



**THE DATASHEET OF  
PMT29EN,135**



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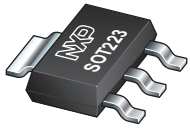
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Kind regards,

Team Nexperia



# PMT29EN

30 V, 6 A N-channel Trench MOSFET

Rev. 1 — 31 August 2011

Product data sheet

## 1. Product profile

### 1.1 General description

N-channel enhancement mode Field-Effect Transistor (FET) in a small SOT223 (SC-73) small Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

### 1.2 Features and benefits

- Logic-level compatible
- Very fast switching
- Trench MOSFET technology

### 1.3 Applications

- Relay driver
- High-speed line driver
- Low-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	$T_j = 25\text{ °C}$	-	-	30	V
$V_{GS}$	gate-source voltage		-20	-	20	V
$I_D$	drain current	$V_{GS} = 10\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	6	A
<b>Static characteristics</b>						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 6\text{ A}; T_j = 25\text{ °C}$	-	24	29	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>.

## 2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	<p>SOT223 (SC-73)</p>	<p>017aaa253</p>
2	D	drain		
3	S	source		
4	D	drain		



### 3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
PMT29EN	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

### 4. Marking

Table 4. Marking codes

Type number	Marking code
PMT29EN	MT29EN

## 5. Limiting values

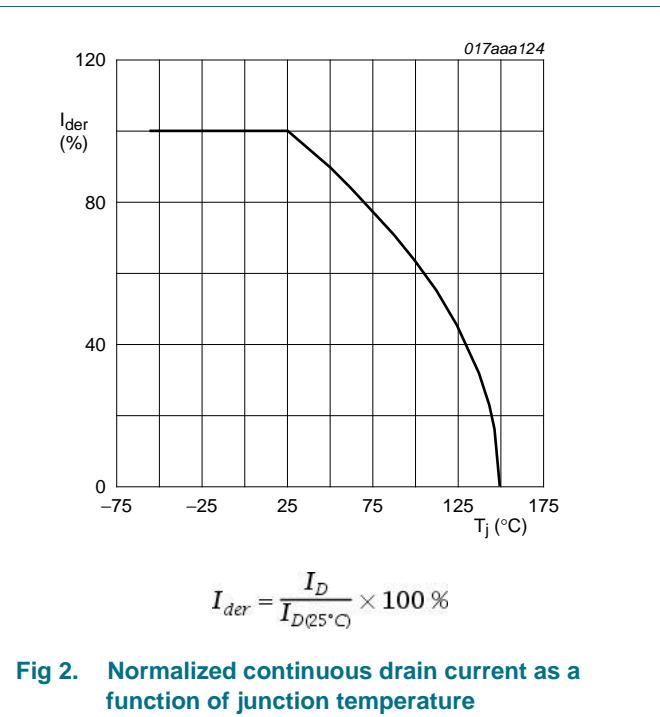
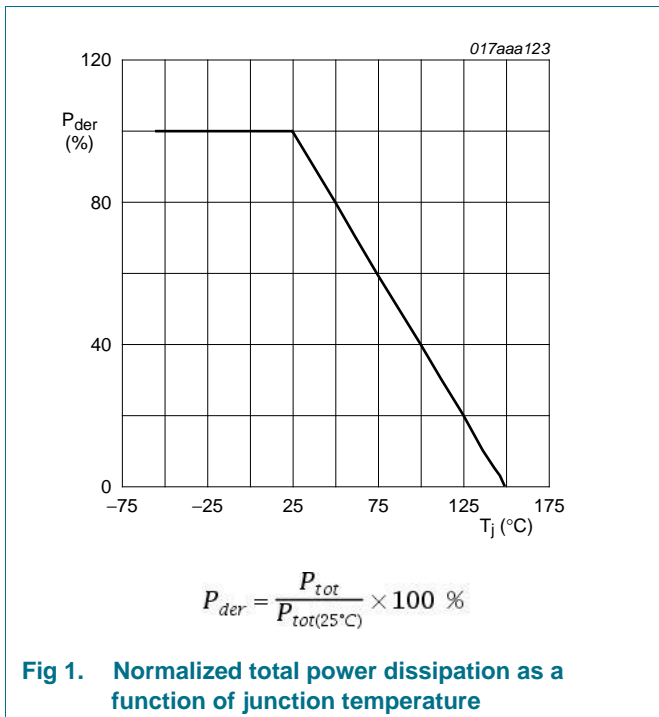
**Table 5. Limiting values**

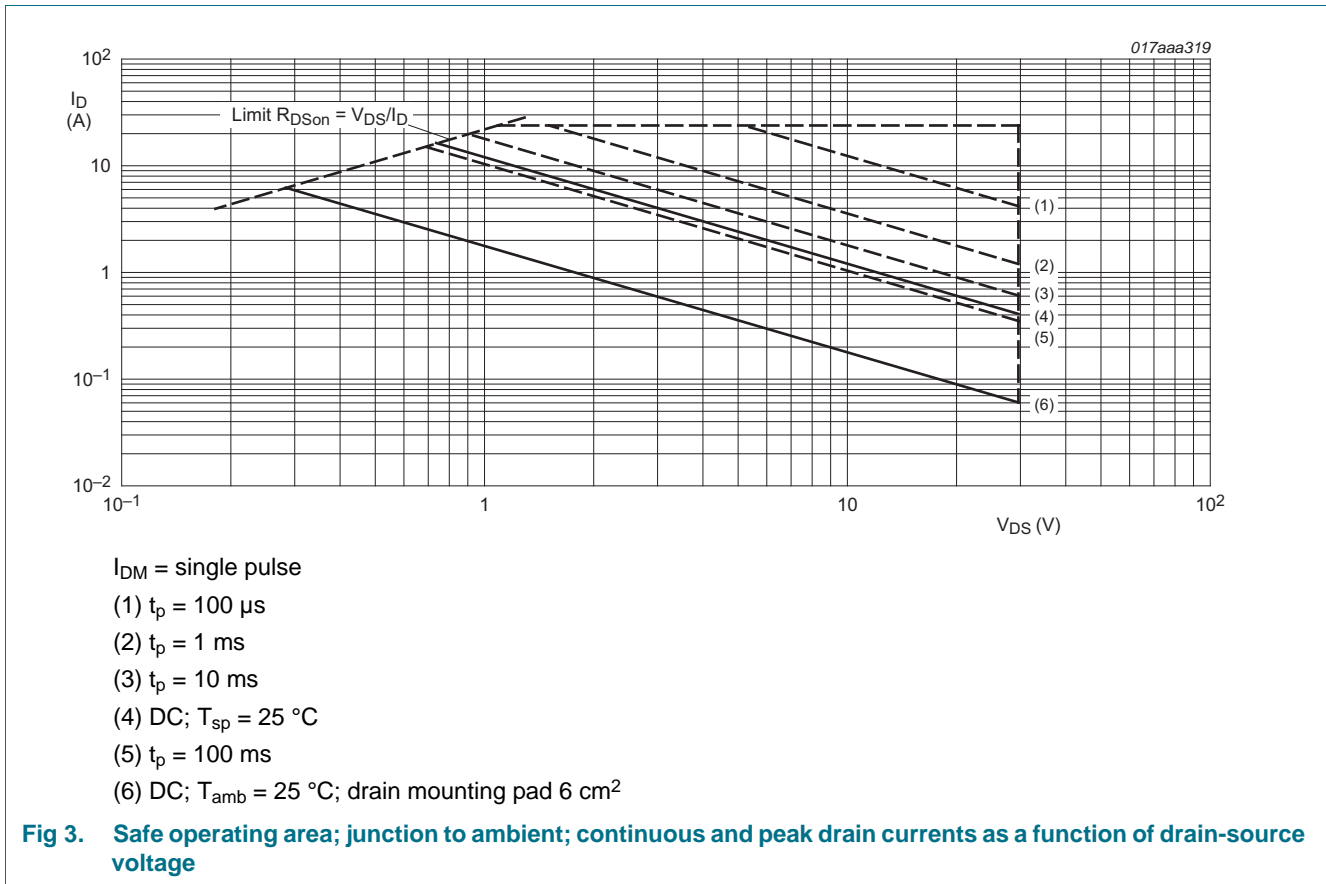
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit	
V <sub>DS</sub>	drain-source voltage	T <sub>j</sub> = 25 °C	-	30	V	
V <sub>GS</sub>	gate-source voltage		-20	20	V	
I <sub>D</sub>	drain current	V <sub>GS</sub> = 10 V; T <sub>amb</sub> = 25 °C	[1]	-	6	A
		V <sub>GS</sub> = 10 V; T <sub>amb</sub> = 100 °C	[1]	-	3.9	A
I <sub>DM</sub>	peak drain current	T <sub>amb</sub> = 25 °C; single pulse; t <sub>p</sub> ≤ 10 μs	-	24	A	
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = 25 °C	[2]	-	820	mW
			[1]	-	1760	mW
		T <sub>sp</sub> = 25 °C		-	8330	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]	-	1.9	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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.





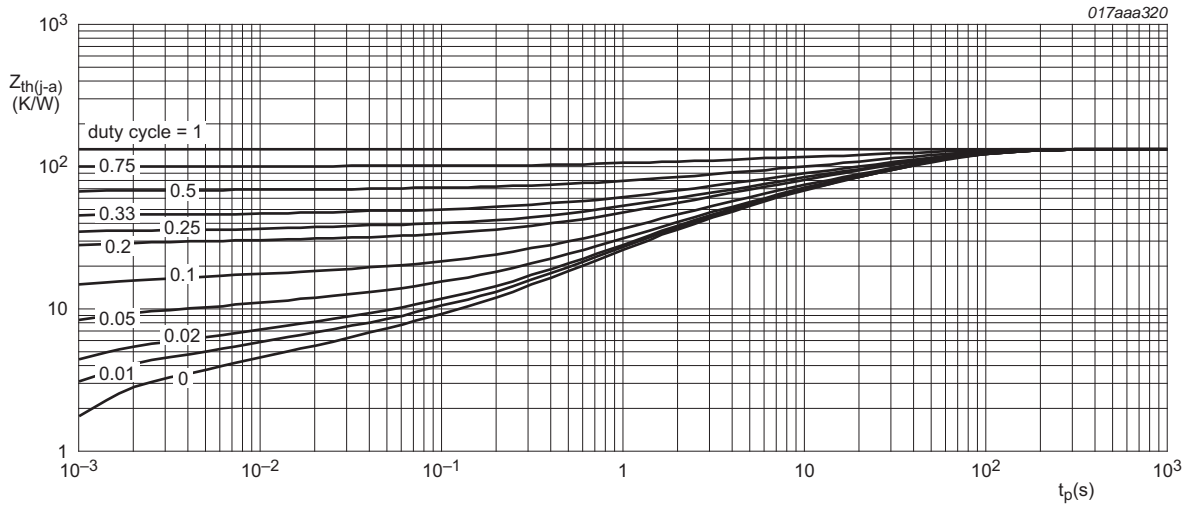
## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	[1]	-	131	151	K/W
		[2]	-	62	71	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	8	15	K/W

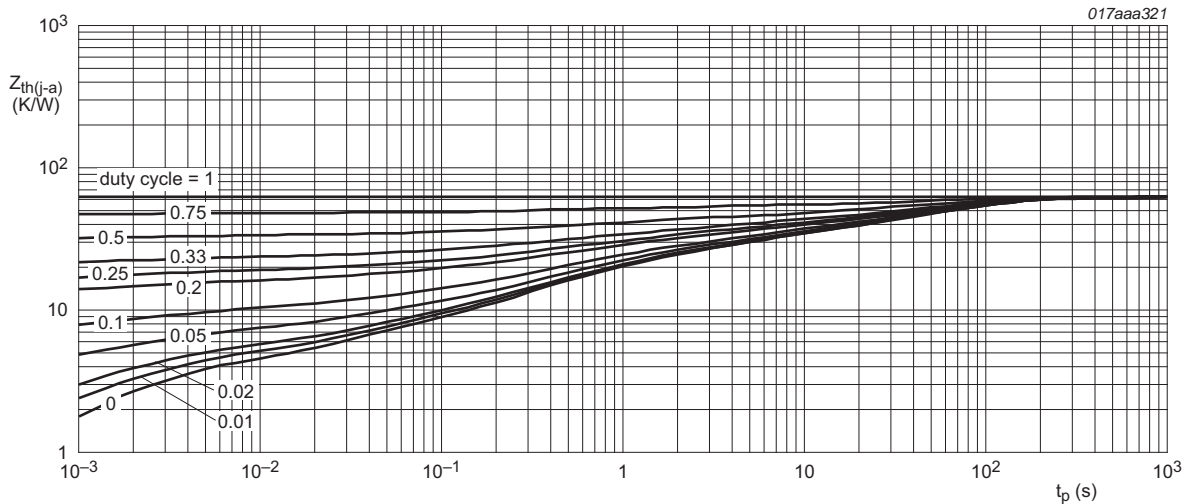
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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



FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for drain 6 cm<sup>2</sup>

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
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	30	-	-	V
$V_{GSth}$	gate-source threshold voltage	$I_D = 250 \mu A; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ C$	1	1.5	2.5	V
$I_{DSS}$	drain leakage current	$V_{DS} = 30 V; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	-	-	1	$\mu A$
		$V_{DS} = 30 V; V_{GS} = 0 V; T_j = 150 \text{ }^\circ C$	-	-	10	$\mu A$

Table 7. Characteristics ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I <sub>GSS</sub>	gate leakage current	V <sub>GS</sub> = 20 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	-	100	nA
		V <sub>GS</sub> = -20 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	-	100	nA
R <sub>DSon</sub>	drain-source on-state resistance	V <sub>GS</sub> = 10 V; I <sub>D</sub> = 6 A; T <sub>j</sub> = 25 °C	-	24	29	mΩ
		V <sub>GS</sub> = 10 V; I <sub>D</sub> = 6 A; T <sub>j</sub> = 150 °C	-	37	45	mΩ
		V <sub>GS</sub> = 4.5 V; I <sub>D</sub> = 5.1 A; T <sub>j</sub> = 25 °C	-	29	36	mΩ
g <sub>fs</sub>	forward transconductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 6 A; T <sub>j</sub> = 25 °C	-	18	-	S
<b>Dynamic characteristics</b>						
Q <sub>G(tot)</sub>	total gate charge	V <sub>DS</sub> = 15 V; I <sub>D</sub> = 6 A; V <sub>GS</sub> = 10 V; T <sub>j</sub> = 25 °C	-	9.6	11	nC
Q <sub>GS</sub>	gate-source charge		-	1.5	-	nC
Q <sub>GD</sub>	gate-drain charge		-	1.5	-	nC
C <sub>iss</sub>	input capacitance	V <sub>DS</sub> = 15 V; f = 1 MHz; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	492	-	pF
C <sub>oss</sub>	output capacitance		-	115	-	pF
C <sub>rss</sub>	reverse transfer capacitance		-	54	-	pF
t <sub>d(on)</sub>	turn-on delay time	V <sub>DS</sub> = 15 V; V <sub>GS</sub> = 10 V; R <sub>G(ext)</sub> = 6 Ω; T <sub>j</sub> = 25 °C; I <sub>D</sub> = 6 A	-	5	-	ns
t <sub>r</sub>	rise time		-	28	-	ns
t <sub>d(off)</sub>	turn-off delay time		-	94	-	ns
t <sub>f</sub>	fall time		-	40	-	ns
<b>Source-drain diode</b>						
V <sub>SD</sub>	source-drain voltage	I <sub>S</sub> = 1.9 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C	-	0.8	1.2	V

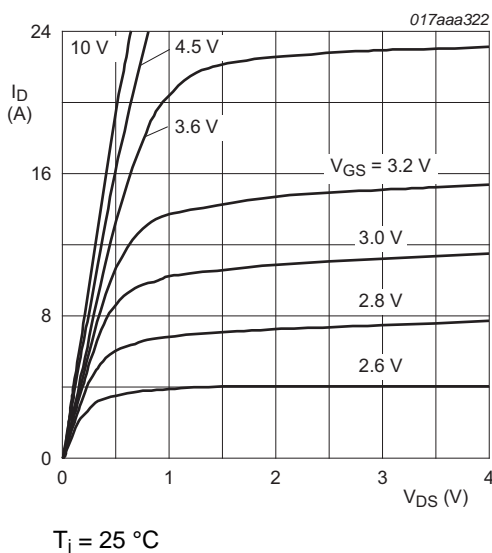


Fig 6. Output characteristics: drain current as a function of drain-source voltage; typical values

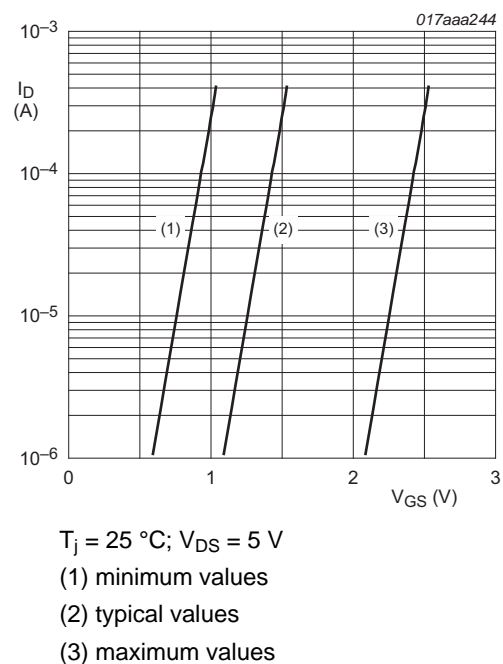
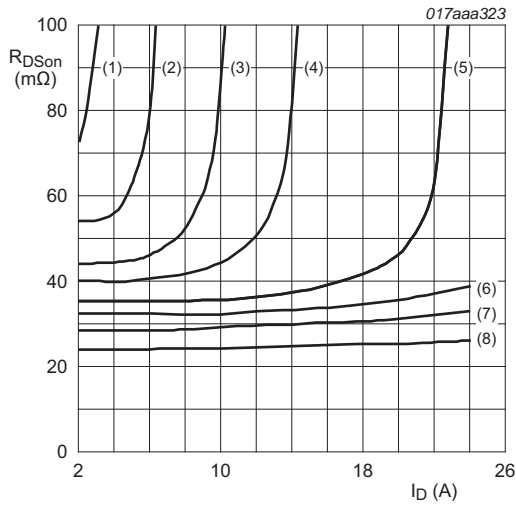
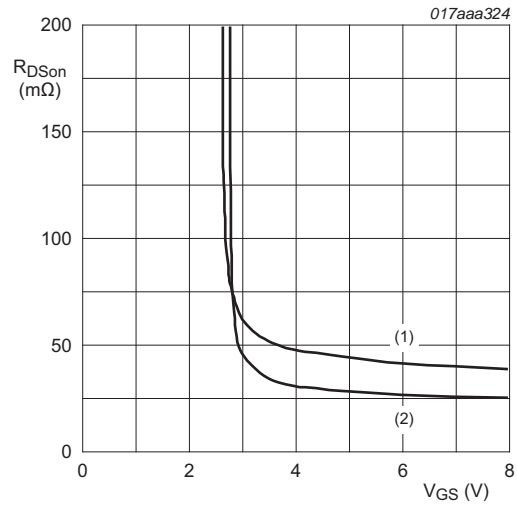


Fig 7. Sub-threshold drain current as a function of gate-source voltage



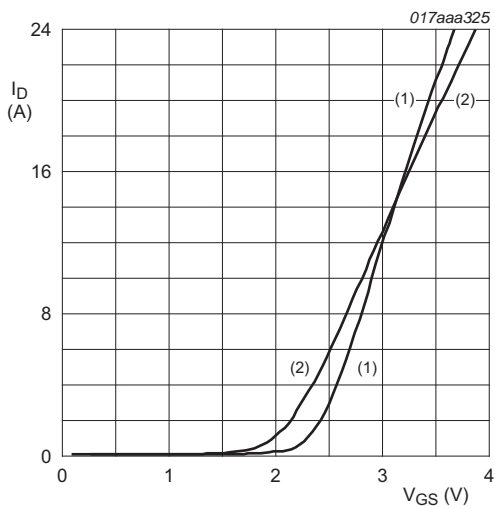
- $T_j = 25\text{ }^\circ\text{C}$
- (1)  $V_{GS} = 2.6\text{ V}$
  - (2)  $V_{GS} = 2.8\text{ V}$
  - (3)  $V_{GS} = 3.0\text{ V}$
  - (4)  $V_{GS} = 3.2\text{ V}$
  - (5)  $V_{GS} = 3.6\text{ V}$
  - (6)  $V_{GS} = 4.0\text{ V}$
  - (7)  $V_{GS} = 4.5\text{ V}$
  - (8)  $V_{GS} = 10.0\text{ V}$

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



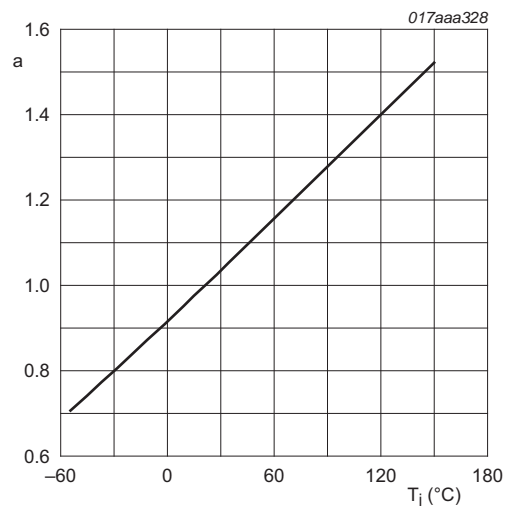
- $I_D = 6\text{ A}$
- (1)  $T_j = 150\text{ }^\circ\text{C}$
  - (2)  $T_j = 25\text{ }^\circ\text{C}$

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



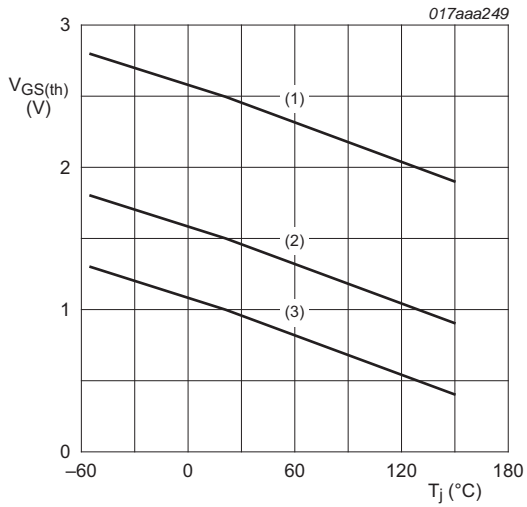
- $V_{DS} > I_D \times R_{DS(on)}$
- (1)  $T_j = 25\text{ }^\circ\text{C}$
  - (2)  $T_j = 150\text{ }^\circ\text{C}$

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



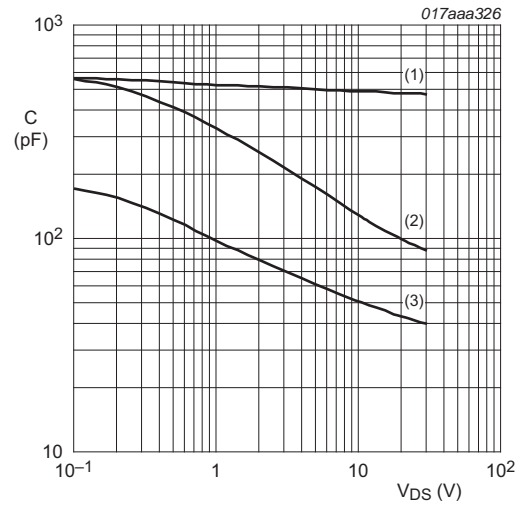
$$a = \frac{R_{DS(on)}}{R_{DS(on)(25^\circ\text{C})}}$$

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



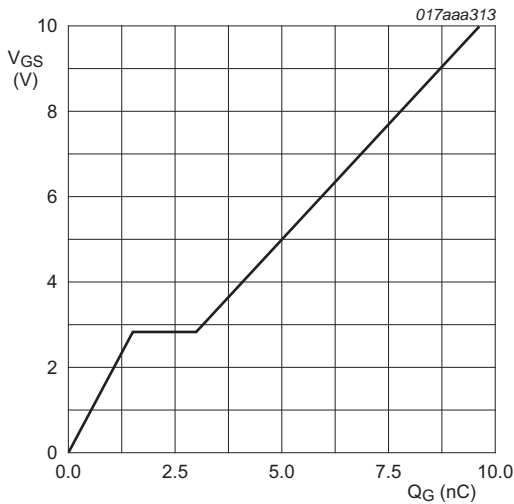
$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}$   
 (1) maximum values  
 (2) typical values  
 (3) minimum values

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



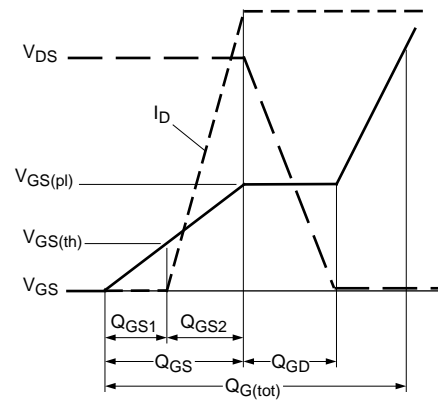
$f = 1 \text{ MHz}; V_{GS} = 0 \text{ V}$   
 (1)  $C_{iss}$   
 (2)  $C_{oss}$   
 (3)  $C_{rss}$

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



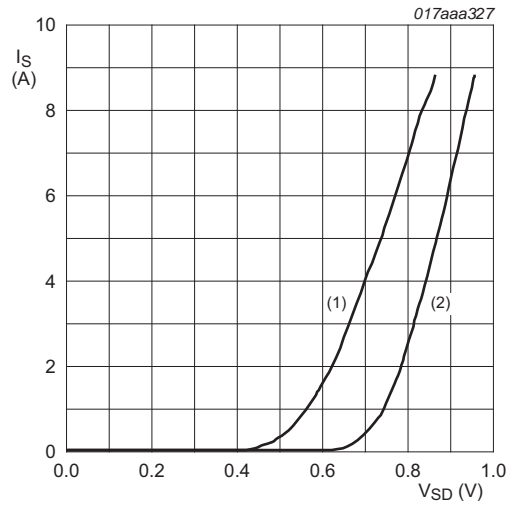
$I_D = 6 \text{ A}; V_{DS} = 10 \text{ V}; T_{amb} = 25 \text{ °C}$

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



017aaa137

**Fig 15. Gate charge waveform definitions**



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

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

## 8. Test information

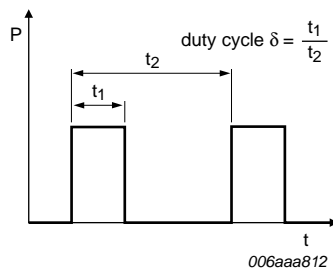


Fig 17. Duty cycle definition

9. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads

SOT223

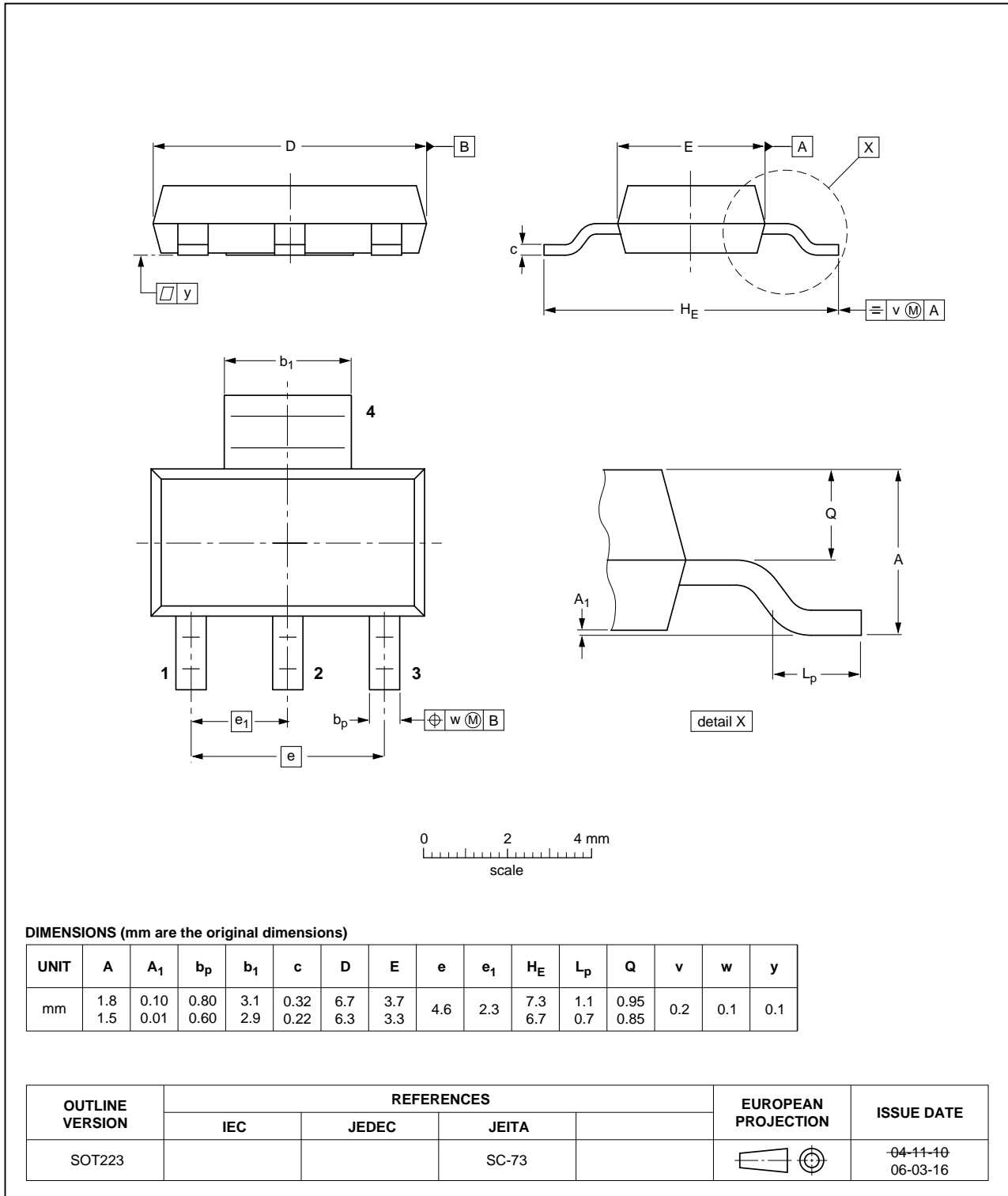


Fig 18. Package outline SOT223 (SC-73)

10. Soldering

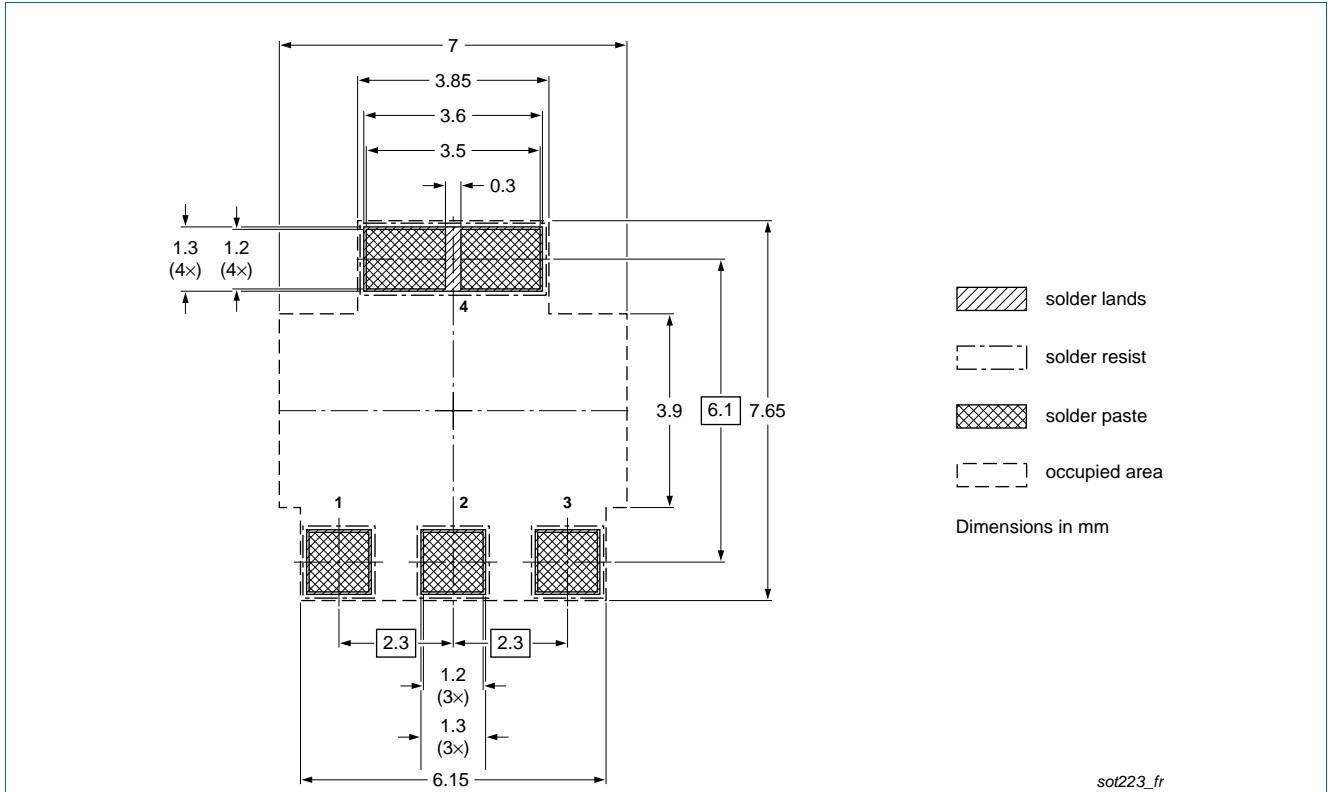


Fig 19. Reflow soldering footprint for SOT223 (SC-73)

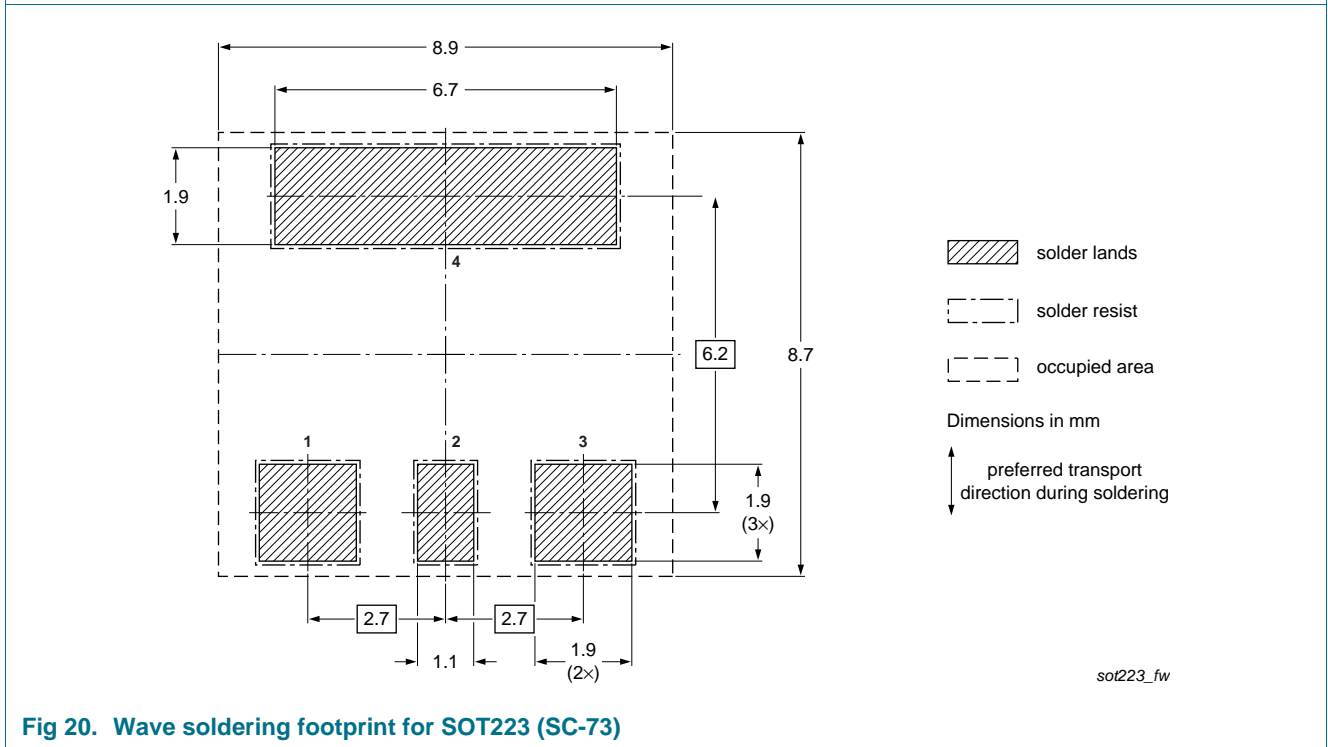


Fig 20. Wave soldering footprint for SOT223 (SC-73)

## 11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMT29EN v.1	20110831	Product data sheet	-	-

## 12. Legal information

### 12.1 Data sheet status

Document status <sup>[1]</sup> <sup>[2]</sup>	Product status <sup>[3]</sup>	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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