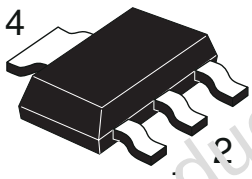
STN690A

High performance low voltage NPN transistor

Features

- Very low collector to emitter saturation voltage
- DC current gain, h_{FE} > 100
- 3 A continuous collector current
- 40 V breakdown voltage $V_{(BR)CER}$
- SOT-223 plastic package for surface mounting circuits in tape and reel packaging



SOT-223

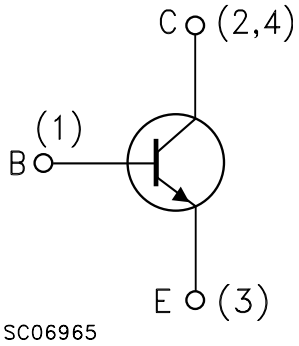
Applications

- Power management in portable equipment
- Voltage regulation in bias supply circuits
- Switching regulator in battery charger applications
- Heavy load driver

Description

The device in manufactured in low voltage NPN planar technology by using a "Base Island" layout. The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage.

Figure 1. Internal schematic diagram



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Table 1. Device summary

Order code	Marking	Package	Packaging
STN690A	N690A	SOT-223	Tape and reel

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage (I_E = 0)	40	V
V_{CER}	Collector-emitter voltage (R_{BE} = 47 Ω)	40	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	30	V
V_{EBO}	Emitter-base voltage (I_C = 0)	5	V
I_C	Collector current	3	A
I_{CM}	Collector peak current (t_P < 5 ms)	6	A
P_{tot}	Total dissipation at T_{amb} = 25 °C	1.6	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
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient (1)	max	78	°C/W

1. Device mounted on PCB area of 1 cm^2.

Obsolete Product(s) - Obsolete Product(s)

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current (I_E = 0)	V_{CB} = 30 V V_{CB} = 30 V; T_C = 100 °C			10 100	µA µA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 4 V			10	µA
$V_{(BR)CEO}$ (1)	Collector-emitter breakdown voltage (I_B = 0)	I_C = 10 mA	30			V
$V_{(BR)CER}$ (1)	Collector-emitter breakdown voltage (R_{BE} = 47 Ω)	I_C = 10 mA	40			V
$V_{(BR)CBO}$	Collector-base breakdown voltage (I_E = 0)	I_C = 100 µA	40			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 100 µA	5			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 0.5 A I_B = 5 mA I_C = 1.2 A I_B = 20 mA I_C = 2 A I_B = 20 mA I_C = 3 A I_B = 100 mA I_C = 3 A I_B = 100 mA T_C = 100 °C		0.08 0.1 0.175 0.2 0.3	0.15 0.22 0.35 0.4 	V V V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 1 A I_B = 10 mA		0.8	1	V
$V_{BE(on)}$ (1)	Base-emitter on voltage	I_C = 1 A V_{CE} = 2 V		0.8	1	V
h_{FE} (1)	DC current gain	I_C = 10 mA V_{CE} = 2 V I_C = 500 mA V_{CE} = 2 V I_C = 1 A V_{CE} = 2 V I_C = 2 A V_{CE} = 1 V I_C = 3 A V_{CE} = 1 V	100 100 100 100 90	200 200 160 130	400 400 	

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Table 4. Electrical characteristics (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
f_t	Transition frequency	I_C = 50 mA V_{CE} = 5 V f = 50 MHz		100		MHz
	Resistive load					
t_d	Delay time	I_C = 3 A V_{CC} = 20 V		50		ns
t_r	Rise time	I_{B1} = -I_{B2} = 60 mA		120		ns
t_s	Storage time	see *Figure 8*		465		ns
t_f	Fall time			80		ns

1. Pulse duration = 300 µs, duty cycle ≤1.5%

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

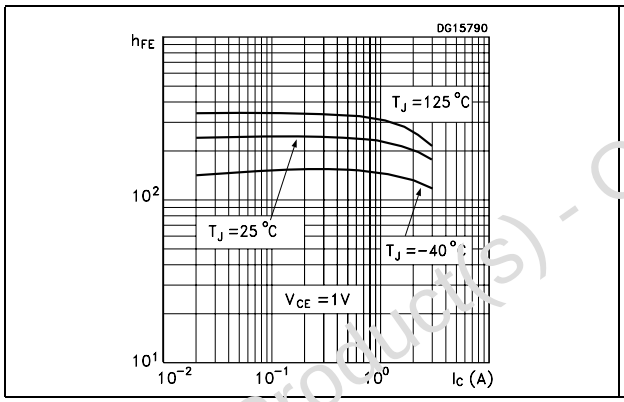


Figure 3. DC current gain

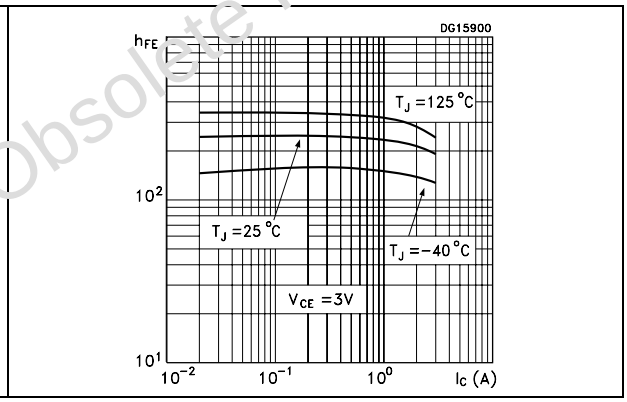


Figure 4. Collector-emitter saturation voltage

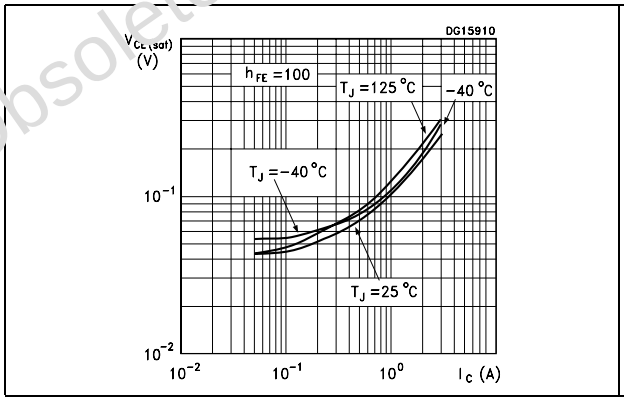
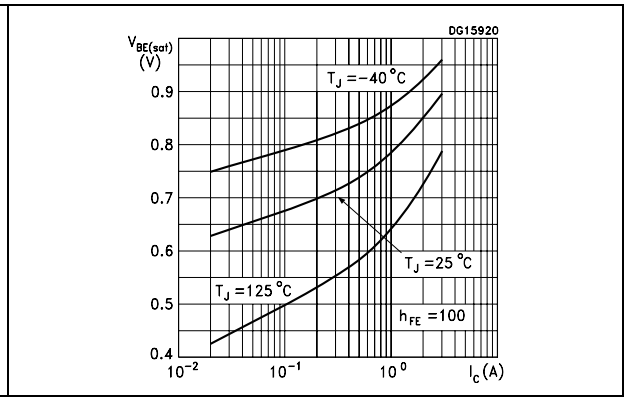


Figure 5. Base-emitter saturation voltage



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Figure 6. Switching time resistive load

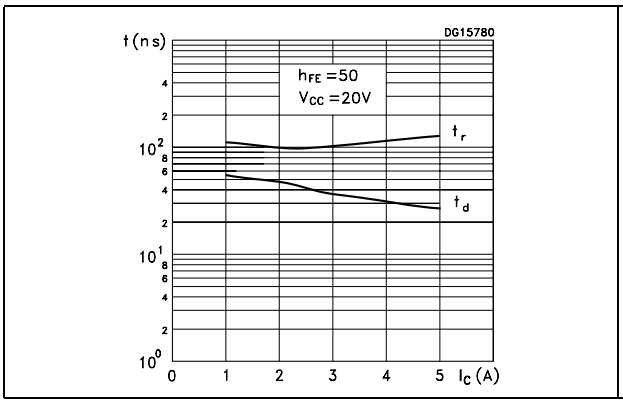
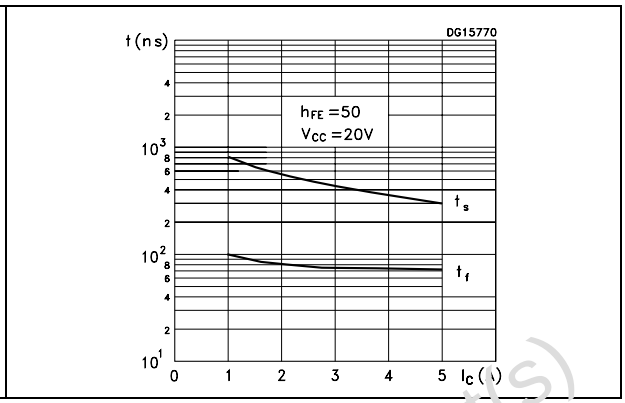
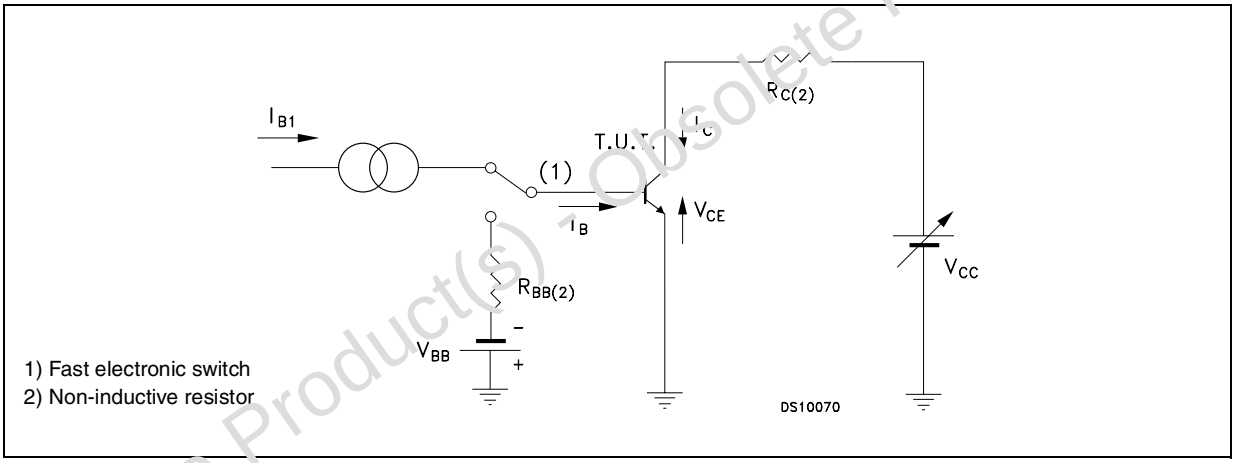


Figure 7. Switching time resistive load



2.2 Test circuit

Figure 8. Resistive load switching test circuit



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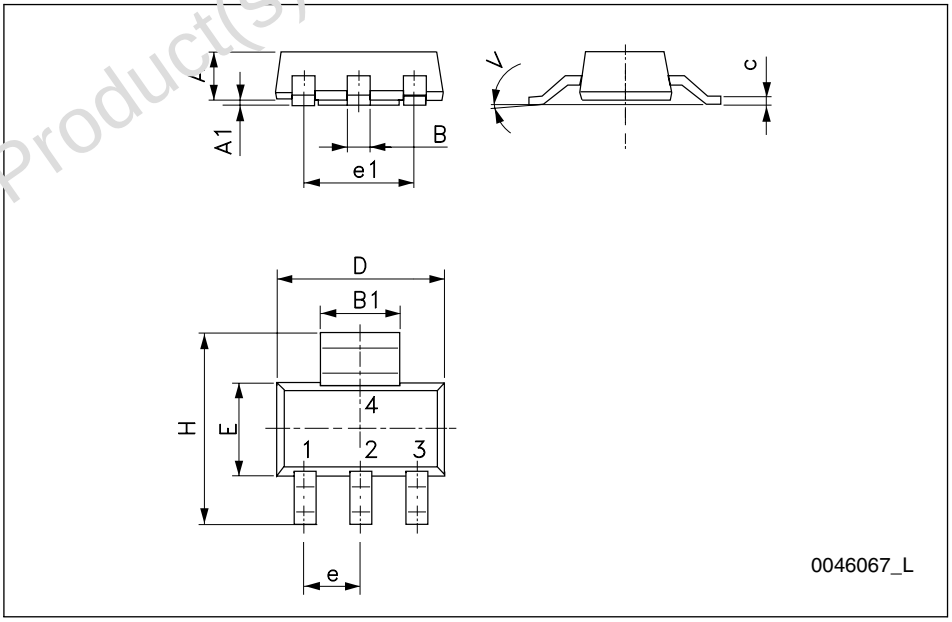
3 Package mechanical data

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 products status are available at: www.st.com. ECOPACK is an ST trademark.

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SOT-223 mechanical data

DIM.	mm.		
	min.	typ	max.
A			1.80
A1	0.02		0.1
B	0.60	0.70	0.85
B1	2.90	3.00	3.15
c	0.24	0.26	0.35
D	6.30	6.50	6.70
e		2.30	
e1		4.60	
E	3.30	3.50	3.70
H	6.70	7.00	7.30
V			10 °



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4 Revision history

Table 5. Document revision history

Date	Revision	Changes
20-Oct-2006	1	Initial release.
10-Feb-2009	2	Updated SOT-223 mechanical data.

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