

PMV65XP

P-channel TrenchMOS™ extremely low level FET

Rev. 01 — 28 September 2004

Product data sheet

1. Product profile

1.1 General description

P-channel enhancement mode field effect transistor in a plastic package using TrenchMOS™ technology.

1.2 Features

- Low threshold voltage
- Low on-state resistance.

1.3 Applications

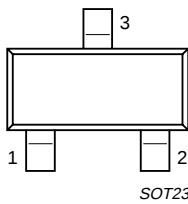
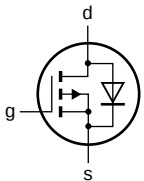
- Low power DC-to-DC converters
- Battery management
- Load switching
- Battery powered portable equipment.

1.4 Quick reference data

- $V_{DS} \leq -20$ V
- $I_D \leq -3.9$ A
- $R_{DS(on)} \leq 76$ mΩ
- $Q_{gd} = 0.65$ nC (typ).

2. Pinning information

Table 1: Discrete pinning

Pin	Description	Simplified outline	Symbol
1	gate (g)	 SOT23	 003aaa671
2	source (s)		
3	drain (d)		

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3. Ordering information

Table 2: Ordering information

Type number	Package		
	Name	Description	Version
PMV65XP	SOT23	Plastic surface mounted package; 3 leads	SOT23

4. Limiting values

Table 3: Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage (DC)	$25\text{ °C} \leq T_j \leq 150\text{ °C}$	-	-20	V
V_{DGR}	drain-gate voltage (DC)	$25\text{ °C} \leq T_j \leq 150\text{ °C}$; $R_{GS} = 20\text{ k}\Omega$	-	-20	V
V_{GS}	gate-source voltage (DC)		-	± 12	V
I_D	drain current (DC)	$T_{sp} = 25\text{ °C}$; $V_{GS} = -4.5\text{ V}$; Figure 2 and 3	-	-3.9	A
		$T_{sp} = 100\text{ °C}$; $V_{GS} = -4.5\text{ V}$; Figure 2	-	-2.5	A
I_{DM}	peak drain current	$T_{sp} = 25\text{ °C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$; Figure 3	-	-15.9	A
P_{tot}	total power dissipation	$T_{sp} = 25\text{ °C}$; Figure 1	-	1.92	W
T_{stg}	storage temperature		-55	+150	°C
T_j	junction temperature		-55	+150	°C
Source-drain diode					
I_S	source (diode forward) current (DC)	$T_{sp} = 25\text{ °C}$	-	-1.6	A
I_{SM}	peak source (diode forward) current	$T_{sp} = 25\text{ °C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$	-	-6.4	A

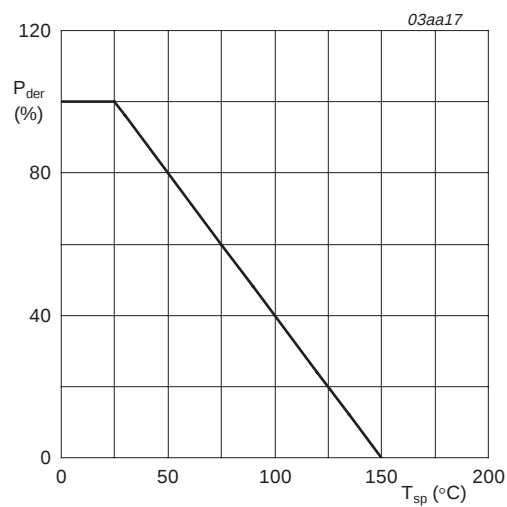


Fig 1. Normalized total power dissipation as a function of solder point temperature.

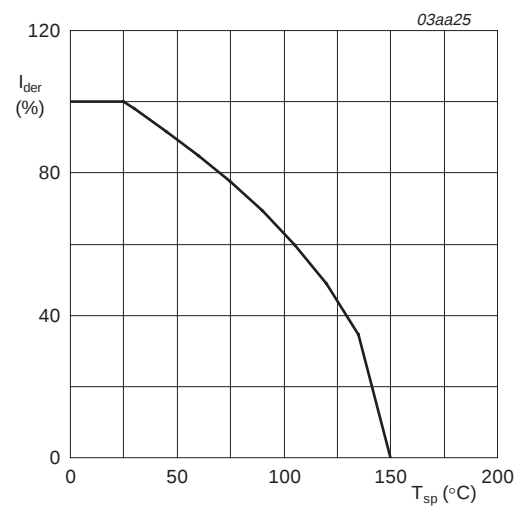
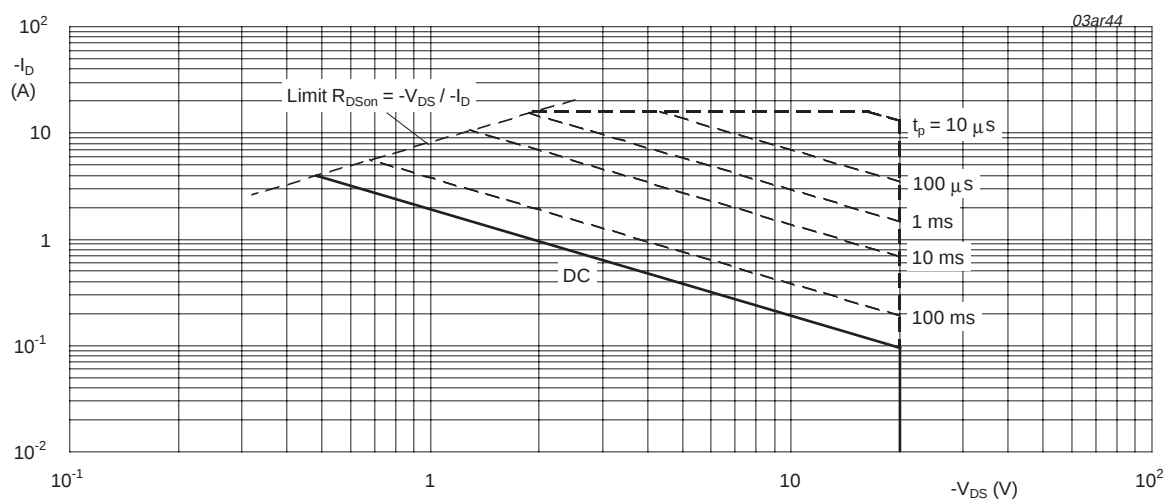


Fig 2. Normalized continuous drain current as a function of solder point temperature.



$T_{sp} = 25^{\circ}C$; I_{DM} is single pulse; $V_{GS} = -4.5 V$

Fig 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage.

5. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	Figure 4	-	-	65	K/W

5.1 Transient thermal impedance

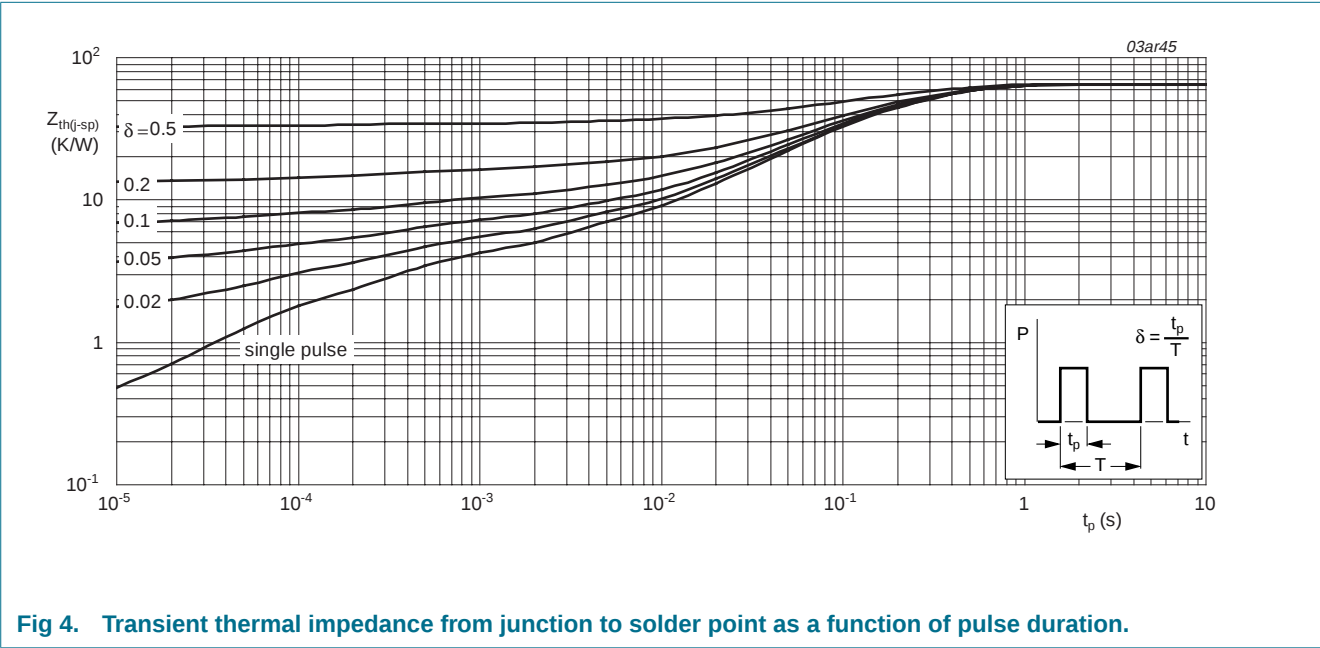
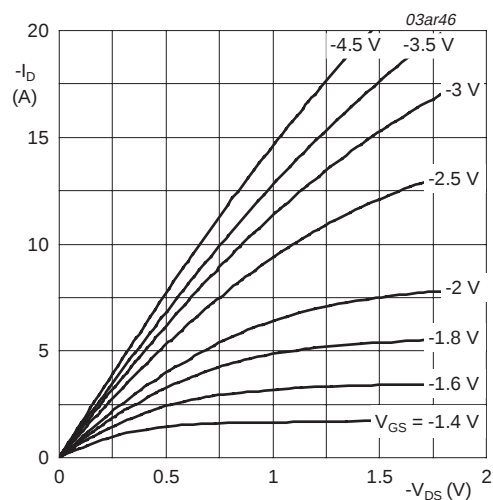


Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration.

6. Characteristics

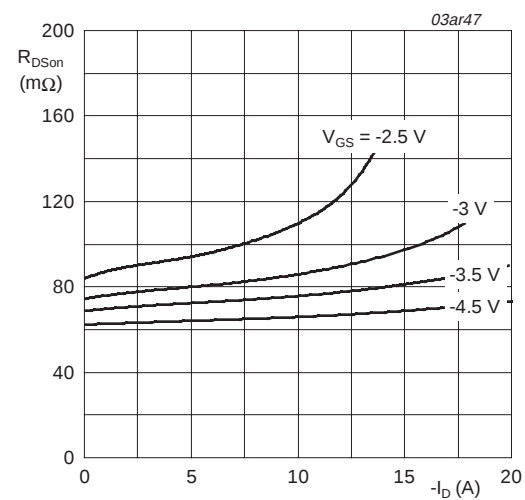
Table 5: Characteristics
 $T_j = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -250\text{ }\mu\text{A}$; $V_{GS} = 0\text{ V}$				
		$T_j = 25\text{ °C}$	-20	-	-	V
		$T_j = -55\text{ °C}$	-18	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = -1\text{ mA}$; $V_{DS} = V_{GS}$; Figure 9 and 10				
		$T_j = 25\text{ °C}$	-0.55	-0.75	-0.95	V
		$T_j = 150\text{ °C}$	-0.35	-	-	V
		$T_j = -55\text{ °C}$	-	-	-1.1	V
I_{DSS}	drain-source leakage current	$V_{DS} = -20\text{ V}$; $V_{GS} = 0\text{ V}$				
		$T_j = 25\text{ °C}$	-	-	-1	μA
		$T_j = 150\text{ °C}$	-	-	-100	μA
I_{GSS}	gate-source leakage current	$V_{GS} = \pm 12\text{ V}$; $V_{DS} = 0\text{ V}$	-	-10	-100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = -4.5\text{ V}$; $I_D = -2.8\text{ A}$; Figure 6 and 8				
		$T_j = 25\text{ °C}$	-	65	76	m Ω
		$T_j = 150\text{ °C}$	-	104	122	m Ω
		$V_{GS} = -2.5\text{ V}$; $I_D = -2.3\text{ A}$; Figure 6 and 8	-	90	112	m Ω
Dynamic characteristics						
$Q_{g(tot)}$	total gate charge	$I_D = -2.8\text{ A}$; $V_{DS} = -6\text{ V}$; $V_{GS} = -4.5\text{ V}$; Figure 11	-	7.6	-	nC
Q_{gs}	gate-source charge		-	1.6	-	nC
Q_{gd}	gate-drain (Miller) charge		-	0.65	-	nC
V_{plat}	plateau voltage		-	-1.5	-	V
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = -20\text{ V}$; $f = 1\text{ MHz}$; Figure 13	-	725	-	pF
C_{oss}	output capacitance		-	105	-	pF
C_{rss}	reverse transfer capacitance		-	80	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = -6\text{ V}$; $R_L = 6\text{ }\Omega$; $V_{GS} = -4.5\text{ V}$; $R_G = 6\text{ }\Omega$	-	7	-	ns
t_r	rise time		-	21	-	ns
$t_{d(off)}$	turn-off delay time		-	68	-	ns
t_f	fall time		-	33	-	ns
Source-drain diode						
V_{SD}	source-drain (diode forward) voltage	$I_S = -1.25\text{ A}$; $V_{GS} = 0\text{ V}$; Figure 12	-	-0.77	-1.2	V



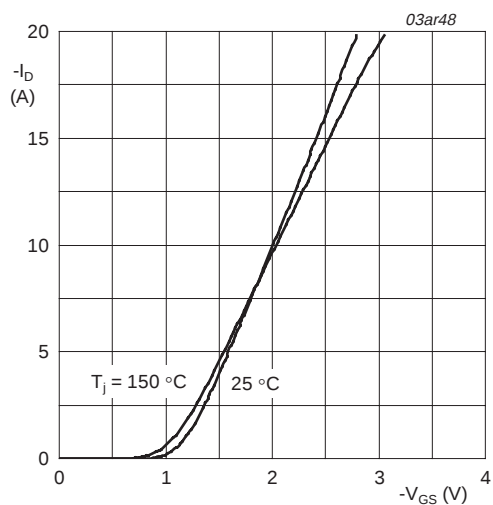
T_j = 25 °C

Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values.



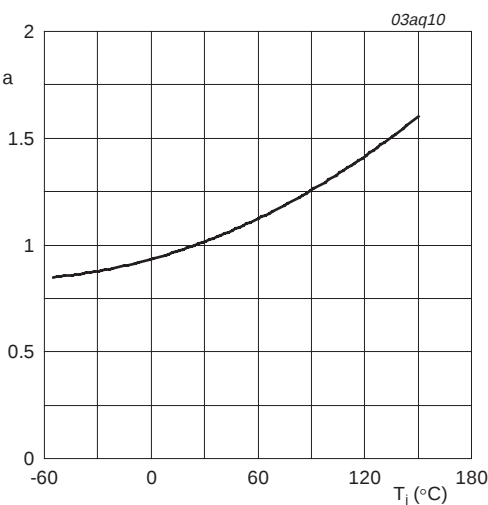
T_j = 25 °C

Fig 6. Drain-source on-state resistance as a function of drain current; typical values.



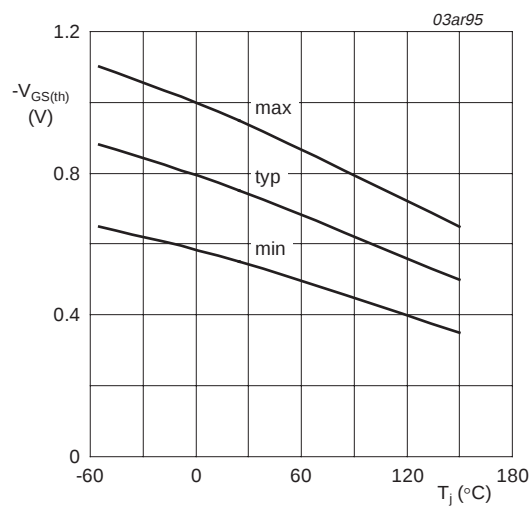
T_j = 25 °C and 150 °C; V_{DS} > I_D × R_{DS(on)}

Fig 7. Transfer characteristics: drain current as a function of gate-source voltage; typical values.



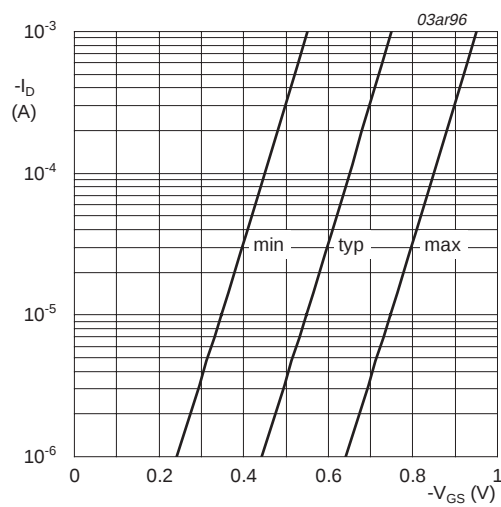
$$a = \frac{R_{DS(on)}}{R_{DS(on)(25^{\circ}C)}}$$

Fig 8. Normalized drain-source on-state resistance factor as a function of junction temperature.



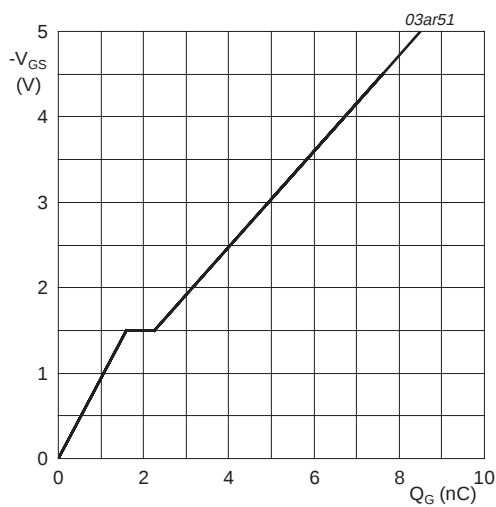
$I_D = -1 \text{ mA}$; $V_{DS} = V_{GS}$

Fig 9. Gate-source threshold voltage as a function of junction temperature.



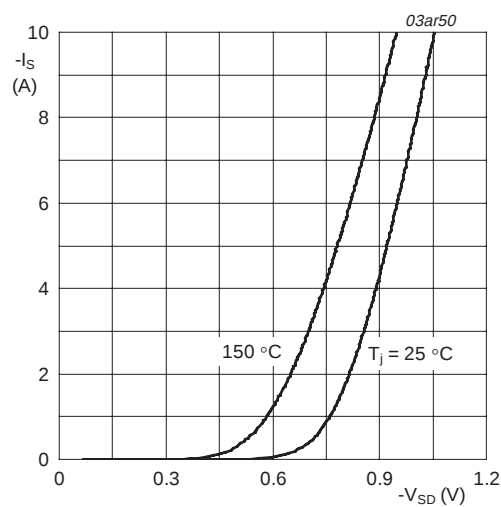
$T_j = 25 \text{ °C}$; $V_{DS} = -5 \text{ V}$

Fig 10. Sub-threshold drain current as a function of gate-source voltage.



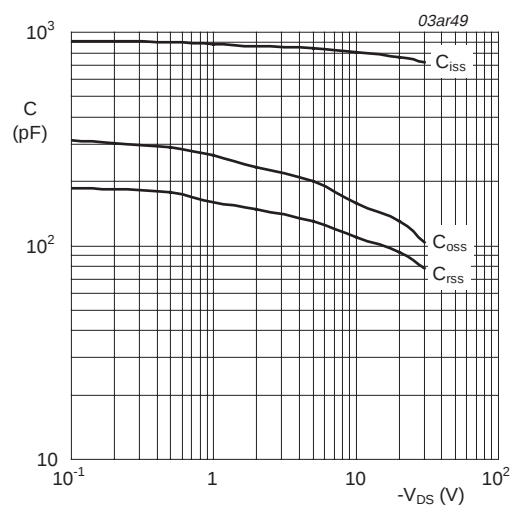
$I_D = -2.8 \text{ A}$; $V_{DS} = -6 \text{ V}$

Fig 11. Gate-source voltage as a function of gate charge; typical values.



$T_j = 25\text{ °C}$ and 150 °C ; $V_{GS} = 0\text{ V}$

Fig 12. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values.



$V_{GS} = 0\text{ V}$; $f = 1\text{ MHz}$

Fig 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values.

7. Package outline

Plastic surface mounted package; 3 leads

SOT23

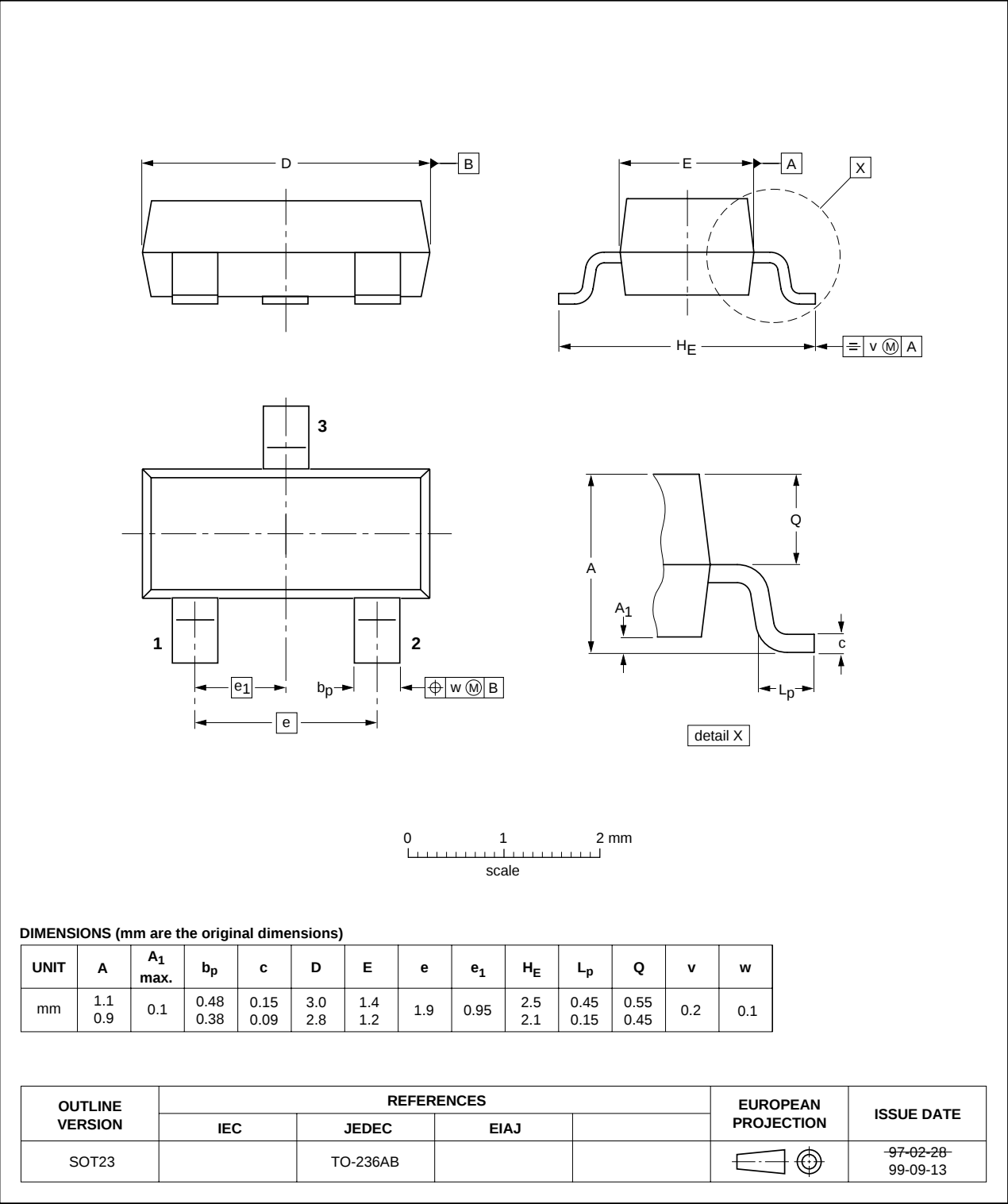


Fig 14. SOT23 package outline.

8. Revision history

Table 6: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
PMV65XP_1	20040928	Product data sheet	-	9397 750 13993	-

9. 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.
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14. Contents

1 Product profile 1

1.1 General description..... 1

1.2 Features 1

1.3 Applications 1

1.4 Quick reference data..... 1

2 Pinning information..... 1

3 Ordering information..... 2

4 Limiting values..... 2

5 Thermal characteristics..... 4

5.1 Transient thermal impedance 4

6 Characteristics..... 5

7 Package outline 9

8 Revision history..... 10

9 Data sheet status 11

10 Definitions 11

11 Disclaimers..... 11

12 Trademarks..... 11

13 Contact information 11



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Date of release: 28 September 2004
Document number: 9397 750 13993

Published in The Netherlands