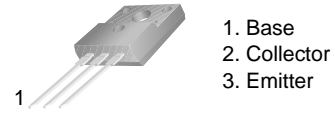


# NPN Silicon Transistor

## BUT11AF

High Voltage Power Switching Applications



TO-220 Fullpack, 3-Lead  
CASE 221AT

### MAXIMUM RATINGS (T<sub>C</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V <sub>CBO</sub>	Collector–Base Voltage	1000	V
V <sub>CEO</sub>	Collector–Emitter Voltage	450	V
V <sub>EBO</sub>	Emitter–Base Voltage	9	V
I <sub>C</sub>	Collector Current (DC)	5	A
I <sub>CP</sub>	*Collector Current (Pulse)	10	A
I <sub>B</sub>	Base Current (DC)	2	A
I <sub>BP</sub>	*Base Current (Pulse)	4	A
P <sub>C</sub>	Collector Dissipation (T <sub>C</sub> = 25°C)	40	W
T <sub>J</sub>	Junction Temperature	150	°C
T <sub>STG</sub>	Storage Temperature	–65~150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL CHARACTERISTICS (T<sub>C</sub> = 25°C, unless otherwise noted)

Symbol	Parameter	Max	Unit
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	3.125	°C/W

### ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CEO(sus)</sub>	*Collector–Emitter Sustaining Voltage	I <sub>C</sub> = 100 mA, I <sub>B</sub> = 0	450	–	–	V
I <sub>CES</sub>	Collector Cut–off Current	V <sub>CE</sub> = 1000 V, V <sub>BE</sub> = 0	–	–	1	mA
I <sub>EBO</sub>	Emitter Cut–off Current	V <sub>BE</sub> = 9 V, I <sub>C</sub> = 0	–	–	10	mA
V <sub>CE(sat)</sub>	Collector–Emitter Saturation Voltage	I <sub>C</sub> = 2.5 A, I <sub>B</sub> = 0.5 A	–	–	1.5	V
V <sub>BE(sat)</sub>	Base–Emitter Saturation Voltage	I <sub>C</sub> = 2.5 A, I <sub>B</sub> = 0.5 A	–	–	1.3	V
t <sub>ON</sub>	Turn On Time	V <sub>CC</sub> = 250 V, I <sub>C</sub> = 2.5 A, I <sub>B1</sub> = –I <sub>B2</sub> = 0.5 A, R <sub>L</sub> = 100 Ω	–	–	1	μs
t <sub>STG</sub>	Storage Time		–	–	4	μs
t <sub>F</sub>	Fall Time		–	–	0.8	μs

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

\*Pulsed: pulsed duration = 300 μs, duty cycle = 1.5%

### MARKING DIAGRAM

BUT11A  
F  
AYWWZZ

BUT11AF = Specific Device Code  
A = Site Code  
Y = Year  
WW = Work Week  
ZZ = Assembly Lot Code

### ORDERING INFORMATION

Device	Package	Shipping
BUT11AFTU	TO-220 Fullpack (Pb–Free)	1000 Units / Tube

TYPICAL CHARACTERISTICS

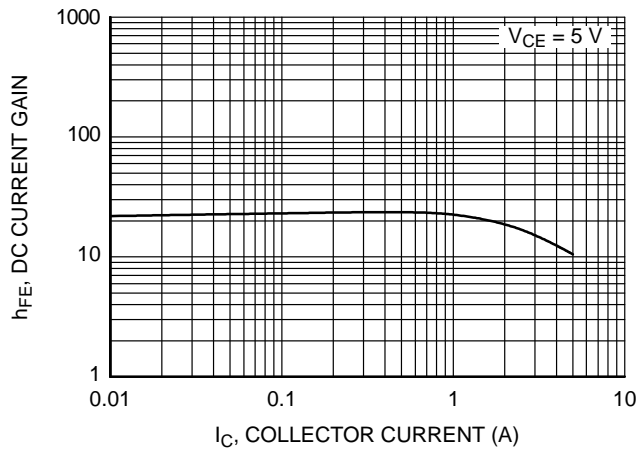


Figure 1. DC Current Gain

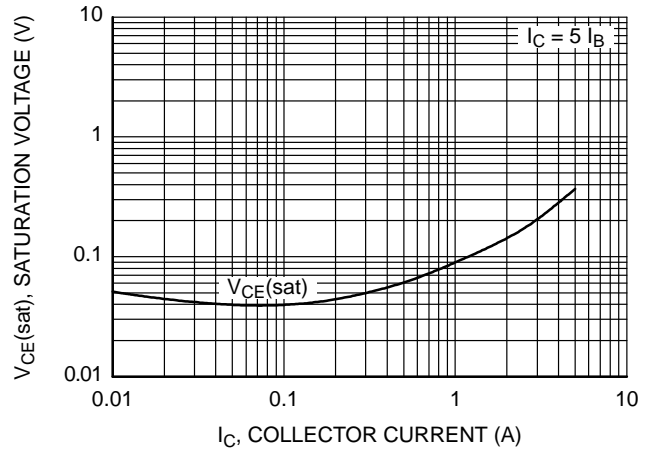


Figure 2. Collector-Emitter Saturation Voltage

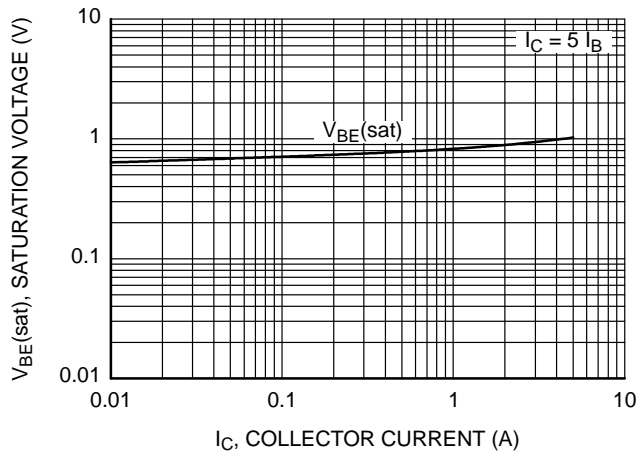


Figure 3. Base-Emitter Saturation Voltage

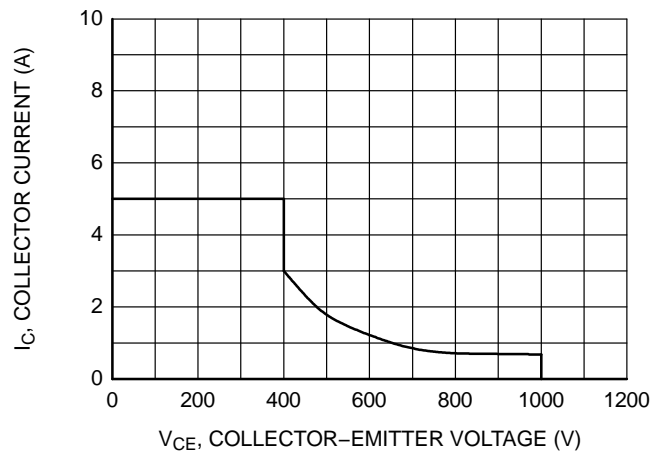


Figure 4. Reverse Biased Safe Operating Area

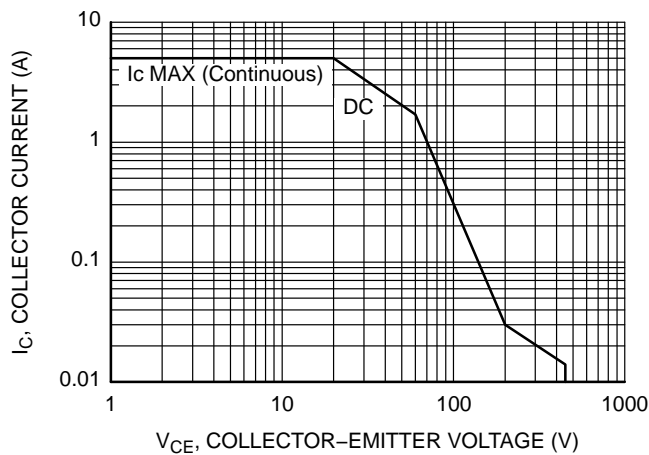


Figure 5. Safe Operating Area

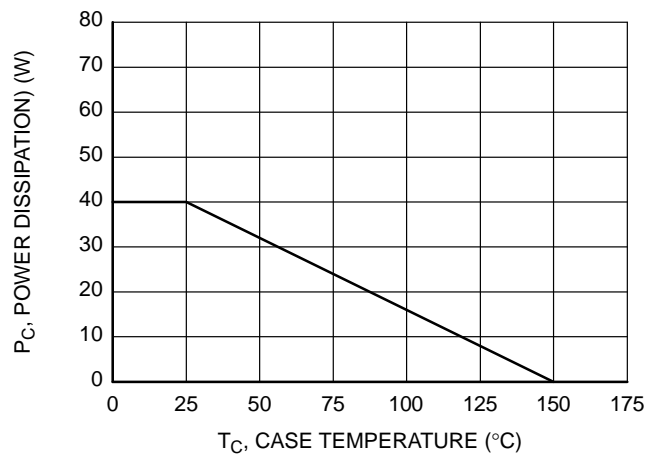
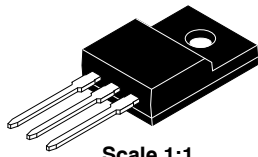


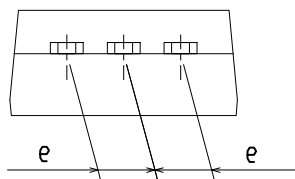
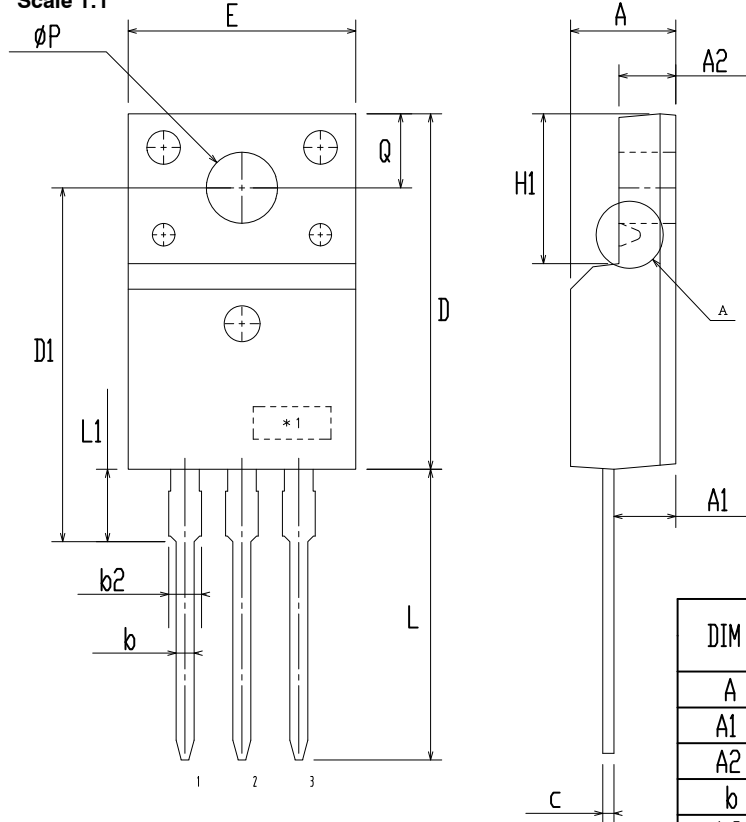
Figure 6. Power Derating

**TO-220 Fullpack, 3-Lead / TO-220F-3SG**  
**CASE 221AT**  
**ISSUE B**

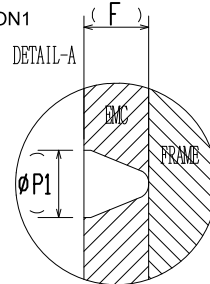
DATE 19 JAN 2021



Scale 1:1



OPTION1



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.50	4.70	4.90
A1	2.56	2.76	2.96
A2	2.34	2.54	2.74
b	0.70	0.80	0.90
b2	~	~	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.60	15.80	16.00
E	9.96	10.16	10.36
e	2.34	2.54	2.74
F	~	0.84	~
H1	6.48	6.68	6.88
L	12.78	12.98	13.18
L1	3.03	3.23	3.43
Ø P	2.98	3.18	3.38
Ø P1	~	1.00	~
Q	3.20	3.30	3.40

**NOTES:**

A. DIMENSION AND TOLERANCE AS ASME Y14.5-2009

B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUCTIONS.

C. OPTION 1 - WITH SUPPORT PIN HOLE

OPTION 2 - NO SUPPORT PIN HOLE

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