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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

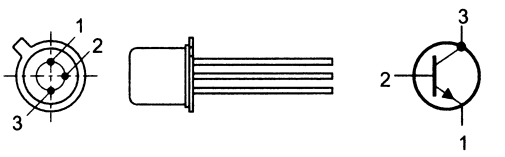

Fig.1 Simplified outline (TO-18) and symbol.

QUICK REFERENCE DATA

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

CHARACTERISTICS

$T_j = 25$ °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	$I_C = 10$ µA; $V_{CE} = 5$ V				
	BCY58/VII; BCY59/VII		–	20	–	
	BCY58/VIII; BCY59/VIII		20	95	–	
	BCY58/IX; BCY59/IX		40	190	–	
	BCY58/X; BCY59/X		100	300	–	

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
h_{FE}	DC current gain	I_C = 2 mA; V_{CE} = 5 V				
	BCY58/VII; BCY59/VII		120	170	220	
	BCY58/VIII; BCY59/VIII		180	250	310	
	BCY58/IX; BCY59/IX		250	350	460	
	BCY58/X; BCY59/X		380	500	630	
h_{FE}	DC current gain	I_C = 10 mA; V_{CE} = 1 V				
	BCY58/VII; BCY59/VII		80	250	–	
	BCY58/VIII; BCY59/VIII		120	300	400	
	BCY58/IX; BCY59/IX		160	390	630	
	BCY58/X; BCY59/X		240	550	1000	
h_{FE}	DC current gain	I_C = 100 mA; V_{CE} = 1 V				
	BCY58/VII; BCY59/VII		40	–	–	
	BCY58/VIII; BCY59/VIII		45	–	–	
	BCY58/IX; BCY59/IX		60	–	–	
	BCY58/X; BCY59/X		60	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.25 mA	50	100	350	mV
		I_C = 100 mA; I_B = 2.5 mA	150	250	700	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 0.25 mA	600	700	850	mV
		I_C = 100 mA; I_B = 2.5 mA	750	875	1200	mV
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 10 V; f = 1 MHz	–	–	5	pF
C_e	emitter capacitance	$I_C = i_c$ = 0; V_{EB} = 500 mV; f = 1 MHz	–	–	15	pF
f_T	transition frequency	I_C = 10 mA; V_{CE} = 5 V; f = 100 MHz	150	–	–	MHz
F	noise figure	I_C = 200 µA; V_{CE} = 5 V; R_S = 2 kΩ; f = 1 kHz; B = 200 Hz	–	–	10	dB
Switching times (between 10% and 90% levels)						
t_{on}	turn-on time	I_{Con} = 10 mA; I_{Bon} = 1 mA; I_{Boff} = –1 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 mA; I_{Bon} = 10 mA; I_{Boff} = –10 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