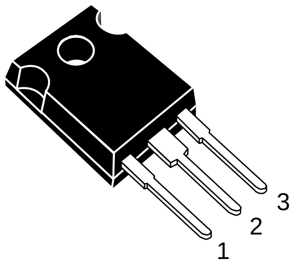
BU931P

Automotive-grade high voltage ignition coil driver NPN power Darlington transistor

Datasheet - production data



TO-247

Features

- AEC-Q101 qualified
- Very rugged Bipolar technology
- High operating junction temperature

Applications

- High ruggedness electronic ignitions

Description

This is a high voltage power Darlington transistor developed using multi-epitaxial planar technology. It has been properly designed for automotive environment as electronic ignition power actuators.

Figure 1: Internal schematic diagram

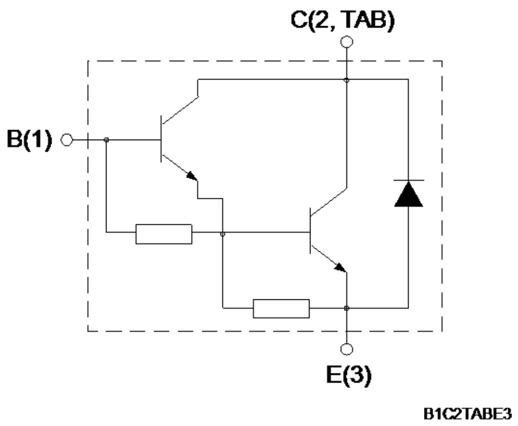


Table 1: Device summary

Order code	Marking	Package	Packing
BU931P	BU931P	TO-247	Tube

Contents

1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{BE} = 0)	500	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	400	V
V_{EBO}	Emitter-base voltage (I_C = 0)	5	V
I_C	Collector current	15	A
I_{CM}	Collector peak current	30	A
I_B	Base current	1	A
I_{BM}	Base peak current	5	A
P_{TOT}	Total dissipation at Tc = 25 °C	135	W
T_{stg}	Storage temperature range	-65 to 175	°C
T_j	Operating junction temperature range		°C

Table 3: Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case	1.1	°C/W
R_{thJA}	Thermal resistance junction-ambient	50	°C/W

2 Electrical characteristics

(T_C = 25 °C unless otherwise specified)

Table 4: Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current	V_{BE} = 0 V, V_{CE} = 500 V		-	100	µA
		V_{BE} = 0 V, V_{CE} = 500 V, T_C = 125 °C (1)		-	0.5	mA
I_{CEO}	Collector cut-off current	I_B = 0 A, V_{CE} = 450 V		-	100	µA
		I_B = 0 A, V_{CE} = 450 V, T_C = 125 °C (1)		-	0.5	mA
I_{EBO}	Emitter cut-off current	I_C= 0 A, V_{EB} = 5 V		-	20	mA
$V_{CEO(sus)}$(2)	Collector-emitter sustaining voltage	I_B= 0 A, I_C = 100 mA	400	-		V
$V_{CE(sat)}$(2)	Collector-emitter saturation voltage	I_C = 7 A, I_B = 70 mA		-	1.6	V
		I_C = 8 A, I_B = 100 mA		-	1.8	V
		I_C = 10 A, I_B = 250 mA		-	1.8	V
$V_{BE(sat)}$(2)	Base-emitter saturation voltage	I_C = 7 A, I_B = 70 mA		-	2.2	V
		I_C = 8 A, I_B = 100 mA		-	2.4	V
		I_C = 10 A, I_B = 250 mA		-	2.5	V
h_{FE}(2)	DC current gain	I_C = 5 A, V_{CE} = 10 V	300	-		
V_F	Diode forward voltage	I_F = 10 A		-	2.5	V
	Functional test	V_{CC} = 24 V, L = 7 mH, V_{clamp} = 400 V (see *Figure 10: "Functional test circuit"*)	8	-		A

Notes:

(1)Defined by design, not subject to production test.

(2)Pulse test: pulse duration ≤ 300 µs, duty cycle ≤ 2 %.

Table 5: Inductive load switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t_s	Storage time	V_{BE}=0, V_{CC} = 12 V, V_{clamp} = 300 V, L = 7 mH, R_{BE} = 47 Ω, I_C = 7 A, I_B = 70 mA (see *Figure 12: "Switching time test circuit"*)	-	15	-	µs
t_f	Fall time		-	0.5	-	µs

2.1 Electrical characteristics (curves)

Figure 2: Safe operating area

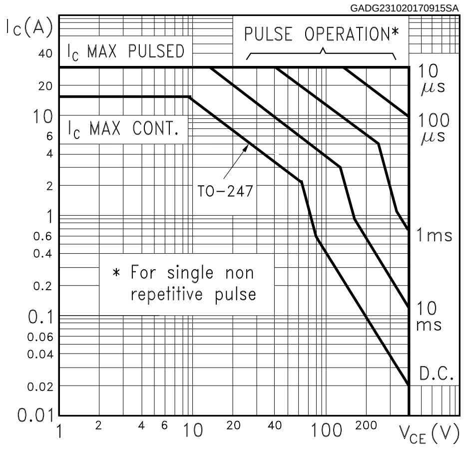


Figure 3: DC current gain

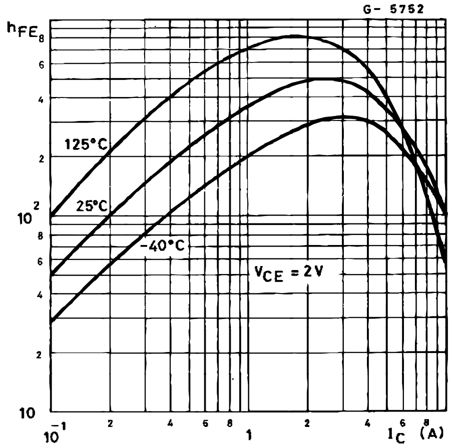


Figure 4: Switching time inductive load

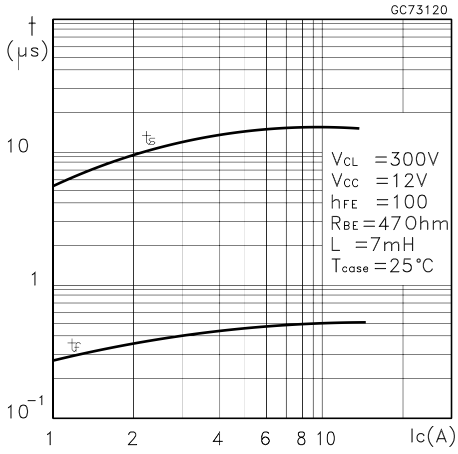


Figure 5: Collector-emitter saturation voltage @ hFE = 50

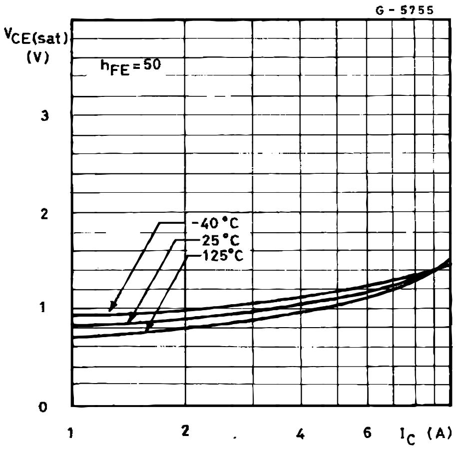


Figure 6: Collector-emitter saturation voltage @ hFE = 100

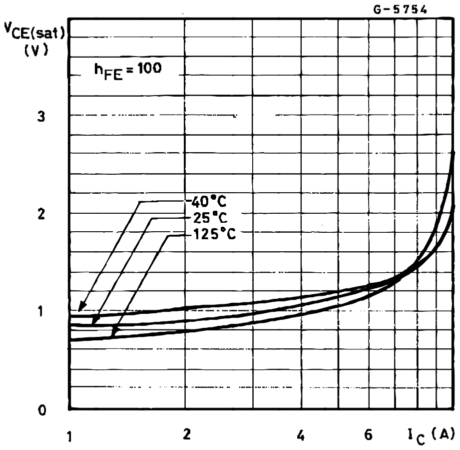


Figure 7: Collector-emitter saturation voltage

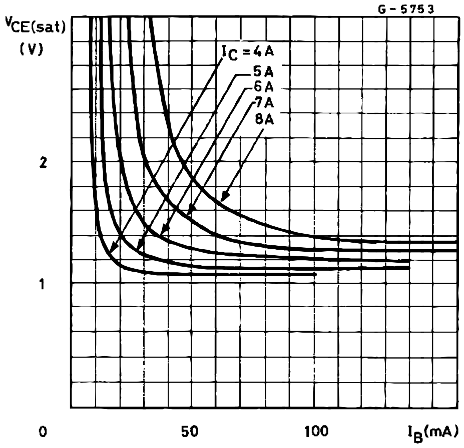


Figure 8: Base-emitter saturation voltage @ h_{FE} = 50

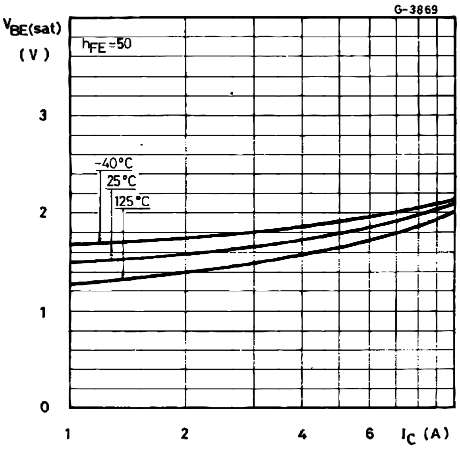
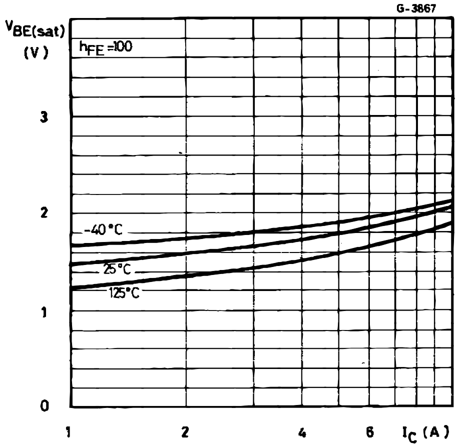


Figure 9: Base-emitter saturation voltage @ hFE = 100



3 Test circuits

Figure 10: Functional test circuit

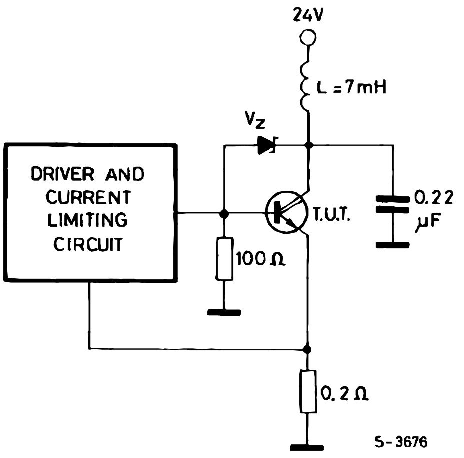


Figure 11: Functional test waveforms

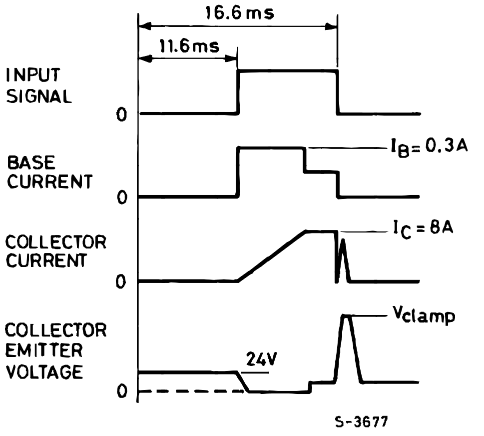


Figure 12: Switching time test circuit

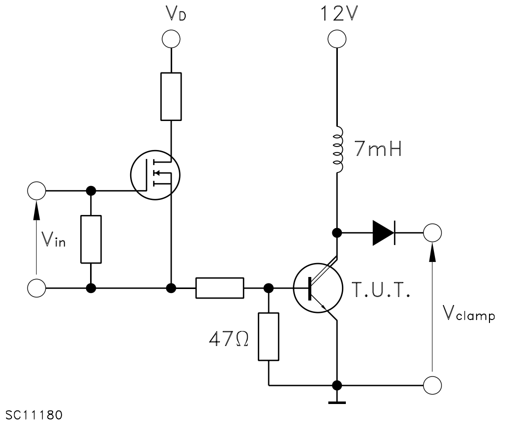
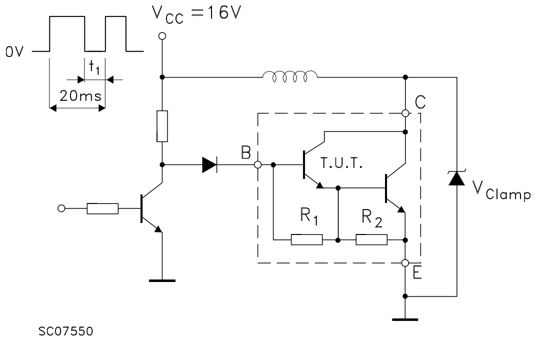


Figure 13: Sustaining voltage test circuit



4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: ***www.st.com***. ECOPACK® is an ST trademark.

4.1 TO-247 package information

Figure 14: TO-247 package outline

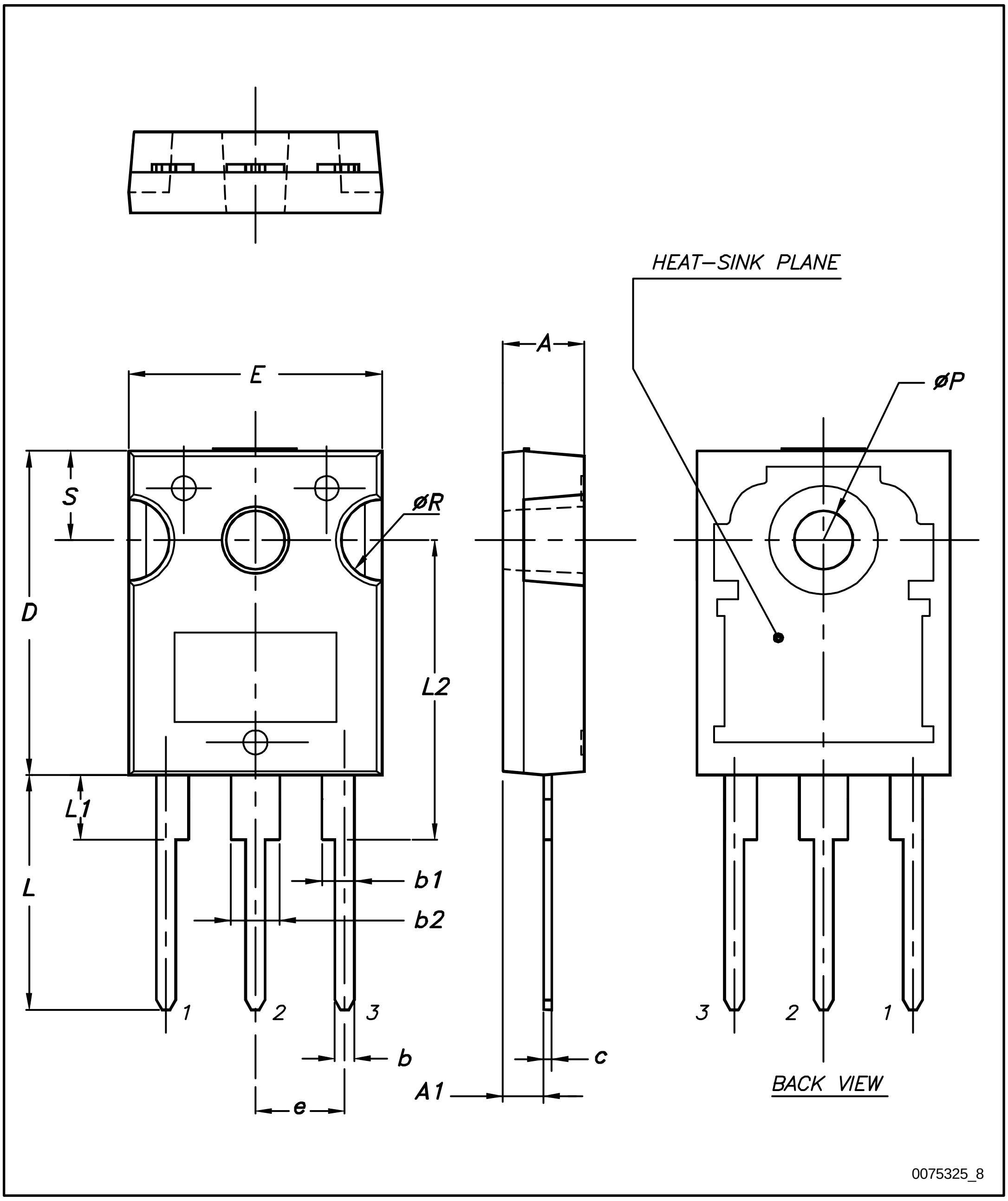


Table 6: TO-247 package mechanical data

Dim.	mm		
	Min.	Typ.	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
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e	5.30	5.45	5.60
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
ØP	3.55		3.65
ØR	4.50		5.50
S	5.30	5.50	5.70

5 Revision history

Table 7: Document revision history

Date	Revision	Changes
23-Oct-2017	1	Initial release. Part number previously included in datasheet DocID1004.

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