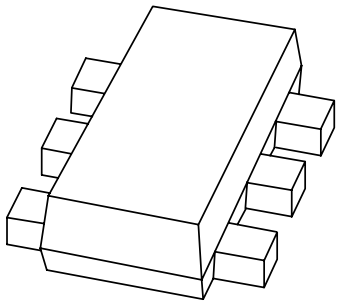
DATA SHEET



PEMF21
12 V PNP loadswitch

Product specification

2004 Jan 12

Philips
Semiconductors

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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	mΩ
TR2; NPN; resistor-equipped transistor				
V_{CEO}	collector-emitter voltage	–	50	V
I_O	output current (DC)	–	100	mA
R1	bias resistor	10	–	kΩ
R2	bias resistor	10	–	kΩ

PINNING

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

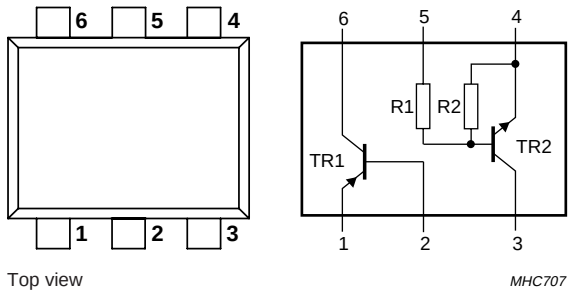


Fig.1 Simplified outline (SOT666) and symbol.

ORDERING INFORMATION

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

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 °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 °C; note 1	–	200	mW
Per device					
P_{tot}	total power dissipation	T_{amb} = 25 °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.

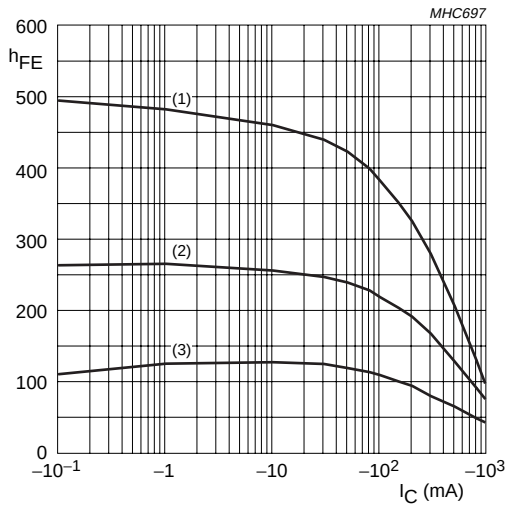
CHARACTERISTICS

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

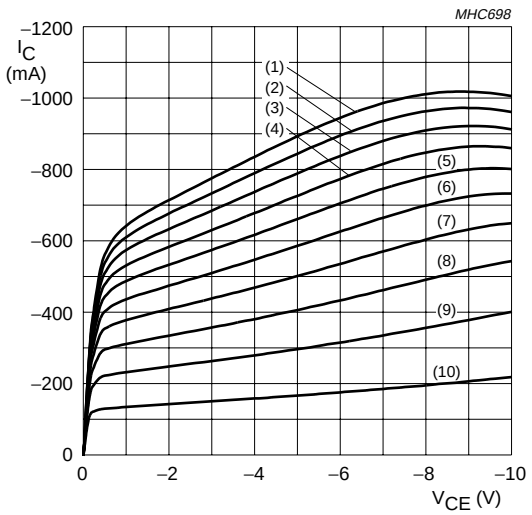
Note

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



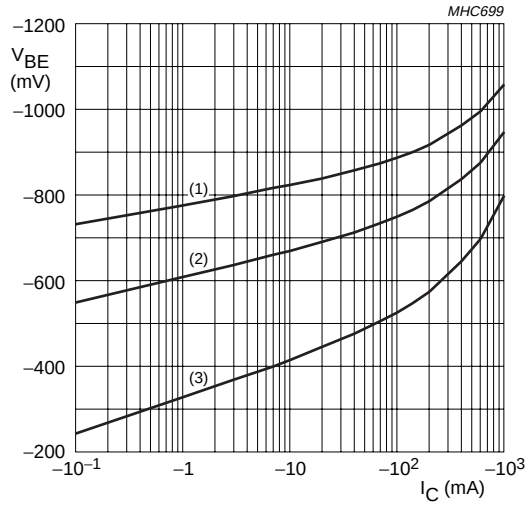
Transistor TR1; V_{CE} = –2 V.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

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



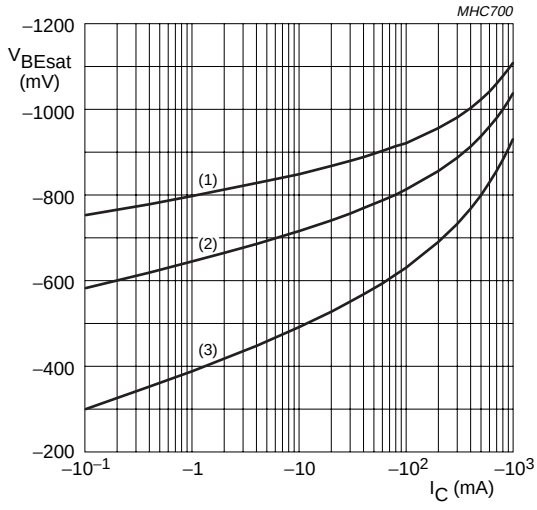
Transistor TR1; T_{amb} = 25 °C.
(1) I_B = –7.0 mA.
(2) I_B = –6.3 mA.
(3) I_B = –5.6 mA.
(4) I_B = –4.9 mA.
(5) I_B = –4.2 mA.
(6) I_B = –3.5 mA.
(7) I_B = –2.8 mA.
(8) I_B = –2.1 mA.
(9) I_B = –1.4 mA.
(10) I_B = –0.7 mA.

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



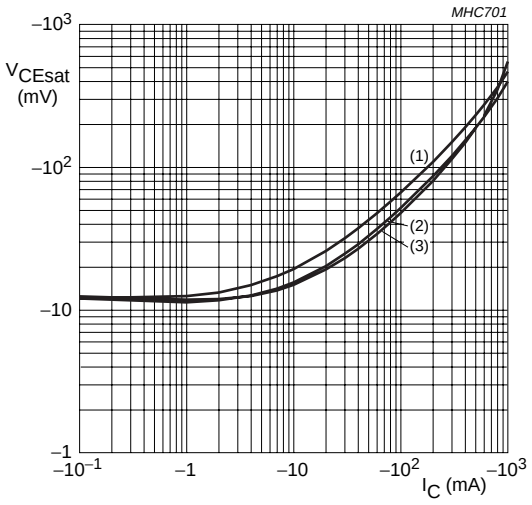
Transistor TR1; V_{CE} = –2 V.
(1) T_{amb} = –55 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 150 °C.

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



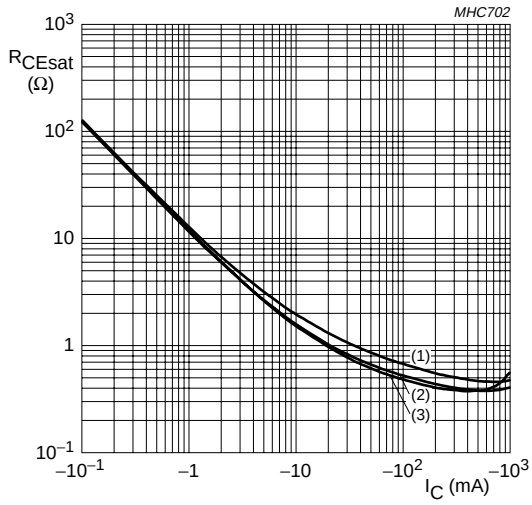
Transistor TR1; I_C/I_B = 20.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –55 °C.

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



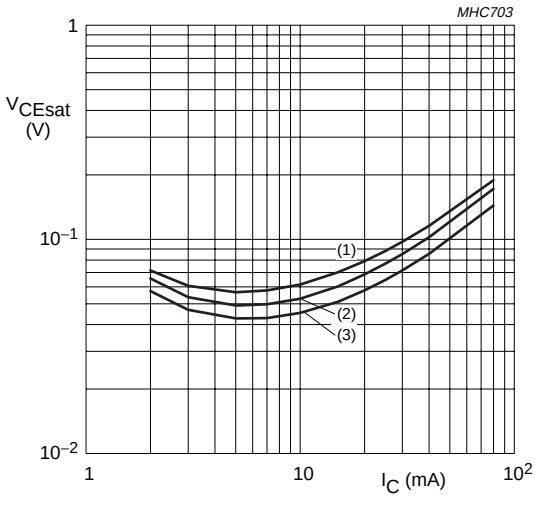
Transistor TR1; $I_C/I_B = 20$.
(1) $T_{amb} = 150$ °C.
(2) $T_{amb} = 25$ °C.
(3) $T_{amb} = -55$ °C.

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



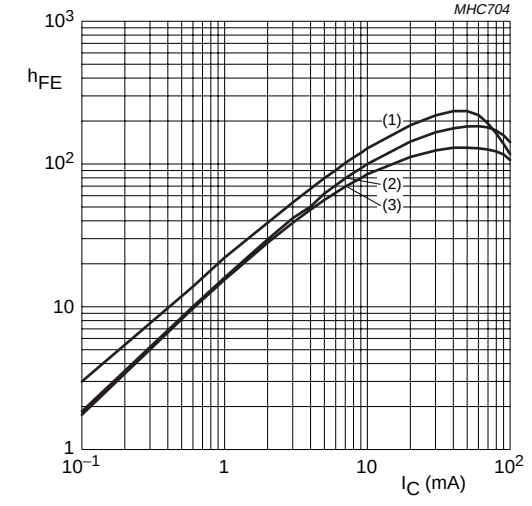
Transistor TR1; $I_C/I_B = 20$.
(1) $T_{amb} = -55$ °C.
(2) $T_{amb} = 25$ °C.
(3) $T_{amb} = 150$ °C.

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



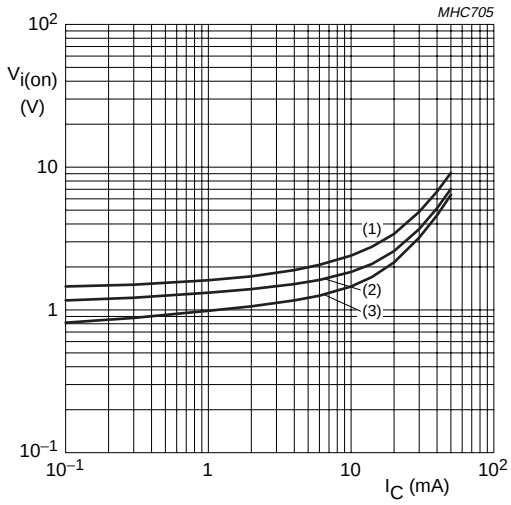
Transistor TR2; $I_C/I_B = 20$.
(1) $T_{amb} = 100$ °C.
(2) $T_{amb} = 25$ °C.
(3) $T_{amb} = -40$ °C.

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



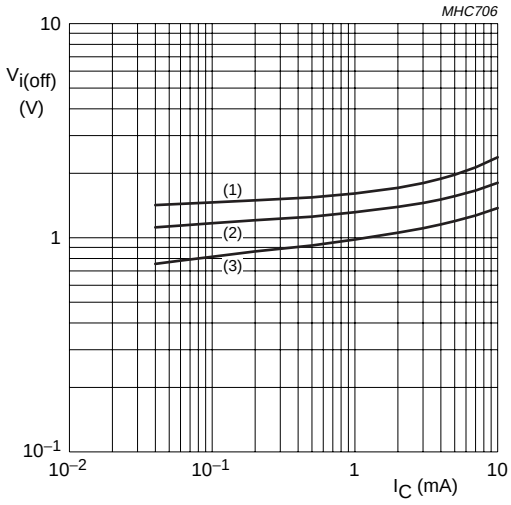
Transistor TR2; $V_{CE} = 5$ V.
(1) $T_{amb} = 150$ °C.
(2) $T_{amb} = 25$ °C.
(3) $T_{amb} = -40$ °C.

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



Transistor TR2; V_{CE} = 0.3 V.
(1) T_{amb} = –40 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

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

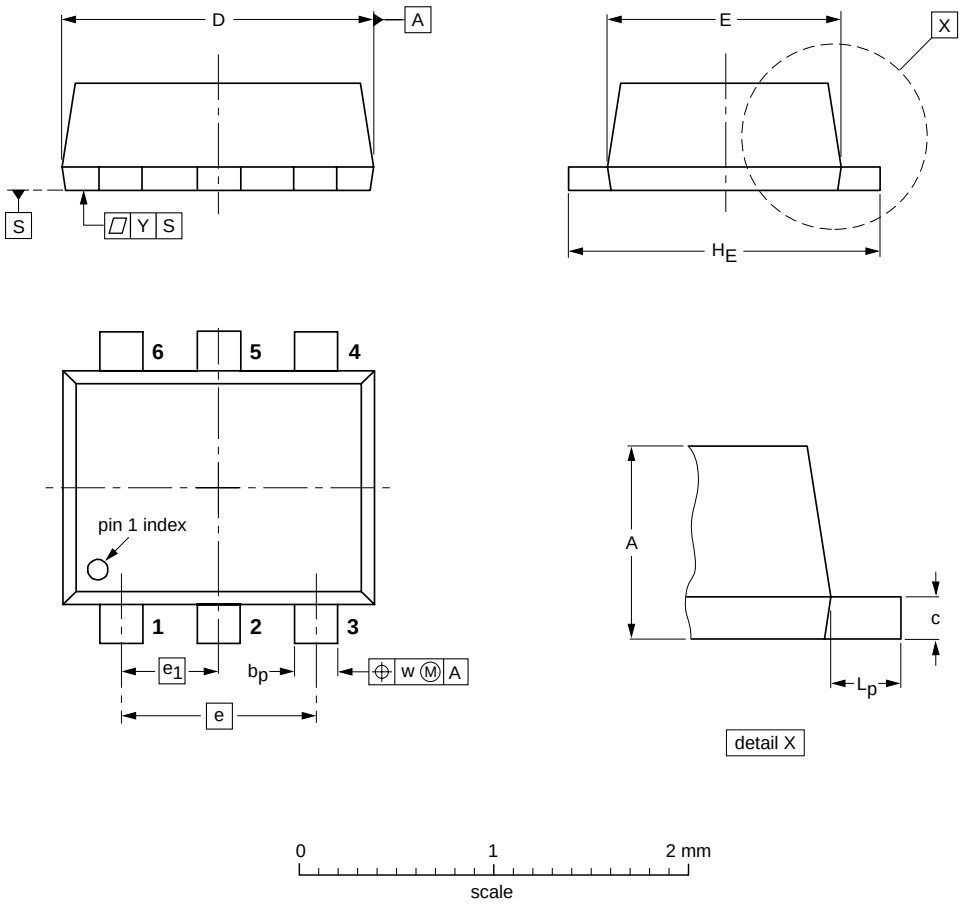


Transistor TR2; V_{CE} = 5 V.
(1) T_{amb} = –40 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

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

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	EIAJ			
SOT666						~~01-01-04~~ 01-08-27

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS(1)	PRODUCT STATUS(2)(3)	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
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3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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