



STX790A

Medium Current, High Performance, Low Voltage PNP Transistor

General features

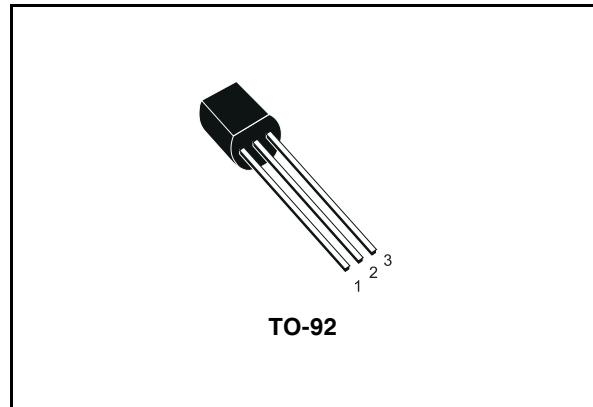
- Very low Collector to Emitter saturation voltage
- D.C. Current gain, $h_{FE} > 100$
- 3A continuous collector current
- 40V breakdown voltage ($V_{(BR)CER}$)
- In compliance with the 2002/93/EC European Directive

Description

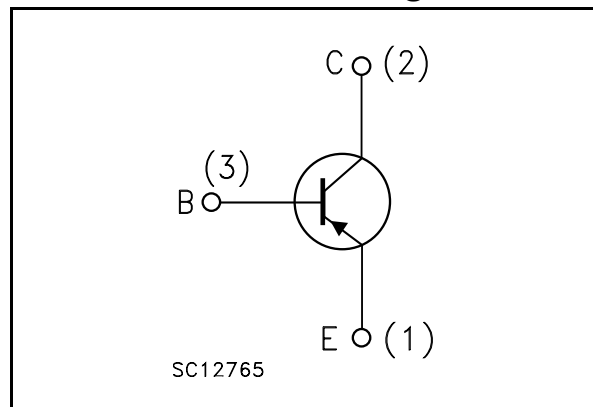
The device is manufactured in low voltage PNP Planar Technology by using a "Base Island" layout. The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage.

Applications

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



Internal schematic diagram



Order codes

Part Number	Marking	Package	Packing
STX790A	X790A	TO-92	Bulk
STX790A-AP	X790A	TO-92 AP	Ammopack

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1 Electrical ratings

Table 1. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage ($I_E = 0$)	-40	V
V_{CER}	Collector-emitter voltage ($R_{BE} = 47\Omega$)	-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 ($t_p < 5ms$)	-6	A
P_{tot}	Total dissipation at $T_C = 25^\circ C$	0.9	W
T_{stg}	Storage temperature	-65 to 150	$^\circ C$
T_J	Max. operating junction temperature	150	$^\circ C$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	44.6	$^\circ C/W$
$R_{thj-amb}$	Thermal resistance junction-amb max	139	$^\circ C/W$

2 Electrical characteristics

($T_{\text{case}} = 25^{\circ}\text{C}$ unless otherwise specified)

Table 3. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_{\text{E}} = 0$)	$V_{\text{CB}} = -30\text{V}$			-10	μA
		$V_{\text{CB}} = -30\text{V}; T_{\text{C}} = 100^{\circ}\text{C}$			100	μA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = -4\text{V}$			-10	μA
$V_{(\text{BR})\text{CEO}}^{(2)}$	Collector-emitter breakdown voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = -10\text{mA}$	-30			V
$V_{(\text{BR})\text{CER}}^{(2)}$	Collector-emitter breakdown voltage ($R_{\text{BE}} = 47\Omega$)	$I_{\text{C}} = -10\text{mA}$	-40			V
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ($I_{\text{E}} = 0$)	$I_{\text{C}} = -100\mu\text{A}$	-40			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ($I_{\text{C}} = 0$)	$I_{\text{E}} = -100\mu\text{A}$	-5			V
$V_{\text{CE}(\text{sat})}^{(2)}$	Collector-emitter saturation voltage	$I_{\text{C}} = -0.5\text{A}$ $I_{\text{B}} = -5\text{mA}$			-0.15	V
		$I_{\text{C}} = -1.2\text{A}$ $I_{\text{B}} = -20\text{mA}$			-0.25	V
		$I_{\text{C}} = -2\text{A}$ $I_{\text{B}} = -20\text{mA}$			-0.5	V
		$I_{\text{C}} = -3\text{A}$ $I_{\text{B}} = -100\text{mA}$			-0.7	V
		$I_{\text{C}} = -3\text{A}$ $I_{\text{B}} = -100\text{mA}$			-0.9	V
		$T_{\text{J}} = 100^{\circ}\text{C}$				
$V_{\text{BE}(\text{sat})}^{(2)}$	Base-emitter saturation voltage	$I_{\text{C}} = -1\text{A}$ $I_{\text{B}} = -10\text{mA}$		-0.8	-1	V
$V_{\text{BE}(\text{on})}^{(2)}$	Base-emitter on voltage	$I_{\text{C}} = -1\text{A}$ $V_{\text{CE}} = -2\text{V}$		-0.8	-1	V
$h_{\text{FE}}^{(2)}$	DC current gain	$I_{\text{C}} = -10\text{mA}$ $V_{\text{CE}} = -2\text{V}$	100	200	400	
		$I_{\text{C}} = -500\text{mA}$ $V_{\text{CE}} = -2\text{V}$	100	200	400	
		$I_{\text{C}} = -1\text{A}$ $V_{\text{CE}} = -2\text{V}$	100			
		$I_{\text{C}} = -2\text{A}$ $V_{\text{CE}} = -1\text{V}$	100	160		
		$I_{\text{C}} = -3\text{A}$ $V_{\text{CE}} = -1\text{V}$	90	130		

Table 3. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
f_t	Transition frequency	$I_C = -50\text{mA}$ $V_{CE} = -5\text{V}$ $f = 50\text{MHz}$		100		MHz
t_d	Resistive load Delay time	$I_C = -3\text{A}$ $V_{CC} = -20\text{V}$ $I_{B1} = -I_{B2} = -60\text{mA}$ (see figure 7)		180	220	ns
t_r	Rise time			160	210	ns
t_s	Storage time			250	300	ns
t_f	Fall time			80	100	ns

Note (2) Pulsed duration = 300 μs , duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 1. DC current gain

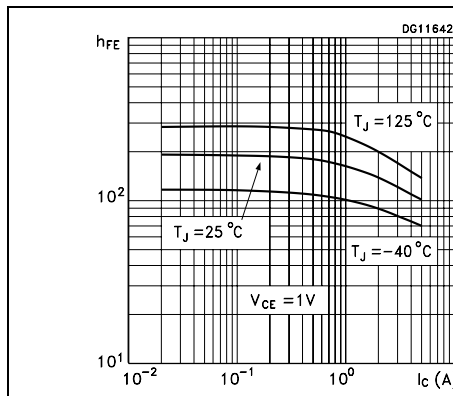


Figure 2. DC current gain

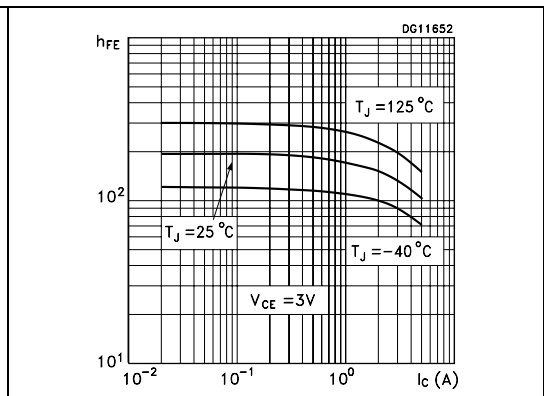


Figure 3. Collector-emitter saturation voltage

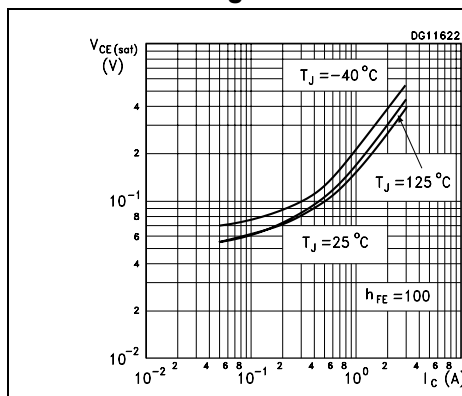


Figure 4. Base-emitter saturation voltage

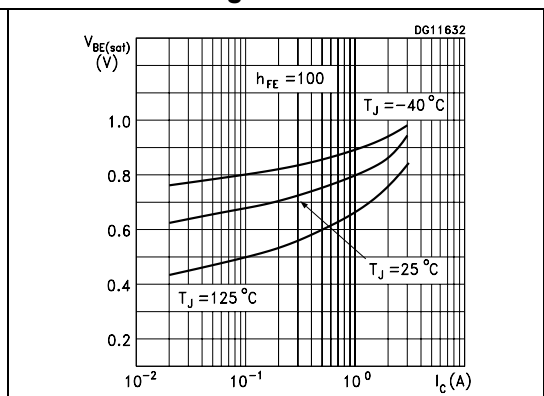
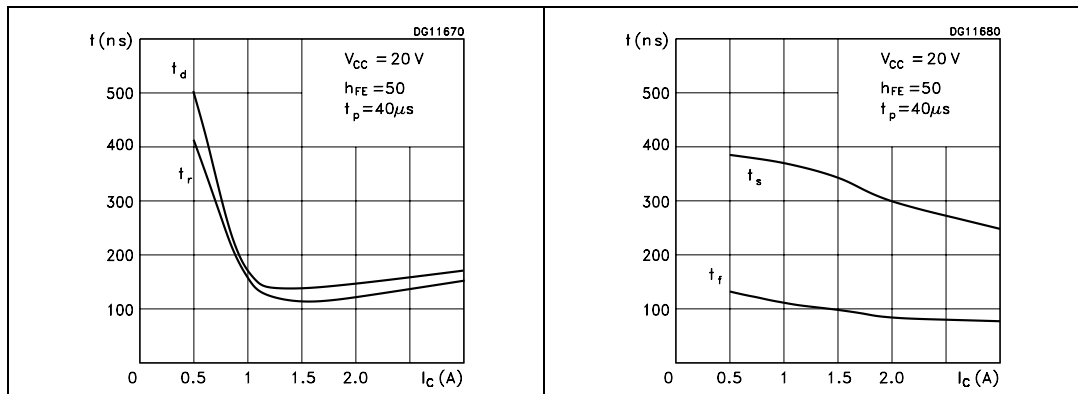
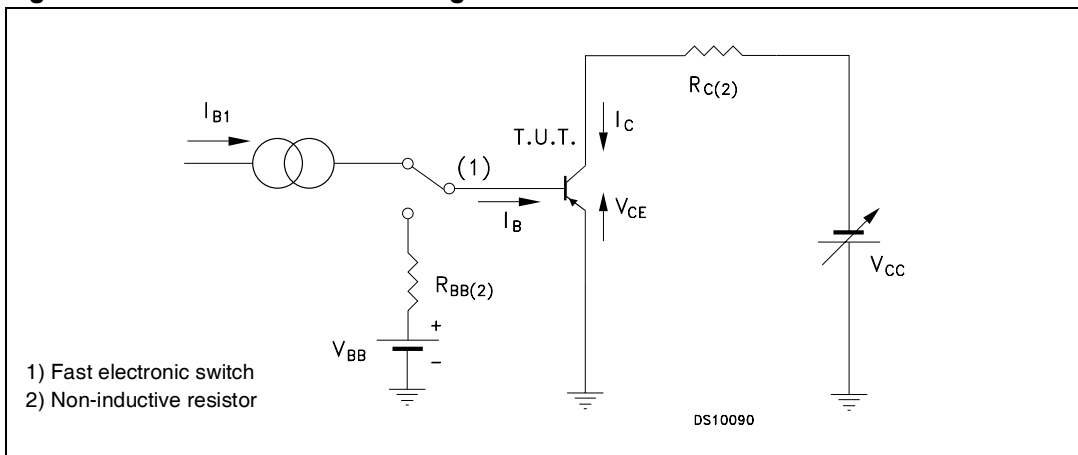


Figure 5. Switching time resistive load Figure 6. Switching time resistive load



2.2 Test circuits

Figure 7. Resistive load switching test circuit

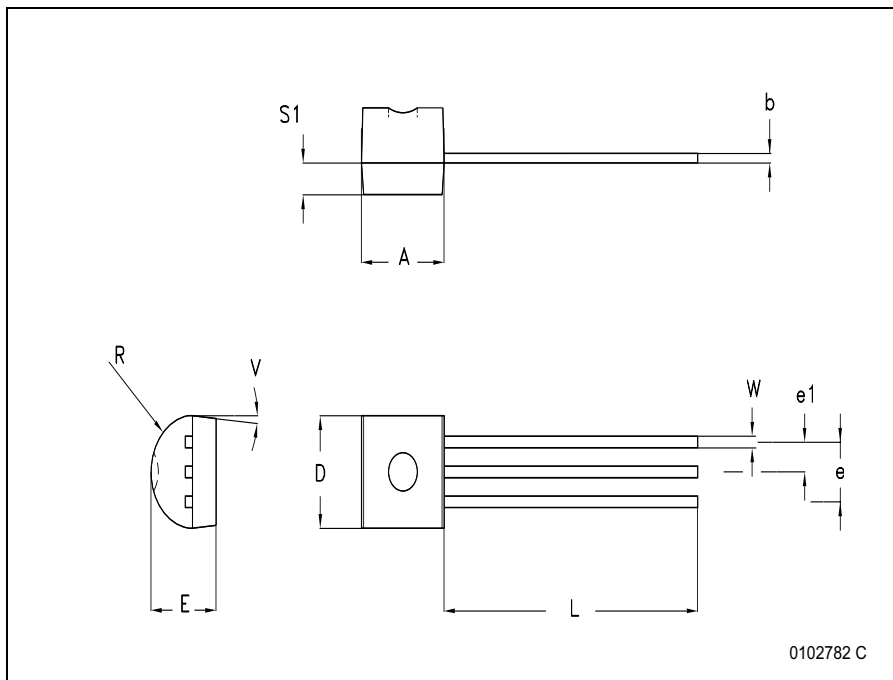


3 Package mechanical data

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

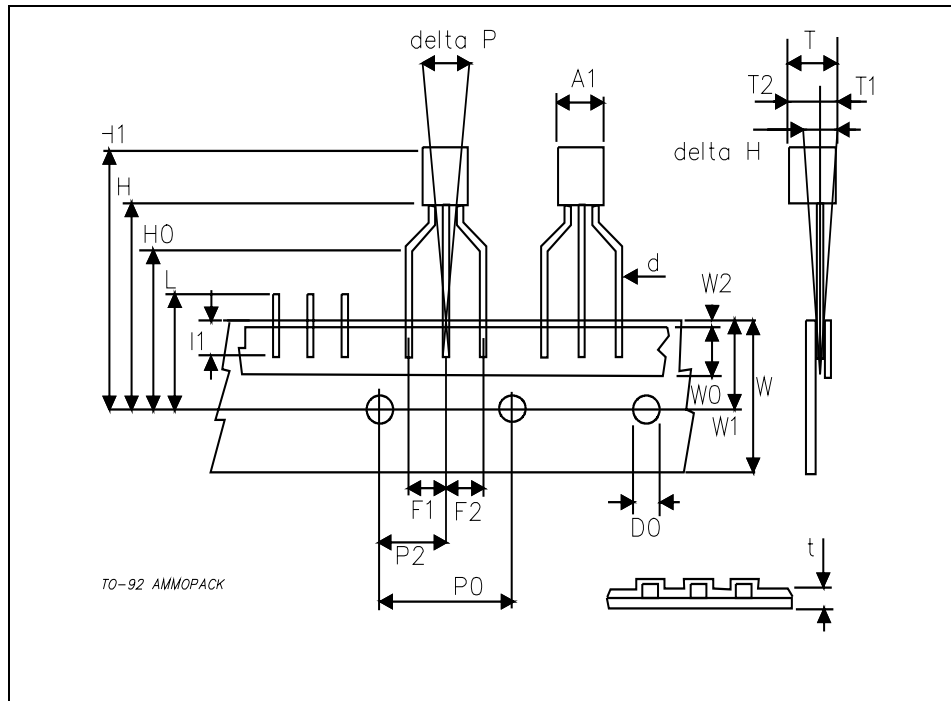
TO-92 BULK SHIPMENT MECHANICAL DATA

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
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
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 4. Revision history

Date	Revision	Changes
24-Mar-2003	1	Initial release.
29-Mar-2006	2	New template.

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