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°C unless otherwise noted)

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

1. Pulse Test: Pulse Width = 300 µs, Duty Cycle ≤2.0%.

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Cutoff Current	T_A = +150°C V_{CE} = 60 V dc; V_{BE} = -1.5 V dc; 2N6300 V_{CE} = 80 V dc; V_{BE} = -1.5 V dc; 2N6301	I_{CEX2}	mA dc	—	1.0 1.0
Forward Current Transfer Ratio	T_A = -55°C V_{CE} = 3 V dc; I_C = 4 A dc	h_{fe4}		200	

Absolute Maximum Ratings (T_A = +25°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 (1) @ T_C = 0°C @ T_C = 27°C @ T_C = 100°C	P_T	 75 W 65 W 37 W
Operating & Storage Temperature Range	T_J, T_{STG}	-55°C to +200°C

Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case (2)	$R_{\theta JC}$	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 °C, +10°C; I Cycle; t = 1.0 s
Test 1:	V_{CE} = 8.0 Vdc; I_C = 8.0 A dc
Test 2:	V_{CE} = 20 Vdc; I_C = 2.0 A dc
Test 3:	V_{CE} = 60 Vdc; I_C = 100 mA dc, 2N6300 V_{CE} = 80 Vdc; I_C = 100 mA dc, 2N6301

Outline Drawing (TO-66)

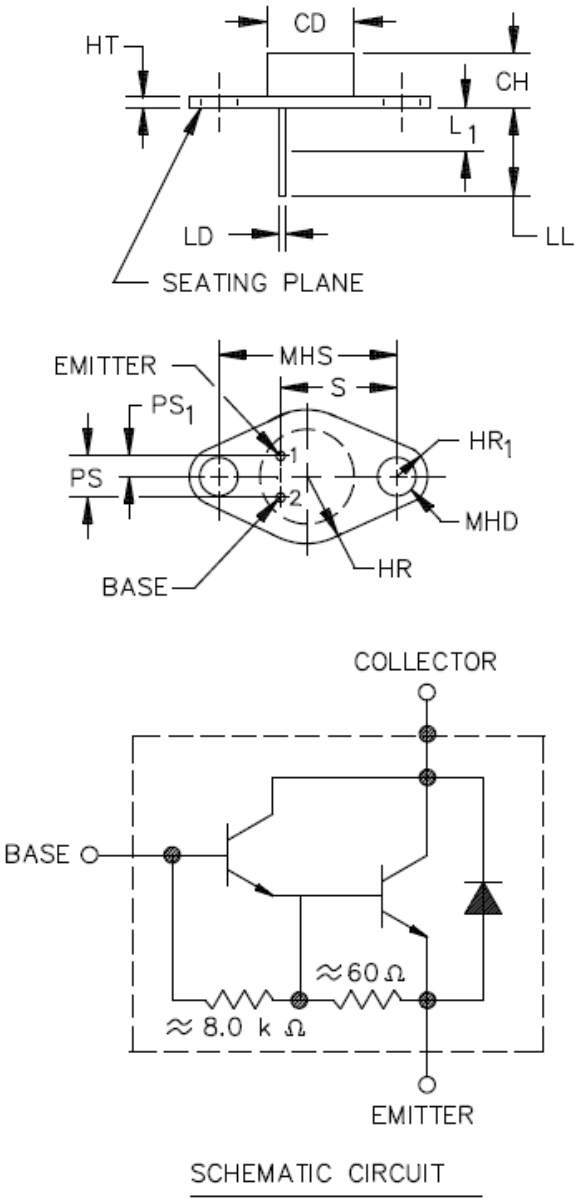

FIGURE 1. Physical dimensions and schematic (TO-213AA, formerly TO-66).

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_1	.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_1		.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_1	.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_1. Dimension LD applies beyond dimension L_1 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 Φx symbology.

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