

PMV160UPVL Datasheet



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DiGi Electronics Part Number	PMV160UPVL-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	PMV160UPVL
Description	MOSFET P-CH 20V 1.2A TO236AB
Detailed Description	P-Channel 20 V 1.2A (Ta) 335mW (Ta) Surface Mount TO-236AB



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Purchase and inquiry

Manufacturer Product Number:

PMV160UPVL

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:

PMV160

Manufacturer:

Nexperia USA Inc.

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

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

1.2A (Ta)

Rds On (Max) @ Id, Vgs:

210mOhm @ 1.2A, 4.5V

Gate Charge (Qg) (Max) @ Vgs:

4 nC @ 4.5 V

Input Capacitance (Ciss) (Max) @ Vds:

365 pF @ 10 V

Power Dissipation (Max):

335mW (Ta)

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:

8541.21.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



PMV160UP

20 V, 1.2 A P-channel Trench MOSFET

Rev. 2 — 6 December 2011

Product data sheet

1. Product profile

1.1 General description

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

1.2 Features and benefits

- 1.8 V R_{DSon} rated
- Very fast switching
- Trench MOSFET technology

1.3 Applications

- Relay driver
- High-speed line driver
- High-side loadswitch
- Switching circuits

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	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	$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-1.2	A
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = -4.5\text{ V}; I_D = -1.2\text{ A}; T_j = 25\text{ °C}$	-	170	210	m Ω

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	<p>SOT23 (TO-236AB)</p>	<p>017aaa257</p>
2	S	source		
3	D	drain		

3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
PMV160UP	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PMV160UP	NH%

[1] % = placeholder for manufacturing site code

5. Limiting values

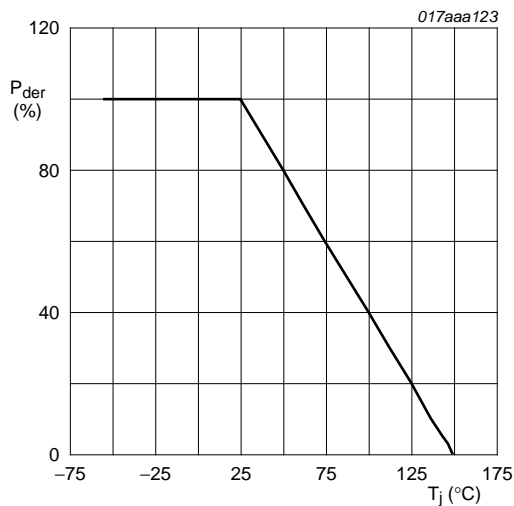
Table 5. Limiting values

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	$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-1.2	A
		$V_{GS} = -4.5\text{ V}; T_{amb} = 100\text{ °C}$	[1]	-	-0.8	A
I_{DM}	peak drain current	$T_{amb} = 25\text{ °C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$	-	-4	A	
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$	[2]	-	335	mW
			[1]	-	480	mW
		$T_{sp} = 25\text{ °C}$		-	2170	mW
T_j	junction temperature		-55	150	°C	
T_{amb}	ambient temperature		-55	150	°C	
T_{stg}	storage temperature		-65	150	°C	
Source-drain diode						
I_S	source current	$T_{amb} = 25\text{ °C}$	[1]	-	-0.5	A

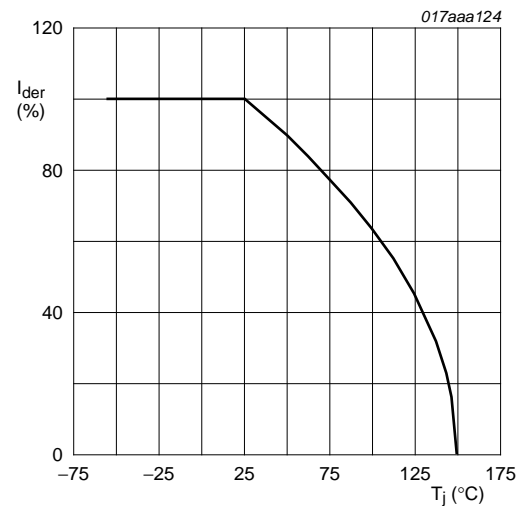
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



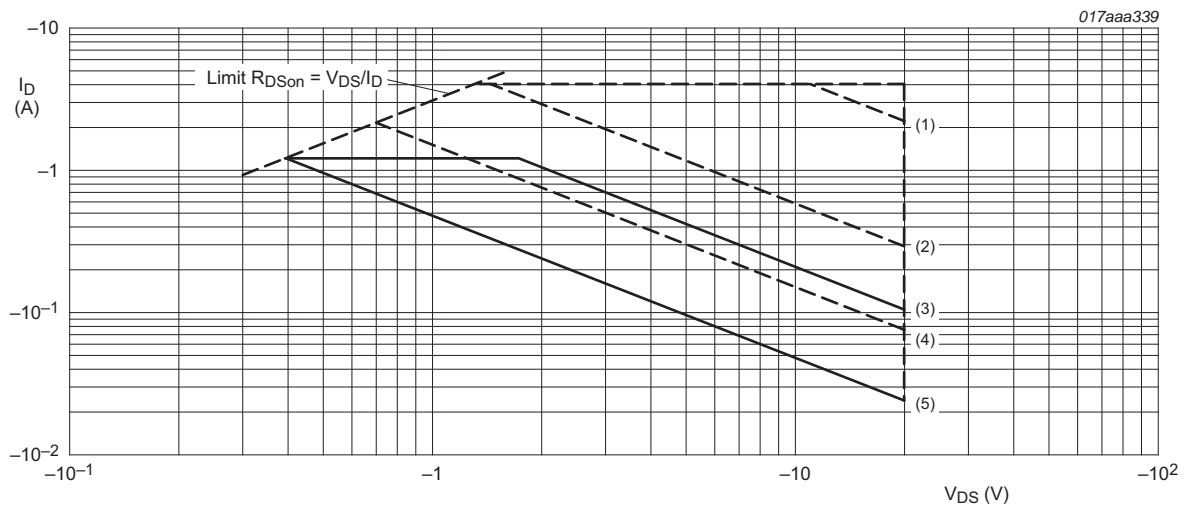
$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ\text{C})}} \times 100\%$$

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



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

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



I_{DM} = single pulse

(1) $t_p = 1$ ms

(2) $t_p = 10$ ms

(3) DC; $T_{sp} = 25$ °C

(4) $t_p = 100$ ms

(5) DC; $T_{amb} = 25$ °C; drain mounting pad 6 cm²

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

6. 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]	-	325	374	K/W
			[2]	-	227	260	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	50	60	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 cm².

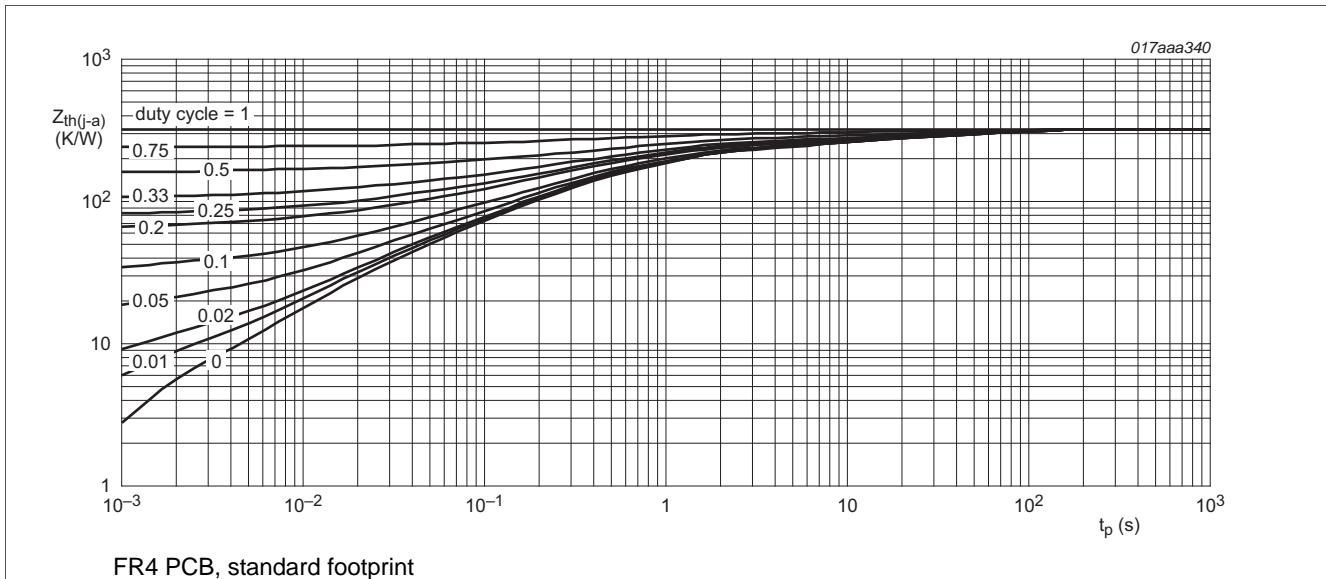


Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

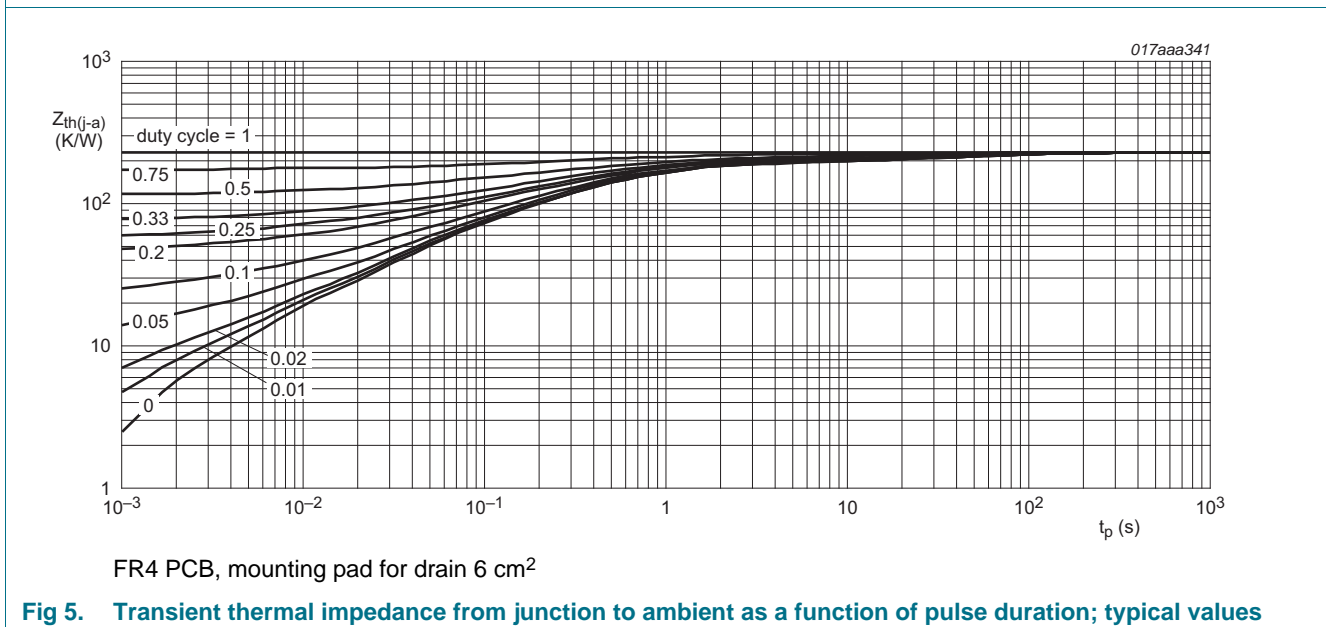
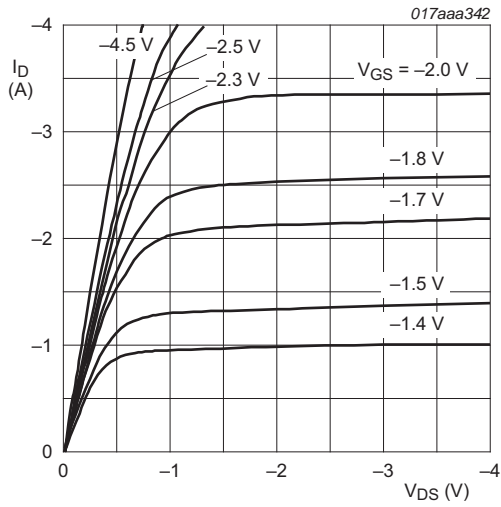


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

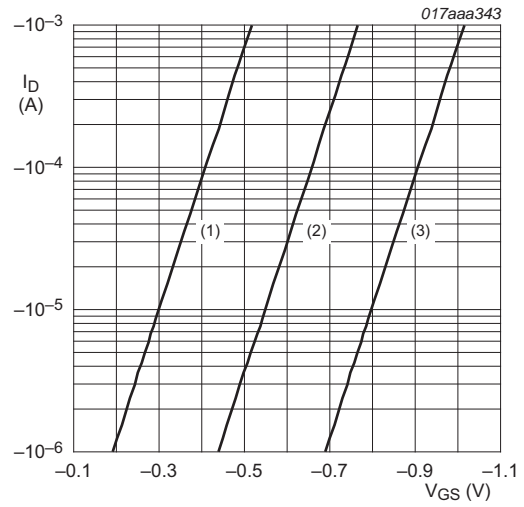
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -250 \mu\text{A}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-20	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = -250 \mu\text{A}$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ\text{C}$	-0.45	-0.7	-0.95	V
I_{DSS}	drain leakage current	$V_{DS} = -20 \text{ V}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-	-1	μA
		$V_{DS} = -20 \text{ V}$; $V_{GS} = 0 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$	-	-	-10	μA
I_{GSS}	gate leakage current	$V_{GS} = -8 \text{ V}$; $V_{DS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-	-100	nA
		$V_{GS} = 8 \text{ V}$; $V_{DS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-	-100	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = -4.5 \text{ V}$; $I_D = -1.2 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	170	210	m Ω
		$V_{GS} = -4.5 \text{ V}$; $I_D = -1.2 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$	-	265	328	m Ω
		$V_{GS} = -2.5 \text{ V}$; $I_D = -1.1 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	210	270	m Ω
		$V_{GS} = -1.8 \text{ V}$; $I_D = -0.5 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	280	380	m Ω
g_{fs}	forward transconductance	$V_{DS} = -5 \text{ V}$; $I_D = -1.2 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	3.7	-	S
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$V_{DS} = -10 \text{ V}$; $I_D = -1 \text{ A}$; $V_{GS} = -4.5 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	3.3	4	nC
Q_{GS}	gate-source charge		-	1	-	nC
Q_{GD}	gate-drain charge		-	0.5	-	nC
C_{iss}	input capacitance	$V_{DS} = -10 \text{ V}$; $f = 1 \text{ MHz}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	365	-	pF
C_{oss}	output capacitance		-	42	-	pF
C_{rss}	reverse transfer capacitance		-	30	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = -10 \text{ V}$; $V_{GS} = -4.5 \text{ V}$; $R_{G(ext)} = 6 \text{ }^\circ\Omega$; $T_j = 25 \text{ }^\circ\text{C}$; $I_D = -1 \text{ A}$	-	7	-	ns
t_r	rise time		-	26	-	ns
$t_{d(off)}$	turn-off delay time		-	35	-	ns
t_f	fall time		-	17	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = -0.5 \text{ A}$; $V_{GS} = 0 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	-0.7	-1.2	V



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

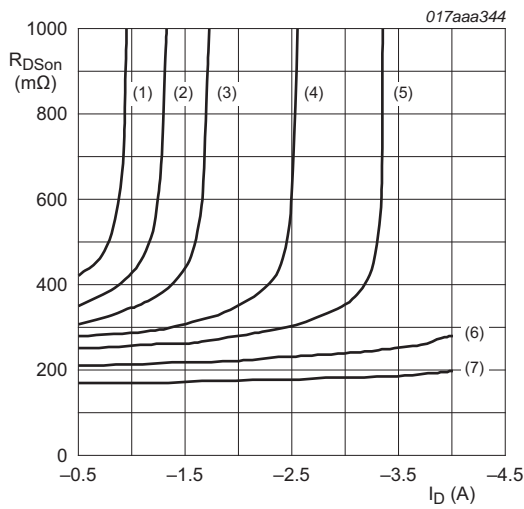
Fig 6. Output characteristics: drain current as a function of drain-source voltage; typical values



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

- (1) minimum values
- (2) typical values
- (3) maximum values

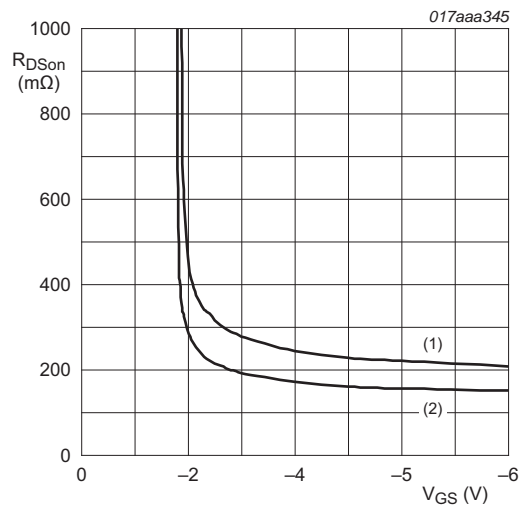
Fig 7. Sub-threshold drain current as a function of gate-source voltage



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

- (1) $V_{GS} = -1.4\text{ V}$
- (2) $V_{GS} = -1.5\text{ V}$
- (3) $V_{GS} = -1.6\text{ V}$
- (4) $V_{GS} = -1.8\text{ V}$
- (5) $V_{GS} = -2.0\text{ V}$
- (6) $V_{GS} = -2.5\text{ V}$
- (7) $V_{GS} = -4.5\text{ V}$

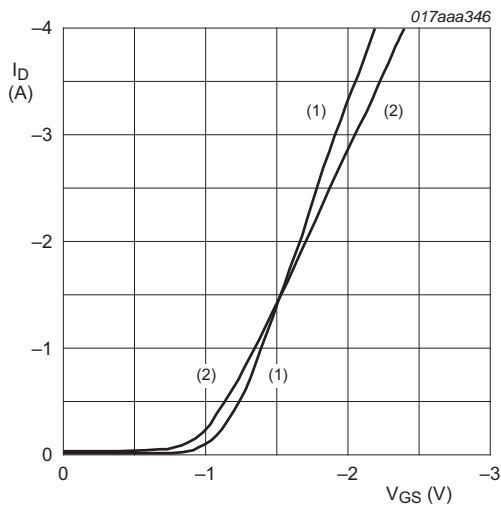
Fig 8. Drain-source on-state resistance as a function of drain current; typical values



$I_D = -2.5\text{ A}$

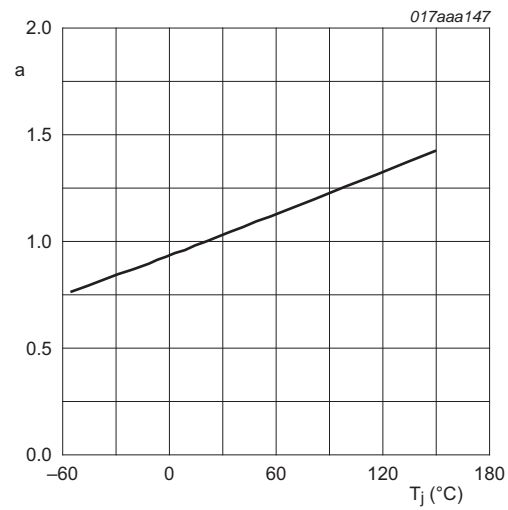
- (1) $T_j = 150\text{ }^\circ\text{C}$
- (2) $T_j = 25\text{ }^\circ\text{C}$

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



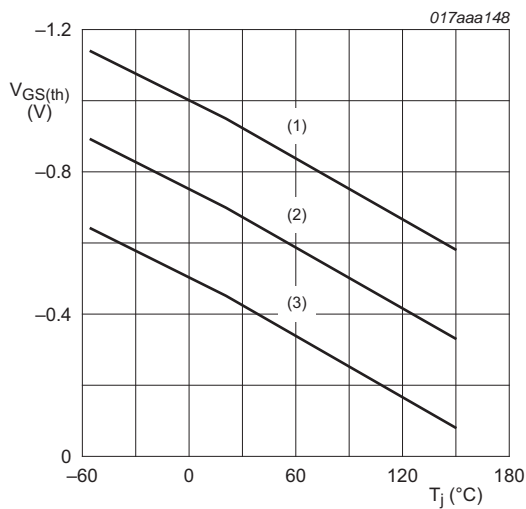
$V_{DS} > I_D \times R_{DS(on)}$
 (1) $T_j = 25\text{ }^\circ\text{C}$
 (2) $T_j = 150\text{ }^\circ\text{C}$

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



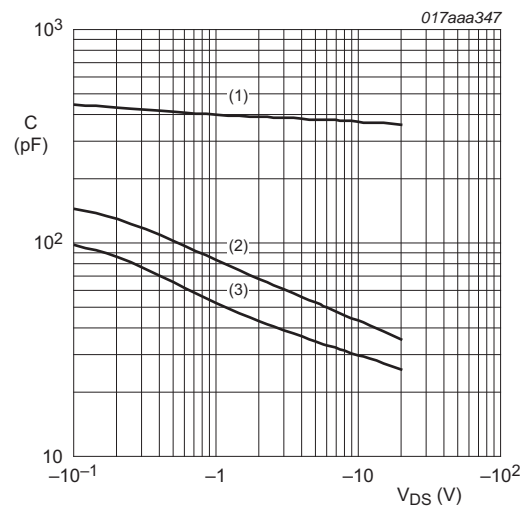
$$a = \frac{R_{DS(on)}}{R_{DS(on)(25^\circ\text{C})}}$$

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



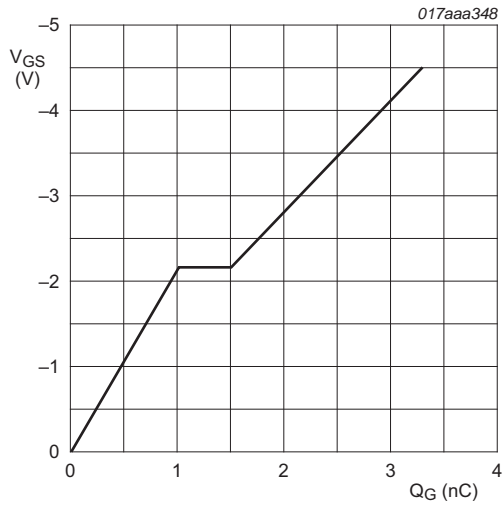
$I_D = -0.25\text{ mA}$; $V_{DS} = V_{GS}$
 (1) maximum values
 (2) typical values
 (3) minimum values

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



$f = 1\text{ MHz}$; $V_{GS} = 0\text{ V}$
 (1) C_{iss}
 (2) C_{oss}
 (3) C_{rss}

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



$I_D = -1.0 \text{ A}; V_{DS} = -10 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$

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

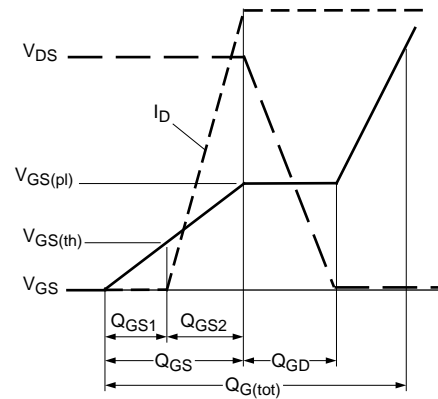
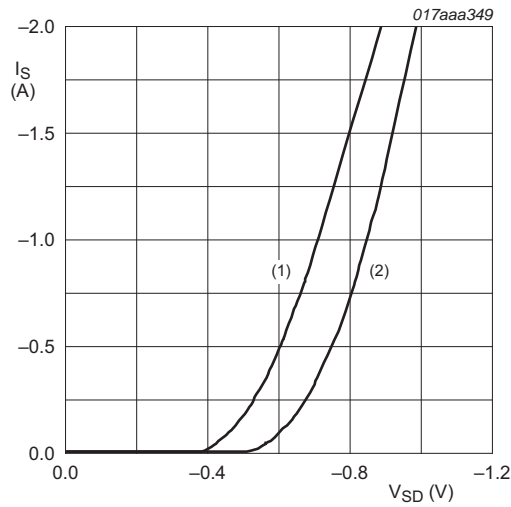


Fig 15. Gate charge waveform definitions



$V_{GS} = 0 \text{ V}$
 (1) $T_j = 150 \text{ }^\circ\text{C}$
 (2) $T_j = 25 \text{ }^\circ\text{C}$

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

8. Test information

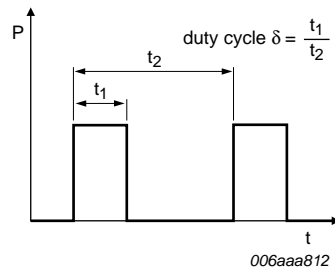


Fig 17. Duty cycle definition

9. Package outline

Plastic surface-mounted package; 3 leads

SOT23

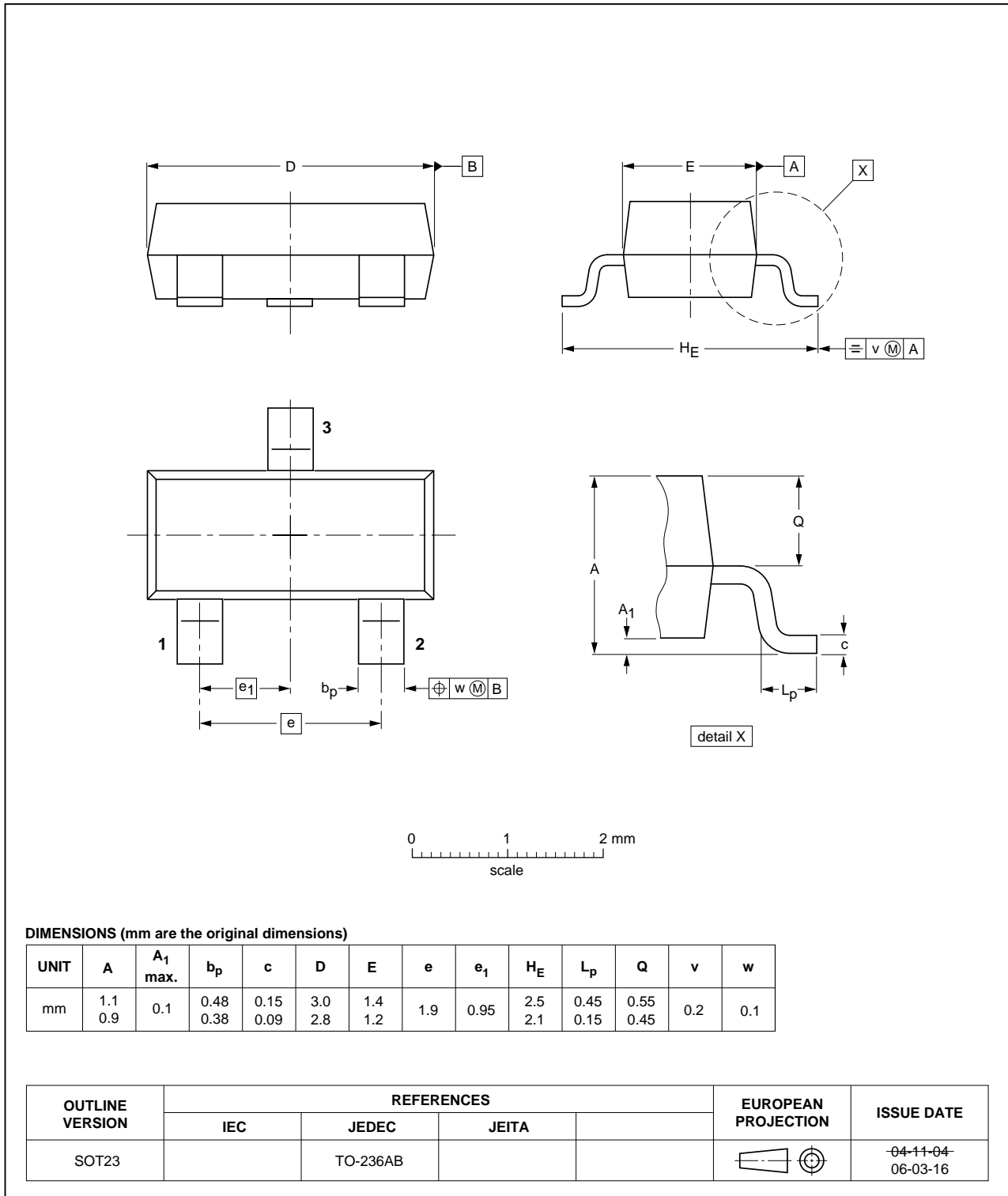


Fig 18. Package outline SOT23 (TO-236AB)

10. Soldering

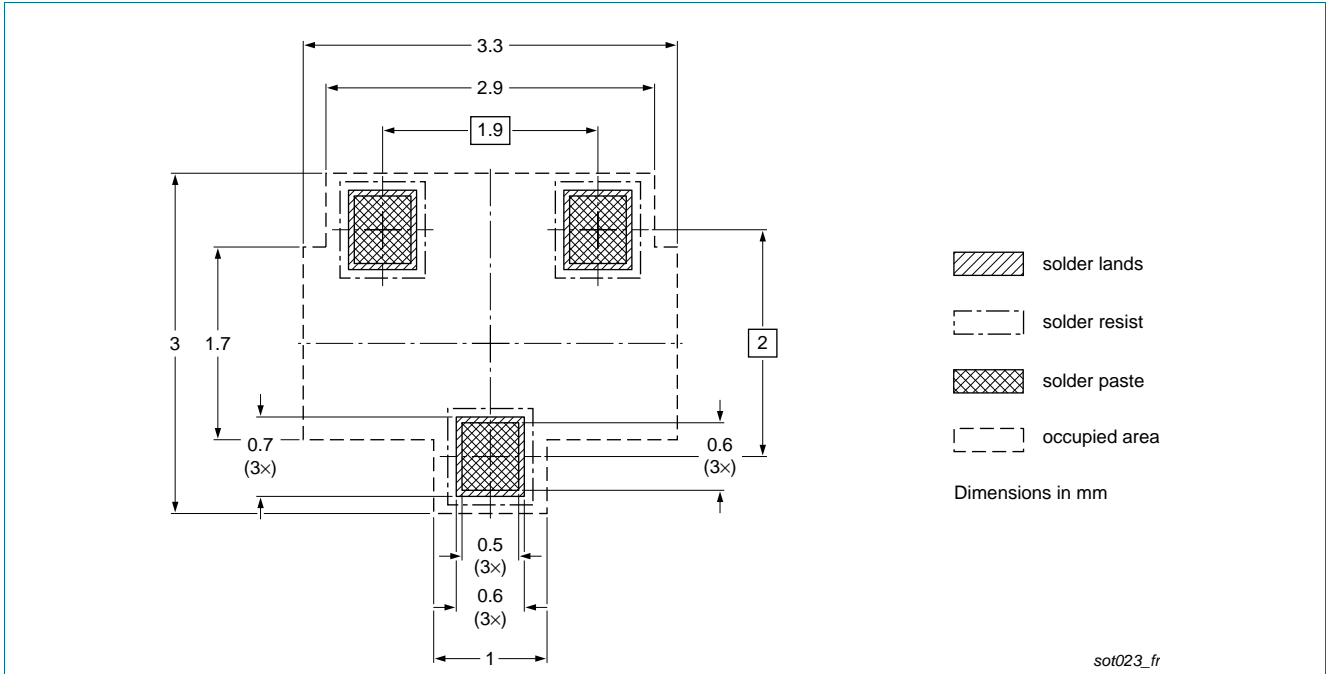


Fig 19. Reflow soldering footprint for SOT23 (TO-236AB)

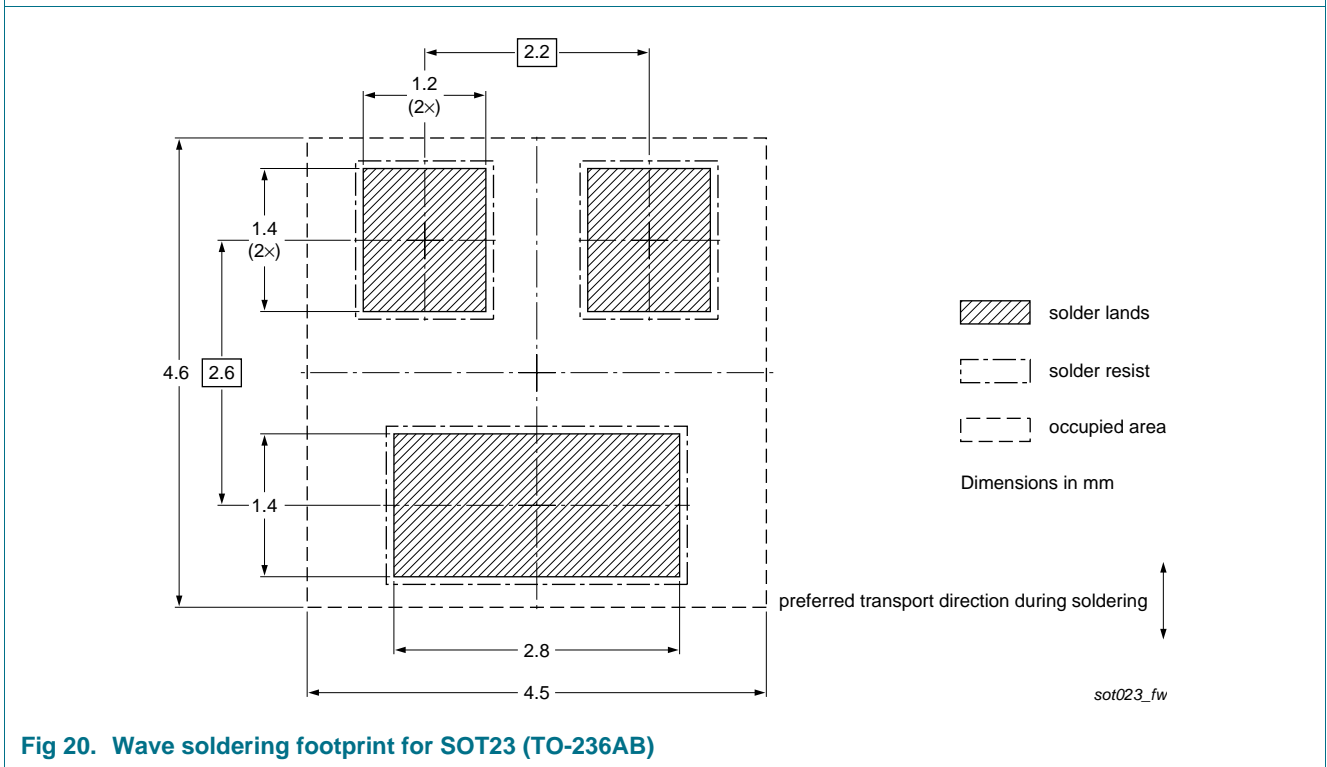


Fig 20. Wave soldering footprint for SOT23 (TO-236AB)

11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMV160UP v.2	20111206	Product data sheet	-	PMV160UP v.1
Modifications:	• 7 "Characteristics" : V_{GSth} condition is corrected			
PMV160UP v.1	20110907	Product data sheet	-	-

12. Legal information

12.1 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.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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For sales office addresses, please send an email to: salesaddresses@nexperia.com

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