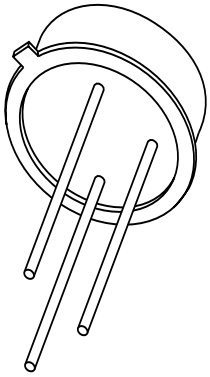
DATA SHEET



BC107; BC108; BC109
NPN general purpose transistors

Product specification
1997 Sep 03
Supersedes data of 1997 Jun 03
File under Discrete Semiconductors, SC04

Philips
Semiconductors

PHILIPS

NPN general purpose transistors BC107; BC108; BC109

FEATURES

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

APPLICATIONS

- General purpose switching and amplification.

DESCRIPTION

NPN transistor in a TO-18; SOT18 metal package.
PNP complement: BC177.

PINNING

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

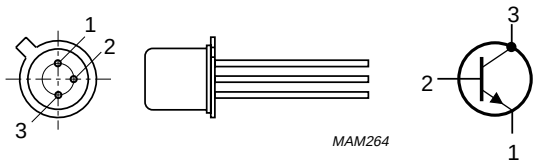


Fig.1 Simplified outline (TO-18; SOT18) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter			
	BC107		–	50	V
	BC108; BC109		–	30	V
V_{CEO}	collector-emitter voltage	open base			
	BC107		–	45	V
	BC108; BC109		–	20	V
I_{CM}	peak collector current		–	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	300	mW
h_{FE}	DC current gain	I_C = 2 mA; V_{CE} = 5 V			
	BC107		110	450	
	BC108		110	800	
	BC109		200	800	
f_T	transition frequency	I_C = 10 mA; V_{CE} = 5 V; f = 100 MHz	100	–	MHz

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			
	BC107		–	50	V
	BC108; BC109		–	30	V
V_{CEO}	collector-emitter voltage	open base			
	BC107		–	45	V
	BC108; BC109		–	20	V
V_{EBO}	emitter-base voltage	open collector			
	BC107		–	6	V
	BC108; BC109		–	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	$T_{amb} \leq 25$ °C	–	300	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	175	°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	note 1	0.5	K/mW
$R_{th\ j\text{-}c}$	thermal resistance from junction to case		0.2	K/mW

Note

1. Transistor mounted on an FR4 printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

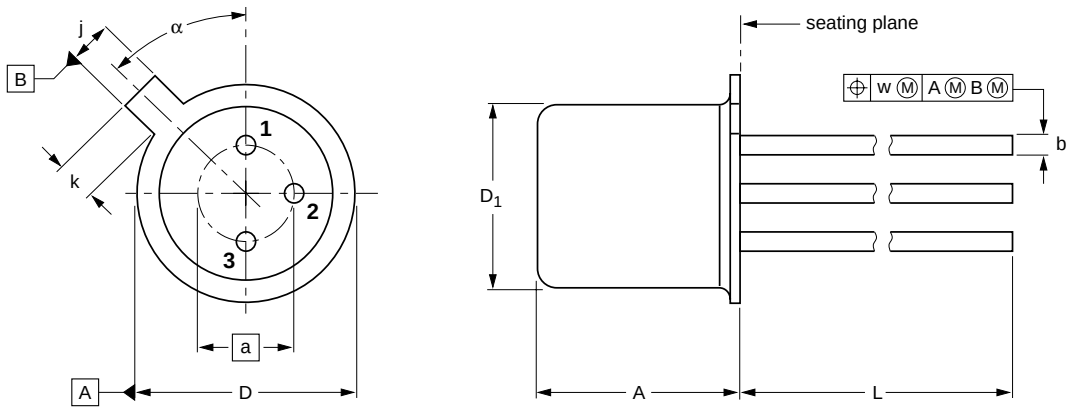
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 20 V	–	–	15	nA
		I_E = 0; V_{CB} = 20 V; T_j = 150 °C	–	–	15	µA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 5 V	–	–	50	nA
h_{FE}	DC current gain	I_C = 10 µA; V_{CE} = 5 V				
	BC107A; BC108A		–	90	–	
	BC107B; BC108B; BC109B		40	150	–	
	BC108C; BC109C		100	270	–	
h_{FE}	DC current gain	I_C = 2 mA; V_{CE} = 5 V				
	BC107A; BC108A		110	180	220	
	BC107B; BC108B; BC109B		200	290	450	
	BC108C; BC109C		420	520	800	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA	–	90	250	mV
		I_C = 100 mA; I_B = 5 mA	–	200	600	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA; note 1	–	700	–	mV
		I_C = 100 mA; I_B = 5 mA; note 1	–	900	–	mV
V_{BE}	base-emitter voltage	I_C = 2 mA; V_{CE} = 5 V; note 2	550	620	700	mV
		I_C = 10 mA; V_{CE} = 5 V; note 2	–	–	770	mV
C_c	collector capacitance	I_E = i_e = 0; V_{CB} = 10 V; f = 1 MHz	–	2.5	6	pF
C_e	emitter capacitance	I_C = i_c = 0; V_{EB} = 0.5 V; f = 1 MHz	–	9	–	pF
f_T	transition frequency	I_C = 10 mA; V_{CB} = 5 V; f = 100 MHz	100	–	–	MHz
F	noise figure	I_C = 200 µA; V_{CE} = 5 V; R_S = 2 kΩ; f = 30 Hz to 15.7 kHz				
	BC109B; BC109C		–	–	4	dB
F	noise figure	I_C = 200 µA; V_{CE} = 5 V; R_S = 2 kΩ; f = 1 kHz; B = 200 Hz				
	BC107A; BC108A BC107B; BC108B; BC108C		–	–	10	dB
	BC109B; BC109C		–	–	4	dB

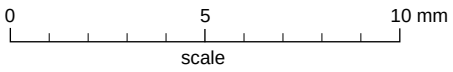
Notes

1. V_{BEsat} decreases by about 1.7 mV/K with increasing temperature.
2. V_{BE} decreases by about 2 mV/K with increasing temperature.

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