

### Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/369
- TO-66 Package
- Designed for General Purpose Switching and Amplifier Applications



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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Breakdown Voltage	$I_C = 100 \text{ mA dc}$ $I_C = 100 \text{ mA dc}, R_{BE} = 100 \Omega$ $V_{BE} = -1.5 \text{ V dc}, I_C = 100 \text{ mA dc}$	$V_{(BR)CEO}$ $V_{(BR)CER}$ $V_{(BR)CEX}$	V dc	140 150 160	—
Collector - Emitter Cutoff Current	$V_{BE} = -1.5 \text{ V dc}, V_{CE} = 140 \text{ V dc}$	$I_{CEX1}$	$\mu\text{A dc}$	—	20
Emitter - Base Cutoff Current	$V_{EB} = 7.0 \text{ V dc}$	$I_{EBO}$	mA dc	—	1
Forward Current Transfer Ratio	$V_{CE} = 4.0 \text{ V dc}, I_C = 50 \text{ mA dc}$ $V_{CE} = 4.0 \text{ V dc}, I_C = 0.5 \text{ A dc}$ $V_{CE} = 4.0 \text{ V dc}, I_C = 1.0 \text{ A dc}$	$h_{FE}$	-	50 25 10	— 100 —
Collector - Emitter Saturation Voltage	$I_C = 0.5 \text{ A dc}, I_B = 50 \text{ mA dc}$	$V_{CE(SAT)}$	V dc	—	1
Emitter - Base Voltage (non-saturated)	$I_C = 0.5 \text{ A dc}, V_{CE} = 4.0 \text{ V dc}$	$V_{BE}$	V dc	—	1.7
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = 4.0 \text{ Vdc}, I_C = 0.5 \text{ A dc}, f = 100 \text{ kHz}$	$ h_{fe} $		4	40
Open Circuit Output Capacitance	$V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	$C_{obo}$	pF	—	300
Small-Signal Short-Circuit Forward-Current Transfer Ratio	$V_{CE} = 4 \text{ V dc}, I_C = 0.5 \text{ A dc}, f = 1.0 \text{ kHz}$	$h_{fe}$	—	15	100
Collector - Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{BE} = -1.5 \text{ V dc}, V_{CE} = 140 \text{ V dc}$	$I_{CEX2}$	mA dc	—	5
Forward Current Transfer Ratio	$T_A = -65^\circ\text{C}$ $V_{CE} = 4 \text{ V dc}, I_C = 0.5 \text{ A dc}$	$h_{FE4}$	-	15	

**Absolute Maximum Ratings ( $T_C = +25^\circ\text{C}$  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 @ $T_A = +25^\circ\text{C}$ <sup>1</sup>	$P_T$	3.0 W
Total Power Dissipation @ $T_C = +25^\circ\text{C}$ <sup>1</sup>	$P_T$	25 W
Operating & Storage Temperature Range	$T_J, T_{STG}$	$-65^\circ\text{C}$ to $+200^\circ\text{C}$

**Thermal Characteristics**

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case <sup>2</sup>	$R_{\theta JC}$	$3^\circ\text{C/W}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	$58.5^\circ\text{C/W}$

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

Switching Characteristics							
Turn-On Time	$V_{CC} = 30 \text{ Vdc}, I_C = 0.5 \text{ A dc}, I_B = 50 \text{ mA dc}$	$t_{on}$	$\mu\text{s}$	—	8		
Turn-Off Time	$V_{CC} = 30 \text{ Vdc}, I_C = 0.5 \text{ A dc}, I_{B1} = -I_{B2} = 50 \text{ mA dc}$	$t_{off}$	$\mu\text{s}$	—	15		

Safe Operating Area	
DC Tests:	$T_C = +25^\circ\text{C}, 1 \text{ Cycle}, t = 1.0 \text{ s}$
Test 1:	$I_C = 3 \text{ A dc}, V_{CE} = 8.33 \text{ V dc}$
Test 2:	$I_C = 833 \text{ mA dc}, V_{CE} = 30 \text{ V dc},$
Test 3:	$I_C = 178.5 \text{ mA dc}, V_{CE} = 140 \text{ V dc}$

# 2N3441

## NPN Silicon Power Transistor

Rev. V2

### Outline Drawing (TO-66)

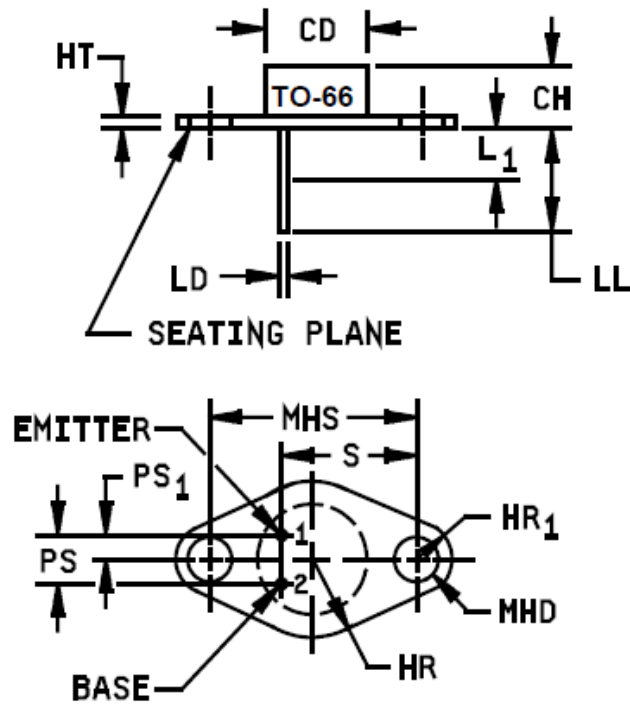


FIGURE 1. Physical dimensions (similar to TO-66).

### Outline Drawing (TO-66)

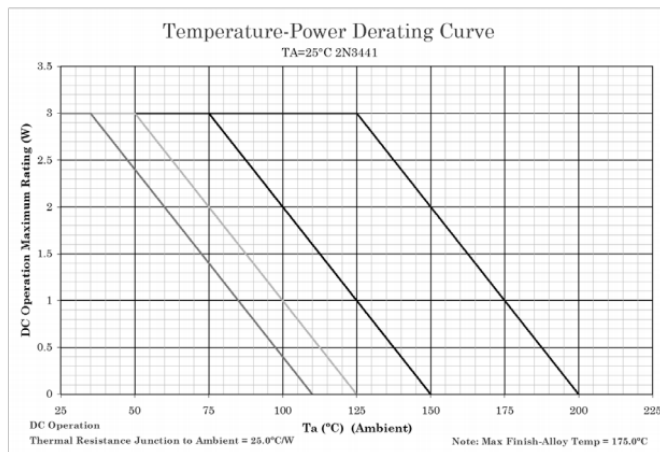
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.470	.500	11.94	12.70	
CH	.250	.340	6.35	8.64	
HR		.350		8.89	
HR <sub>1</sub>	.115	.145	2.92	3.68	
HT	.050	.075	1.27	1.91	
LD	.028	.034	0.71	0.86	4, 6
LL	.360	.500	9.14	12.70	
L <sub>1</sub>		.050		1.27	6
MHD	.142	.152	3.61	3.86	4
MHS	.958	.962	24.33	24.43	
PS	.190	.210	4.83	5.33	3
PS <sub>1</sub>	.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<sub>1</sub>.
7. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  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.

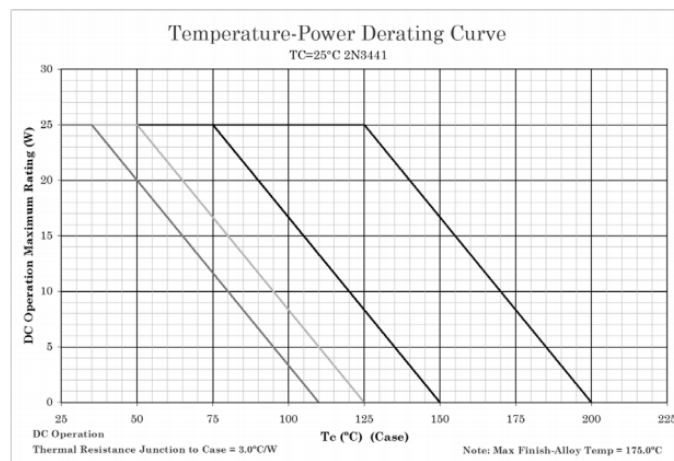
### Temperature-Power Derating Curves



**NOTES:**

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

FIGURE 2. Temperature-power derating for 2N3441,  $R_{\theta JA} = 25^\circ\text{C/W}$  (TO-66).



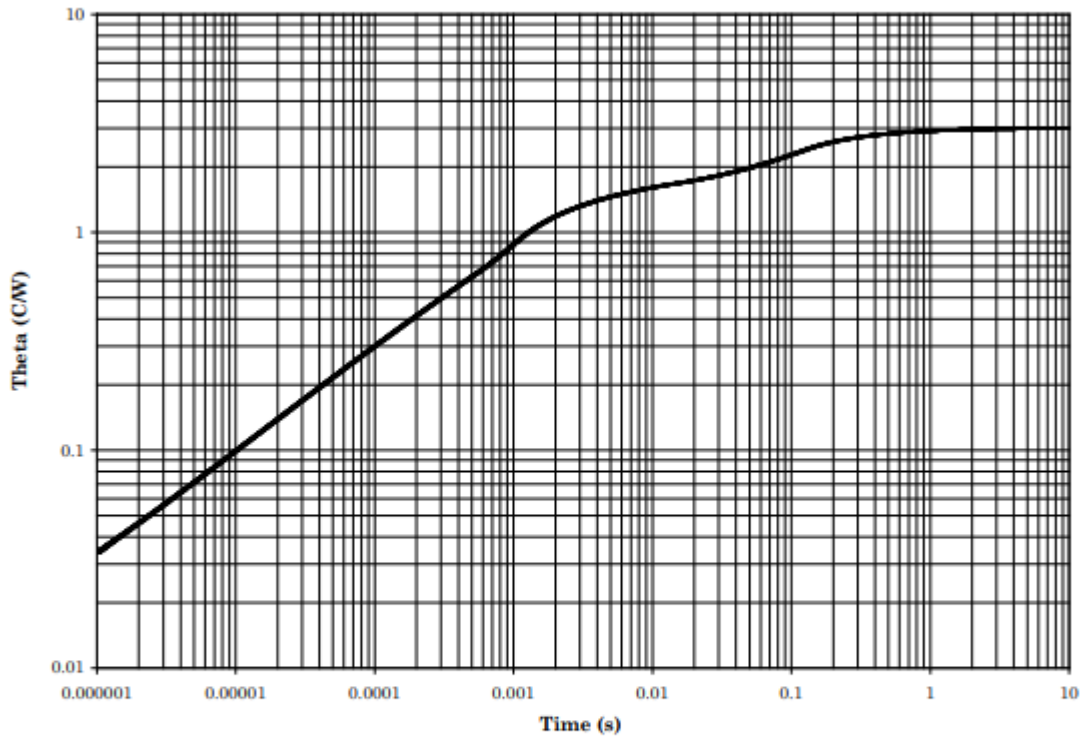
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FIGURE 3. Temperature-power derating for 2N3441,  $R_{\theta JC} = 3^\circ\text{C/W}$  (TO-66).

### Thermal Impedance Curve

#### Maximum Thermal Impedance



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

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

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