

DATA SHEET

PEMH13; PUMH13
NPN/NPN resistor-equipped
transistors; $R1 = 4.7 \text{ k}\Omega$, $R2 = 47 \text{ k}\Omega$

Product specification
Supersedes data of 2003 Nov 07

2004 Apr 14

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FEATURES

- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs.

APPLICATIONS

- Low current peripheral driver
- Replacement of general purpose transistors in digital applications
- Control of IC inputs.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	TYP.	MAX.	UNIT
V _{CEO}	collector-emitter voltage	–	50	V
I _O	output current (DC)	–	100	mA
TR1	NPN	–	–	–
TR2	NPN	–	–	–
R1	bias resistor	4.7	–	kΩ
R2	bias resistor	47	–	kΩ

DESCRIPTION

NPN/NPN resistor-equipped transistors (see “Simplified outline, symbol and pinning” for package details).

PRODUCT OVERVIEW

TYPE NUMBER	PACKAGE		MARKING CODE	PNP/PNP COMPLEMENT	NPN/PNP COMPLEMENT
	PHILIPS	EIAJ			
PEMH13	SOT666	–	21	PEMB13	PEMD13
PUMH13	SOT363	SC-88	H0 ^{*(1)}	PUMB13	PUMD13

Note

- * = p: Made in Hong Kong.
 * = t: Made in Malaysia.
 * = W: Made in China.

SIMPLIFIED OUTLINE, SYMBOL AND PINNING

TYPE NUMBER	SIMPLIFIED OUTLINE AND SYMBOL	PINNING	
		PIN	DESCRIPTION
PEMH13 PUMH13	<p>Top view MHC650</p>	1	emitter TR1
		2	base TR1
		3	collector TR2
		4	emitter TR2
		5	base TR2
		6	collector TR1

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ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PEMH13	–	plastic surface mounted package; 6 leads	SOT666
PUMH13	–	plastic surface mounted package; 6 leads	SOT363

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Per transistor					
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		–	+30	V
			–	–5	V
I_o	output current (DC)		–	100	mA
I_{CM}	peak collector current		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25 \text{ }^\circ\text{C}$			
	SOT363	note 1	–	200	mW
	SOT666	notes 1 and 2	–	200	mW
T_{stg}	storage temperature		–65	+150	$^\circ\text{C}$
T_j	junction temperature		–	150	$^\circ\text{C}$
T_{amb}	operating ambient temperature		–65	+150	$^\circ\text{C}$
Per device					
P_{tot}	total power dissipation	$T_{amb} \leq 25 \text{ }^\circ\text{C}$			
	SOT363	note 1	–	300	mW
	SOT666	notes 1 and 2	–	300	mW

Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, standard footprint.
2. Reflow soldering is the only recommended soldering method.

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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
Per transistor				
$R_{th(j-a)}$	thermal resistance from junction to ambient	$T_{amb} \leq 25 \text{ }^\circ\text{C}$		
	SOT363	note 1	625	K/W
	SOT666	notes 1 and 2	625	K/W
Per device				
$R_{th(j-a)}$	thermal resistance from junction to ambient	$T_{amb} \leq 25 \text{ }^\circ\text{C}$		
	SOT363	note 1	416	K/W
	SOT666	notes 1 and 2	416	K/W

Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, standard footprint.
2. Reflow soldering is the only recommended soldering method.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor						
I_{CBO}	collector-base cut-off current	$V_{CB} = 50 \text{ V}$; $I_E = 0 \text{ A}$	–	–	100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = 30 \text{ V}$; $I_B = 0 \text{ A}$	–	–	1	μA
		$V_{CE} = 30 \text{ V}$; $I_B = 0 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$	–	–	50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5 \text{ V}$; $I_C = 0 \text{ A}$	–	–	170	μA
h_{FE}	DC current gain	$V_{CE} = 5 \text{ V}$; $I_C = 10 \text{ mA}$	100	–	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 5 \text{ mA}$; $I_B = 0.25 \text{ mA}$	–	–	100	mV
$V_{i(off)}$	input-off voltage	$V_{CE} = 5 \text{ V}$; $I_C = 100 \text{ } \mu\text{A}$	–	0.6	0.5	V
$V_{i(on)}$	input-on voltage	$V_{CE} = 0.3 \text{ V}$; $I_C = 5 \text{ mA}$	1.3	0.9	–	V
R1	input resistor		3.3	4.7	6.1	$\text{k}\Omega$
$\frac{R2}{R1}$	resistor ratio		8	10	12	
C_c	collector capacitance	$V_{CB} = 10 \text{ V}$; $I_E = i_e = 0 \text{ A}$; $f = 1 \text{ MHz}$	–	–	2.5	pF

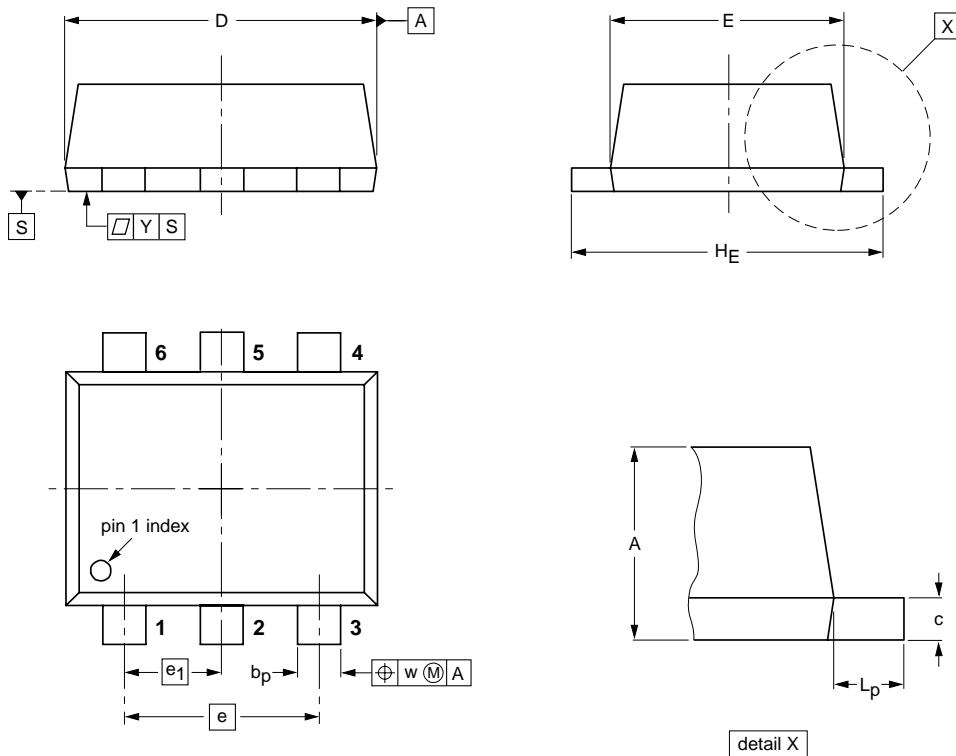
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PACKAGE OUTLINES

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

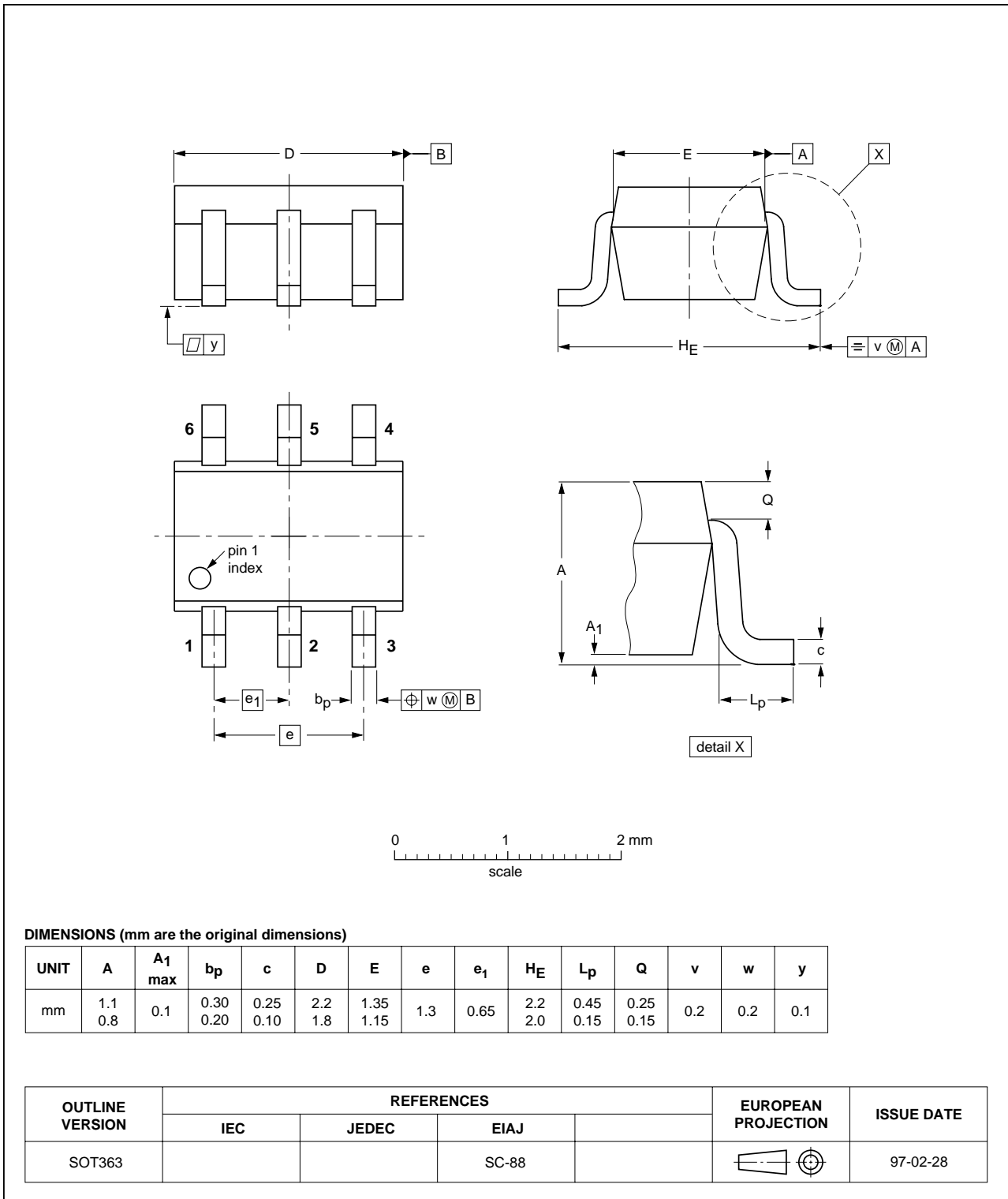
OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT666					01-01-04 01-08-27

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LEVEL	DATA SHEET STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾⁽³⁾	DEFINITION
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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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.

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