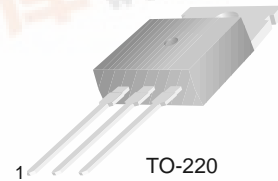




## BUT11/11A

High Voltage Power Switching Applications



TO-220  
1.Base 2.Collector 3.Emitter

### NPN Silicon Transistor

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

Symbol	Parameter	Value	Units
$V_{CBO}$	Collector-Base Voltage		V
	: BUT11	850	
	: BUT11A	1000	
$V_{CEO}$	Collector-Emitter Voltage		V
	: BUT11	400	
	: BUT11A	450	
$V_{EBO}$	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 ( $T_C=25^\circ\text{C}$ )	100	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					V
	: BUT11	$I_C = 100\text{mA}, I_B = 0$	400			V
	: BUT11A		450			V
$I_{CES}$	Collector Cut-off Current				1	mA
	: BUT11	$V_{CE} = 850\text{V}, V_{BE} = 0$			1	mA
	: BUT11A				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				1.5	V
	: BUT11	$I_C = 3\text{A}, I_B = 0.6\text{A}$			1.5	V
	: BUT11A	$I_C = 2.5\text{A}, I_B = 0.5\text{A}$			1.5	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage				1.3	V
	: BUT11	$I_C = 3\text{A}, I_B = 0.6\text{A}$			1.3	V
	: BUT11A	$I_C = 2.5\text{A}, I_B = 0.5\text{A}$			1.3	V
$t_{ON}$	Turn On Time	$V_{CC} = 250\text{V}, I_C = 2.5\text{A}$			1	$\mu\text{s}$
$t_{STG}$	Storage Time	$I_{B1} = -I_{B2} = 0.5\text{A}$			4	$\mu\text{s}$
$t_F$	Fall Time	$R_L = 100\Omega$			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		1.25	$^\circ\text{C/W}$



# Typical Characteristics

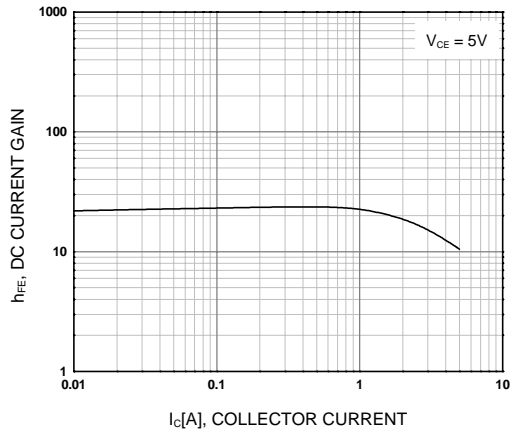


Figure 1. DC current Gain

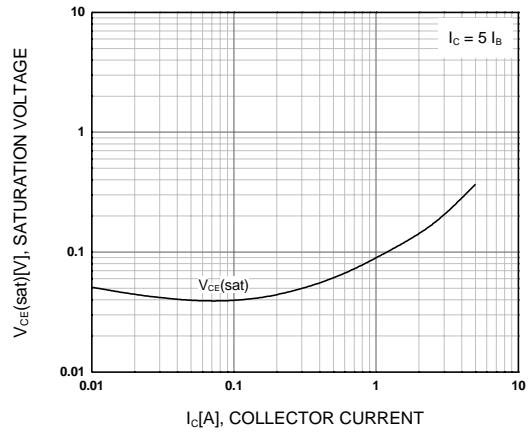


Figure 2. Collector-Emitter Saturation Voltage

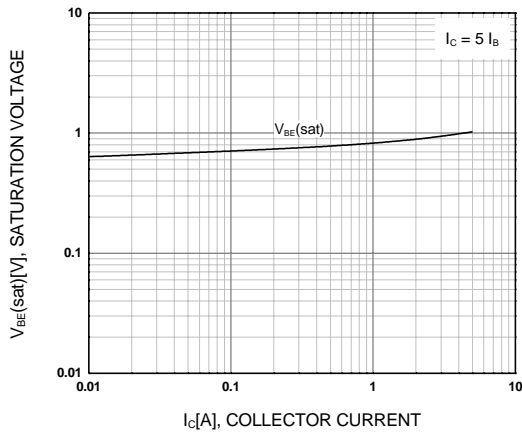


Figure 3. Base-Emitter Saturation Voltage

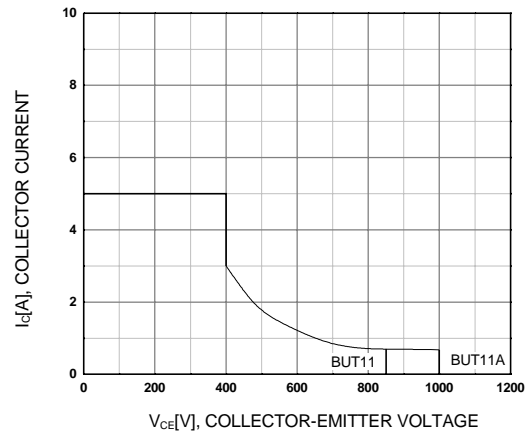


Figure 4. Reverse Biased Safe Operating Area

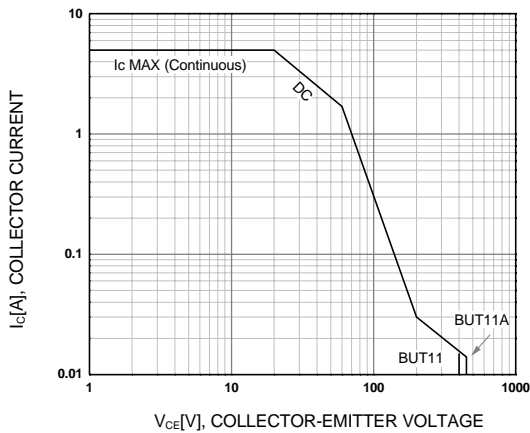


Figure 5. Safe Operating Area

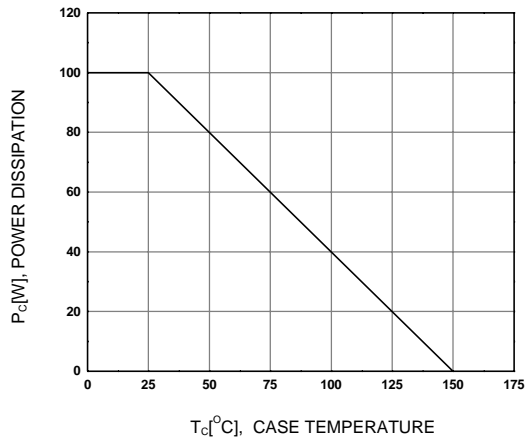
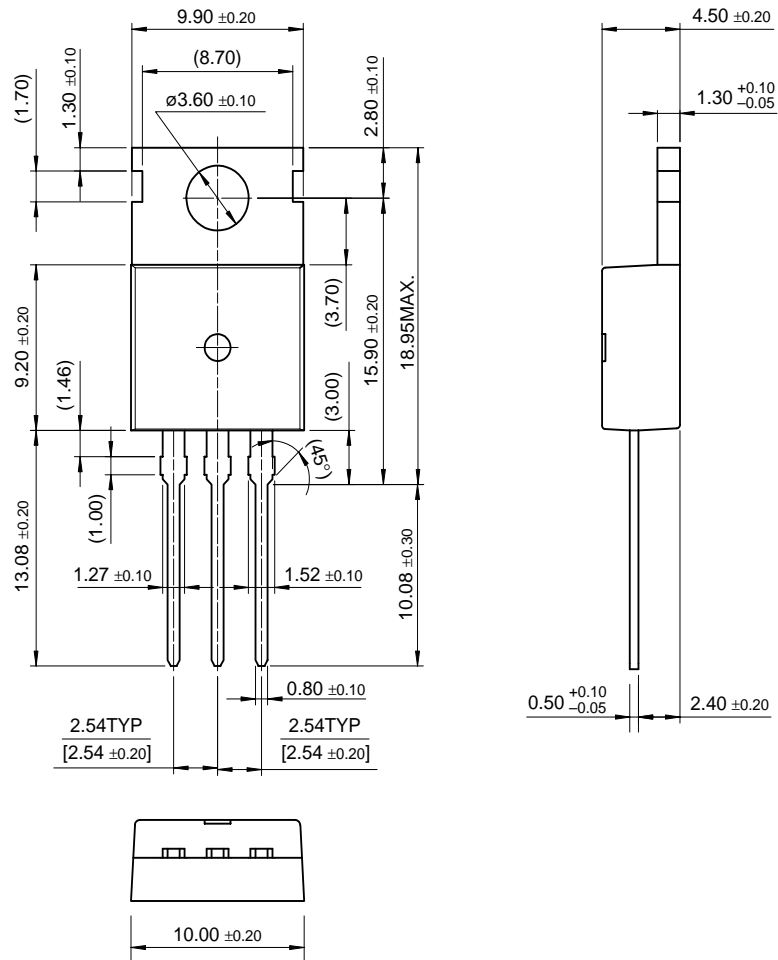


Figure 6. Power Derating

# Package Dimensions

BUT11/11A

## TO-220



Dimensions in Millimeters

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