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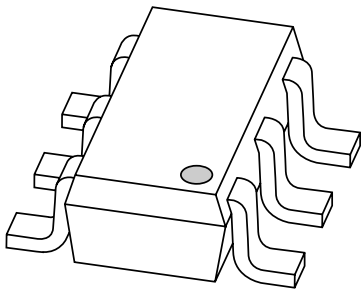
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Team Nexperia

DATA SHEET



PBSS4240DPN

40 V low V_{CEsat} NPN/PNP
transistor

Product data sheet

2003 Feb 20

40 V low V_{CEsat} NPN/PNP transistor

PBSS4240DPN

FEATURES

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain h_{FE} at high I_C
- High efficiency leading to reduced heat generation
- Reduced printed-circuit board area requirements.

APPLICATIONS

- Power management:
 - Complementary MOSFET driver
 - Dual supply line switching.
- Peripheral driver:
 - Half and full bridge motor drivers
 - Multi-phase stepper motor driver.

DESCRIPTION

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

MARKING

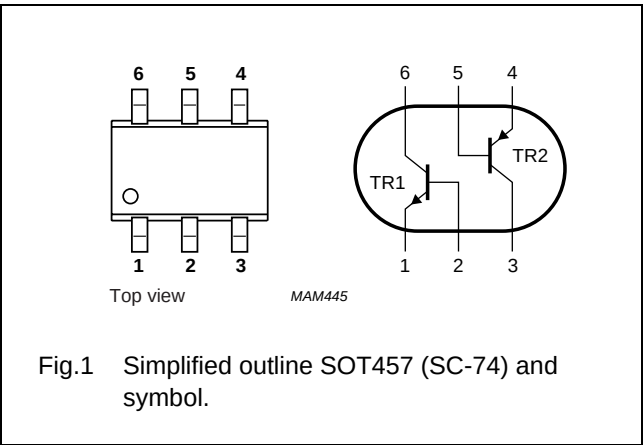
TYPE NUMBER	MARKING CODE
PBSS4240DPN	M3

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.		UNIT
		NPN	PNP	
V_{CEO}	emitter-collector voltage	40	−40	V
I_C	collector current (DC)	1.35	−1.1	A
I_{CRP}	repetitive peak collector current	2	−2	A
I_{CM}	peak collector current	3	−3	A
R_{CEsat}	equivalent on-resistance	200	260	mΩ

PINNING

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



40 V low V_{CEsat} NPN/PNP transistor

PBSS4240DPN

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Per transistor unless otherwise specified; 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) NPN PNP		–		
			–	1.35	A
			–	–1.1	A
I_{CRP}	repetitive peak collector current	note 1	–	2	A
I_{CM}	peak collector current	single peak	–	3	A
I_B	base current (DC)		–	300	mA
I_{BM}	peak base current		–	1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$; note 2	–	370	mW
		$T_{amb} \leq 25\text{ °C}$; note 3	–	310	mW
		$T_{amb} \leq 25\text{ °C}$; note 1	–	1.1	W
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	$T_{amb} \leq 25\text{ °C}$; note 2	–	600	mW

Notes

1. Operated under pulsed conditions: duty cycle $\delta \leq 20\%$; pulse width $t_p \leq 10\text{ ms}$; mounting pad for collector standard footprint.
2. Device mounted on a printed-circuit board; single-sided copper; tinplated; mounting pad for collector 1 cm^2 .
3. Device mounted on a printed-circuit board; single-sided copper; tinplated; standard footprint.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
Per transistor				
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air; note 1	340	K/W
		in free air; note 2	110	K/W

Notes

1. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 cm^2 .
2. Operated under pulsed conditions: pulse width $t_p \leq 10\text{ ms}$; duty cycle $\delta \leq 0.20$; mounting pad for collector standard footprint.

40 V low V_{CEsat} NPN/PNP transistor

PBSS4240DPN

CHARACTERISTICS

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

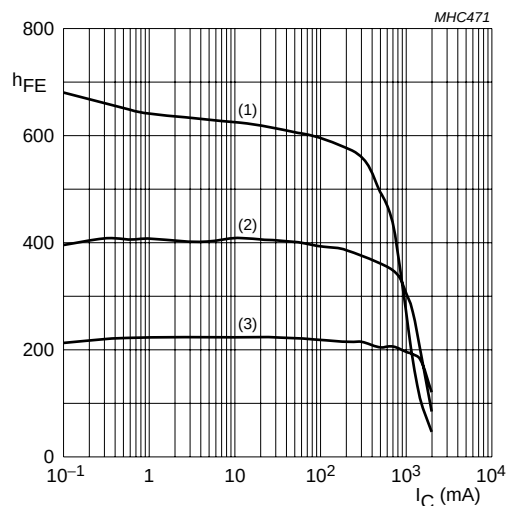
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor unless otherwise specified; for the PNP transistor with negative polarity						
I_{CBO}	collector-base cut-off current	$V_{CB} = 40\text{ V}; I_E = 0$	–	–	100	nA
		$V_{CB} = 40\text{ V}; I_E = 0; T_j = 150\text{ }^{\circ}\text{C}$	–	–	50	μA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = 30\text{ V}; I_B = 0$	–	–	100	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0$	–	–	100	nA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}; I_C = 1\text{ mA}$	300	–	–	
f_T	transition frequency	$I_C = 50\text{ mA}; V_{CE} = 10\text{ V};$ $f = 100\text{ MHz}$	150	–	–	MHz
C_c	collector capacitance	$V_{CB} = 10\text{ V}; I_E = I_e = 0;$ $f = 1\text{ MHz}$	–	–	12	pF
TR1 (NPN)						
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}; I_C = 500\text{ mA}$	300	–	900	
		$V_{CE} = 5\text{ V}; I_C = 1\text{ A}$	200	–	–	
		$V_{CE} = 5\text{ V}; I_C = 2\text{ A}; \text{note 1}$	75	–	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 1\text{ mA}$	–	60	75	mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	–	80	100	mV
		$I_C = 1\text{ A}; I_B = 100\text{ mA}$	–	150	200	mV
		$I_C = 2\text{ A}; I_B = 200\text{ mA}; \text{note 1}$	–	300	400	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 1\text{ A}; I_B = 100\text{ mA}$	–	–	1.2	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = 5\text{ V}; I_C = 1\text{ A}$	–	–	1.1	V
R_{CEsat}	equivalent on-resistance	$I_C = 1\text{ A}; I_B = 100\text{ mA}$	–	–	200	$\text{m}\Omega$
TR2 (PNP)						
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}; I_C = -100\text{ mA}$	300	–	800	
		$V_{CE} = -5\text{ V}; I_C = -500\text{ mA}$	250	–	–	
		$V_{CE} = -5\text{ V}; I_C = -1\text{ A}$	160	–	–	
		$V_{CE} = -5\text{ V}; I_C = -2\text{ A}; \text{note 1}$	50	–	–	
V_{CEsat}	saturation voltage	$I_C = -100\text{ mA}; I_B = -1\text{ mA}$	–	-90	-120	mV
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	–	-100	-145	mV
		$I_C = -1\text{ A}; I_B = -100\text{ mA}$	–	-180	-260	mV
		$I_C = -2\text{ A}; I_B = -200\text{ mA}; \text{note 1}$	–	-400	-530	mV
V_{BEsat}	saturation voltage	$I_C = -1\text{ A}; I_B = -50\text{ mA}$	–	–	-1.1	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = -5\text{ V}; I_C = -1\text{ A}$	–	–	-1	V
R_{CEsat}	equivalent on-resistance	$I_C = -1\text{ A}; I_B = -100\text{ mA}; \text{note 1}$	–	–	260	$\text{m}\Omega$

Note

1. Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.

40 V low V_{CEsat} NPN/PNP transistor

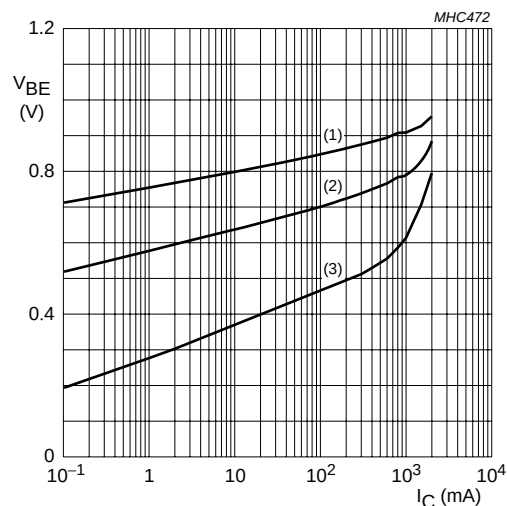
PBSS4240DPN



TR1 (NPN); $V_{CE} = 5$ V.

- (1) $T_{amb} = 150$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = -55$ °C.

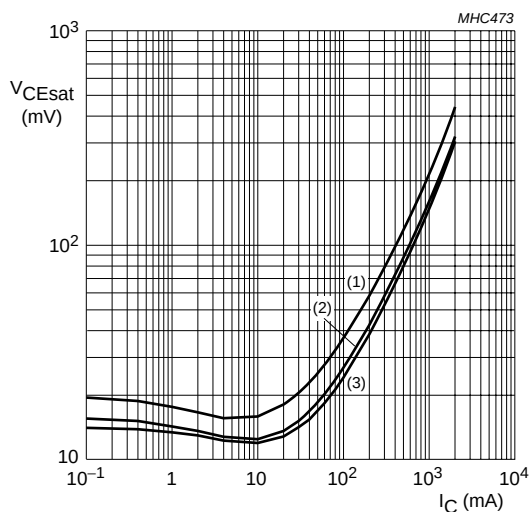
Fig.2 DC current gain as a function of collector current; typical values.



TR1 (NPN); $V_{CE} = 5$ V.

- (1) $T_{amb} = -55$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = 150$ °C.

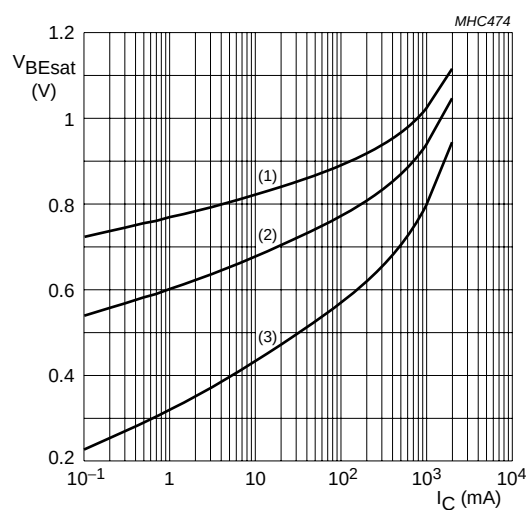
Fig.3 Base-emitter voltage as a function of collector current; typical values.



TR1 (NPN); $I_C/I_B = 20$.

- (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.



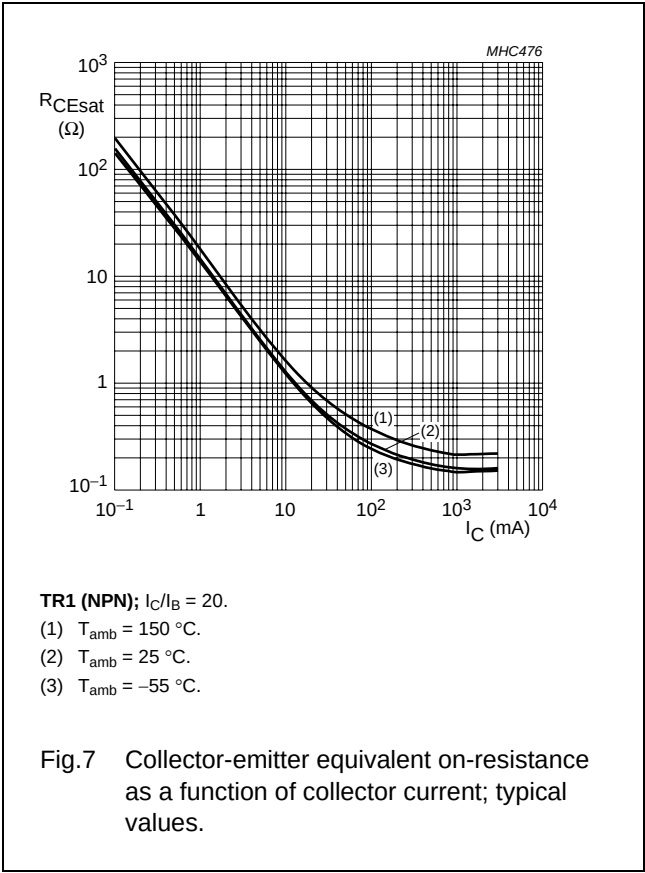
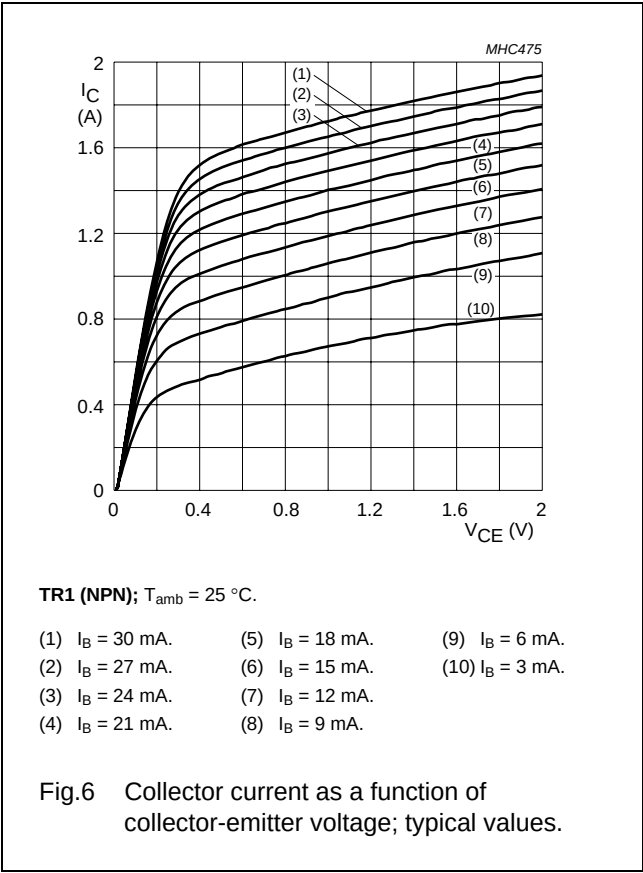
TR1 (NPN); $I_C/I_B = 20$.

- (1) $T_{amb} = -55$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = 150$ °C.

Fig.5 Base-emitter saturation voltage as a function of collector current; typical values.

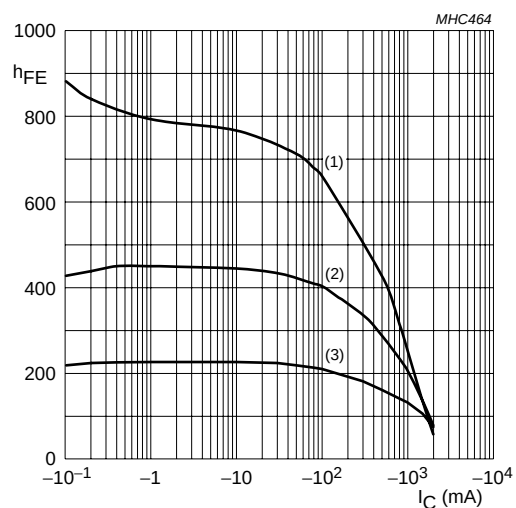
40 V low V_{CEsat} NPN/PNP transistor

PBSS4240DPN



40 V low V_{CEsat} NPN/PNP transistor

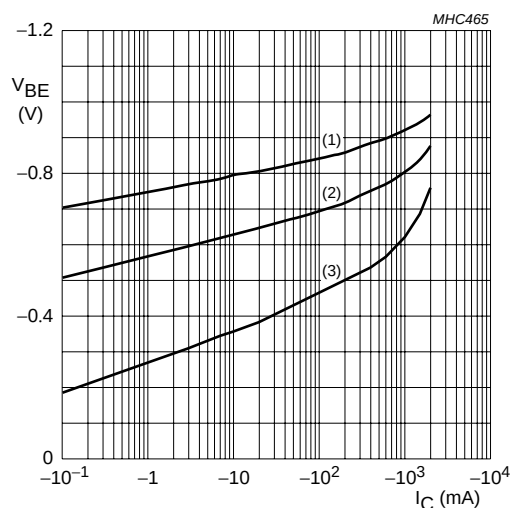
PBSS4240DPN



TR2 (PNP); $V_{CE} = -5$ V.

- (1) $T_{amb} = 150$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = -55$ °C.

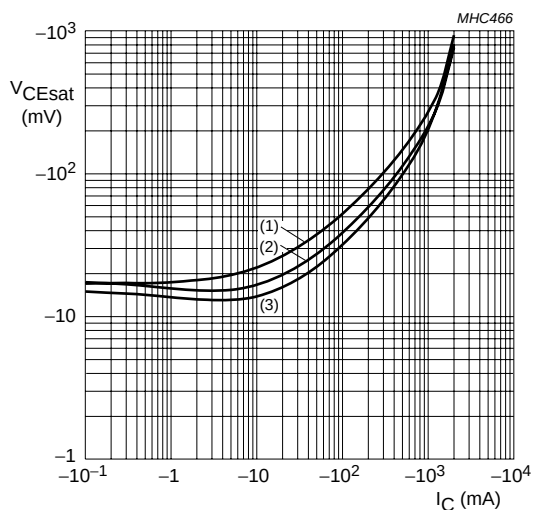
Fig.8 DC current gain as a function of collector current; typical values.



TR2 (PNP); $V_{CE} = -5$ V.

- (1) $T_{amb} = -55$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = 150$ °C.

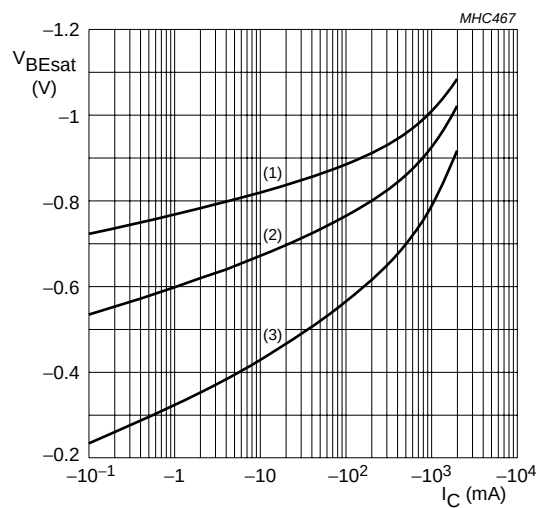
Fig.9 Base-emitter voltage as a function of collector current; typical values.



TR2 (PNP); $I_C/I_B = 20$.

- (1) $T_{amb} = 150$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = -55$ °C.

Fig.10 Collector-emitter saturation voltage as a function of collector current; typical values.



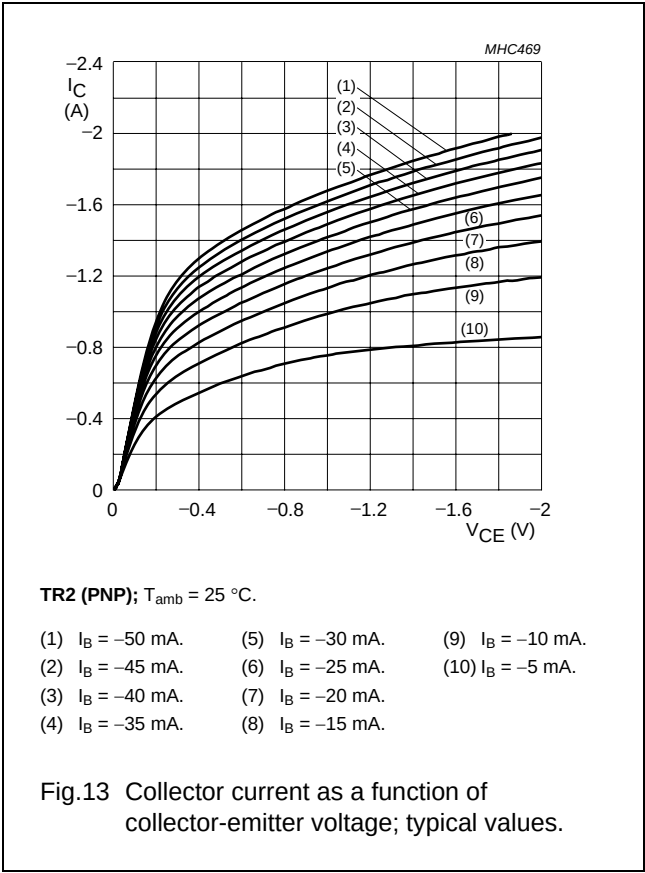
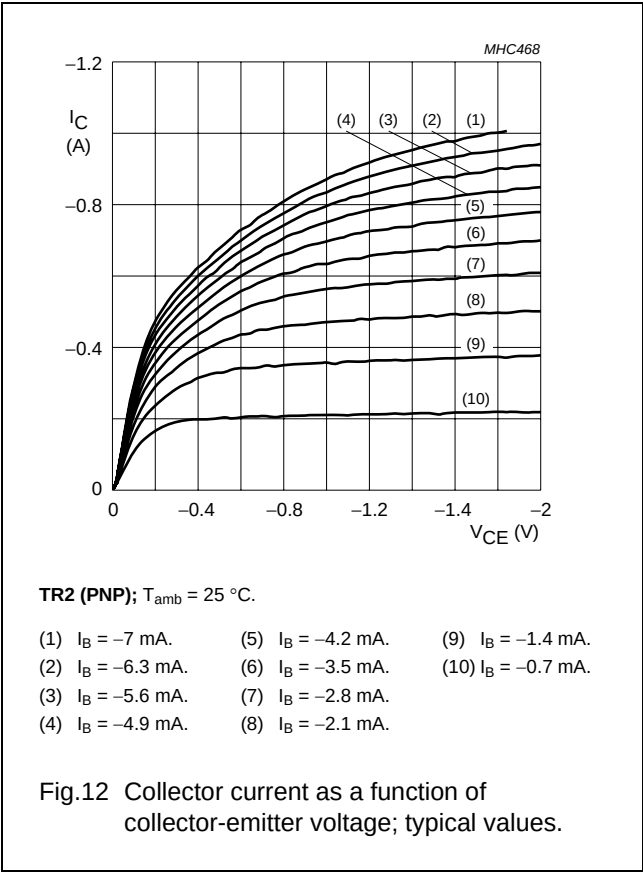
TR2 (PNP); $I_C/I_B = 20$.

- (1) $T_{amb} = -55$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = 150$ °C.

Fig.11 Base-emitter saturation voltage as a function of collector current; typical values.

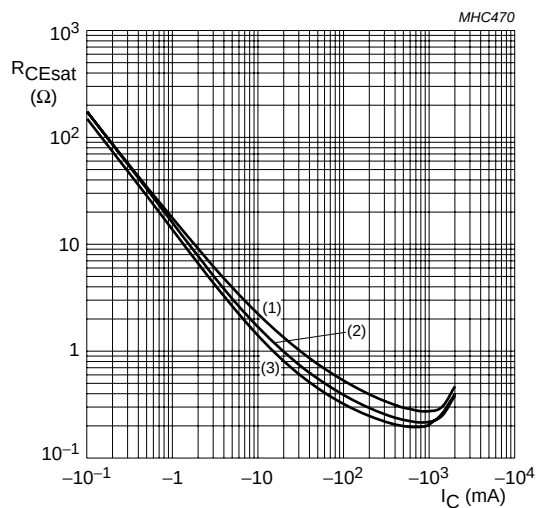
40 V low V_{CEsat} NPN/PNP transistor

PBSS4240DPN



40 V low V_{CEsat} NPN/PNP transistor

PBSS4240DPN



TR2 (PNP); $I_C/I_B = 20$.

(1) $T_{amb} = 150\text{ }^{\circ}\text{C}$.

(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$.

(3) $T_{amb} = -55\text{ }^{\circ}\text{C}$.

Fig.14 Collector-emitter equivalent on-resistance as a function of collector current; typical values.

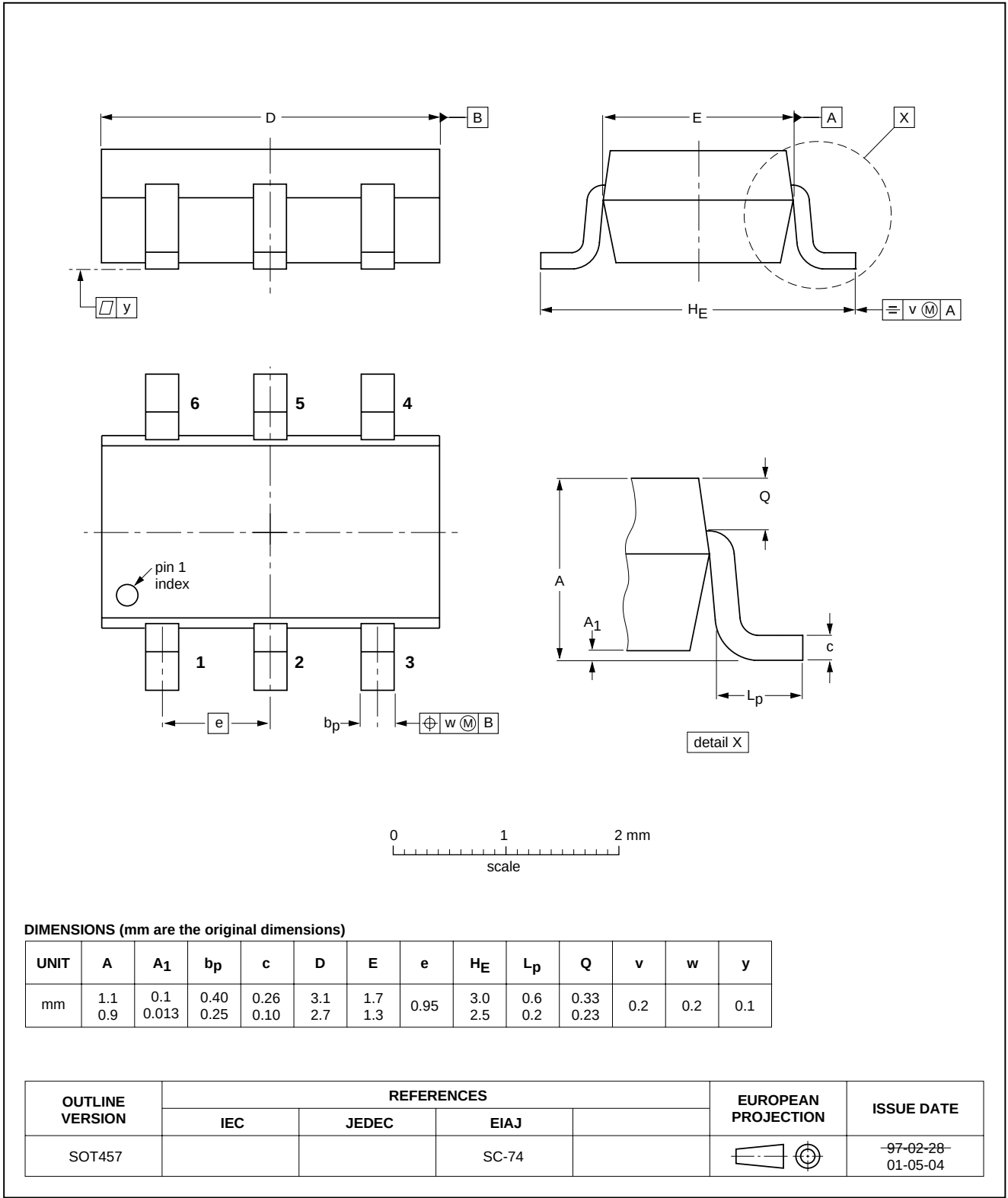
40 V low V_{CEsat} NPN/PNP transistor

PBSS4240DPN

PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT457



40 V low V_{CEsat} NPN/PNP transistor

PBSS4240DPN

DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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NXP Semiconductors

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