

High-Voltage - High Power Transistors

High-voltage – high power transistors designed for use in high power audio amplifier applications and high voltage switching regulator circuits.

- High Collector Emitter Sustaining Voltage –
 $V_{CEO(sus)} = 140 \text{ Vdc}$
- High DC Current Gain – @ $I_C = 8.0 \text{ Adc}$
 $h_{FE} = 15 \text{ (Min)}$
- Low Collector-Emitter Saturation Voltage –
 $V_{CE(sat)} = 1.0 \text{ Vdc (Max) @ } I_C = 10 \text{ Adc}$

MAXIMUM RATINGS (1)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	140	Vdc
Collector-Base Voltage	V_{CB}	140	Vdc
Emitter-Base Voltage	V_{EB}	7.0	Vdc
Collector Current – Continuous Peak	I_C	16 20	Adc
Base Current – Continuous	I_B	5.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	200 1.14	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	$^\circ\text{C}$

THERMAL CHARACTERISTICS (1)

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.875	$^\circ\text{C/W}$

(1) Indicates JEDEC Registered Data.

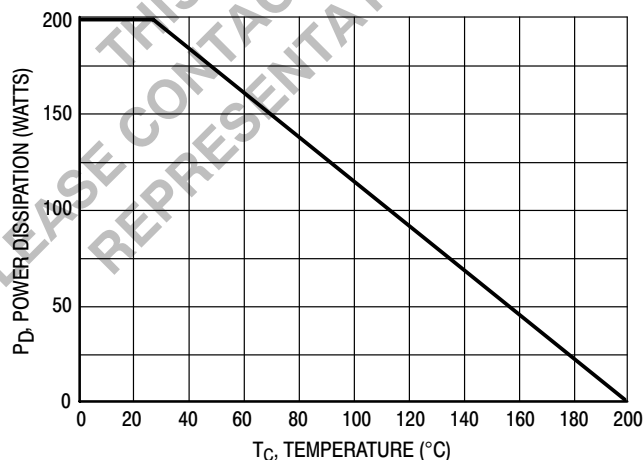


Figure 1. Power Derating

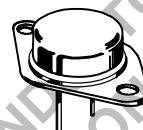
Safe Area Curves are indicated by Figure 5. All Limits are applicable and must be observed.



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**16 AMPERE
POWER TRANSISTORS
COMPLEMENTARY SILICON
140 VOLTS, 200 WATTS**



**CASE 1-07
TO-204AA
(TO-3)**

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (2) ($I_C = 200\text{ mA}$, $I_B = 0$)	$V_{CEO(sus)}$	140	–	Vdc
Collector-Emitter Cutoff Current ($V_{CE} = 70\text{ Vdc}$, $I_B = 0$)	I_{CEO}	–	2.0	mA
Collector-Emitter Cutoff Current ($V_{CE} = \text{Rated } V_{CB}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = \text{Rated } V_{CB}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$)	I_{CEX}	–	2.0 7.0	mA
Collector-Base Cutoff Current ($V_{CB} = \text{Rated } V_{CB}$, $I_E = 0$)	I_{CBO}	–	2.0	mA
Emitter-Base Cutoff Current ($V_{BE} = 7.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	–	5.0	mA

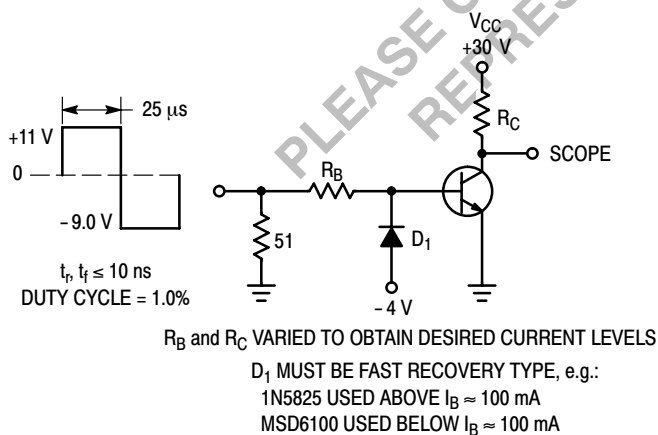
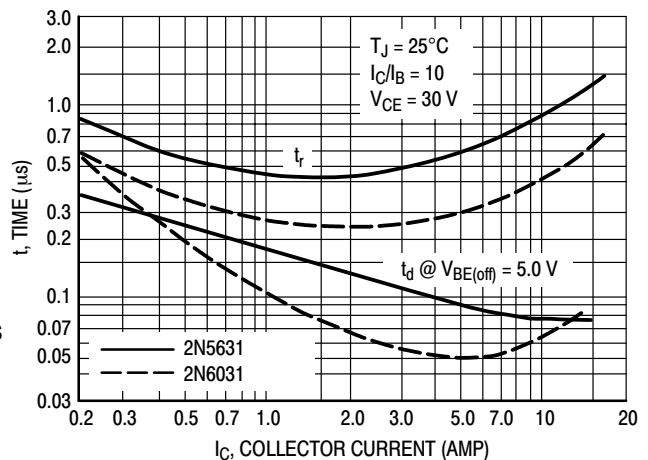
ON CHARACTERISTICS (2)

DC Current Gain ($I_C = 8\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 16\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$)	h_{FE}	15 4.0	60 –	–
Collector-Emitter Saturation Voltage ($I_C = 10\text{ A}$, $I_B = 1.0\text{ A}$) ($I_C = 16\text{ A}$, $I_B = 4.0\text{ A}$)	$V_{CE(sat)}$	– –	1.0 2.0	Vdc
Base-Emitter Saturation Voltage ($I_C = 10\text{ A}$, $I_B = 1.0\text{ A}$)	$V_{BE(sat)}$	–	1.8	Vdc
Base-Emitter On Voltage ($I_C = 8.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$)	$V_{BE(on)}$	–	1.5	Vdc

DYNAMIC CHARACTERISTICS

Current-Gain – Bandwidth Product (3) ($I_C = 1.0\text{ A}$, $V_{CE} = 20\text{ Vdc}$, $f_{test} = 0.5\text{ MHz}$)	f_T	1.0	–	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 0.1\text{ MHz}$)	C_{ob}	–	500 1000	pF
Small-Signal Current Gain ($I_C = 4.0\text{ A}$, $V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ kHz}$)	h_{fe}	15	–	–

*Indicates JEDEC Registered Data.

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\geq 2.0\%$.(2) $f_T = |h_{fe}| \cdot f_{test}$ **Figure 2. Switching Times Test Circuit****Figure 3. Turn-On Time**

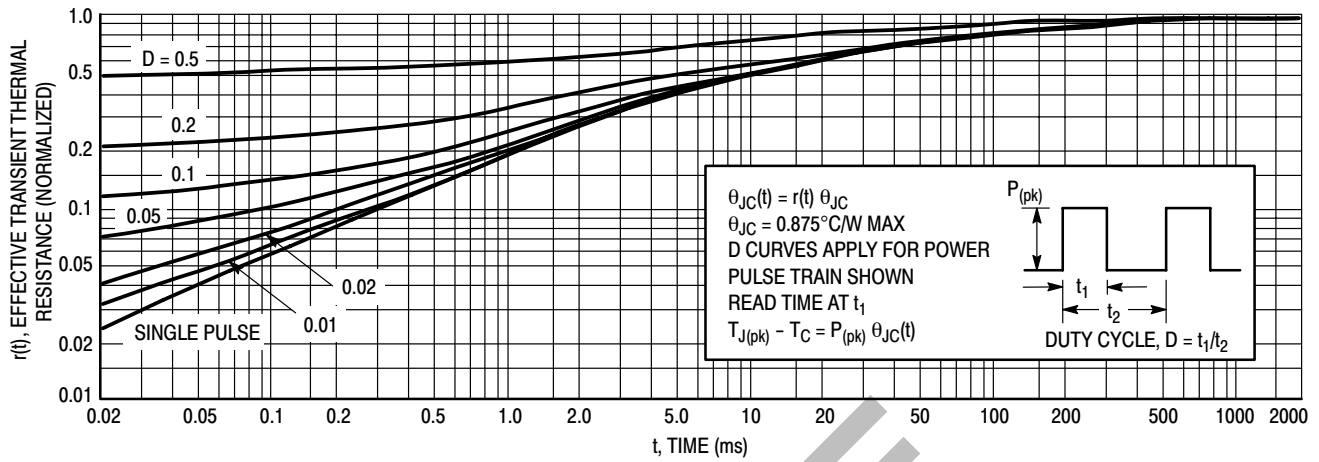


Figure 4. Thermal Response

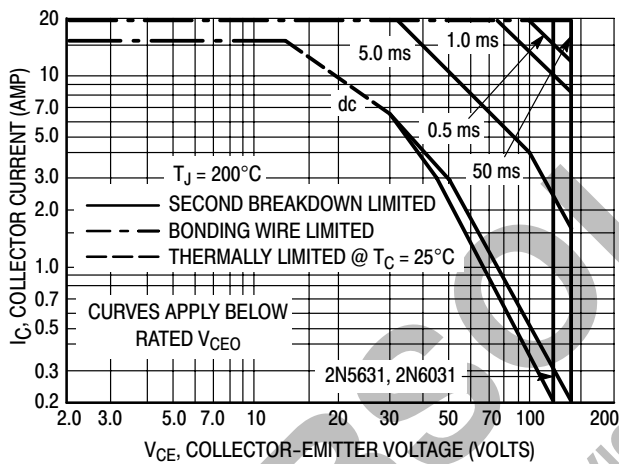


Figure 5. Active-Region Safe Operating Area

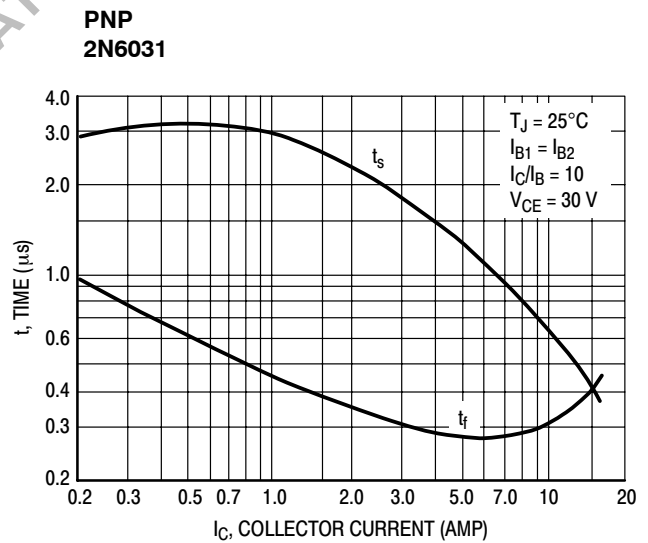
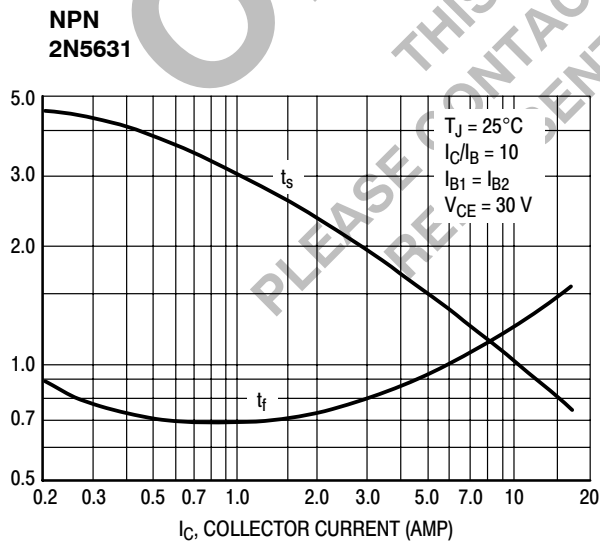


Figure 6. Turn-Off Time

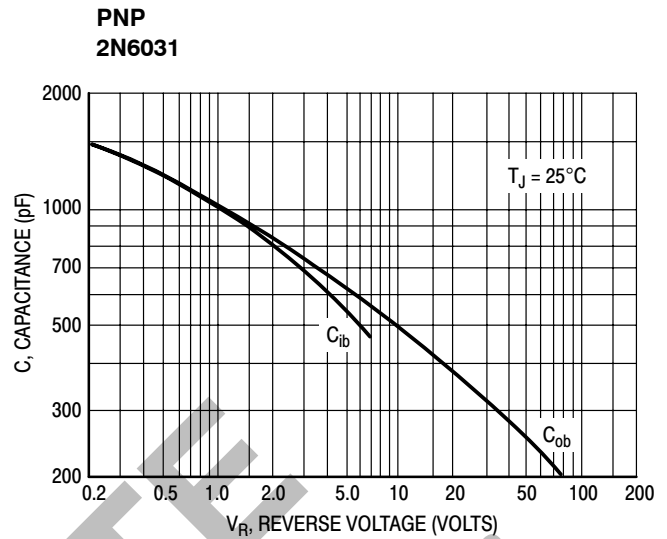
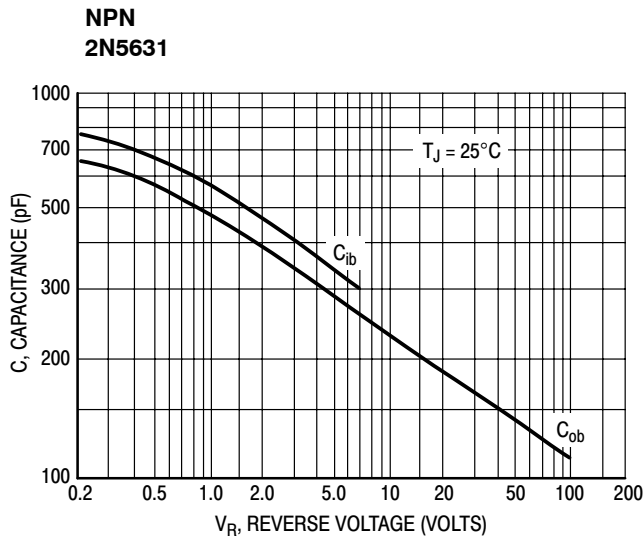


Figure 7. Capacitance

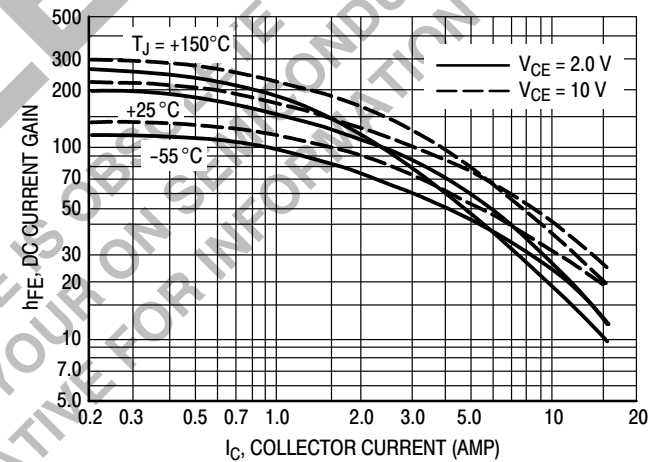
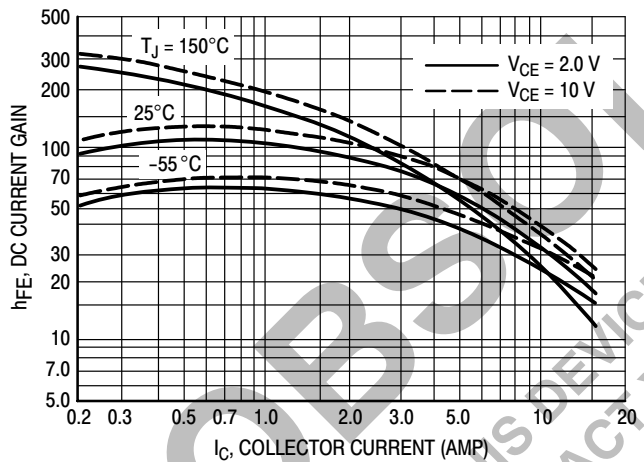


Figure 8. DC Current Gain

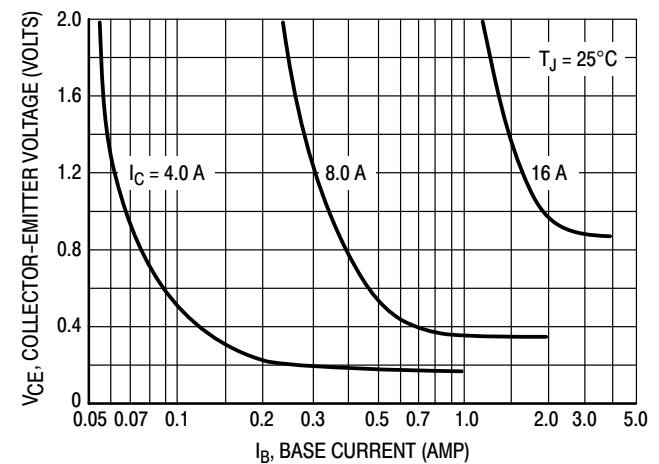
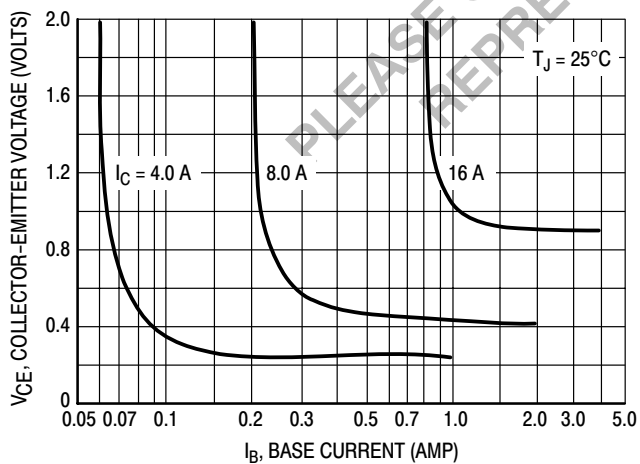
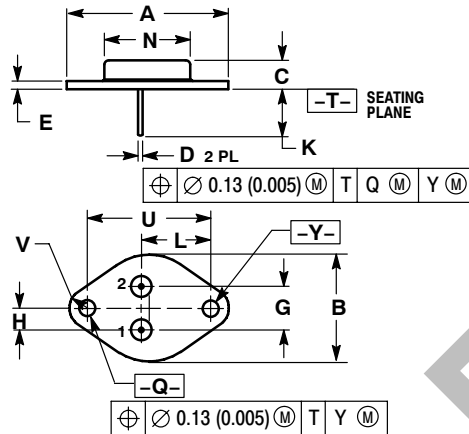


Figure 9. Collector Saturation Region

PACKAGE DIMENSIONS

CASE 1-07
TO-204AA (TO-3)
ISSUE Z

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.550 REF		39.37 REF	
B	---	1.050	---	26.67
C	0.250	0.335	6.35	8.51
D	0.038	0.043	0.97	1.09
E	0.055	0.070	1.40	1.77
G	0.430 BSC		10.92 BSC	
H	0.215 BSC		5.46 BSC	
K	0.440	0.480	11.18	12.19
L	0.665 BSC		16.89 BSC	
N	---	0.830	---	21.08
Q	0.151	0.165	3.84	4.19
U	1.187 BSC		30.15 BSC	
V	0.131	0.188	3.33	4.77

STYLE 1:

1. BASE
 2. EMITTER
- CASE: COLLECTOR

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