

**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

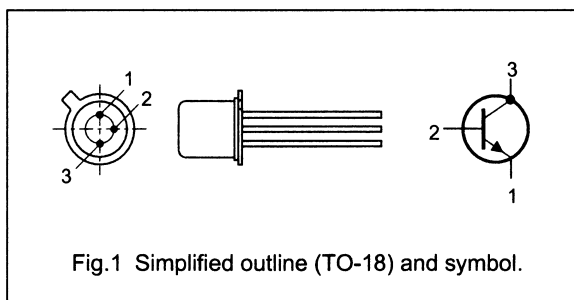


Fig.1 Simplified outline (TO-18) and symbol.

**QUICK REFERENCE DATA**

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
V <sub>CBO</sub>	collector-base voltage	open emitter					
	BCY58		–	–	32	V	
	BCY59		–	–	45	V	
V <sub>CEO</sub>	collector-emitter voltage	open base					
	BCY58		–	–	32	V	
	BCY59		–	–	45	V	
I <sub>C</sub>	collector current (DC)		–	–	100	mA	
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 45 °C	–	–	340	mW	
		T <sub>case</sub> ≤ 45 °C	–	–	1	W	
h <sub>FE</sub>	DC current gain	I <sub>C</sub> = 2 mA; V <sub>CE</sub> = 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 <sub>T</sub>	transition frequency	I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 5 V; f = 100 MHz	150	–	–	MHz	
t <sub>off</sub>	turn-off time	I <sub>Con</sub> = 10 mA; I <sub>Bon</sub> = 1 mA; I <sub>Boff</sub> = –1 mA	–	480	800	ns	
		I <sub>Con</sub> = 100 mA; I <sub>Bon</sub> = 10 mA; I <sub>Boff</sub> = –10 mA	–	450	800	ns	

**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CB0</sub>	collector-base voltage	open emitter	-	32	V
	BCY58			45	V
V <sub>CE0</sub>	collector-emitter voltage	open base	-	32	V
	BCY58			45	V
V <sub>EB0</sub>	emitter-base voltage	open collector	-	7	V
I <sub>C</sub>	collector current (DC)		-	100	mA
I <sub>CM</sub>	peak collector current		-	200	mA
I <sub>BM</sub>	peak base current		-	200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 45 °C	-	340	mW
		T <sub>case</sub> ≤ 45 °C	-	1	W
T <sub>stg</sub>	storage temperature		-65	+150	°C
T <sub>j</sub>	junction temperature		-	200	°C
T <sub>amb</sub>	operating ambient temperature		-65	+150	°C

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	thermal resistance from junction to ambient	in free air	450	K/W
R <sub>th j-c</sub>	thermal resistance from junction to case		150	K/W

**CHARACTERISTICS**T<sub>j</sub> = 25 °C unless otherwise specified.

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
h <sub>FE</sub>	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	I <sub>C</sub> = 2 mA; V <sub>CE</sub> = 5 V	120	170	220	
			180	250	310	
			250	350	460	
			380	500	630	
h <sub>FE</sub>	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 1 V	80	250	–	
			120	300	400	
			160	390	630	
			240	550	1000	
h <sub>FE</sub>	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	I <sub>C</sub> = 100 mA; V <sub>CE</sub> = 1 V	40	–	–	
			45	–	–	
			60	–	–	
			60	–	–	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.25 mA	50	100	350	mV
		I <sub>C</sub> = 100 mA; I <sub>B</sub> = 2.5 mA	150	250	700	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.25 mA	600	700	850	mV
		I <sub>C</sub> = 100 mA; I <sub>B</sub> = 2.5 mA	750	875	1200	mV
C <sub>c</sub>	collector capacitance	I <sub>E</sub> = I <sub>e</sub> = 0; V <sub>CB</sub> = 10 V; f = 1 MHz	–	–	5	pF
C <sub>e</sub>	emitter capacitance	I <sub>C</sub> = I <sub>c</sub> = 0; V <sub>EB</sub> = 500 mV; f = 1 MHz	–	–	15	pF
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 5 V; f = 100 MHz	150	–	–	MHz
F	noise figure	I <sub>C</sub> = 200 μA; V <sub>CE</sub> = 5 V; R <sub>S</sub> = 2 kΩ; f = 1 kHz; B = 200 Hz	–	–	10	dB
<b>Switching times (between 10% and 90% levels)</b>						
t <sub>on</sub>	turn-on time	I <sub>Con</sub> = 10 mA; I <sub>Bon</sub> = 1 mA; I <sub>Boff</sub> = –1 mA	–	85	150	ns
t <sub>d</sub>	delay time		–	35	–	ns
t <sub>r</sub>	rise time		–	50	–	ns
t <sub>off</sub>	turn-off time		–	480	800	ns
t <sub>s</sub>	storage time		–	400	–	ns
t <sub>f</sub>	fall time		–	80	–	ns
t <sub>on</sub>	turn-on time	I <sub>Con</sub> = 100 mA; I <sub>Bon</sub> = 10 mA; I <sub>Boff</sub> = –10 mA	–	55	150	ns
t <sub>d</sub>	delay time		–	5	–	ns
t <sub>r</sub>	rise time		–	50	–	ns
t <sub>off</sub>	turn-off time		–	450	800	ns
t <sub>s</sub>	storage time		–	250	–	ns
t <sub>f</sub>	fall time		–	200	–	ns