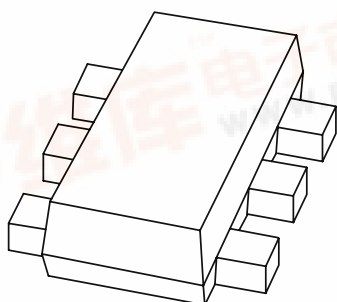


DATA SHEET



PEMF21 12 V PNP loadswitch

Product data sheet

2004 Jan 12

NXP
founded by Philips

12 V PNP loadswitch

PEMF21

FEATURES

- Low V_{CEsat} transistor and resistor-equipped transistor in one package
- Very small 1.6 × 1.2 mm ultra thin package
- Reduced component count.

APPLICATIONS

- Line switches
- Battery charger switches
- Power supply switches
- Drive switches
- General purpose analog switches.

DESCRIPTION

Low V_{CEsat} PNP transistor and NPN resistor-equipped transistor in a SOT666 plastic package (see “Ordering information” for package details).

MARKING

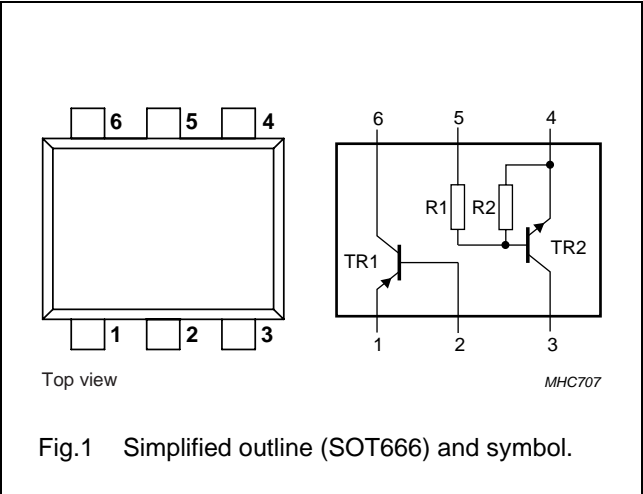
TYPE NUMBER	MARKING CODE
PEMF21	2F

QUICK REFERENCE DATA

SYMBOL	PARAMETER	TYP.	MAX.	UNIT
TR1; PNP; low V_{CEsat} transistor				
V_{CEO}	collector-emitter voltage	–	–12	V
I_C	collector current (DC)	–	–500	mA
R_{CEsat}	equivalent on-resistance	–	500	m Ω
TR2; NPN; resistor-equipped transistor				
V_{CEO}	collector-emitter voltage	–	50	V
I_O	output current (DC)	–	100	mA
R1	bias resistor	10	–	k Ω
R2	bias resistor	10	–	k Ω

PINNING

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



ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PEMF21	–	plastic surface mounted package; 6 leads	SOT666

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LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Transistor TR1					
V_{CBO}	collector-base voltage	open emitter	–	–15	V
V_{CEO}	collector-emitter voltage	open base	–	–12	V
V_{EBO}	emitter-base voltage	open collector	–	–6	V
I_C	collector current (DC)		–	–500	mA
I_{CM}	peak collector current		–	–1	A
I_{BM}	peak base current		–	–100	mA
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$; note 1	–	200	mW
Transistor TR2					
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	50	V
V_{EBO}	emitter-base voltage	open collector	–	10	V
V_i	input voltage				
	positive		–	+40	V
	negative		–	–10	V
I_O	output current (DC)		–	100	mA
I_{CM}	peak collector current		–	100	mA
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$; note 1	–	200	mW
Per device					
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$; note 1	–	300	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

Note

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

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
Per device				
$R_{th(j-a)}$	thermal resistance from junction to ambient	notes 1 and 2	416	K/W

Notes

1. Transistor mounted on an FR4 printed-circuit board.
2. Reflow soldering is the only recommended soldering method.

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CHARACTERISTICS

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

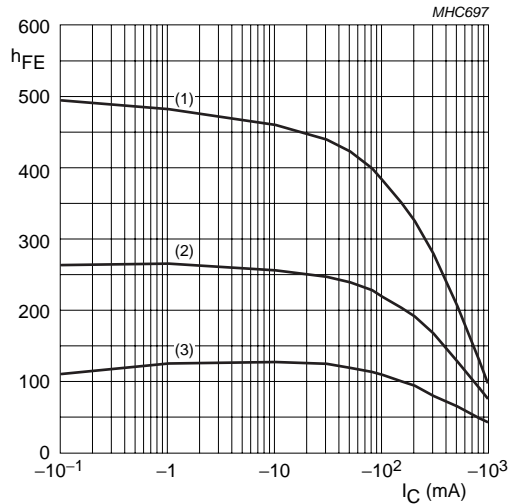
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Transistor TR1						
I _{CBO}	collector-base cut-off current	V _{CB} = -15 V; I _E = 0	–	–	-100	nA
I _{EBO}	emitter-base cut-off current	V _{EB} = -5 V; I _C = 0	–	–	-100	nA
h _{FE}	DC current gain	V _{CE} = -2 V; I _C = -10 mA	200	–	–	
V _{CEsat}	collector-emitter saturation voltage	I _C = -200 mA; I _B = -10 mA	–	–	-250	mV
R _{CEsat}	equivalent on-resistance	I _C = -500 mA; I _B = -50 mA; note 1	–	300	500	mΩ
V _{BEsat}	base-emitter saturation voltage	I _C = -500 mA; I _B = -50 mA; note 1	–	–	-1.1	V
V _{BEon}	base-emitter turn-on voltage	V _{CE} = -2 V; I _C = -100 mA; note 1	–	–	-0.9	V
f _T	transition frequency	I _C = -100 mA; V _{CE} = -5 V; f = 100 MHz	100	280	–	MHz
C _c	collector capacitance	V _{CB} = -10 V; I _E = i _e = 0; f = 1 MHz	–	–	10	pF
Transistor TR2						
I _{CBO}	collector-base cut-off current	V _{CB} = 50 V; I _E = 0	–	–	100	nA
I _{CEO}	collector-emitter cut-off current	V _{CE} = 30 V; I _B = 0	–	–	1	μA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0	–	–	400	μA
h _{FE}	DC current gain	V _{CE} = 5 V; I _C = 5 mA	30	–	–	
V _{CEsat}	collector-emitter saturation voltage	I _C = 10 mA; I _B = 0.5 mA	–	–	300	mV
V _{i(off)}	input-off voltage	V _{CE} = 5 V; I _C = 100 μA	–	–	0.5	V
V _{i(on)}	input-on voltage	V _{CE} = 0.3 V; I _C = 10 mA	3	–	–	V
R1	input resistor		7	10	13	kΩ
$\frac{R2}{R1}$	resistor ratio		0.8	1	1.2	
C _c	collector capacitance	V _{CB} = 10 V; I _E = i _e = 0; f = 1 MHz	–	–	2.5	pF

Note

1. Pulse test: t_p ≤ 300 μs; δ ≤ 0.02.

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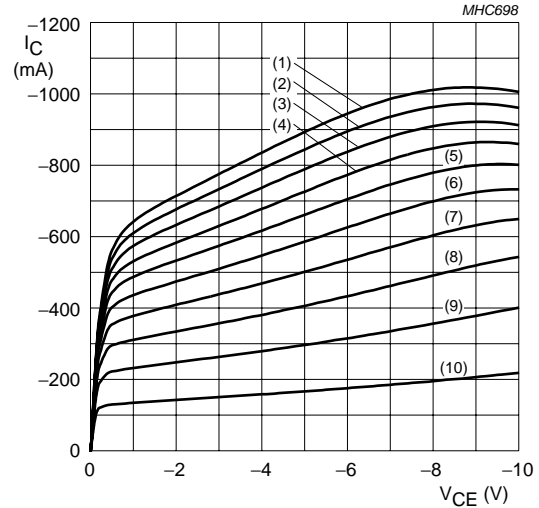
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Transistor TR1; $V_{CE} = -2$ V.

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

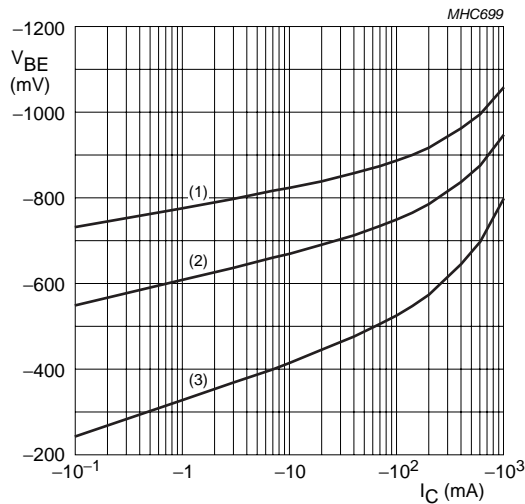
Fig.2 DC current gain as a function of collector current; typical values.



Transistor TR1;
 $T_{amb} = 25$ °C.

- (3) $I_B = -5.6$ mA.
- (4) $I_B = -4.9$ mA.
- (5) $I_B = -4.2$ mA.
- (6) $I_B = -3.5$ mA.
- (7) $I_B = -2.8$ mA.
- (8) $I_B = -2.1$ mA.
- (9) $I_B = -1.4$ mA.
- (10) $I_B = -0.7$ mA.

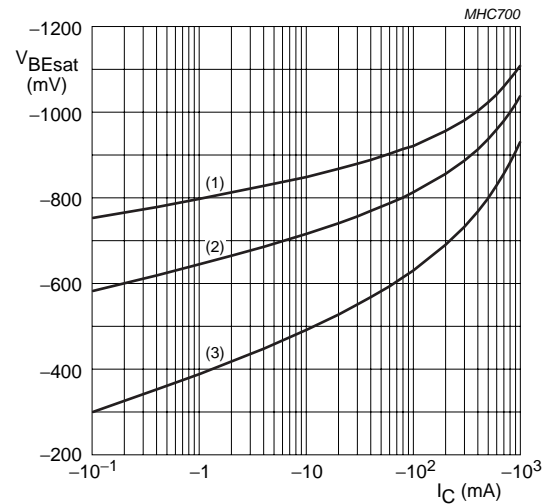
Fig.3 Collector current as a function of collector-emitter voltage; typical values.



Transistor TR1; $V_{CE} = -2$ V.

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

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



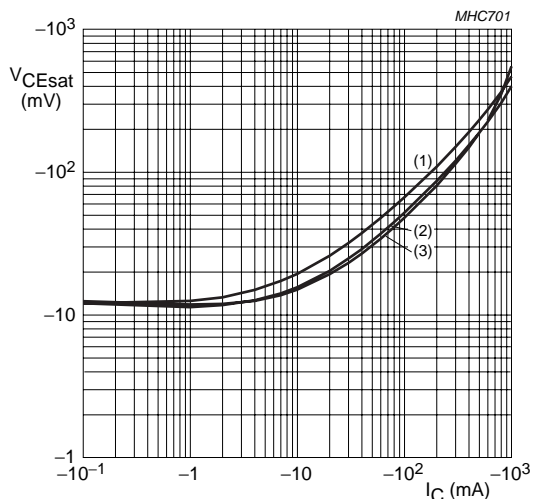
Transistor TR1; $I_C/I_B = 20$.

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

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

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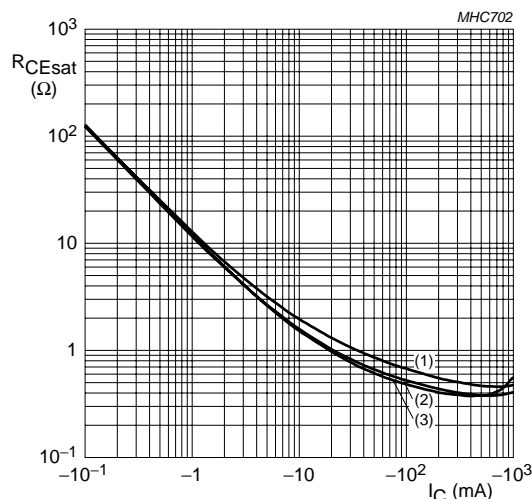
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Transistor TR1; $I_C/I_B = 20$.

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

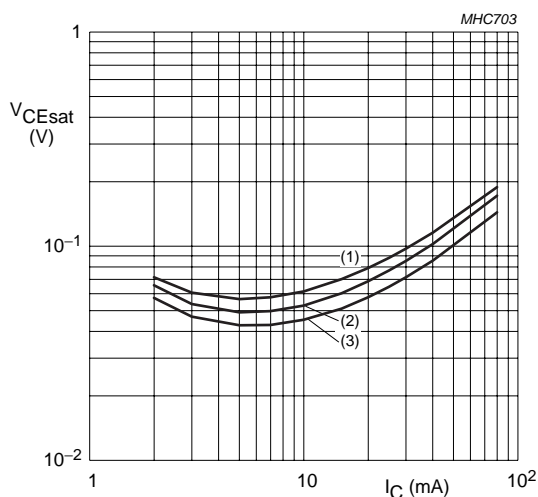
Fig.6 Collector-emitter saturation voltage as a function of collector current; typical values.



Transistor TR1; $I_C/I_B = 20$.

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

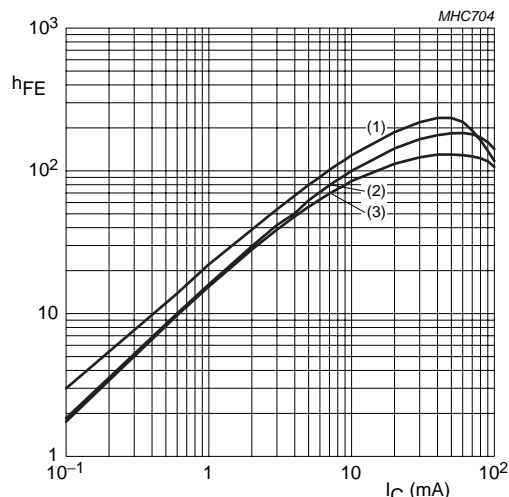
Fig.7 Equivalent on-resistance as a function of collector current; typical values.



Transistor TR2; $I_C/I_B = 20$.

- (1) $T_{amb} = 100\text{ °C}$.
- (2) $T_{amb} = 25\text{ °C}$.
- (3) $T_{amb} = -40\text{ °C}$.

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



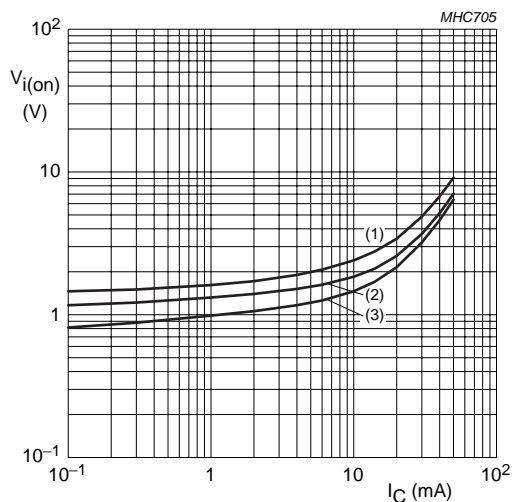
Transistor TR2; $V_{CE} = 5\text{ V}$.

- (1) $T_{amb} = 150\text{ °C}$.
- (2) $T_{amb} = 25\text{ °C}$.
- (3) $T_{amb} = -40\text{ °C}$.

Fig.9 DC current gain as a function of collector current; typical values.

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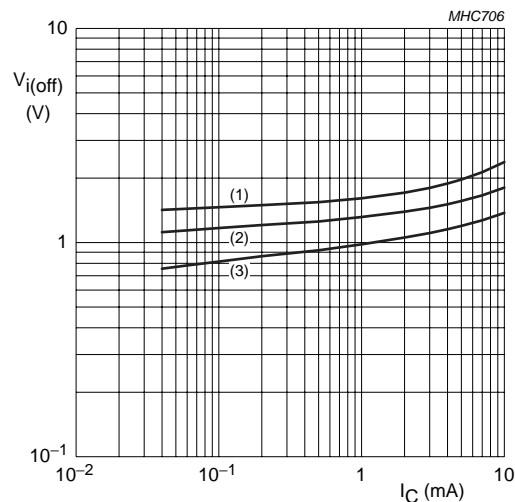
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Transistor TR2; $V_{CE} = 0.3\text{ V}$.

- (1) $T_{amb} = -40^\circ\text{C}$.
- (2) $T_{amb} = 25^\circ\text{C}$.
- (3) $T_{amb} = 100^\circ\text{C}$.

Fig.10 Input-on voltage as a function of collector current; typical values.



Transistor TR2; $V_{CE} = 5\text{ V}$.

- (1) $T_{amb} = -40^\circ\text{C}$.
- (2) $T_{amb} = 25^\circ\text{C}$.
- (3) $T_{amb} = 100^\circ\text{C}$.

Fig.11 Input-off voltage as a function of collector current; typical values.

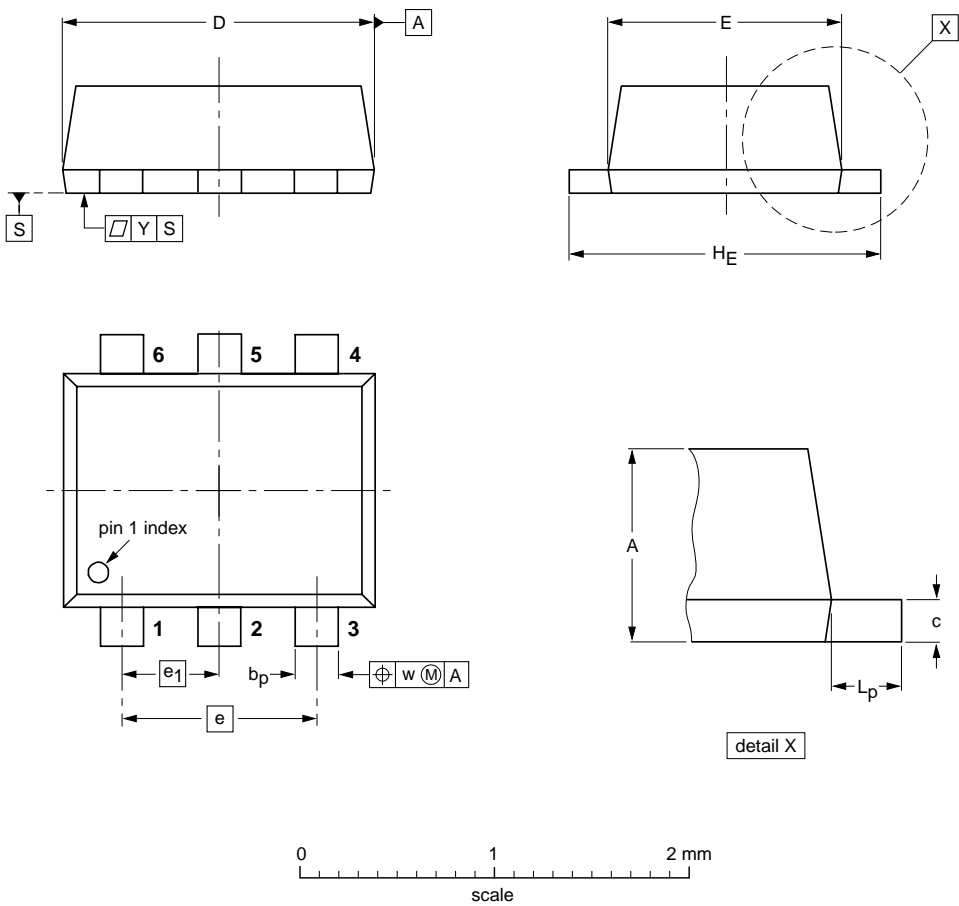
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PACKAGE OUTLINE

Plastic surface-mounted package; 6 leads

SOT666



DIMENSIONS (mm are the original dimensions)

UNIT	A	b _p	c	D	E	e	e ₁	H _E	L _p	w	y
mm	0.6 0.5	0.27 0.17	0.18 0.08	1.7 1.5	1.3 1.1	1.0	0.5	1.7 1.5	0.3 0.1	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT666						04-11-08 06-03-16

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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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This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content, except for package outline drawings which were updated to the latest version.

Contact information

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