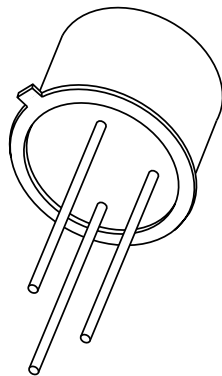


# DATA SHEET



## **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

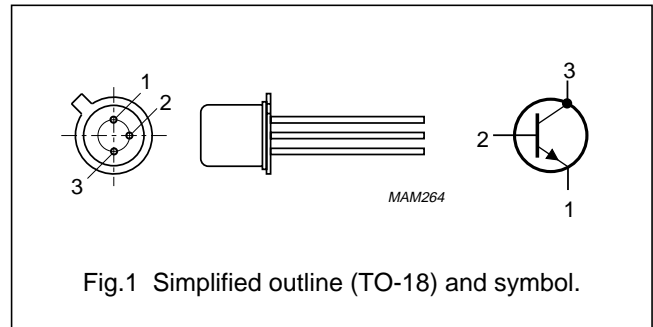
- Switching and amplification.

### 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 <sub>CBO</sub>	collector-base voltage	open emitter				
	BCY58		–	–	32	V
	BCY59		–	–	45	V
V <sub>CEO</sub>	collector-emitter voltage	open base				
	BCY58		–	–	32	V
	BCY59		–	–	45	V
I <sub>C</sub>	collector current (DC)		–	–	100	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 45 °C	–	–	340	mW
		T <sub>case</sub> ≤ 45 °C	–	–	1	W
h <sub>FE</sub>	DC current gain	I <sub>C</sub> = 2 mA; V <sub>CE</sub> = 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 <sub>T</sub>	transition frequency	I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 5 V; f = 100 MHz	150	–	–	MHz
t <sub>off</sub>	turn-off time	I <sub>Con</sub> = 10 mA; I <sub>Bon</sub> = 1 mA; I <sub>Boff</sub> = –1 mA	–	480	800	ns
		I <sub>Con</sub> = 100 mA; I <sub>Bon</sub> = 10 mA; I <sub>Boff</sub> = –10 mA	–	450	800	ns

## NPN switching transistors

## BCY58; BCY59

**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage BCY58 BCY59	open emitter	–	32	V
			–	45	V
V <sub>CEO</sub>	collector-emitter voltage BCY58 BCY59	open base	–	32	V
			–	45	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	7	V
I <sub>C</sub>	collector current (DC)		–	100	mA
I <sub>CM</sub>	peak collector current		–	200	mA
I <sub>BM</sub>	peak base current		–	200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 45 °C	–	340	mW
		T <sub>case</sub> ≤ 45 °C	–	1	W
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	200	°C
T <sub>amb</sub>	operating ambient temperature		–65	+150	°C

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	thermal resistance from junction to ambient	in free air	450	K/W
R <sub>th j-c</sub>	thermal resistance from junction to case		150	K/W

**CHARACTERISTICS**T<sub>j</sub> = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I <sub>CBO</sub>	collector cut-off current BCY58	I <sub>E</sub> = 0; V <sub>CB</sub> = 32 V	–	–	10	nA
		I <sub>E</sub> = 0; V <sub>CB</sub> = 32 V; T <sub>j</sub> = 150 °C	–	–	10	μA
I <sub>CBO</sub>	collector cut-off current BCY59	I <sub>E</sub> = 0; V <sub>CB</sub> = 45 V	–	–	10	nA
		I <sub>E</sub> = 0; V <sub>CB</sub> = 45 V; T <sub>j</sub> = 150 °C	–	–	10	μA
I <sub>EBO</sub>	emitter cut-off current	I <sub>C</sub> = 0; V <sub>EB</sub> = 5 V	–	–	10	nA
h <sub>FE</sub>	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	I <sub>C</sub> = 10 μA; V <sub>CE</sub> = 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 BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/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 BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	$I_C = 10 \text{ mA}; V_{CE} = 1 \text{ V}$	80	250	–	
			120	300	400	
			160	390	630	
			240	550	1000	
$h_{FE}$	DC current gain BCY58/VII; BCY59/VII BCY58/VIII; BCY59/VIII BCY58/IX; BCY59/IX BCY58/X; BCY59/X	$I_C = 100 \text{ mA}; V_{CE} = 1 \text{ V}$	40	–	–	
			45	–	–	
			60	–	–	
			60	–	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.25 \text{ mA}$	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
<b>Switching times (between 10% and 90% levels)</b>						
$t_{on}$	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

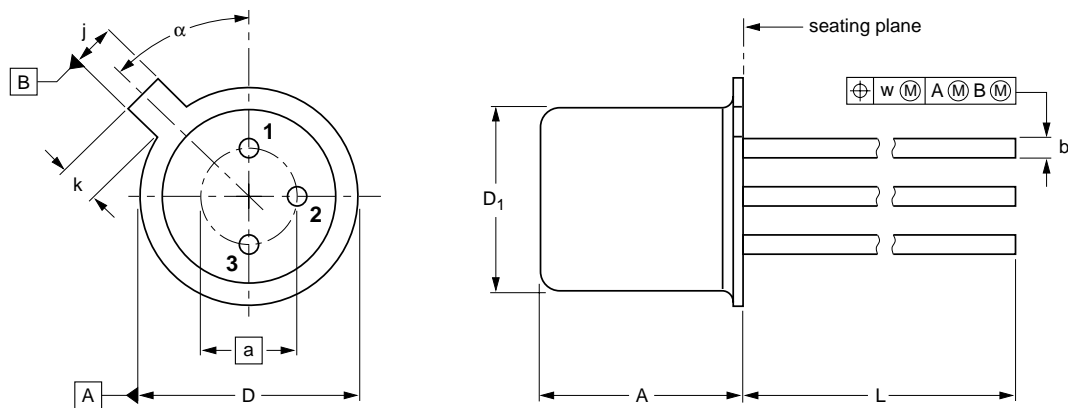
NPN switching transistors

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 <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

## NPN switching transistors

BCY58; BCY59

**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.	
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Where application information is given, it is advisory and does not form part of the specification.	

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NPN switching transistors

BCY58; BCY59

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