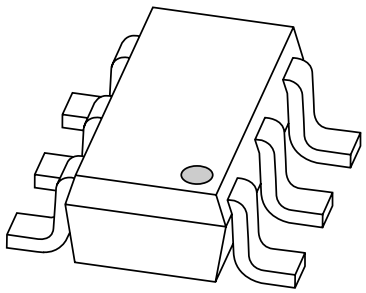
DATA SHEET



PBSS4140DPN

40 V low V_{CEsat} NPN/PNP transistor

Product specification

2001 Dec 13

Philips
Semiconductors

PHILIPS

40 V low V_{CEsat} NPN/PNP transistor PBSS4140DPN

FEATURES

- 600 mW total power dissipation
- Low collector-emitter saturation voltage
- High current capability
- Improved device reliability due to reduced heat generation
- Replaces two SOT23 packaged low V_{CEsat} transistors on same PCB area
- Reduces required PCB area
- Reduced pick and place costs.

APPLICATIONS

- General purpose switching and muting
- LCD backlighting
- Supply line switching circuits
- Battery driven equipment (mobile phones, video cameras and hand-held devices).

DESCRIPTION

NPN/PNP low V_{CEsat} transistor pair in an SC-74 (SOT457) plastic package.

MARKING

TYPE NUMBER	MARKING CODE
PBSS4140DPN	M2

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CEO}	collector-emitter voltage	40	V
I_C	peak collector current	1	A
I_{CM}	peak collector current	2	A
TR1	NPN	–	–
TR2	PNP	–	–
R_{CEsat}	equivalent on-resistance	<500	mΩ

PINNING

PIN	DESCRIPTION
1, 4	emitter TR1; TR2
2, 5	base TR1; TR2
6, 3	collector TR1; TR2

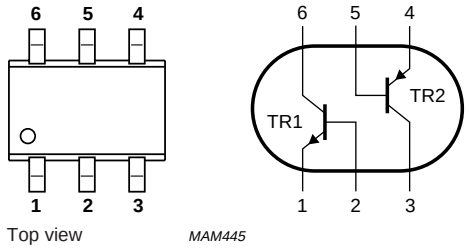


Fig.1 Simplified outline SC74 (SOT457) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Per transistor; for the PNP transistor with negative polarity					
V_{CBO}	collector-base voltage	open emitter	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	40	V
V_{EBO}	emitter-base voltage	open collector	–	5	V
I_C	collector current (DC)		–	1	A
I_{CM}	peak collector current		–	2	A
I_{BM}	peak base current		–	1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; note 1	–	370	mW
T_{stg}	storage temperature		−65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		−65	+150	°C
Per device					
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; note 1	–	600	mW

Note

1. Device mounted on a printed-circuit board, single side copper, tinplated, mounting pad for collector 1 cm^2.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air; note 1	208	K/W

Note

1. Device mounted on a printed-circuit board, single side copper, tinplated, mounting pad for collector 1 cm^2.

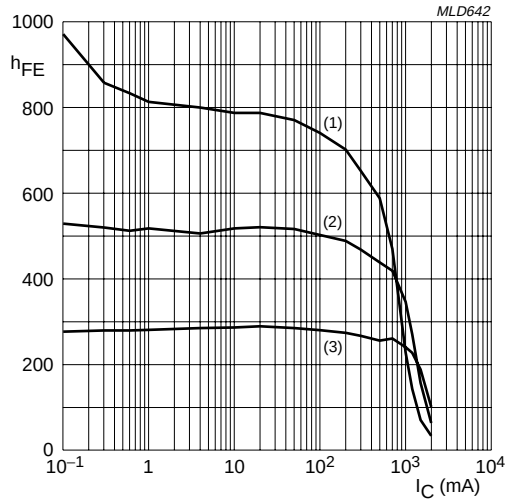
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor unless otherwise specified; for the PNP transistor with negative polarity						
I_{CBO}	collector-base cut-off current	V_{CB} = 40 V; I_E = 0	–	–	100	nA
		V_{CB} = 40 V; I_E = 0; T_j = 150 °C	–	–	50	µA
I_{CEO}	collector-emitter cut-off current	V_{CE} = 30 V; I_B = 0	–	–	100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0	–	–	100	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 1 mA	300	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 100 mA; I_B = 1 mA	–	–	200	mV
		I_C = 500 mA; I_B = 50 mA	–	–	250	mV
		I_C = 1 A; I_B = 100 mA	–	–	500	mV
NPN transistor						
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 500 mA	300	–	900	
		V_{CE} = 5 V; I_C = 1 A	200	–	–	
V_{BEsat}	base-emitter saturation voltage	I_C = 1 A; I_B = 100 mA	–	–	1.2	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 5 V; I_C = 1 A	–	–	1.1	V
R_{CEsat}	equivalent on-resistance	I_C = 500 mA; I_B = 50 mA; note 1	–	260	<500	mΩ
f_T	transition frequency	V_{CE} =10 V; I_C = 50 mA; f = 100 MHz	150	–	–	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = I_e = 0; f = 1 MHz	–	–	10	pF
PNP transistor						
h_{FE}	DC current gain	V_{CE} = –5 V; I_C = –100 mA	300	–	800	
		V_{CE} = –5 V; I_C = –500 mA	250	–	–	
		V_{CE} = –5 V; I_C = –1 A	160	–	–	
V_{BEsat}	base-emitter saturation voltage	I_C = –1 A; I_B = –50 mA	–	–	–1.1	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = –5 V; I_C = –1 A	–	–	–1.0	V
R_{CEsat}	equivalent on-resistance	I_C = –500 mA; I_B –50 mA; note 1	–	300	<500	mΩ
f_T	transition frequency	V_{CE} = –10 V; I_C = –50 mA; f = 100 MHz	150	–	–	MHz
C_c	collector capacitance	V_{CB} = –10 V; I_E = I_e = 0; f =1 MHz	–	–	12	pF

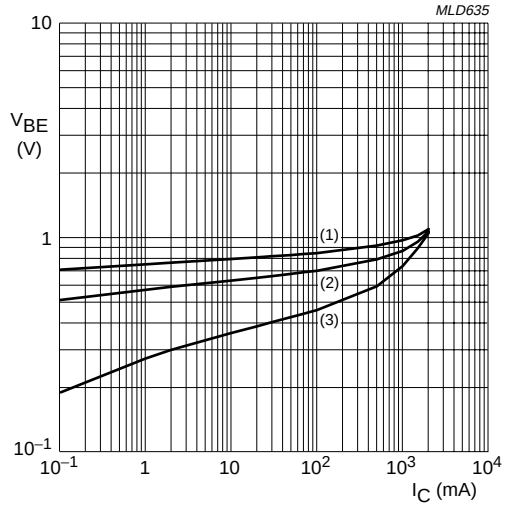
Note

1. Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.



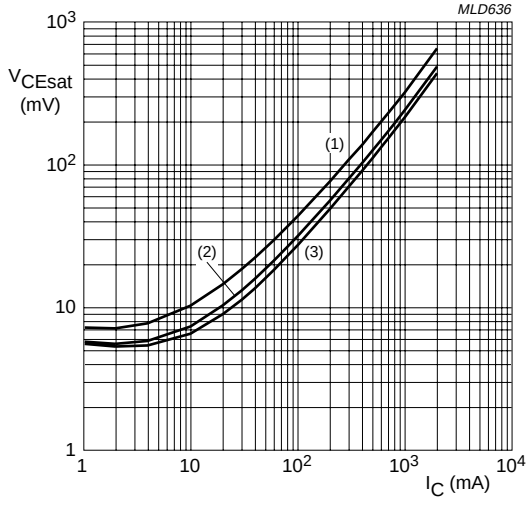
TR1 (NPN); V_{CE} = 5 V.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

Fig.2 DC current gain as a function of collector current; typical values.



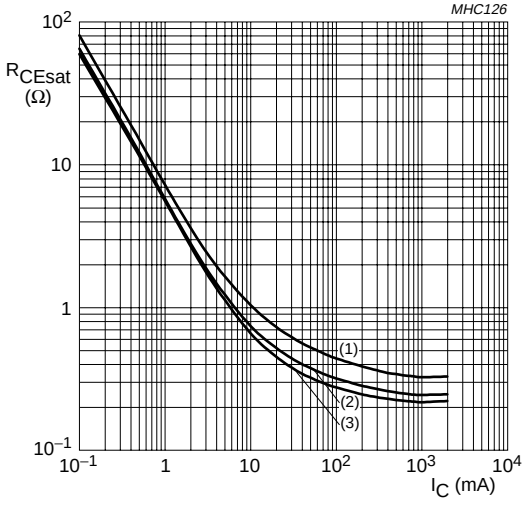
TR1 (NPN); V_{CE} = 5 V.
(1) T_{amb} = –55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 150 °C.

Fig.3 Base-emitter voltage as a function of collector current; typical values.



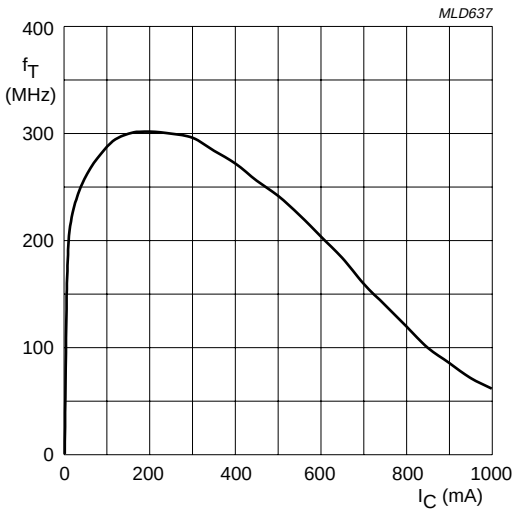
TR1 (NPN); I_C/I_B = 10.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

Fig.4 Collector-emitter saturation voltage as a function of collector current; typical values.



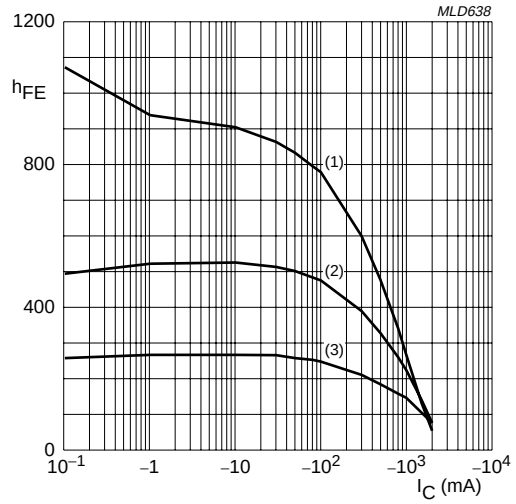
TR1 (NPN); I_C/I_B = 10.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

Fig.5 Equivalent on-resistance as a function of collector current; typical values.



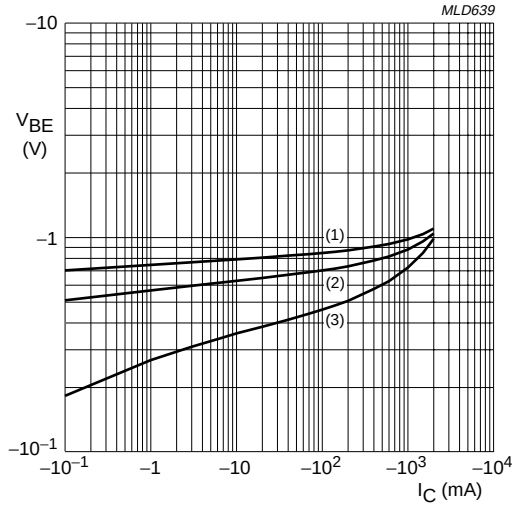
TR1 (NPN); V_{CE} = 10 V.

Fig.6 Transition frequency as a function of collector current; typical values.



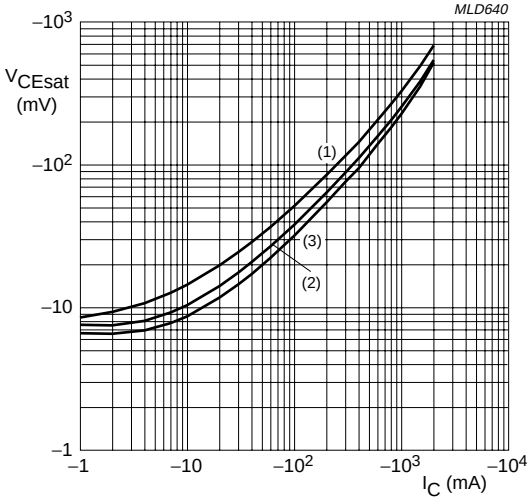
TR2 (PNP); V_{CE} = −5 V.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = −55 °C.

Fig.7 DC current gain as a function of collector current; typical values.



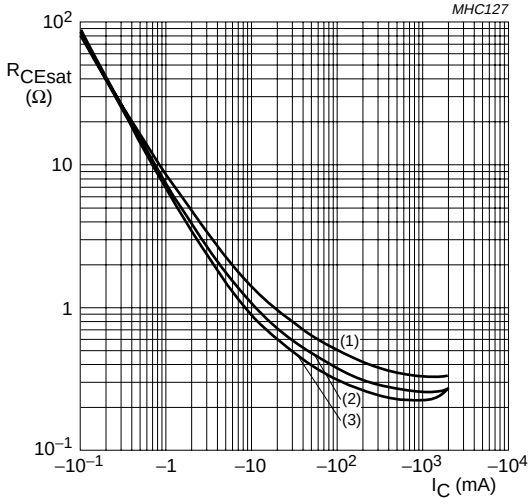
TR2 (PNP); V_{CE} = −5 V.
(1) T_{amb} = −55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 150 °C.

Fig.8 Base-emitter voltage as a function of collector current; typical values.



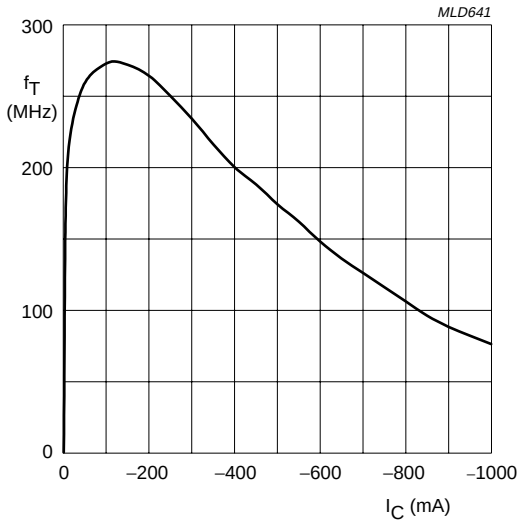
TR2 (PNP); I_C/I_B = 10.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = −55 °C.

Fig.9 Collector-emitter saturation voltage as a function of collector current; typical values.



TR2 (PNP); I_C/I_B = 10.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = −55 °C.

Fig.10 Equivalent on-resistance as a function of collector current; typical values.

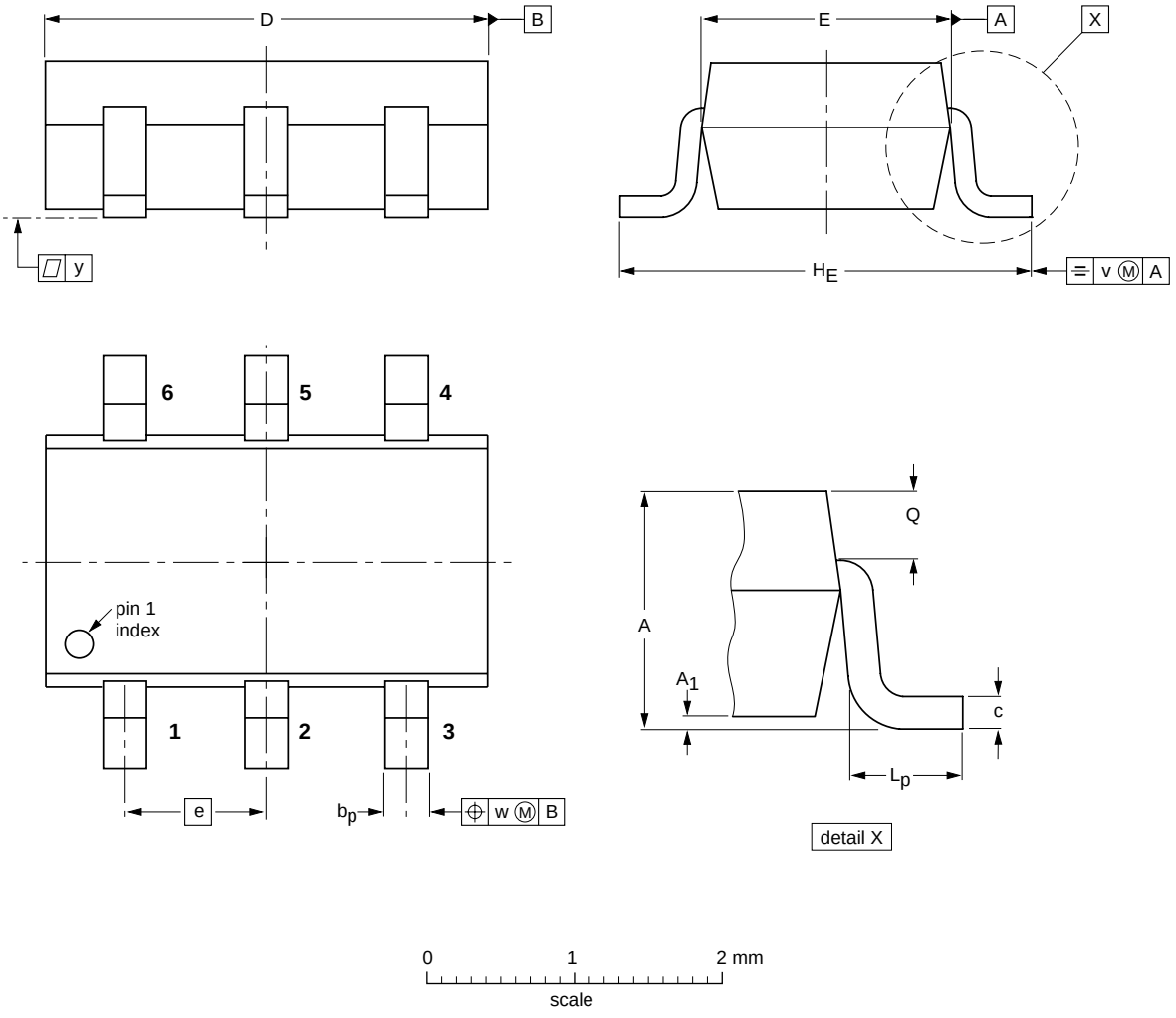


TR2 (PNP); V_{CE} = -10 V.

Fig.11 Transition frequency as a function of collector current; typical values.

PACKAGE OUTLINE

Plastic surface mounted package; 6 leads **SOT457**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	c	D	E	e	H_E	L_p	Q	v	w	y
mm	1.1 0.9	0.1 0.013	0.40 0.25	0.26 0.10	3.1 2.7	1.7 1.3	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT457			SC-74			~~97-02-28~~ 01-05-04

DATA SHEET STATUS

DATA SHEET STATUS[1]	PRODUCT STATUS[2]	DEFINITIONS
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