

# 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	$V_{EB} = -7 \text{ V dc}$	$I_{EBO}$	$\text{mA dc}$	—	-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	$I_{CES2}$	$\text{mA dc}$		-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	
<b>Dynamic Characteristics</b>					
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.
<b>Switching Characteristics</b>					
Delay Time	See figure 4 of MIL-PRF-19500/379	$t_d$	$\mu\text{s}$	—	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 @ $T_A = +25^\circ\text{C}$ <sup>(1)</sup> @ $T_C = +100^\circ\text{C}$ <sup>(2)</sup>	$P_T$	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

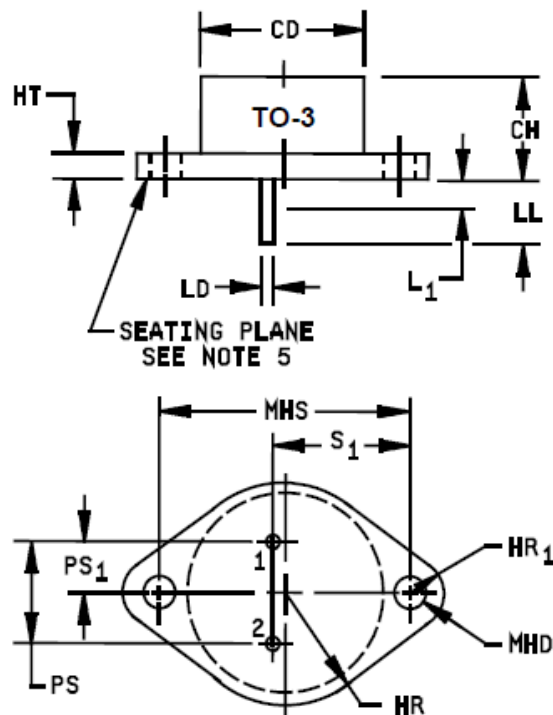
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### Outline Drawing (TO-3)

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 <sub>1</sub>	.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 <sub>1</sub>		.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 <sub>1</sub>	.205	.225	5.21	5.72	4,5
s <sub>1</sub>	.655	.675	16.64	17.15	4

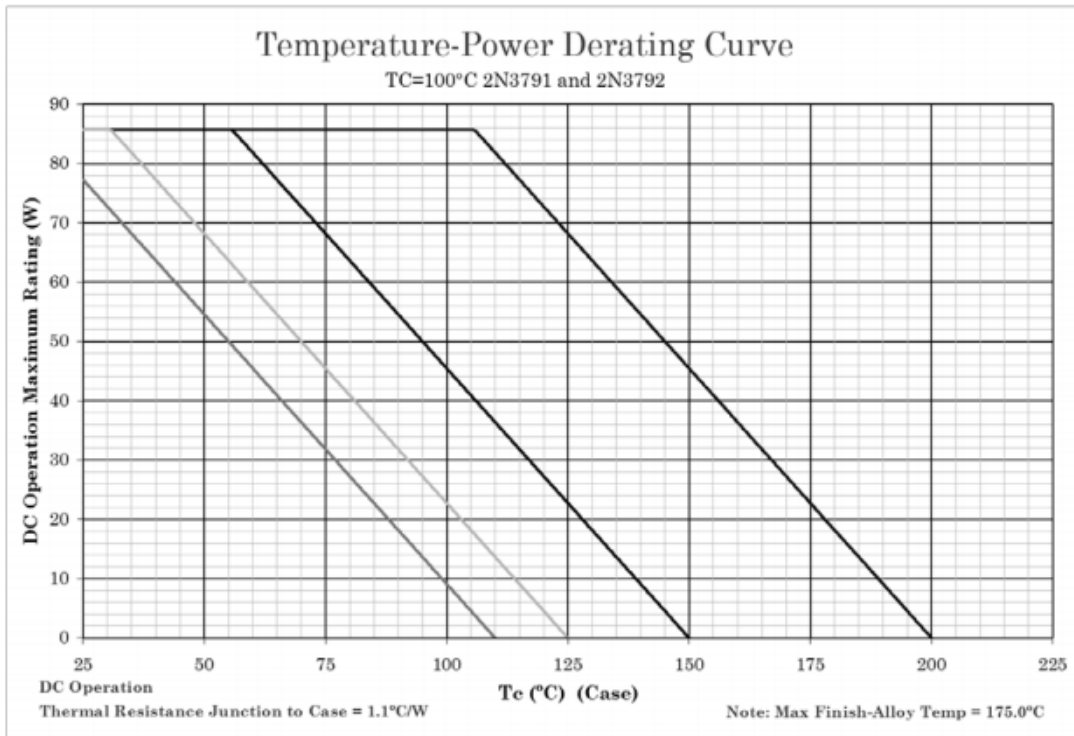


#### NOTES:

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 L<sub>1</sub> and LL. Lead diameter shall not exceed LD within L<sub>1</sub>.
8. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.

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

### Temperature-Power Derating Curve



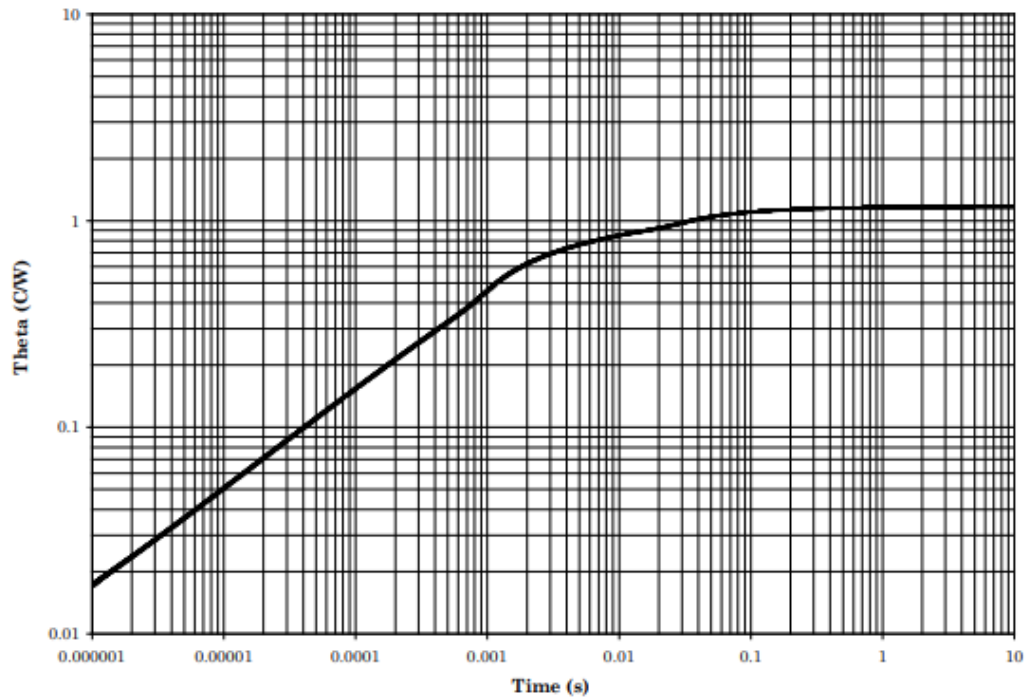
#### NOTES:

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.

## Thermal Impedance Curve

### Maximum Thermal Impedance



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

FIGURE 3. Transient thermal impedance graph.

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