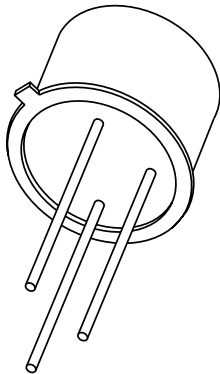


DATA SHEET



BCY78; BCY79 PNP switching transistors

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

1997 Jun 18

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

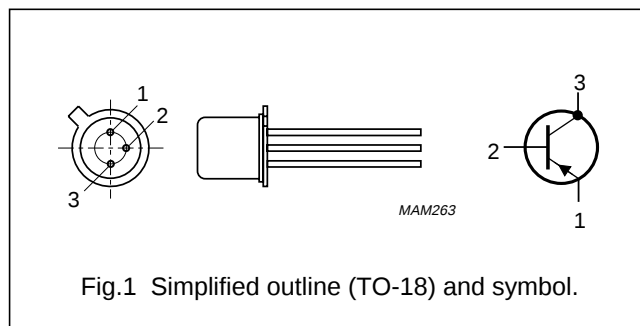


Fig.1 Simplified outline (TO-18) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	—	—32	V
	BCY78			—45	V
V_{CEO}	collector-emitter voltage	open base	—	—32	V
	BCY78			—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	$I_C = -2\text{ mA}; V_{CE} = -5\text{ V}$	120	220	
	BCY78/VII; BCY79/VII				
	BCY78/VIII; BCY79/VIII				
	BCY78/IX; BCY79/IX				
	BCY78/X				
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	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} ≤ 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

PNP switching transistors

BCY78; BCY79

CHARACTERISTICS

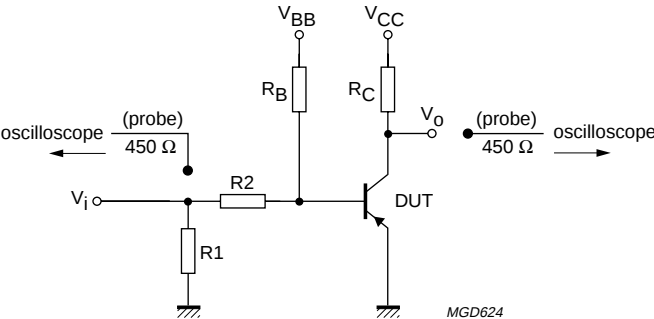
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

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

PNP switching transistors

BCY78; BCY79

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
F	noise figure	$I_C = -200\text{ }\mu\text{A}$; $V_{CE} = -5\text{ V}$; $R_S = 2\text{ k}\Omega$; $f = 1\text{ kHz}$; $B = 200\text{ Hz}$	–	–	10	dB
Switching times (between 10% and 90% levels); see Fig.2						
t_{on}	turn-on time	$I_{Con} = -10\text{ mA}$; $I_{Bon} = -1\text{ mA}$; $I_{Boff} = 1\text{ mA}$; 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	$I_{Con} = -100\text{ mA}$; $I_{Bon} = -10\text{ mA}$; $I_{Boff} = 10\text{ mA}$; 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
 $V_i = -5\text{ V}$; $T = 500\text{ }\mu\text{s}$; $t_p = 10\text{ }\mu\text{s}$; $t_r = t_f \leq 3\text{ ns}$.
 $R_1 = 56\text{ }\Omega$; $R_2 = 2.5\text{ k}\Omega$; $R_B = 3.9\text{ k}\Omega$; $R_C = 270\text{ }\Omega$.
 $V_{BB} = 1.9\text{ V}$; $V_{CC} = -3\text{ V}$
Oscilloscope input impedance $Z_i = 50\text{ }\Omega$.

Test conditions B
 $V_i = -9.8\text{ V}$; $T = 500\text{ }\mu\text{s}$; $t_p = 10\text{ }\mu\text{s}$; $t_r = t_f \leq 3\text{ ns}$.
 $R_1 = 62\text{ }\Omega$; $R_2 = 470\text{ }\Omega$; $R_B = 470\text{ }\Omega$; $R_C = 100\text{ }\Omega$.
 $V_{BB} = 3.4\text{ V}$; $V_{CC} = -10.8\text{ V}$
Oscilloscope input impedance $Z_i = 50\text{ }\Omega$.

Fig.2 Test circuit for switching times.

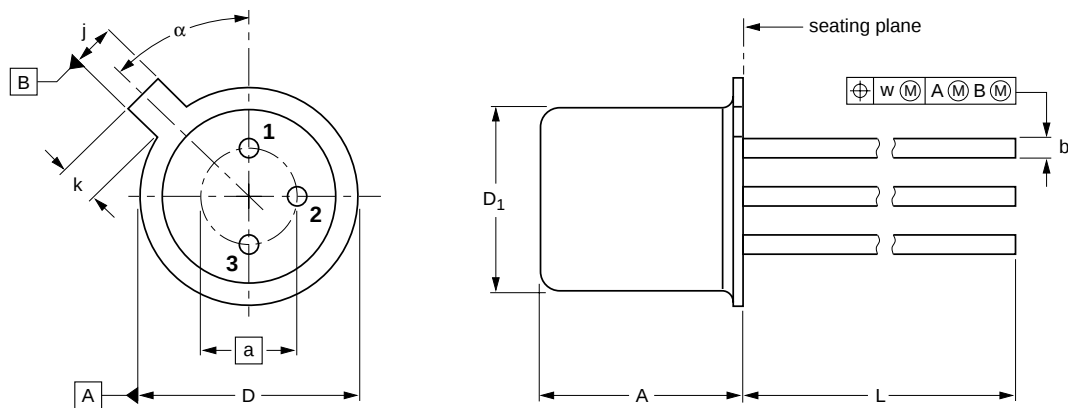
PNP switching transistors

BCY78; BCY79

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT18/13



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

PNP switching transistors

BCY78; BCY79

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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