

NPN POWER SILICON SWITCHING TRANSISTOR

Qualified per MIL-PRF-19500/560

DEVICES

2N5339 2N5339U3

LEVELS
JAN
JANTX
JANTXV
JANS

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

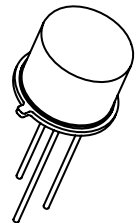
| Parameters / Test Conditions | Symbol | Value | Unit |
|--|-------------------|---|---------------------------|
| Collector-Emitter Voltage | V_{CEO} | 100 | Vdc |
| Collector-Base Voltage | V_{CBO} | 100 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 6.0 | Vdc |
| Base Current | I_B | 1.0 | Adc |
| Collector Current | I_C | 5.0 | Adc |
| Total Power Dissipation | P_T | @ $T_A = +25^\circ\text{C}$ ⁽¹⁾ | 1.0 |
| | | @ $T_C = +25^\circ\text{C}$ ⁽²⁾ | 17.5 |
| | | @ $T_C = +25^\circ\text{C}$ ⁽³⁾ – U3 | 75 |
| Operating & Storage Junction Temperature Range | T_{op}, T_{stg} | -65 to +200 | $^\circ\text{C}$ |
| Thermal Resistance, Junction-to Air | $R_{\theta JA}$ | 175 | $^\circ\text{C}/\text{W}$ |

NOTES:

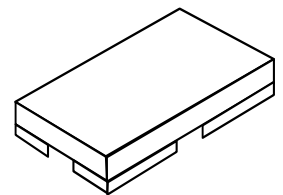
- 1) Derate linearly 5.71mW/ $^\circ\text{C}$ for $T_A > 25^\circ\text{C}$
- 2) Derate linearly 100mW/ $^\circ\text{C}$ for $T_C > 25^\circ\text{C}$
- 3) Derate linearly 434mW/ $^\circ\text{C}$ for $T_C > 25^\circ\text{C} - \text{U3}$

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

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|---|---------------|------|------|-----------------|
| OFF CHARACTERISTICS | | | | |
| Collector-Emitter Breakdown Voltage $I_C = 50\text{mA}$ | $V_{(BR)CEO}$ | 100 | | Vdc |
| Collector-Emitter Cutoff Current $V_{CE} = 100\text{Vdc}$ | I_{CEO} | | 100 | μAdc |
| Collector-Emitter Cutoff Current $V_{CE} = 90\text{Vdc}, V_{BE} = 1.5\text{Vdc}$ | I_{CEX} | | 1.0 | μAdc |
| Collector-Base Cutoff Current $V_{CB} = 100\text{Vdc}$ | I_{CBO} | | 1.0 | μAdc |
| Emitter-Base Cutoff Current $V_{EB} = 6.0\text{Vdc}$ | I_{EBO} | | 100 | μAdc |



TO-39
(TO-205AD)



U-3
(TO-276AA)

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

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|--|---------------|----------------|------------|------|
| ON CHARACTERISTICS ⁽³⁾ | | | | |
| Forward-Current Transfer Ratio $I_C = 0.5\text{A}_{dc}$, $V_{CE} = 2.0\text{V}_{dc}$ $I_C = 2.0\text{A}_{dc}$, $V_{CE} = 2.0\text{V}_{dc}$ $I_C = 5.0\text{A}_{dc}$, $V_{CE} = 2.0\text{V}_{dc}$ | h_{FE} | 60 60 40 | 240 | |
| Collector-Emitter Saturation Voltage $I_C = 2.0\text{A}_{dc}$, $I_B = 0.2\text{A}_{dc}$ $I_C = 5.0\text{A}_{dc}$, $I_B = 0.5\text{A}_{dc}$ | $V_{CE(sat)}$ | | 0.7 1.2 | Vdc |
| Base-Emitter Saturation Voltage $I_C = 2.0\text{A}_{dc}$, $I_B = 0.2\text{A}_{dc}$ $I_C = 5.0\text{A}_{dc}$, $I_B = 0.5\text{A}_{dc}$ | $V_{BE(sat)}$ | | 1.2 1.8 | Vdc |

DYNAMIC CHARACTERISTICS

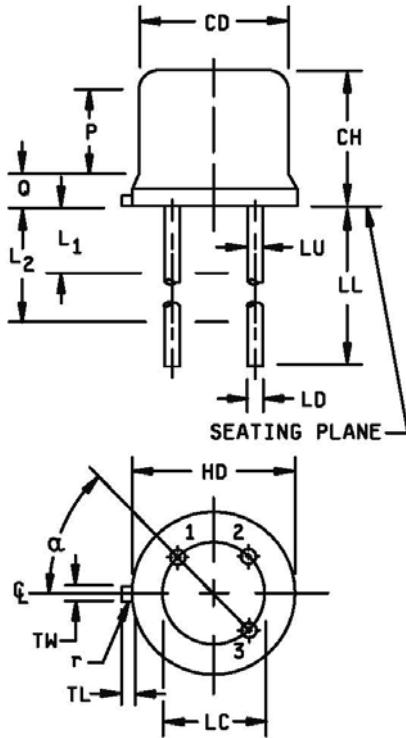
| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|---|------------|------|-------|------|
| Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 0.5\text{A}_{dc}$, $V_{CE} = 10\text{V}_{dc}$, $f = 10\text{MHz}$ | $ h_{fe} $ | 3.0 | 15 | |
| Output Capacitance $V_{CB} = 10\text{V}_{dc}$, $I_E = 0$, $100\text{kHz} \leq f \leq 1.0\text{MHz}$ | C_{obo} | | 250 | pF |
| Input Capacitance $V_{BE} = 2.0\text{V}_{dc}$, $I_C = 0$, $100\text{kHz} \leq f \leq 1.0\text{MHz}$ | C_{ibo} | | 1,000 | pF |

SAFE OPERATING AREA

| |
|--|
| DC Tests $T_C = +25^\circ\text{C}$, 1 Cycle, $t \geq 0.5\text{s}$ Test 1 $V_{CE} = 2.0\text{V}_{dc}$, $I_C = 5.0\text{A}_{dc}$ Test 2 $V_{CE} = 5.0\text{V}_{dc}$, $I_C = 2.0\text{A}_{dc}$ Test 3 $V_{CE} = 90\text{V}_{dc}$, $I_C = 55\text{mA}_{dc}$ |
|--|

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

PACKAGE DIMENSIONS



| Symbol | Dimensions | | | | Note |
|----------------|------------|------|-------------|-------|--------|
| | Inches | | Millimeters | | |
| | Min | Max | Min | Max | |
| CD | .305 | .355 | 7.75 | 9.02 | 5 |
| CH | .240 | .260 | 6.10 | 6.60 | |
| HD | .335 | .370 | 8.51 | 9.40 | 3 |
| LC | .200 TP | | 5.08 TP | | 6 |
| LD | .016 | .021 | 0.41 | 0.53 | 7 |
| LL | .500 | .750 | 12.70 | 19.05 | 7 |
| LU | .016 | .019 | 0.41 | 0.48 | 7 |
| L ₁ | | .050 | | 1.27 | 7 |
| L ₂ | .250 | | 6.35 | | 7 |
| TL | .029 | .045 | 0.74 | 1.14 | 3 |
| TW | .028 | .034 | 0.71 | 0.86 | 10 |
| P | .100 | | 2.54 | | 5 |
| Q | | .050 | | 1.27 | 4 |
| r | | .010 | | 0.25 | 10, 11 |
| α | 45° TP | | 45° TP | | 6 |
| Notes | 1, 2, 8, 9 | | 1, 2, 8, 9 | | |

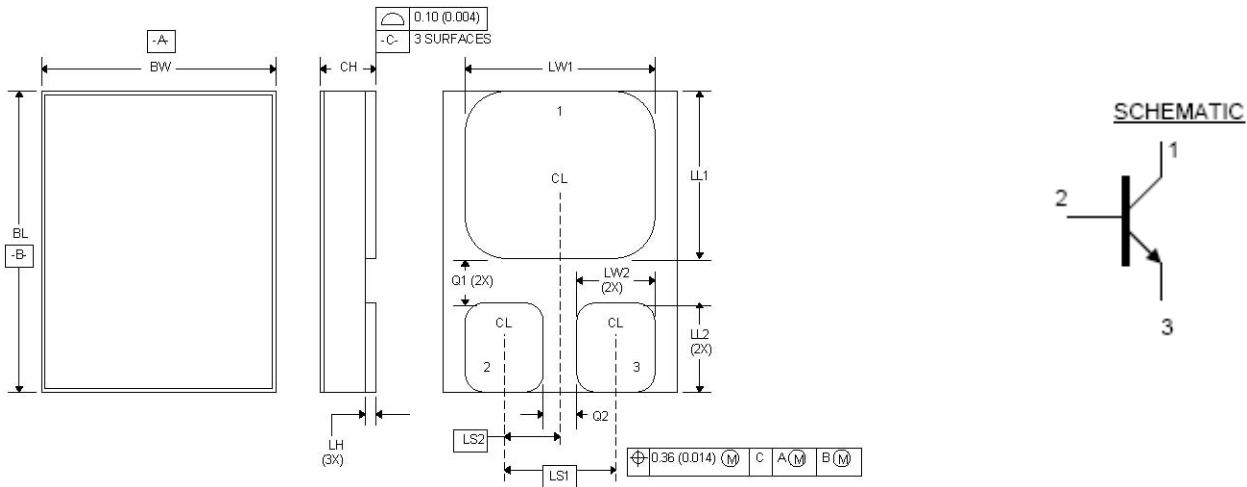
NOTES:

- Dimensions are in inches.
- Millimeters are given for general information only.
- Symbol TL is measured from HD maximum.
- Details of outline in this zone are optional.
- Symbol CD shall not vary more than .010 (0.25 mm) in zone P. This zone is controlled for automatic handling.
- Leads at gauge plane .054 inch (1.37 mm) +.001 inch (0.03 mm) -.000 inch (0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) relative to tab. Device may be measured by direct methods or by gauge.
- Symbol LD applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum.
- Lead designation, depending on device type, shall be as follows:

| Lead number | TO-39 |
|-------------|-----------|
| 1 | Emitter |
| 2 | Base |
| 3 | Collector |

- Lead number three is electrically connected to case.
- Beyond r maximum, TW shall be held for a minimum length of .011 inch (0.28 mm).
- Symbol r applied to both inside corners of tab.
- In accordance with ASME Y14.5M, diameters are equivalent to φx symbology.

FIGURE 1. Physical dimensions (TO-39)



NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.
4. Terminal 1 - collector, terminal 2 - base, terminal 3 - emitter.

| Ltr | Dimensions | | | |
|-----------------|------------|-------|-------------|-------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| BL | .395 | .405 | 10.03 | 10.29 |
| BW | .291 | .301 | 7.40 | 7.65 |
| CH | .1085 | .1205 | 2.76 | 3.06 |
| LH | .010 | .020 | 0.25 | 0.51 |
| LW ₁ | .281 | .291 | 7.14 | 7.39 |
| LW ₂ | .090 | .100 | 2.29 | 2.54 |
| LL ₁ | .220 | .230 | 5.59 | 5.84 |
| LL ₂ | .115 | .125 | 2.92 | 3.18 |
| LS ₁ | .150 BSC | | 3.81 BSC | |
| LS ₂ | .075 BSC | | 1.91 BSC | |
| Q ₁ | .030 | | 0.762 | |
| Q ₂ | .030 | | 0.762 | |

FIGURE 2. Physical dimensions and configuration (U3) (SMD 5) (TO-276AA)

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