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NPN switching transistors

BCY58; BCY59

FEATURES

- Low current (max. 100 mA)
- Low voltage (max. 45 V).

APPLICATIONS

- Switching and amplification.

DESCRIPTION

NPN switching transistor in a TO-18 metal package.
PNP complements: BCY78 and BCY79.

PINNING

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

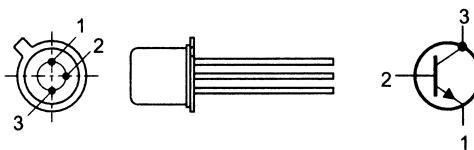


Fig.1 Simplified outline (TO-18) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage BCY58 BCY59	open emitter	—	—	32	V
			—	—	45	V
V_{CEO}	collector-emitter voltage BCY58 BCY59	open base	—	—	32	V
			—	—	45	V
I_C	collector current (DC)		—	—	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 45^\circ C$	—	—	340	mW
		$T_{case} \leq 45^\circ C$	—	—	1	W
h_{FE}	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	$I_C = 2 \text{ mA}; V_{CE} = 5 \text{ V}$	120 180 250 380	170 250 350 500	220 310 460 630	
f_T	transition frequency	$I_C = 10 \text{ mA}; V_{CE} = 5 \text{ V}; f = 100 \text{ MHz}$	150	—	—	MHz
t_{off}	turn-off time	$I_{Con} = 10 \text{ mA}; I_{Bon} = 1 \text{ mA}; I_{Boff} = -1 \text{ mA}$	—	480	800	ns
		$I_{Con} = 100 \text{ mA}; I_{Bon} = 10 \text{ mA}; I_{Boff} = -10 \text{ mA}$	—	450	800	ns

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{CBO}	collector-base voltage BCY58 BCY59	open emitter	— —	32 45	V V
V _{CEO}	collector-emitter voltage BCY58 BCY59	open base	— —	32 45	V V
V _{EBO}	emitter-base voltage	open collector	—	7	V
I _C	collector current (DC)		—	100	mA
I _{CM}	peak collector current		—	200	mA
I _{BM}	peak base current		—	200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 45 °C T _{case} ≤ 45 °C	— —	340 1	mW W
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-a}	thermal resistance from junction to ambient	in free air	450	K/W
R _{th j-c}	thermal resistance from junction to case		150	K/W

CHARACTERISTICST_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I _{CBO}	collector cut-off current BCY58	I _E = 0; V _{CB} = 32 V	—	—	10	nA
		I _E = 0; V _{CB} = 32 V; T _j = 150 °C	—	—	10	μA
I _{CBO}	collector cut-off current BCY59	I _E = 0; V _{CB} = 45 V	—	—	10	nA
		I _E = 0; V _{CB} = 45 V; T _j = 150 °C	—	—	10	μA
I _{EBO}	emitter cut-off current	I _C = 0; V _{EB} = 5 V	—	—	10	nA
h _{FE}	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	I _C = 10 μA; V _{CE} = 5 V	—	20	—	
			20	95	—	
			40	190	—	
			100	300	—	

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
h_{FE}	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	$I_C = 2 \text{ mA}; V_{CE} = 5 \text{ V}$	120 180 250 380	170 250 350 500	220 310 460 630	
h_{FE}	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	$I_C = 10 \text{ mA}; V_{CE} = 1 \text{ V}$	80 120 160 240	250 300 390 550	— 400 630 1000	
h_{FE}	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	$I_C = 100 \text{ mA}; V_{CE} = 1 \text{ V}$	40 45 60 60	— — — —	— — — —	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.25 \text{ mA}$	50	100	350	mV
		$I_C = 100 \text{ mA}; I_B = 2.5 \text{ mA}$	150	250	700	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.25 \text{ mA}$	600	700	850	mV
		$I_C = 100 \text{ mA}; I_B = 2.5 \text{ mA}$	750	875	1200	mV
C_c	collector capacitance	$I_E = i_e = 0; V_{CB} = 10 \text{ V}; f = 1 \text{ MHz}$	—	—	5	pF
C_e	emitter capacitance	$I_C = i_c = 0; V_{EB} = 500 \text{ mV}; f = 1 \text{ MHz}$	—	—	15	pF
f_T	transition frequency	$I_C = 10 \text{ mA}; V_{CE} = 5 \text{ V}; f = 100 \text{ MHz}$	150	—	—	MHz
F	noise figure	$I_C = 200 \mu\text{A}; V_{CE} = 5 \text{ V}; R_S = 2 \text{ k}\Omega; f = 1 \text{ kHz}; B = 200 \text{ Hz}$	—	—	10	dB

Switching times (between 10% and 90% levels)

t_{on}	turn-on time	$I_{Con} = 10 \text{ mA}; I_{Bon} = 1 \text{ mA}; I_{Boff} = -1 \text{ mA}$	—	85	150	ns
t_d	delay time		—	35	—	ns
t_r	rise time		—	50	—	ns
t_{off}	turn-off time		—	480	800	ns
t_s	storage time		—	400	—	ns
t_f	fall time		—	80	—	ns
t_{on}	turn-on time	$I_{Con} = 100 \text{ mA}; I_{Bon} = 10 \text{ mA}; I_{Boff} = -10 \text{ mA}$	—	55	150	ns
t_d	delay time		—	5	—	ns
t_r	rise time		—	50	—	ns
t_{off}	turn-off time		—	450	800	ns
t_s	storage time		—	250	—	ns
t_f	fall time		—	200	—	ns