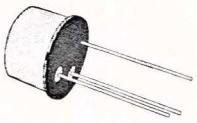
SGS-THOMSON MICROELECTRONICS

BFX38/BFX39 BFX40/BFX41

HIGH VOLTAGE, GENERAL PURPOSE TYPES

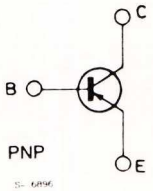
DESCRIPTION

The BFX38, BFX39, BFX40 and BFX41 are silicon planar epitaxial PNP transistors in Jedec TO-39 metal case, designed for a wide variety of applications. They are particulary useful as complementary drivers (BFY56A is a good complement) in output and switching applications where high voltage and high current are required.



TO-39

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		BFX38 BFX39	BFX40 BFX41	
V_{CBO}	Collector-base Voltage (I_E = 0)	– 55	– 75	V
V_{CEO}	Collector-emitter Voltage (I_B = 0)	– 55	– 75	V
V_{EBO}	Emitter-base Voltage (I_C = 0)	– 5		V
I_C	Collector Current	– 1		A
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25$ °C at $T_{case} \leq 25$ °C	0.8 4		W
T_{stg}, T_j	Storage and Junction Temperature	– 55 to 200		°C

THERMAL DATA

$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	44	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	219	°C/W

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C unless otherwise specified)

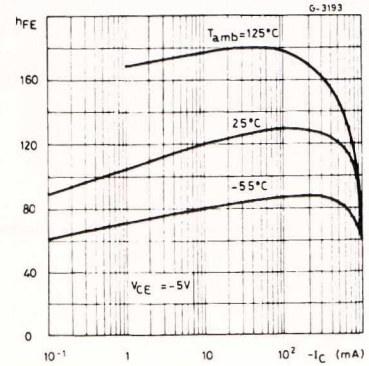
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current (I_E = 0)	for **BFX38 – BFX39**				
		V_{CB} = – 40 V		– 0.2	– 50	nA
		V_{CB} = – 40 V T_{amb} = 125 °C		– 0.25	– 50	µA
		for **BFX40 – BFX41**				
		V_{CB} = – 50 V		– 0.2	– 50	nA
		V_{CB} = – 50 V T_{amb} = 125 °C		– 0.25	– 50	µA
$V_{(BR)CBO}$	Collector-base Breakdown Voltage (I_E = 0)	I_C = – 10 µA				
		for **BFX38 – BFX39**	– 55			V
		for **BFX40 – BFX41**	– 75			V
$V_{(BR)CEO}$*	Collector-emitter Breakdown Voltage (I_B = 0)	I_C = – 10 mA				
		for **BFX38 – BFX39**	– 55			V
		for **BFX40 – BFX41**	– 75			V
$V_{(BR)EBO}$	Emitter-base Breakdown Voltage (I_C = 0)	I_E = – 10 µA	– 5			V
$V_{CE(sat)}$*	Collector-emitter Saturation Voltage	I_c = – 150 mA I_B = – 15 mA		– 0.12	– 0.15	V
		I_c = – 500 mA I_B = – 50 mA		– 0.3	– 0.5	V
$V_{BE\ (sat)}$*	Base-emitter Saturation Voltage	I_C = – 150 mA I_B = – 15 mA		– 0.8	– 0.9	V
		I_C = – 500 mA I_B = – 50 mA		– 0.9	– 1.1	V
h_{FE}*	DC Current Gain	for **BFX38 – BFX40**				
		I_C = – 100 µA V_{CE} = – 5 V	60	90		
		I_C = – 100 mA V_{CE} = – 5 V	85	130		
		I_C = – 500 mA V_{CE} = – 5 V	60	120		
		for **BFX39 – BFX41**				
		I_C = – 100 µA V_{CE} = – 5 V	30	45		
		I_C = – 100 mA V_{CE} = – 5 V	40	70		
		I_C = – 500 mA V_{CE} = – 5 V	25	65		
h_{FE}*	DC Current Gain	I_C = – 1 A V_{CE} = – 5 V				
		for **BFX38**	30			
		for **BFX39**	15			
		for **BFX40**	25			
		for **BFX41**	10			
		I_C = – 100 mA V_{CE} = – 5 V				
		T_{amb} = – 55 °C				
		for **BFX38 – BFX40**	30			
		for **BFX39 – BFX41**	15			
f_T	Transition Frequency	I_C = – 50 mA V_{CE} = – 10 V f = 100 MHz	100	150		MHz
C_{EBO}	Emitter-base Capacitance	I_C = 0 f = 1 MHz V_{EB} = – 0.5 V		75	120	pF
C_{CBO}	Collector-base Capacitance	I_E = 0 f = 1 MHz V_{CB} = – 0.5 V		15	20	pF
t_{on}**	Turn-on Time	I_C = – 500 mA I_{B1} = – 50 mA V_{CC} = – 30 V		33	100	ns

* Pulsed : pulse duration = 300 µs, duty cycle = 1 %.
** See test circuit.

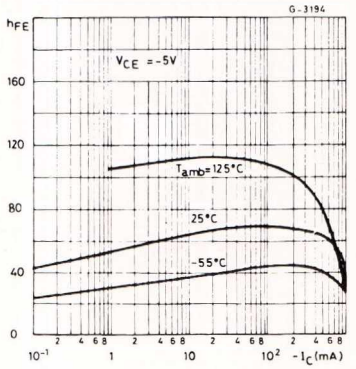
ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_s**	Storage Time	$I_C = -500$ mA $V_{CC} = -30$ V $I_{B1} = I_{B2} = -50$ mA		160	350	ns
t_f**	Fall Time	$I_C = -500$ mA $V_{CC} = -30$ V $I_{B1} = -I_{B2} = -50$ mA		27	50	ns

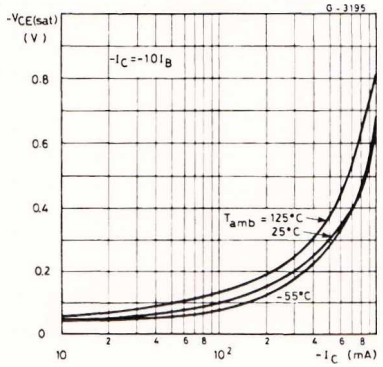
DC Current Gain (for BFX38 and BFX40 only).



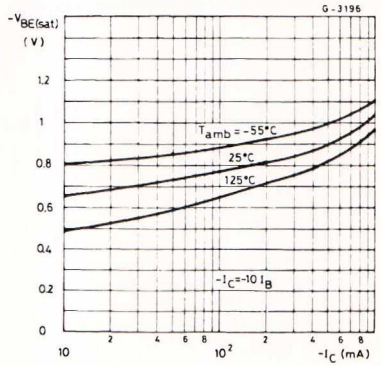
DC Current Gain (for BFX39 and BFX41 only).



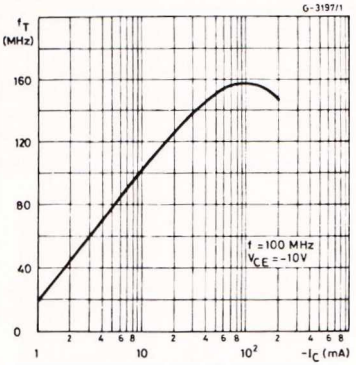
Collector-emitter Saturation Voltage.



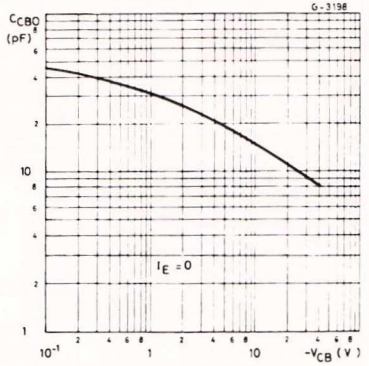
Base-emitter Saturation Voltage.



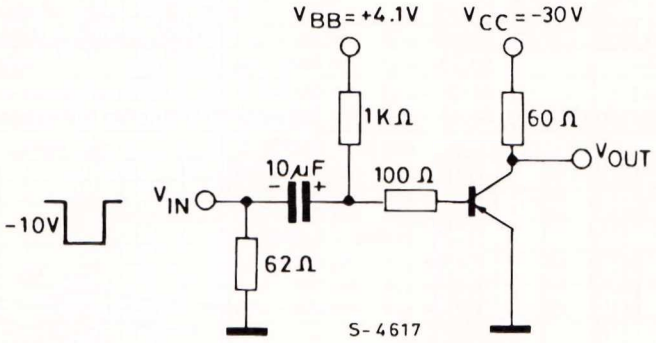
Transition Frequency.



Collector-base Capacitance.



Test Circuit for t_{on}, t_s, and t_f.



PULSE GENERATOR :
t_r, t_f < 20 ns
PW = 10 μs
Z_{IN} = 50 Ω
DC < 2 %

TO OSCILLOSCOPE:
t_r ≈ 10 ns
Z_{IN} > 100 KΩ