STL128D

High voltage fast-switching NPN power transistor

Features

- High voltage capability
- Low spread of dynamic parameters
- Very high switching speed
- Integrated antiparallel collector-emitter diode

Applications

- Electronic ballast for fluorescent lighting
- Flyback and forward single transistor low power converters

Description

These devices are high voltage fast-switching NPN power transistors. They are manufactured using high voltage multi epitaxial planar technology for high switching speeds and medium voltage capability.

They use a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA. The devices are designed for use in lighting applications and low cost switch-mode power supplies.

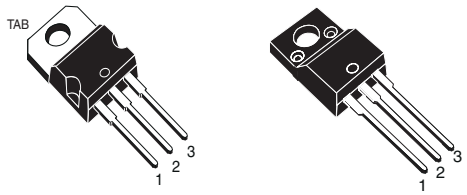


Figure 1. Internal schematic diagram

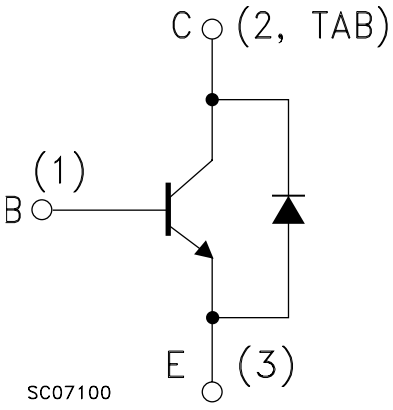


Table 1. Device summary

Order codes	Marking	Packages	Packaging
STL128D	L128D	TO-220	Tube
STL128DFP	L128DFP	TO-220FP	Tube

Content

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		TO-220	TO-220FP	
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)	$V_{(BR)EBO}$		V
I_C	Collector current	4		A
I_{CM}	Collector peak current (t_P < 5 ms)	8		A
I_B	Base current	2		A
I_{BM}	Base peak current (t_P < 5 ms)	4		A
V_{ISOL}	Insulation withstand voltage (RMS) from all three leads to external heatsink		1500	V
P_{TOT}	Total dissipation at T_c = 25 °C	65	30	W
T_{stg}	Storage temperature	-65 to 150		°C
T_J	Max. operating junction temperature	150		°C

Table 3. Thermal data

Symbol	Parameter	Value		Unit
		TO-220	TO-220FP	
$R_{thJ\text{-}case}$	Thermal resistance junction-case max	1.92	4.17	°C/W
$R_{thJ\text{-}amb}$	Thermal resistance junction-ambient max	62.5		°C/W

2 Electrical characteristics

T_{case} = 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_{CE} = 700 V V_{CE} = 700 V T_c = 125 °C			100 500	µA µA
I_{CEO}	Collector cut-off current (I_B = 0)	V_{CE} = 400 V			250	µA
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 10 mA	9		18	V
$V_{CEO(sus)}$(1)	Collector-emitter sustaining voltage (I_B = 0)	I_C = 100 mA	400			V
$V_{CE(sat)}$(1)	Collector-emitter saturation voltage	I_C = 1 A I_B = 0.2 A I_C = 2.5 A I_B = 0.5 A I_C = 3.5 A I_B = 0.7 A		 0.5	1 1.5 	V V V
$V_{BE(sat)}$(1)	Base-emitter saturation voltage	I_C = 1 A I_B = 0.2 A I_C = 2.5 A I_B = 0.5 A			1.2 1.3	V V
h_{FE}(1)	DC current gain	I_C = 10 mA V_{CE} = 5 V I_C = 2 A V_{CE} = 5 V	10 10		 32	
 t_s t_f	Inductive load Storage time Fall time	V_{CC} = 200 V I_C=2 A I_{B1} = 0.4 A $V_{BE(off)}$ = - 5 V R_{BB} = 0 L = 200 µH		 0.6 0.1		 µs µs

1. Pulse test: pulse duration ≤ 300 µs, duty cycle ≤ 1.5 %.

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

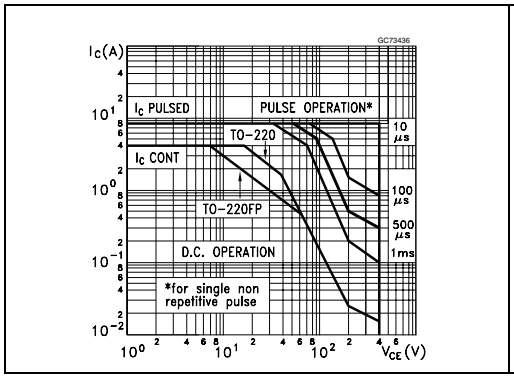


Figure 3. Derating curve

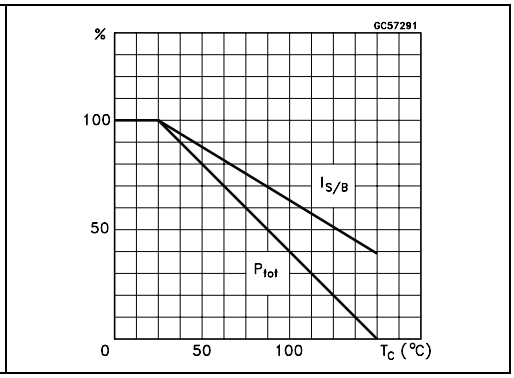


Figure 4. DC current gain (V_{CE} = 1.5 V)

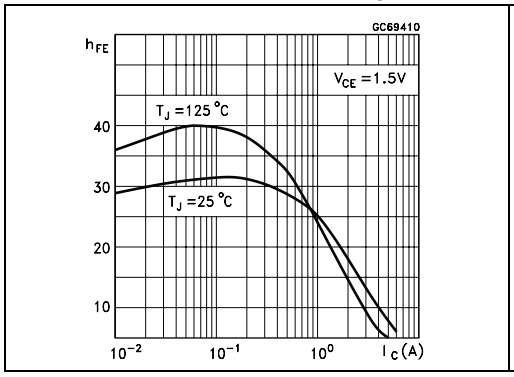


Figure 5. DC current gain (V_{CE} = 5 V)

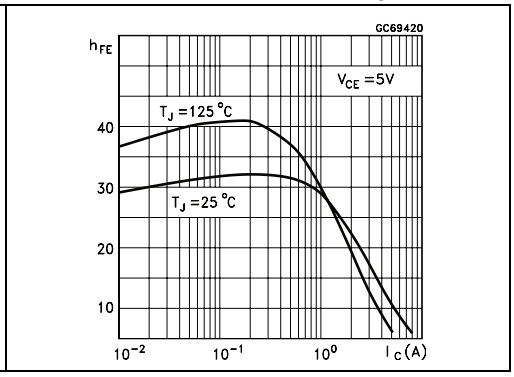


Figure 6. Collector-emitter saturation voltage

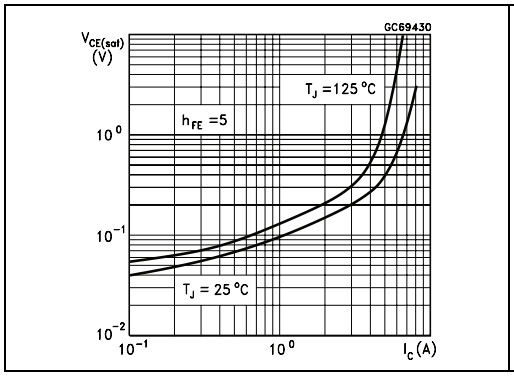


Figure 7. Base-emitter saturation voltage

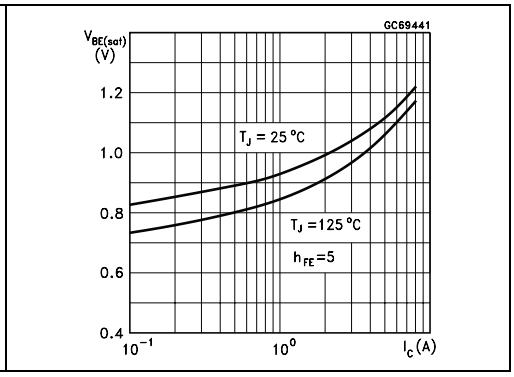


Figure 8. Inductive load fall time

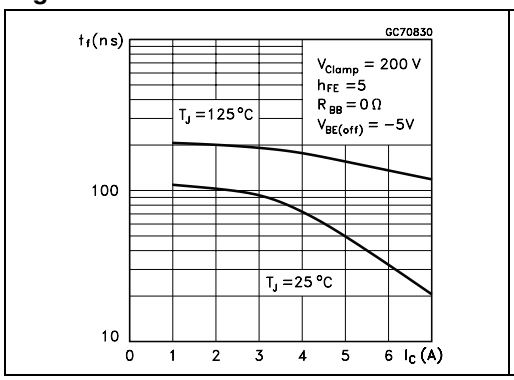


Figure 9. Inductive load storage time

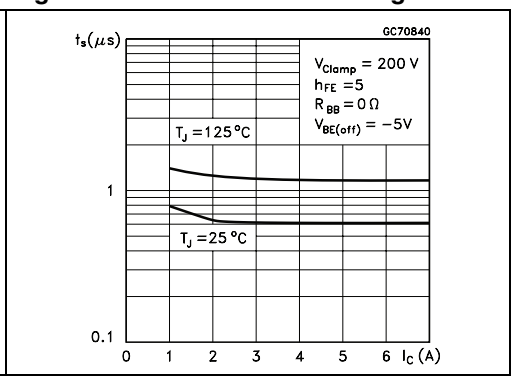


Figure 10. Resistive load fall time

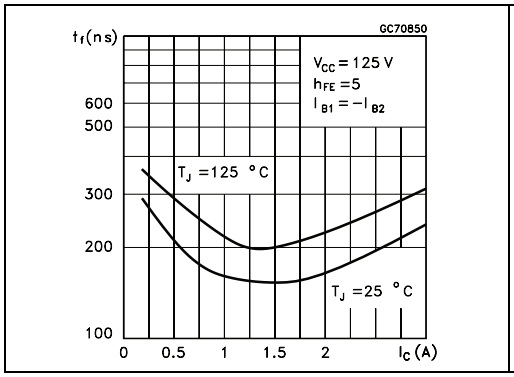


Figure 11. Resistive load storage time

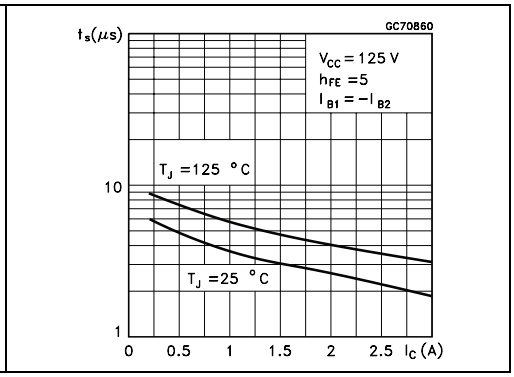
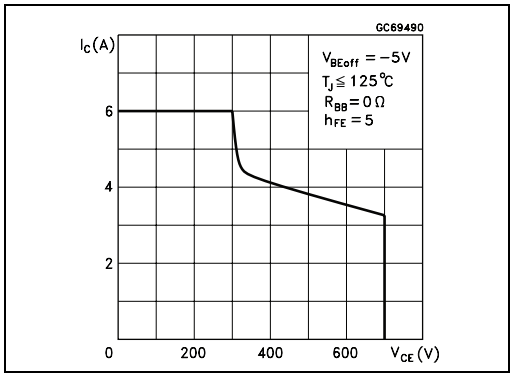


Figure 12. Reverse biased SOA



3 Package mechanical data

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.

Table 5. TO-220 type A mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
∅P	3.75		3.85
Q	2.65		2.95

Figure 13. TO-220 type A drawing

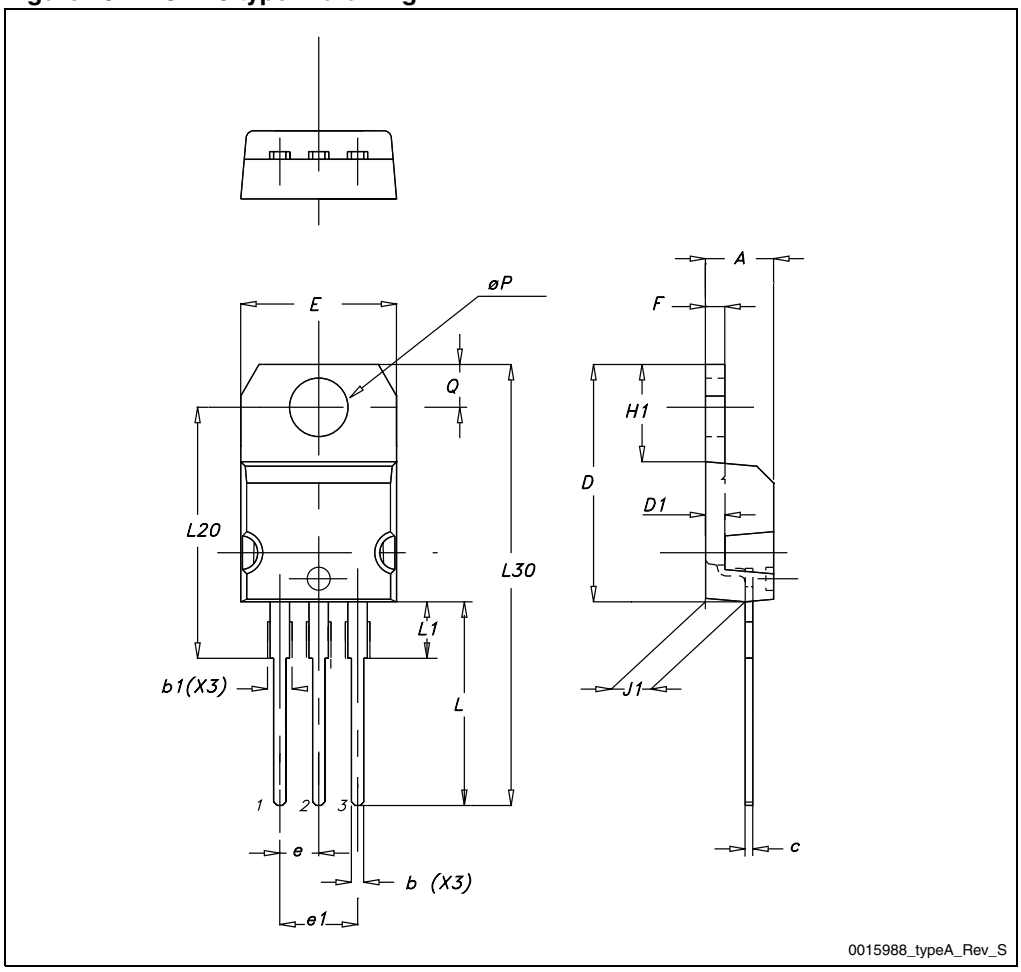
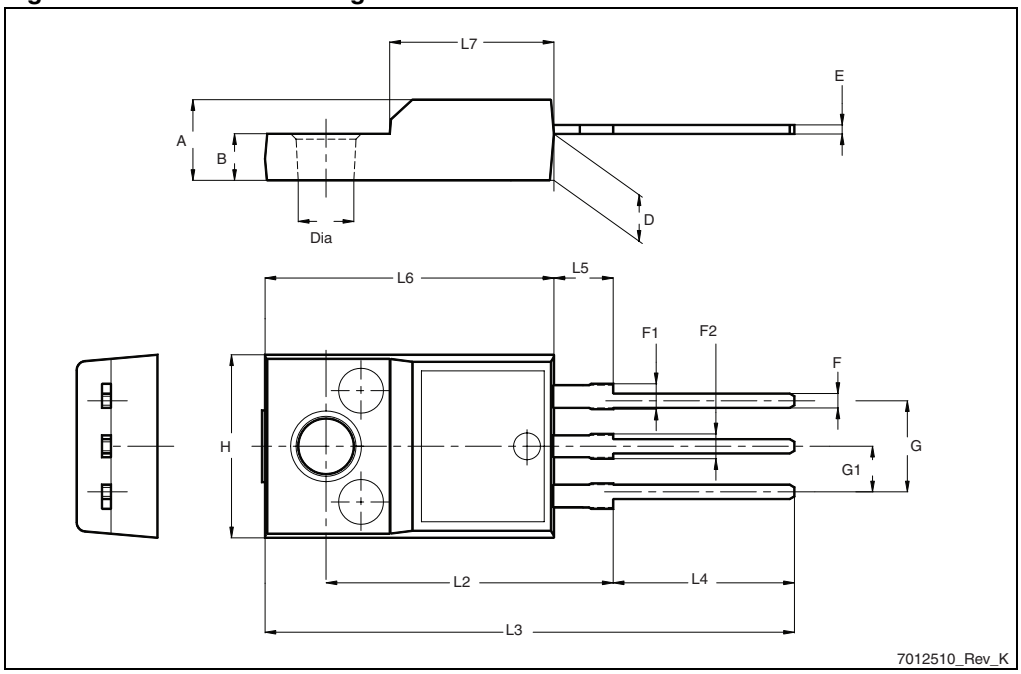


Table 6. TO-220FP mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.70
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2

Figure 14. TO-220FP drawing



4 Revision history

Table 7. Document revision history

Date	Revision	Changes
27-Jun-2011	1	First release

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