

# 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

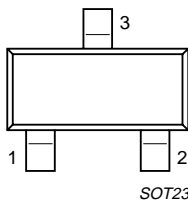
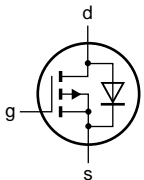
- Low power DC-to-DC converters
- Battery management
- Load switching
- Battery powered portable equipment.

### 1.4 Quick reference data

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

## 2. Pinning information

Table 1: Discrete pinning

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

### 3. Ordering information

**Table 2: Ordering information**

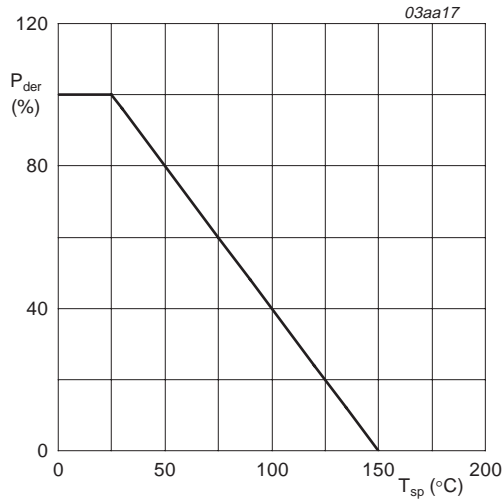
Type number	Package		
	Name	Description	Version
PMV65XP	SOT23	Plastic surface mounted package; 3 leads	SOT23

### 4. Limiting values

**Table 3: Limiting values**

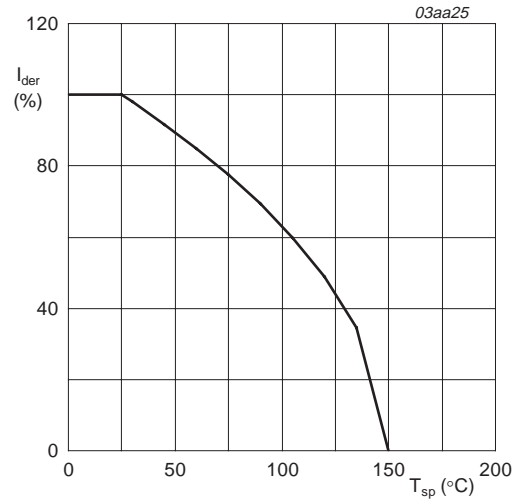
In accordance with the Absolute Maximum Rating System (IEC 60134).

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)		-	$\pm 12$	V
$I_D$	drain current (DC)	$T_{sp} = 25\text{ °C}$ ; $V_{GS} = -4.5\text{ V}$ ; <a href="#">Figure 2</a> and <a href="#">3</a>	-	-3.9	A
		$T_{sp} = 100\text{ °C}$ ; $V_{GS} = -4.5\text{ V}$ ; <a href="#">Figure 2</a>	-	-2.5	A
$I_{DM}$	peak drain current	$T_{sp} = 25\text{ °C}$ ; pulsed; $t_p \leq 10\text{ }\mu\text{s}$ ; <a href="#">Figure 3</a>	-	-15.9	A
$P_{tot}$	total power dissipation	$T_{sp} = 25\text{ °C}$ ; <a href="#">Figure 1</a>	-	1.92	W
$T_{stg}$	storage temperature		-55	+150	°C
$T_j$	junction temperature		-55	+150	°C
<b>Source-drain diode</b>					
$I_S$	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



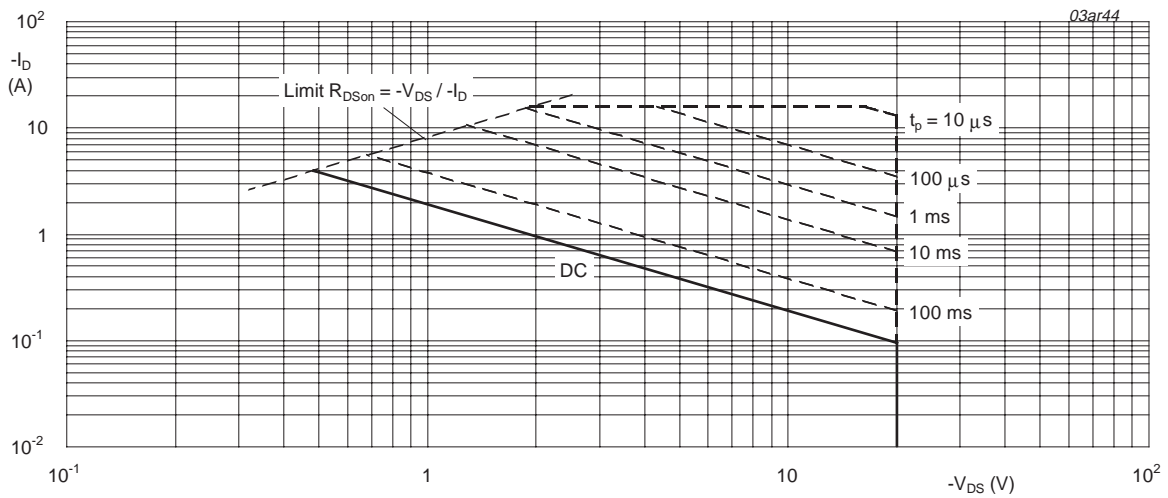
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}C)}} \times 100\%$$

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



$$I_{der} = \frac{I_D}{I_{D(25^{\circ}C)}} \times 100\%$$

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

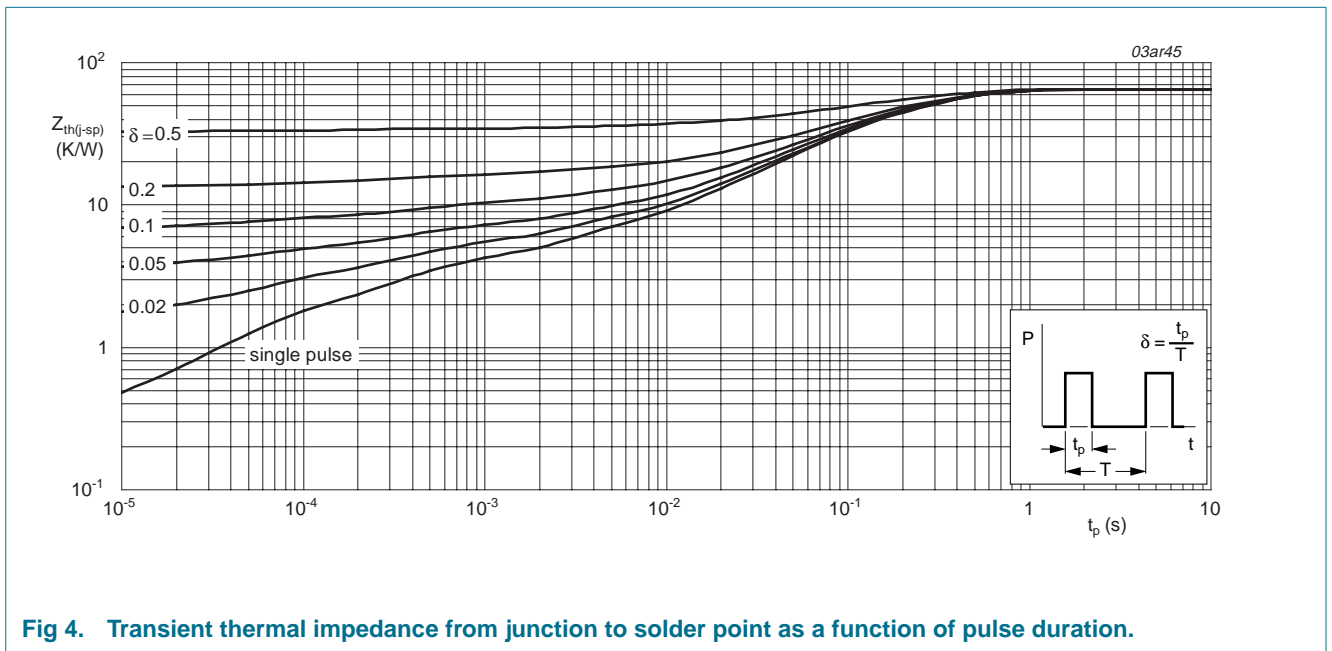


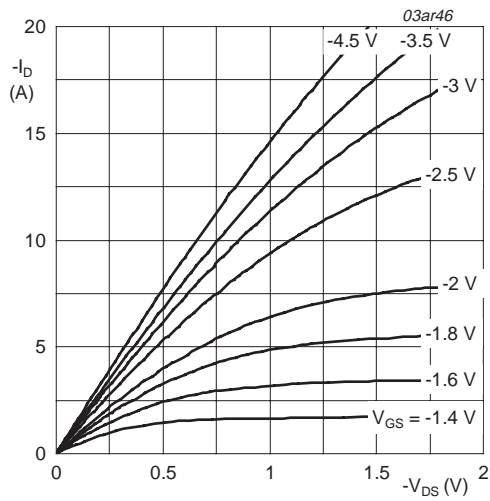
Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration.

## 6. Characteristics

**Table 5: Characteristics**

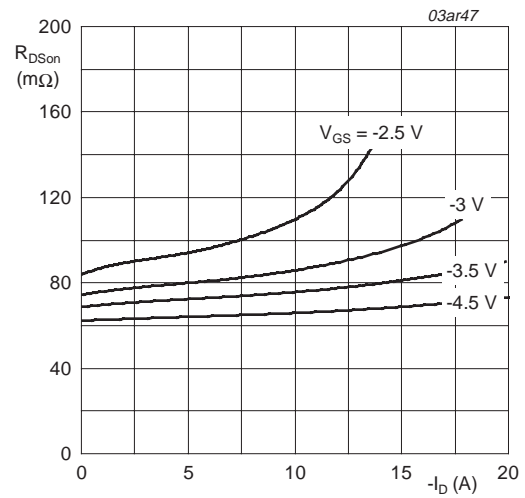
$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	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	$I_D = -1\text{ mA}$ ; $V_{DS} = V_{GS}$ ; <a href="#">Figure 9</a> and <a href="#">10</a>				
		$T_j = 25\text{ °C}$	-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	$\mu\text{A}$
		$T_j = 150\text{ °C}$	-	-	-100	$\mu\text{A}$
$I_{GSS}$	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	$V_{GS} = -4.5\text{ V}$ ; $I_D = -2.8\text{ A}$ ; <a href="#">Figure 6</a> and <a href="#">8</a>				
		$T_j = 25\text{ °C}$	-	65	76	m $\Omega$
		$T_j = 150\text{ °C}$	-	104	122	m $\Omega$
		$V_{GS} = -2.5\text{ V}$ ; $I_D = -2.3\text{ A}$ ; <a href="#">Figure 6</a> and <a href="#">8</a>	-	90	112	m $\Omega$
<b>Dynamic characteristics</b>						
$Q_{g(tot)}$	total gate charge	$I_D = -2.8\text{ A}$ ; $V_{DS} = -6\text{ V}$ ; $V_{GS} = -4.5\text{ V}$ ; <a href="#">Figure 11</a>	-	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	$V_{GS} = 0\text{ V}$ ; $V_{DS} = -20\text{ V}$ ; $f = 1\text{ MHz}$ ; <a href="#">Figure 13</a>	-	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
<b>Source-drain diode</b>						
$V_{SD}$	source-drain (diode forward) voltage	$I_S = -1.25\text{ A}$ ; $V_{GS} = 0\text{ V}$ ; <a href="#">Figure 12</a>	-	-0.77	-1.2	V



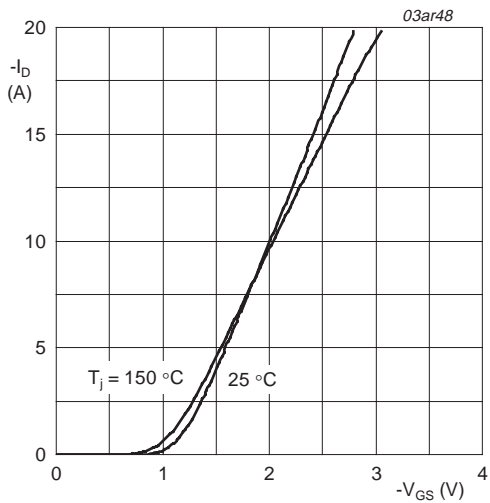
$T_j = 25\text{ }^\circ\text{C}$

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



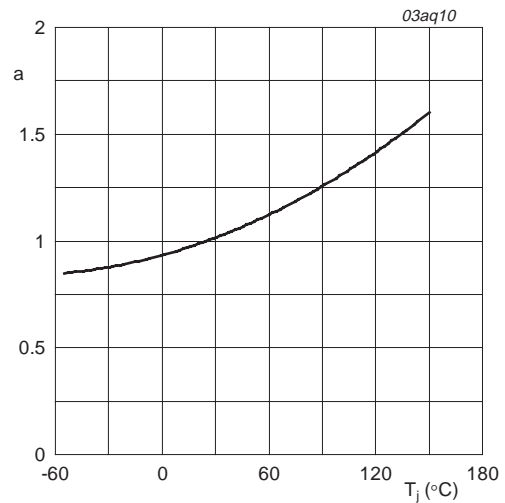
$T_j = 25\text{ }^\circ\text{C}$

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



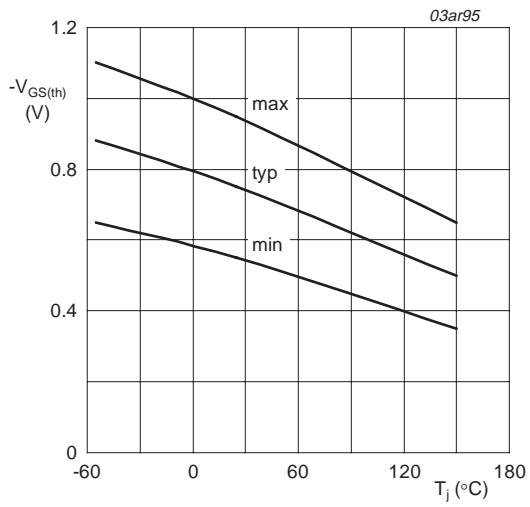
$T_j = 25\text{ }^\circ\text{C}$  and  $150\text{ }^\circ\text{C}$ ;  $V_{DS} > I_D \times R_{DSon}$

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



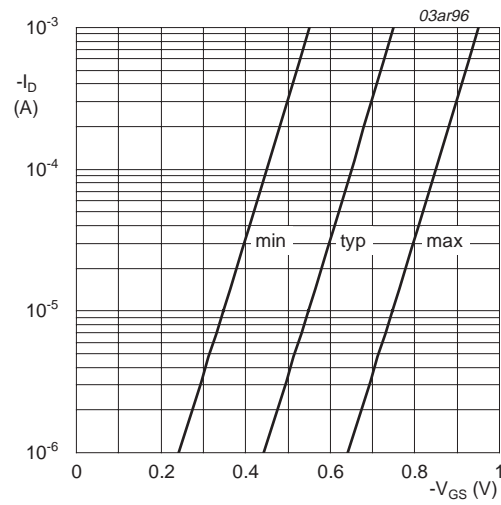
$$a = \frac{R_{DSon}}{R_{DSon(25^\circ\text{C})}}$$

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



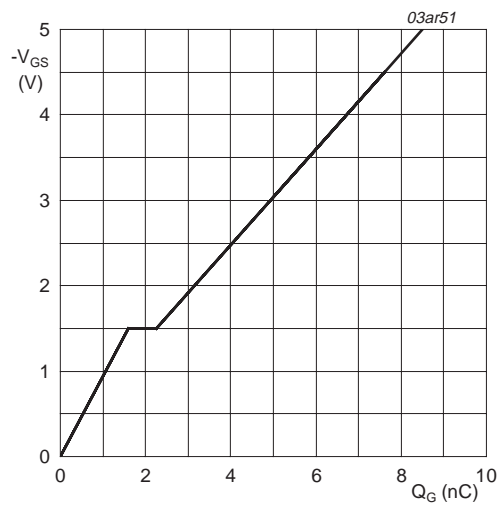
$I_D = -1 \text{ mA}; V_{DS} = V_{GS}$

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



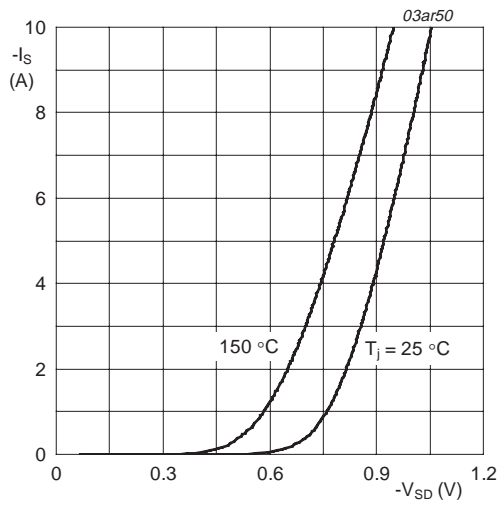
$T_j = 25 \text{ }^{\circ}C; V_{DS} = -5 \text{ V}$

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



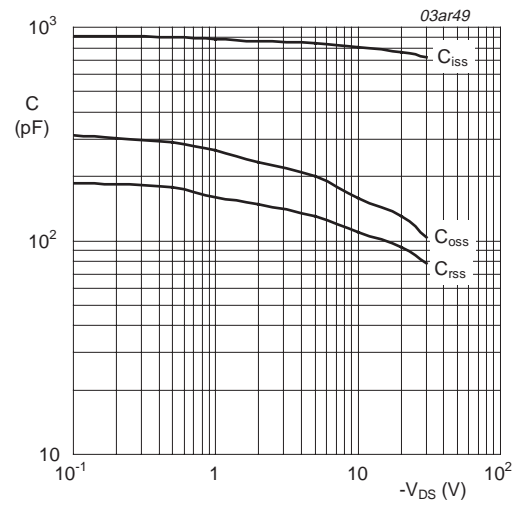
$I_D = -2.8 \text{ A}; V_{DS} = -6 \text{ V}$

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



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

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



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

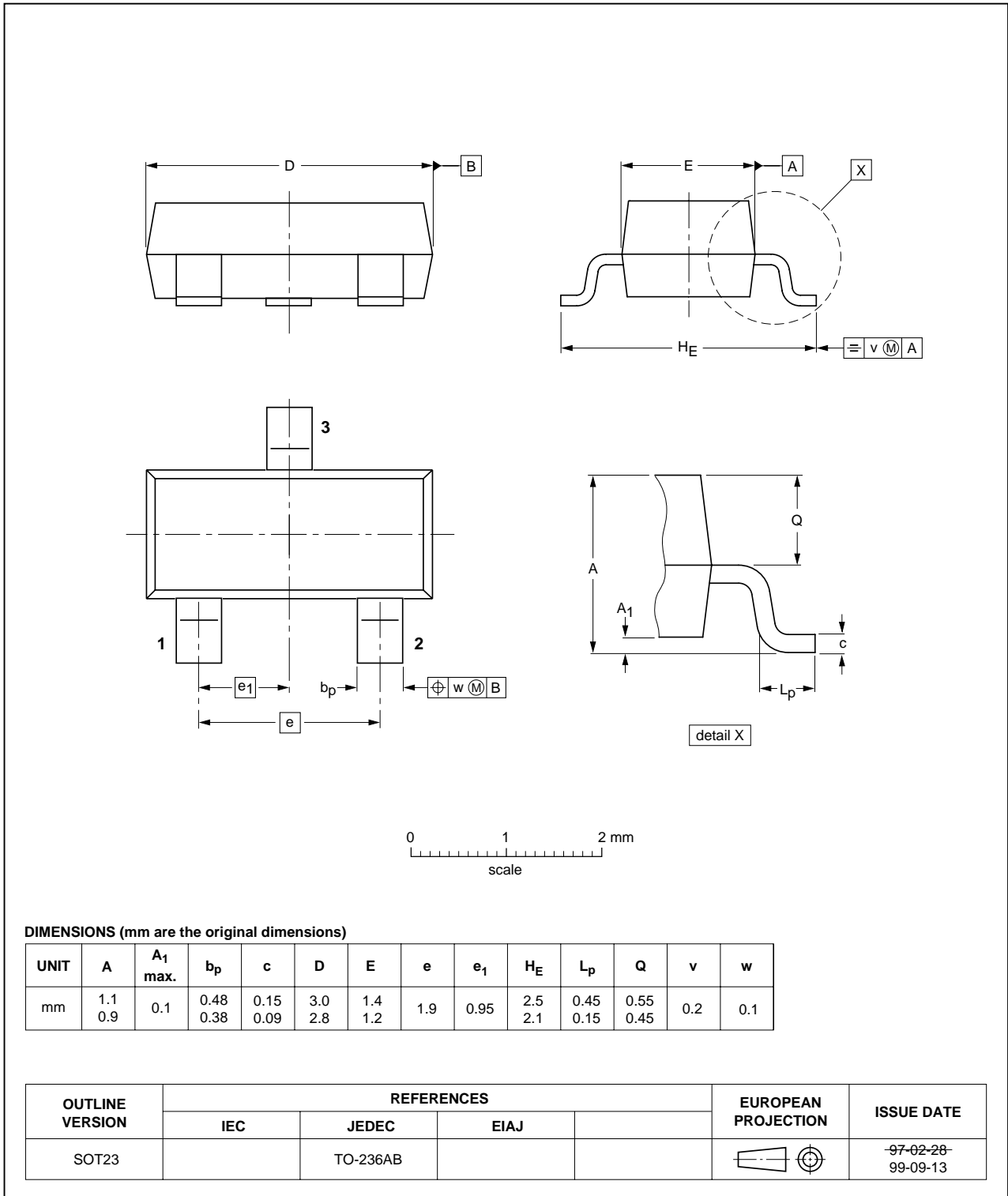
**Fig 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values.**



7. Package outline

Plastic surface mounted package; 3 leads

SOT23



www.DataSheet4U.com  
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 <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[3]</sup>	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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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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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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