

# 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.

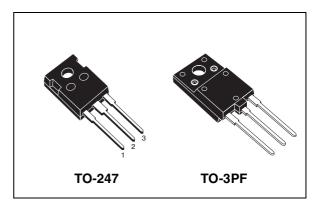
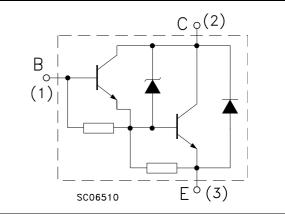


Figure 1. Internal schematic diagram



#### Table 1. Device summary

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

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## 1 Absolute maximum ratings

Table 2.	Absolute	maximum	ratings
	Absolute	maximum	ruungo

Symbol	Parameter	Va	Unit	
Symbol	Falameter	BU941ZP	BU941ZPFI	Onit
V <sub>CEO</sub>	Collector-emitter voltage ( $I_B = 0$ )	3	50	V
V <sub>EBO</sub>	Emitter-base voltage (I <sub>C</sub> = 0)		5	V
Ι <sub>C</sub>	Collector current 15		А	
I <sub>CM</sub>	Collector peak current (t <sub>p</sub> < 5ms) 30		А	
Ι <sub>Β</sub>	Base current 1		А	
I <sub>BM</sub>	Base peak current (t <sub>p</sub> < 5ms)	5		А
P <sub>tot</sub>	Total dissipation at $T_c \le 25 \text{ °C}$ 155 65		65	W
V <sub>isol</sub>	Insulation withstand voltage (RMS) from all three leads to external heatsink		2500	V
T <sub>stg</sub>	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 <sub>thj-case</sub>	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 <sub>CEO</sub>	Collector cut-off current $(I_B = 0)$	V <sub>CE</sub> = 300 V V <sub>CE</sub> = 300 V T <sub>j</sub> = 125 °C			100 0.5	μA mA
I <sub>EBO</sub>	Emitter cut-off current $(I_{C} = 0)$	V <sub>EB</sub> = 5 V			20	mA
V <sub>Clamp</sub> <sup>(1)</sup>	Clamping voltage	I <sub>C</sub> = 100 mA	350		500	V
V <sub>CE(sat)</sub> <sup>(1)</sup>	Collector-emitter saturation voltage	$I_{C} = 8 A \qquad I_{B} = 100 \text{ mA}$ $I_{C} = 10 A \qquad I_{B} = 250 \text{ mA}$ $I_{C} = 12 A \qquad I_{B} = 300 \text{ mA}$			1.8 1.8 2	V V V
V <sub>BE(sat)</sub> <sup>(1)</sup>	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 <sub>FE</sub> <sup>(1)</sup>	DC current gain	I <sub>C</sub> = 5 A V <sub>CE</sub> = 10 V	300			
	Functional test	V <sub>CC</sub> = 24 V L = 7 mH <i>Figure 13.</i>	10			A
t <sub>s</sub> t <sub>f</sub>	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 <sub>F</sub>	Diode forward voltage	I <sub>F</sub> = 10 A			2.5	V

 Table 4.
 Electrical characteristics

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

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### 2.1 Electrical characteristic (curves)

Figure 2. Safe operating area

### Figure 3. Derating curve

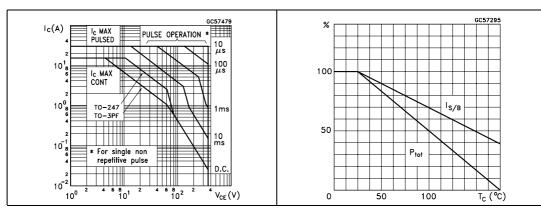


Figure 4. DC current gain

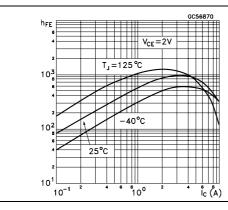
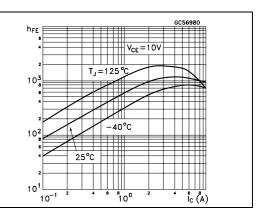
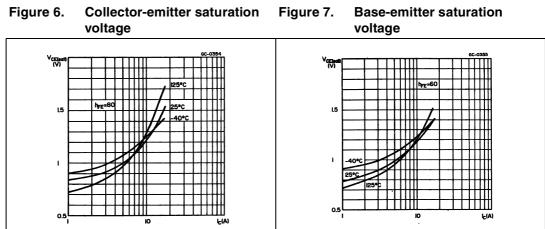


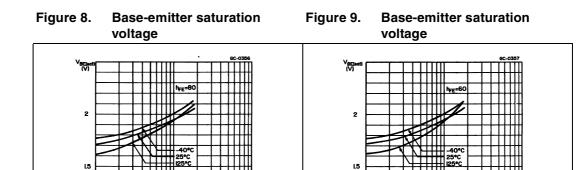
Figure 5. DC current gain



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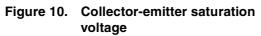
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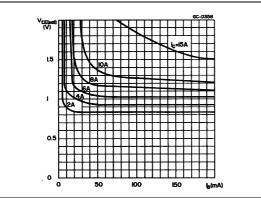
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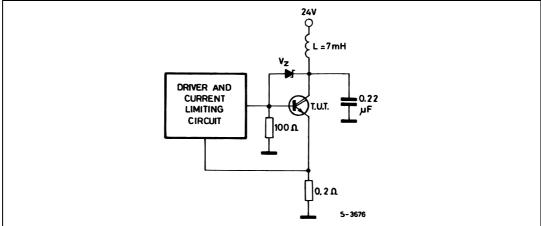
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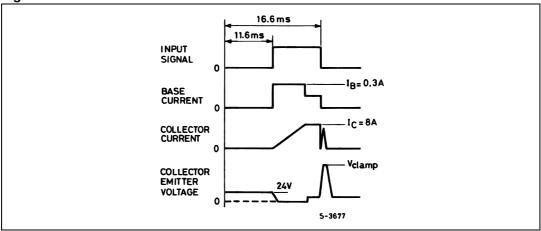


#### 2.2 **Test circuit**

#### Figure 11. Functional test circuit

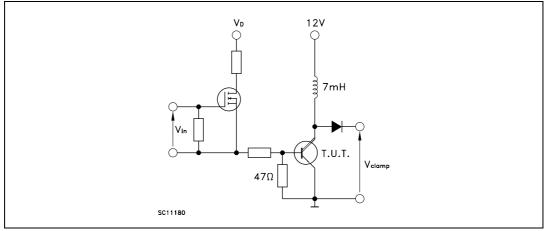


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#### Figure 13. Switching time test circuit

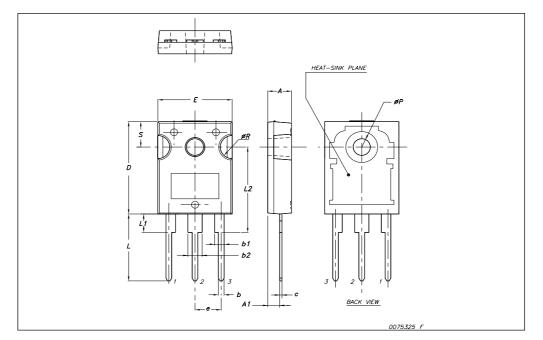


## 3 Package mechanical data

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

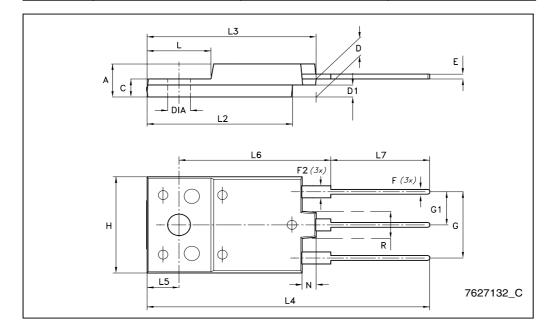


	TO-247 Mechanical data			
Dim.		mm.		
	Min.	Тур	Max.	
A	4.85		5.15	
A1	2.20		2.60	
b	1.0		1.40	
b1	2.0		2.40	
b2	3.0		3.40	
с	0.40		0.80	
D	19.85		20.15	
E	15.45		15.75	
е		5.45		
L	14.20		14.80	
L1	3.70		4.30	
L2		18.50		
øP	3.55		3.65	
øR	4.50		5.50	
S		5.50		





	TO-3PF mechanical data			
DIM.		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		
н	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	history
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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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