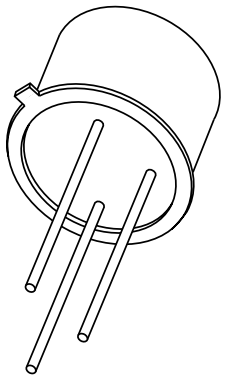
DATA SHEET



BCY78; BCY79
PNP switching transistors

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

1997 Jun 18

Philips
Semiconductors

PHILIPS

PNP switching transistors BCY78; BCY79

FEATURES

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

APPLICATIONS

- Switching and amplification.

DESCRIPTION

PNP switching transistor in a TO-18 metal package.
NPN complements: BCY58 and BCY59.

PINNING

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

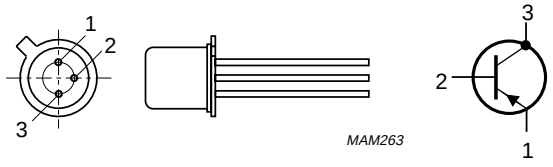


Fig.1 Simplified outline (TO-18) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter			
	BCY78		–	–32	V
	BCY79		–	–45	V
V_{CEO}	collector-emitter voltage	open base			
	BCY78		–	–32	V
	BCY79		–	–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			
	BCY78/VII; BCY79/VII		120	220	
	BCY78/VIII; BCY79/VIII		180	310	
	BCY78/IX; BCY79/IX		250	460	
	BCY78/X		380	630	
f_T	transition frequency	$I_C = -10$ mA; $V_{CE} = -5$ V	100	–	MHz
t_{off}	turn-off time	$I_{Con} = -100$ mA; $I_{Bon} = -10$ mA; $I_{Boff} = 10$ mA	–	400	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			
	BCY78		–	–32	V
	BCY79		–	–45	V
V_{CEO}	collector-emitter voltage	open base			
	BCY78		–	–32	V
	BCY79		–	–45	V
V_{EBO}	emitter-base voltage	open collector		–5	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

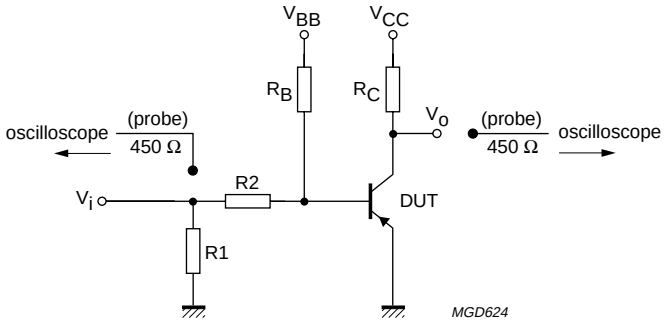
SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air	450	K/W
$R_{th\ j\text{-}c}$	thermal resistance from junction to case		150	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current					
	BCY78	I_E = 0; V_{CB} = –32 V	–	–2	–15	nA
		I_E = 0; V_{CB} = –32 V; T_{amb} = 150 °C	–	–	–10	μA
I_{CBO}	collector cut-off current					
	BCY79	I_E = 0; V_{CB} = –45 V	–	–2	–15	nA
		I_E = 0; V_{CB} = –45 V; T_{amb} = 150 °C	–	–	–10	μA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = –5 V	–	–	–20	nA
h_{FE}	DC current gain	I_C = –10 μA; V_{CE} = –5 V				
	BCY78/VII; BCY79/VII		–	140	–	
	BCY78/VIII; BCY79/VIII		30	200	–	
	BCY78/IX; BCY79/IX		40	270	–	
	BCY78/X		100	340	–	
h_{FE}	DC current gain	I_C = –2 mA; V_{CE} = –5 V				
	BCY78/VII; BCY79/VII		120	170	220	
	BCY78/VIII; BCY79/VIII		180	250	310	
	BCY78/IX; BCY79/IX		250	350	460	
	BCY78/X		380	500	630	
h_{FE}	DC current gain	I_C = –10 mA; V_{CE} = –1 V				
	BCY78/VII; BCY79/VII		80	180	–	
	BCY78/VIII; BCY79/VIII		120	260	400	
	BCY78/IX; BCY79/IX		160	360	630	
	BCY78/X		240	500	1000	
h_{FE}	DC current gain	I_C = –100 mA; V_{CE} = –1 V				
	BCY78/VII; BCY79/VII		40	–	–	
	BCY78/VIII; BCY79/VIII		45	–	–	
	BCY78/IX; BCY79/IX		60	–	–	
	BCY78/X		60	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = –10 mA; I_B = –250 μA	–	–120	–250	mV
		I_C = –100 mA; I_B = –2.5 mA	–	–400	–800	mV
V_{BEsat}	base-emitter saturation voltage	I_C = –10 mA; I_B = –250 μA	–600	–700	–850	mV
		I_C = –100 mA; I_B = –2.5 mA	–700	–850	–1200	mV
V_{BE}	base-emitter voltage	I_C = –10 μA; V_{CE} = –5 V	–	–550	–	mV
		I_C = –2 mA; V_{CE} = –5 V	–600	–650	–750	mV
		I_C = –10 mA; V_{CE} = –1 V	–	–650	–	mV
		I_C = –100 mA; V_{CE} = –1 V	–	–750	–	mV
C_c	collector capacitance	I_E = i_e = 0; V_{CB} = –10 V; f = 1 MHz	–	–	7	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	100	–	–	MHz

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
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); see Fig.2						
t_{on}	turn-on time	I_{Con} = –10 mA; I_{Bon} = –1 mA; I_{Boff} = 1 mA; test conditions A	–	–	100	ns
t_d	delay time		–	–	50	ns
t_r	rise time		–	–	50	ns
t_{off}	turn-off time		–	–	700	ns
t_s	storage time		–	–	600	ns
t_f	fall time		–	–	100	ns
t_{on}	turn-on time	I_{Con} = –100 mA; I_{Bon} = –10 mA; I_{Boff} = 10 mA; test conditions B	–	–	100	ns
t_d	delay time		–	–	35	ns
t_r	rise time		–	–	65	ns
t_{off}	turn-off time		–	–	400	ns
t_s	storage time		–	–	300	ns
t_f	fall time		–	–	100	ns



Test conditions A

V_i = –5 V; T = 500 μs; t_p = 10 μs; t_r = t_f ≤ 3 ns.
R1 = 56 Ω; R2 = 2.5 kΩ; R_B = 3.9 kΩ; R_C = 270 Ω.
V_{BB} = 1.9 V; V_{CC} = –3 V
Oscilloscope input impedance Z_i = 50 Ω.

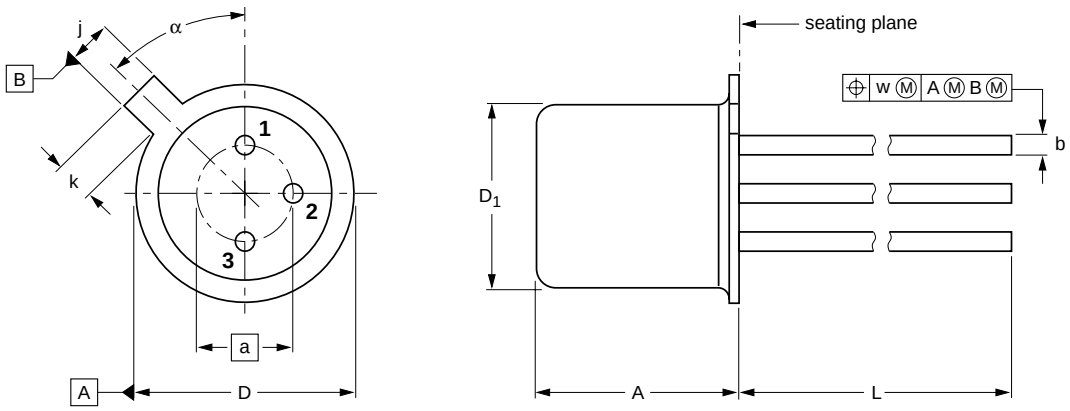
Test conditions B

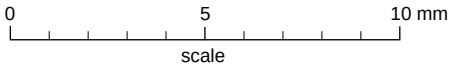
V_i = –9.8 V; T = 500 μs; t_p = 10 μs; t_r = t_f ≤ 3 ns.
R1 = 62 Ω; R2 = 470 Ω; R_B = 470 Ω; R_C = 100 Ω.
V_{BB} = 3.4 V; V_{CC} = –10.8 V
Oscilloscope input impedance Z_i = 50 Ω.

Fig.2 Test circuit for switching times.

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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