2N6249, 2N6250, & 2N6251

NPN Darlington Power Silicon Transistor

Rev. V4

Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/510
- TO-3 (TO-204AA) Package
- Suitable for High Voltage, High Current, High 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 = 200 mA dc, L = 42 mH, f = 30 - 60 GHz 2N6249 2N6250 2N6251	$V_{(BR)CEO}$	V dc	—	 200 275 350
Collector - Emitter Breakdown Voltage	I_C = 200 mA dc, L = 42 mH, f = 30 - 60 GHz, R_{BE} = 50 Ω 2N6249 2N6250 2N6251	$V_{(BR)CER}$	V dc	—	 225 300 375
Emitter - Base Cutoff Current	V_{EB} = 6 Vdc	I_{EBO}	µA dc	—	100
Collector - Emitter Cutoff Current	V_{CE} = 150 V dc, 2N6249 V_{CE} = 225 V dc, 2N6250 V_{CE} = 300 V dc, 2N6251	I_{CEO}	mA dc	—	1.0
Collector - Emitter Cutoff Current	V_{CE} = 225 V dc, V_{BE} = -1.5 V dc, 2N6249 V_{CE} = 300 V dc, V_{BE} = -1.5 V dc, 2N6250 V_{CE} = 375 V dc, V_{BE} = -1.5 V dc, 2N6251	I_{CEX1}	µA dc	—	10
Collector - Base Cutoff Current	V_{CE} = 300 V dc, 2N6249 V_{CE} = 375 V dc, 2N6250 V_{CE} = 450 V dc, 2N6251	I_{CBO}	mA dc	—	0.5
Forward Current Transfer Ratio	I_C = 10 A dc, V_{CE} = 3 Vdc 2N6249 2N6250 2N6251	h_{FE1}	-	 10 8 6	 50 50 50
Collector - Emitter Sustaining Voltage	I_C = 10 A dc, I_B = 1.0 A dc, 2N6249 I_C = 10 A dc, I_B = 1.25 A dc, 2N6250 I_C = 10 A dc, I_B = 1.67 A dc, 2N6251	$V_{CE(SAT)}$	V dc	—	1.5
Base - Emitter Saturation Voltage	I_C = 10 A dc, I_B = 1.0 A dc, 2N6249 I_C = 10 A dc, I_B = 1.25 A dc, 2N6250 I_C = 10 A dc, I_B = 1.67 A dc, 2N6251	$V_{BE(SAT)}$	V dc	—	2.25

Electrical Characteristics (T_A = +25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Cutoff Current	T_A = +125°C V_{CE} = 225 V dc, V_{BE} = -1.5 V dc, 2N6249 V_{CE} = 300 V dc, V_{BE} = -1.5 V dc, 2N6250 V_{CE} = 375 V dc, V_{BE} = -1.5 V dc, 2N6251	I_{CEX2}	µA dc	—	90
Forward - Current Transfer Ratio	T_A = -55°C V_{CE} = 3 V dc, I_C = 10 A dc 2N6249 2N6250 2N6251	h_{FE2}	-	 5 4 3	
Dynamic Characteristics					
Small-Signal Short-Circuit Forward Current Transfer Ratio	I_C = 1 A dc, V_{CE} = 10 Vdc, f = 1 MHz	$\lvert h_{FE} \rvert$	-	2.5	15.0
Open Capacitance Open Circuit	V_{CE} = 10 Vdc, I_C = 0, 100 kHz ≤ f ≤ 1 MHz	C_{obo}	pF	—	500
Switching Characteristics					
Turn-On Time	V_{CC} = 200 Vdc; I_C = 10 A dc; I_B = 1.0 A dc, 2N6249 I_B = 1.25 A dc, 2N6250 I_B = 1.67 A dc, 2N6251	t_{on}	µs	—	2.0
Turn-Off Time	V_{CC} = 200 Vdc; I_C = 10 A dc; I_B = 1.0 A dc, 2N6249 I_B = 1.25 A dc, 2N6250 I_B = 1.67 A dc, 2N6251	t_{off}	µs	—	4.5
Safe Operating Area					
DC Tests:	T_C = +25 °C, I Cycle, t = 1.0 s (see figure 12 of MIL-PRF-19500/371)				
Test 1:	V_{CE} = 17.5 Vdc, I_C = 10 A dc				
Test 2:	V_{CE} = 30 Vdc, I_C = 5.8 A dc				
Test 3:	V_{CE} = 100 Vdc, I_C = 0.3 A dc				
Test 4:	V_{CE} = 200 Vdc, I_C = 0.13 A dc, (for 2N6249 only)				
Test 5:	V_{CE} = 275 Vdc, I_C = 0.09 A dc, (for 2N6250 only)				
Test 6:	V_{CE} = 350 Vdc, I_C = 0.065 A dc, (for 2N6251 only)				

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Absolute Maximum Ratings

Ratings	Symbol	2N6249	2N6250	2N6251	Units
Collector - Emitter Voltage	V_{CEO}	200	275	350	V dc
Collector - Base Voltage	V_{CBO}	300	375	450	V dc
Emitter - Base Voltage	V_{EBO}	6			V dc
Collector Current	I_C	10			A dc
Base Current	I_B	5			A dc
Total Power Dissipation @ T_A = +25°C @ T_C = +25°C[1]	P_T	6 175			W
Operating & Storage Temperature Range	T_J, T_{STG}	-65 to +200			°C

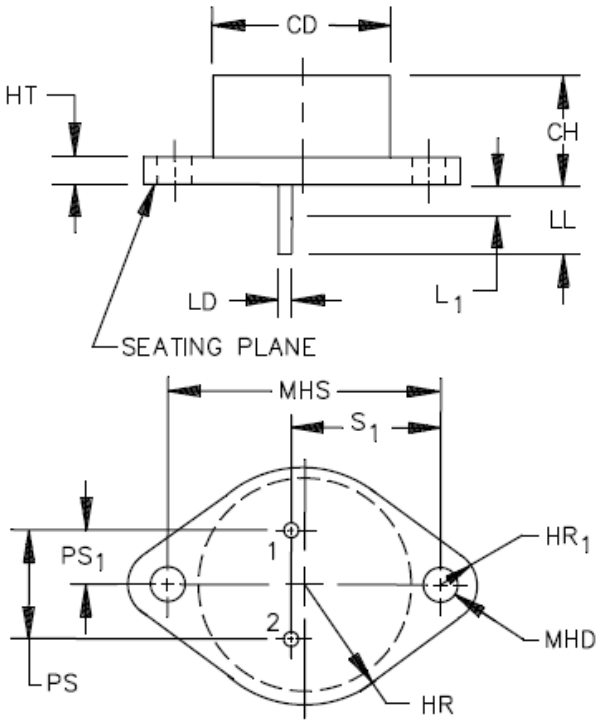
Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case [2]	$R_{\theta JC}$	1.0°C/W

(1) For temperature-power derating curves, see figures 5 and 6 of MIL-PRF-19500/510
(2) For thermal impedance curves, see figures 7, 8 and 9 of MIL-PRF-19500/510

Outline Drawing (TO-3)

Ltr	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.23	
CH	.250	.450	6.35	11.43	
HR	.495	.525	12.57	13.34	
HR_1	.131	.188	3.33	4.78	
HT	.050	.135	1.27	3.43	
LD	.038	.053	0.97	1.35	3, 5
LL	.312	.500	7.92	12.70	3
L_1		.050		1.27	5
MHD	.151	.161	3.84	4.09	
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	2
PS_1	.205	.25	5.21	6.35	2, 3
S_1	.665	.675	16.89	17.15	2



NOTES:
1. Dimensions are in inches. Millimeters are given for general information only.
2. These dimensions should be measured at points .050 (1.27 mm) to .055 (1.40 mm) below seating plane. When gage is not used, measurement will be made at seating plane.
3. Two leads.
4. Collector shall be electrically connected to the case.
5. LD applies between L_1 and LL maximum. Lead diameter shall not exceed twice LD within L_1.
6. In accordance with ASME Y14.5M, diameters are equivalent to ϕ symbology.
7. Terminal 1 is emitter; terminal 2 is base; case is collector.

FIGURE 1. Physical dimensions (similar to TO-3).