

NPN LOW POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/368

Devices

2N3439
2N3439L

2N3440
2N3440L

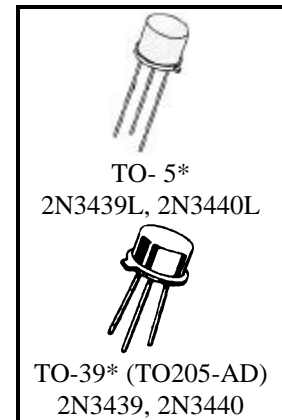
Qualified Level

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 | | $^{\circ}C$ |

- Derate linearly 4.57 mW/ $^{\circ}C$ for $T_A > +25^{\circ}C$
- 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 |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

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 | μ Adc μ Adc |
| Emitter-Base Cutoff Current $V_{EB} = 7.0$ Vdc | | I_{EBO} | 10 | μ Adc |

ELECTRICAL CHARACTERISTICS (con't)

| Characteristics | Symbol | Min. | Max. | Unit |
|--|-----------|------|--------------------------|------------------------------------|
| OFF CHARACTERISTICS (con't) | | | | |
| 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 | μAdc μAdc |
| 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 | μAdc |

ON CHARACTERISTICS ⁽³⁾

| | | | | |
|---|---------------|----------------|-----|-----|
| 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 | μs |
| Turn-Off Time $V_{CC} = 200 \text{ Vdc}$; $I_C = 20 \text{ mAdc}$, $I_{B1} = -I_{B2} = 2.0 \text{ mAdc}$ | t_{off} | | 10 | μs |

SAFE OPERATING AREA

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

(3) Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.

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