COMPLEMENTARY MEDIUM POWER HIGH GAIN TRANSISTOR IN SM-8 PACKAGE

Features

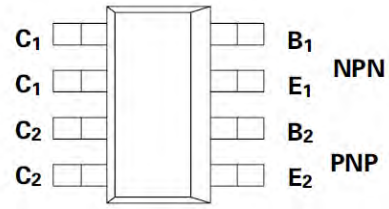
- NPN Transistor
  - BV_{CEO} > 45
  - $V_{CE(sat)}$ < 100mV @ I_C= 100mA
  - Continuous Current I_C = 2A
- PNP Transistor
  - BV_{CEO} > -40V
  - $V_{CE(sat)}$ < 250mV @ I_C= -500mA
  - Continuous Current I_C = -2A
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

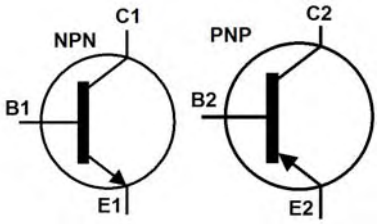
- Case: SM-8 (8 LEAD SOT223)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish e3
- Weight: 0.117 grams (approximate)

SM-8

Top View



Top View
Pin Out



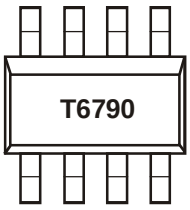
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZDT6790TA	T6790	7	12	1,000
ZDT6790TC	T6790	13	12	4,000

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
2. See http://www.diodes.com for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com

Marking Information



T6790 = Product Type Marking Code

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

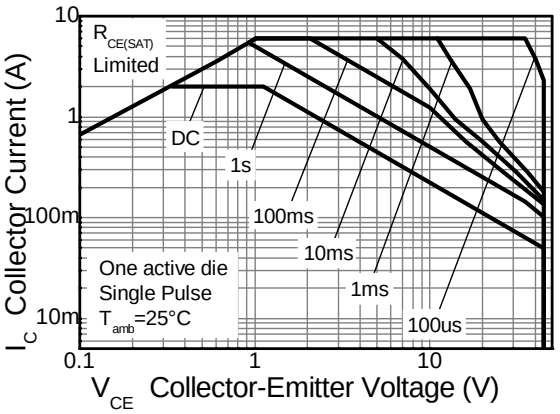
Characteristic	Symbol	NPN	PNP	Unit
Collector-Base Voltage	V_{CBO}	45	-50	V
Collector-Emitter Voltage	V_{CEO}	45	-40	V
Emitter-Base Voltage	V_{EBO}	6	-6	V
Continuous Collector Current	I_C	2	-2	A
Peak Pulse Current (Note 5)	I_{CM}	6	-6	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

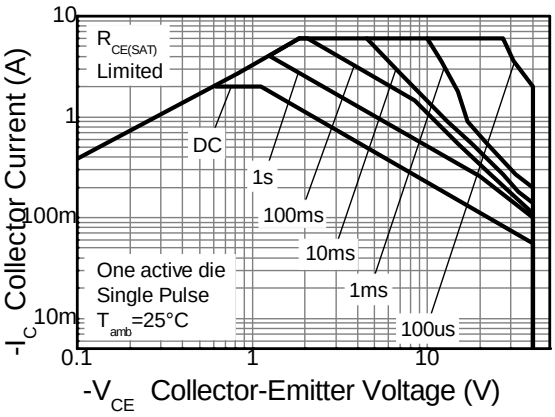
Characteristic		Symbol	Value	Unit
Collector Power Dissipation	(Note 5)	P_D	2.25	W
	(Note 6)		2.75	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	55.60	°C/W
	(Note 6)		45.50	
Thermal Resistance, Junction to Leads	(Note 7)	$R_{\theta JL}$	30.68	°C/W
Operating and Storage Temperature Range		T_J,T_{STG}	-55 to +150	°C

Notes: 5. For the device with any single die active, mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions .
6. For the device with both die active, mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions.
7. Thermal resistance from junction to solder-point (at the end of the collector lead).

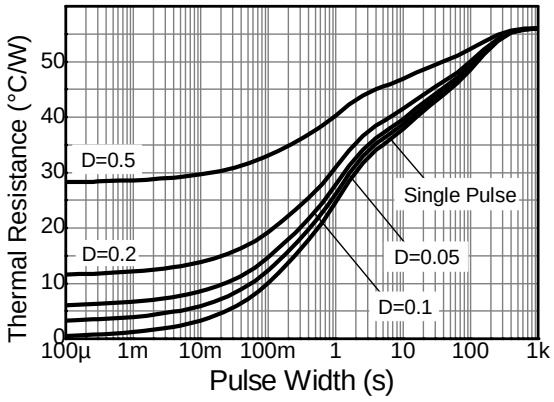
Thermal Characteristics



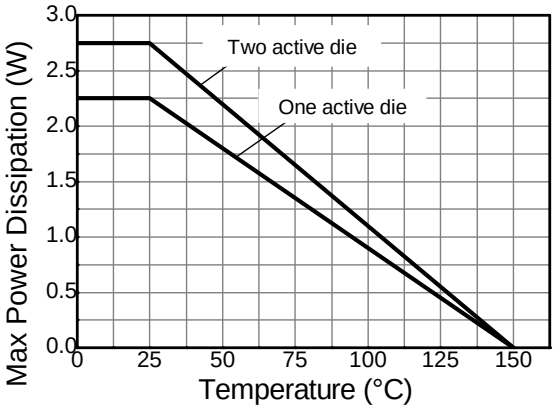
NPN Safe Operating Area



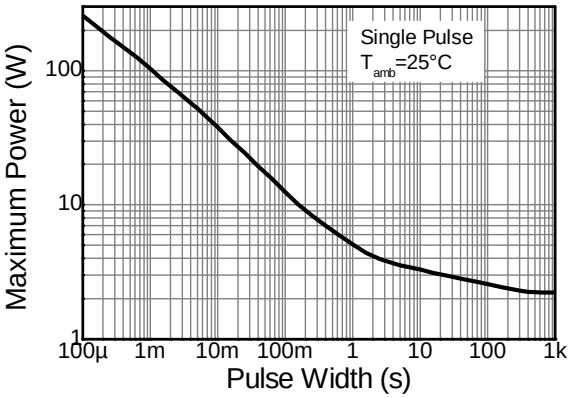
PNP Safe Operating Area



Transient Thermal Impedance



Derating Curve



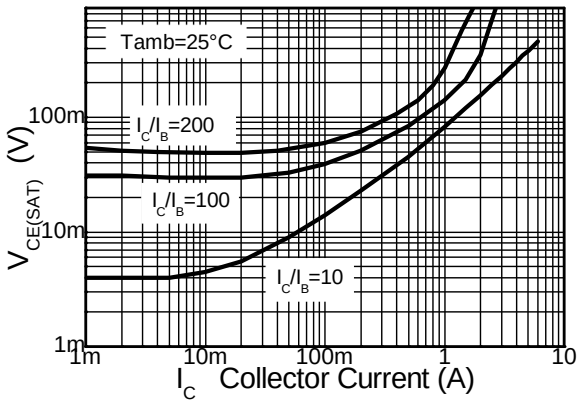
Pulse Power Dissipation

NPN - Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

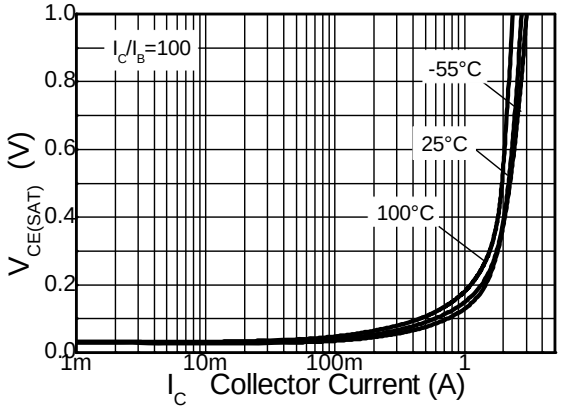
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	45	—	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 8)	BV_{CEO}	45	—	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	6	—	—	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	—	—	100	nA	V_{CB} = 35V
Emitter Cutoff Current	I_{EBO}	—	—	100	nA	V_{EB} = 5V
DC Current Transfer Static Ratio (Note 8)	h_{FE}	500 400 150	— — —	— — —	—	I_C = 100mA, V_{CE} = 2V I_C = 1A, V_{CE} = 2V I_C = 2A, V_{CE} = 2V
Collector-Emitter Saturation Voltage (Note 8)	$V_{CE(sat)}$	— —	— —	100 500	mV	I_C = 100mA, I_B = 0.5mA I_C = 1A, I_B = 5mA
Base-Emitter Saturation Voltage (Note 8)	$V_{BE(sat)}$	—	—	900	mV	I_C = 1A, I_B = 10mA
Base-Emitter Turn-on Voltage (Note 8)	$V_{BE(on)}$	—	—	900	mV	I_C = 1A, V_{CE} = 2V
Transitional Frequency (Note 8)	f_T	150	—	—	MHz	I_C = 50mA, V_{CE} = 5V, f = 50MHz
Input Capacitance	C_{ibo}	—	200	—	pF	V_{EB} = 0.5V, f = 1MHz
Output Capacitance	C_{obo}	—	16	—	pF	V_{CB} = 10V, f = 1MHz
Switching Time	t_{on}	—	33	—	ns	V_{CC} = 10V, I_C = 500mA,
	t_{off}		1300		ns	I_{B1} = 50mA, I_{B2} = 50mA

Note: 8. Measured under pulsed conditions. Pulse width = 300µs. Duty cycle ≤ 2%.

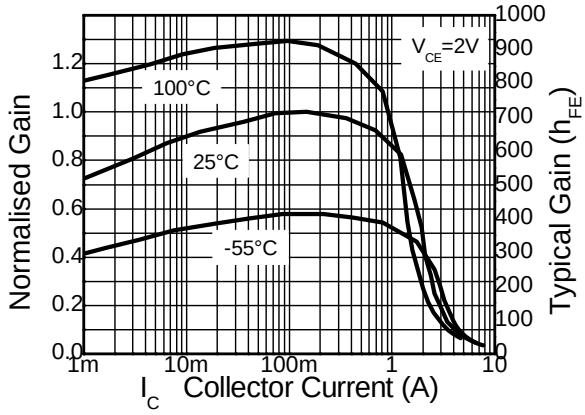
NPN – Typical Electrical Characteristics



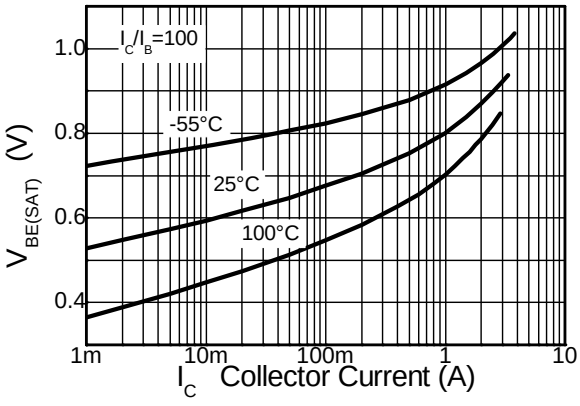
$V_{CE(SAT)}$ v I_C



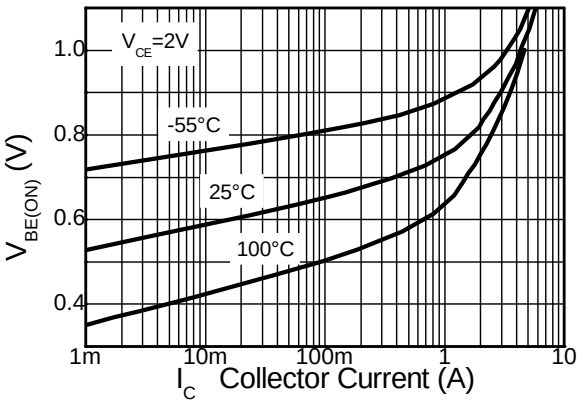
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C



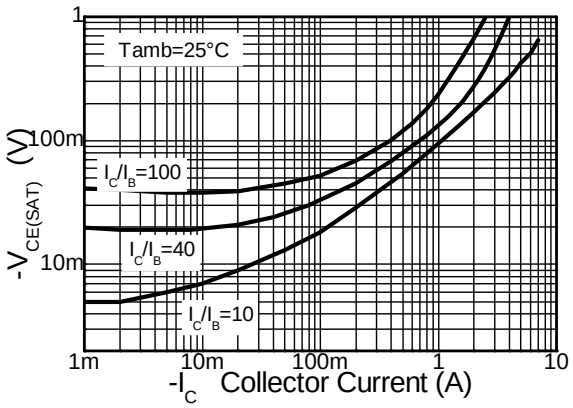
$V_{BE(ON)}$ v I_C

PNP - Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

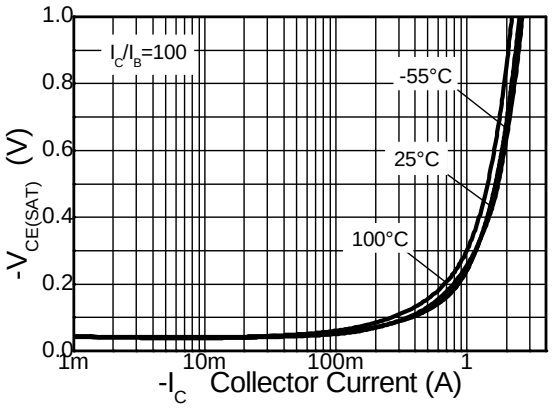
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-50	—	—	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Notes 8)	BV_{CEO}	-40	—	—	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-6	—	—	V	I_E = -100µA
Collector Cutoff Current	I_{CBO}	—	—	-100	nA	V_{CB} = -30V
Emitter Cutoff Current	I_{EBO}	—	—	-100	nA	V_{EB} = -5V
DC Current Transfer Static Ratio (Notes 8)	h_{FE}	300 250 200 150	— — — —	800 — — —	—	I_C = -10mA, V_{CE} = -2V I_C = -500mA, V_{CE} = -2V I_C = -1A, V_{CE} = -2V I_C = -2A, V_{CE} = -2V
Collector-Emitter Saturation Voltage (Notes 8)	$V_{CE(sat)}$	—	— — —	-250 -450 -750	mV	I_C = -500mA, I_B = -5mA I_C = -1A, I_B = -10mA I_C = -2A, I_B = -50mA
Base-Emitter Saturation Voltage (Notes 8)	$V_{BE(sat)}$	—	—	-1000	mV	I_C = -1A, I_B = -10mA
Base-Emitter Turn-on Voltage (Notes 8)	$V_{BE(on)}$	—	-750	—	mV	I_C = -1A, V_{CE} = -2V
Transitional Frequency (Notes 8)	f_T	100	—	—	MHz	I_C = -50mA, V_{CE} = -5V, f = 50MHz
Input Capacitance	C_{ibo}	—	225	—	pF	V_{EB} = -0.5V, f = 1MHz,
Output Capacitance	C_{obo}	—	24	—	pF	V_{CB} = -10V, f = 1MHz,
Switching Time	t_{on}	—	35	—	ns	V_{CC} = -10V, I_C = -500mA,
	t_{off}		600		ns	I_{B1} = -50mA, I_{B2} = -50mA

Notes: 8. Measured under pulsed conditions. Pulse width = 300µs. Duty cycle ≤ 2%.

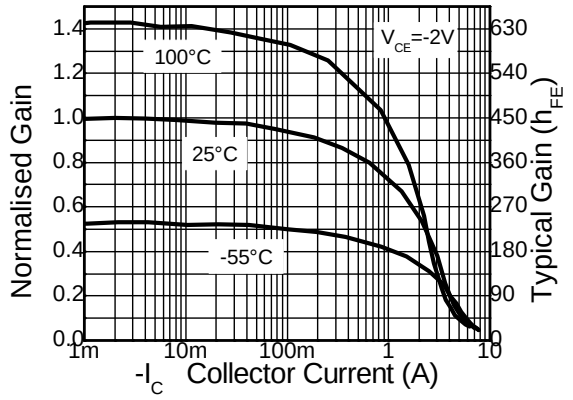
PNP – Typical Electrical Characteristics



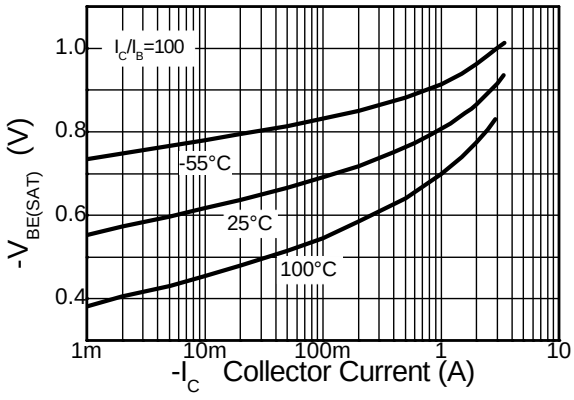
$V_{CE(SAT)}$ v I_C



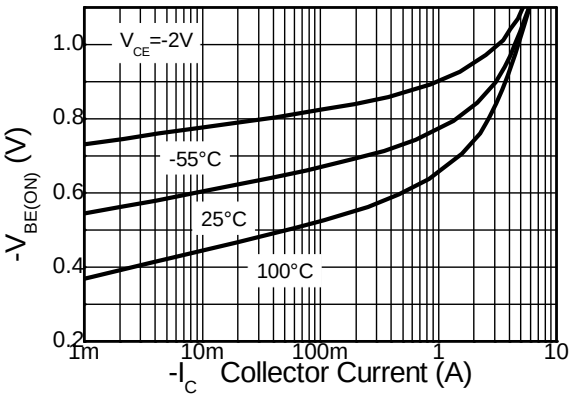
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C

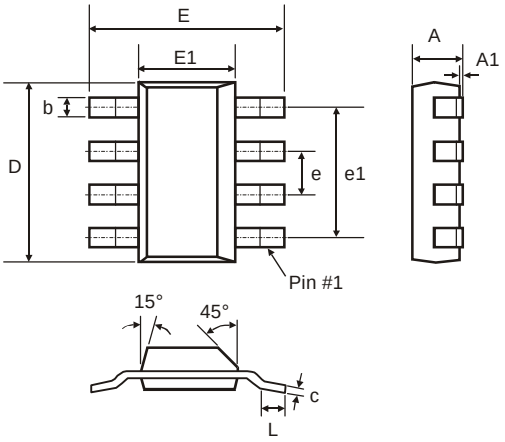


$V_{BE(SAT)}$ v I_C



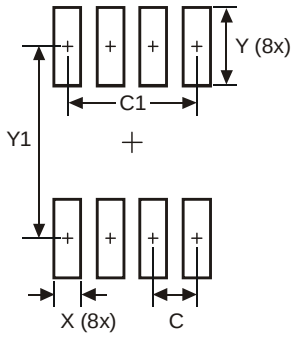
$V_{BE(ON)}$ v I_C

Package Outline Dimensions



SM-8			
Dim	**Min**	**Max**	**Typ**
A	–	1.7	–
A1	0.02	0.1	–
b	–	0.7	–
c	0.24	0.32	–
D	6.3	6.7	–
e	–	–	1.53
e1	–	–	4.59
E	6.7	7.3	–
E1	3.3	3.7	–
L	0.9	–	–
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	1.52
C1	4.6
X	0.95
Y	2.80
Y1	6.80

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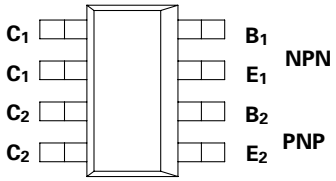
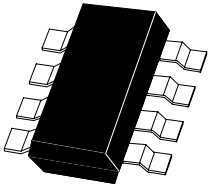
SM-8 COMPLEMENTARY MEDIUM POWER HIGH GAIN TRANSISTORS

ISSUE 1 - NOVEMBER 1995

ZDT6790



PARTMARKING DETAIL – T6790



SM-8
(8 LEAD SOT223)

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	NPN	PNP	UNIT
Collector-Base Voltage	V_{CBO}	45	-50	V
Collector-Emitter Voltage	V_{CEO}	45	-40	V
Emitter-Base Voltage	V_{EBO}	5	-5	V
Peak Pulse Current	I_{CM}	6	-6	A
Continuous Collector Current	I_C	2	-2	A
Operating and Storage Temperature Range	T_j:T_{stg}	-55 to +150		°C

THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	VALUE	UNIT
Total Power Dissipation at T_{amb} = 25°C* Any single die "on" Both die "on" equally	P_{tot}	 2.25 2.75	 W W
Derate above 25°C* Any single die "on" Both die "on" equally		 18 22	 mW/ °C mW/ °C
Thermal Resistance - Junction to Ambient* Any single die "on" Both die "on" equally		 55.6 45.5	 °C/ W °C/ W

* The power which can be dissipated assuming the device is mounted in a typical manner on a PCB with copper equal to 2 inches square.

ZDT6790

NPN TRANSISTOR
ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	45			V	I_C=100μA
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	45			V	I_C=10mA*
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5			V	I_E=100μA
Collector Cutoff Current	I_{CBO}			0.1	μA	V_{CB}=35V
Emitter Cutoff Current	I_{EBO}			0.1	μA	V_{EB}=4V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.1 0.5	V V	I_C=0.1A, I_B=0.5mA* I_C=1A, I_B=5mA*
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			0.9	V	I_C=1A, I_B=10mA*
Base-Emitter Turn-On Voltage	$V_{BE(on)}$			0.9	V	I_C=1A, V_{CE}=2V*
Static Forward Current Transfer Ratio	h_{FE}	500 400 150				I_C=100mA, V_{CE}=2V* I_C=1A, V_{CE}=2V* I_C=2A, V_{CE}=2V*
Transition Frequency	f_T	150			MHz	I_C=50mA, V_{CE}=5V f=50MHz
Input Capacitance	C_{ibo}		200		pF	V_{EB}=0.5V, f=1MHz
Output Capacitance	C_{obo}		16		pF	V_{CB}=10V, f=1MHz
Switching Times	t_{on} t_{off}		33 1300		ns	I_C=500mA, $I_{B!}$=50mA I_{B2}=50mA, V_{CC}=10V

*Measured under pulsed conditions. Pulse width=300μs. Duty cycle ≤ 2%
For typical characteristics graphs see FZT690 datasheet.

PNP TRANSISTOR
ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-50			V	I_C=-100μA
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-40			V	I_C=-10mA*
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5			V	I_E=-100μA
Collector Cutoff Current	I_{CBO}			-0.1	μA	V_{CB}=-30V
Emitter Cutoff Current	I_{EBO}			-0.1	μA	V_{EB}=-4V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			-0.25 -0.45 -0.75	V V V	I_C=-500mA, I_B=-5mA* I_C=-1A, I_B=-10mA* I_C=-2A, I_B=-50mA*
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			-1.0	V	I_C=-1A, I_B=-10mA*
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		-0.75		V	I_C=-1A, V_{CE}=-2V*
Static Forward Current Transfer Ratio	h_{FE}	300 250 200 150		800		I_C=-10mA, V_{CE}=-2V I_C=-500mA, V_{CE}=-2V* I_C=-1A, V_{CE}=-2V* I_C=-2A, V_{CE}=-2V*
Transition Frequency	f_T	100			MHz	I_C=-50mA, V_{CE}=-5V f=50MHz
Input Capacitance	C_{ibo}		225		pF	V_{EB}=-0.5V, f=1MHz
Output Capacitance	C_{obo}		24		pF	V_{CB}=-10V, f=1MHz
Switching Times	t_{on} t_{off}		35 600		ns	I_C=-500mA, I_{B1}=-50mA I_{B2}=-50mA, V_{CC}=-10V

*Measured under pulsed conditions. Pulse width=300μs. Duty cycle ≤ 2%
For typical characteristics graphs see FZT790 datasheet.