

# 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**

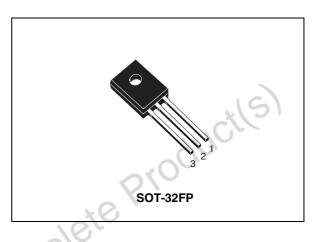
- Electronic ballast for fluorescent lighting
- Flyback and forward single transistor low power converters

### Description

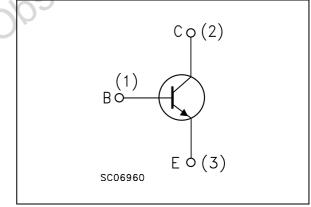
The device is manufactured using high voltage multi-epitaxial planar technology for high switching speeds and medium voltage capability.

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.







#### Table 1. Device summary

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

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#### **Electrical ratings** 1

Table 2.	Absolute maximum ratings
	Absolute maximum ratings

Symbol	Pa	Value	Unit	
V <sub>CES</sub>	Collector-emitter voltage (	V <sub>BE</sub> = 0)	700	V
V <sub>CEO</sub>	Collector-emitter voltage (	l <sub>B</sub> = 0)	400	V
V <sub>EBO</sub>	Emitter-base voltage (I <sub>C</sub> =	0)	9	V
۱ <sub>C</sub>	Collector current		2	А
I <sub>CM</sub>	Collector peak current (t <sub>P</sub>	< 5 ms)	4	А
Ι <sub>Β</sub>	Base current 1			
I <sub>BM</sub>	Base peak current (t <sub>P</sub> < 5 ms) 2			
P <sub>tot</sub>	Total dissipation at $T_c = 25 \text{ °C}$ 30			W
T <sub>stg</sub>	Storage temperature -65 to 150			°C
ТJ	Max. operating junction te	mperature	150	°C
Table 3.	Thermal data	colete		
Symbo	Der	amotar	Value	Llmit

#### Table 3. Thermal data

	Symbol	Symbol Parameter		Value	Unit
	R <sub>thJC</sub>	Thermal resistance junction-case	max	4.2	°C/W
obsole	tepr	oduct(S)			



# 2 Electrical characteristics

 $T_{case} = 25 \ ^{\circ}C$  unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
Symbol	i di dificter			Typ.	Μαλ.	Unit
I <sub>CES</sub>	Collector cut-off current	V <sub>CE</sub> = 700 V			100	μA
-CES	(V <sub>BE</sub> = 0)	$V_{CE} = 700 V T_{C} = 125 °C$			500	μA
I <sub>CEO</sub>	Collector cut-off current $(I_B = 0)$	V <sub>CE</sub> = 400 V			250	μA
V <sub>EBO</sub>	Emitter-base voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	9		100	v
V <sub>CEO(sus)</sub> <sup>(1)</sup>	Collector-emitter sustaining voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 10 mA	400	90,	5	V
	Collector emitter	$I_{\rm C} = 0.5  {\rm A}$ $I_{\rm B} = 125  {\rm mA}$	$\sim$		0.5	V
V <sub>CE(sat)</sub> <sup>(1)</sup>	Collector-emitter saturation voltage	$I_{\rm C} = 0.8  {\rm A}$ $I_{\rm B} = 0.2  {\rm A}$			1	V
		$I_{\rm C} = 1.6  {\rm A}$ $I_{\rm B} = 0.4  {\rm A}$			1.5	V
	<b>D</b>	I <sub>C</sub> = 0.5 A I <sub>B</sub> = 125 mA			1	V
V <sub>BE(sat)</sub> <sup>(1)</sup>	Base-emitter saturation voltage	$I_{\rm C} = 0.8  {\rm A}$ $I_{\rm B} = 0.2  {\rm A}$			1.3	V
	vollage	$I_{\rm C} = 1.6  {\rm A} \qquad I_{\rm B} = 0.4  {\rm A}$			1.5	V
ь (1)	DC current gain	$I_{\rm C} = 0.5  {\rm A}  {\rm V}_{\rm CE} = 5  {\rm V}$	10		50	
$h_{FE}^{(1)}$		$I_{\rm C} = 2  {\rm A}$ $V_{\rm CE} = 5  {\rm V}$	8			
	Resistive load					
t <sub>r</sub>	Rise time	$I_{\rm C} = 1  {\rm A}$ $V_{\rm CC} = 125  {\rm V}$		0.4	0.7	μs
t <sub>s</sub>	Storage time	$I_{B1} = -I_{B2} = 0.2 \text{ A}$		3.2	4.5	μs
t <sub>f</sub>	Fall time			0.25	0.4	μs
0	Inductive load	$I_{\rm C} = 1  {\rm A}$ $I_{\rm B1} = 0.2  {\rm A}$				
t <sub>s</sub>	Storage time	$V_{BE(off)} = -5 V$ L = 50 mH		0.8		μs
t <sub>f</sub>	Fall time	$V_{Clamp} = 300 V$		0.16		μs

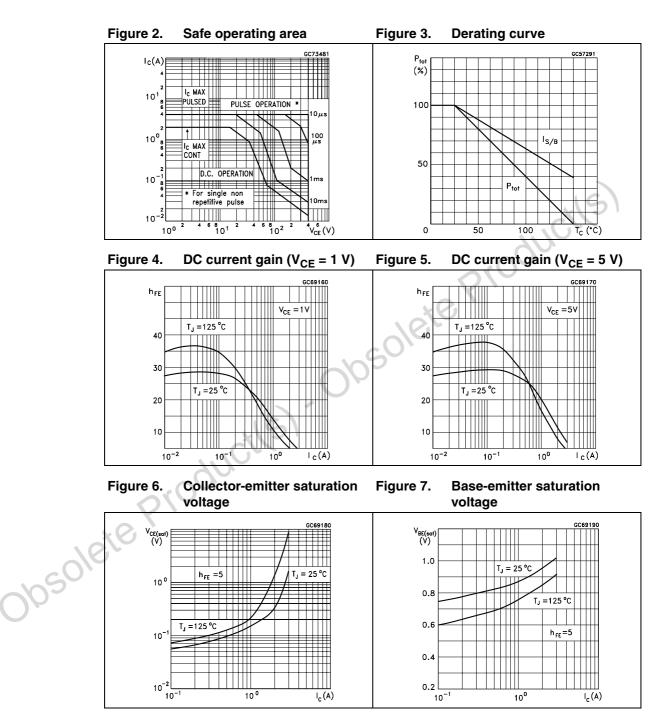
 Table 4.
 Electrical characteristics

1. Pulse test: pulse duration  $\leq$  300 µs, duty cycle  $\leq$  2 %



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### 2.1 Electrical characteristics (curves)





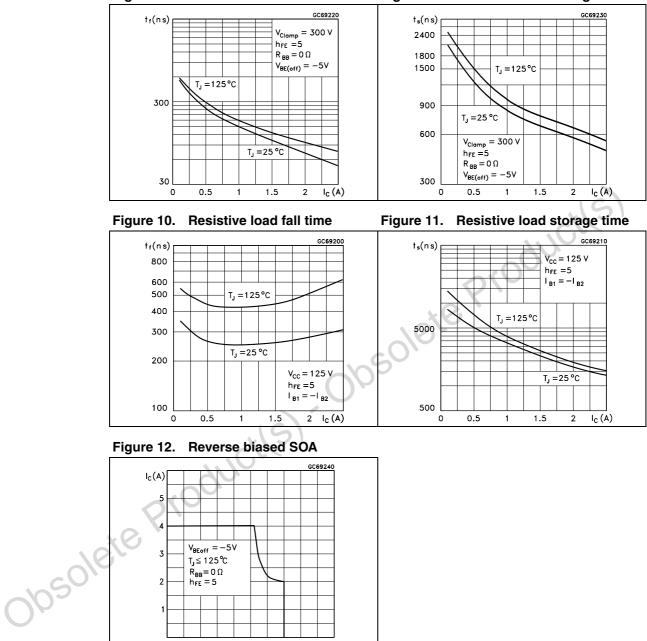


Figure 8. Inductive load fall time Figure 9. Inductive load storage time



2

0

 $h_{FE} = 5$ 

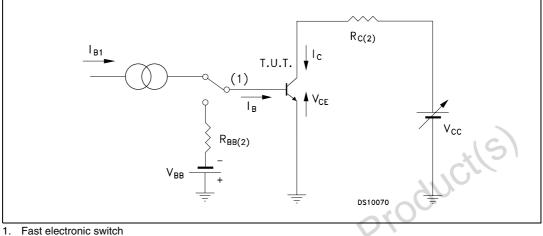
200

400

600

800 V<sub>CE</sub>(V)

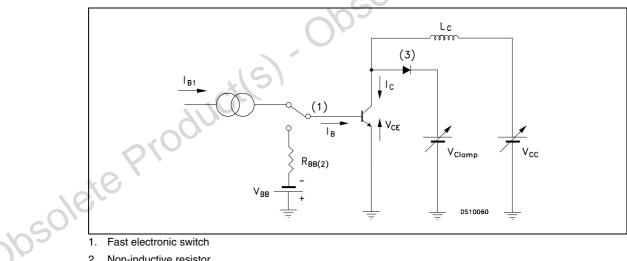
#### 2.2 **Test circuits**



#### Figure 13. Resistive load switching test circuit

2. Non-inductive resistor

#### Figure 14. Inductive load switching test circuit



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



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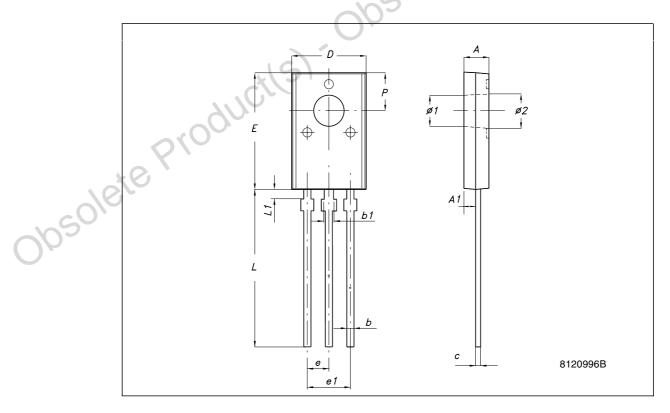
## 3 Package mechanical data

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



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	SOT-32FP mechanical data			
DIM.		mm.		
	MIN.	ТҮР	MAX.	
A	3.00		3.40	
A1	1.80		2.20	
b	0.66		0.86	
b1	1.17		1.37	
С	0.45		0.60	
D	7.80		8.20	
E	10.80		11.20	
е		2.28		
e1	4.46		4.66	
L	15.30		15.70	
L1	1.30	2	1.50	
Р	4.04	× 0,	4.24	
ø1	2.90	101	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



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