T_A = 25^{\circ}C^{(1)}$	0.8	W
		@ $T_C = 25^{\circ}C^{(2)}$	5.0	W/ $^{\circ}C$
Operating & Storage Temperature Range	$T_{op}, T_{stg}$	-55 to +200		$^{\circ}C$

- 1) Derate linearly 4.57 mW/ $^{\circ}C$  for  $T_A > +25^{\circ}C$
- 2) Derate linearly 28.5 mW/ $^{\circ}C$  for  $T_C > +25^{\circ}C$



\*See Appendix A for Package Outline

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

Characteristics	Symbol	Min.	Max.	Unit
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#### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage $I_C = 50$ mAdc	2N3439 2N3440	$V_{(BR)CEO}$	350 250	Vdc
Collector-Emitter Cutoff Current $V_{CE} = 300$ Vdc $V_{CE} = 200$ Vdc	2N3439 2N3440	$I_{CEO}$	2.0 2.0	$\mu$ Adc $\mu$ Adc
Emitter-Base Cutoff Current $V_{EB} = 7.0$ Vdc		$I_{EBO}$	10	$\mu$ Adc

**ELECTRICAL CHARACTERISTICS (con't)**

Characteristics	Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS (con't)</b>				
Collector-Emitter Cutoff Current $V_{CE} = 450 \text{ Vdc}$ , $V_{BE} = -1.5 \text{ Vdc}$ $V_{CE} = 300 \text{ Vdc}$ , $V_{BE} = -1.5 \text{ Vdc}$	$I_{CEX}$		5.0 5.0	$\mu\text{Adc}$ $\mu\text{Adc}$
Collector-Base Cutoff Current $V_{CB} = 360 \text{ Vdc}$ $V_{CB} = 250 \text{ Vdc}$ $V_{CB} = 450 \text{ Vdc}$ $V_{CB} = 300 \text{ Vdc}$	$I_{CBO}$		2.0 2.0 5.0 5.0	$\mu\text{Adc}$

**ON CHARACTERISTICS <sup>(3)</sup>**

Forward-Current Transfer Ratio $I_C = 20 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ $I_C = 2.0 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ $I_C = 0.2 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$	$h_{FE}$	40 30 10	160	
Collector-Emitter Saturation Voltage $I_C = 50 \text{ mAdc}$ , $I_B = 4.0 \text{ mAdc}$	$V_{CE(sat)}$		0.5	Vdc
Base-Emitter Saturation Voltage $I_C = 50 \text{ mAdc}$ , $I_B = 4.0 \text{ mAdc}$	$V_{BE(sat)}$		1.3	Vdc

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 10 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 5.0 \text{ MHz}$	$ h_{fe} $	3.0	15	
Forward Current Transfer Ratio $I_C = 5.0 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 1.0 \text{ kHz}$	$h_{fe}$	25		
Output Capacitance $V_{CB} = 10 \text{ Vdc}$ , $I_E = 0$ , $100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	$C_{obo}$		10	pF
Input Capacitance $V_{EB} = 5.0 \text{ Vdc}$ , $I_C = 0$ , $100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	$C_{ibo}$		75	pF

**SWITCHING CHARACTERISTICS**

Turn-On Time $V_{CC} = 200 \text{ Vdc}$ ; $I_C = 20 \text{ mAdc}$ , $I_{B1} = 2.0 \text{ mAdc}$	$t_{on}$		1.0	$\mu\text{s}$
Turn-Off Time $V_{CC} = 200 \text{ Vdc}$ ; $I_C = 20 \text{ mAdc}$ , $I_{B1} = -I_{B2} = 2.0 \text{ mAdc}$	$t_{off}$		10	$\mu\text{s}$

**SAFE OPERATING AREA**

<b>DC Tests</b> $T_C = 25^\circ\text{C}$ , 1 cycle, $t = 1.0 \text{ s}$				
<b>Test 1</b> $V_{CE} = 5.0 \text{ Vdc}$ , $I_C = 1.0 \text{ Adc}$ Both Types				
<b>Test 2</b> $V_{CE} = 350 \text{ Vdc}$ , $I_C = 14 \text{ mAdc}$ 2N3439				
<b>Test 3</b> $V_{CE} = 250 \text{ Vdc}$ , $I_C = 20 \text{ mAdc}$ 2N3440				

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