

# 2N6300 & 2N6301

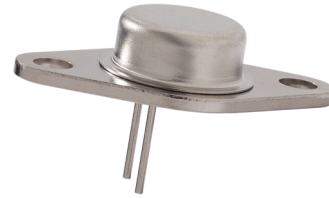


## NPN Darlington Power Silicon Transistor

Rev. V4

### Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-500/539
- TO-66 (TO-213AA) Package
- Designed for High Gain Amplifier and Medium Speed Switching Applications



### Electrical Characteristics ( $T_A = +25^\circ\text{C}$ unless otherwise noted)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Breakdown Voltage	$I_C = 100 \text{ mA dc}; 2N6300$ $I_C = 100 \text{ mA dc}; 2N6301$	$V_{(BR)CEO}$	V dc	60 80	—
Collector - Emitter Cutoff Current	$V_{CE} = 30 \text{ V dc}; 2N6300$ $V_{CE} = 40 \text{ V dc}; 2N6301$	$I_{CEO}$	mA dc	—	0.5 0.5
Collector - Emitter Cutoff Current	$V_{CE} = 60 \text{ V dc}; V_{BE} = -1.5 \text{ V dc}; 2N6300$ $V_{CE} = 80 \text{ V dc}; V_{BE} = -1.5 \text{ V dc}; 2N6301$	$I_{CEX1}$	$\mu\text{A dc}$	—	10 10
Emitter - Base Cutoff Current	$V_{EB} = 5 \text{ V dc}$	$I_{EBO}$	mA dc	—	2.0
Forward Current Transfer Ratio	$I_C = 1 \text{ A dc}; V_{CE} = 3 \text{ Vdc}$ $I_C = 4 \text{ A dc}; V_{CE} = 3 \text{ Vdc}$ $I_C = 8 \text{ A dc}; V_{CE} = 3 \text{ Vdc}$	$h_{FE}$	-	500 700 100	18,000
Collector - Emitter Saturation Voltage	$I_C = 4 \text{ A dc}; I_B = 16 \text{ mA dc}$ $I_C = 8 \text{ A dc}; I_B = 80 \text{ mA dc}$	$V_{CE(SAT)1}$ $V_{CE(SAT)2}$	V dc	—	2.0 3.0
Base - Emitter Saturation Voltage	$I_C = 8 \text{ A dc}; I_B = 80 \text{ mA dc}$	$V_{BE(SAT)2}$	V dc	—	4.0
Base - Emitter Voltage	$I_C = 4 \text{ A dc}; V_{CE} = 3 \text{ V dc}$	$V_{BE(ON)}$	V dc	—	2.8
<b>Dynamic Characteristics</b>					
Magnitude of Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = 3 \text{ V dc}; I_C = 3 \text{ A dc}; f = 1.0 \text{ MHz}$	$ h_{fe} $	-	25	350
Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = 3 \text{ V dc}; I_C = 3 \text{ A dc}; f = 1.0 \text{ kHz}$	$h_{fe}$	-	300	—
Output Capacitance	$V_{CB} = 10 \text{ V dc}; I_E = 0; 100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	$C_{obo}$	pF	—	200
<b>Switching Characteristics</b>					
Turn-On Time	$V_{CC} = 30 \text{ Vdc}; I_C = 4.0 \text{ A dc}; I_{B1} = 16 \text{ mA dc}$	$t_{on}$	$\mu\text{s}$	—	2.0
Turn-Off Time	$V_{CC} = 30 \text{ Vdc}; I_C = 4.0 \text{ A dc}; I_{B1} = -I_{B2} = 16 \text{ mA dc}$	$t_{off}$	$\mu\text{s}$	—	8.0

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

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Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{CE} = 60\text{ V dc}; V_{BE} = -1.5\text{ V dc}; 2\text{N}6300$ $V_{CE} = 80\text{ V dc}; V_{BE} = -1.5\text{ V dc}; 2\text{N}6301$	$I_{CEX2}$	mA dc	—	1.0 1.0
Forward Current Transfer Ratio	$T_A = -55^\circ\text{C}$ $V_{CE} = 3\text{ V dc}; I_C = 4\text{ A dc}$	$h_{fe4}$		200	

### Absolute Maximum Ratings ( $T_A = +25^\circ\text{C}$ unless otherwise noted)

Ratings	Symbol	Value
Collector - Emitter Voltage 2N6300 2N6301	$V_{CEO}$	60 V dc 80 V dc
Collector - Base Voltage 2N6300 2N6301	$V_{CBO}$	60 V dc 80 V dc
Emitter - Base Voltage	$V_{EBO}$	5 V dc
Base Current	$I_B$	120 mA dc
Collector Current	$I_C$	8 A dc
Total Power Dissipation <sup>(1)</sup> @ $T_C = 0^\circ\text{C}$ @ $T_C = 27^\circ\text{C}$ @ $T_C = 100^\circ\text{C}$	$P_T$	75 W 65 W 37 W
Operating & Storage Temperature Range	$T_J, T_{STG}$	$-55^\circ\text{C}$ to $+200^\circ\text{C}$

### Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case <sup>(2)</sup>	$R_{\theta JC}$	2.66°C/W

(1) See figure 2 of MIL-PRF-19500/539 for temperature derating curves.

(2) See figure 3 of MIL-PRF-19500/539 for thermal impedance curve.

Safe Operating Area	
DC Tests:	$T_C = +25^\circ\text{C}, +10^\circ\text{C}; 1\text{ Cycle}; t = 1.0\text{ s}$
Test 1:	$V_{CE} = 8.0\text{ Vdc}; I_C = 8.0\text{ A dc}$
Test 2:	$V_{CE} = 20\text{ Vdc}; I_C = 2.0\text{ A dc}$
Test 3:	$V_{CE} = 60\text{ Vdc}; I_C = 100\text{ mA dc}, 2\text{N}6300$ $V_{CE} = 80\text{ Vdc}; I_C = 100\text{ mA dc}, 2\text{N}6301$

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## NPN Darlington Power Silicon Transistor

Rev. V4

### Outline Drawing (TO-66)

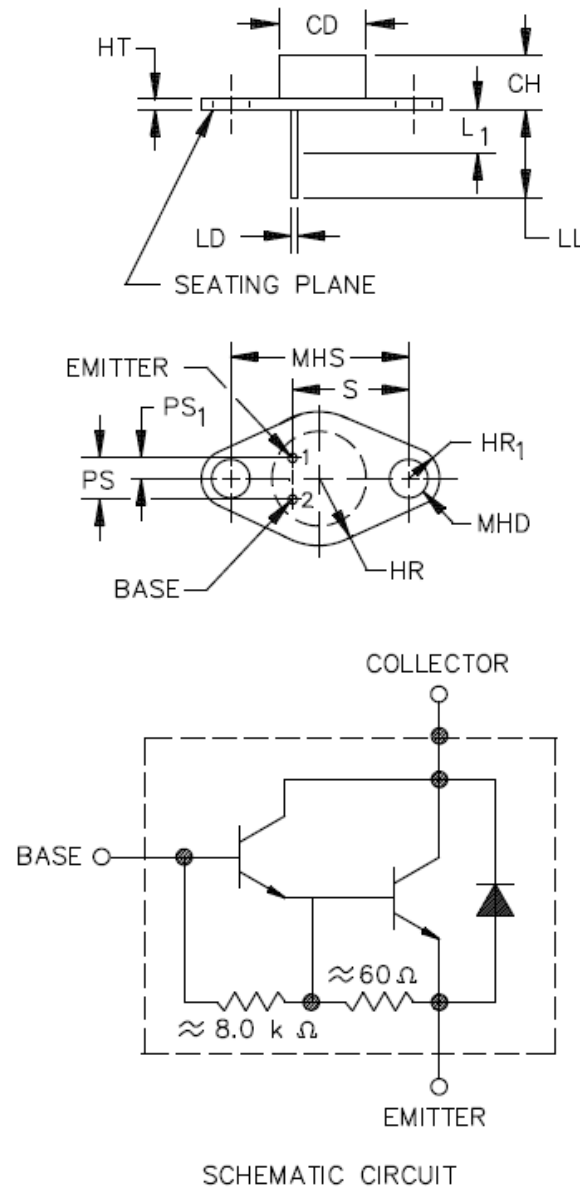


FIGURE 1. Physical dimensions and schematic (TO-213AA, formerly TO-66).

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Rev. V4

### Outline Drawing (TO-66)

Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.470	.500	11.94	12.70	3
CH	.250	.340	6.35	8.64	
HR		.350		8.89	
HR <sub>1</sub>	.115	.145	2.92	3.68	4
HT	.050	.075	1.27	1.91	3, 5
LD	.028	.034	0.71	0.86	6, 7
LL	.360	.500	9.14	12.70	6
L <sub>1</sub>		.050		1.27	6, 8
MHD	.142	.152	3.61	3.86	4
MHS	.958	.962	24.33	24.43	
PS	.190	.210	4.83	5.33	9
PS <sub>1</sub>	.093	.107	2.37	2.71	9
S	.570	.590	14.48	14.99	9

#### NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Terminal 1 is the emitter and terminal 2 is the base. The collector shall be electrically connected to the case.
3. Body contour is optional within zone defined by dimension CD.
4. Applies to two holes, at both ends.
5. Dimension HT does not include sealing flanges.
6. Applies to both terminals.
7. The lead diameter (dimension LD) is uncontrolled within dimension L<sub>1</sub>. Dimension LD applies beyond dimension L<sub>1</sub> to the end of dimension LL.
8. Within this zone the lead diameter may vary to allow for lead finishes and irregularities.
9. These dimensions shall be measured at points .050 inch (1.27 mm) to .055 inch (1.40 mm) below seating plane. When gauge is not used, measurement shall be made at seating plane.
10. The seating plane of header shall be flat within .001 inch (0.03 mm), concave to .004 inch (0.10 mm), convex inside a .520 inch (13.20 mm) diameter circle on the center of the header, and flat within .001 inch (0.03 mm), concave to .006 inch (0.15 mm), convex overall.
11. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.

FIGURE 1. Physical dimensions and schematic (TO-213AA, formerly TO-66) - Continued.

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