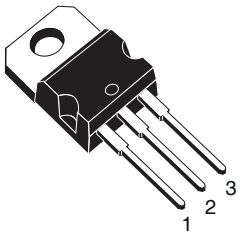
BUL3N7

MEDIUM VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

Features

- MEDIUM VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED



TO-220

Applications

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING

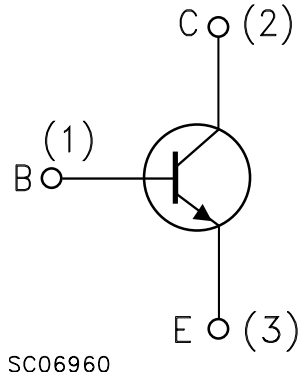
Description

The BUL3N7 is manufactured using high voltage Multi-Epitaxial Planar technology for high switching speeds and medium voltage capability.

It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA.

The device is expressly designed for a new solution to be used in compact fluorescent lamps, H.F. ballast voltage FED where it is coupled with the BUL3P5, its complementary PNP transistor.

Internal Schematic Diagram



Order Codes

Part Number	Marking	Package	Packing
BUL3N7	BUL3N7	TO-220	TUBE

1 Absolute Maximum Ratings

Table 1. Absolute Maximum Rating

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{BE} = 0)	700	V
V_{CEO}	Collector-Emitter Voltage (I_B = 0)	400	V
V_{EBO}	Emitter-Base Voltage (I_C = 0, I_B = -0.75 A, t_p < 100ms, T_j < 150°C)	$V_{(BR)EBO}$	V
I_C	Collector Current	3	A
I_{CM}	Collector Peak Current (t_P < 5ms)	6	A
I_B	Base Current	1.5	A
I_{BM}	Base Peak Current (t_P < 5ms)	3	A
P_{TOT}	Total dissipation at T_c = 25°C	60	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	2.08	°C/W
$R_{thJ\text{-}amb}$	Thermal Resistance Junction-Ambient	Max	62.5	°C/W

2 Electrical Characteristics

Table 3. Electrical Characteristics (T_{CASE} = 25°C; unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cut-off Current (V_{BE} = 0)	V_{CE} = 700 V V_{CE} = 700 V T_C = 125°C			0.1 0.5	mA mA
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage (I_C = 0)	I_E = 10 mA	10		18	V
$V_{CEO(sus)}$ *Note: 1*	Collector-Emitter Sustaining Voltage (I_B = 0)	I_C = 100 mA	400			V
$V_{CE(sat)}$ *Note: 1*	Collector-Emitter Saturation Voltage	I_C = 0.7 A I_B = 0.1A I_C = 1 A I_B = 0.2 A			0.5 0.5	V V
$V_{BE(sat)}$ *Note: 1*	Base-Emitter Saturation Voltage	I_C = 0.5A I_B = 0.1 A I_C = 1A I_B = 0.2 A I_C = 2A I_B = 0.4 A			1.1 1.2 1.3	V V V
h_{FE}	DC Current Gain	I_C = 10 mA V_{CE} = 5 V I_C = 0.7A V_{CE} = 5 V I_C = 2A V_{CE} = 5 V	10 18 4		34	
t_r t_s t_f	RESISTIVE LOAD Rise Time Storage Time Fall Time	I_C = 0.7 A V_{CC} = 250 V I_{B1} = 0.14 A I_{B2} = -0.14 A T_p = 30 µs		80 2.4 100		ns µs ns
t_s t_f	INDUCTIVE LOAD Storage Time Fall Time	I_C = 1 A I_{B1} = 0.2 A $V_{BE(off)}$ = -5 V R_{bb} = 0 Ω L = 1 mH V_{clamp} = 200 V		450 120		ns ns

Note: 1 Pulsed duration = 300 µs, duty cycle ≤1.5%.

2.1 Typical Characteristics

Figure 1. Safe Operating Area

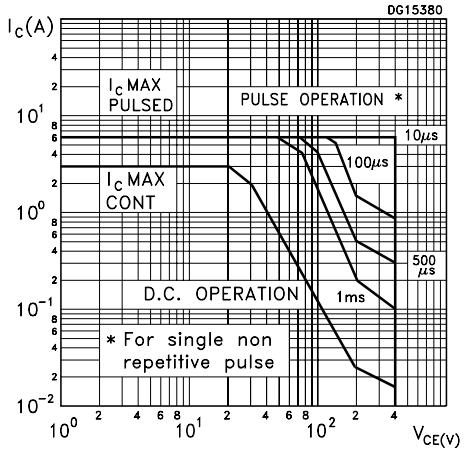


Figure 2. DC Current Gain

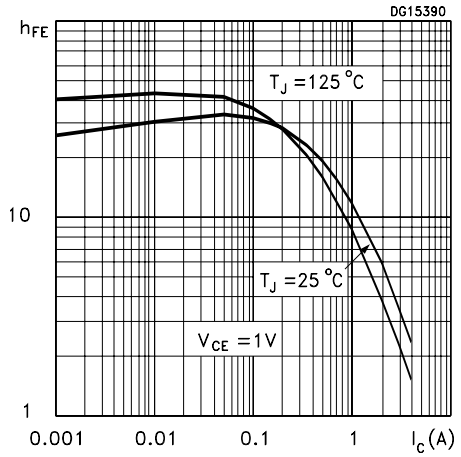


Figure 3. DC Current Gain

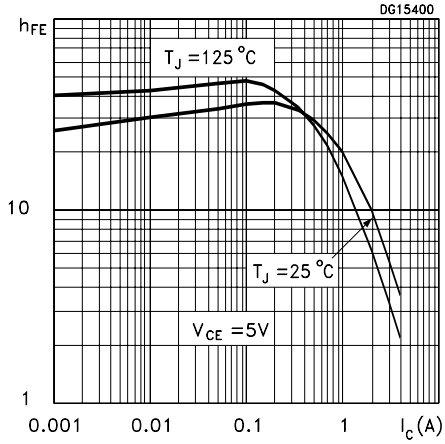


Figure 4. Collector Emitter Saturation Voltage

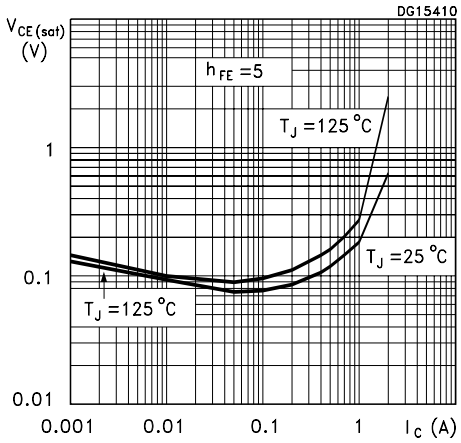


Figure 5. Base Emitter Saturation Voltage

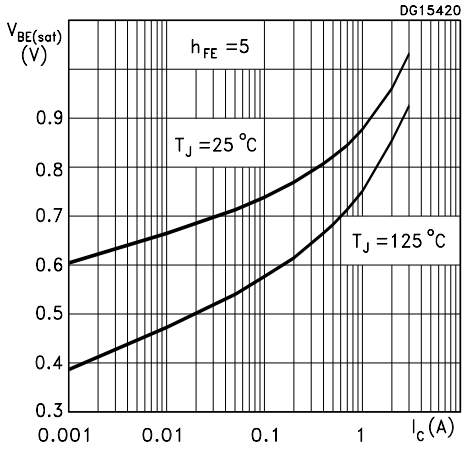


Figure 6. Switching Times Resistive Load

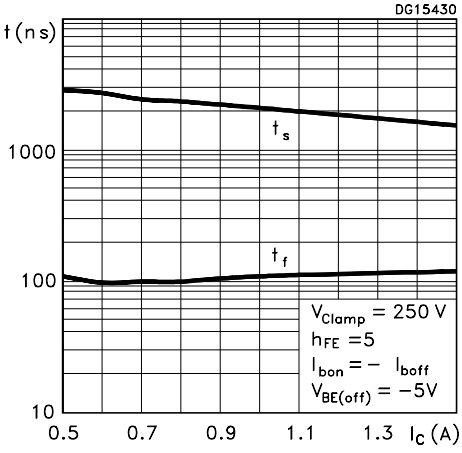


Figure 7. Switching Times Inductive Load

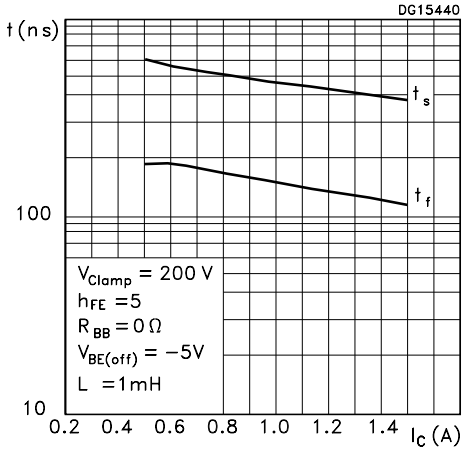
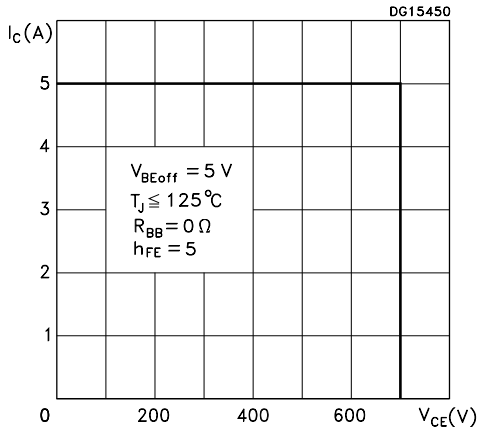


Figure 8. Reverse Bised SOA



3 Test Circuits

Figure 9. Inductive Load Switching Test Circuit

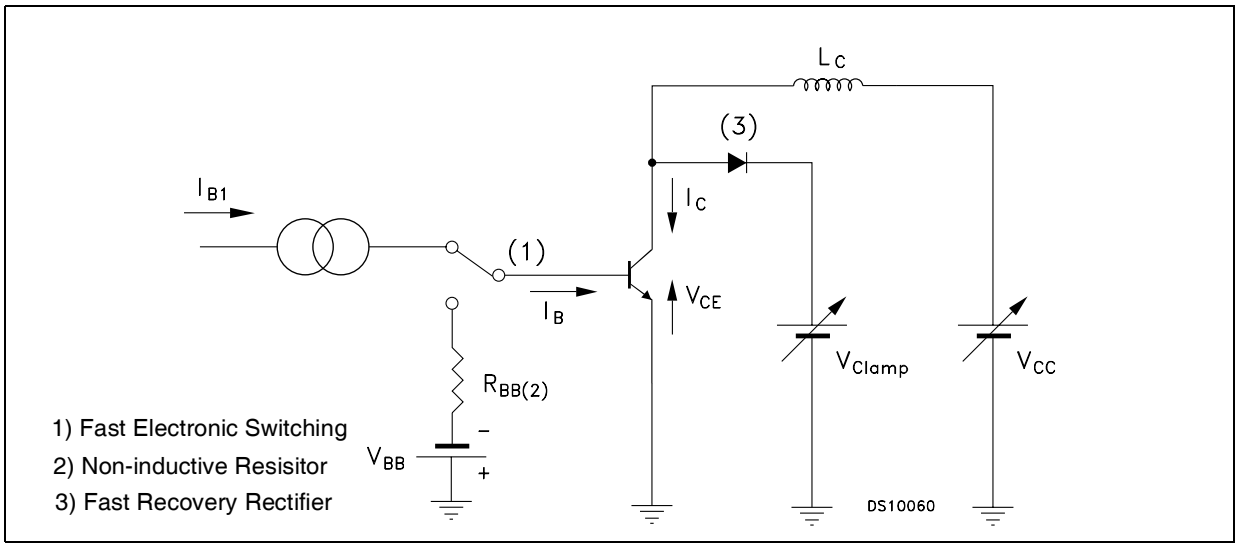
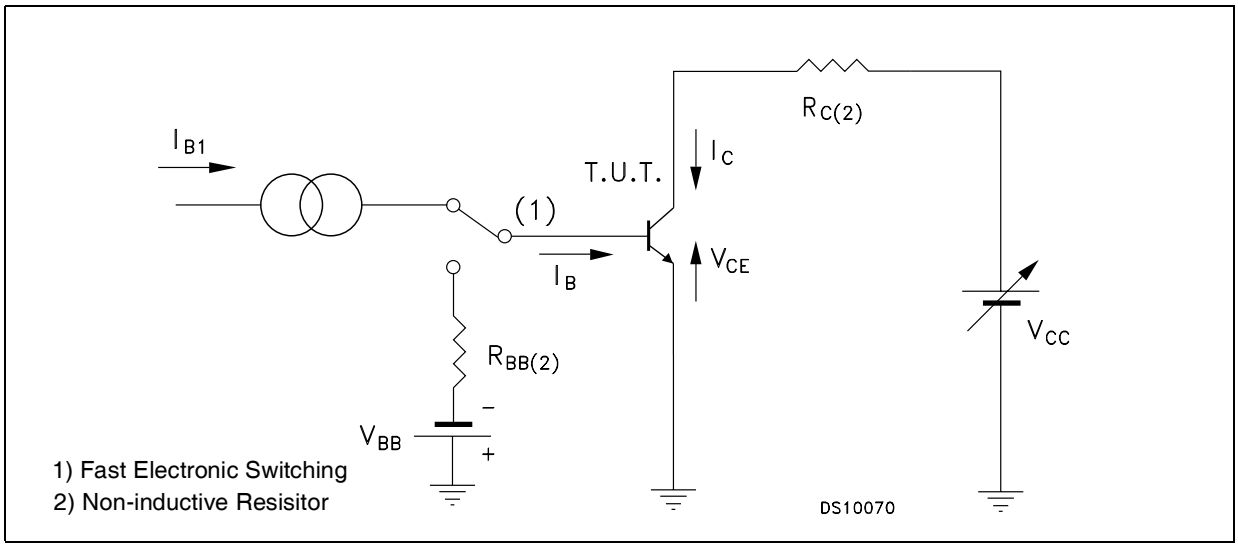


Figure 10. Resistive Load Switching Test Circuits

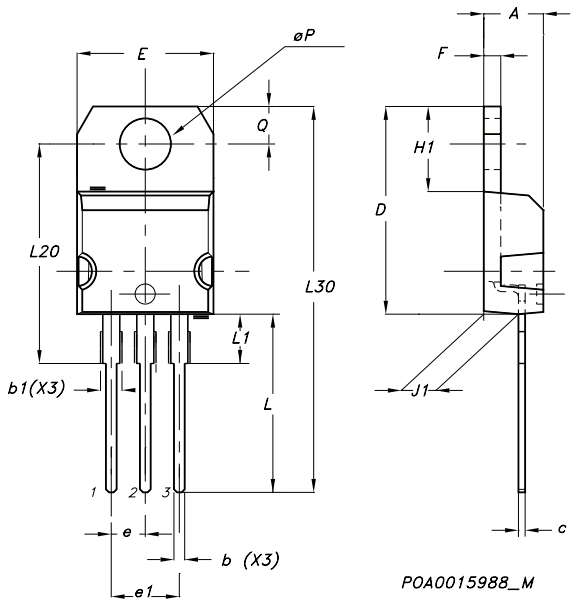


4 Package Mechanical Data

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-220 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



5 Revision History

Date	Revision	Changes
09-Dec-2005	1	Initial Relase