



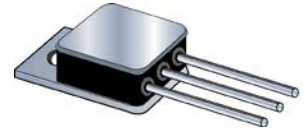
# NPN Darlington High Power Silicon Transistor

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<sub>A</sub> = +25 °C unless otherwise noted.

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T <sub>J</sub> and T <sub>STG</sub>	-65 to +200	°C
Thermal Resistance Junction-to-Case	R <sub>θJC</sub>	1.5	°C/W
Collector-Base Voltage	V <sub>CBO</sub>	100	V
Collector-Emitter Voltage	V <sub>CEO</sub>	100	V
Emitter-Base Voltage	V <sub>EBO</sub>	5.0	V
Total Power Dissipation (see <a href="#">Figure 1</a> )	P <sub>T</sub>	100	W
Base Current	I <sub>B</sub>	0.2	A
Collector Current	I <sub>C</sub>	12	A

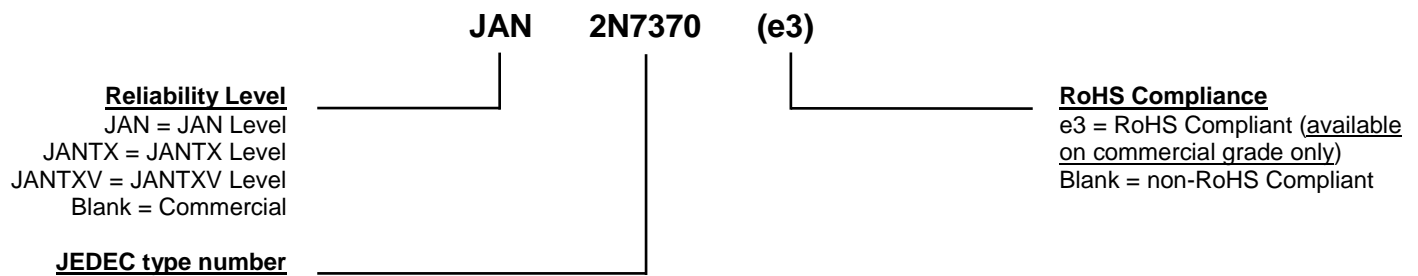
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**MECHANICAL and PACKAGING**

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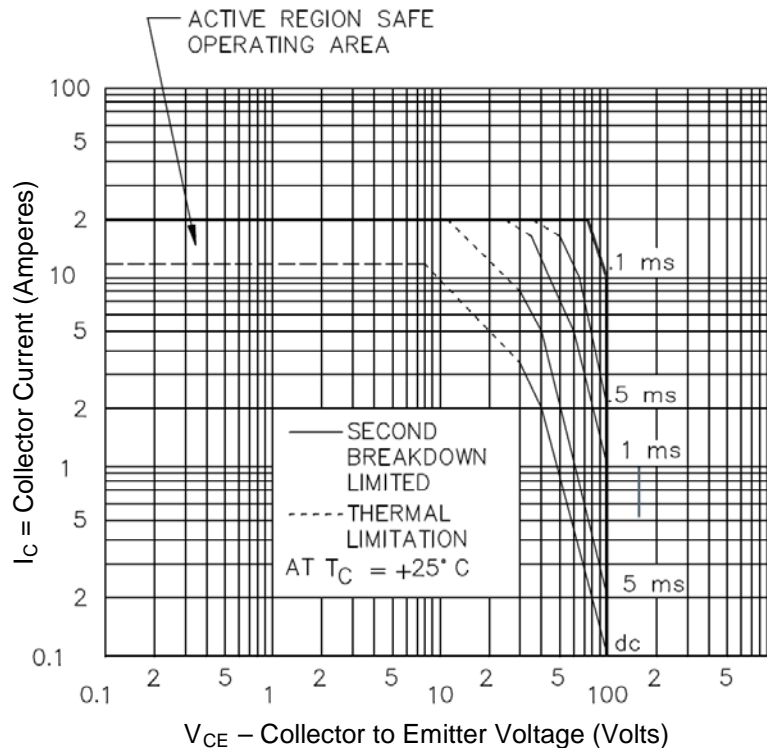
**ELECTRICAL CHARACTERISTICS @  $T_C = 25^\circ\text{C}$  unless otherwise noted. (continued)**
**SWITCHING CHARACTERISTICS**

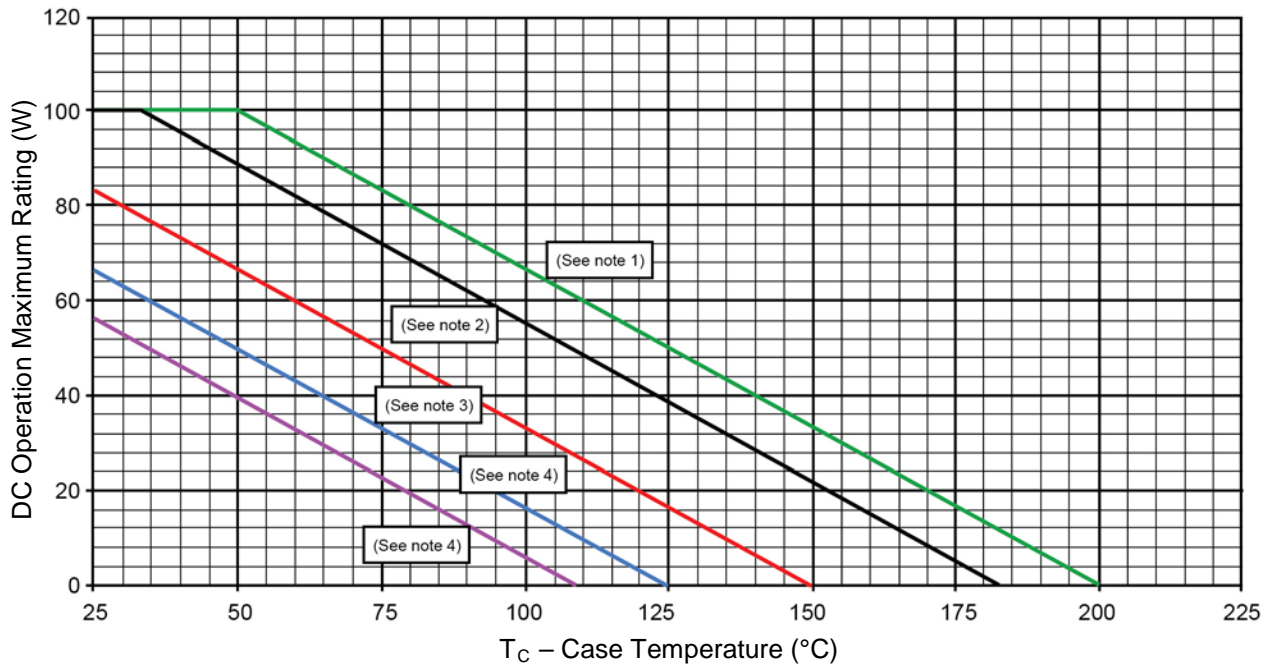
Turn-On Time $V_{CC} = 30\text{ V}$ , $I_C = 12\text{ A}$ ; $I_{B1} = 120\text{ mA}$	$t_{on}$	2.0	$\mu\text{s}$
Turn-Off Time $V_{CC} = 30\text{ V}$ , $I_C = 12\text{ A}$ ; $I_{B1} = I_{B2} = 120\text{ mA}$	$t_{off}$	10	$\mu\text{s}$

**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  $\mu\text{sec}$ , duty cycle  $\leq 2\%$ .


**Safe Operating Area**

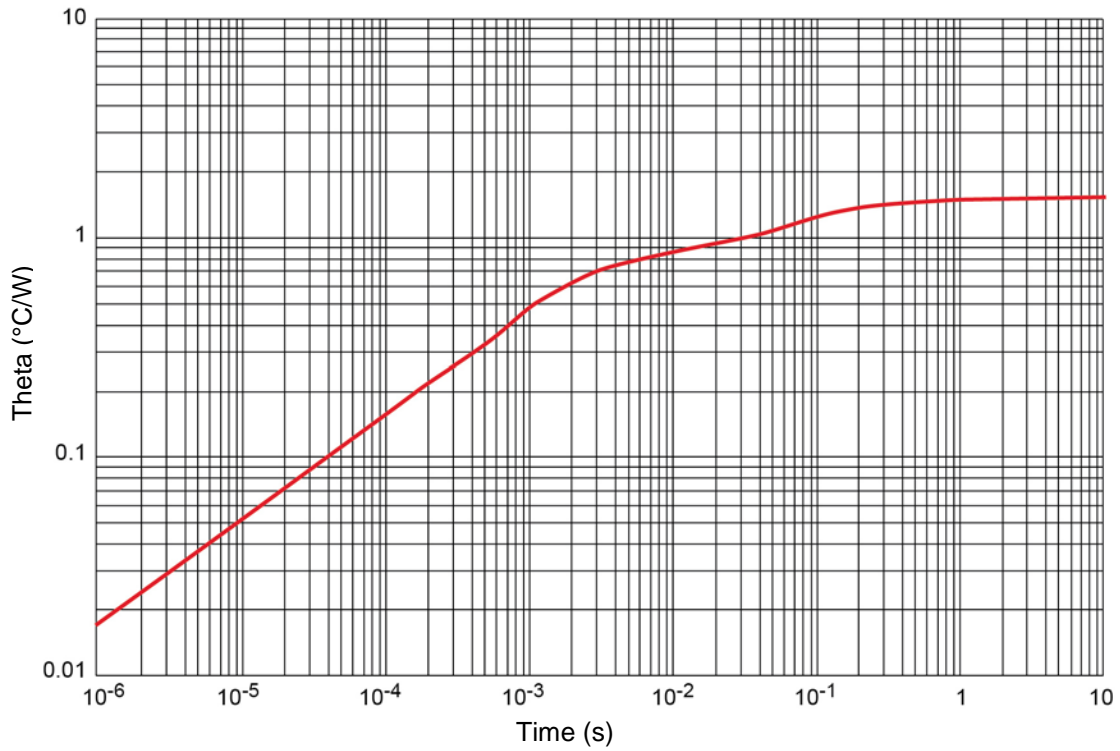
**GRAPHS**


**FIGURE 1**  
Temperature-Power Derating Graph

**NOTES:**

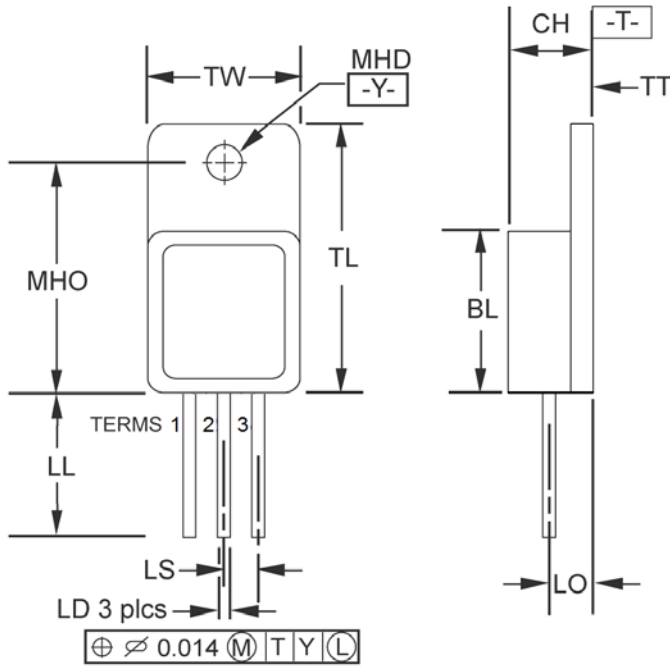
1. All devices are capable of operating at  $\leq T_J$  specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum  $T_J$  allowed.
2. Derate design curve constrained by the maximum junction temperature ( $T_J \leq +200^\circ\text{C}$ ) and power 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

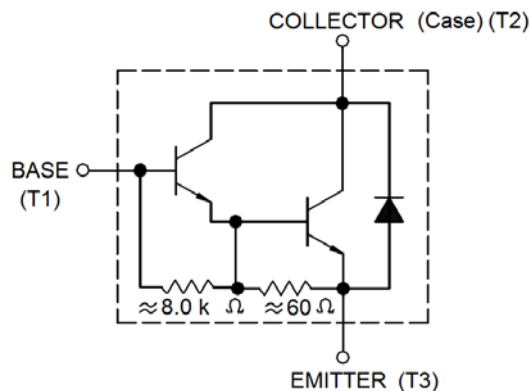


Ltr	Dimensions			
	Inch		Millimeters	
	Min	Max	Min	Max
BL	0.535	0.545	13.59	13.84
CH	0.249	0.260	6.32	6.60
LD	0.035	0.045	0.89	1.14
LL	0.510	0.570	12.95	14.48
LO	0.150 BSC		3.81 BSC	
LS	0.150 BSC		3.81 BSC	
MHD	0.139	0.149	3.53	3.78
MHO	0.665	0.685	16.89	17.40
TL	0.790	0.800	20.07	20.32
TT	0.040	0.050	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  $\Phi$ x symbology.

SCHEMATIC



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