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 device in 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.

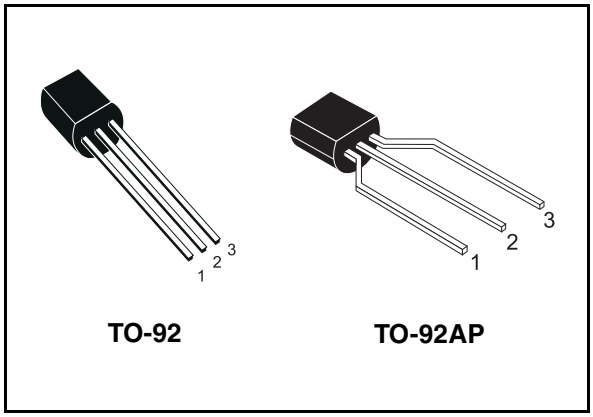


Figure 1. Internal schematic diagram

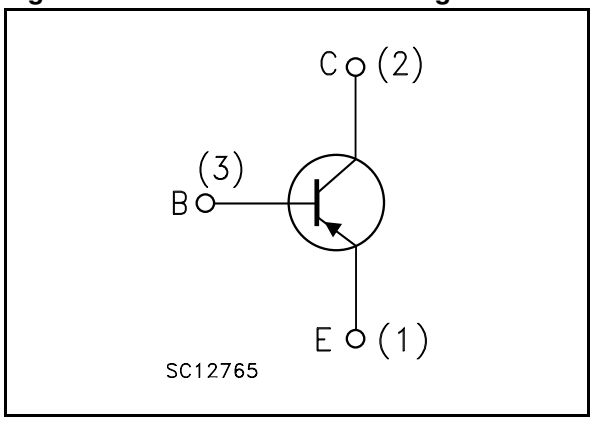


Table 1. Device summary

Order code	Marking	Package	Packaging
STX790A	X790A	TO-92	Bulk
STX790A-AP	X790A	TO-92 AP	Ammopack

1 Electrical ratings

Table 2. Absolute maximum rating

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-amb	max	139	°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_{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_J = 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	

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

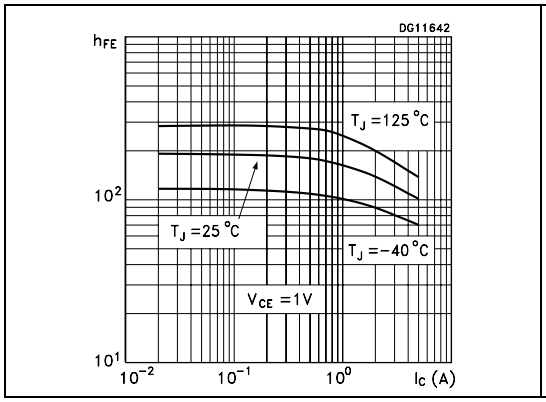


Figure 3. DC current gain

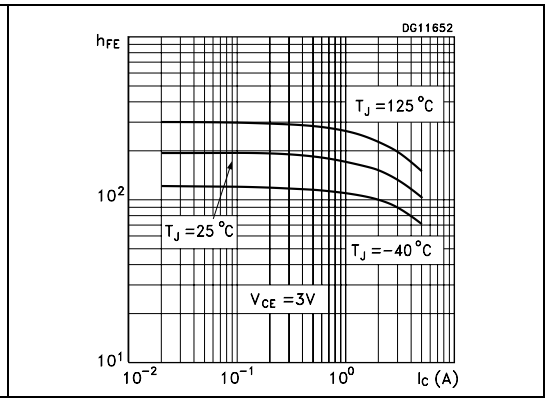


Figure 4. Collector-emitter saturation voltage

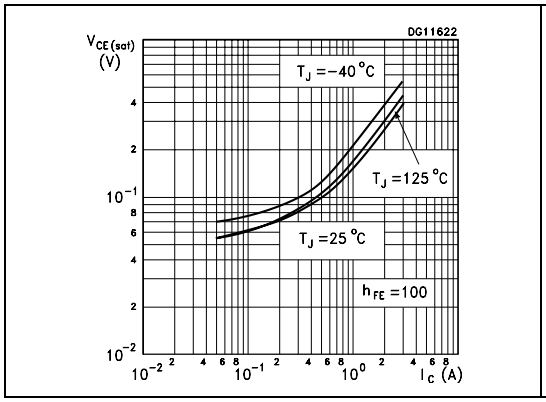


Figure 5. Base-emitter saturation voltage

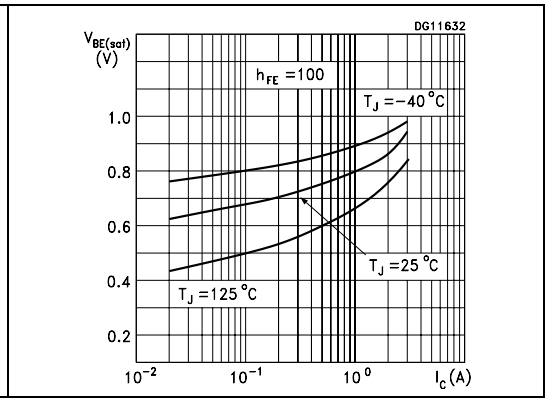


Figure 6. Switching time resistive load

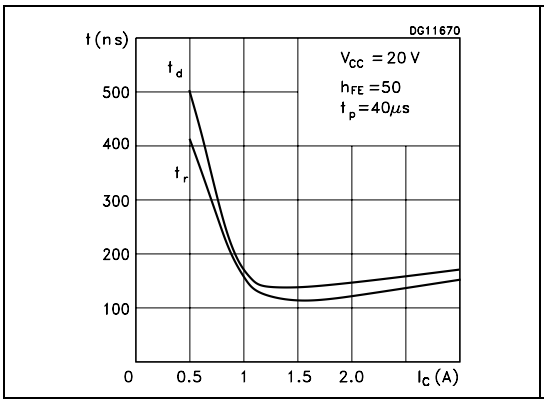
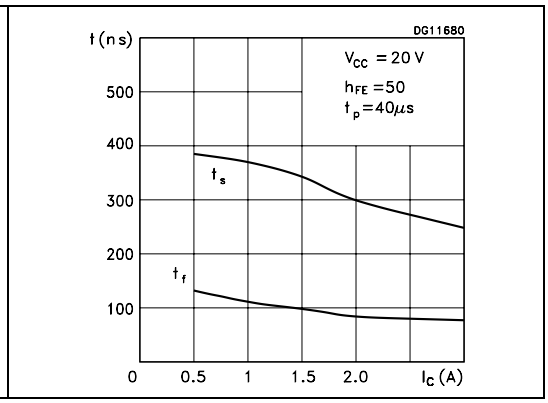
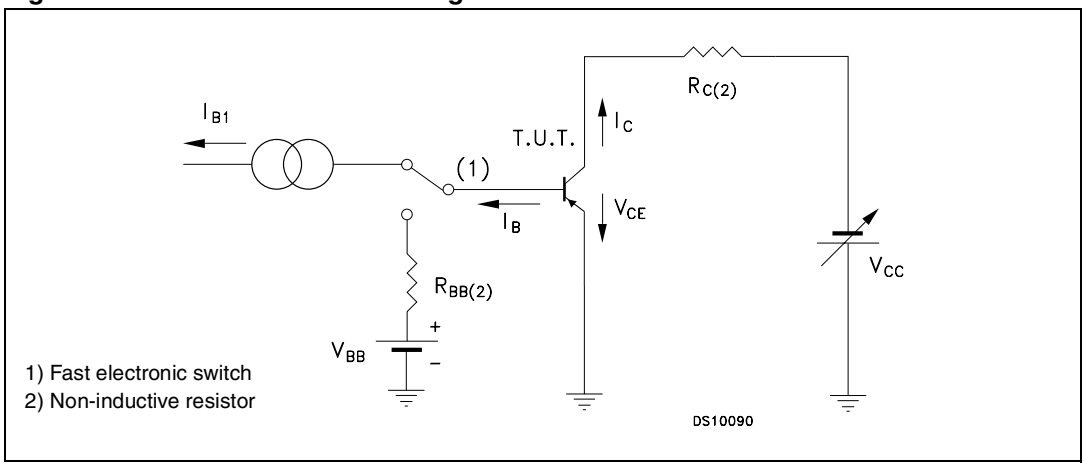


Figure 7. Switching time resistive load



2.2 Test circuit

Figure 8. Resistive load switching test circuit

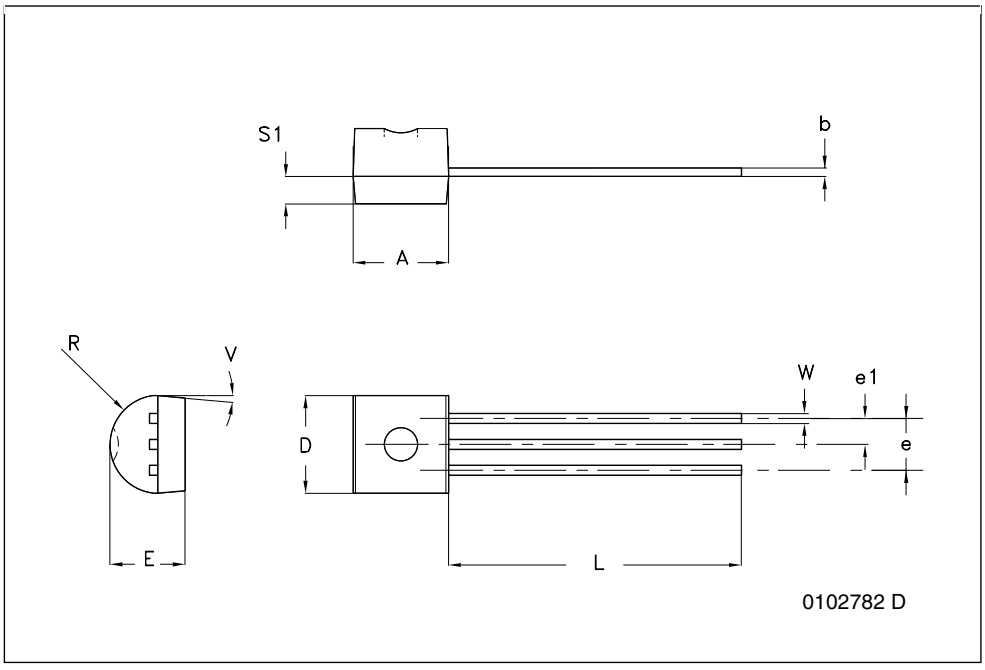


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

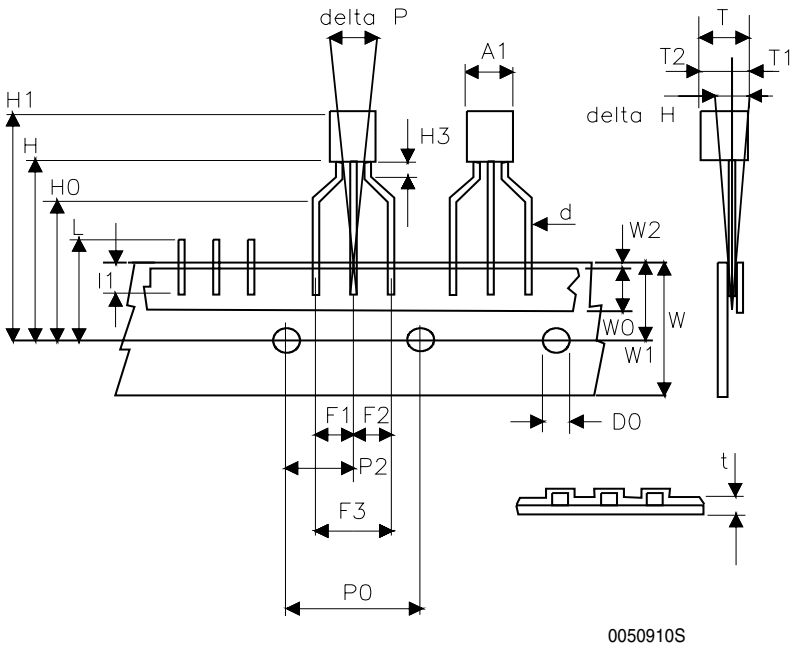
TO-92 bulk shipment mechanical data

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°	



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



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.

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