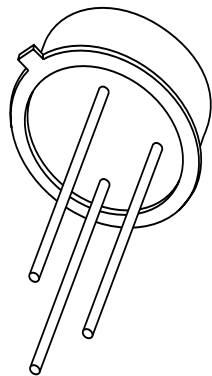


# DATA SHEET



## **BC107; BC108; BC109** NPN general purpose transistors

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

1997 Sep 03

# 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

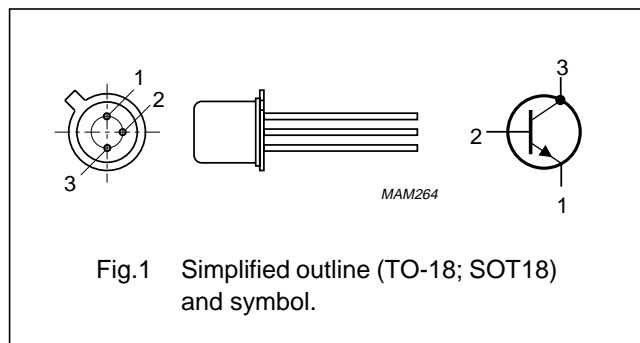


Fig.1 Simplified outline (TO-18; SOT18) and symbol.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter			
	BC107		–	50	V
	BC108; BC109		–	30	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	BC107		–	45	V
	BC108; BC109		–	20	V
I <sub>CM</sub>	peak collector current		–	200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	–	300	mW
h <sub>FE</sub>	DC current gain	I <sub>C</sub> = 2 mA; V <sub>CE</sub> = 5 V			
	BC107		110	450	
	BC108		110	800	
	BC109		200	800	
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 5 V; f = 100 MHz	100	–	MHz

## NPN general purpose transistors

## BC107; BC108; BC109

**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	open emitter	–	50	V
	BC107 BC108; BC109			30	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	45	V
	BC107 BC108; BC109			20	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	6	V
	BC107 BC108; BC109			5	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> ≤ 25 °C	–	300	mW
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	175	°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	note 1	0.5	K/mW
R <sub>th j-c</sub>	thermal resistance from junction to case		0.2	K/mW

**Note**

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

## NPN general purpose transistors

## BC107; BC108; BC109

**CHARACTERISTICS**

$T_j = 25\text{ °C}$  unless otherwise specified.

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

**Notes**

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

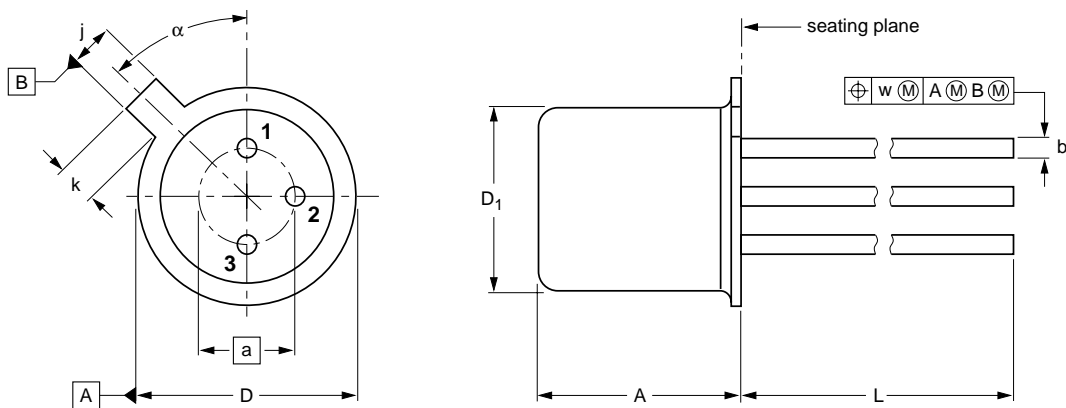
NPN general purpose transistors

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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	$\alpha$
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 general purpose transistors

BC107; BC108; BC109

**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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NPN general purpose transistors

BC107; BC108; BC109

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