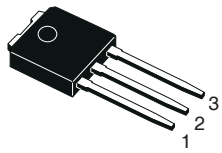
BULD39D-1
BULD39DT4

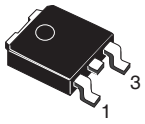
High Voltage Fast-Switching NPN Power Transistor

General features

- NPN transistor
- High voltage capability
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed
- High ruggedness
- Surface-mounting DPAK (TO-252) power package in tape & reel (suffix “T4”)
- Through-hole IPAK (TO-251) power package in tube (suffix “-1”)
- In compliance with the 2002/93/EC European Directive



IPAK
TO-251
(suffix “-1”)



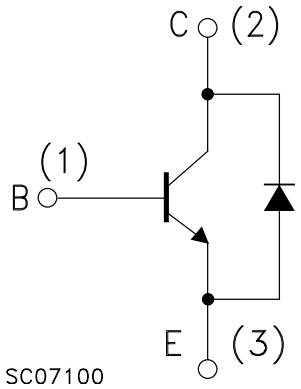
DPAK
TO-252
(suffix “T4”)

Description

The device in manufactured using high voltage Multi-epitaxial Planar technology to enhance switching speeds while maintaining wide RBSOA.

The BUL series is designed for use in electronics transformer for halogen lamps.

Internal schematic diagram



Applications

- Electronics transformer for halogen lamps
- Switch mode power supplies

Order codes

Part Number	Marking	Package	Packing
BULD39D-1		IPAK	Tube
BULD39DT4		DPAK	Tape & reel

Contents

1 Electrical ratings

Table 1. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{BE} = 0)	850	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	450	V
V_{EBO}	Emitter-base voltage (I_C = 0)	9	V
I_C	Collector current	4	A
I_{CM}	Collector peak current (t_P < 5ms)	8	A
I_B	Base current	2	A
I_{BM}	Base peak current (t_P < 5ms)	4	A
P_{tot}	Total dissipation at T_c = 25°C	35	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 2. Thermal data

Symbol	Parameter		Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	max	3.57	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-amb	max	62.5	°C/W

2 Electrical characteristics

(T_{case} = 25°C unless otherwise specified)

Table 3. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current (V_{BE} = 0)	V_{CE} = 850V V_{CE} = 850V T_j = 125°C			100 500	µA µA
I_{EBO}	Emitter cut-off current (I_C =0)	V_{EB} = 9V			100	µA
$V_{CEO(sus)}$	Collector-emitter sustaining voltage (I_B = 0)	I_C = 100mA L = 25 mH	450			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 1A I_B = 0.2A I_C = 2.5A I_B = 0.5A		0.13	0.5 1.1	V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 1A I_B = 0.2A I_C = 2.5A I_B = 0.5A			1.1 1.3	V V
h_{FE} (1)	DC current gain	I_C = 10mA V_{CE} = 5 I_C = 5A V_{CE} = 10V	10 4			
V_{CEW}	Maximum collector emitter voltage without snubber	I_C = 6A R_{BB} = 0Ω V_{BB}= -2.5V L = 50µH $t_P \geq 10\mu s$	450			V
t_s t_f	Inductive load Storage time Fall time	I_C = 2.5A $I_{B(on)}$ = 0.5A $V_{BE(off)}$ = -5V R_{BB} = 0Ω V_{CL} = 300V L = 1mH		0.7 50	1.5 100	µs ns
V_f	Diode forward voltage	I_C = 2A			1.5	V

Note (1) Pulsed duration = 300 µs, duty cycle ≤1.5%

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

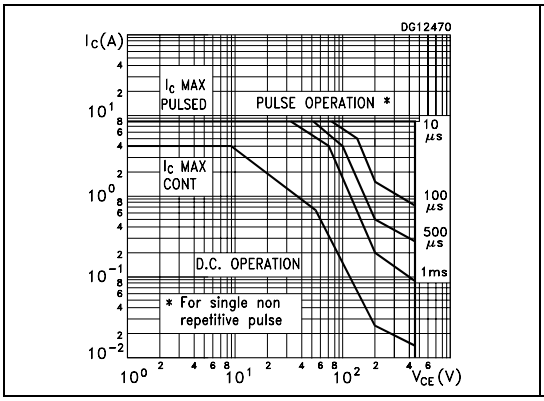


Figure 2. Derating curve

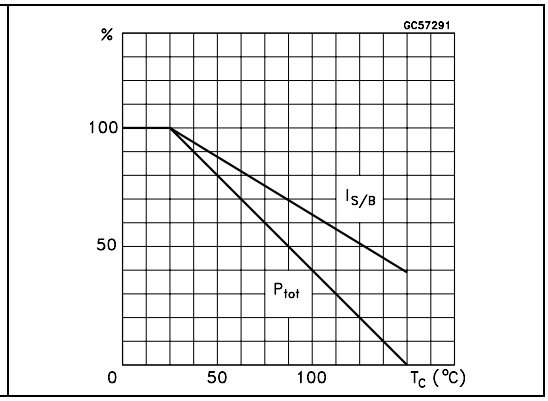
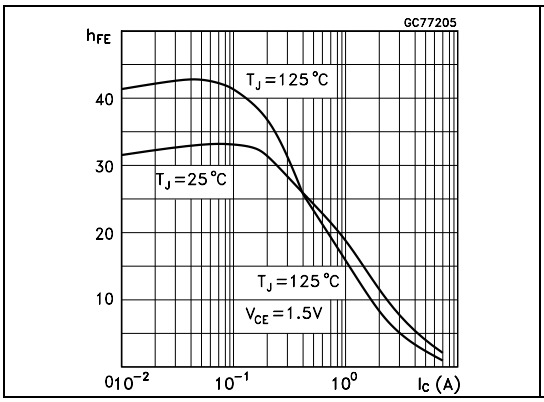


Figure 3. DC current gain

DC current gain



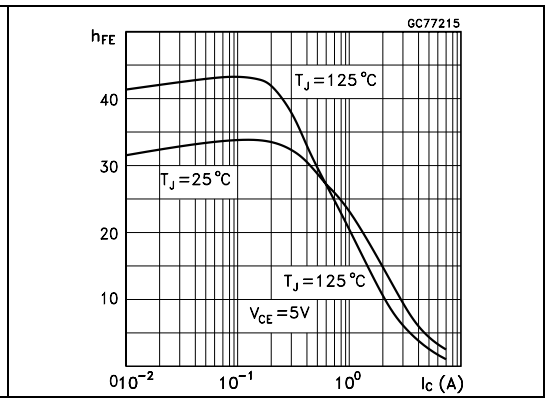
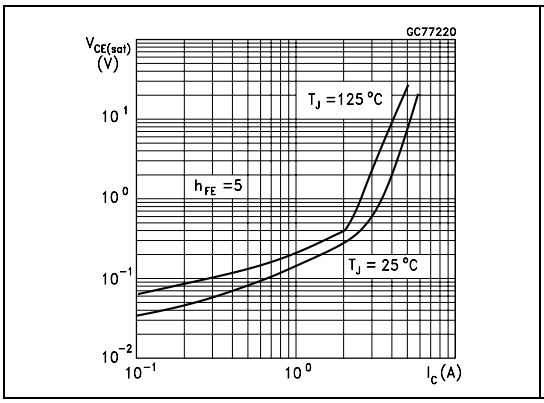


Figure 4. Collector-emitter saturation voltage

Figure 5. Base-emitter saturation voltage



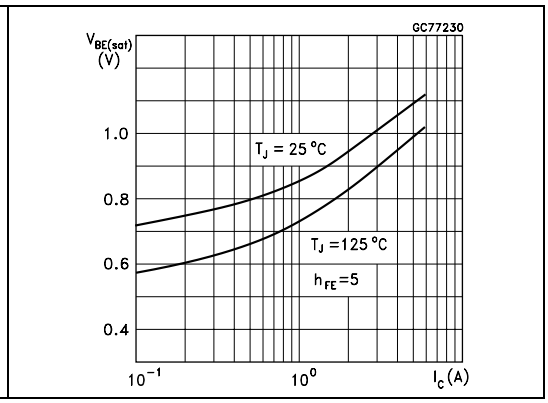


Figure 6. Inductive load fall time

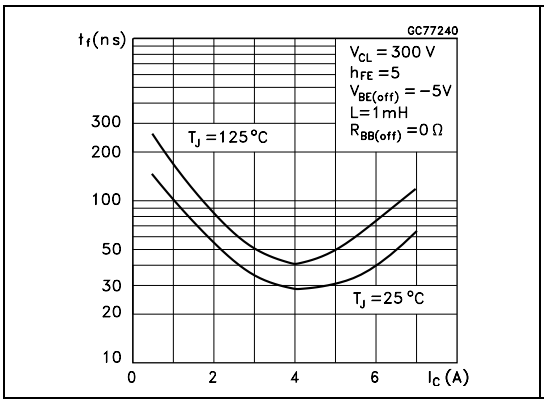


Figure 7. Inductive load storage time

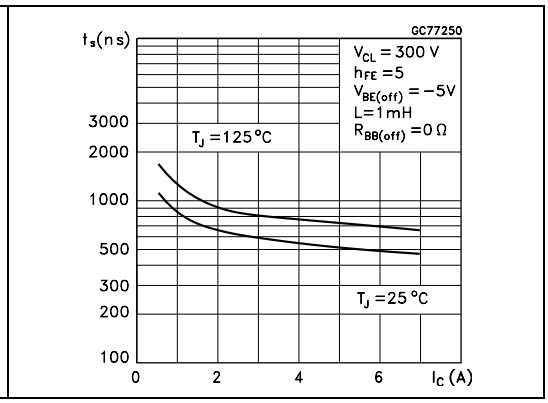
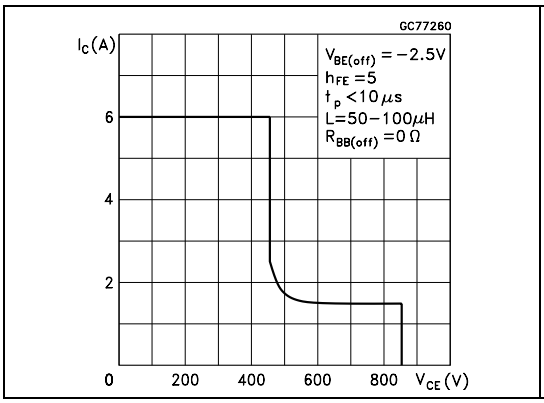
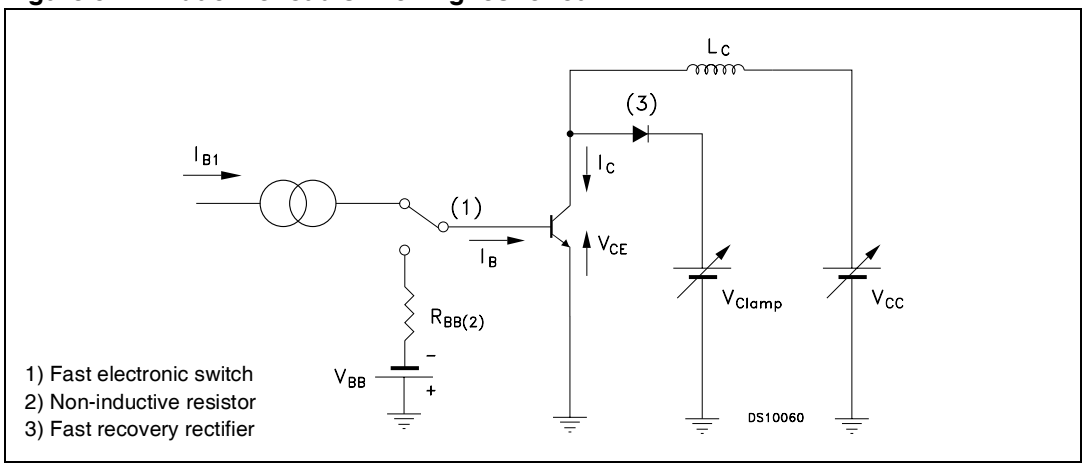


Figure 8. Reverse biased SOA



2.2 Test circuits

Figure 9. Inductive load switching test circuit

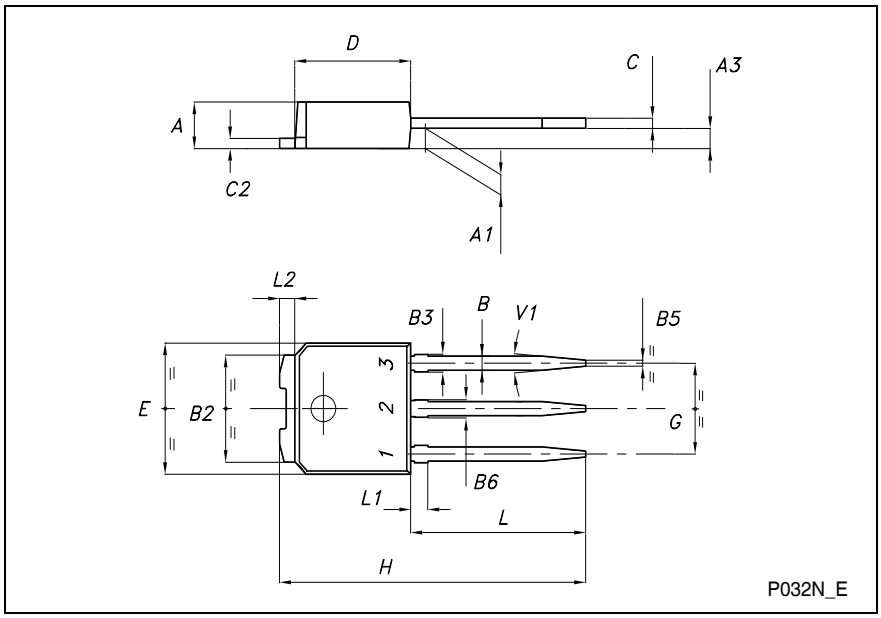


3 Package mechanical data

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

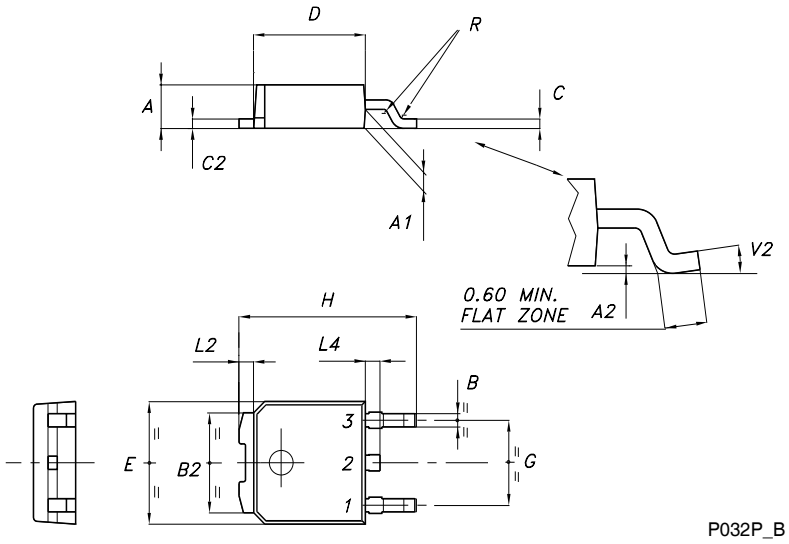
TO-251 (IPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A3	0.70		1.30	0.028		0.051
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
B3			0.85			0.033
B5		0.30			0.012	
B6			0.95			0.037
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.237		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	15.90		16.30	0.626		0.642
L	9.00		9.40	0.354		0.370
L1	0.80		1.20	0.031		0.047
L2		0.80	1.00		0.031	0.039
V1		10°			10°	



TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0°		8°	0°		0°



4 Revision history

Table 4. Revision history

Date	Revision	Changes
09-May-2006	1	Initial release.

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