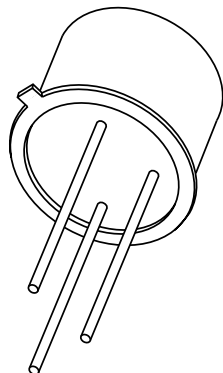


DATA SHEET



BCY58; BCY59 NPN switching transistors

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

1997 Jun 17

NPN switching transistors

BCY58; BCY59

FEATURES

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

APPLICATIONS

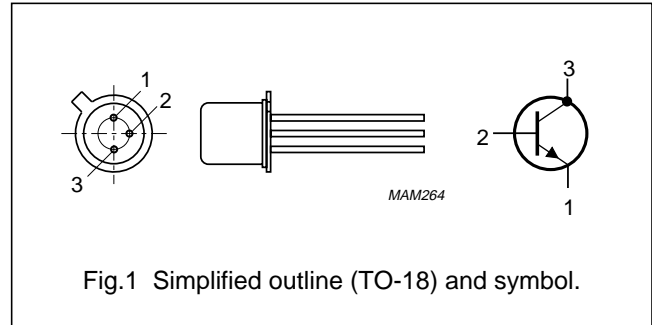
- Switching and amplification.

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



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	$T_{amb} \leq 45\text{ }^\circ\text{C}$	–	–	340	mW	
		$T_{case} \leq 45\text{ }^\circ\text{C}$	–	–	1	W	
h_{FE}	DC current gain	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$					
			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	$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$	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	

NPN switching transistors

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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} ≤ 45 °C	–	340	mW
		T _{case} ≤ 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-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	–	

NPN switching transistors

BCY58; BCY59

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
h_{FE}	DC current gain	$I_C = 2 \text{ mA}; V_{CE} = 5 \text{ V}$				
	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	$I_C = 10 \text{ mA}; V_{CE} = 1 \text{ V}$				
	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	$I_C = 100 \text{ mA}; V_{CE} = 1 \text{ V}$				
	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	$I_C = 10 \text{ mA}; I_B = 0.25 \text{ mA}$	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

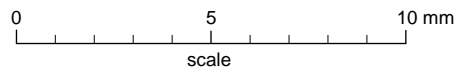
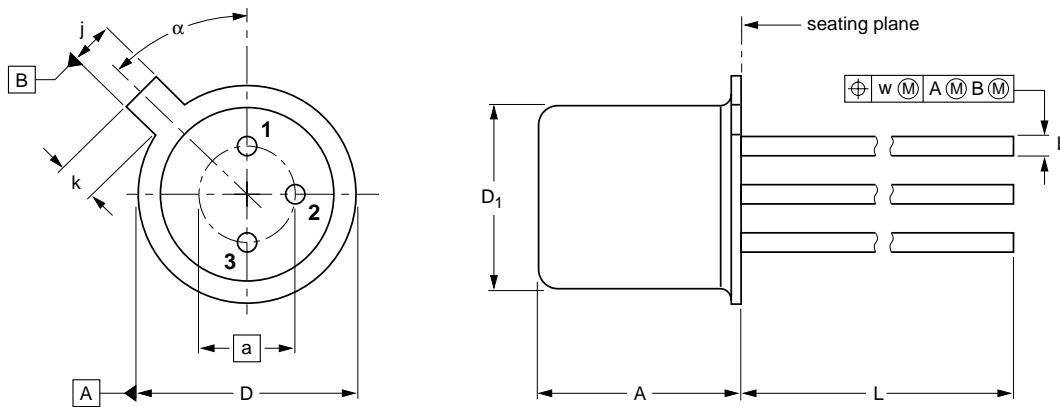
NPN switching transistors

BCY58; BCY59

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

NPN switching transistors

BCY58; BCY59

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.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.