

High-Power NPN Silicon Transistor

... for use in power amplifier and switching circuits applications.

- Low Collector–Emitter Saturation Voltage –
 $V_{CE(sat)} = 0.75 \text{ Vdc (Max) @ } I_C = 10 \text{ Adc}$

*MAXIMUM RATINGS

Rating	Symbol	2N5302	Unit
Collector–Emitter Voltage	V_{CEO}	60	Vdc
Collector–Base Voltage	V_{CB}	60	Vdc
Collector Current – Continuous	I_C	30	Adc
Base Current	I_B	7.5	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	200 1.14	Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	$^\circ\text{C}$

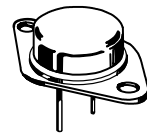
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.875	$^\circ\text{C/W}$
Thermal Resistance, Case to Ambient	θ_{CA}	34	$^\circ\text{C/W}$

*Indicates JEDEC Registered Data.

2N5302

**30 AMPERE
POWER TRANSISTOR
NPN SILICON
60 VOLTS
200 WATTS**



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

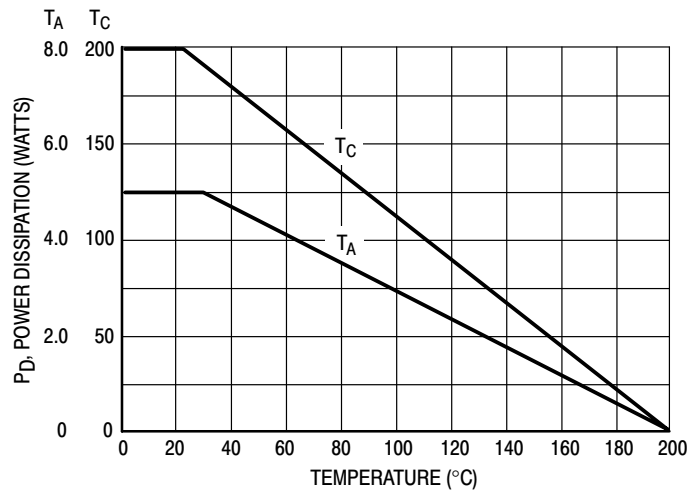


Figure 1. Power Temperature Derating Curve

2N5302

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

Characteristic	Symbol	Min	Max	Unit
*OFF CHARACTERISTICS				
Collector–Emitter Sustaining Voltage (Note 1) ($I_C = 200\text{ mA}$, $I_B = 0$)	$V_{CE(sus)}$	60	–	Vdc
Collector Cutoff Current ($V_{CE} = 60\text{ Vdc}$, $I_B = 0$)	I_{CEO}	–	5.0	mA
Collector Cutoff Current ($V_{CE} = 60\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$)	I_{CEX}	–	1.0	mA
Collector Cutoff Current ($V_{CE} = 60\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$)	I_{CEX}	–	10	mA
Collector Cutoff Current ($V_{CB} = 80\text{ Vdc}$, $I_E = 0$)	I_{CBO}	–	1.0	mA
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	–	5.0	mA

ON CHARACTERISTICS

DC Current Gain (Note 1) *($I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) *($I_C = 15\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 30\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$)	h_{FE}	40 15 5.0	– 60 –	–
*Collector–Emitter Saturation Voltage (Note 1) ($I_C = 10\text{ A}$, $I_B = 1.0\text{ A}$) ($I_C = 20\text{ A}$, $I_B = 2.0\text{ A}$) ($I_C = 30\text{ A}$, $I_B = 6.0\text{ A}$)	$V_{CE(sat)}$	– – –	0.75 2.0 3.0	Vdc
*Base Emitter Saturation Voltage (Note 1) ($I_C = 10\text{ A}$, $I_B = 1.0\text{ A}$) ($I_C = 15\text{ A}$, $I_B = 1.5\text{ A}$) ($I_C = 20\text{ A}$, $I_B = 2.0\text{ A}$)	$V_{BE(sat)}$	– – –	1.7 1.8 2.5	Vdc
*Base–Emitter On Voltage (Note 1) ($I_C = 15\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 30\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$)	$V_{BE(on)}$	– –	1.7 3.0	Vdc

*DYNAMIC CHARACTERISTICS

Current–Gain – Bandwidth Product ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ MHz}$)	f_T	2.0	–	MHz
Small–Signal Current Gain ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ kHz}$)	h_{fe}	40	–	–

*SWITCHING CHARACTERISTICS

Rise Time	$(V_{CC} = 30\text{ Vdc}$, $I_C = 10\text{ A}$, $I_{B1} = I_{B2} = 1.0\text{ A}$)	t_r	–	1.0	μs
Storage Time		t_s	–	2.0	μs
Fall Time		t_f	–	1.0	μs

*Indicates JEDEC Registered Data.

Note 1: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

SWITCHING TIME EQUIVALENT TEST CIRCUITS

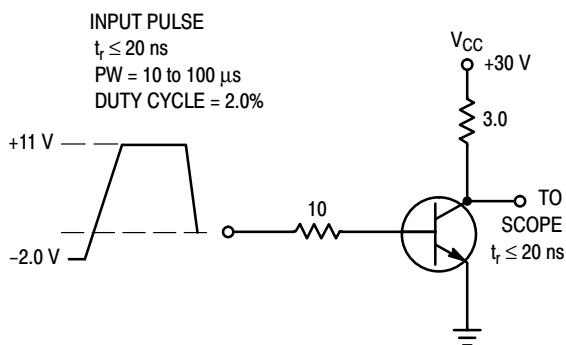


Figure 2. Turn–On time

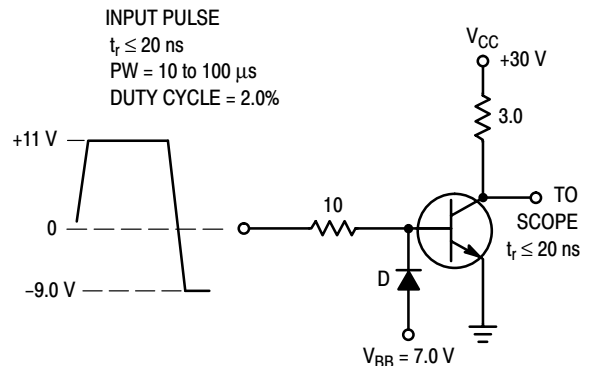


Figure 3. Turn–Off time

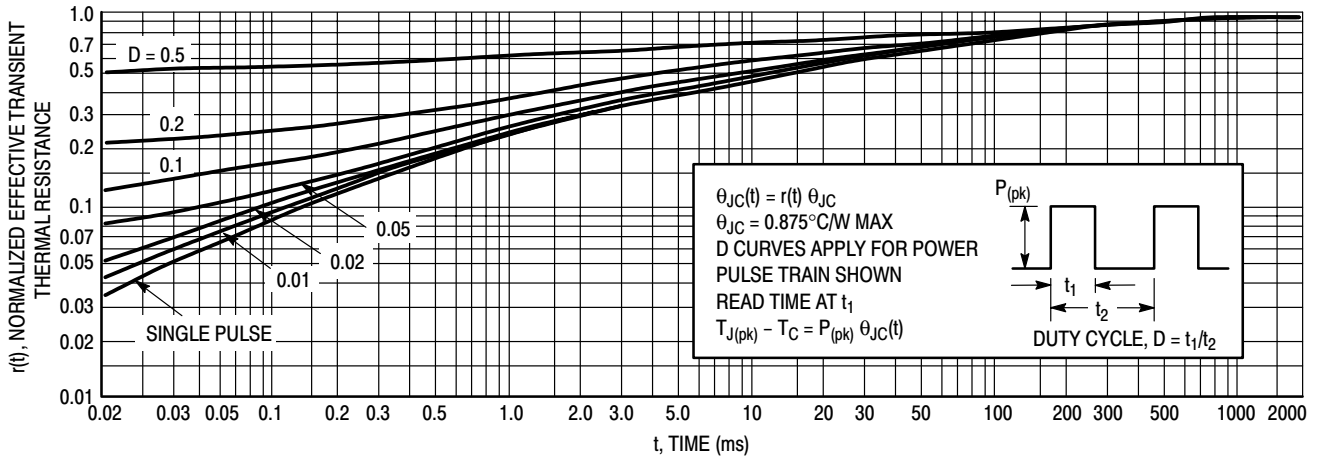


Figure 4. Thermal Response

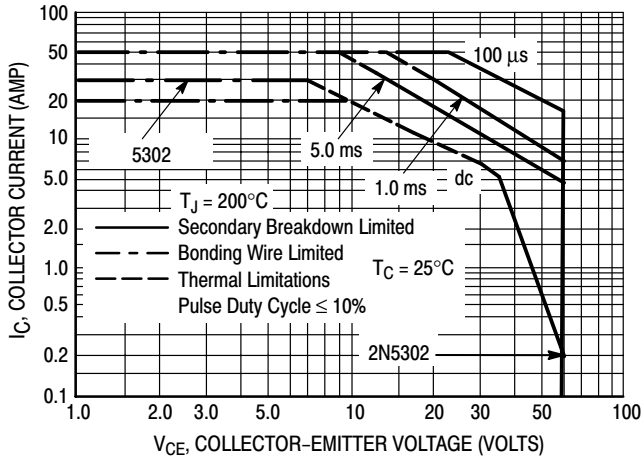


Figure 5. Active-Region Safe Operating Area

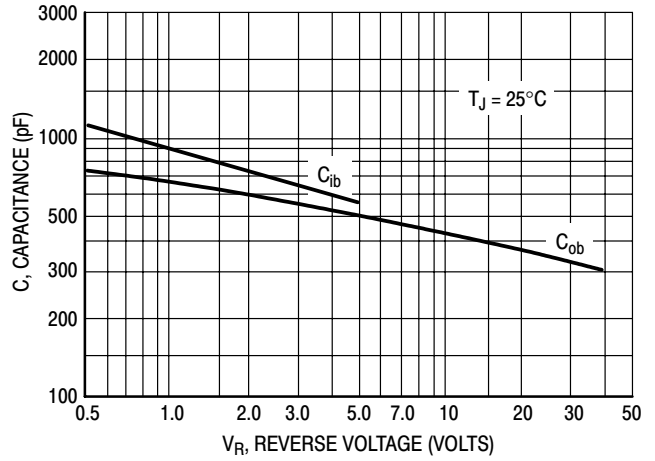


Figure 6. Capacitance versus Voltage

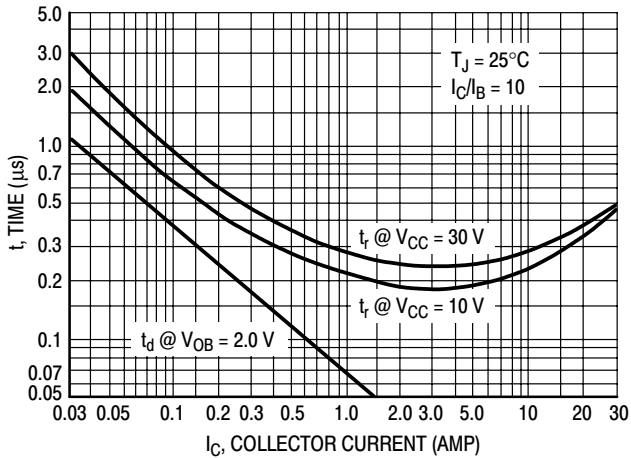


Figure 7. Turn-On Time

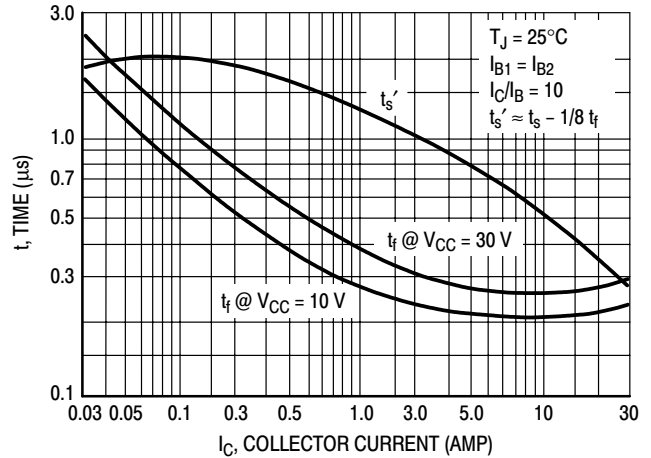


Figure 8. Turn-Off Time

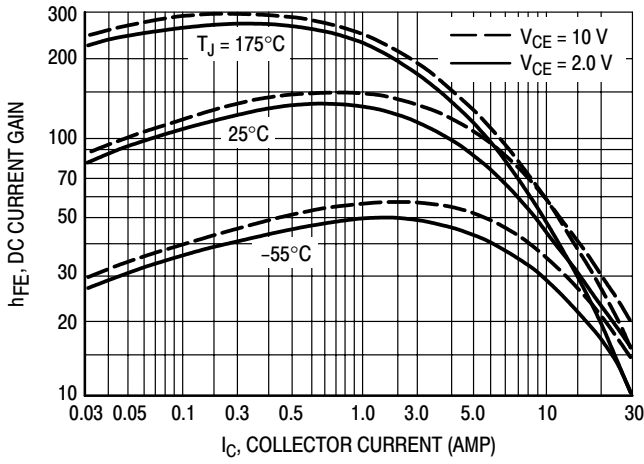


Figure 9. DC Current Gain

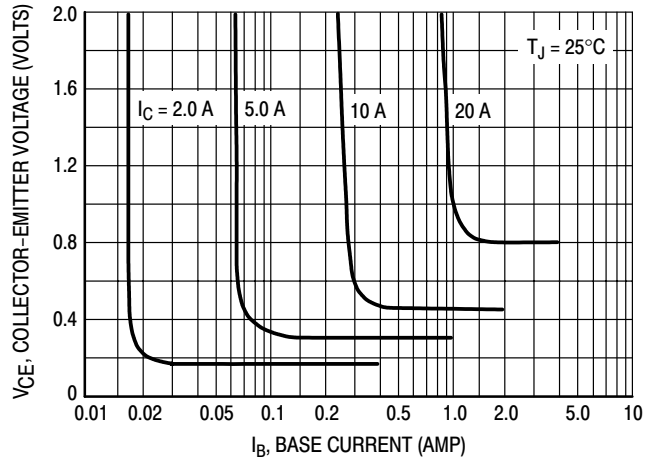


Figure 10. Collector Saturation Region

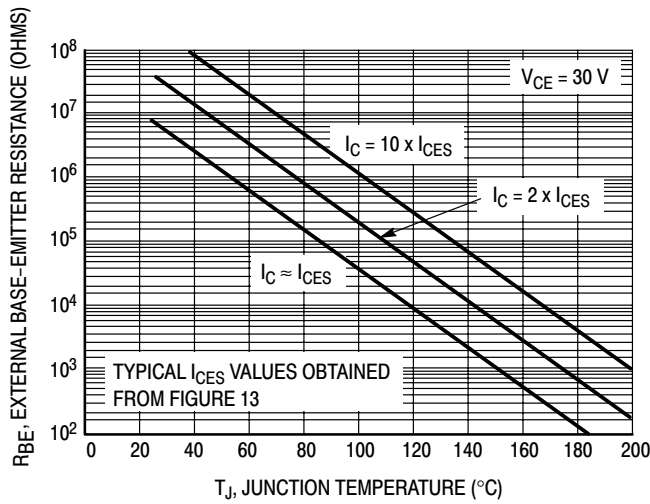


Figure 11. Effects of Base-Emitter Resistance

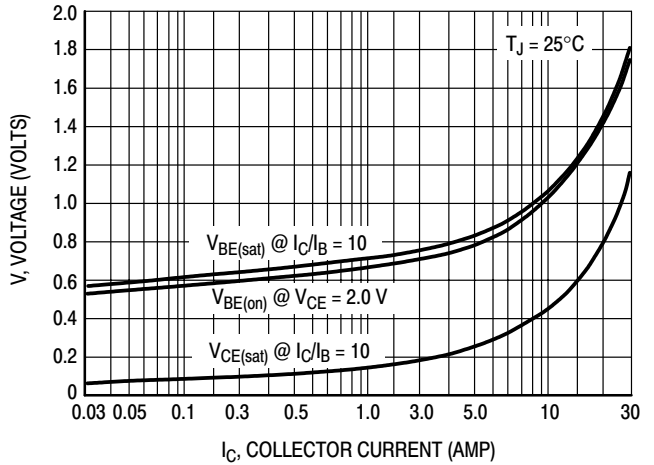


Figure 12. "On" Voltages

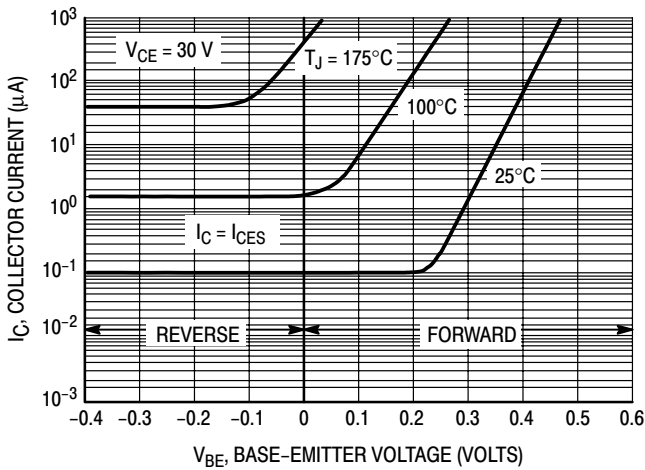


Figure 13. Collector Cut-Off Region

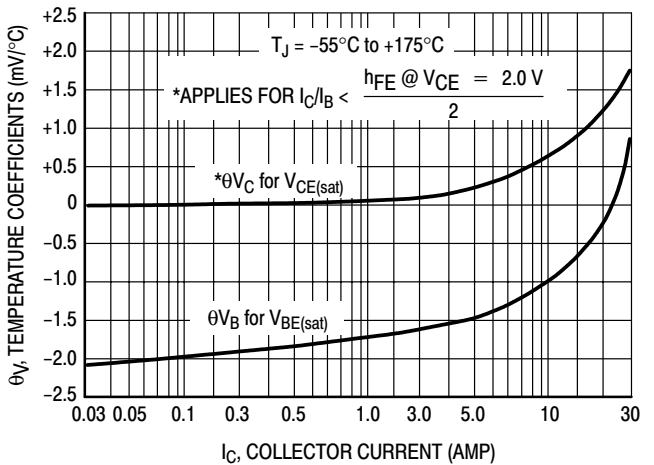
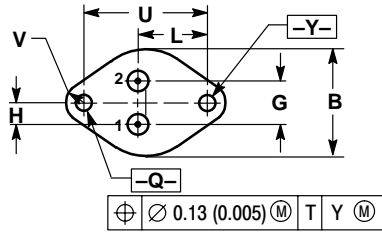
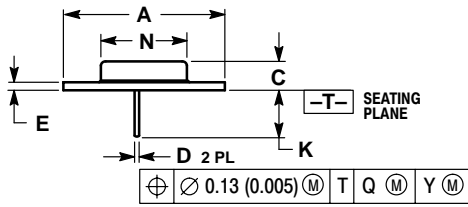


Figure 14. Temperature Coefficients

2N5302

PACKAGE DIMENSIONS

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

Notes

Notes

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