

2N3791 & 2N3792



PNP High Power Silicon Transistor

Rev. V3

Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/379
- TO-3 (TO-204AA) Package
- Designed for High Power, Medium Speed 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	$I_C = -10 \text{ mA dc}$; 2N3791 $I_C = -10 \text{ mA dc}$; 2N3792	$V_{(BR)CEO}$	V dc	-60 -80	—
Collector - Emitter Cutoff Current	$V_{CE} = -60 \text{ V dc}$; $V_{BE} = -1.5 \text{ V dc}$, 2N3791 $V_{CE} = -80 \text{ V dc}$; $V_{BE} = -1.5 \text{ V dc}$, 2N3792	I_{CEX}	$\mu\text{A dc}$	—	-20 -20
Collector - Base Cutoff Current	$V_{CE} = -60 \text{ V dc}$, 2N3791 $V_{CE} = -80 \text{ V dc}$, 2N3792	I_{CBO}	$\mu\text{A dc}$	—	-20 -20
Emitter - Base Cutoff Current	$V_{EB} = -7 \text{ V dc}$	I_{EBO}	mA dc	—	-5.0
Collector-Emitter Cutoff Current	$V_{CE} = -50 \text{ V dc}$, 2N3791 $V_{CE} = -70 \text{ V dc}$, 2N3792	I_{CES1}	$\mu\text{A dc}$		-20 -20
Forward Current Transfer Ratio	$V_{CE} = -2.0 \text{ V dc}$; $I_C = -1.0 \text{ A dc}$ $V_{CE} = -2.0 \text{ V dc}$; $I_C = -3.0 \text{ A dc}$ $V_{CE} = -2.0 \text{ V dc}$; $I_C = -5 \text{ A dc}$ $V_{CE} = -4.0 \text{ V dc}$; $I_C = -10 \text{ A dc}$	h_{FE}	-	50 30 10 5	150 120
Collector - Emitter Saturation Voltage	$I_C = -5 \text{ A dc}$; $I_B = -0.5 \text{ A dc}$ $I_C = -10 \text{ A dc}$; $I_B = -2.0 \text{ A dc}$	$V_{CE(sat)1}$ $V_{CE(sat)2}$	Vdc	—	-1.0 -2.5
Base - Emitter Saturation Voltage	$I_C = -5 \text{ A dc}$; $I_B = -0.5 \text{ Vdc}$ $I_C = -10 \text{ A dc}$; $I_B = -2.0 \text{ Vdc}$	$V_{BE(sat)1}$ $V_{BE(sat)2}$	Vdc	—	-1.5 -3.0
Collector-Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{CE} = -50 \text{ V dc}$, 2N3791 $V_{CE} = -70 \text{ V dc}$, 2N3792	I_{CES2}	mA dc		-3.4 -3.4
Forward Current Transfer Ratio	$T_A = -55^\circ\text{C}$ $V_{CE} = -2.0 \text{ V dc}$; $I_C = -3.0 \text{ A dc}$	h_{FE5}		12	
Dynamic Characteristics					
Magnitude of Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = -10 \text{ V dc}$; $I_C = -0.5 \text{ A dc}$; $f = 1 \text{ MHz}$	$ h_{fe} $		4.0	20
Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = -10 \text{ V dc}$; $I_C = -0.5 \text{ A dc}$; $f = 1 \text{ kHz}$	h_{fe}		30	300
Open Circuit Output Capacitance	$V_{CB} = -10 \text{ V dc}$; $I_E = 0$; $f = 1\text{MHz}$	C_{obo}	pF	—	500

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Parameter	Test Conditions	Symbol	Units	Min.	Max.
Switching Characteristics					
Delay Time	See figure 4 of MIL-PRF-19500/379	t_d	μs	—	0.2
Rise Time		t_r			1.3
Storage Time		t_s			1.4
Fall Time		t_f			1.0

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

Ratings	Symbol	Value
Collector - Emitter Voltage 2N3791 2N3792	V_{CEO}	-60 V dc -80 V dc
Collector - Base Voltage 2N3791 2N3792	V_{CBO}	-60 V dc -80 V dc
Emitter - Base Voltage	V_{EBO}	-7 V dc
Base Current	I_B	-4 V dc
Collector Current	I_C	-10 A dc
Total Power Dissipation @ $T_A = +25^\circ\text{C}$ ⁽¹⁾ @ $T_C = +100^\circ\text{C}$ ⁽²⁾	P_T	5.0 W 85.7 W
Operating & Storage Temperature Range	T_J, T_{STG}	-65°C to +200°C

(1) Derate linearly 28.57 mW/°C above $T_A = +25^\circ\text{C}$.

(2) See figure 2 of Mil-PRF-19500/379 for temperature-power derating curves.

Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.1°C/W

Safe Operating Area	
DC Tests:	$T_C = +25^\circ\text{C}$, 1 Cycle, $t \geq 1.0$ s
Test 1:	$V_{CE} = -15$ V dc; $I_C = -10$ A dc
Test 2:	$V_{CE} = -40$ V dc; $I_C = -3.75$ A dc
Test 3:	$V_{CE} = -55$ V dc; $I_C = -0.9$ A dc, 2N3791
	$V_{CE} = -65$ V dc; $I_C = -0.9$ A dc, 2N3792

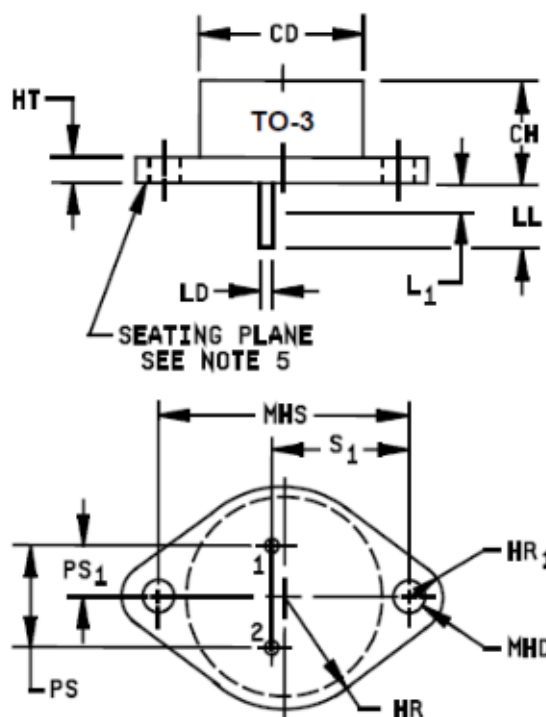
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Outline Drawing (TO-3)

Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.22	
CH	.270	.350	6.86	8.89	
HR	.495	.525	12.57	13.34	
HR ₁	.131	.188	3.33	4.78	
HT	.060	.135	1.52	3.43	
LD	.038	.043	0.97	1.09	7
LL	.312	.500	7.92	12.70	
L ₁		.050		1.27	7
MHD	.151	.165	3.84	4.19	
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	4,5
PS ₁	.205	.225	5.21	5.72	4,5
s ₁	.655	.675	16.64	17.15	4

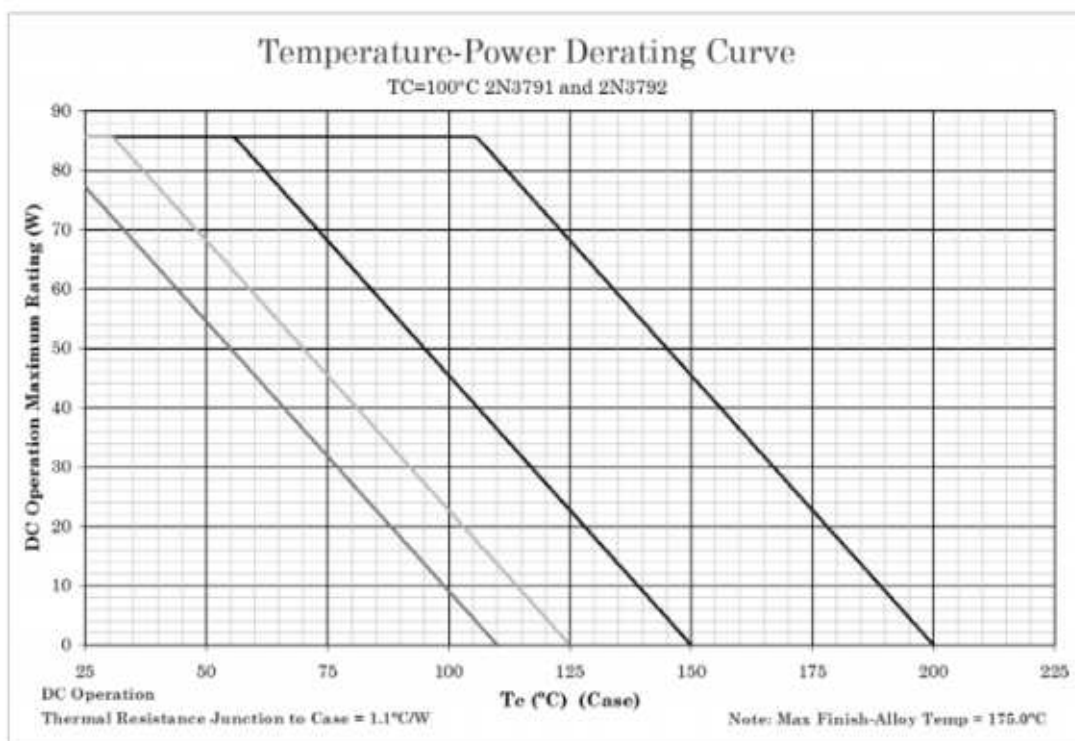


NOTES:

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

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

Temperature-Power Derating Curve



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/current 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 graphs, TO-3.

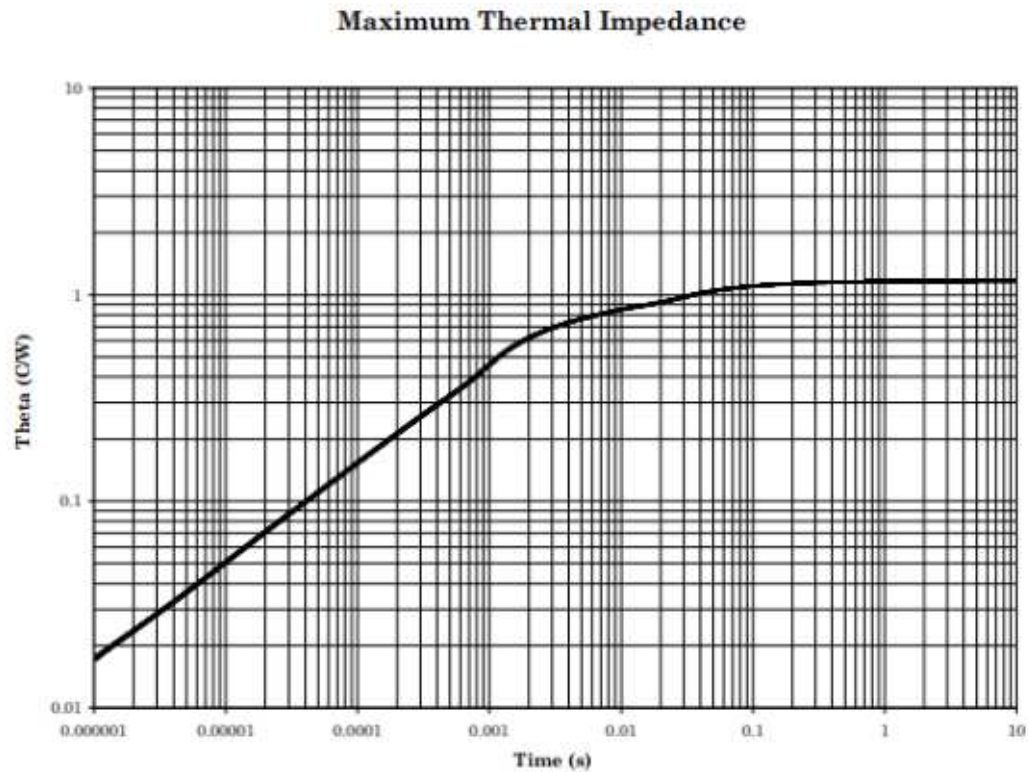
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Thermal Impedance Curve



$T_C = +25^{\circ}\text{C}$. $R_{\theta\text{JC}} = 1.1^{\circ}\text{C/W}$.

FIGURE 3. Transient thermal impedance graph.

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