2N3441

NPN Silicon Power Transistor

Rev. V2

Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/369
- TO-66 Package
- Designed for General Purpose Switching and Amplifier 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 I_C = 100 mA dc, R_{BE} = 100 Ω V_{BE} = -1.5 V dc, I_C = 100 mA dc	$V_{(BR)CEO}$ $V_{(BR)CER}$ $V_{(BR)CEX}$	V dc	140 150 160	—
Collector - Emitter Cutoff Current	V_{BE} = -1.5 V dc, V_{CE} = 140 V dc	I_{CEX1}	µA dc	—	20
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 = 50 mA dc V_{CE} = 4.0 V dc, I_C = 0.5 A dc V_{CE} = 4.0 V dc, I_C = 1.0 A dc	h_{FE}	-	50 25 10	— 100 —
Collector - Emitter Saturation Voltage	I_C = 0.5 A dc, I_B = 50 mA dc	$V_{CE(SAT)}$	V dc	—	1
Emitter - Base Voltage (non-saturated)	I_C = 0.5 A dc, V_{CE} = 4.0 V dc	V_{BE}	V dc	—	1.7
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	V_{CE} = 4.0 Vdc, I_C = 0.5 A dc, f = 100 kHz	$\lvert h_{fe} \rvert$		4	40
Open Circuit Output Capacitance	V_{CB} = 10 Vdc, I_E = 0, 100 kHz ≤ f ≤ 1 MHz	C_{obo}	pF	—	300
Small-Signal Short-Circuit Forward-Current Transfer Ratio	V_{CE} = 4 V dc, I_C = 0.5 A dc, f = 1.0 kHz	h_{fe}	—	15	100
Collector - Emitter Cutoff Current	T_A = +150°C V_{BE} = -1.5 V dc, V_{CE} = 140 V dc	I_{CEX2}	mA dc	—	5
Forward Current Transfer Ratio	T_A = -65°C V_{CE} = 4 V dc, I_C = 0.5 A dc	h_{FE4}	-	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	2.0 A dc
Collector Current	I_C	3.0 A dc
Total Power Dissipation @ T_A = +25°C [1]	P_T	3.0 W
Total Power Dissipation @ T_C = +25°C [1]	P_T	25 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 [2]	$R_{\theta JC}$	3°C/W
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	58.5°C/W

1. For derating see figures 2 and 3 of MIL-PRF-19500/369.
2. For thermal impedance see figure 4 of MIL-PRF-19500/369.

Switching Characteristics					
Turn-On Time	V_{CC} = 30 Vdc, I_C = 0.5 A dc, I_B = 50 mA dc	t_{on}	µs	—	8
Turn-Off Time	V_{CC} = 30 Vdc, I_C = 0.5 A dc, I_{B1} = -I_{B2} = 50 mA dc	t_{off}	µs	—	15
Safe Operating Area					

DC Tests: T_C = +25 °C, I Cycle, t = 1.0 s

Test 1: I_C = 3 A dc, V_{CE} = 8.33 V dc
Test 2: I_C = 833 mA dc, V_{CE} = 30 V dc,
Test 3: I_C = 178.5 mA dc, V_{CE} = 140 V dc

Outline Drawing (TO-66)

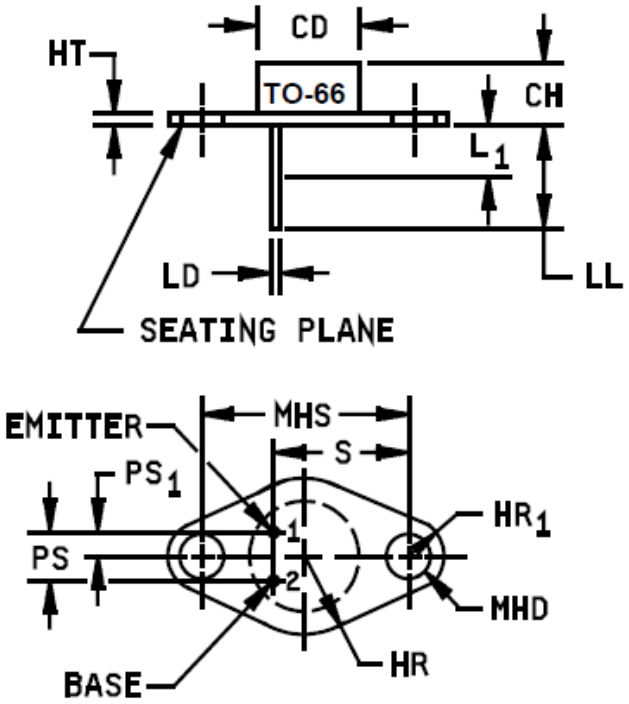


FIGURE 1. Physical dimensions (similar to TO-66).

Outline Drawing (TO-66)

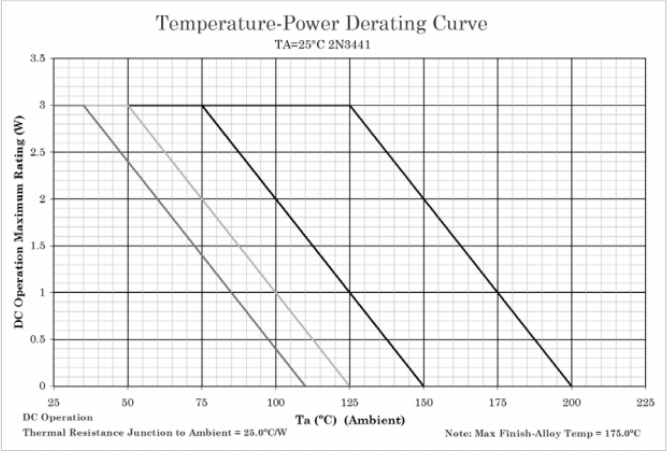
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.470	.500	11.94	12.70	
CH	.250	.340	6.35	8.64	
HR		.350		8.89	
HR_1	.115	.145	2.92	3.68	
HT	.050	.075	1.27	1.91	
LD	.028	.034	0.71	0.86	4, 6
LL	.360	.500	9.14	12.70	
L_1		.050		1.27	6
MHD	.142	.152	3.61	3.86	4
MHS	.958	.962	24.33	24.43	
PS	.190	.210	4.83	5.33	3
PS_1	.093	.107	2.36	2.72	3
S	.570	.590	14.48	14.99	

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. These dimensions should be measured at points .050 inch (1.27 mm) +.005 inch (0.13 mm) - 0 inch below seating plane. When gauge is not used, measurement will be made at the seating plane.
4. Two places.
5. 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.
6. Lead diameter shall not exceed twice LD within L_1.
7. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.
8. Pin 1 is the emitter and pin 2 is the base. The collector shall be electrically connected to the case.

FIGURE 1. Physical dimensions - Continued.

Temperature-Power Derating Curves



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 for 2N3441, $R_{\theta JA}$ = 25°C/W (TO-66).

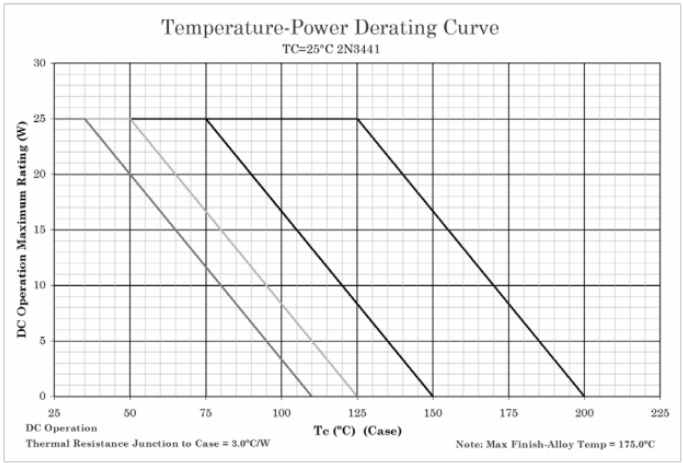


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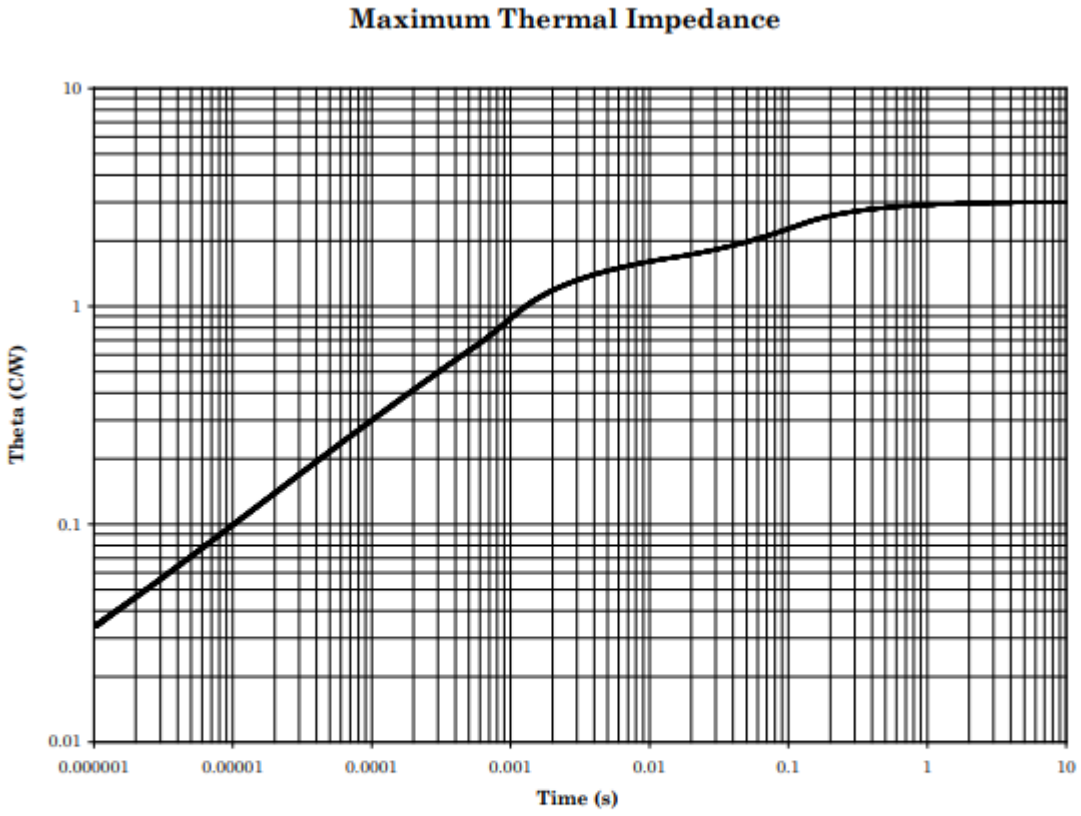
FIGURE 3. Temperature-power derating for 2N3441, $R_{\theta JC}$ = 3°C/W (TO-66).

Thermal Impedance Curve



T_C = +25°C, thermal resistance $R_{\theta JC}$ = 3°C/W at T_C +25°C.

FIGURE 4. Thermal impedance graph for 2N3441, (TO-66).