



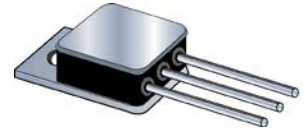
NPN Darlington High Power Silicon Transistor

Qualified per MIL-PRF-19500/624

Qualified Levels:
JAN, JANTX, and
JANTXV

DESCRIPTION

This high power NPN transistor is rated at 12 amps and is military qualified up to the JANTXV level for high reliability applications. This TO-254AA low-profile design offers flexible mounting options.



TO-254AA Package

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- JEDEC registered 2N7370
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/624. (See [part nomenclature](#) for all available options.)
- RoHS compliant versions are available (commercial grade only)

APPLICATIONS / BENEFITS

- High power operation
- Flexible, low-profile TO-254AA package

MAXIMUM RATINGS @ T_A = +25 °C unless otherwise noted.

| Parameters/Test Conditions | Symbol | Value | Unit |
|---|-------------------------------------|-------------|------|
| Junction and Storage Temperature | T _J and T _{STG} | -65 to +200 | °C |
| Thermal Resistance Junction-to-Case | R _{θJC} | 1.5 | °C/W |
| Collector-Base Voltage | V _{CBO} | 100 | V |
| Collector-Emitter Voltage | V _{CEO} | 100 | V |
| Emitter-Base Voltage | V _{EBO} | 5.0 | V |
| Total Power Dissipation (see Figure 1) | P _T | 100 | W |
| Base Current | I _B | 0.2 | A |
| Collector Current | I _C | 12 | A |

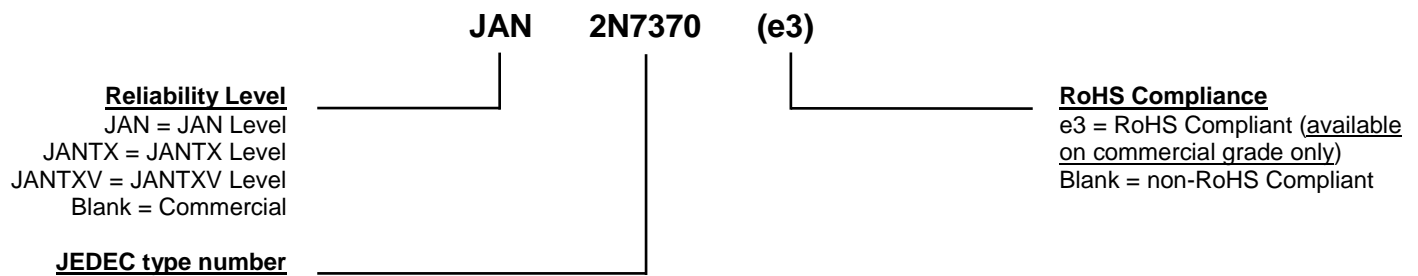
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MECHANICAL and PACKAGING

- CASE: Nickel plated CRS steel
- TERMINALS: Ceramic feed-through, hot solder dip, Ni plated Alloy 52, copper core. RoHS compliant pure tin dip is available for commercial version only.
- MARKING: Part number, date code, and polarity symbol
- POLARITY: See [Schematic](#) on last page
- WEIGHT: Approximately 6.5 grams
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE

SYMBOLS & DEFINITIONS

| Symbol | Definition |
|-----------|---|
| I_B | Base current: The value of the dc current into the base terminal. |
| I_C | Collector current: The value of the dc current into the collector terminal. |
| I_E | Emitter current: The value of the dc current into the emitter terminal. |
| T_C | Case temperature: The temperature measured at a specified location on the case of a device. |
| V_{CB} | Collector-base voltage: The dc voltage between the collector and the base. |
| V_{CBO} | Collector-base voltage, base open: The voltage between the collector and base terminals when the emitter terminal is open-circuited. |
| V_{CC} | Collector-supply voltage: The supply voltage applied to a circuit connected to the collector. |
| V_{CE} | Collector-emitter voltage: The dc voltage between the collector and the emitter. |
| V_{CEO} | Collector-emitter voltage, base open: The voltage between the collector and the emitter terminals when the base terminal is open-circuited. |
| V_{EB} | Emitter-base voltage: The dc voltage between the emitter and the base |
| V_{EBO} | Emitter-base voltage, collector open: The voltage between the emitter and base terminals with the collector terminal open-circuited. |

ELECTRICAL CHARACTERISTICS @ $T_C = +25^\circ\text{C}$ unless otherwise noted

| Characteristics | Symbol | Min. | Max. | Unit |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

OFF CHARACTERISTICS

| | | | | |
|---|---------------|-----|-------------|----|
| Collector-Emitter Breakdown Voltage $I_C = 100\text{ mA}$ | $V_{(BR)CEO}$ | 100 | | V |
| Collector-Emitter Cutoff Current $V_{CE} = 50\text{ V}$ | I_{CEO} | | 1.0 | mA |
| Collector-Emitter Cutoff Current $V_{CE} = 100\text{ V}, V_{BE} = 1.5\text{ V}$ $V_{CE} = 100\text{ V}, V_{BE} = 1.5\text{ V}, T_A = 150^\circ\text{C}$ | I_{CEX} | | 0.01 5.0 | mA |
| Emitter-Base Cutoff Current $V_{EB} = 5.0\text{ V}$ | I_{EBO} | | 2.0 | mA |

ON CHARACTERISTICS

| | | | | |
|---|---------------|---------------------|--------|---|
| Forward-Current Transfer Ratio $I_C = 6.0\text{ A}, V_{CE} = 3.0\text{ V}$ $I_C = 12.0\text{ A}, V_{CE} = 3.0\text{ V}$ $I_C = 6.0\text{ A}, V_{CE} = 3.0\text{ V}, T_A = -55^\circ\text{C}$ | h_{FE} | 1,000 150 300 | 18,000 | |
| Collector-Emitter Saturation Voltage $I_C = 12\text{ A}, I_B = 120\text{ mA}$ | $V_{CE(sat)}$ | | 3.0 | V |
| Base-Emitter Saturation Voltage $I_C = 12\text{ A}, I_B = 120\text{ mA}$ | $V_{BE(sat)}$ | | 4.0 | V |

DYNAMIC CHARACTERISTICS

| | | | | |
|--|------------|----|-----|--|
| Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 5\text{ A}, V_{CE} = 3.0\text{ V}, f = 1\text{ MHz}$ | $ h_{fe} $ | 10 | 250 | |
|--|------------|----|-----|--|

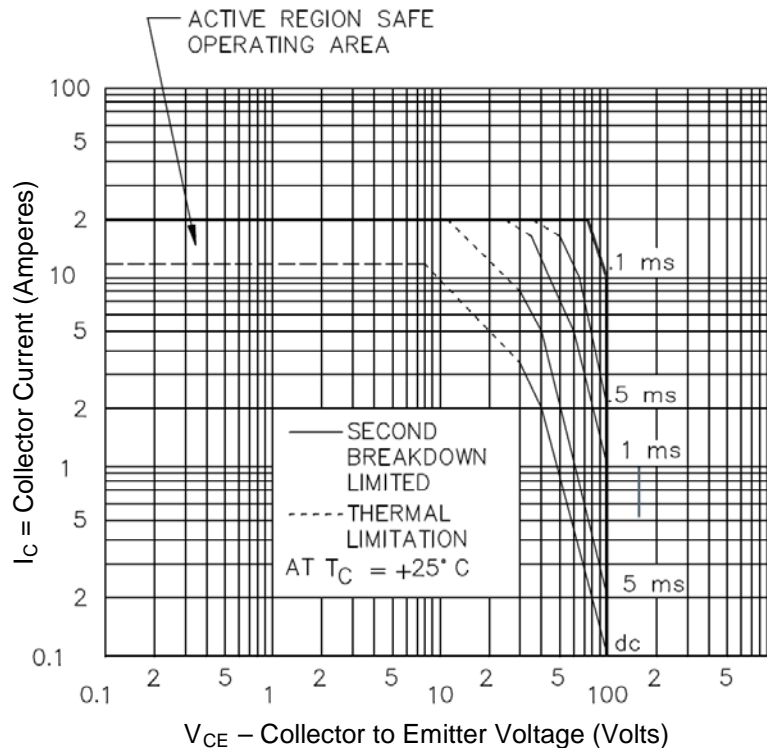
ELECTRICAL CHARACTERISTICS @ $T_C = 25^\circ\text{C}$ unless otherwise noted. (continued)
SWITCHING CHARACTERISTICS

| | | | |
|---|-----------|-----|---------------|
| Turn-On Time $V_{CC} = 30\text{ V}$, $I_C = 12\text{ A}$; $I_{B1} = 120\text{ mA}$ | t_{on} | 2.0 | μs |
| Turn-Off Time $V_{CC} = 30\text{ V}$, $I_C = 12\text{ A}$; $I_{B1} = I_{B2} = 120\text{ mA}$ | t_{off} | 10 | μs |

SAFE OPERATING AREA (See figure below and [MIL-STD-750, Test Method 3053](#))
DC Tests
 $T_C = +25^\circ\text{C}$, $t \geq 1\text{ second}$, 1 Cycle

Test 1
 $V_{CE} = 8.3\text{ V}$, $I_C = 12\text{ A}$
Test 2
 $V_{CE} = 30\text{ V}$, $I_C = 3.3\text{ A}$
Test 3
 $V_{CE} = 90\text{ V}$, $I_C = 150\text{ mA}$

* Pulse test: Pulse width 300 μsec , duty cycle $\leq 2\%$.


Safe Operating Area

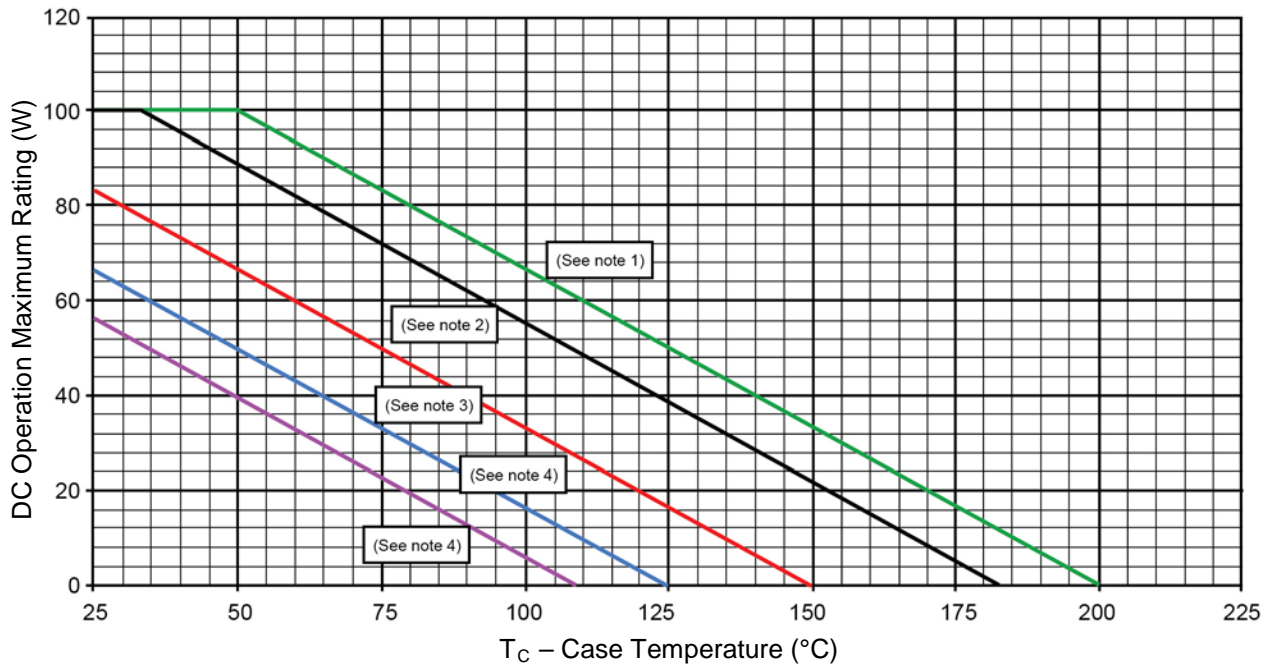
GRAPHS


FIGURE 1
Temperature-Power Derating Graph

NOTES:

1. All devices are capable of operating at $\leq T_J$ specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. Derate design curve constrained by the maximum junction temperature ($T_J \leq +200^\circ\text{C}$) and power rating specified. (See [Maximum Ratings](#).)
3. Derate design curve chosen at $T_J \leq +150^\circ\text{C}$, where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at $T_J \leq +125^\circ\text{C}$, and $+110^\circ\text{C}$ to show power rating where most users want to limit T_J in their application.

GRAPHS (continued)

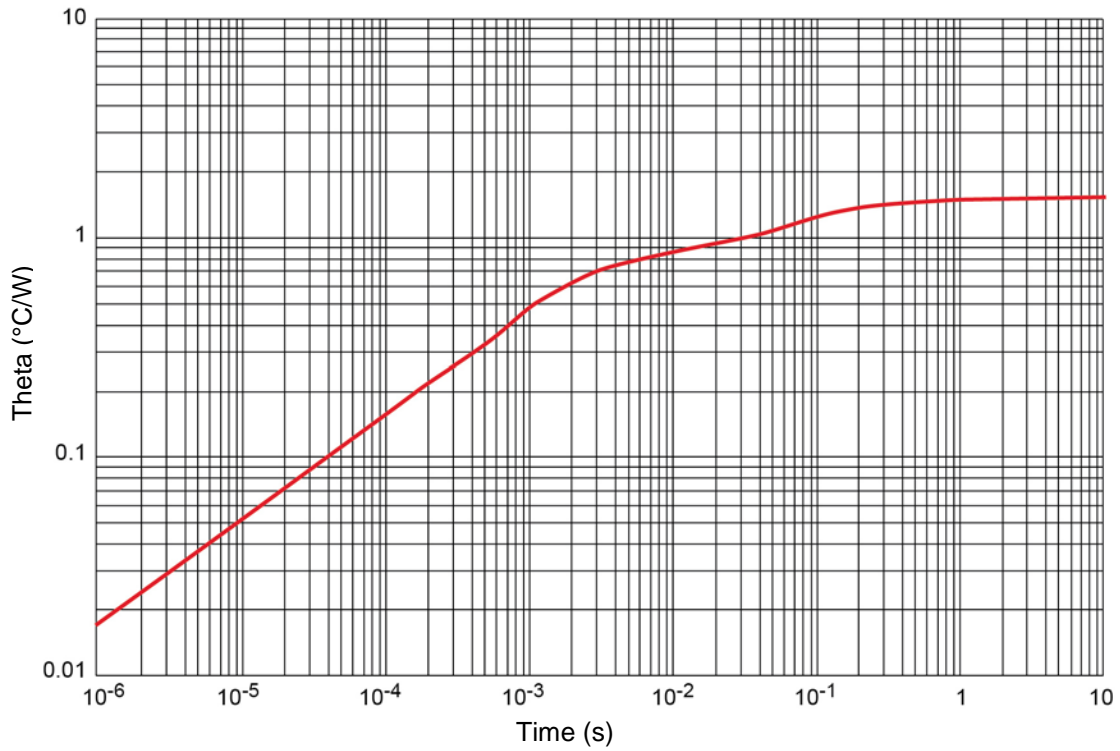
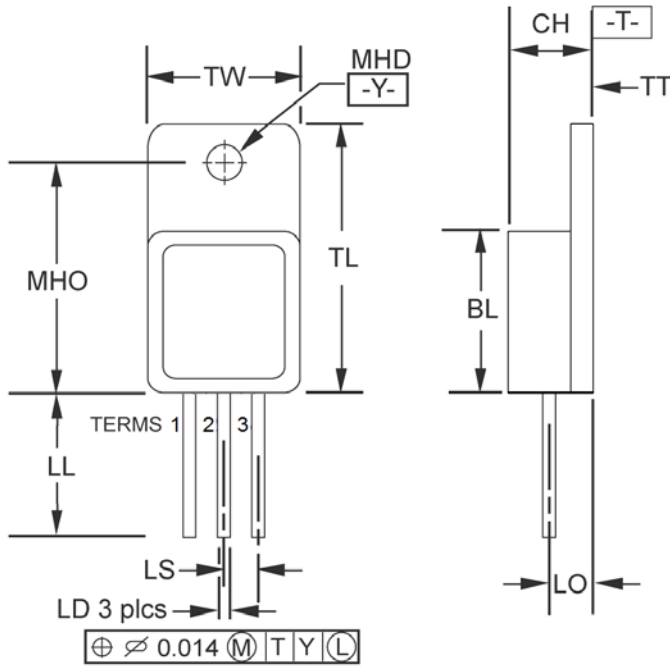


FIGURE 2
Thermal Impedance Graph

PACKAGE DIMENSIONS



| Ltr | Dimensions | | | |
|--------|------------|-------|-------------|-------|
| | Inch | | Millimeters | |
| | Min | Max | Min | Max |
| BL | 0.535 | 0.545 | 13.59 | 13.84 |
| CH | 0.249 | 0.260 | 6.32 | 6.60 |
| LD | 0.035 | 0.045 | 0.89 | 1.14 |
| LL | 0.510 | 0.570 | 12.95 | 14.48 |
| LO | 0.150 BSC | | 3.81 BSC | |
| LS | 0.150 BSC | | 3.81 BSC | |
| MHD | 0.139 | 0.149 | 3.53 | 3.78 |
| MHO | 0.665 | 0.685 | 16.89 | 17.40 |
| TL | 0.790 | 0.800 | 20.07 | 20.32 |
| TT | 0.040 | 0.050 | 1.02 | 1.27 |
| TW | 0.535 | 0.545 | 13.59 | 13.84 |
| Term 1 | Base | | | |
| Term 2 | Collector | | | |
| Term 3 | Emitter | | | |

NOTES:

1. Dimensions are in inches. Millimeters are given for information only.
2. All terminals are isolated from case
3. Protrusion of ceramic eyelets included in dimension LL
4. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

SCHEMATIC

