2N3442

NPN Silicon Power Transistor

Rev. V2

Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/370
- TO-3 Package
- Designed for High Voltage, High Power Switching and Amplifier Applications

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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Breakdown Voltage	I_C = 3 A dc I_C = 1.5 A dc, R_{BE} = 100 Ω V_{EB} = 1.5 V dc, I_C = 1.5 A dc	$V_{(BR)CEO}$ $V_{(BR)CER}$ $V_{(BR)CEX}$	V dc	140 150 160	—
Collector - Emitter Cutoff Current	V_{EB} = 1.5 V dc, V_{CE} = 125 V dc	I_{CEX}	mA dc	—	0.01
Collector - Base Cutoff Current	V_{CB} = 140 V dc	I_{CBO1}	mA dc		0.1
Emitter - Base Cutoff Current	V_{EB} = 7.0 V dc	I_{EBO}	mA dc	—	1
Forward Current Transfer Ratio	V_{CE} = 4.0 V dc, I_C = 3 A dc	h_{FE1}	-	20	70
Collector - Emitter Saturation Voltage	I_C = 3 A dc, I_B = 300 mA dc	$V_{CE(SAT)}$	V dc	—	1.0
Emitter - Base Voltage (non-saturated)	I_C = 3 A dc, V_{CE} = 4.0 V dc	V_{BE}	V dc	—	1.7
Small-Signal Short-Circuit Forward-Current Transfer Ratio	V_{CE} = 4 V dc, I_C = 3 A dc, f = 100 kHz	h_{fe}	—	1	—
Collector - Emitter Cutoff Current	T_A = +150°C V_{CB} = 140 V dc	I_{CBO2}	mA dc	—	1.0
Forward Current Transfer Ratio	T_A = -55°C V_{CE} = 4 V dc, I_C = 3 A dc	h_{FE2}	-	15	

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Absolute Maximum Ratings (T_C = +25°C unless otherwise noted)

Ratings	Symbol	Value
Collector - Emitter Voltage	V_{CEO}	140 V dc
Collector - Emitter Voltage	V_{CER}	150 V dc
Collector - Base Voltage	V_{CBO}	160 V dc
Emitter - Base Voltage	V_{EBO}	7.0 V dc
Base Current	I_B	7.0 A dc
Collector Current	I_C	10 A dc
Total Power Dissipation @ T_A = +25°C [1]	P_T	6.0 W
Total Power Dissipation @ T_C = +25°C [2]	P_T	117 W
Operating & Storage Temperature Range	T_J, T_{STG}	-65°C to +200°C

Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case [3]	$R_{\theta JC}$	1.5°C/W

1. Derate linearly 34.2 mW/°C above T_A = +25°C.
2. See figure 2 of MIL-PRF-19500/370 for temperature-power derating curves.
3. See figure 3 of MIL-PRF-19500/370 for transient thermal impedance graph.

Safe Operating Area	
DC Tests:	T_C = +25 °C, I Cycle, t = 1.0 s
Test 1:	I_C = 10 A dc, V_{CE} = 11.7 V dc
Test 2:	I_C = 1.5 A dc, V_{CE} = 78 V dc
Test 3:	I_C = 0.5 A dc, V_{CE} = 125 V dc

Outline Drawing (TO-3)

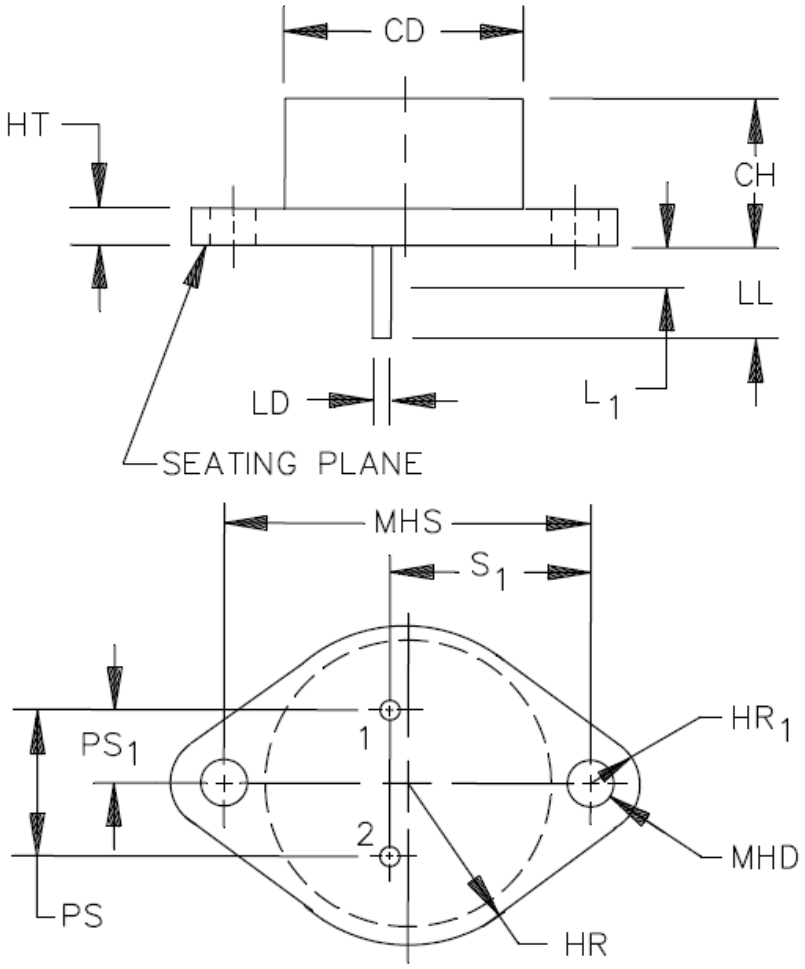


FIGURE 1. Physical dimensions (TO-204AA, formerly TO-3).

Outline Drawing (TO-3)

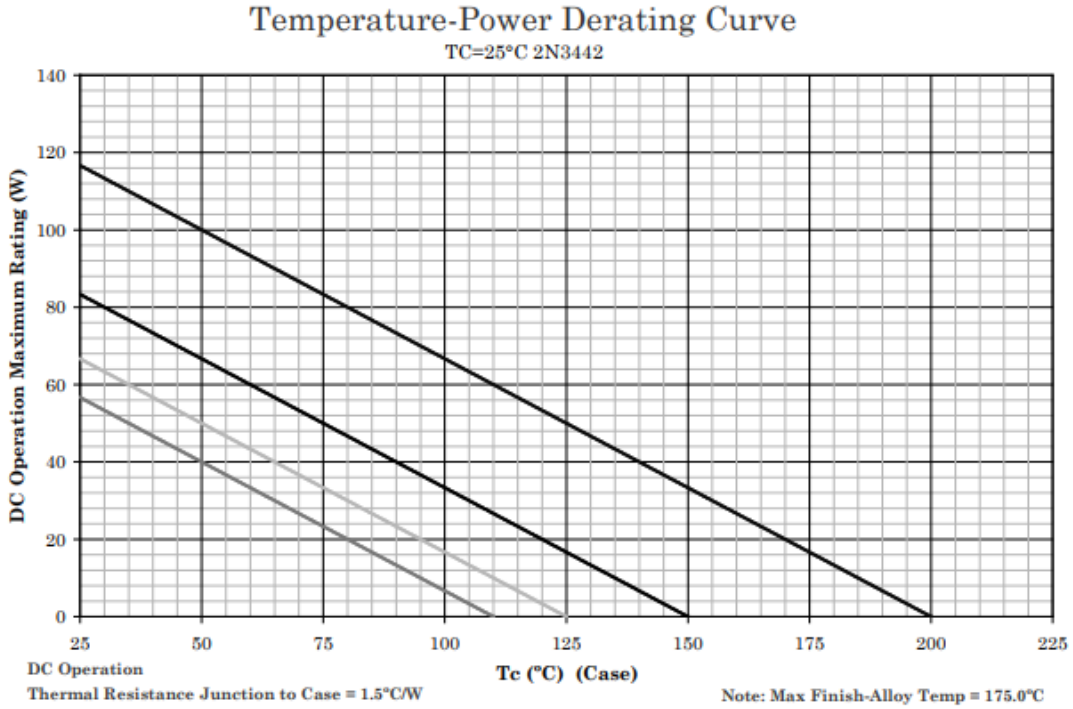
Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.23	3
CH	.250	.450	6.35	11.43	
HR	.495	.525	12.57	13.34	
HR_1	.131	.188	3.33	4.78	4
HT	.060	.135	1.52	3.43	
L_1		.050		1.27	5, 6
LD	.038	.043	0.97	1.09	5, 6
LL	.312	.500	7.92	12.70	5
MHD	.151	.161	3.84	4.09	4
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	7
PS_1	.205	.225	5.21	5.72	7
S_1	.655	.675	16.64	17.15	7

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Terminal 1 is the emitter; terminal 2 is the base; and the collector shall be electrically connected to the case.
3. Body contour is optional within zone defined by dimension CD.
4. Applies to both ends.
5. Applies to both terminals.
6. Dimension LD applies between L_1 and LL. Lead diameter shall not exceed twice dimension LD within dimension L_1. Diameter is uncontrolled in dimension L_1.
7. These dimensions shall be measured at points .050 inch (1.27 mm) to .055 inch (1.4 mm) below the seating plane. When gauge is not used, measurement will be made at the seating plane.
8. The seating plane of the header shall be flat within .001 inch (0.03 mm) concave to .004 inch (0.10 mm) convex inside a .930 inch (23.62 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.
9. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

FIGURE 1. Physical dimensions ((TO-204AA, formerly TO-3) - Continued.

Temperature-Power Derating Curve

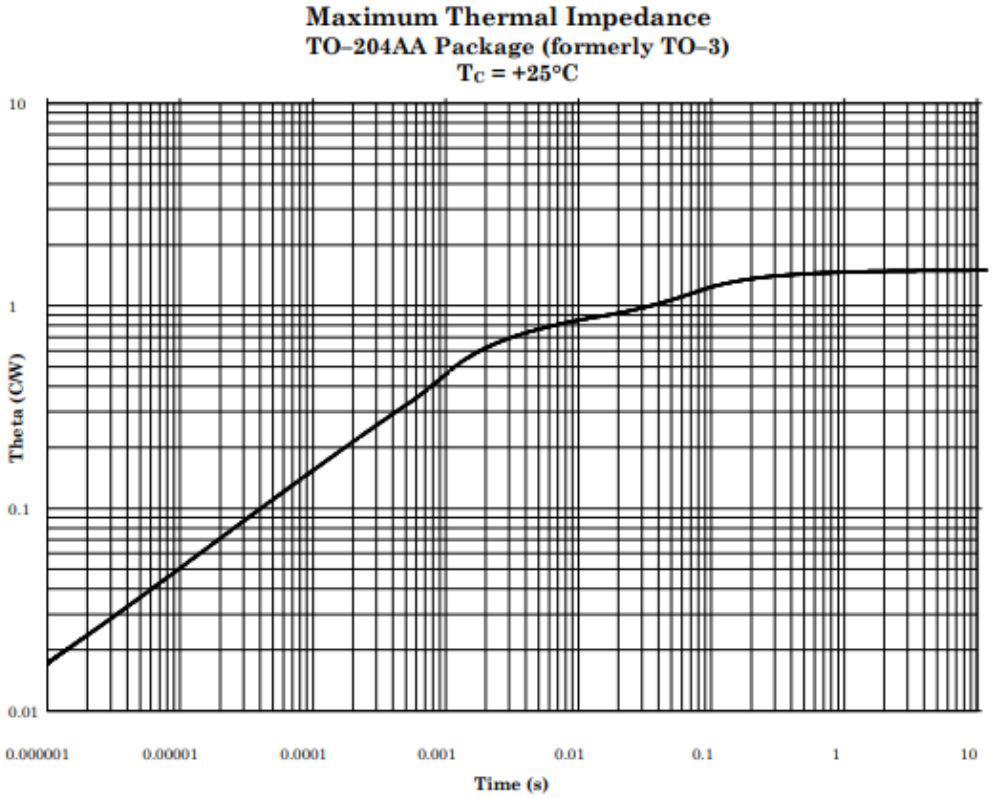


NOTES:

1. All devices are capable of operating at ≤ 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 ≤ +200°C) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at T_J ≤ +150°C, where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at T_J ≤ +125°C, and +110°C to show power rating where most users want to limit T_J in their application.

FIGURE 2. Temperature-power derating graph for device type 2N3442 (TO-204AA, formerly TO-3).

Thermal Impedance Curve



T_C = +25°C. Thermal resistance = 1.5°C/W.

FIGURE 3. Transient thermal impedance graph for device type 2N3442.