NPN switching transistors | BSX59; BSX61

FEATURES

- High current (max. 1 A)
- Low voltage (max. 45 V).

APPLICATIONS

- High-speed switching in industrial applications.

DESCRIPTION

NPN switching transistor in a TO-39 metal package.

PINNING

PIN	DESCRIPTION
1	emitter
2	base
3	collector, connected to case

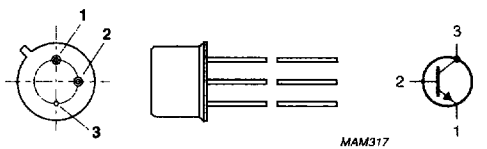

Fig.1 Simplified outline (TO-39) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	45	V
I_C	collector current (DC)		–	1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	800	mW
h_{FE}	DC current gain	I_C = 500 mA; V_{CE} = 1 V	30	–	
f_T	transition frequency	I_C = 50 mA; V_{CE} = 10 V; f = 100 MHz	250	–	MHz
t_{off}	turn-off time	I_{Con} = 500 mA; I_{Bon} = 50 mA; I_{Boff} = −50 mA			
	BSX59		–	60	ns
	BSX61		–	100	ns

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	70	V
V_{CEO}	collector-emitter voltage	open base	–	45	V
V_{EBO}	emitter-base voltage	open collector	–	5	V
I_C	collector current (DC)		–	1	A
I_{CM}	peak collector current		–	1	A
I_{BM}	peak base current		–	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	800	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C
T_{amb}	operating ambient temperature		–65	+150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air	220	K/W
$R_{th\ j\text{-}c}$	thermal resistance from junction to case		43	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 40 V	–	–	500	nA
		I_E = 0; V_{CB} = 40 V; T_j = 150 °C	–	–	300	μA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 4 V				
	BSX59		–	–	300	nA
	BSX61		–	–	500	nA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 4 V; T_j = 150 °C	–	–	50	μA
h_{FE}	DC current gain	I_C = 150 mA; V_{CE} = 1 V	30	–	–	
		I_C = 500 mA; V_{CE} = 1 V	30	–	90	
		I_C = 1 A; V_{CE} = 5 V	20	–	–	
V_{CEsat}	collector-emitter saturation voltage					
	BSX59	I_C = 150 mA; I_B = 15 mA	–	–	300	mV
		I_C = 500 mA; I_B = 50 mA	–	–	500	mV
		I_C = 1 A; I_B = 100 mA	–	–	1	V
V_{CEsat}	collector-emitter saturation voltage					
	BSX61	I_C = 150 mA; I_B = 15 mA	–	–	500	mV
		I_C = 500 mA; I_B = 50 mA	–	–	700	mV
		I_C = 1 A; I_B = 100 mA	–	–	1.3	V
V_{BEsat}	base-emitter saturation voltage	I_C = 150 mA; I_B = 15 mA	–	–	1	V
V_{BEsat}	base-emitter saturation voltage	I_C = 500 mA; I_B = 50 mA				
	BSX59		0.85	–	1.2	V
	BSX61		0.7	–	1.3	V
V_{BEsat}	base-emitter saturation voltage	I_C = 1 A; I_B = 100 mA	–	–	1.8	V
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 10 V; f = 1 MHz	–	6	10	pF
C_e	emitter capacitance	$I_C = i_c$ = 0; V_{EB} = 500 mV; f = 1 MHz	–	36	50	pF
f_T	transition frequency	I_C = 50 mA; V_{CE} = 10 V; f = 100 MHz	250	–	–	MHz
Switching times (between 10% and 90% levels)						
t_{on}	turn-on time	I_{Con} = 500 mA; I_{Bon} = 50 mA;				
	BSX59	I_{Boff} = −50 mA	–	17	35	ns
	BSX61		–	18	50	ns
t_{off}	turn-off time	I_{Con} = 500 mA; I_{Bon} = 50 mA;				
	BSX59	I_{Boff} = −50 mA	–	45	60	ns
	BSX61		–	70	100	ns