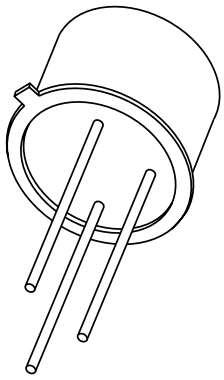
DATA SHEET



BCY58; BCY59
NPN switching transistors

Product specification
Supersedes data of September 1994
File under Discrete Semiconductors, SC04

1997 Jun 17

Philips
Semiconductors

PHILIPS

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

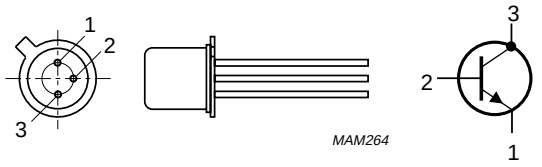


Fig.1 Simplified outline (TO-18) and symbol.

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

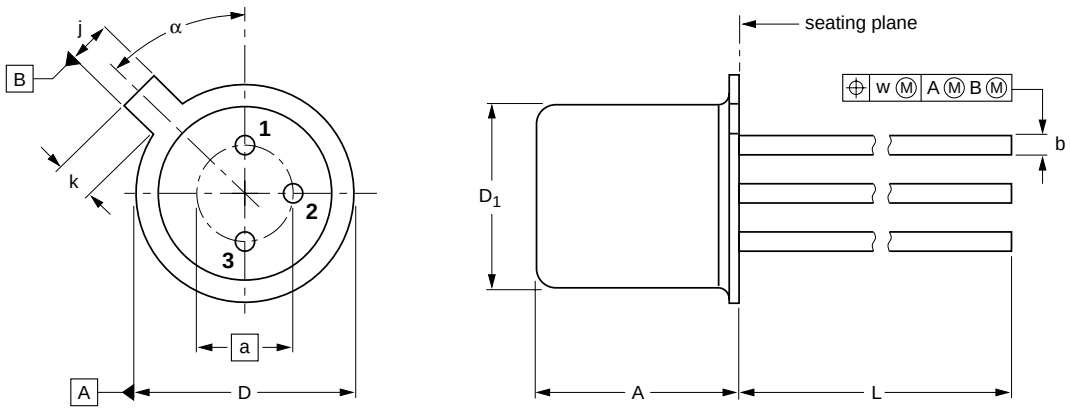
$T_j = 25$ °C unless otherwise specified.

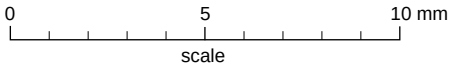
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current					
	BCY58	$I_E = 0$; $V_{CB} = 32$ V	–	–	10	nA
		$I_E = 0$; $V_{CB} = 32$ V; $T_j = 150$ °C	–	–	10	µA
I_{CBO}	collector cut-off current					
	BCY59	$I_E = 0$; $V_{CB} = 45$ V	–	–	10	nA
		$I_E = 0$; $V_{CB} = 45$ V; $T_j = 150$ °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

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads **SOT18/13**





DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	a	b	D	D_1	j	k	L	w	α
mm	5.31 4.74	2.54	0.47 0.41	5.45 5.30	4.70 4.55	1.03 0.94	1.1 0.9	15.0 12.7	0.40	45°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT18/13	B11/C7 type 3	TO-18				97-04-18

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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