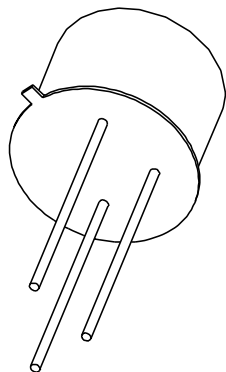


# DATA SHEET



## **BC140; BC141** NPN medium power transistors

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

1997 May 12

# NPN medium power transistors

# BC140; BC141

### FEATURES

- High current (max. 1 A)
- Low voltage (max. 60 V).

### APPLICATIONS

- General purpose switching and amplification.

### DESCRIPTION

NPN medium power transistor in a TO-39 metal package.  
PNP complements: BC160 and BC161.

### PINNING

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

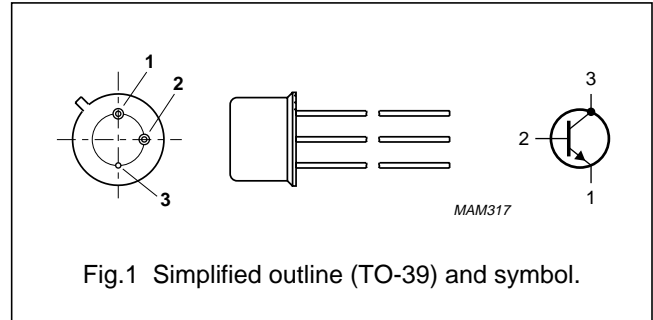


Fig.1 Simplified outline (TO-39) and symbol.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter				
	BC140		–	–	80	V
	BC141		–	–	100	V
$V_{CEO}$	collector-emitter voltage	open base				
	BC140		–	–	40	V
	BC141		–	–	60	V
$I_{CM}$	peak collector current		–	–	1.5	A
$P_{tot}$	total power dissipation	$T_{case} \leq 45\text{ }^{\circ}\text{C}$	–	–	3.7	W
$h_{FE}$	DC current gain	$I_C = 100\text{ mA}; V_{CE} = 1\text{ V}$				
	BC140-10; BC141-10		63	100	160	
	BC140-16; BC141-16		100	160	250	
$f_T$	transition frequency	$I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 100\text{ MHz}$	50	–	–	MHz

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**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	–	80	V
	BC140			100	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	40	V
	BC140			60	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	7	V
I <sub>C</sub>	collector current (DC)		–	1	A
I <sub>CM</sub>	peak collector current		–	1.5	A
I <sub>BM</sub>	peak base current		–	200	mA
P <sub>tot</sub>	total power dissipation	T <sub>case</sub> ≤ 45 °C	–	3.7	W
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	in free air	200	K/W
R <sub>th j-c</sub>	thermal resistance from junction to case		35	K/W

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**CHARACTERISTICS**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0; V_{CB} = 60\text{ V}$	–	10	100	nA
		$I_E = 0; V_{CB} = 60\text{ V}; T_j = 150\text{ °C}$	–	10	100	$\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = 5\text{ V}$	–	–	100	nA
$h_{FE}$	DC current gain BC140-10; BC141-10 BC140-16; BC141-16	$I_C = 100\text{ }\mu\text{A}; V_{CE} = 1\text{ V}$	–	40	–	
			–	90	–	
$h_{FE}$	DC current gain BC140-10; BC141-10 BC140-16; BC141-16	$I_C = 100\text{ mA}; V_{CE} = 1\text{ V}$	63	100	160	
			100	160	250	
$h_{FE}$	DC current gain BC140-10; BC141-10 BC140-16; BC141-16	$I_C = 1\text{ A}; V_{CE} = 1\text{ V}$	–	20	–	
			–	30	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 1\text{ A}; I_B = 100\text{ mA}$	–	0.6	1	V
$V_{BE}$	base-emitter voltage	$I_C = 1\text{ A}; V_{CE} = 1\text{ V}$	–	1.2	1.8	V
$C_c$	collector capacitance	$I_E = i_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$	–	–	25	pF
$C_e$	emitter capacitance	$I_C = i_c = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	–	80	pF
$f_T$	transition frequency	$I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 100\text{ MHz}$	50	–	–	MHz
<b>Switching times (between 10% and 90% levels)</b>						
$t_{on}$	turn-on time	$I_{Con} = 100\text{ mA}; I_{Bon} = 5\text{ mA};$	–	–	250	ns
$t_{off}$	turn-off time	$I_{Boff} = -5\text{ mA}$	–	–	850	ns

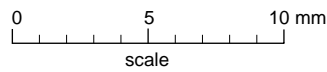
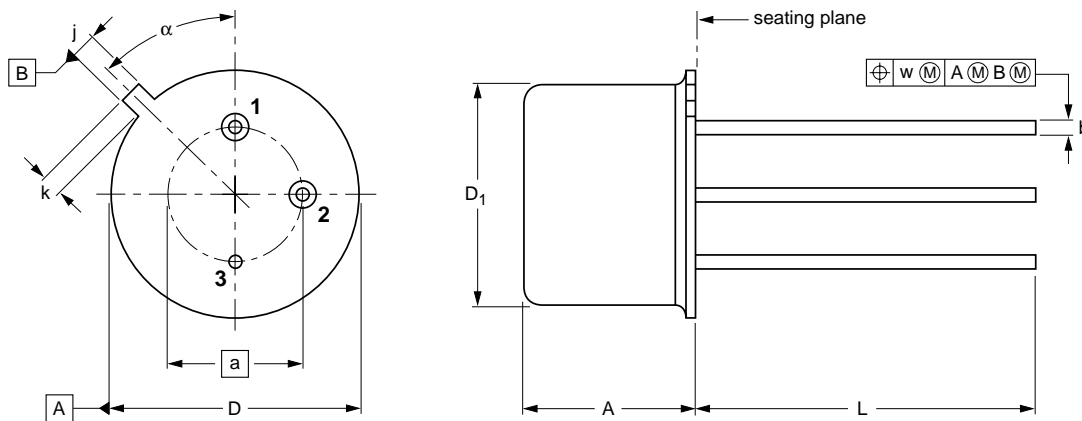
NPN medium power transistors

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PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT5/11



DIMENSIONS (mm are the original dimensions)

UNIT	A	a	b	D	D <sub>1</sub>	j	k	L	w	α
mm	6.60 6.35	5.08	0.48 0.41	9.39 9.08	8.33 8.18	0.85 0.75	0.95 0.75	14.2 12.7	0.2	45°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT5/11		TO-39				97-04-11

## NPN medium power transistors

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**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.	

**LIFE SUPPORT APPLICATIONS**

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NPN medium power transistors

BC140; BC141

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