SILICON PLANAR EPITAXIAL TRANSISTORS

NPN transistors in TO-39 metal packages for general purpose industrial applications.

QUICK REFERENCE DATA

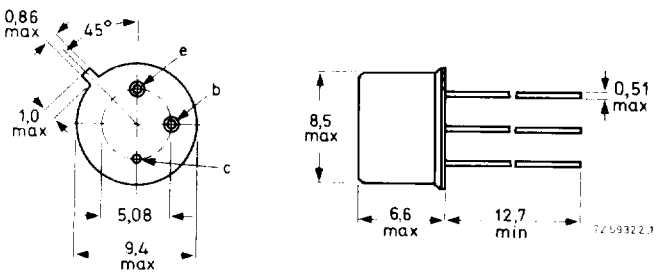
			BFX84	BFX85	
Collector-base voltage (open emitter)	V_{CBO}	max.	100	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	60	60	V
Collector current (peak value)	I_{CM}	max.	1.0	1.0	A
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	800	800	mW
Total power dissipation up to T_{case} = 100 °C	P_{tot}	max.	2.86	2.86	W
DC current gain I_C = 150 mA; V_{CE} = 10 V	h_{FE}	min. typ.	30 112	70 142	
Transition frequency at f = 100 MHz I_C = 50 mA; V_{CE} = 10 V; T_{amb} = 25 °C	f_T	min.	50	50	MHz

MECHANICAL DATA

Dimensions in mm

Fig.1 TO-39.

Collector connected to case.



Maximum lead diameter is guaranteed only for 12.7 mm.

RATINGS

Limiting values of operation according to the absolute maximum system.

Electrical

	BFX84	BFX85	
V_{CBO} max.	100	100	V
V_{CE} max. (cut-off, $I_C \leq 1mA$)	100	100	V
V_{CEO} max.	60	60	V
V_{EBO} max.	6.0		V
I_C max.	1.0		A
I_{CM} max.	1.0		A
$-I_E$ max.	1.0		A
$-I_{EM}$ max.	1.0		A
I_B max.	100		mA
$\pm I_{BM}$ max.	100		mA
P_{tot} max. $T_{amb} \leq 25^oC$	800		mW
$T_{case} \leq 25^oC$	5.0		W
$T_{case} \geq 25, \leq 100^oC$	2.86		W

Temperature

T_{stg}	-65 to +150	^oC
T_j max.	175	^oC

THERMAL CHARACTERISTICS

$R_{th(j-amb)}$ in free air	200	K/W
$R_{th(j-case)}$	35	K/W

BFX84

ELECTRICAL CHARACTERISTICS ($T_j = 25^oC$ unless otherwise stated)

		Min.	Typ.	Max.	
I_{CBO}	Collector cut-off current				
	$V_{CB} = 100V$, $I_E = 0$	-	10	500	nA
	$V_{CB} = 100V$, $I_E = 0$, $T_j = 100^oC$	-	0.5	30	μA
	$V_{CB} = 80V$, $I_E = 0$	-	2.0	50	nA
	$V_{CB} = 80V$, $I_E = 0$, $T_j = 100^oC$	-	0.1	2.5	μA
I_{EBO}	Emitter cut-off current				
	$V_{EB} = 6.0V$, $I_C = 0$	-	10	500	nA
	$V_{EB} = 5.0V$, $I_C = 0$	-	2.0	50	nA
	$V_{EB} = 5.0V$, $I_C = 0$, $T_j = 100^oC$	-	0.1	2.5	μA
h_{FE}	Static forward current transfer ratio				
	$I_C = 10mA$, $V_{CE} = 10V$	20	80	-	
	$I_C = 150mA$, $V_{CE} = 10V$	30	112	-	
	$I_C = 500mA$, $V_{CE} = 10V$	20	70	-	
	$I_C = 1.0A$, $V_{CE} = 10V$	15	35	-	
$V_{CE(sat)}$	Collector-emitter saturation voltage				
	$I_C = 10mA$, $I_B = 1.0mA$	-	0.15	0.20	V
	$I_C = 150mA$, $I_B = 15mA$	-	0.15	0.35	V
	$I_C = 500mA$, $I_B = 50mA$	-	0.35	1.00	V
	$I_C = 1.0A$, $I_B = 100mA$	-	0.66	1.60	V
$V_{BE(sat)}$	Base-emitter saturation voltage				
	$I_C = 10mA$, $I_B = 1.0mA$	-	0.69	1.2	V
	$I_C = 150mA$, $I_B = 15mA$	-	0.92	1.3	V
	$I_C = 500mA$, $I_B = 50mA$	-	1.15	1.5	V
	$I_C = 1.0A$, $I_B = 100mA$	-	1.40	2.0	V
C_C	Collector capacitance $V_{CB} = 10V$, $I_E = I_e = 0$, $f = 1.0MHz$	-	7.0	12	pF

BFX84

ELECTRICAL CHARACTERISTICS (contd.)

		Min.	Typ.	Max.	
f_T	Transition frequency $I_C = 50mA$, $V_{CE} = 10V$, $f = 100$ MHz, $T_{amb} = 25^oC$	50	140	-	MHz
	Saturated switching times $I_C = 150mA$, $I_{B(on)} = -I_{B(off)} = 15mA$, $-V_{EE} = 10V$, $-V_{BE(off)} = 2.0V$				
t_d	Delay time	-	15	-	ns
t_r	Rise time	-	40	-	ns
t_{on}	Turn-on time	-	55	-	ns
t_s	Storage time	-	300	-	ns
t_f	Fall time	-	60	-	ns
t_{off}	Turn-off time	-	360	-	ns
	h-parameters				
h_{fe}	$I_C = 1.0mA$, $V_{CE} = 5.0V$, $f = 1.0kHz$, $T_{amb} = 25^oC$	10	65	-	
h_{ie}	$I_C = 10mA$, $V_{CE} = 5.0V$, $f = 1.0kHz$, $T_{amb} = 25^oC$	-	750	-	Ω
h_{re}		-	0.85	5.0	$\times 10^{-4}$
h_{fe}		15	80	-	
h_{oe}		-	35	80	μmho

BFX85

ELECTRICAL CHARACTERISTICS ($T_j = 25^oC$ unless otherwise stated)

		Min.	Typ.	Max.	
I_{CBO}	Collector cut-off current				
	$V_{CB} = 100V$, $I_E = 0$	-	10	500	nA
	$V_{CB} = 100V$, $I_E = 0$, $T_j = 100^oC$	-	0.5	30	μA
	$V_{CB} = 80V$, $I_E = 0$	-	2.0	50	nA
	$V_{CB} = 80V$, $I_E = 0$, $T_j = 100^oC$	-	0.1	2.5	μA
I_{EBO}	Emitter cut-off current				
	$V_{EB} = 6.0V$, $I_C = 0$	-	10	500	nA
	$V_{EB} = 5.0V$, $I_C = 0$	-	2.0	50	nA
	$V_{EB} = 5.0V$, $I_C = 0$, $T_j = 100^oC$	-	0.1	2.5	μA
h_{FE}	Static forward current transfer ratio				
	$I_C = 10mA$, $V_{CE} = 10V$	50	90	-	
	$I_C = 150mA$, $V_{CE} = 10V$	70	142	-	
	$I_C = 500mA$, $V_{CE} = 10V$	30	90	-	
	$I_C = 1.0A$, $V_{CE} = 10V$	15	50	-	
$V_{CE(sat)}$	Collector-emitter saturation voltage				
	$I_C = 10mA$, $I_B = 1.0mA$	-	0.15	0.20	V
	$I_C = 150mA$, $I_B = 15mA$	-	0.15	0.35	V
	$I_C = 500mA$, $I_B = 50mA$	-	0.35	1.00	V
	$I_C = 1.0A$, $I_B = 100mA$	-	0.66	1.60	V
$V_{BE(sat)}$	Base-emitter saturation voltage				
	$I_C = 10mA$, $I_B = 1.0mA$	-	0.69	1.2	V
	$I_C = 150mA$, $I_B = 15mA$	-	0.92	1.3	V
	$I_C = 500mA$, $I_B = 50mA$	-	1.15	1.5	V
	$I_C = 1.0A$, $I_B = 100mA$	-	1.40	2.0	V
C_C	Collector capacitance				
	$V_{CB} = 10V$, $I_E = I_e = 0$, $f = 1.0MHz$	-	7.0	12	pF

BFX85

ELECTRICAL CHARACTERISTICS (contd.)

		Min.	Typ.	Max.	
f_T	Transition frequency $I_C = 50mA$, $V_{CE} = 10V$, $f = 35MHz$, $T_{amb} = 25^oC$	50	185	-	MHz
Saturated switching times					
	$I_C = 150mA$, $I_{B(on)} = -I_{B(off)} = 15mA$, $-V_{EE} = 10V$, $-V_{BE(off)} = 2.0V$				
t_d	Delay time	-	15	-	ns
t_r	Rise time	-	40	-	ns
t_{on}	Turn-on time	-	55	-	ns
t_s	Storage time	-	300	-	ns
t_f	Fall time	-	60	-	ns
t_{off}	Turn-off time	-	360	-	ns
h-parameters					
h_{fe}	$I_C = 1.0mA$, $V_{CE} = 5.0V$, $f = 1.0kHz$, $T_{amb} = 25^oC$	20	65	-	
h_{ie}	$I_C = 10mA$, $V_{CE} = 5.0V$, $f = 1.0kHz$, $T_{amb} = 25^oC$	-	750	-	Ω
h_{re}		-	0.85	5.0×10^{-4}	
h_{fe}		25	80	-	
h_{oe}		-	35	80	μmho

MEASUREMENT OF SATURATED SWITCHING TIMES

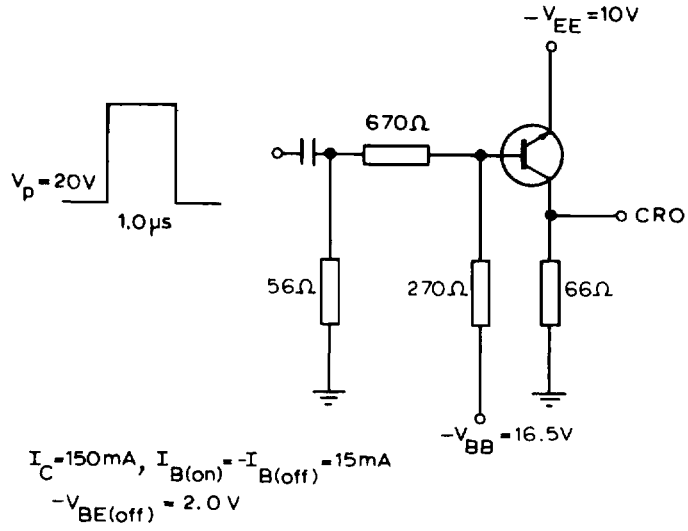


Fig.2 Test circuit.

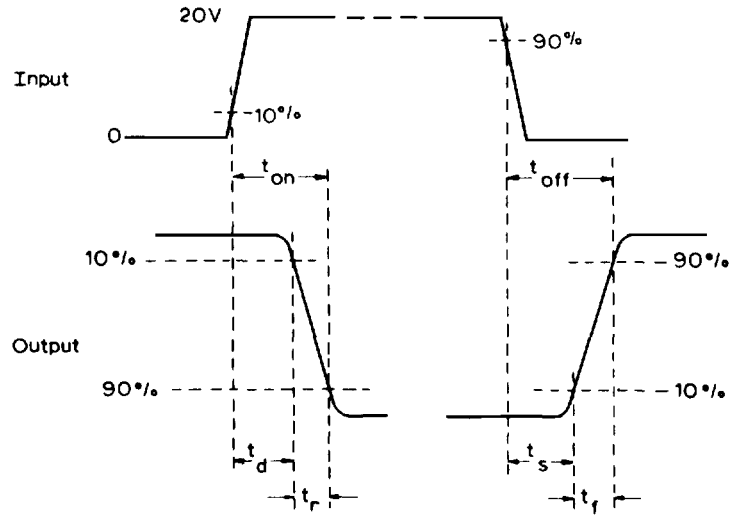


Fig.3 Switching waveforms.

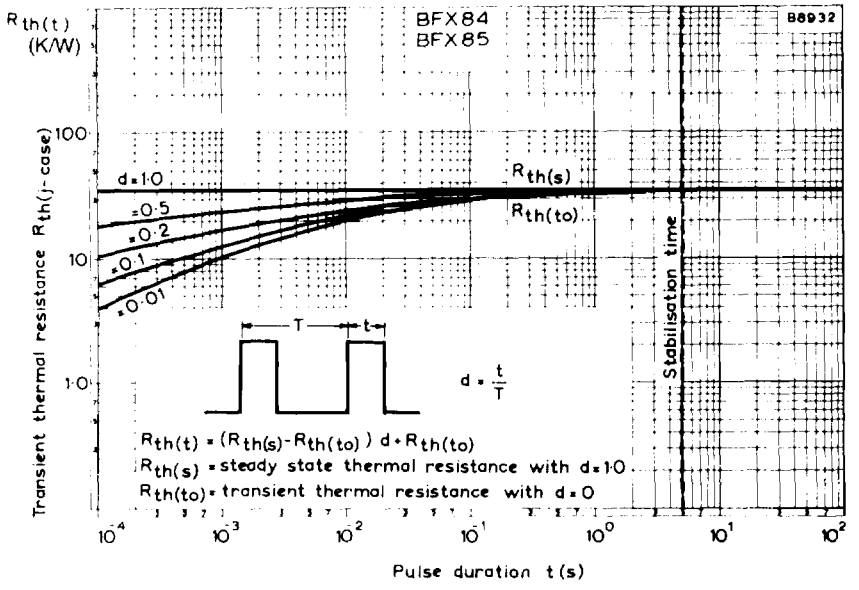


Fig.4 Transient thermal resistance for various duty factors plotted against pulse duration.