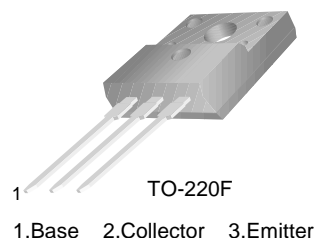


# BUT11F/11AF

## High Voltage Power Switching Applications



## NPN Silicon Transistor

### Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
$V_{CBO}$	Collector-Base Voltage : BUT11F : BUT11AF	850	V
		1000	V
$V_{CEO}$	Collector-Emitter Voltage : BUT11F : BUT11AF	400	V
		450	V
$V_{EBO}$	Emitter-Base Voltage	9	V
$I_C$	Collector Current (DC)	5	A
$I_{CP}$	*Collector Current (Pulse)	10	A
$I_B$	Base Current (DC)	2	A
$I_{BP}$	*Base Current (Pulse)	4	A
$P_C$	Collector Dissipation ( $T_C=25^\circ\text{C}$ )	40	W
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature	- 65 ~ 150	$^\circ\text{C}$

### Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
$V_{CEO(sus)}$	* Collector-Emitter Sustaining Voltage : BUT11F : BUT11AF	$I_C = 100\text{mA}, I_B = 0$	400			V
			450			V
$I_{CES}$	Collector Cut-off Current : BUT11F : BUT11AF	$V_{CE} = 850\text{V}, V_{BE} = 0$ $V_{CE} = 1000\text{V}, V_{BE} = 0$			1	mA
					1	mA
$I_{EBO}$	Emitter Cut-off Current	$V_{BE} = 9\text{V}, I_C = 0$			10	mA
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage : BUT11F : BUT11AF	$I_C = 3\text{A}, I_B = 0.6\text{A}$ $I_C = 2.5\text{A}, I_B = 0.5\text{A}$			1.5	V
					1.5	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage : BUT11F : BUT11AF	$I_C = 3\text{A}, I_B = 0.6\text{A}$ $I_C = 2.5\text{A}, I_B = 0.5\text{A}$			1.3	V
					1.3	V
$t_{ON}$	Turn On Time	$V_{CC} = 250\text{V}, I_C = 2.5\text{A}$ $I_{B1} = -I_{B2} = 0.5\text{A}$ $R_L = 100\Omega$			1	$\mu\text{s}$
$t_{STG}$	Storage Time				4	$\mu\text{s}$
$t_F$	Fall Time				0.8	$\mu\text{s}$

\* Pulsed: pulsed duration = 300 $\mu\text{s}$ , duty cycle = 1.5%

### Thermal Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case		3.125	$^\circ\text{C/W}$

# Typical Characteristics

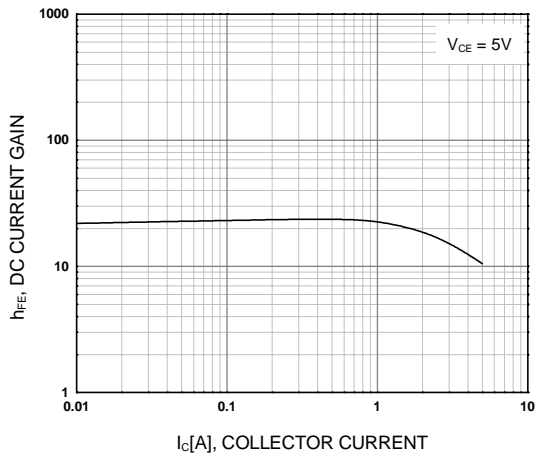


Figure 1. DC current Gain

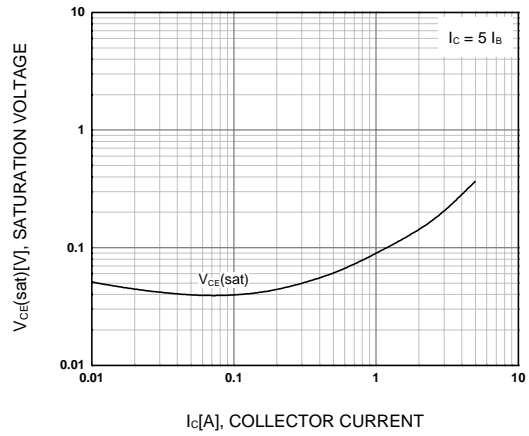


Figure 2. Collector-Emitter Saturation Voltage

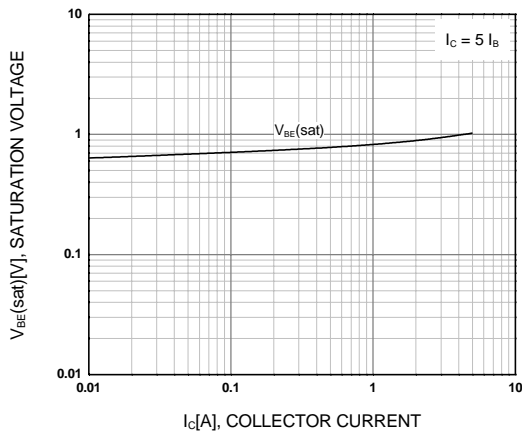


Figure 3. Base-Emitter Saturation Voltage

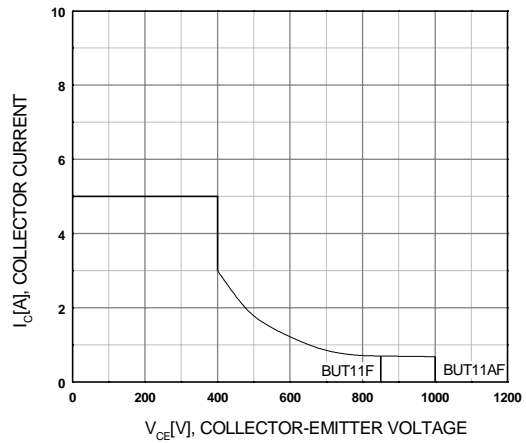


Figure 4. Reverse Biased Safe Operating Area

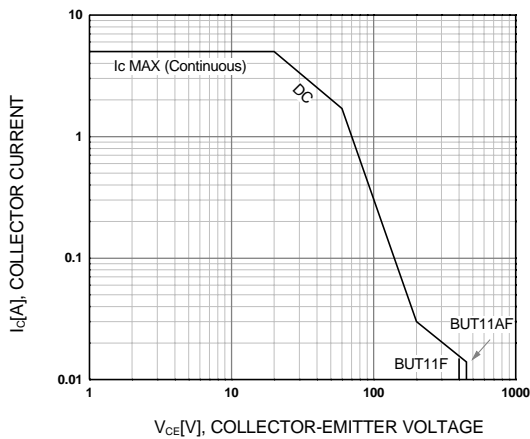


Figure 5. Safe Operating Area

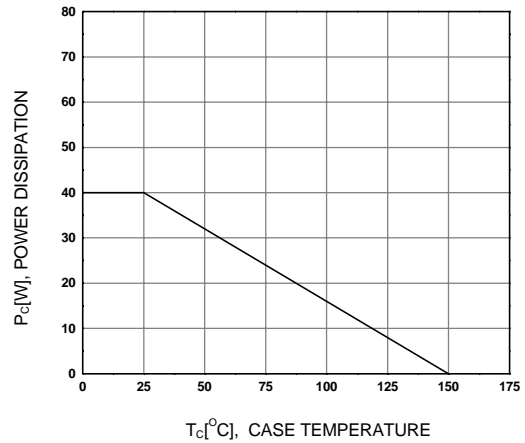
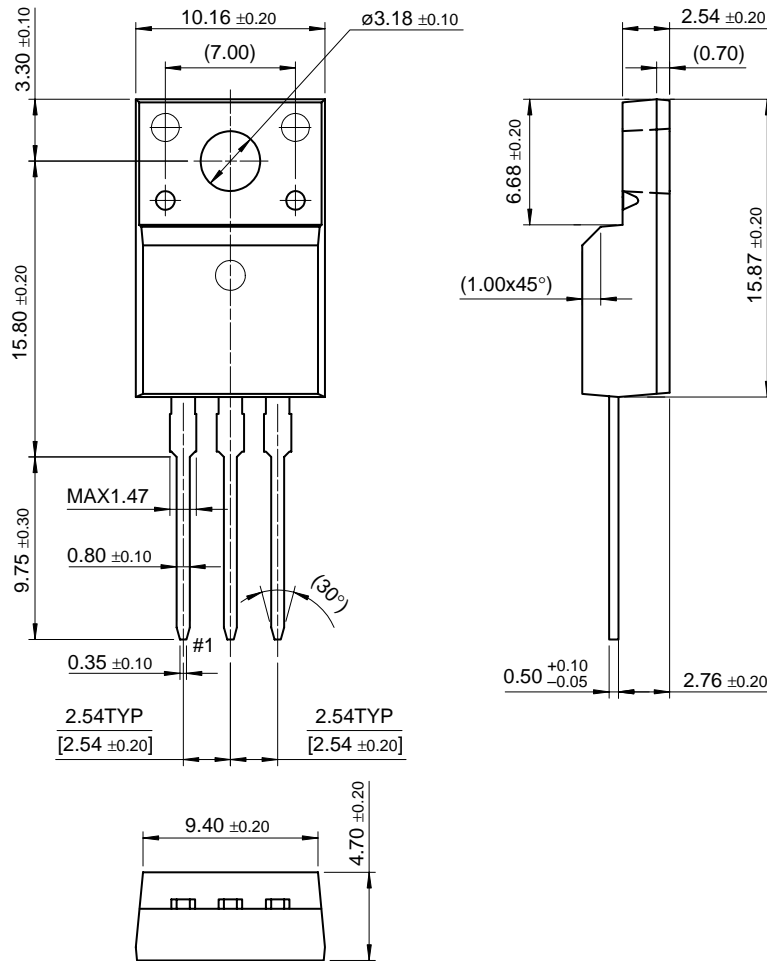


Figure 6. Power Derating

# Package Dimensions

## TO-220F



Dimensions in Millimeters

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