ON Semiconductor™

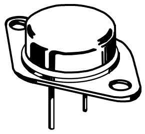
BUV11

SWITCHMODE™ Series NPN Silicon Power Transistor

. . . designed for high current, high speed, high power applications.

- High DC current gain; h_{FE}
  min. = 20 at I_C = 6 A
- Low $V_{CE(sat)}$, $V_{CE(sat)}$
  max. = 0.6 V at I_C = 6 A
- Very fast switching times:
  T_F max. = 0.8 µs at I_C = 12 A

20 AMPERES
NPN SILICON
POWER
METAL TRANSISTOR
200 VOLTS
150 WATTS



CASE 1–07
TO–204AA
(TO–3)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO(sus)}$	200	Vdc
Collector–Base Voltage	V_{CBO}	250	Vdc
Emitter–Base Voltage	V_{EBO}	7	Vdc
Collector–Emitter Voltage (V_{BE} = –1.5 V)	V_{CEX}	250	Vdc
Collector–Emitter Voltage (R_{BE} = 100 Ω)	V_{CER}	240	Vdc
Collector–Current— Continuous — Peak (PW ≤ 10 ms)	I_C I_{CM}	20 25	Adc Apk
Base–Current continuous	I_B	4	Adc
Total Power Dissipation @ T_C = 25°C	P_D	150	Watts
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to 200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	1.17	°C/W

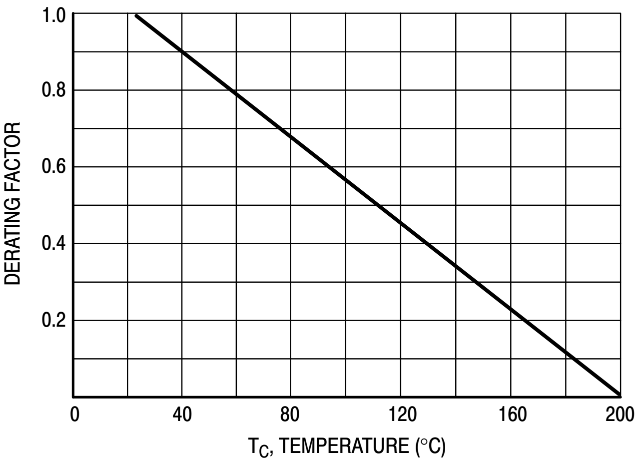


Figure 1. Power Derating

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Sustaining Voltage (I_C = 200 mA, I_B = 0, L = 25 mH)	$V_{CEO(sus)}$	200		Vdc
Collector Cutoff Current at Reverse Bias	I_{CEX}			mAdc
(V_{CE} = 250 V, V_{BE} = –1.5 V)			1.5	
(V_{CE} = 250 V, V_{BE} = –1.5 V, T_C = 125°C)			6	
Collector–Emitter Cutoff Current (V_{CE} = 160 V)	I_{CEO}		1.5	mAdc
Emitter–Base Reverse Voltage (I_E = 50 mA)	V_{EBO}	7		V
Emitter–Cutoff Current (V_{EB} = 5 V)	I_{EBO}		1.0	mAdc
SECOND BREAKDOWN				
Second Breakdown Collector Current with base forward biased	$I_{S/b}$			Adc
(V_{CE} = 30 V, t = 1 s)		5.0		
(V_{CE} = 140 V, t = 1 s)		0.15		
ON CHARACTERISTICS[1]				
DC Current Gain	h_{FE}			
(I_C = 6 A, V_{CE} = 2 V)		20	60	
(I_C = 12 A, V_{CE} = 4 V)		10		
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$			Vdc
(I_C = 6 A, I_B = 0.6 A)			0.6	
(I_C = 12 A, I_B = 1.5 A)			1.5	
Base–Emitter Saturation Voltage (I_C = 12 A, I_B = 1.5 A)	$V_{BE(sat)}$		1.5	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain — Bandwidth Product (V_{CE} = 15 V, I_C = 1 A, f = 4 MHz)	f_T	8.0		MHz

SWITCHING CHARACTERISTICS (Resistive Load)

Turn–on Time	(I_C = 12 A, I_{B1} = I_{B2} = 1.5 A, V_{CC} = 150 V, T_C = 12.5 Ω)	t_{on}		0.8	µs
Storage Time		t_s		1.8	
Fall Time		t_f		0.4	

[1] Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2%.

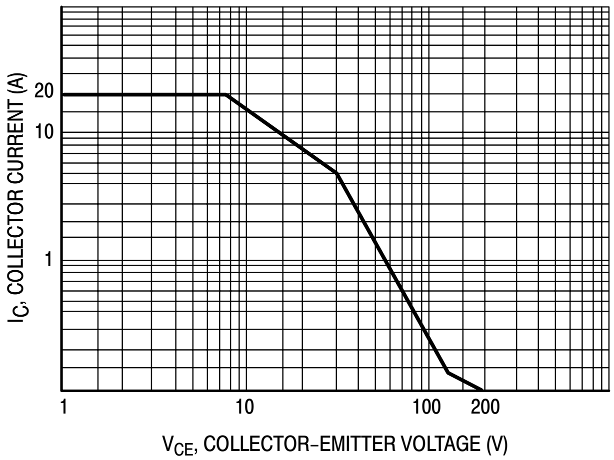


Figure 2. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C – V_{CE}$ limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 2 is based on $T_C = 25°C$; $T_{J(pk)}$ is variable depending on power level. Second breakdown limitations do not derate the same as thermal limitations.

At high case temperatures, thermal limitations will reduce the power that can handled to values less than the limitations imposed by second breakdown.

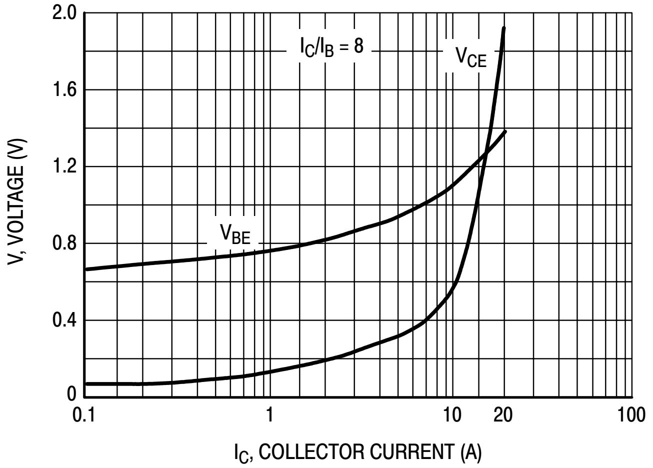


Figure 3. “On” Voltages

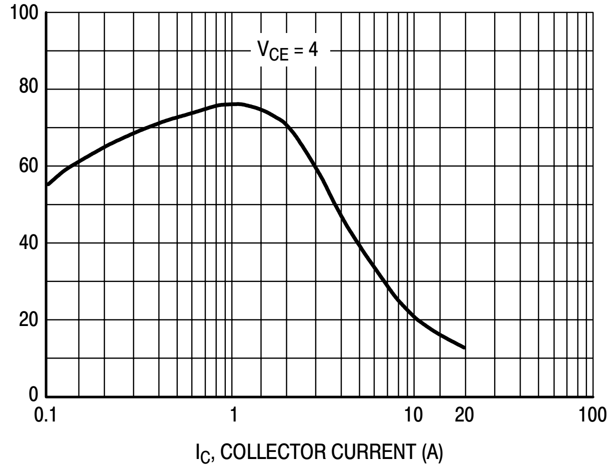


Figure 4. DC Current Gain

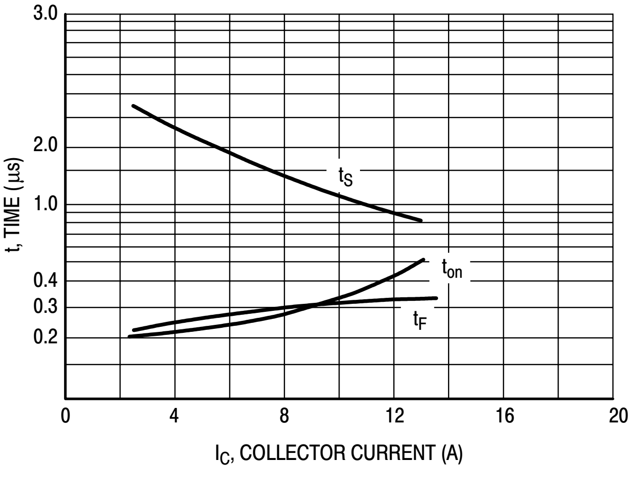
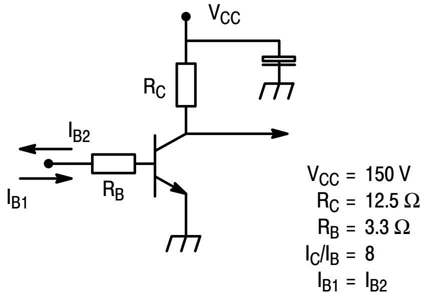


Figure 5. Switching Times versus Collector Current



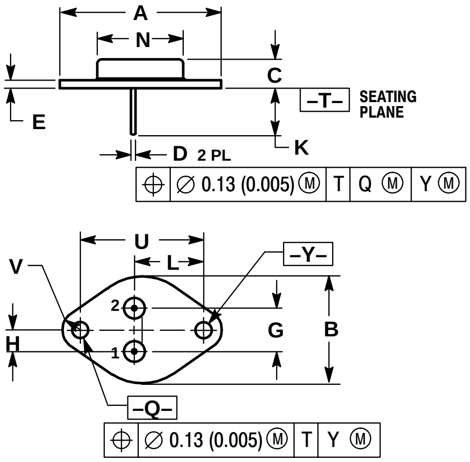
$V_{CC} = 150\ V$
$R_C = 12.5\ \Omega$
$R_B = 3.3\ \Omega$
$I_C/I_B = 8$
$I_{B1} = I_{B2}$

$R_C – R_B$: Non inductives resistances

Figure 6. Switching Times Test Circuit

PACKAGE DIMENSIONS

TO–204AA (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.

	INCHES		MILLIMETERS	
DIM	**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

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JAPAN: ON Semiconductor, Japan Customer Focus Center
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Phone: 81–3–5740–2700
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