SILICON EPITAXIAL PLANAR TRANSISTORS

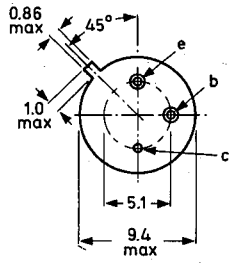
N-P-N transistors in a TO-39 metal envelope with the collector connected to the case. These transistors are intended for general purpose industrial applications.

QUICK REFERENCE DATA

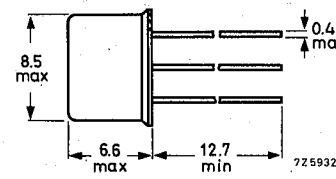
			BFY50	BFY51	BFY52	
Collector-base voltage (open emitter)	V_{CBO}	max.	80	60	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	35	30	20	V
Collector current (peak value)	I_{CM}	max.	1	1	1	A
Total dissipation up to T_{mb} = 50 °C	P_{tot}	max.	5	5	5	W
Junction temperature	T_j	max.	200	200	200	°C
D.C. current gain at T_j = 25 °C						
I_C = 150 mA; V_{CE} = 10 V	h_{FE}	typ.	112	123	142	
Transition frequency						
I_C = 50 mA; V_{CE} = 10 V	f_T	typ.	140	160	185	MHz
Saturation voltage						
I_C = 500 mA; I_B = 50 mA	V_{CEsat}	<	0.7	1.0	1.0	V

MECHANICAL DATA

TO-39
Collector connected to case



Dimensions in mm



max. lead diameter is guaranteed only for 12.7 mm.
Accessories supplied on request: 56218, 56245

RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

			BFY50	BFY51	BFY52	
Voltages						
Collector-base voltage (open emitter)	V_{CBO}	max.	80	60	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	35	30	20	V
Emitter-base voltage (open collector)	V_{EBO}	max.	6	6	6	V
Currents						
Collector current (d.c.)	I_C	max.		1		A
Collector current (peak value)	I_{CM}	max.		1		A
Emitter current (d.c.)	$-I_E$	max.		1		A
Emitter current (peak value)	$-I_{EM}$	max.		1		A
Reverse base current (peak value)	$-I_{BM}$	max.		0.1		A
Power dissipation (See also page 8)						
Total power dissipation up to $T_{mb} = 50\ ^oC$	P_{tot}	max.		5		W
Temperatures						
Storage temperature	T_{stg}			−65 to +200		^oC
Junction temperature	T_j	max.		200		^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	220	$^oC/W$
From junction to case	$R_{th\ j-c}$	=	35	$^oC/W$
From junction to mounting base	$R_{th\ j-mb}$	=	30	$^oC/W$

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BFY50	BFY51	BFY52	
Collector cut-off current						
I_E = 0; V_{CB} = 60 V	I_{CBO}	typ.	2			nA
		<	50			nA
I_E = 0; V_{CB} = 40 V	I_{CBO}	typ.		2		nA
		<		50		nA
I_E = 0; V_{CB} = 30 V	I_{CBO}	typ.			2	nA
		<			50	nA
I_E = 0; V_{CB} = 60 V; T_j = 100 °C	I_{CBO}	typ.	100			nA
		<	2.5			µA
I_E = 0; V_{CB} = 40 V; T_j = 100 °C	I_{CBO}	typ.		100		nA
		<		2.5		µA
I_E = 0; V_{CB} = 30 V; T_j = 100 °C	I_{CBO}	typ.			100	nA
		<			2.5	µA
Emitter cut-off current						
I_C = 0; V_{EB} = 5 V	I_{EBO}	typ.	2	2	2	nA
		<	50	50	50	nA
I_C = 0; V_{EB} = 5 V; T_j = 100 °C	I_{EBO}	typ.	0.1	0.1	0.1	µA
		<	2.5	2.5	2.5	µA
Saturation voltages						
I_C = 10 mA; I_B = 1.0 mA	V_{CEsat}	typ.	0.06	0.06	0.06	V
		<	0.10	0.15	0.15	V
	V_{BEsat}	typ.	0.69	0.69	0.69	V
		<	1.2	1.2	1.2	V
I_C = 150 mA; I_B = 15 mA	V_{CEsat}	typ.	0.15	0.15	0.15	V
		<	0.20	0.35	0.35	V
	V_{BEsat}	typ.	0.92	0.92	0.92	V
		<	1.3	1.3	1.3	V
I_C = 500 mA; I_B = 50 mA [1]	V_{CEsat}	typ.	0.35	0.35	0.35	V
		<	0.70	1.00	1.00	V
	V_{BEsat}	typ.	1.15	1.15	1.15	V
		<	1.5	1.5	1.5	V
I_C = 1 A; I_B = 100 mA [1]	V_{CEsat}	typ.	0.66	0.66	0.66	V
		<	1.00	1.60	1.60	V
	V_{BEsat}	typ.	1.40	1.40	1.40	V
		<	2.0	2.0	2.0	V

[1] Measured under pulsed conditions to avoid excessive dissipation.

CHARACTERISTICS (continued) T_j = 25 °C unless otherwise specified

			BFY50	BFY51	BFY52	
D.C. current gain						
I_C = 10 mA; V_{CE} = 10 V	h_{FE}	>	20	30	30	
		typ.	80	85	90	
I_C = 150 mA; V_{CE} = 10 V [1]	h_{FE}	>	30	40	60	
		typ.	112	123	142	
I_C = 500 mA; V_{CE} = 10 V [1]	h_{FE}	>	20	25	30	
		typ.	70	79	90	
I_C = 1 A ; V_{CE} = 10 V [1]	h_{FE}	>	15	15	15	
		typ.	35	40	50	
Switching times (See also page 5)						
I_C = 150 mA; $+I_B = -I_{BM}$ = 15 mA						
delay time	t_d	typ.	15	15	15	ns
rise time	t_r	typ.	40	40	40	ns
storage time	t_s	typ.	300	300	300	ns
fall time	t_f	typ.	60	60	60	ns
Collector capacitance at f = 1 MHz						
$I_E = I_e$ = 0; V_{CB} = 10 V	C_c	<	12	12	12	pF
Transition frequency at f = 35 MHz						
I_C = 50 mA; V_{CE} = 10 V	f_T	>	60	50	50	MHz
		typ.	140	160	185	MHz
h parameters at f = 1 kHz						
I_C = 10 mA; V_{CE} = 5 V						
Input impedance	h_{ie}	<	750	750	750	Ω
Reverse voltage transfer ratio	h_{re}	<	5.0	5.0	5.0	10^{-4}
Small signal current gain	h_{fe}	>	15	45	45	
		typ.	90	100	110	
Output admittance	h_{oe}	<	80	80	80	$\mu\Omega^{-1}$
I_C = 1 mA; V_{CE} = 5 V						
Small signal current gain	h_{fe}	>	10	30	30	
		typ.	60	65	70	

[1] Measured under pulsed conditions to avoid excessive dissipation.

MEASUREMENT OF SWITCHING TIMES

Fig.1 : Circuit diagram

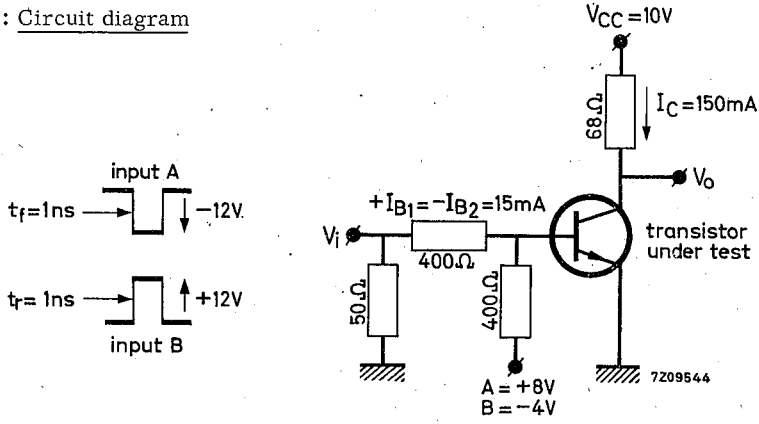
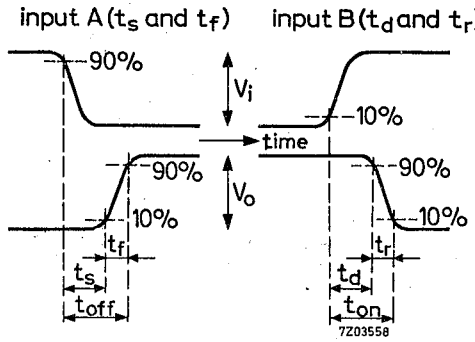


Fig.2 : Waveforms



Equipment Pulse generator: rise time t_r = 1 ns
pulse duration t_p = 1 μs

Double beam or
dual trace oscilloscope: rise time t_r < 5 ns