

# BUX85G

## Switch-mode NPN Silicon Power Transistors

The BUX85G is designed for high voltage, high speed power switching applications like converters, inverters, switching regulators, motor control systems.

### Features

- These Devices are Pb-Free and are RoHS Compliant\*

### MAXIMUM RATINGS

| Rating                                                                                 | Symbol         | Value       | Unit                     |
|----------------------------------------------------------------------------------------|----------------|-------------|--------------------------|
| Collector-Emitter Voltage                                                              | $V_{CE(sus)}$  | 450         | Vdc                      |
| Collector-Emitter Voltage                                                              | $V_{CES}$      | 1000        | Vdc                      |
| Emitter-Base Voltage                                                                   | $V_{EBO}$      | 5           | Vdc                      |
| Collector Current – Continuous                                                         | $I_C$          | 2           | Adc                      |
| Collector Current – Peak (Note 1)                                                      | $I_{CM}$       | 3.0         | Adc                      |
| Base Current – Continuous                                                              | $I_B$          | 0.75        | Adc                      |
| Base Current – Peak (Note 1)                                                           | $I_{BM}$       | 1.0         | Adc                      |
| Reverse Base Current – Peak                                                            | $I_{BM}$       | 1           | Adc                      |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 50<br>0.4   | W<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                    | $T_J, T_{stg}$ | -65 to +150 | $^\circ\text{C}$         |

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.

1. Pulse Test: Pulse Width = 5 ms, Duty Cycle  $\leq 10\%$ .

### THERMAL CHARACTERISTICS

| Characteristics                                                                 | Symbol          | Max  | Unit               |
|---------------------------------------------------------------------------------|-----------------|------|--------------------|
| Thermal Resistance, Junction-to-Case                                            | $R_{\theta JC}$ | 2.5  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient                                         | $R_{\theta JA}$ | 62.5 | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering<br>Purposes 1/8" from Case for 5 Seconds | $T_L$           | 275  | $^\circ\text{C}$   |

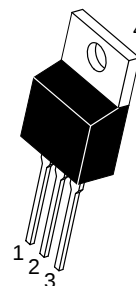
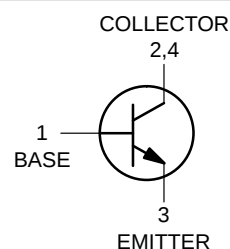
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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## 2.0 AMPERES POWER TRANSISTOR NPN SILICON 450 VOLTS, 50 WATTS



TO-220  
CASE 221A  
STYLE 1

### MARKING DIAGRAM



BUX85 = Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

### ORDERING INFORMATION

| Device | Package             | Shipping        |
|--------|---------------------|-----------------|
| BUX85G | TO-220<br>(Pb-Free) | 50 Units / Rail |

# BUX85G

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

### OFF CHARACTERISTICS (Note 2)

|                                                                                                                                  |                |        |        |            |      |
|----------------------------------------------------------------------------------------------------------------------------------|----------------|--------|--------|------------|------|
| Collector-Emitter Sustaining Voltage<br>( $I_C = 100\text{ mAdc}$ , $L = 25\text{ mH}$ ) See Figure 1                            | $V_{CEO(sus)}$ | 450    | –      | –          | Vdc  |
| Collector Cutoff Current<br>( $V_{CES} = \text{Rated Value}$ )<br>( $V_{CES} = \text{Rated Value}$ , $T_C = 125^\circ\text{C}$ ) | $I_{CES}$      | –<br>– | –<br>– | 0.2<br>1.5 | mAdc |
| Emitter Cutoff Current<br>( $V_{EB} = 5\text{ Vdc}$ , $I_C = 0$ )                                                                | $I_{EBO}$      | –      | –      | 1          | mAdc |

### ON CHARACTERISTICS (Note 2)

|                                                                                                                                                   |               |        |        |          |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|--------|----------|-----|
| DC Current Gain<br>( $I_C = 0.1\text{ Adc}$ , $V_{CE} = 5\text{ V}$ )                                                                             | $h_{FE}$      | 30     | 50     | –        | –   |
| Collector-Emitter Saturation Voltage<br>( $I_C = 0.3\text{ Adc}$ , $I_B = 30\text{ mAdc}$ )<br>( $I_C = 1\text{ Adc}$ , $I_B = 200\text{ mAdc}$ ) | $V_{CE(sat)}$ | –<br>– | –<br>– | 0.8<br>1 | Vdc |
| Base-Emitter Saturation Voltage<br>( $I_C = 1\text{ Adc}$ , $I_B = 0.2\text{ Adc}$ )                                                              | $V_{BE(sat)}$ | –      | –      | 1.1      | Vdc |

### DYNAMIC CHARACTERISTICS

|                                                                                                                  |       |   |   |   |     |
|------------------------------------------------------------------------------------------------------------------|-------|---|---|---|-----|
| Current-Gain – Bandwidth Product<br>( $I_C = 500\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ , $f = 1\text{ MHz}$ ) | $f_T$ | 4 | – | – | MHz |
|------------------------------------------------------------------------------------------------------------------|-------|---|---|---|-----|

### SWITCHING CHARACTERISTICS

|              |                                                                                                                     |          |   |     |     |               |
|--------------|---------------------------------------------------------------------------------------------------------------------|----------|---|-----|-----|---------------|
| Turn-on Time | $V_{CC} = 250\text{ Vdc}$ , $I_C = 1\text{ A}$<br>$I_{B1} = 0.2\text{ A}$ , $I_{B2} = 0.4\text{ A}$<br>See Figure 2 | $t_{on}$ | – | 0.3 | 0.5 | $\mu\text{s}$ |
| Storage Time |                                                                                                                     | $t_s$    | – | 2   | 3.5 | $\mu\text{s}$ |
| Fall Time    |                                                                                                                     | $t_f$    | – | 0.3 | –   | $\mu\text{s}$ |
| Fall Time    | Same above cond. at $T_C = 95^\circ\text{C}$                                                                        | $t_f$    | – | –   | 1.4 | $\mu\text{s}$ |

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.

2. Pulse Test:  $PW = 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

TYPICAL CHARACTERISTICS

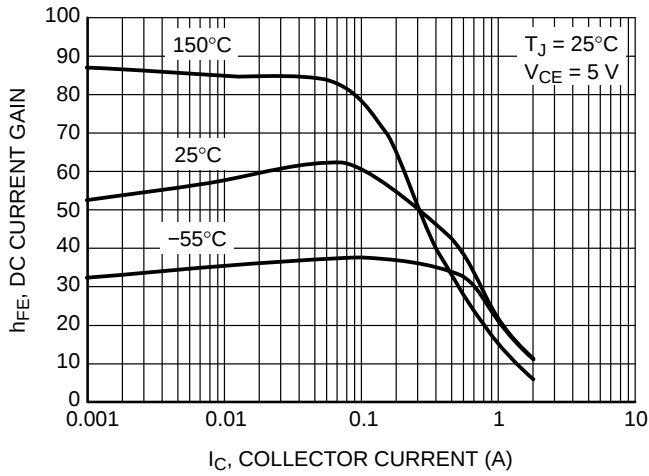


Figure 1. DC Current Gain

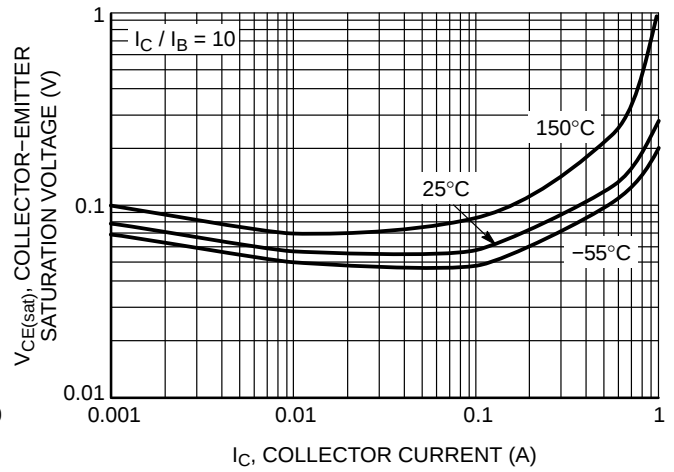


Figure 2.  $V_{CE(sat)}$ , Collector Emitter Saturation Voltage

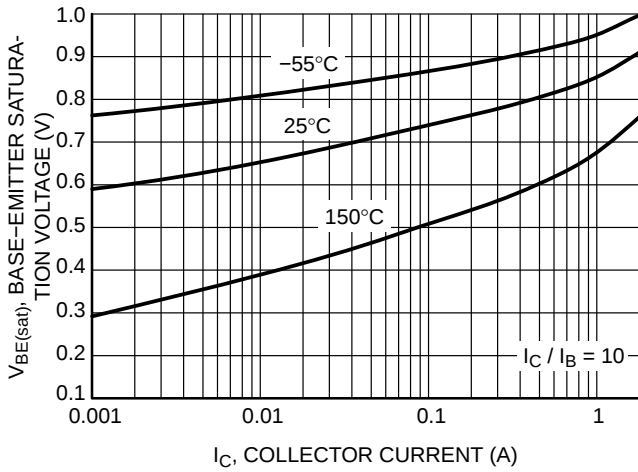


Figure 3.  $V_{BE(sat)}$ , Base Emitter Saturation Voltage

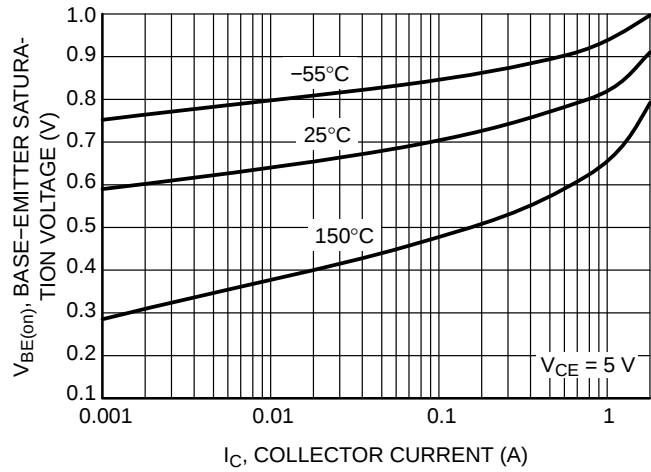


Figure 4.  $V_{BE(on)}$ , Base Emitter On Voltage

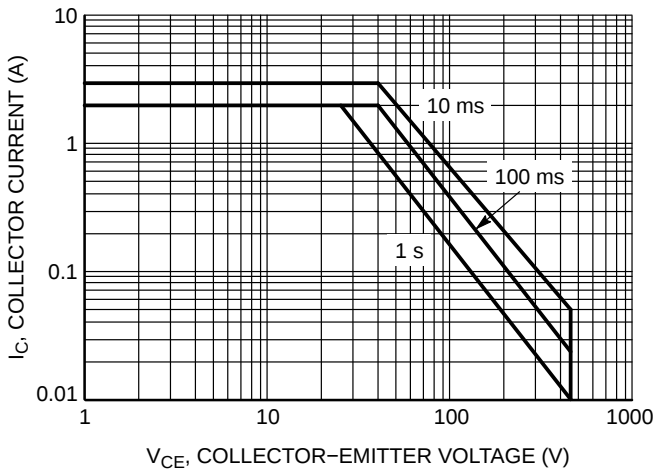


Figure 5. Safe Operating Area (SOA)

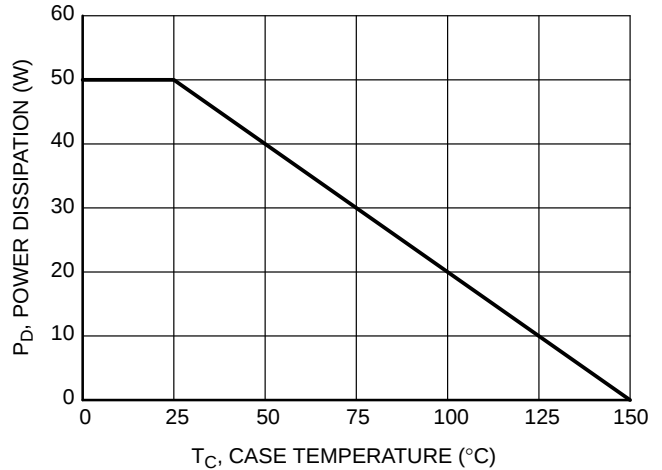


Figure 6. Power Derating

# BUX85G

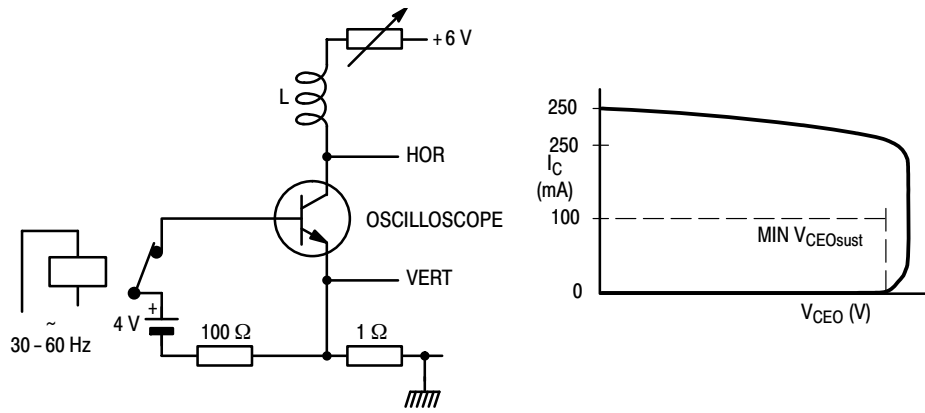


Figure 1. Test Circuit for  $V_{CEOsust}$

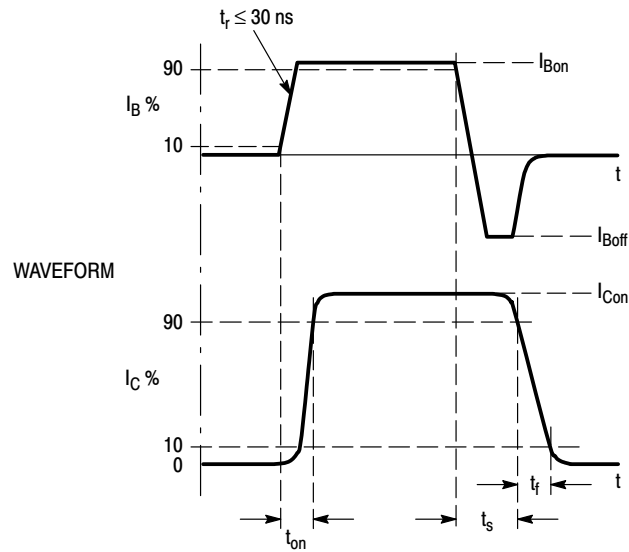


Figure 2. Switching Times/Test Circuit

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