

# PMV27UPER Datasheet



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DiGi Electronics Part Number	PMV27UPER-DG
Manufacturer	<a href="#">Nexperia USA Inc.</a>
Manufacturer Product Number	PMV27UPER
Description	MOSFET P-CH 20V 4.5A TO236AB
Detailed Description	P-Channel 20 V 4.5A (Ta) 490mW (Ta), 4.15W (Tc) Surface Mount TO-236AB



Tel: +00 852-30501935

RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

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## Purchase and inquiry

Manufacturer Product Number:

PMV27UPER

Series:

-

FET Type:

P-Channel

Drain to Source Voltage (Vdss):

20 V

Drive Voltage (Max Rds On, Min Rds On):

1.8V, 4.5V

Vgs(th) (Max) @ Id:

950mV @ 250µA

Vgs (Max):

±8V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

TO-236AB

Base Product Number:

PMV27

Manufacturer:

Nexperia USA Inc.

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

4.5A (Ta)

Rds On (Max) @ Id, Vgs:

32mOhm @ 4.5A, 4.5V

Gate Charge (Qg) (Max) @ Vgs:

22.1 nC @ 4.5 V

Input Capacitance (Ciss) (Max) @ Vds:

1820 pF @ 10 V

Power Dissipation (Max):

490mW (Ta), 4.15W (Tc)

Mounting Type:

Surface Mount

Package / Case:

TO-236-3, SC-59, SOT-23-3

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



# PMV27UPE

20 V, P-channel Trench MOSFET

15 May 2014

Product data sheet

## 1. General description

P-channel enhancement mode Field-Effect Transistor (FET) in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

## 2. Features and benefits

- Trench MOSFET technology
- Low threshold voltage
- Very fast switching
- Enhanced power dissipation capability:  $P_{tot} = 980$  mW
- ElectroStatic Discharge (ESD) protection 2 kV HBM

## 3. Applications

- LED driver
- Power management
- High-side loadswitch
- Switching circuits

## 4. Quick reference data

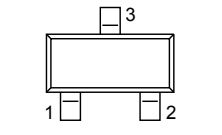
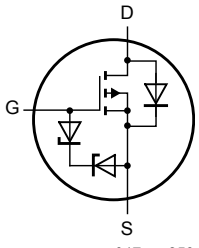
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j = 25$ °C	-	-	-20	V
$V_{GS}$	gate-source voltage		-8	-	8	V
$I_D$	drain current	$V_{GS} = -4.5$ V; $T_{amb} = 25$ °C; $t \leq 5$ s	[1]	-	-5.6	A
<b>Static characteristics</b>						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = -4.5$ V; $I_D = -4.5$ A; $T_j = 25$ °C	-	27	32	mΩ

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm<sup>2</sup>.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 TO-236AB (SOT23)	 017aaa259
2	S	source		
3	D	drain		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMV27UPE	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMV27UPE	%KD

[1] % = placeholder for manufacturing site code

## 8. Limiting values

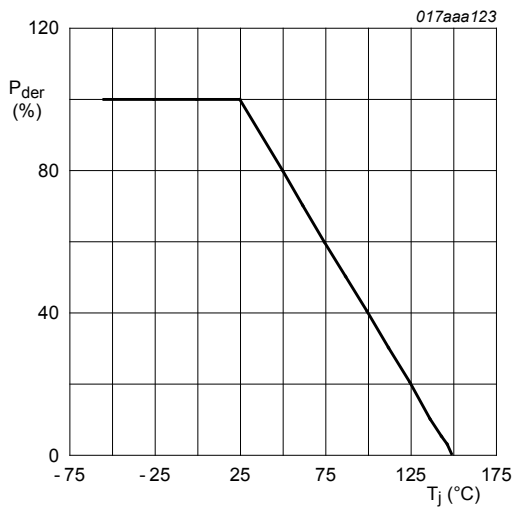
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
$V_{DS}$	drain-source voltage	$T_j = 25\text{ °C}$		-	-20	V
$V_{GS}$	gate-source voltage			-8	8	V
$I_D$	drain current	$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ °C}; t \leq 5\text{ s}$	[1]	-	-5.6	A
		$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-4.5	A
		$V_{GS} = -4.5\text{ V}; T_{amb} = 100\text{ °C}$	[1]	-	-2.8	A
$I_{DM}$	peak drain current	$T_{amb} = 25\text{ °C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	-18	A
$P_{tot}$	total power dissipation	$T_{amb} = 25\text{ °C}$	[2]	-	490	mW

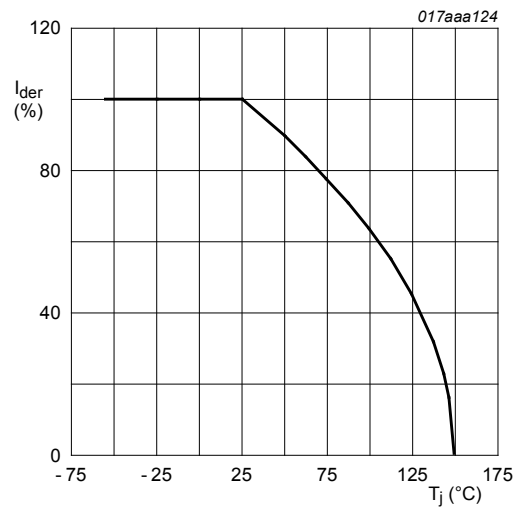
Symbol	Parameter	Conditions		Min	Max	Unit
			[1]	-	980	mW
		T <sub>sp</sub> = 25 °C		-	4150	mW
T <sub>j</sub>	junction temperature			-55	150	°C
T <sub>amb</sub>	ambient temperature			-55	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C
<b>Source-drain diode</b>						
I <sub>s</sub>	source current	T <sub>amb</sub> = 25 °C	[1]	-	-1.2	A

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm<sup>2</sup>.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



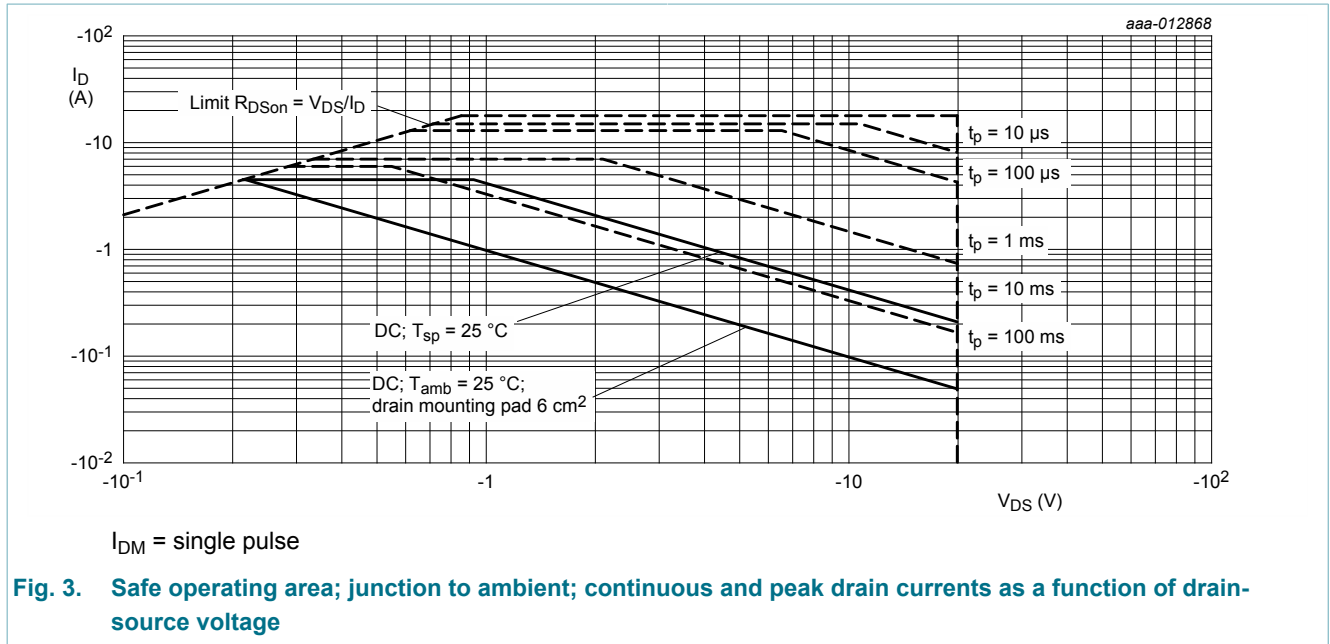
**Fig. 1. Normalized total power dissipation as a function of junction temperature**

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



**Fig. 2. Normalized continuous drain current as a function of junction temperature**

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



## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	222	255	K/W
			[2]	-	111	128	K/W
		in free air; $t \leq 5 \text{ s}$	[2]	-	74	85	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	25	30	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain  $6 \text{ cm}^2$ .

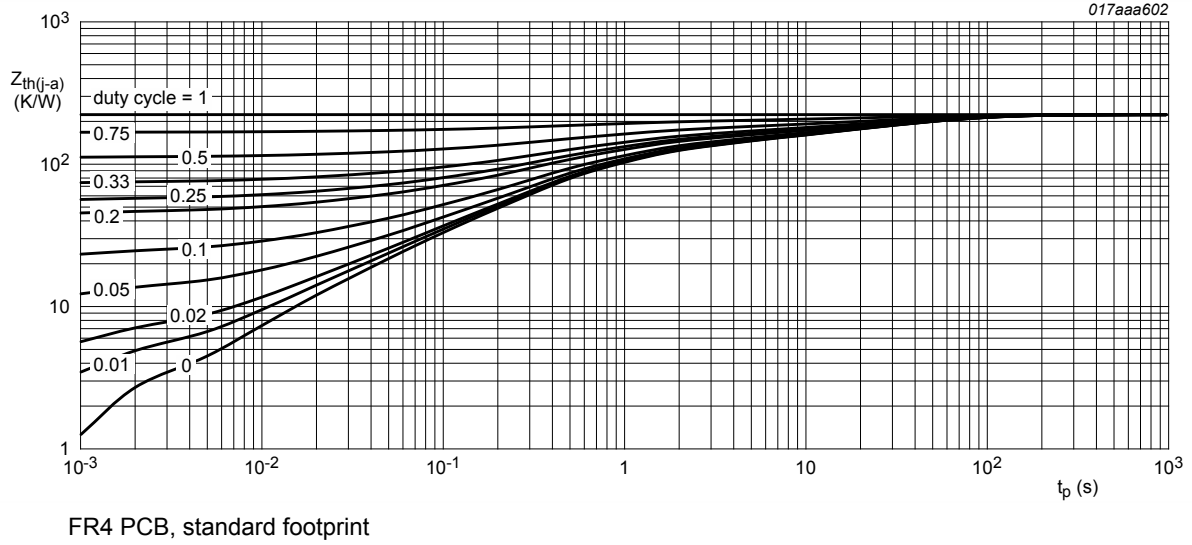


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

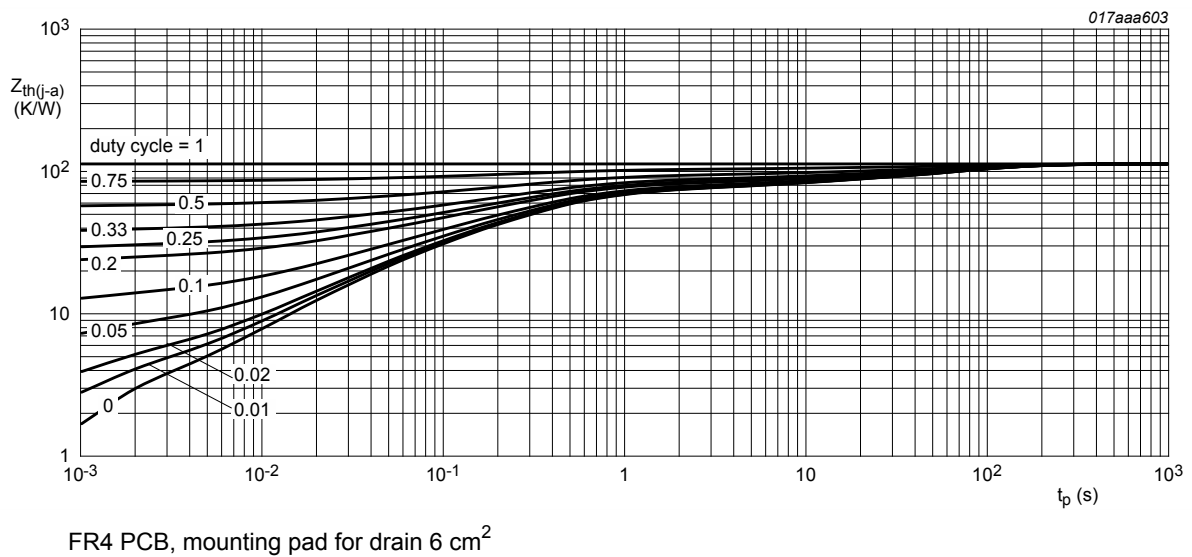


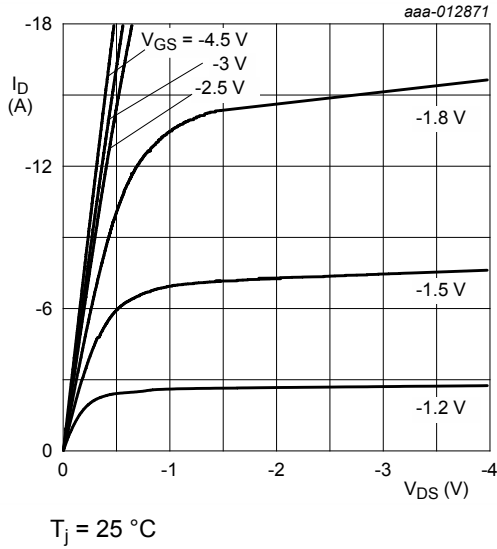
Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

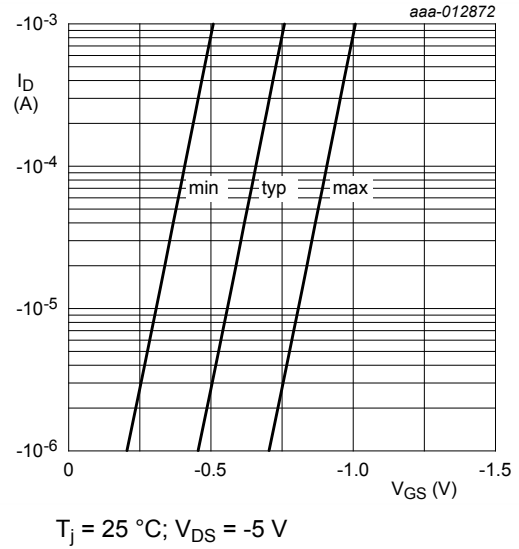
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -250 \mu A$ ; $V_{GS} = 0 V$ ; $T_j = 25^\circ C$	-20	-	-	V
$V_{GSth}$	gate-source threshold voltage	$I_D = -250 \mu A$ ; $V_{DS} = V_{GS}$ ; $T_j = 25^\circ C$	-0.45	-0.7	-0.95	V
$I_{DSS}$	drain leakage current	$V_{DS} = -20 V$ ; $V_{GS} = 0 V$ ; $T_j = 25^\circ C$	-	-	-1	$\mu A$
$I_{GSS}$	gate leakage current	$V_{GS} = 8 V$ ; $V_{DS} = 0 V$ ; $T_j = 25^\circ C$	-	-	10	$\mu A$
		$V_{GS} = -8 V$ ; $V_{DS} = 0 V$ ; $T_j = 25^\circ C$	-	-	-10	$\mu A$
		$V_{GS} = 4.5 V$ ; $V_{DS} = 0 V$ ; $T_j = 25^\circ C$	-	-	5	$\mu A$
		$V_{GS} = -4.5 V$ ; $V_{DS} = 0 V$ ; $T_j = 25^\circ C$	-	-	-5	$\mu A$
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = -4.5 V$ ; $I_D = -4.5 A$ ; $T_j = 25^\circ C$	-	27	32	m $\Omega$
		$V_{GS} = -4.5 V$ ; $I_D = -4.5 A$ ; $T_j = 150^\circ C$	-	40	48	m $\Omega$
		$V_{GS} = -2.5 V$ ; $I_D = -3.8 A$ ; $T_j = 25^\circ C$	-	38	45	m $\Omega$
		$V_{GS} = -1.8 V$ ; $I_D = -3 A$ ; $T_j = 25^\circ C$	-	50	63	m $\Omega$
$g_{fs}$	forward transconductance	$V_{DS} = -10 V$ ; $I_D = -2 A$ ; $T_j = 25^\circ C$	-	15	-	S
$R_G$	gate resistance	$f = 1 MHz$	-	10.7	-	$\Omega$
<b>Dynamic characteristics</b>						
$Q_{G(tot)}$	total gate charge	$V_{DS} = -10 V$ ; $I_D = -4.4 A$ ; $V_{GS} = -4.5 V$ ; $T_j = 25^\circ C$	-	14.7	22.1	nC
$Q_{GS}$	gate-source charge		-	2.6	-	nC
$Q_{GD}$	gate-drain charge		-	2.5	-	nC
$C_{iss}$	input capacitance	$V_{DS} = -10 V$ ; $f = 1 MHz$ ; $V_{GS} = 0 V$ ; $T_j = 25^\circ C$	-	1820	-	pF
$C_{oss}$	output capacitance		-	208	-	pF
$C_{rss}$	reverse transfer capacitance		-	146	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = -10 V$ ; $I_D = -4.4 A$ ; $V_{GS} = -4.5 V$ ; $R_{G(ext)} = 6 \Omega$ ; $T_j = 25^\circ C$	-	11	-	ns
$t_r$	rise time		-	30	-	ns
$t_{d(off)}$	turn-off delay time		-	83	-	ns
$t_f$	fall time		-	39	-	ns
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = -1.2 A$ ; $V_{GS} = 0 V$ ; $T_j = 25^\circ C$	-	-0.7	-1.2	V

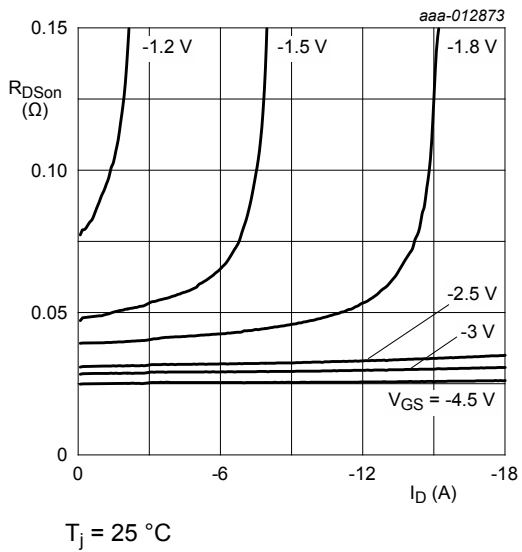




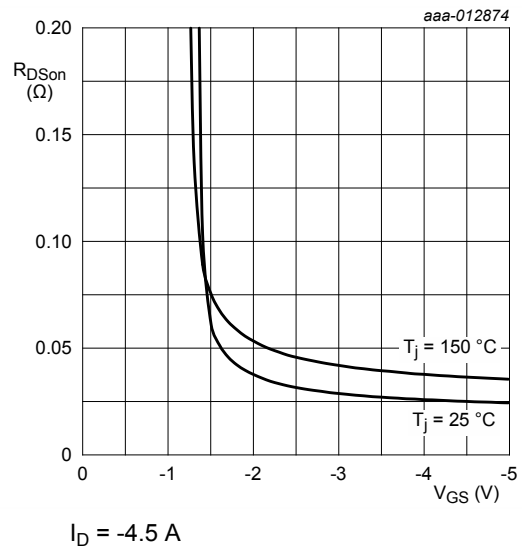
**Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values**



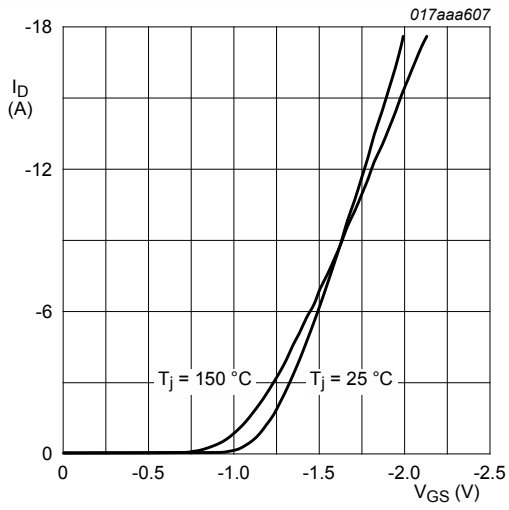
**Fig. 7. Sub-threshold drain current as a function of gate-source voltage**



**Fig. 8. Drain-source on-state resistance as a function of drain current; typical values**

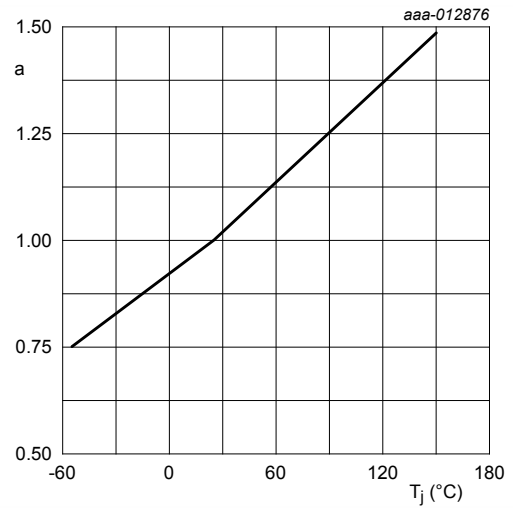


**Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values**



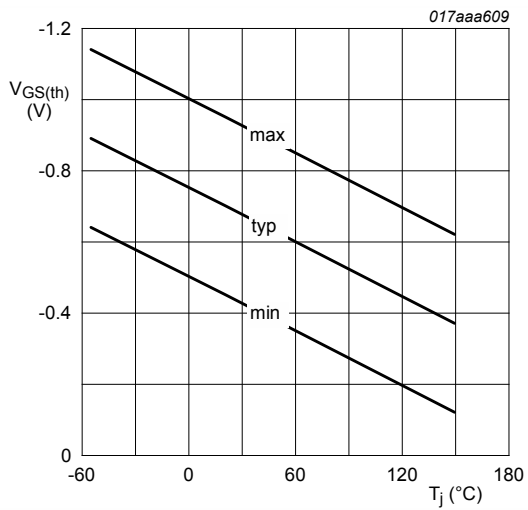
$$V_{DS} > I_D \times R_{DSon}$$

**Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values**



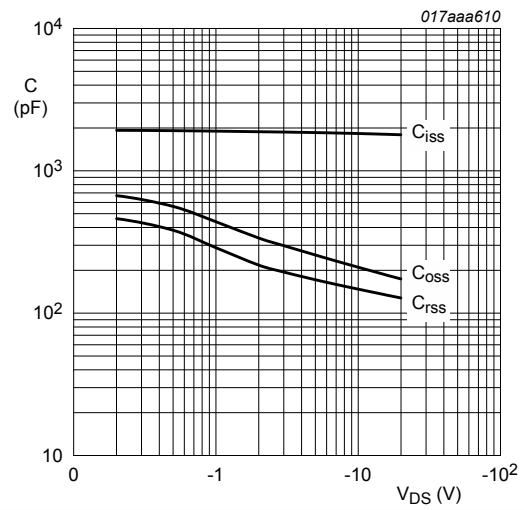
**Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values**

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



$$I_D = -0.25 \text{ mA}; V_{DS} = V_{GS}$$

**Fig. 12. Gate-source threshold voltage as a function of junction temperature**



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

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

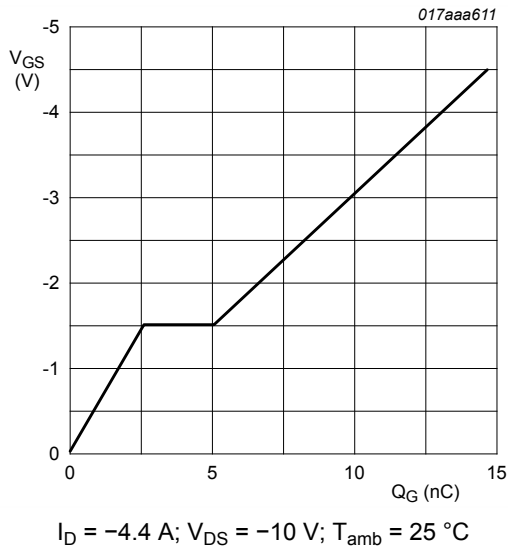


Fig. 14. Gate-source voltage as a function of gate charge; typical values

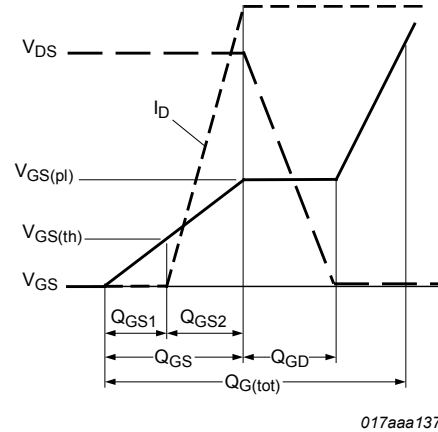
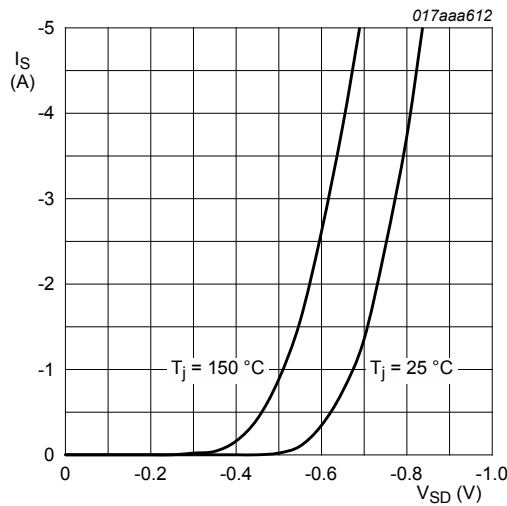


Fig. 15. MOSFET transistor: Gate charge waveform definitions



$V_{GS} = 0$  V

Fig. 16. Source current as a function of source-drain voltage; typical values

## 11. Test information

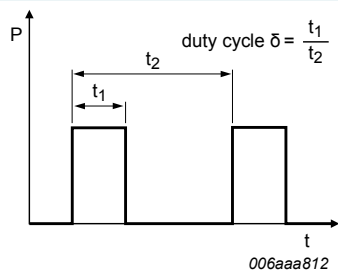


Fig. 17. Duty cycle definition

## 12. Package outline

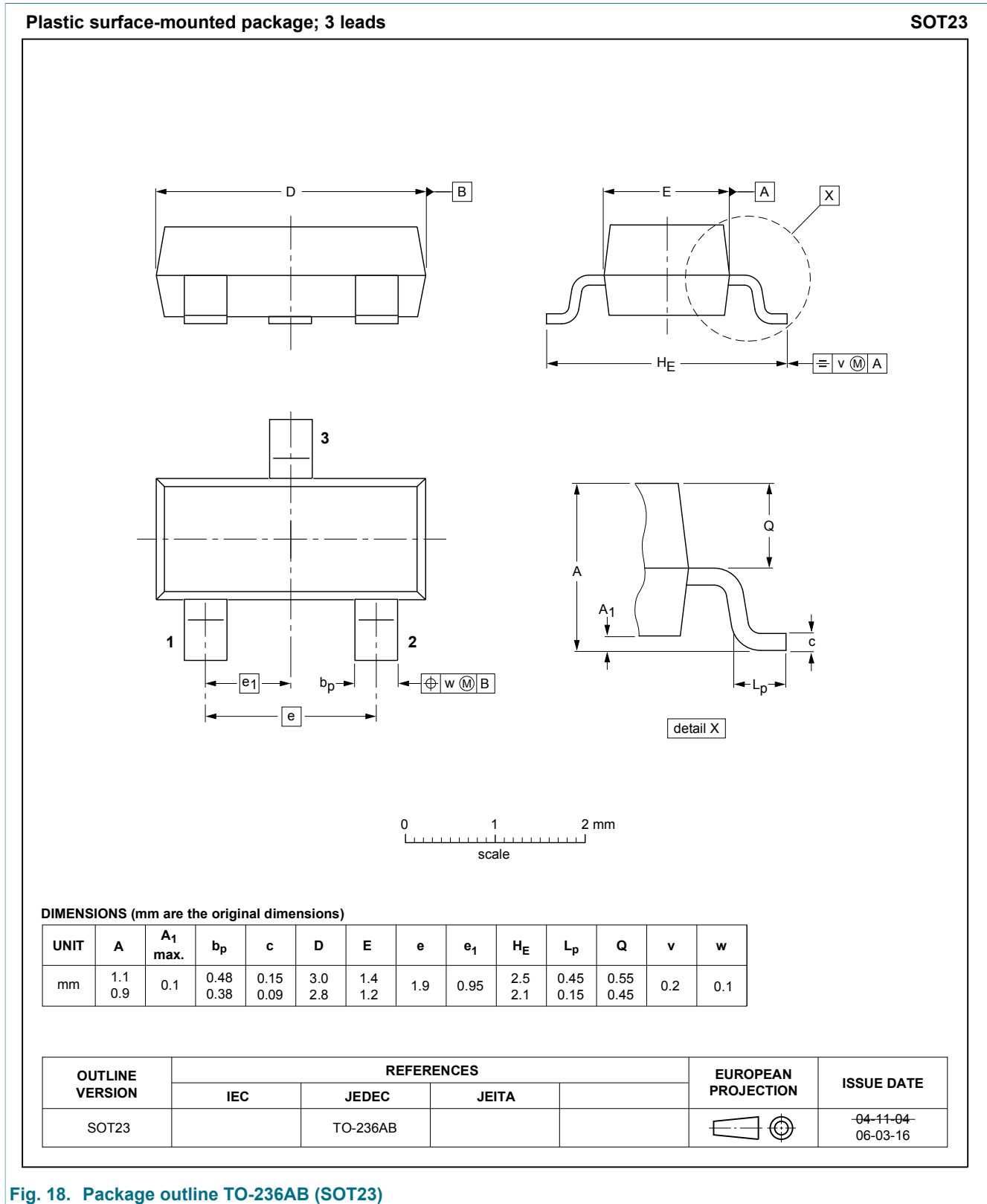


Fig. 18. Package outline TO-236AB (SOT23)

### 13. Soldering

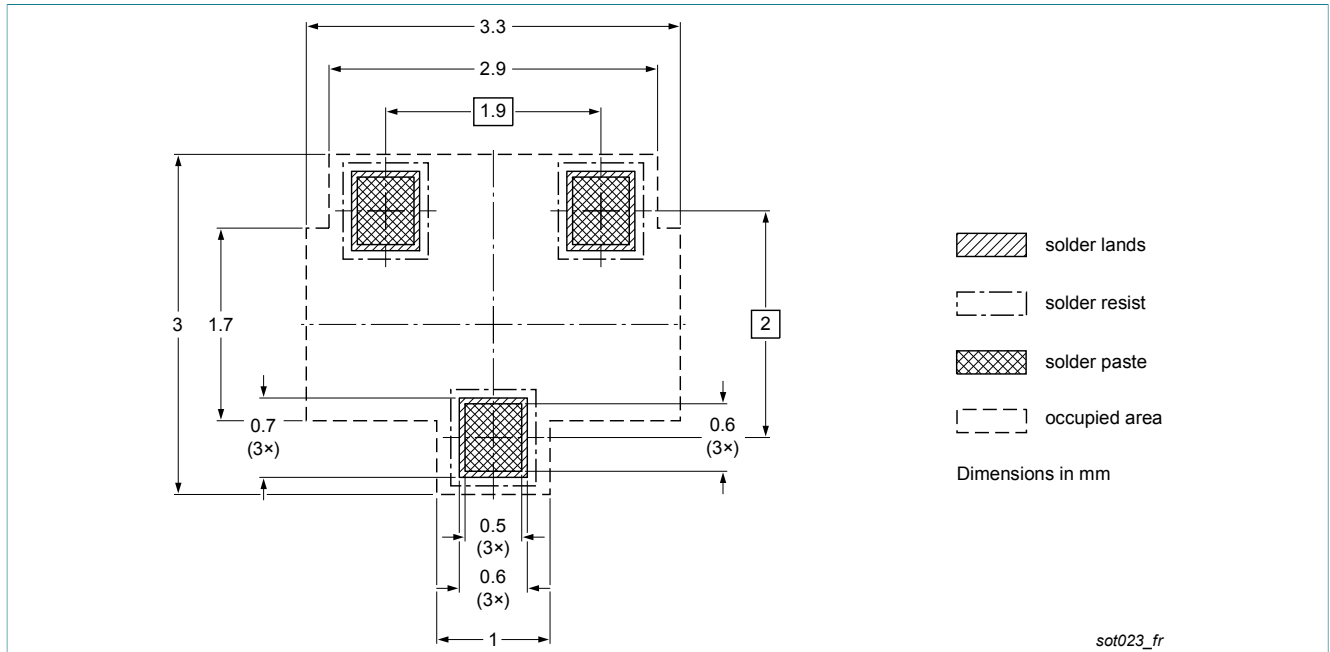


Fig. 19. Reflow soldering footprint for TO-236AB (SOT23)

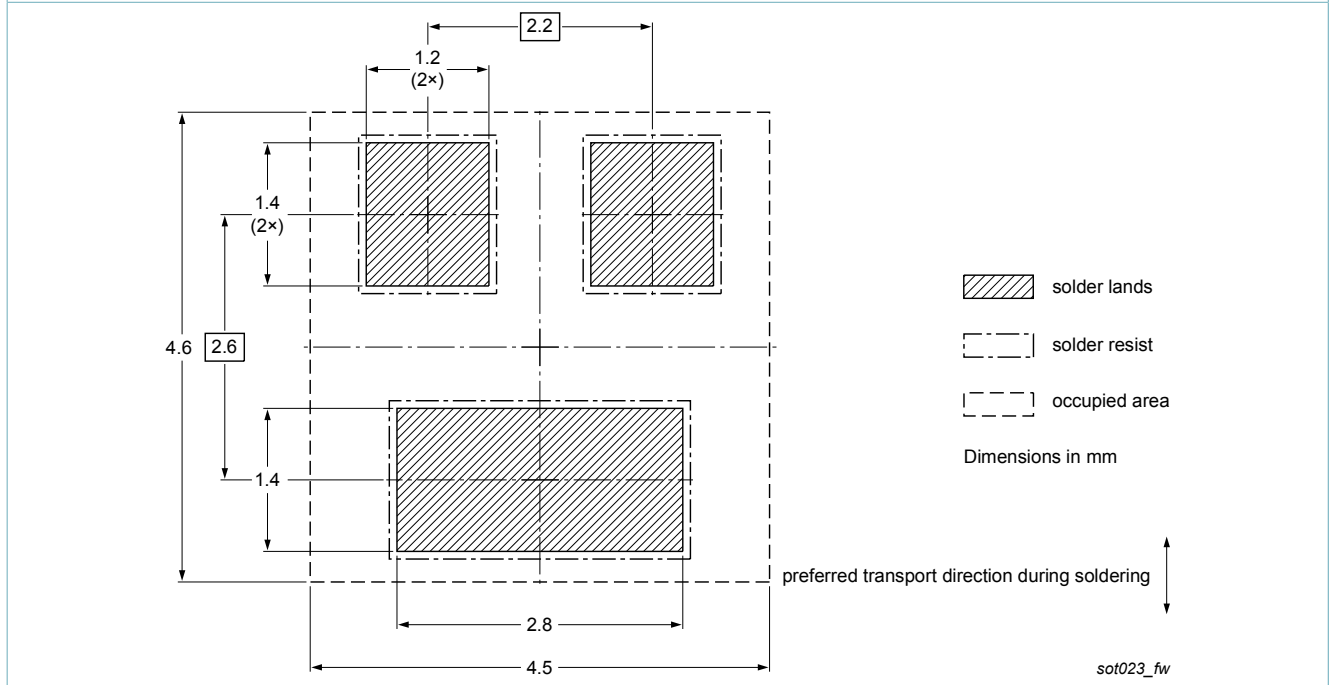


Fig. 20. Wave soldering footprint for TO-236AB (SOT23)



## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMV27UPE v.1	20140515	Product data sheet	-	-

## 15. Legal information

### 15.1 Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 15 May 2014



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