STT13005FP

High voltage fast-switching NPN power transistor

Features

- High voltage capability
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed

Applications

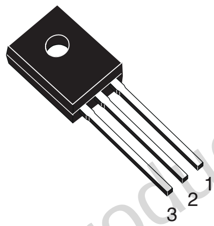
- Electronic ballast for fluorescent lighting
- Flyback and forward single transistor low power converters

Description

The device 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 designed for use in lighting applications and low cost switch-mode power supplies.



SOT-32FP

Figure 1. Internal schematic diagram

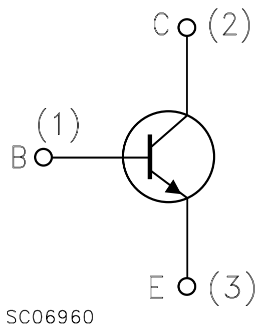


Table 1. Device summary

Order code	Marking	Package	Packaging
STT13005FP	T13005FP	SOT-32FP	Bag

1 Electrical ratings

Table 2. Absolute maximum ratings

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)	9	V
I_C	Collector current	2	A
I_{CM}	Collector peak current (t_P < 5 ms)	4	A
I_B	Base current	1	A
I_{BM}	Base peak current (t_P < 5 ms)	2	A
P_{tot}	Total dissipation at T_c = 25 °C	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
R_{thJC}	Thermal resistance junction-case	max	4.2	°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_{EBO}	Emitter-base voltage (I_C = 0)	I_E = 10 mA	9			V
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C = 10 mA	400			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 0.5 A I_B = 125 mA I_C = 0.8 A I_B = 0.2 A I_C = 1.6 A I_B = 0.4 A			0.5 1 1.5	V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 0.5 A I_B = 125 mA I_C = 0.8 A I_B = 0.2 A I_C = 1.6 A I_B = 0.4 A			1 1.3 1.5	V V V
h_{FE} (1)	DC current gain	I_C = 0.5 A V_{CE} = 5 V I_C = 2 A V_{CE} = 5 V	10 8		50	
t_r t_s t_f	Resistive load Rise time Storage time Fall time	I_C = 1 A V_{CC} = 125 V I_{B1} = $-I_{B2}$ = 0.2 A		0.4 3.2 0.25	0.7 4.5 0.4	µs µs µs
t_s t_f	Inductive load Storage time Fall time	I_C = 1 A I_{B1} = 0.2 A $V_{BE(off)}$ = -5 V L = 50 mH V_{Clamp} = 300 V		0.8 0.16		µs µs

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

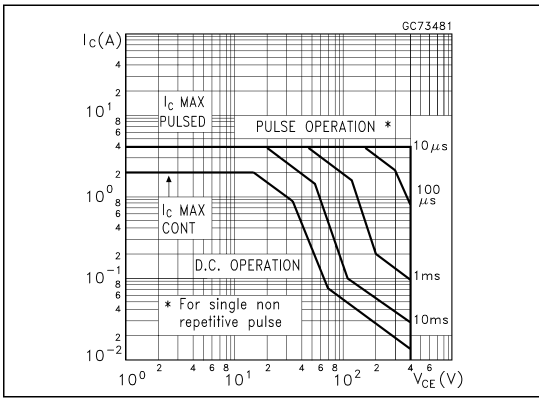


Figure 3. Derating curve

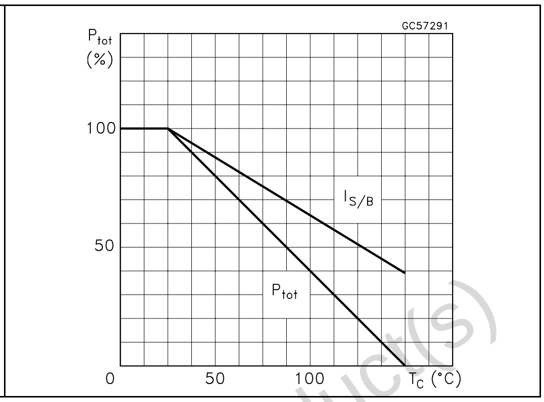


Figure 4. DC current gain (V_{CE} = 1 V)

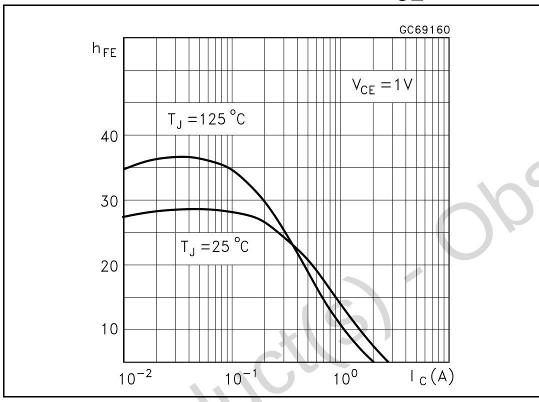


Figure 5. DC current gain (V_{CE} = 5 V)

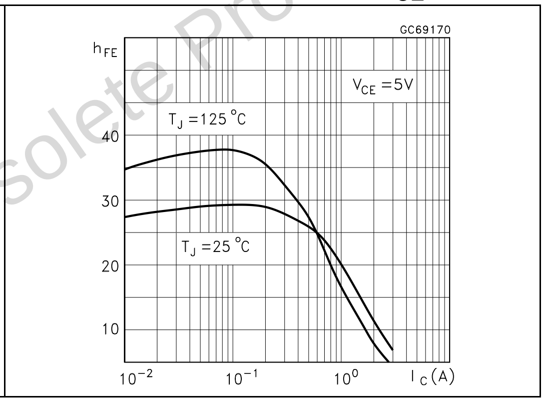


Figure 6. Collector-emitter saturation voltage

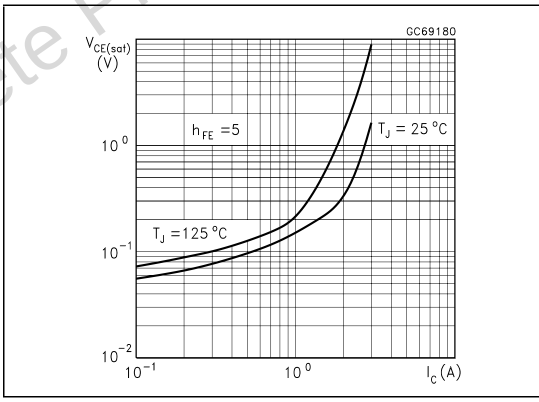


Figure 7. Base-emitter saturation voltage

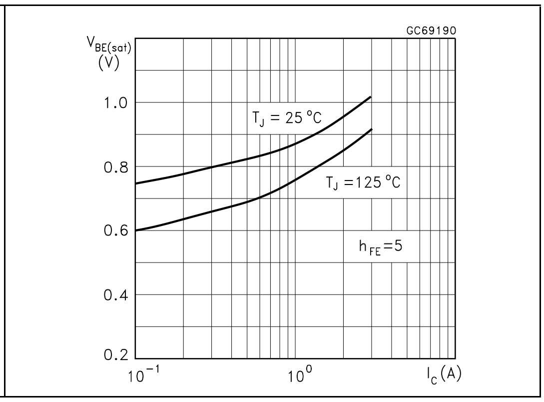


Figure 8. Inductive load fall time

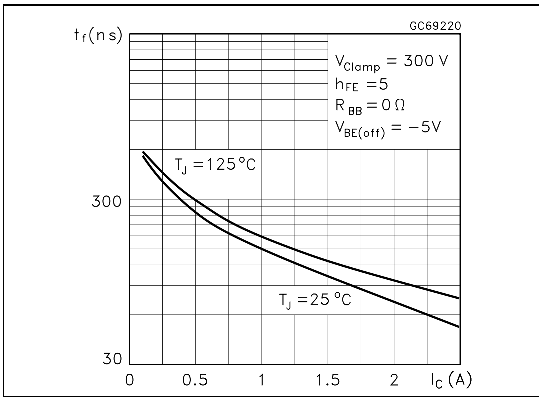


Figure 9. Inductive load storage time

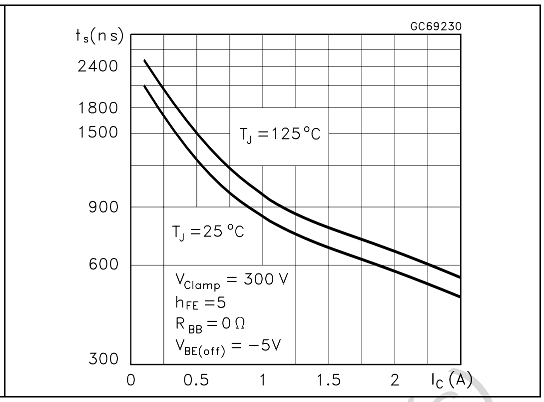


Figure 10. Resistive load fall time

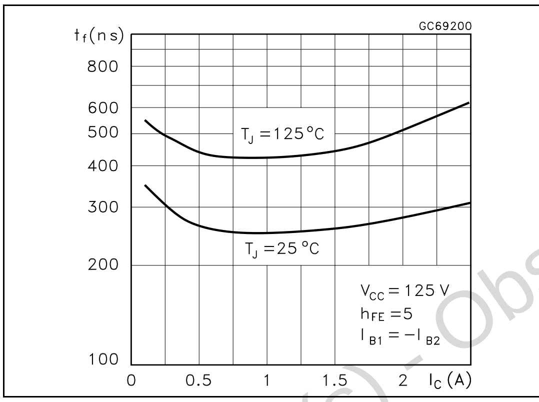


Figure 11. Resistive load storage time

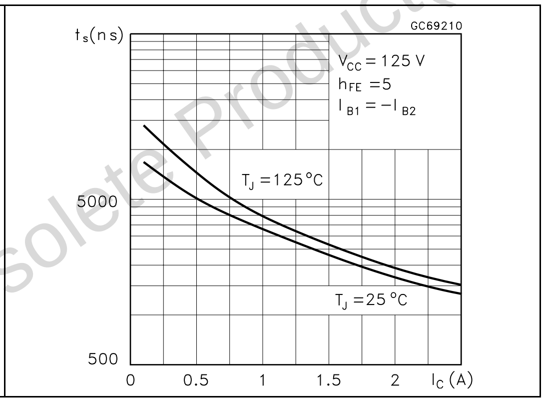
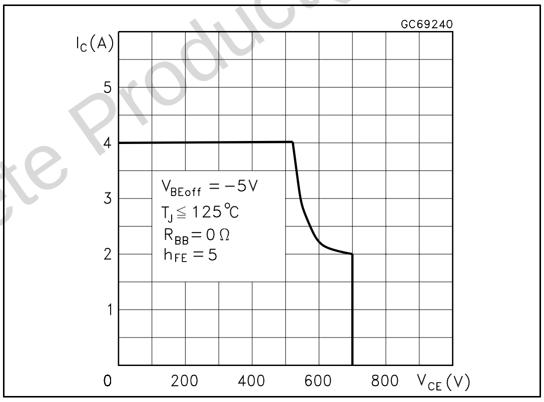
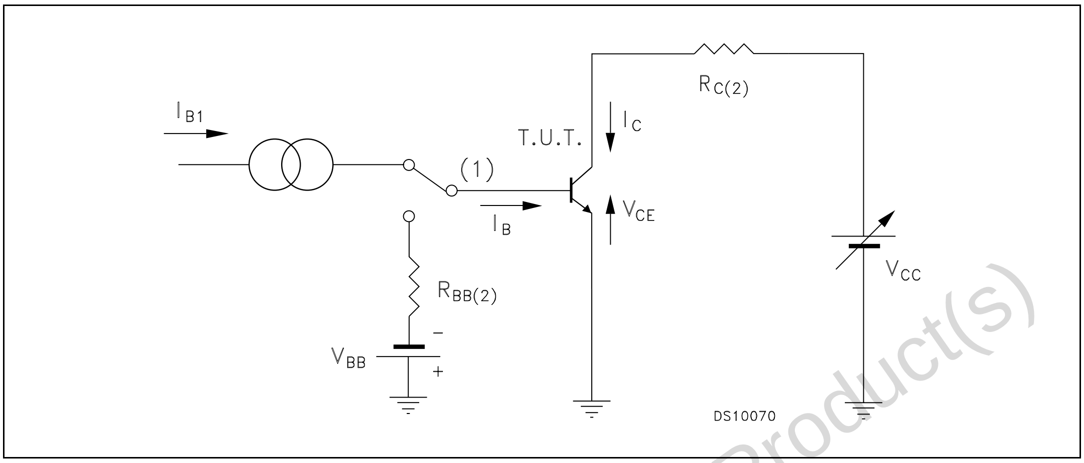


Figure 12. Reverse biased SOA



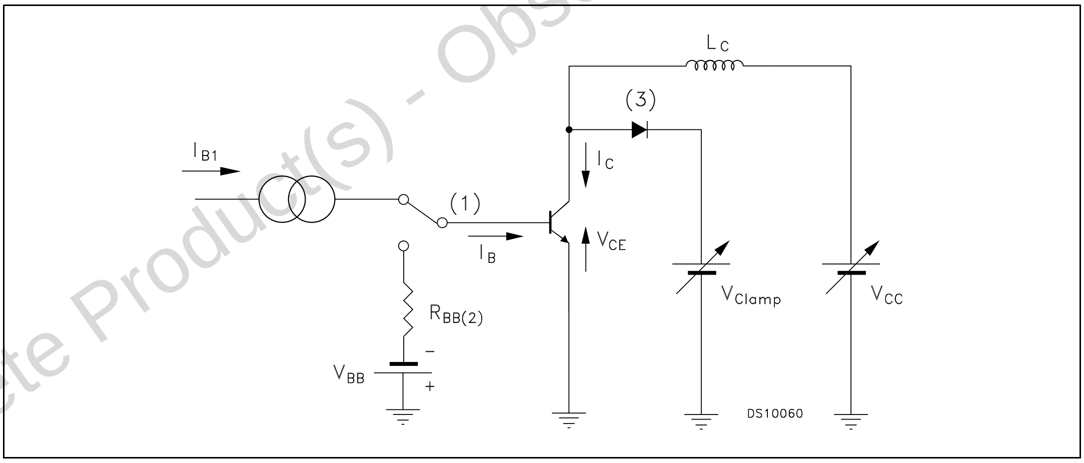
2.2 Test circuits

Figure 13. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

Figure 14. Inductive load switching test circuit



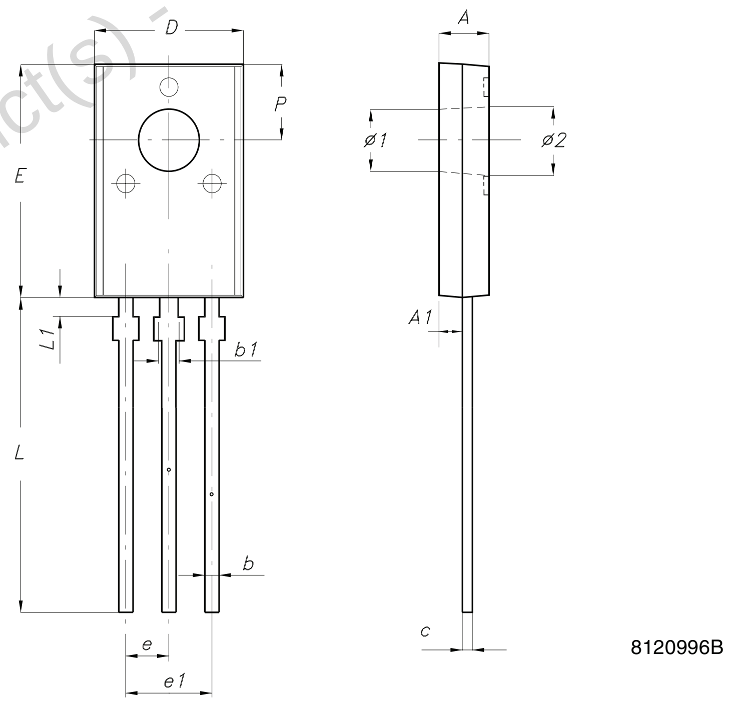
1. Fast electronic switch
2. Non-inductive resistor
3. Fast recovery rectifier

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.

SOT-32FP mechanical data

DIM.	mm.		
	MIN.	TYP	MAX.
A	3.00		3.40
A1	1.80		2.20
b	0.66		0.86
b1	1.17		1.37
c	0.45		0.60
D	7.80		8.20
E	10.80		11.20
e		2.28	
e1	4.46		4.66
L	15.30		15.70
L1	1.30		1.50
P	4.04		4.24
ø1	2.90		3.10
ø2	3.10		3.30



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
06-May-2009	1	Initial release
10-Sep-2009	2	Document status promoted from preliminary data to datasheet