

# 2N3771 & 2N3772



## NPN High Power Silicon Transistor

Rev. V1

### Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/413
- TO-3 (TO-204AA) Package
- Designed for High Speed Switching and Amplifier Applications



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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Base Breakdown Voltage	$I_C = 200 \text{ mA dc}$ , 2N3771 $I_C = 200 \text{ mA dc}$ , 2N3772	$V_{(BR)CEO}$	V dc	40 60	—
Collector - Emitter Breakdown Voltage	$I_C = 200 \text{ mA dc}$ ; $R_{BE} = 100\Omega$ , 2N3771 $I_C = 200 \text{ mA dc}$ ; $R_{BE} = 100\Omega$ , 2N3772	$V_{(BR)CER}$	V dc	45 70	—
Collector - Emitter Breakdown Voltage	$I_C = 200 \text{ mA dc}$ ; $V_{BE} = -1.5 \text{ V dc}$ , 2N3771 $I_C = 200 \text{ mA dc}$ ; $V_{BE} = -1.5 \text{ V dc}$ , 2N3772	$V_{(BR)CEX}$	V dc	50 90	—
Collector - Emitter Cutoff Current	$V_{CE} = 30 \text{ V dc}$ , 2N3771 $V_{CE} = 50 \text{ V dc}$ , 2N3772	$I_{CEO}$	mA dc	—	5 5
Emitter - Base Cutoff Current	$V_{EB} = 7.0 \text{ V dc}$	$I_{EBO}$	mA dc	—	2.0
Collector - Emitter Cutoff Current	$V_{BE} = 1.5 \text{ V dc}$ $V_{CE} = 50 \text{ V dc}$ , 2N3771 $V_{CE} = 100 \text{ V dc}$ , 2N3772	$I_{CEX1}$	$\mu\text{A dc}$	—	20 20
Forward-Current Transfer Ratio	$I_C = 1.0 \text{ A dc}$ ; $V_{CE} = 4 \text{ V dc}$	$h_{FE1}$	-	40	
Forward-Current Transfer Ratio	$I_C = 15 \text{ A dc}$ ; $V_{CE} = 4 \text{ V dc}$ , 2N3771 $I_C = 10 \text{ A dc}$ ; $V_{CE} = 4 \text{ V dc}$ , 2N3772	$h_{FE2}$	-	15 15	60 60
Collector - Emitter Saturation Voltage	$I_C = 15 \text{ A dc}$ ; $I_B = 1.5 \text{ A dc}$ , 2N3771 $I_C = 10 \text{ A dc}$ ; $I_B = 1.0 \text{ A dc}$ , 2N3772	$V_{CE(SAT)1}$	V dc	—	1.5 1.2
Collector - Emitter Saturation Voltage	$I_C = 30 \text{ A dc}$ ; $I_B = 6 \text{ A dc}$ , 2N3771 $I_C = 20 \text{ A dc}$ ; $I_B = 4 \text{ A dc}$ , 2N3772	$V_{CE(SAT)2}$	V dc	—	4 4
Emitter - Base Saturation Voltage	$V_{CE} = 4 \text{ V dc}$ $I_C = 15 \text{ A dc}$ , 2N3771 $I_C = 10 \text{ A dc}$ , 2N3772	$V_{BE}$	Vdc	—	2.3 2.0

# 2N3771 & 2N3772



## NPN High Power Silicon Transistor

Rev. V1

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Cutoff Current	$T_A = +150^{\circ}\text{C}$ $V_{BE} = -1.5\text{ V dc}; V_{CE} = 50\text{ V dc}, 2\text{N}3771$ $V_{BE} = -1.5\text{ V dc}; V_{CE} = 100\text{ V dc}, 2\text{N}3772$	$I_{CEX2}$	mA dc	—	1.5 1.5
Forward-Current Transfer Ratio	$T_A = -55^{\circ}\text{C}$ $V_{CE} = 4\text{ V dc}; I_C = 15\text{ A dc}, 2\text{N}3771$ $V_{CE} = 4\text{ V dc}; I_C = 10\text{ A dc}, 2\text{N}3772$	$h_{FE3}$		10 10	
Turn On Time	$V_{CC} = 30\text{ V dc}$ $I_C = 15\text{ A dc}; I_{B1} = 1.5\text{ A dc}, 2\text{N}3771$ $I_C = 10\text{ A dc}; I_{B1} = 1.0\text{ A dc}, 2\text{N}3772$	$t_{on}$	$\mu\text{s}$		10 8
Turn Off Time	$V_{CC} = 30\text{ V dc}$ $I_C = 15\text{ A dc}; I_{B1} = 1.5\text{ A dc}; I_{B2} = -1.5\text{ A dc}$ 2N3771 $I_C = 10\text{ A dc}; I_{B1} = 1\text{ A dc}; I_{B2} = -1\text{ A dc}$ 2N3772	$t_{off}$	$\mu\text{s}$		12 10
Magnitude of Common Emitter Small-Signal Short-Circuited Forward-Current Transfer Ratio	$V_{CE} = 4\text{ V dc}; I_C = 1.0\text{ A dc}; f = 100\text{ kHz}$	$ h_{re} $	—	6	30
Small-Signal Short-Circuit Forward-Current Transfer Ratio	$V_{CE} = 10\text{ V dc}; I_C = 1.0\text{ A dc}; f = 1\text{ kHz}$	$h_{re}$	—	40	
Output Capacitance (Open Circuit)	$V_{CB} = 10\text{ V dc}; I_E = 0; 100\text{ kHz} \leq f \leq 1\text{ MHz}$	$C_{obo}$	pF		1,200

# 2N3771 & 2N3772



## NPN High Power Silicon Transistor

Rev. V1

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

Ratings	Symbol	Value
Collector - Emitter Voltage 2N3771 2N3772	$V_{CEO}$	40 V dc 60 V dc
Collector - Base Voltage 2N3771 2N3772	$V_{CBO}$	50 V dc 100 V dc
Emitter - Base Voltage	$V_{EBO}$	7 V dc
Base Current 2N3771 2N3772	$I_B$	7.5 V dc 5.0 V dc
Collector Current 2N3771 2N3772	$I_C$	30 A dc 20 A dc
Total Power Dissipation @ $T_A = 25^\circ\text{C}^1$ @ $T_A = 25^\circ\text{C}^2$	$P_T$	6 W 150 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	$R_{\theta JC}$	$1.17^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	$29.2^\circ\text{C/W}$

- (1) Derate linearly  $34.2 \text{ mW}/^\circ\text{C}$  above  $T_A > +25^\circ\text{C}$
- (2) Derate linearly  $857 \text{ mW}/^\circ\text{C}$  above  $T_C > +25^\circ\text{C}$

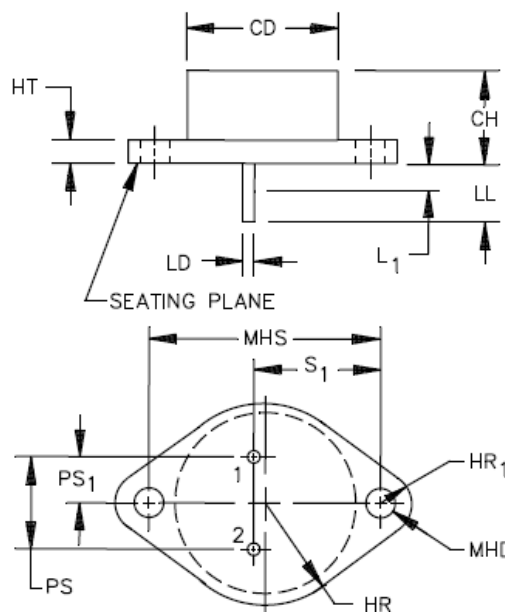
# 2N3771 & 2N3772

## NPN High Power Silicon Transistor

Rev. V1

### Outline Drawing (TO-3)

Ltr	Dimension				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.22	
CH	.270	.380	6.86	9.65	
HR	.495	.525	12.57	13.33	3
HR <sub>1</sub>	.131	.188	3.33	4.78	3
HT	.060	.135	1.52	3.43	
LD	.038	.053	0.97	1.35	3, 4
LL	.312	.500	7.92	12.70	4
L <sub>1</sub>		.050		1.27	4
MHD	.151	.165	3.84	4.19	3
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	5
PS <sub>1</sub>	.205	.225	5.21	5.72	5
S <sub>1</sub>	.655	.675	16.64	17.15	



#### NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Terminal 1 is base; terminal 2 is emitter; case is collector. The collector shall be electrically connected to the case.
3. Two places.
4. LD within L<sub>1</sub>. LD applies between L<sub>1</sub> and LL. Lead diameter shall not exceed twice LD within L<sub>1</sub>.
5. These dimensions should be measured at points .050 - .055 inch (1.27 mm - 1.40 mm) below seating plane. When gauge is not used, measurement will be made at seating plane.
6. The seating place of the header shall be flat within .004 inch (0.102 mm) inside a .930 inch (23.62 mm) diameter circle on the center of the header and flat within .004 inch (0.102 mm) concave to .006 inch (0.15 mm) convex overall.
- \* 7. In accordance with ASME Y14.5, diameters are equivalent to  $\phi$ x symbology.

FIGURE 1. Physical dimensions and configurations of TO-204AA (formerly TO-3) package.

# 2N3771 & 2N3772



NPN High Power Silicon Transistor

Rev. V1

## Maximum Safe Operating Area

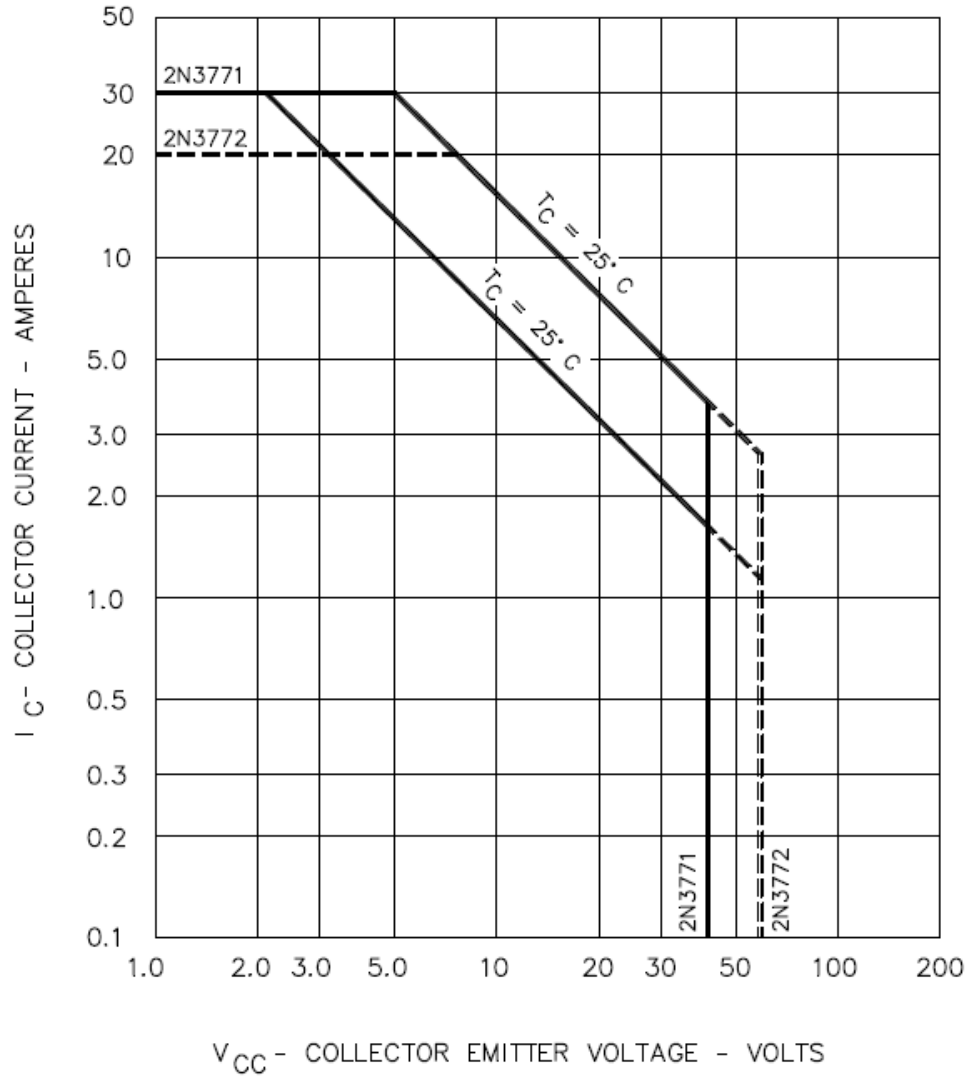


FIGURE 3. Maximum safe operating area graph (continuous dc).

# 2N3771 & 2N3772



NPN High Power Silicon Transistor

Rev. V1

## Safe Operating Area

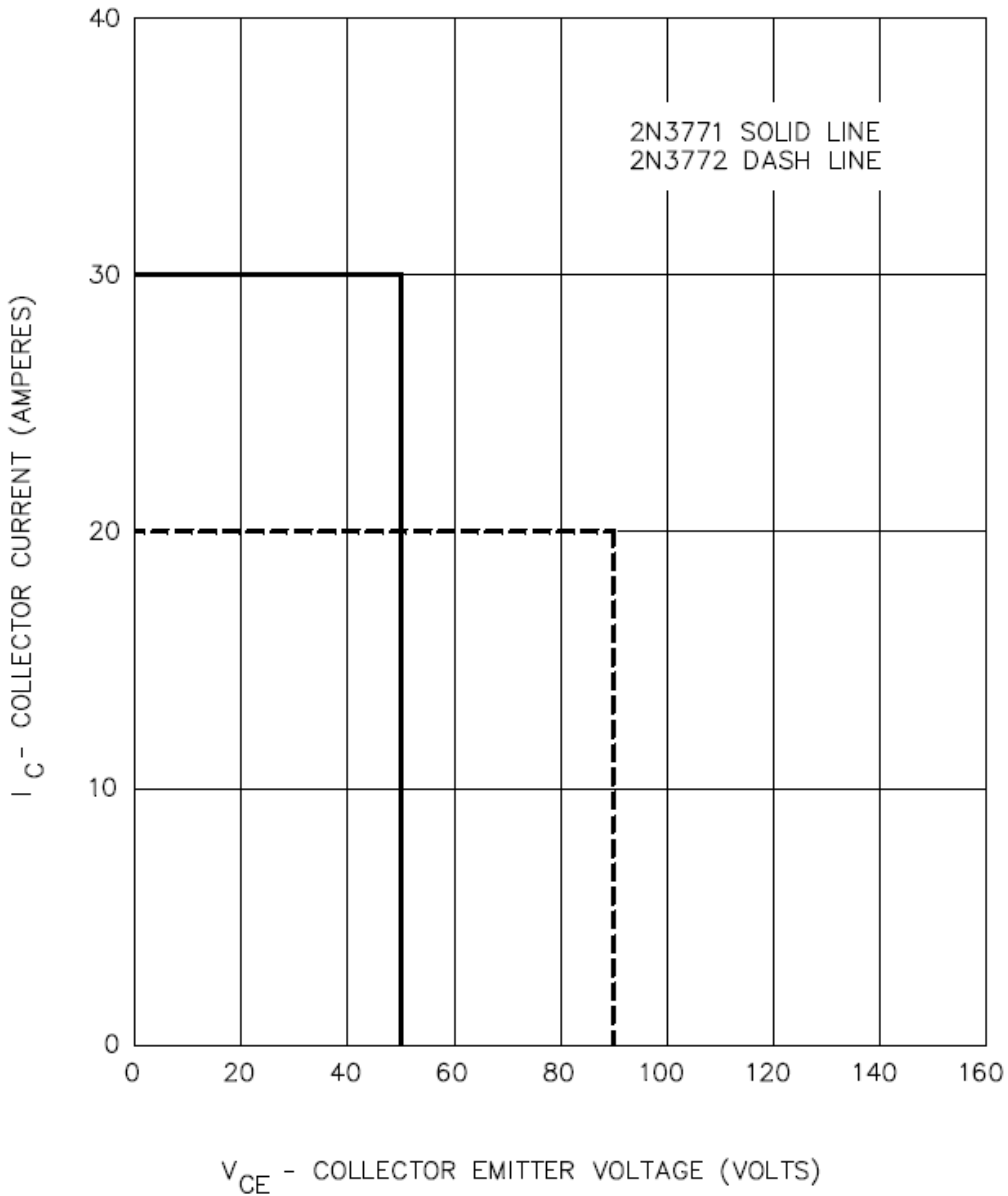


FIGURE 4. Safe operating area for switching between saturation and cutoff (clamped inductive load).

# 2N3771 & 2N3772

## NPN High Power Silicon Transistor

Rev. V1

### Safe Operating Area

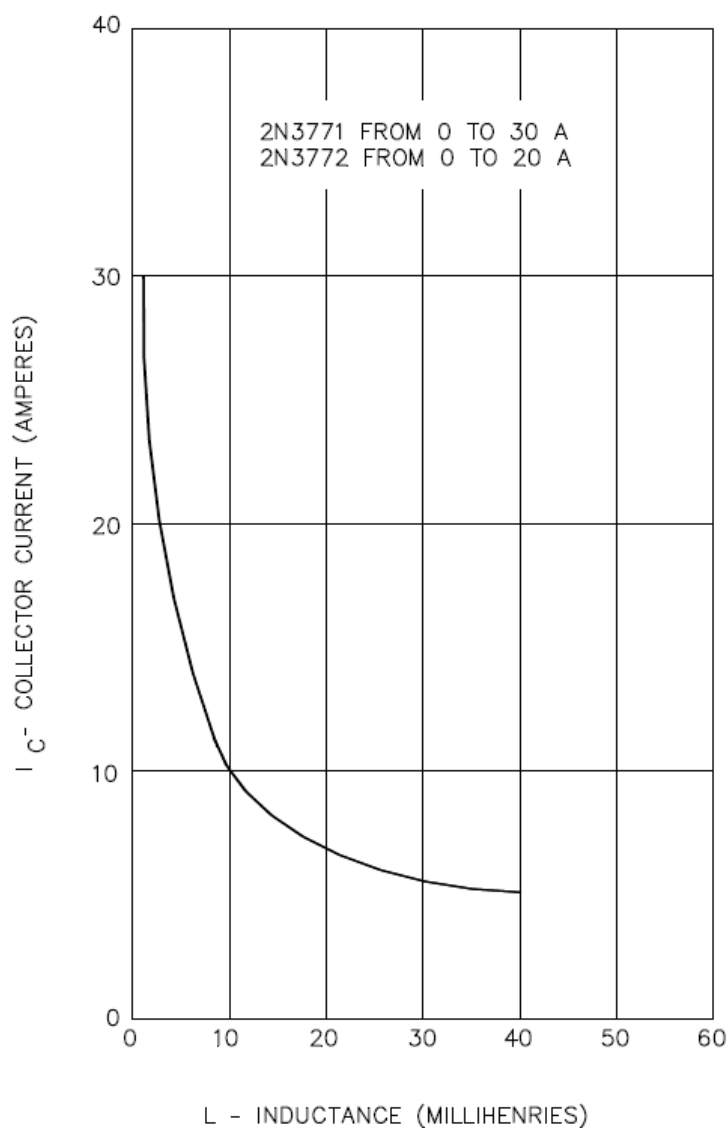


FIGURE 5. Safe operating area switching between saturation and cutoff (unclamped inductive load).

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