

2N3740 & 2N3741



PNP Power Silicon Transistor

Rev. V4

Features

- Available in JAN, JANTX, JANTXV, JANS and JANSR per MIL-PRF-19500/441
- Radiation Tolerant Levels M, D, P, L and R
- TO-66 Package
- Designed for Power Amplifier and Medium Speed Switching Applications



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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Off Characteristics					
Collector - Emitter Breakdown Voltage	$I_C = -100 \text{ mA dc}$, 2N3740 $I_C = -100 \text{ mA dc}$, 2N3741	$V_{(BR)CEO}$	V dc	-60 -80	—
Collector - Emitter Cutoff Current	$V_{CE} = -40 \text{ V dc}$, 2N3740 $V_{CE} = -60 \text{ V dc}$, 2N3741	I_{CEO}	$\mu\text{A dc}$	—	-10
Collector - Emitter Cutoff Current	$V_{CE} = -60 \text{ V dc}$, $V_{BE} = 1.5 \text{ V dc}$, 2N3740 $V_{CE} = -80 \text{ V dc}$, $V_{BE} = 1.5 \text{ V dc}$, 2N3741	I_{CEX}	nA dc	—	-300
Collector - Base Cutoff Current	$V_{CE} = -60 \text{ V dc}$, 2N3740 $V_{CE} = -80 \text{ V dc}$, 2N3741	I_{CBO}	nA dc	—	-100
Emitter - Base Cutoff Current	$V_{EB} = -7 \text{ V dc}$	I_{EBO}	nA dc	—	-100
On Characteristics¹					
Forward Current Transfer Ratio	$I_C = -100 \text{ mA dc}$, $V_{CE} = -1 \text{ V dc}$ $I_C = -250 \text{ mA dc}$, $V_{CE} = -1 \text{ V dc}$ $I_C = -500 \text{ mA dc}$, $V_{CE} = -1 \text{ V dc}$ $I_C = -1 \text{ A dc}$, $V_{CE} = -1 \text{ V dc}$ $I_C = -4 \text{ A dc}$, $V_{CE} = -5 \text{ V dc}$	h_{FE}	-	40 30 20 10 3	120
Collector - Emitter Saturation Voltage	$I_C = -250 \text{ mA dc}$, $I_B = -25 \text{ mA dc}$ $I_C = -1 \text{ A dc}$, $I_B = -125 \text{ mA dc}$	$V_{CE(SAT)1}$ $V_{CE(SAT)2}$	V dc	—	-0.4 -0.6
Base - Emitter Voltage	$I_C = -250 \text{ mA dc}$, $V_{CE} = -1 \text{ Vdc}$	V_{BE}	V dc	—	-1.0
Dynamic Characteristics					
Small-Signal Short-Circuit Forward Current Transfer Ratio	$I_C = -100 \text{ mA dc}$; $V_{CE} = -10 \text{ V dc}$; $f = 5 \text{ MHz}$	$ h_{FE} $	-	1	12
Small-Signal Short-Circuit Forward Current Transfer Ratio	$I_C = -50 \text{ mA dc}$; $V_{CE} = -10 \text{ V dc}$; $f = 1 \text{ kHz}$	h_{FE}	-	25	250
Output Capacitance	$V_{CB} = -10 \text{ V dc}$; $I_E = 0$; $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	C_{obo}	pF	—	100
Switching Characteristics					
Turn-On Time	$I_C = -1 \text{ A dc}$; $I_{B1} = -0.1 \text{ A dc}$	t_{on}	ns	—	400
Turn-Off Time	$I_C = -1 \text{ A dc}$; $I_{B1} = I_{B2} = -0.1 \text{ A dc}$	t_{off}	μs	—	1

1. Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.

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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{CE} = -60\text{ V dc, 2N3740}$ $V_{CE} = -80\text{ V dc, 2N3741}$	I_{CEX2}	$\mu\text{A dc}$	—	-25
Forward Current Transfer Ratio	$T_A = -55^\circ\text{C}$ $V_{CE} = -1\text{ V dc; } I_C = -250\text{ mA dc}$	h_{FE6}		10	—

Safe Operating Area

DC Tests:	$T_C = +25^\circ\text{C, 1 Cycle, } t = 1.0\text{ s}$
Test 1:	$V_{CE} = -6.25\text{ V dc, } I_C = -4.0\text{ A dc}$
Test 2:	$V_{CE} = -20\text{ Vdc, } I_C = -1.25\text{ A dc}$
Test 3:	$V_{CE} = -50\text{ Vdc, } I_C = -150\text{ A dc, 2N3740}$ $V_{CE} = -65\text{ Vdc, } I_C = -150\text{ A dc, 2N3741}$

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Absolute Maximum Ratings ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Ratings	Symbol	Value
Collector - Emitter Voltage 2N3740 2N3741	V_{CEO}	-60 V dc -80 V dc
Collector - Base Voltage 2N3740 2N3741	V_{CBO}	-60 V dc -80 V dc
Emitter - Base Voltage	V_{EBO}	-7 V dc
Base Current	I_B	-2 A dc
Collector Current	I_C	-4 A dc
Total Power Dissipation $T_C = +25^\circ\text{C}$ $T_A = +25^\circ\text{C}$ $T_C = +100^\circ\text{C}$	$P_T^{(1)}$	25 W 3 W 14 W
Operating & Storage Temperature Range	T_J, T_{STG}	-65°C to $+200^\circ\text{C}$

Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case	$R_{\theta JC}^{(2)}$	7°C/W

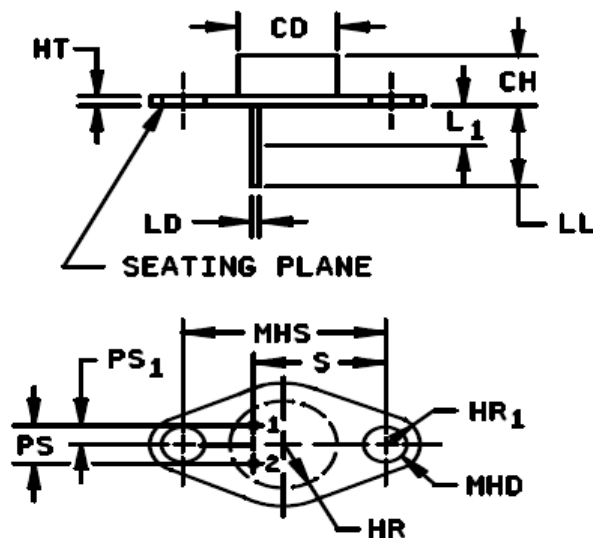
1. Derate linearly @ $0.428 \text{ mW} / ^\circ\text{C}$ for $T_C > +25^\circ\text{C}$.
2. See figures 6 and 7 of MIL-PRF-19500/441 for transient thermal impedance graphs.

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Outline Drawing (TO-66)



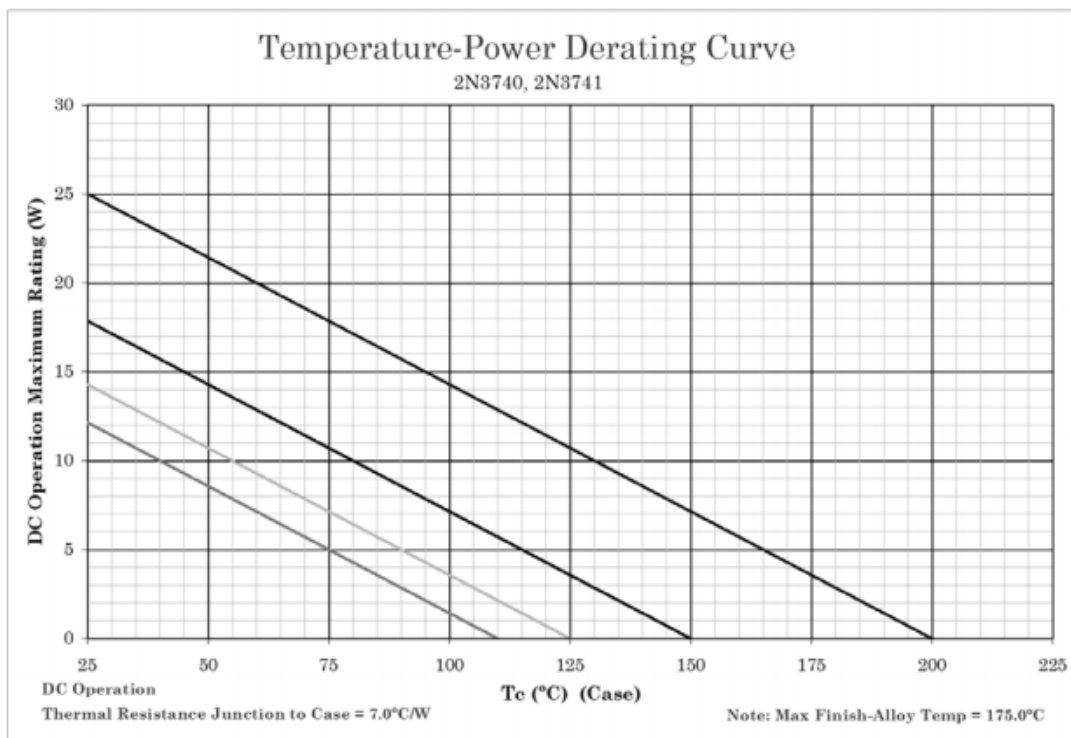
Symbol	Dimensions				Notes	Symbol	Dimensions				Notes
	Inches		Millimeter				Inches		Millimeters		
	Min	Max	Min	Max			Min	Max	Min	Max	
CD		.620		15.75	9	LL	.360	.500	9.14	12.70	4, 8
CH	.250	.340	6.35	8.64		L ₁		.050		1.27	4, 8
HT	.050	.075	1.27	1.91		MHD	.142	.152	3.61	3.86	6, 9
HR		.350		8.89		MHS	.958	.962	24.33	24.43	
HR ₁	.115	.145	2.92	3.68	5	PS	.190	.210	4.83	5.33	3
LD	.028	.034	0.71	0.86	4, 8, 9	PS ₁	.093	.107	2.36	2.72	3
						S	.570	.590	14.48	14.99	3

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. These dimensions should be measured at points .050 to .055 inch (1.27 to 1.40 mm) below seating plane. When gauge is not used, measurement will be made at seating plane.
4. Both terminals.
5. At both ends.
6. Two holes.
7. The collector shall be electrically connected to the case.
8. LD applies between L₁ and LL. Lead diameter shall not exceed twice LD within L₁.
9. In accordance with ASME Y14.5M, diameters are equivalent to ϕ symbology.
10. Lead 1 is the emitter, lead 2 is the base, collector is the case.

FIGURE 1. Physical dimensions, TO-66 (2N3740, 2N3741).

Temperature-Power Derating Curve



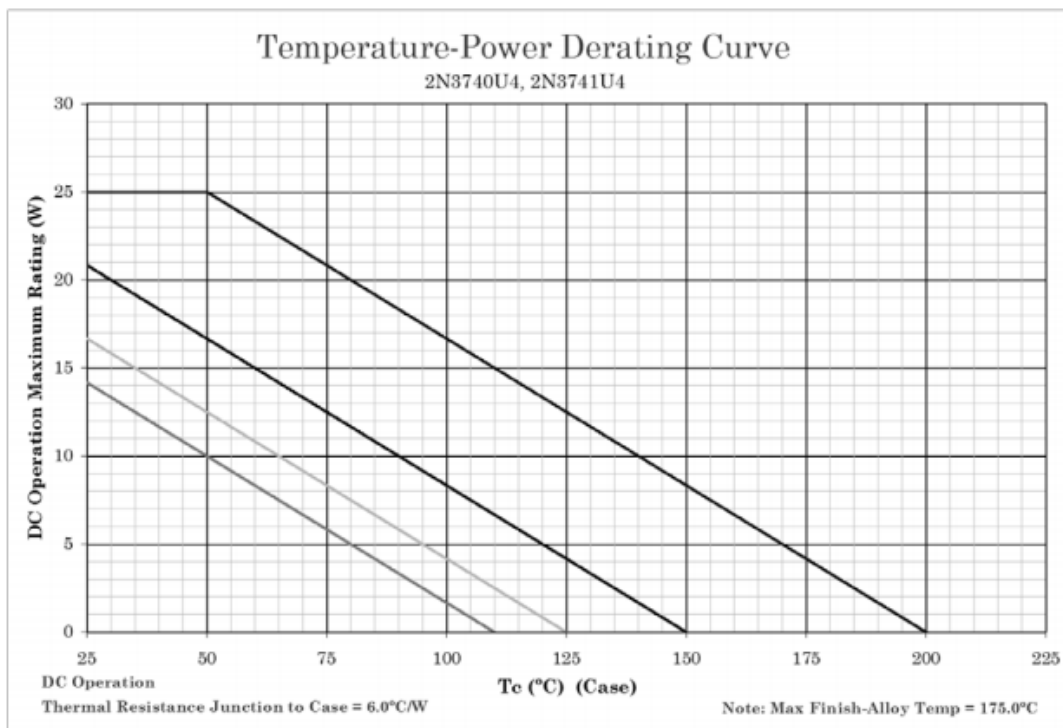
$$R_{\theta JC} = 7^{\circ}\text{C/W}$$

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 4. Temperature-power derating graph (2N3740, 2N3741, TO-66).

Temperature-Power Derating Curve



$$R_{\theta JC} = 6^{\circ}\text{C/W}$$

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 5. Temperature-power derating graph (2N3740U4, 2N3741U4).

Thermal Impedance Curves

Maximum Thermal Impedance

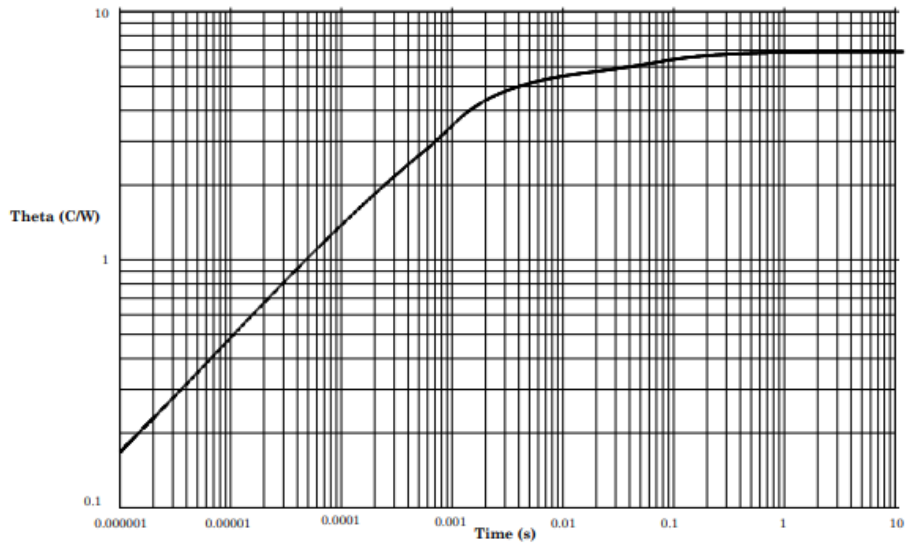


FIGURE 6. Transient thermal impedance graph (2N3740 and 2N3741).

Maximum Thermal Impedance

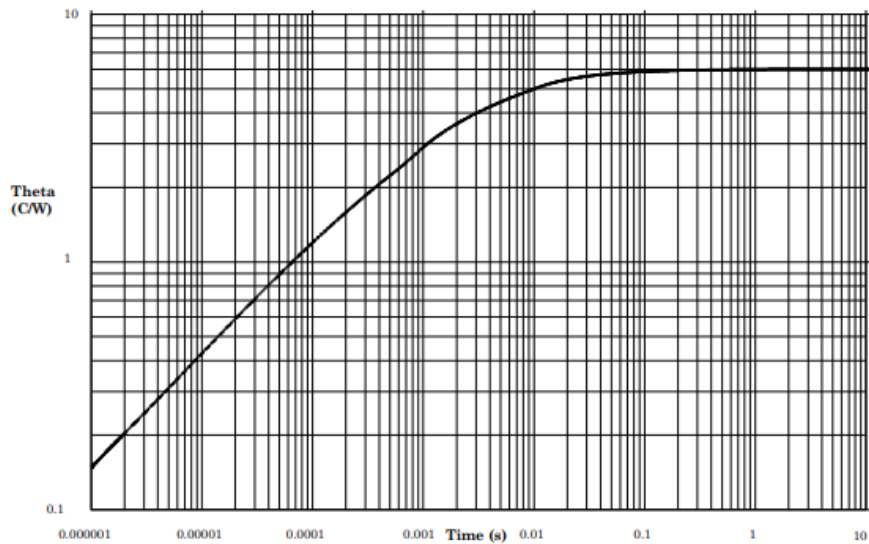


FIGURE 7. Transient thermal impedance graph (2N3740U4 and 2N3741U4).

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