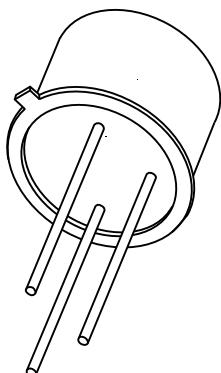


# **DATA SHEET**



## **BCY78; BCY79 PNP switching transistors**

Product specification

1997 Jun 18

Supersedes data of September 1994

File under Discrete Semiconductors, SC04

**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

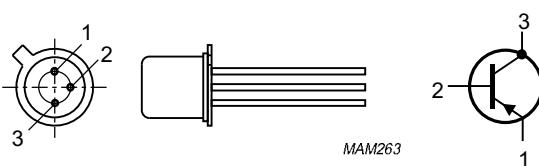


Fig.1 Simplified outline (TO-18) and symbol.

**QUICK REFERENCE DATA**

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage BCY78 BCY79	open emitter	–	-32 –45	V V
$V_{CEO}$	collector-emitter voltage BCY78 BCY79	open base	–	-32 –45	V V
$I_C$	collector current (DC)		–	-100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 45^\circ\text{C}$ $T_{case} \leq 45^\circ\text{C}$	–	340 1	mW W
$h_{FE}$	DC current gain BCY78/VII; BCY79/VII BCY78/VIII; BCY79/VIII BCY78/IX; BCY79/IX BCY78/X	$I_C = -2 \text{ mA}; V_{CE} = -5 \text{ V}$	120 180 250 380	220 310 460 630	
$f_T$	transition frequency	$I_C = -10 \text{ mA}; V_{CE} = -5 \text{ V}$	100	–	MHz
$t_{off}$	turn-off time	$I_{Con} = -100 \text{ mA}; I_{Bon} = -10 \text{ mA}; I_{Boff} = 10 \text{ mA}$	–	400	ns

## PNP switching transistors

BCY78; BCY79

**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage BCY78 BCY79	open emitter	–	-32	V
$V_{CEO}$	collector-emitter voltage BCY78 BCY79	open base	–	-32	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	$T_{amb} \leq 45^\circ\text{C}$	–	340	mW
		$T_{case} \leq 45^\circ\text{C}$	–	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

## PNP switching transistors

BCY78; BCY79

## CHARACTERISTICS

 $T_{amb} = 25^\circ C$  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	
		$I_E = 0; V_{CB} = -32 V; T_{amb} = 150^\circ C$	—	—	-10	$\mu A$	
$I_{CBO}$	collector cut-off current BCY79	$I_E = 0; V_{CB} = -45 V$	—	-2	-15	nA	
		$I_E = 0; V_{CB} = -45 V; T_{amb} = 150^\circ C$	—	—	-10	$\mu A$	
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = -5 V$	—	—	-20	nA	
$h_{FE}$	DC current gain BCY78/VII; BCY79/VII BCY78/VIII; BCY79/VIII BCY78/IX; BCY79/IX BCY78/X	$I_C = -10 \mu A; V_{CE} = -5 V$	—	140	—		
			30	200	—		
			40	270	—		
			100	340	—		
$h_{FE}$	DC current gain BCY78/VII; BCY79/VII BCY78/VIII; BCY79/VIII BCY78/IX; BCY79/IX BCY78/X	$I_C = -2 mA; V_{CE} = -5 V$	120	170	220		
			180	250	310		
			250	350	460		
			380	500	630		
			80	180	—		
$h_{FE}$	DC current gain BCY78/VII; BCY79/VII BCY78/VIII; BCY79/VIII BCY78/IX; BCY79/IX BCY78/X	$I_C = -10 mA; V_{CE} = -1 V$	120	260	400		
			160	360	630		
			240	500	1000		
			40	—	—		
			45	—	—		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -10 mA; I_B = -250 \mu A$	—	-120	-250	mV	
		$I_C = -100 mA; I_B = -2.5 mA$	—	-400	-800	mV	
	base-emitter saturation voltage	$I_C = -10 mA; I_B = -250 \mu A$	-600	-700	-850	mV	
		$I_C = -100 mA; I_B = -2.5 mA$	-700	-850	-1200	mV	
	base-emitter voltage	$I_C = -10 \mu A; V_{CE} = -5 V$	—	-550	—	mV	
$V_{BE}$		$I_C = -2 mA; V_{CE} = -5 V$	-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	

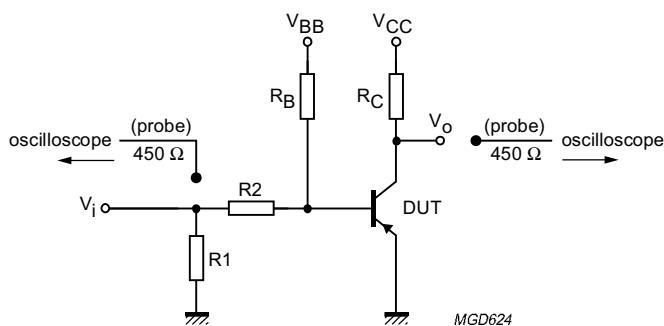
## PNP switching transistors

BCY78; BCY79

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
F	noise figure	$I_C = -200 \mu A$ ; $V_{CE} = -5 V$ ; $R_S = 2 k\Omega$ ; $f = 1 kHz$ ; $B = 200 Hz$	-	-	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**

$V_i = -5 V$ ;  $T = 500 \mu s$ ;  $t_p = 10 \mu s$ ;  $t_r = t_f \leq 3 ns$ .  
 $R1 = 56 \Omega$ ;  $R2 = 2.5 k\Omega$ ;  $R_B = 3.9 k\Omega$ ;  $R_C = 270 \Omega$ .  
 $V_{BB} = 1.9 V$ ;  $V_{CC} = -3 V$   
Oscilloscope input impedance  $Z_i = 50 \Omega$ .

**Test conditions B**

$V_i = -9.8 V$ ;  $T = 500 \mu s$ ;  $t_p = 10 \mu s$ ;  $t_r = t_f \leq 3 ns$ .  
 $R1 = 62 \Omega$ ;  $R2 = 470 \Omega$ ;  $R_B = 470 \Omega$ ;  $R_C = 100 \Omega$ .  
 $V_{BB} = 3.4 V$ ;  $V_{CC} = -10.8 V$   
Oscilloscope input impedance  $Z_i = 50 \Omega$ .

Fig.2 Test circuit for switching times.

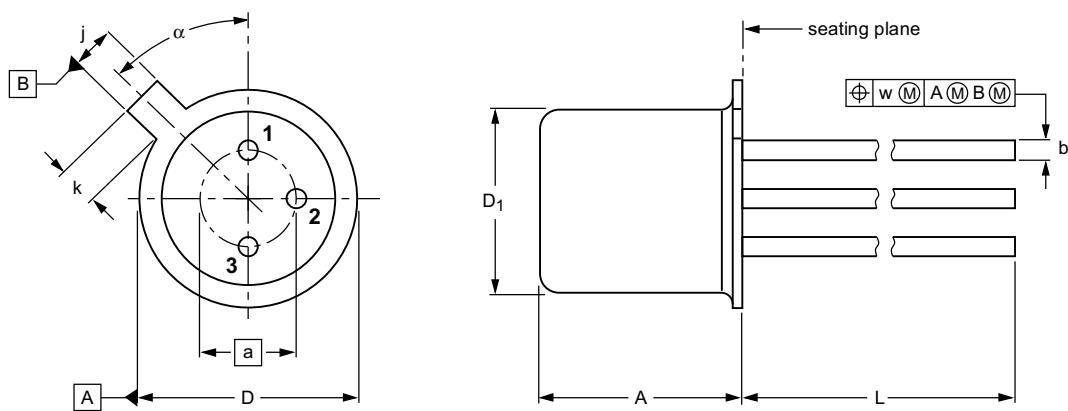
## PNP switching transistors

BCY78; BCY79

## PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT18/13



0                    5                    10 mm  
scale

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

UNIT	A	a	b	D	D <sub>1</sub>	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

**PNP switching transistors****BCY78; BCY79****DEFINITIONS**

<b>Data sheet status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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