

BU941ZP BU941ZPFI

High voltage ignition coil driver NPN power Darlington transistors

Features

- Very rugged bipolar technology
- Built in clamping Zener
- High operating junction temperature
- Fully insulated package (U.L. compliant) for easy mounting

Applications

High ruggedness electronic ignitions

Description

The devices are bipolar Darlington transistors manufactured using Multi-Epitaxial Planar technology. They have been properly designed to be used in Automotive environment as electronic ignition power actuators.

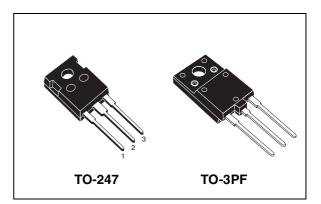


Figure 1. Internal schematic diagram

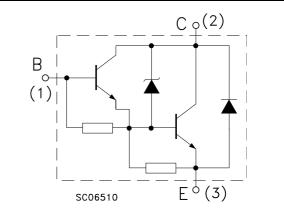


Table 1.Device summary

| Order code | Marking | Packages | Packaging |
|------------|-----------|----------|-----------|
| BU941ZP | BU941ZP | TO-247 | Tube |
| BU941ZPFI | BU941ZPFI | TO-3PF | Tube |

1 Absolute maximum ratings

| Table 2. | Absolute maximum ratings | |
|----------|--------------------------|--|
| | Absolute maximum rutings | |

| Symbol | Parameter | Va | Unit | | |
|-------------------|--|------------|------------|------|--|
| Symbol | Farameter | BU941ZP | BU941ZPFI | Unit | |
| V _{CEO} | Collector-emitter voltage ($I_B = 0$) | 350 | | V | |
| V _{EBO} | Emitter-base voltage (I _C = 0) | | 5 | V | |
| ۱ _C | Collector current 15 | | А | | |
| I _{CM} | Collector peak current (t _p < 5ms) 30 | | А | | |
| Ι _Β | Base current 1 | | А | | |
| I _{BM} | Base peak current (t _p < 5ms) 5 | | А | | |
| P _{tot} | Total dissipation at $T_c \le 25 \text{ °C}$ | 155 | 65 | W | |
| V _{isol} | Insulation withstand voltage (RMS) from all three leads to external heatsink | | 2500 | V | |
| T _{stg} | Storage temperature | -65 to 175 | -65 to 175 | °C | |
| TJ | Max. operating junction temperature | 175 | 175 | °C | |

Table 3.Thermal data

| Symbol | Parameter | TO-247 | TO-3PF | Unit |
|-----------------------|--------------------------------------|--------|--------|------|
| R _{thj-case} | Thermal resistance junction-case max | 0.97 | 2.3 | °C/W |



2 Electrical characteristics

 $(T_{case} = 25^{\circ}C; unless otherwise specified)$

| Symbol | Parameter | Test conditions | Min. | Тур. | Max. | Unit |
|-------------------------------------|---|---|------|-----------|-------------------|-------------|
| I _{CEO} | Collector cut-off current $(I_B = 0)$ | V _{CE} = 300 V V _{CE} = 300 V T _j = 125 °C | | | 100 0.5 | μA mA |
| I _{EBO} | Emitter cut-off current $(I_{\rm C} = 0)$ | V _{EB} = 5 V | | | 20 | mA |
| V _{Clamp} ⁽¹⁾ | Clamping voltage | I _C = 100 mA | 350 | | 500 | V |
| V _{CE(sat)} ⁽¹⁾ | Collector-emitter saturation voltage | $I_{C} = 8 \text{ A} \qquad I_{B} = 100 \text{ mA}$ $I_{C} = 10 \text{ A} \qquad I_{B} = 250 \text{ mA}$ $I_{C} = 12 \text{ A} \qquad I_{B} = 300 \text{ mA}$ | | | 1.8 1.8 2 | V V V |
| V _{BE(sat)} ⁽¹⁾ | Collector-emitter base voltage | $I_{C} = 8 A \qquad I_{B} = 100 \text{ mA}$ $I_{C} = 10 A \qquad I_{B} = 250 \text{ mA}$ $I_{C} = 12 A \qquad I_{B} = 300 \text{ mA}$ | | | 2.2 2.5 2.7 | V V V |
| h _{FE} ⁽¹⁾ | DC current gain | I _C = 5 A V _{CE} = 10 V | 300 | | | |
| | Functional test | V _{CC} = 24 V L = 7 mH <i>Figure 13.</i> | 10 | | | A |
| t _s t _f | Inductive load Storage time Fall time | $\begin{split} V_{CC} &= 12 \ V & L = 7 \ mH \\ V_{BE(off)} &= 0 \ V & R_{BE} = 47 \ \Omega \\ V_{Clamp} &= 300 \ V & I_{C} = 7 \ A \\ I_{B1} &= 70 \ mA \end{split}$ | | 15 0.5 | | μs μs |
| V _F | Diode forward voltage | I _F = 10 A | | | 2.5 | V |

 Table 4.
 Electrical characteristics

1. Pulsed duration = 300 μ s, duty cycle \leq 1.5%.

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2.1 Electrical characteristic (curves)

Figure 2. Safe operating area

GC57479 Ic(A) I_C MAX PULSED PULSE OPERATION * 10 μs 100 µs 10¹ Ic MAX CONT 10° TO-247 TO-3PF 1ms 10 ms 10 8 For single non repetitive pulse D.C 10⁻² ໍ່າ0¹ 10² $V_{CE}(V)$ 10⁰

Figure 3. Derating curve

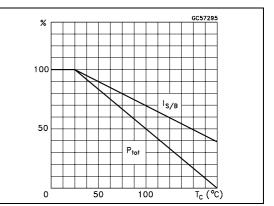


Figure 4. DC current gain

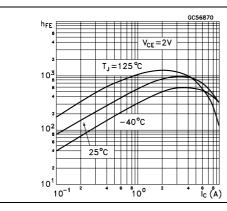
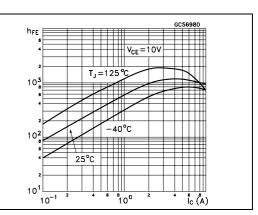
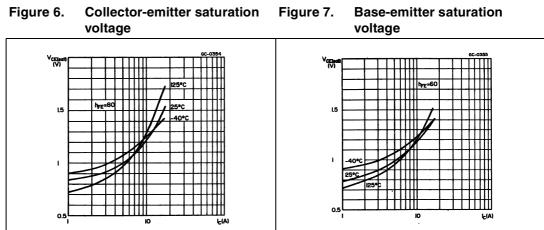
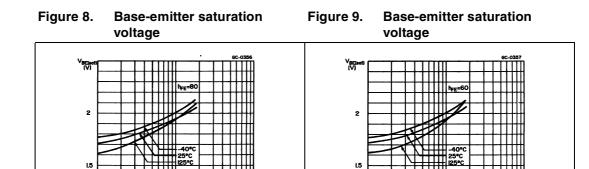


Figure 5. DC current gain





ic(A)



Ic(A)

1.5

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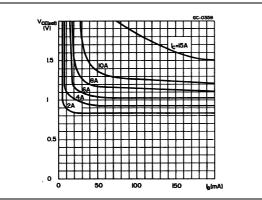
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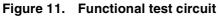
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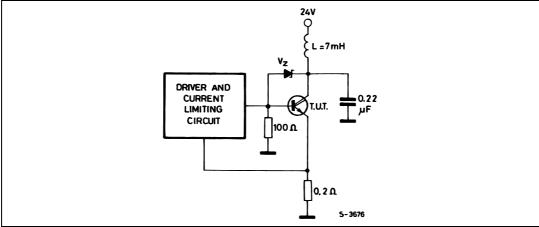
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2.2 **Test circuit**





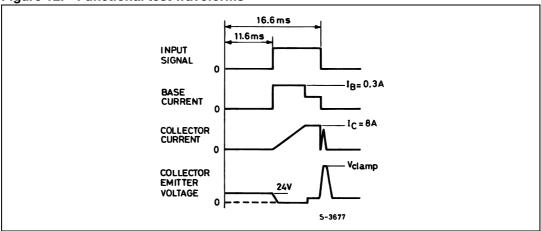
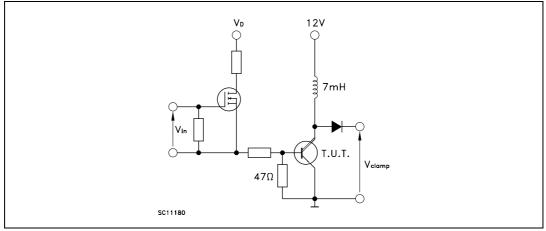




Figure 13. Switching time test circuit

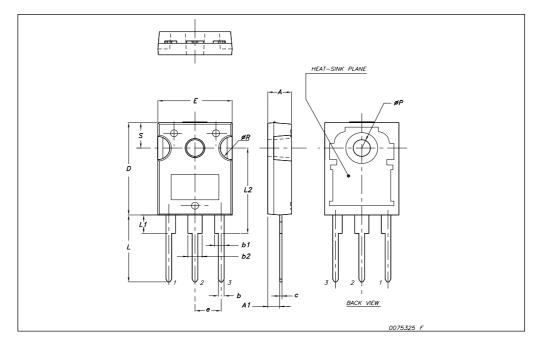


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

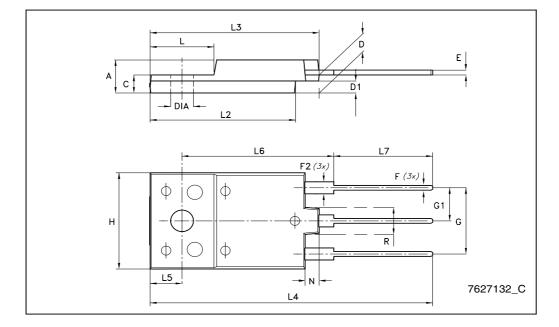


| | TO-247 Mechanical data | | | | |
|------|------------------------|-------|-------|--|--|
| Dim. | mm. | | | | |
| | Min. | Тур | Max. | | |
| А | 4.85 | | 5.15 | | |
| A1 | 2.20 | | 2.60 | | |
| b | 1.0 | | 1.40 | | |
| b1 | 2.0 | | 2.40 | | |
| b2 | 3.0 | | 3.40 | | |
| С | 0.40 | | 0.80 | | |
| D | 19.85 | | 20.15 | | |
| Е | 15.45 | | 15.75 | | |
| е | | 5.45 | | | |
| L | 14.20 | | 14.80 | | |
| L1 | 3.70 | | 4.30 | | |
| L2 | | 18.50 | | | |
| øP | 3.55 | | 3.65 | | |
| øR | 4.50 | | 5.50 | | |
| S | | 5.50 | | | |





| TO-3PF mechanical data | | | |
|------------------------|-------|------|-------|
| ом. | mm. | | |
| | min. | typ | max. |
| A | 5.30 | | 5.70 |
| С | 2.80 | | 3.20 |
| D | 3.10 | | 3.50 |
| D1 | 1.80 | | 2.20 |
| E | 0.80 | | 1.10 |
| F | 0.65 | | 0.95 |
| F2 | 1.80 | | 2.20 |
| G | 10.30 | | 11.50 |
| G1 | | 5.45 | |
| H | 15.30 | | 15.70 |
| L | 9.80 | 10 | 10.20 |
| L2 | 22.80 | | 23.20 |
| L3 | 26.30 | | 26.70 |
| L4 | 43.20 | | 44.40 |
| L5 | 4.30 | | 4.70 |
| L6 | 24.30 | | 24.70 |
| L7 | 14.60 | | 15 |
| N | 1.80 | | 2.20 |
| R | 3.80 | | 4.20 |
| Dia | 3.40 | | 3.80 |



4 Revision history

| Table 5. Document revision hi | istory |
|-------------------------------|--------|
|-------------------------------|--------|

| Date | Revision | Changes |
|-------------|----------|---|
| 03-Feb-2005 | 6 | |
| 22-Jan-2008 | 7 | Package change from TO-218 to TO-247 and from ISOWATT218 to TO-3PF. |



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