

NPN Silicon Planar Medium Power High Gain Transistors

PRELIMINARY INFORMATION

ZTX689B ZTX690B
ZTX692B ZTX694B

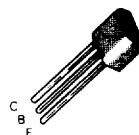
FEATURES

- High gain — 500 min.
- Up to 3 amps continuous current
- Gain specified up to 6 amps
- 1.5 watt power dissipation at $T_{amb} = 25^{\circ}\text{C}^*$
- Voltages up to 120V
- Very low saturation voltages

DESCRIPTION

A range of high gain, high performance, medium power transistors encapsulated in the popular E-line (TO-92 style) plastic package.

The 1.5 watt performance and outstanding electrical characteristics permit use in a wide variety of applications, including lamp, solenoid and relay drivers, motor drives and DC-DC convertors.



Plastic E-Line
(TO-92 Compatible)

The E-line package is formed by transfer moulding a silicone plastic specially selected to provide a rugged one-piece encapsulation resistant to severe environments and allow the high junction temperature operation normally associated with metal can devices.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	ZTX689B	ZTX690B	ZTX692B	ZTX694B	Unit
Collector-Base Voltage	V_{CBO}	20	45	70	120	V
Collector-Emitter Voltage	V_{CEO}	20	45	70	120	V
Emitter-Base Voltage	V_{EBO}	5	5	5	5	V
Peak Pulse Current	I_{CM}	8	6	2	1	A
Continuous Collector Current	I_C	3	2	2	0.5	A
Practical Power Dissipation*	P_{totP}	1.5				W
Power Dissipation at $T_{amb} = 25^{\circ}\text{C}$ derate above 25°C	P_{tot}	1.0 5.7				W mW/ $^{\circ}\text{C}$
Operating & Storage Temperature Range		- 55 to + 200				$^{\circ}\text{C}$

*The power which can be dissipated assuming device mounted in typical manner on P.C.B. with copper equal to 1in^2 minimum.

ZTX689B, ZTX690B, ZTX692B, ZTX694B

ELECTRICAL CHARACTERISTICS (Test conditions at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

Parameter	Symbol	ZTX689B			ZTX690B			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Collector-base breakdown voltage	$V_{(BR)CBO}$	20	—	—	45	—	—	V	$I_C = 100\mu\text{A}$
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	20	—	—	45	—	—	V	$I_C = 10\text{mA}$
Emitter-base breakdown voltage	$V_{(BR)EBO}$	5	—	—	5	—	—	V	$I_E = 100\mu\text{A}$
Collector cut-off current	I_{CBO}	—	—	0.1	—	—	—	μA μA	$V_{CB} = 16\text{V}$ $V_{CB} = 35\text{V}$
Emitter cut-off current	I_{EBO}	—	—	0.1	—	—	0.1	μA	$V_{EB} = 4\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	—	0.1	—	—	0.1	V	$I_C = 100\text{mA}$,
								V	$I_B = 0.5\text{mA}$
								V	$I_C = 1\text{A}$,
								V	$I_B = 5\text{mA}^*$
				0.5	—	—	—	V	$I_C = 2\text{A}$,
								V	$I_B = 10\text{mA}^*$
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	0.9	—	—	0.9	V	$I_C = 1\text{A}$, $I_B = 10\text{mA}^*$
Base-emitter turn-on voltage	$V_{BE(on)}$	—	—	0.9	—	—	0.9	V	$I_C = 1\text{A}$, $V_{CE} = 2\text{V}^*$
Static forward current transfer ratio	h_{FE}	500	—	—	500	—	—		$I_C = 100\text{mA}$,
		—	—	—	400	—	—		$V_{CE} = 2\text{V}$
		400	—	—	150	—	—		$I_C = 1\text{A}$,
		150	—	—	—	—	—		$V_{CE} = 2\text{V}^*$
									$I_C = 2\text{A}$,
									$V_{CE} = 2\text{V}^*$
									$I_C = 6\text{A}$,
									$V_{CE} = 2\text{V}^*$
Transition frequency	f_T	150	—	—	150	—	—	MHz	$I_C = 50\text{mA}$, $V_{CE} = 5\text{V}$ $f = 100\text{MHz}$
Input capacitance	C_{ibo}	—	60	—	—	50	—	pF	$V_{EB} = 0.5\text{V}$, $f = 1\text{MHz}$
Output capacitance	C_{obo}	—	25	—	—	25	—	pF	$V_{CE} = 10\text{V}$, $f = 1\text{MHz}$
Switching times	t_{on}	—	50	—	—	50	—	ns	$I_C = 500\text{mA}$, $I_{B1} = 50\text{mA}$
	t_{off}	—	1000	—	—	1000	—	ns	$I_{B2} = 50\text{mA}$, $V_{CC} = 10\text{V}$

*Measured under pulsed conditions. Pulse width = 300 μs . Duty cycle $\leq 2\%$.

ZTX689B, ZTX690B, ZTX692B, ZTX694B

ELECTRICAL CHARACTERISTICS (Test conditions at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

Parameter	Symbol	ZTX692B			ZTX694B			Unit	Conditions
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Collector-base breakdown voltage	$V_{(BR)CBO}$	70	—	—	120	—	—	V	$I_C = 100\mu\text{A}$
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	70	—	—	120	—	—	V	$I_C = 10\text{mA}$
Emitter-base breakdown voltage	$V_{(BR)EBO}$	5	—	—	5	—	—	V	$I_E = 100\mu\text{A}$
Collector cut-off current	I_{CBO}	—	—	0.1	—	—	—	μA	$V_{CB} = 55\text{V}$ $V_{CB} = 100\text{V}$
Emitter cut-off current	I_{EBO}	—	—	0.1	—	—	0.1	μA	$V_{EB} = 4\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	—	0.15	—	—	0.25	V	$I_C = 100\text{mA}$, $I_B = 0.5\text{mA}$
							0.5	V	$I_C = 400\text{mA}$, $I_B = 5\text{mA}^*$
							—	V	$I_C = 1\text{A}$, $I_B = 10\text{mA}^*$
							—	V	
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	0.9	—	—	0.9	V	$I_C = 1\text{A}$, $I_B = 10\text{mA}^*$
Base-emitter turn-on voltage	$V_{BE(on)}$	—	—	0.9	—	—	0.9	V	$I_C = 1\text{A}$, $V_{CE} = 2\text{V}^*$
Static forward current transfer ratio	h_{FE}	500	—	—	500	—	—		$I_C = 100\text{mA}$, $V_{CE} = 2\text{V}$
		—	—	—	400	—	—		$I_C = 200\text{mA}$, $V_{CE} = 2\text{V}^*$
		—	—	—	150	—	—		$I_C = 400\text{mA}$, $V_{CE} = 2\text{V}^*$
		400	—	—	—	—	—		$I_C = 500\text{mA}$, $V_{CE} = 2\text{V}^*$
		150	—	—	—	—	—		$I_C = 1\text{A}$, $V_{CE} = 2\text{V}^*$
Transition frequency	f_T	150	—	—	150	—	—	MHz	$I_C = 50\text{mA}$, $V_{CE} = 5\text{V}$, $f = 100\text{MHz}$
Input capacitance	C_{ibo}	—	37	—	—	33	—	pF	$V_{EB} = 0.5\text{V}$, $f = 1\text{MHz}$
Output capacitance	C_{obo}	—	14	—	—	11	—	pF	$V_{CE} = 10\text{V}$, $f = 1\text{MHz}$
Switching times	t_{on}	50	—	—	—	200	—	ns	$I_C = 500\text{mA}$, $I_{B1} = 50\text{mA}$
	t_{off}	1200	—	—	—	1600	—	ns	$I_{B2} = 50\text{mA}$, $V_{CC} = 10\text{V}$

*Measured under pulsed conditions. Pulse width = 300 μs . Duty cycle $\leq 2\%$.