STX790A

Medium current, high performance, low voltage PNP transistor

Features

- Very low collector to emitter saturation voltage
- DC current gain, h_{FE} > 100
- 3 A continuous collector current
- 40 V breakdown voltage $V_{(BR)CER}$

Applications

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

Description

The devices are manufactured in low voltage PNP planar technology by using a “Base Island” layout. The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage. The STX790AG-AP is supplied using halogen-free molding compound.

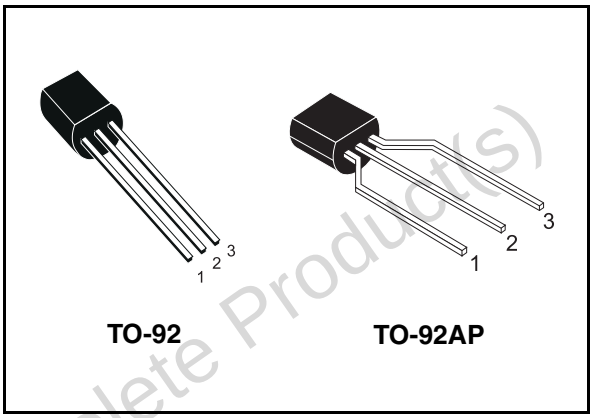
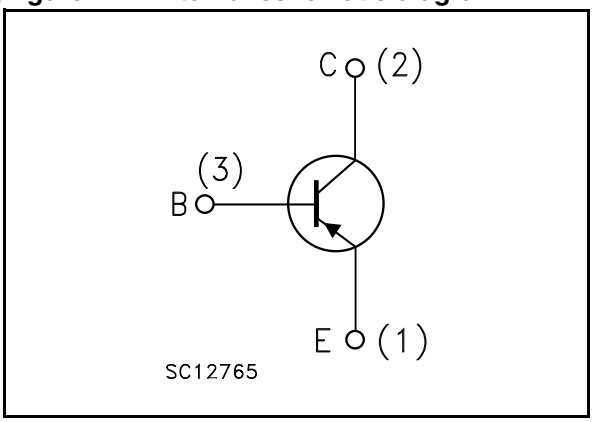


Figure 1. Internal schematic diagram



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Table 1. Device summary

Order codes	Marking	Packages	Packaging
STX790A	X790A	TO-92	Bulk
STX790A-AP	X790A	TO-92 AP	Ammopack
STX790AG-AP	X790AG	TO-92 AP	Ammopack

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	0.9	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
$R_{thj\text{-}case}$	Thermal resistance junction-case	max	44.6	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient	max	139	°C/W

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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			-0.15 -0.25 -0.5 -0.7 -0.9	V V V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = -1A I_B = -10mA		-0.8	-1	V
$V_{BE(on)}$ (1)	Base-emitter on voltage	I_C = -1A V_{CE} = -2V		-0.8	-1	V
h_{FE} (1)	DC current gain	I_C = -10mA V_{CE} = -2V I_C = -500mA V_{CE} = -2V I_C = -1A V_{CE} = -2V I_C = -2A V_{CE} = -1V I_C = -3A V_{CE} = -1V	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		180	220	ns
t_r	Rise time	I_{B1} = -I_{B2} = -60 mA		160	210	ns
t_s	Storage time	see *Figure 8*		250	300	ns
t_f	Fall time			80	100	ns

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

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

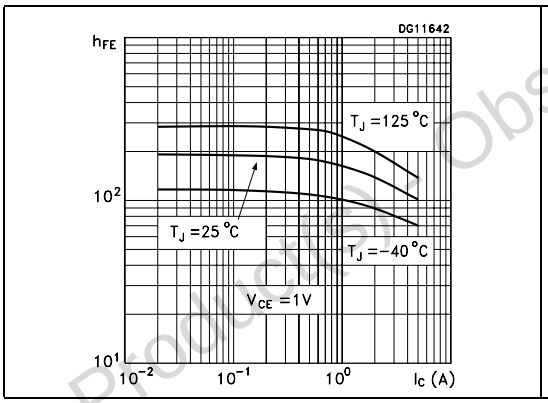


Figure 3. DC current gain

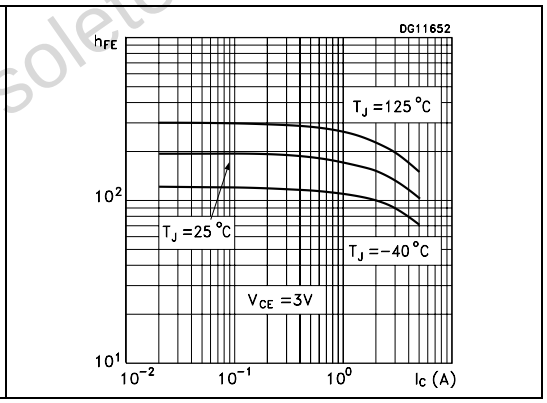


Figure 4. Collector-emitter saturation voltage

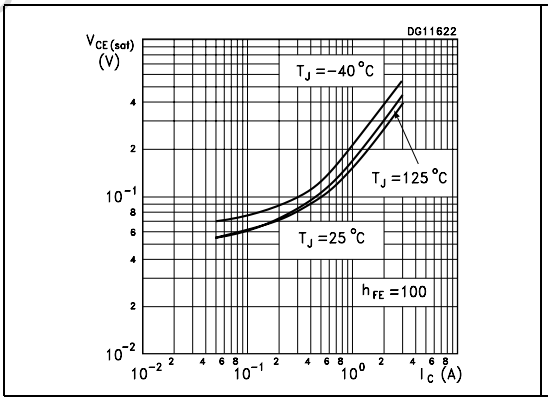
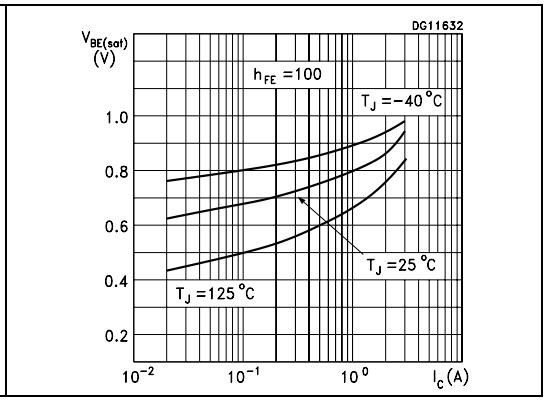
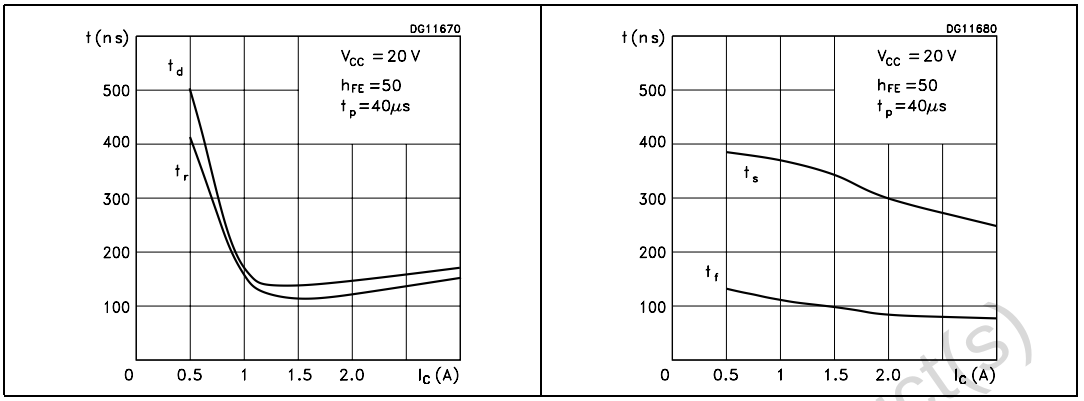


Figure 5. Base-emitter saturation voltage



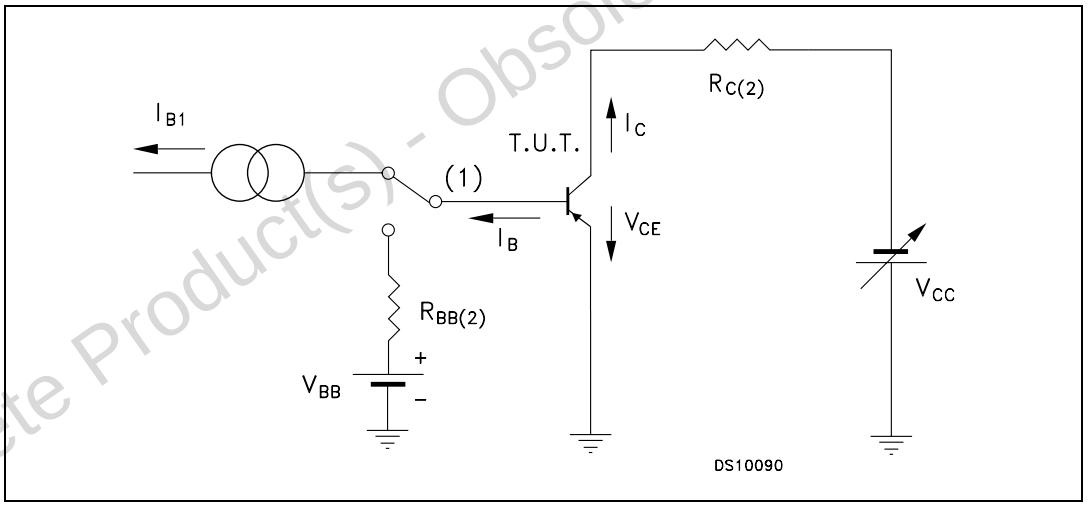
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Figure 6. Switching time resistive load **Figure 7. Switching time resistive load**



2.2 Test circuit

Figure 8. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

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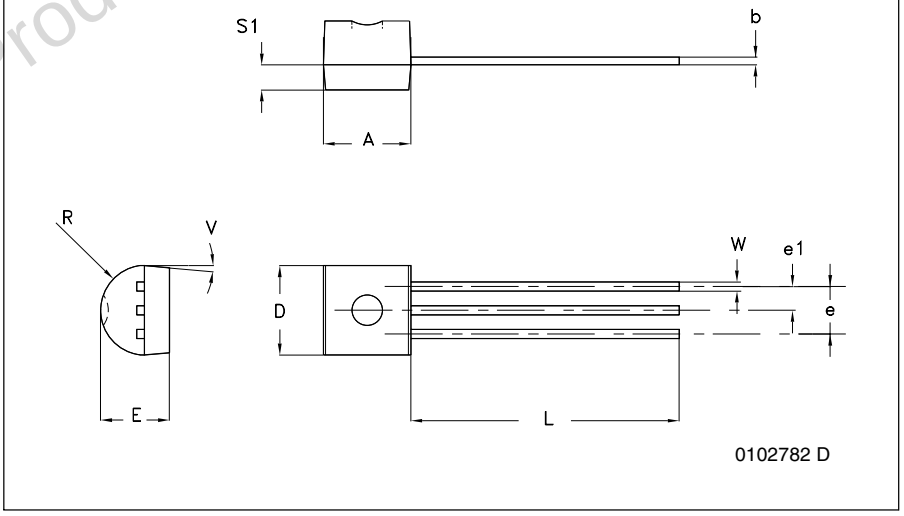
3 Package mechanical data

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 product status are available at: *www.st.com*.
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TO-92 bulk shipment mechanical data

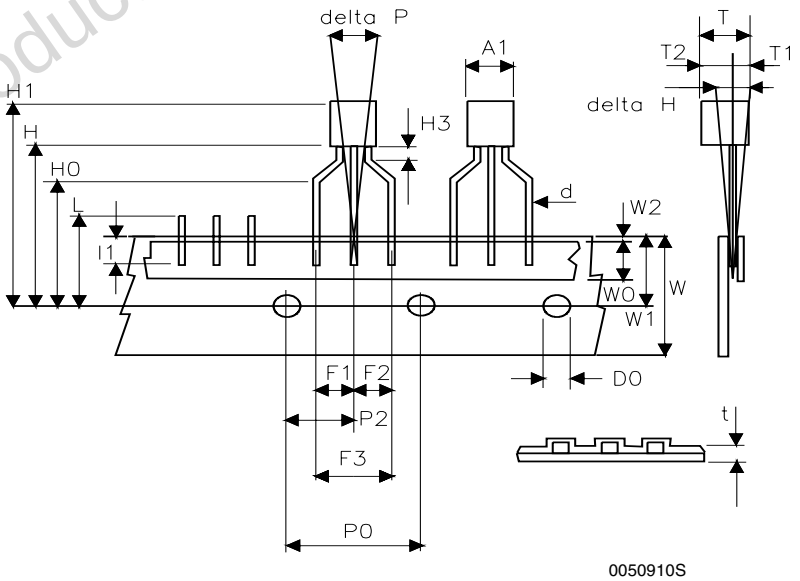
DIM.	mm.		
	MIN.	TYP	MAX.
A	4.32		4.95
b	0.36		0.51
D	4.45		4.95
E	3.30		3.94
e	2.41		2.67
e1	1.14		1.40
L	12.70		15.49
R	2.16		2.41
S1	0.92		1.52
W	0.41		0.56
V		5°	



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TO-92 ammopack shipment (suffix"-AP") mechanical data

Dim.	mm		
	Min	Typ	Max
A1			4.80
T			3.80
T1			1.60
T2			2.30
d			0.48
P0	12.50	12.70	12.90
P2	5.65	6.35	7.05
F1,F2	2.44	2.54	2.94
F3	4.98	5.08	5.48
delta H	-2.00		2.00
W	17.50	18.00	19.00
W0	5.70	6.00	6.30
W1	8.50	9.00	9.25
W2			0.50
H	18.50		20.50
H3	0.5	1	1.5
H0	15.50	16.00	16.50
H1			25.00
D0	3.80	4.00	4.20
t			0.90
L			11.00
I1	3.00		
delta P	-1.00		1.00



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4 Revision history

Table 5. Document revision history

Date	Revision	Changes
24-Mar-2003	1	Initial release.
29-Mar-2006	2	New template.
25-Jun-2008	3	Updated TO-92 mechanical data.
28-Apr-2009	4	Added new order code STX790AG-AP *Table 1 on page 1*.

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