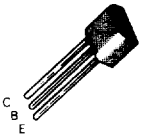
NPN Silicon Planar Medium Power High Gain Transistors

PRELIMINARY INFORMATION

ZTX689B ZTX690B ZTX692B ZTX694B

FEATURES

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



Plastic E-Line
(TO-92 Compatible)

DESCRIPTION

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

The 1.5watt 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.

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 $T_{amb} = 25°C$	P_{tot}	1.0				W
derate above 25°C		5.7				mW/°C
Operating & Storage Temperature Range		−55 to +200				°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 $T_{amb} = 25°C$ 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	$I_C = 100\mu A$
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	20	–	–	45	–	–	V	$I_C = 10mA$
Emitter-base breakdown voltage	$V_{(BR)EBO}$	5	–	–	5	–	–	V	$I_E = 100\mu A$
Collector cut-off current	I_{CBO}	–	–	0.1	–	–	–	μA	$V_{CB} = 16V$
							0.1	μA	$V_{CB} = 35V$
Emitter cut-off current	I_{EBO}	–	–	0.1	–	–	0.1	μA	$V_{EB} = 4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	–	–	0.1	–	–	0.1	V	$I_C = 100mA$, $I_B = 0.5mA$
							0.5	V	$I_C = 1A$, $I_B = 5mA$*
				0.5	–	–	–	V	$I_C = 2A$, $I_B = 10mA$*
Base-emitter saturation voltage	$V_{BE(sat)}$	–	–	0.9	–	–	0.9	V	$I_C = 1A$, $I_B = 10mA$*
Base-emitter turn-on voltage	$V_{BE(on)}$	–	–	0.9	–	–	0.9	V	$I_C = 1A$, $V_{CE} = 2V$*
Static forward current transfer ratio	h_{FE}	500	–	–	500	–	–		$I_C = 100mA$, $V_{CE} = 2V$
		–	–	–	400	–	–		$I_C = 1A$, $V_{CE} = 2V$*
		400	–	–	150	–	–		$I_C = 2A$, $V_{CE} = 2V$*
		150	–	–	–	–	–		$I_C = 6A$, $V_{CE} = 2V$*
Transition frequency	f_T	150	–	–	150	–	–	MHz	$I_C = 50mA$, $V_{CE} = 5V$ f = 100MHz
Input capacitance	C_{ibo}	–	60	–	–	50	–	pF	$V_{EB} = 0.5V$, f = 1MHz
Output capacitance	C_{obo}	–	25	–	–	25	–	pF	$V_{CE} = 10V$, f = 1MHz
Switching times	t_{on}	–	50	–	–	50	–	ns	$I_C = 500mA$, $I_{B1} = 50mA$
	t_{off}	–	1000	–	–	1000	–	ns	$I_{B2} = 50mA$, $V_{CC} = 10V$

*Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ⩽ 2%.

ELECTRICAL CHARACTERISTICS (Test conditions at $T_{amb} = 25°C$ 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	$I_C = 100\mu A$
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	70	–	–	120	–	–	V	$I_C = 10mA$
Emitter-base breakdown voltage	$V_{(BR)EBO}$	5	–	–	5	–	–	V	$I_E = 100\mu A$
Collector cut-off current	I_{CBO}	–	–	0.1	–	–	–	μA	$V_{CB} = 55V$
							0.1	μA	$V_{CB} = 100V$
Emitter cut-off current	I_{EBO}	–	–	0.1	–	–	0.1	μA	$V_{EB} = 4V$
Collector-emitter saturation voltage	$V_{CE(sat)}$	–	–	0.15	–	–	0.25	V	$I_C = 100mA$, $I_B = 0.5mA$
							0.5	V	$I_C = 400mA$, $I_B = 5mA$*
				0.5	–	–	–	V	$I_C = 1A$, $I_B = 10mA$*
Base-emitter saturation voltage	$V_{BE(sat)}$	–	–	0.9	–	–	0.9	V	$I_C = 1A$, $I_B = 10mA$*
Base-emitter turn-on voltage	$V_{BE(on)}$	–	–	0.9	–	–	0.9	V	$I_C = 1A$, $V_{CE} = 2V$*
Static forward current transfer ratio	h_{FE}	500	–	–	500	–	–		$I_C = 100mA$, $V_{CE} = 2V$
		–	–	–	400	–	–		$I_C = 200mA$, $V_{CE} = 2V$*
		–	–	–	150	–	–		$I_C = 400mA$, $V_{CE} = 2V$*
		400	–	–	–	–	–		$I_C = 500mA$, $V_{CE} = 2V$*
		150	–	–	–	–	–		$I_C = 1A$, $V_{CE} = 2V$*
Transition frequency	f_T	150	–	–	150	–	–	MHz	$I_C = 50mA$, $V_{CE} = 5V$ f = 100MHz
Input capacitance	C_{ibo}	–	37	–	–	33	–	pF	$V_{EB} = 0.5V$, f = 1MHz
Output capacitance	C_{obo}	–	14	–	–	11	–	pF	$V_{CE} = 10V$, f = 1MHz
Switching times	t_{on}	50	–	–	–	200	–	ns	$I_C = 500mA$, $I_{B1} = 50mA$
	t_{off}	1200	–	–	–	1600	–	ns	$I_{B2} = 50mA$, $V_{CC} = 10V$

*Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.

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