

# PMT200EN

100 V N-channel Trench MOSFET

25 October 2012

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
- LED backlight driver
- Low-side loadswitch
- Switching circuits

### 1.4 Quick reference data

Table 1. Quick reference data

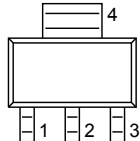
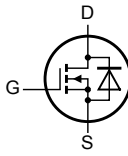
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j = 25\text{ °C}$	-	-	100	V
$V_{GS}$	gate-source voltage		-20	-	20	V
$I_D$	drain current	$V_{GS} = 10\text{ V}; T_{amb} = 25\text{ °C}; t \leq 5\text{ s}$	[1]	-	3.3	A
<b>Static characteristics</b>						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 1.5\text{ A}; T_j = 25\text{ °C}$	-	190	235	m $\Omega$

[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>SC-73 (SOT223)</p>	 <p>017aaa253</p>
2	D	drain		
3	S	source		
4	D	drain		

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMT200EN	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

## 4. Marking

Table 4. Marking codes

Type number	Marking code
PMT200EN	T200EN

## 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	$T_j = 25\text{ }^\circ\text{C}$		-	100	V
$V_{GS}$	gate-source voltage			-20	20	V
$I_D$	drain current	$V_{GS} = 10\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}; t \leq 5\text{ s}$	[1]	-	3.3	A
		$V_{GS} = 10\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$	[1]	-	1.8	A
		$V_{GS} = 10\text{ V}; T_{amb} = 100\text{ }^\circ\text{C}$	[1]	-	1.1	A
$I_{DM}$	peak drain current	$T_{amb} = 25\text{ }^\circ\text{C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	13	A
$P_{tot}$	total power dissipation	$T_{amb} = 25\text{ }^\circ\text{C}$	[2]	-	800	mW
			[1]	-	1700	mW
		$T_{sp} = 25\text{ }^\circ\text{C}$		-	8300	mW
$T_j$	junction temperature			-55	150	$^\circ\text{C}$

Symbol	Parameter	Conditions		Min	Max	Unit
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]	-	1.6	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.

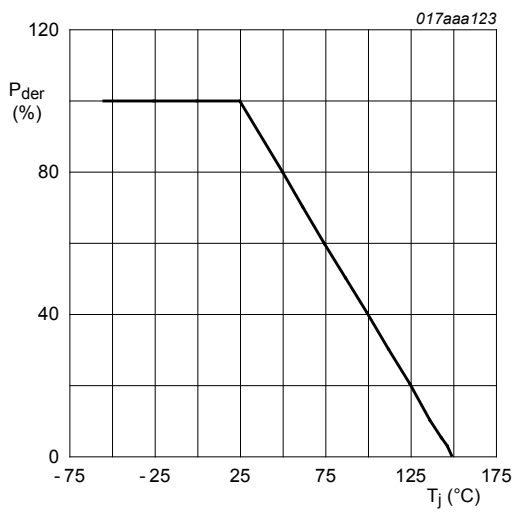


Fig. 1. Normalized total power dissipation as a function of junction temperature

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

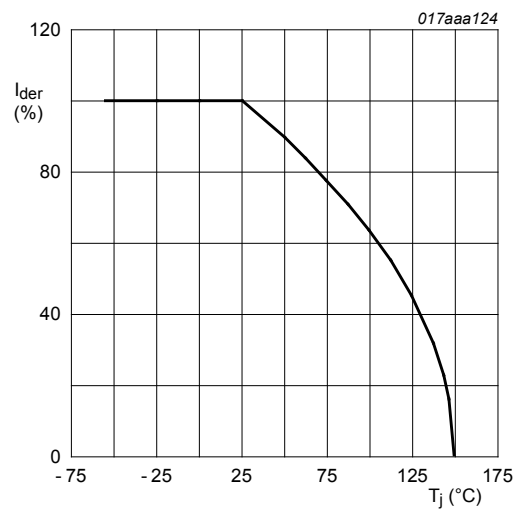
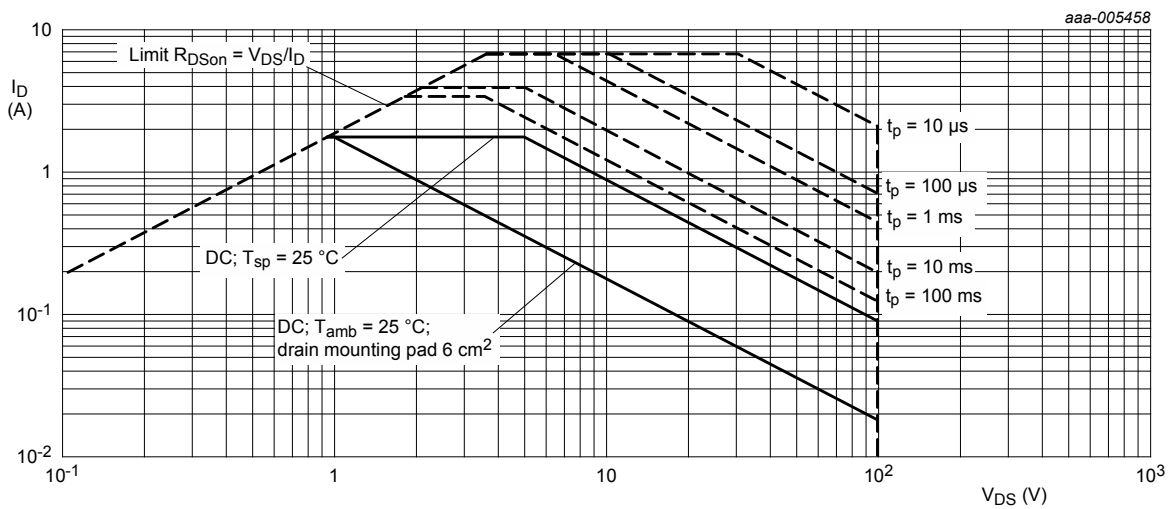


Fig. 2. Normalized continuous drain current as a function of junction temperature

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



I<sub>DM</sub> = single pulse

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

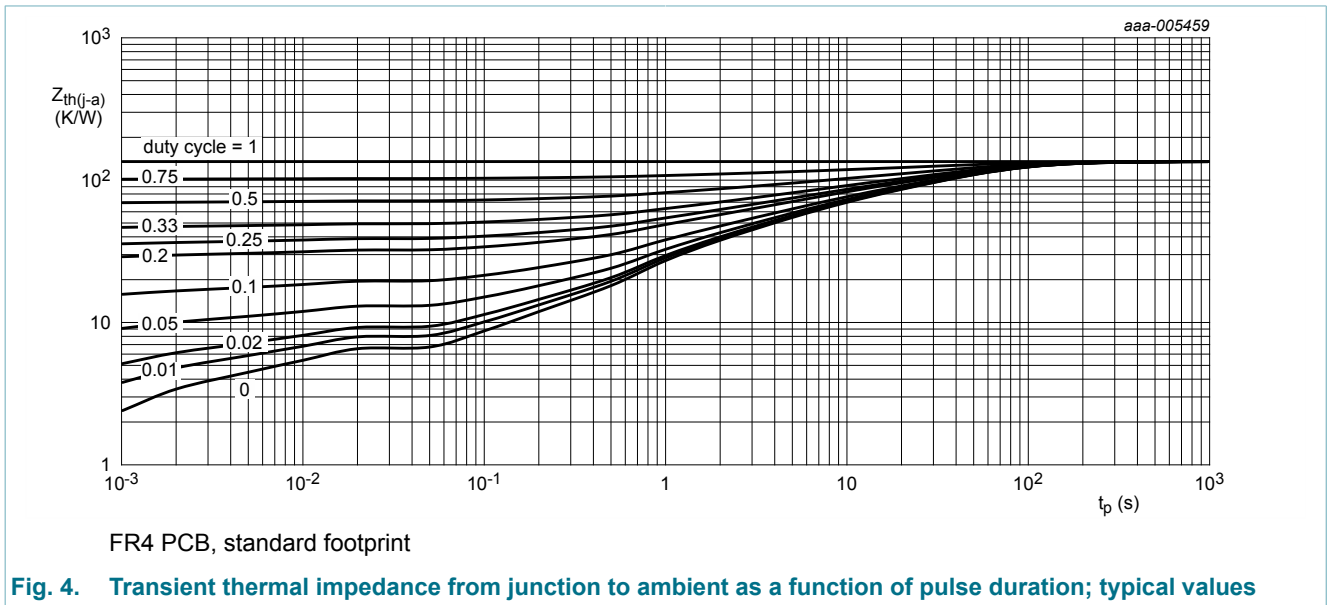
## 6. Thermal characteristics

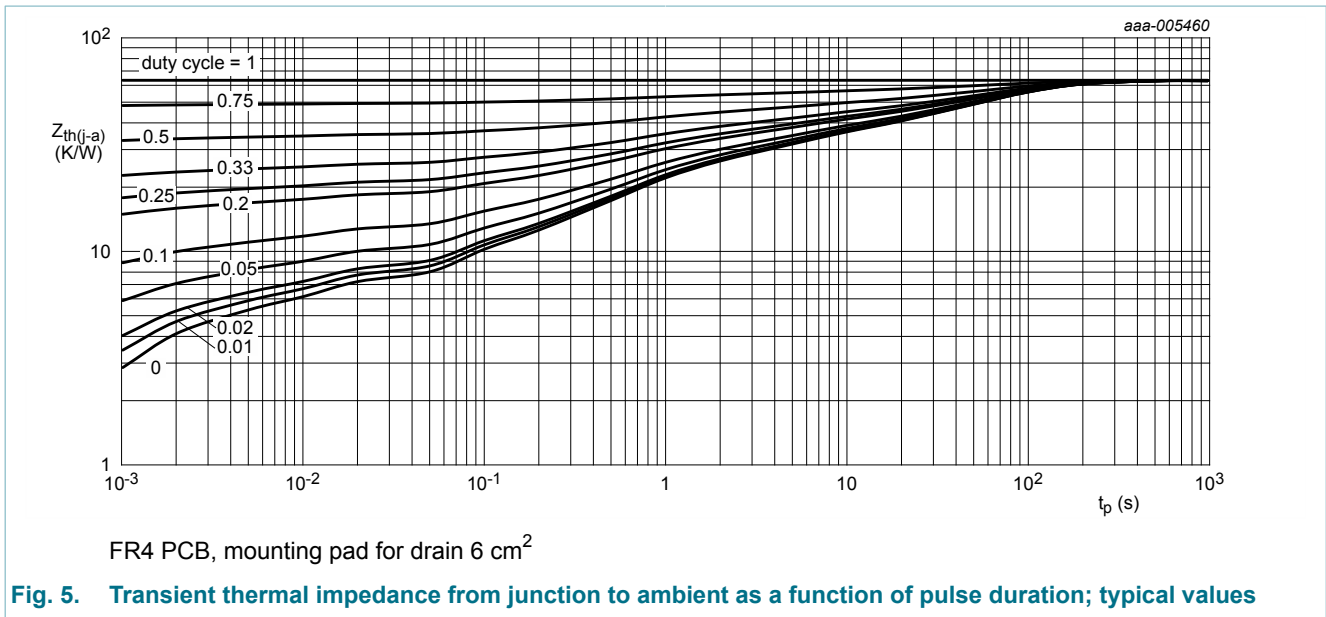
Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	135	155	K/W
			[2]	-	60	70	K/W
		in free air; $t \leq 5$ s	[2]	-	31	36	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	12	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 cm<sup>2</sup>.





## 7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	100	-	-	V
$V_{GSth}$	gate-source threshold voltage	$I_D = 250 \mu A; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ C$	1.3	1.7	2.5	V
$I_{DSS}$	drain leakage current	$V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	-	-	1	$\mu A$
$I_{GSS}$	gate leakage current	$V_{GS} = 20 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$	-	-	100	nA
		$V_{GS} = -20 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$	-	-	-100	nA
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 10 V; I_D = 1.5 A; T_j = 25 \text{ }^\circ C$	-	190	235	m $\Omega$
		$V_{GS} = 10 V; I_D = 1.5 A; T_j = 150 \text{ }^\circ C$	-	420	520	m $\Omega$
		$V_{GS} = 4.5 V; I_D = 1 A; T_j = 25 \text{ }^\circ C$	-	200	270	m $\Omega$
$g_{fs}$	forward transconductance	$V_{DS} = 10 V; I_D = 1.5 A; T_j = 25 \text{ }^\circ C$	-	5	-	S
<b>Dynamic characteristics</b>						
$Q_{G(tot)}$	total gate charge	$V_{DS} = 80 V; I_D = 1.5 A; V_{GS} = 10 V; T_j = 25 \text{ }^\circ C$	-	7.4	10	nC
$Q_{GS}$	gate-source charge	$T_j = 25 \text{ }^\circ C$	-	0.7	-	nC
$Q_{GD}$	gate-drain charge		-	1.9	-	nC
$C_{iss}$	input capacitance	$V_{DS} = 80 V; f = 1 \text{ MHz}; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	-	315	475	pF
$C_{oss}$	output capacitance		-	35	-	pF

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_{rSS}$	reverse transfer capacitance		-	25	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 50\text{ V}; I_D = 1.5\text{ A}; V_{GS} = 10\text{ V}; R_{G(ext)} = 6\ \Omega; T_j = 25\text{ }^\circ\text{C}$	-	4	-	ns
$t_r$	rise time		-	5	-	ns
$t_{d(off)}$	turn-off delay time		-	11	-	ns
$t_f$	fall time		-	3	-	ns
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = 1.6\text{ A}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^\circ\text{C}$	-	0.8	1.2	V

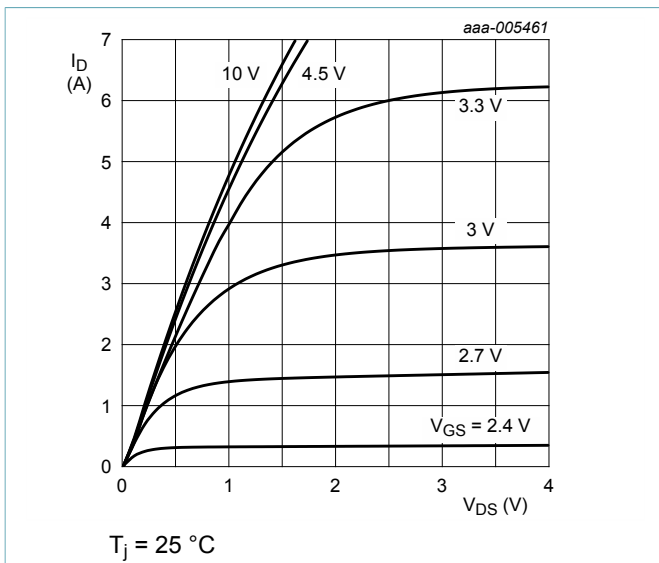


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

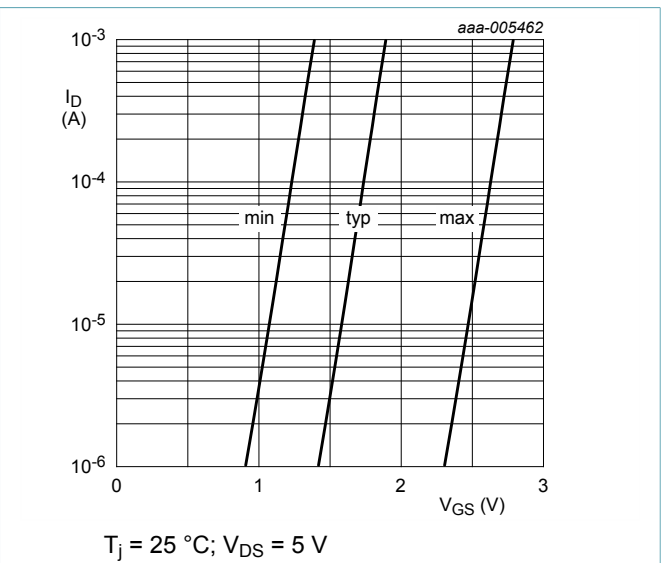


Fig. 7. Subthreshold drain current as a function of gate-source voltage

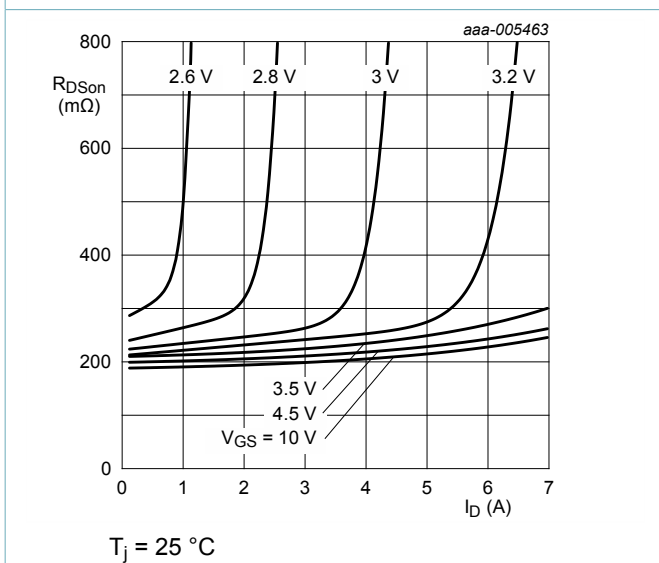


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

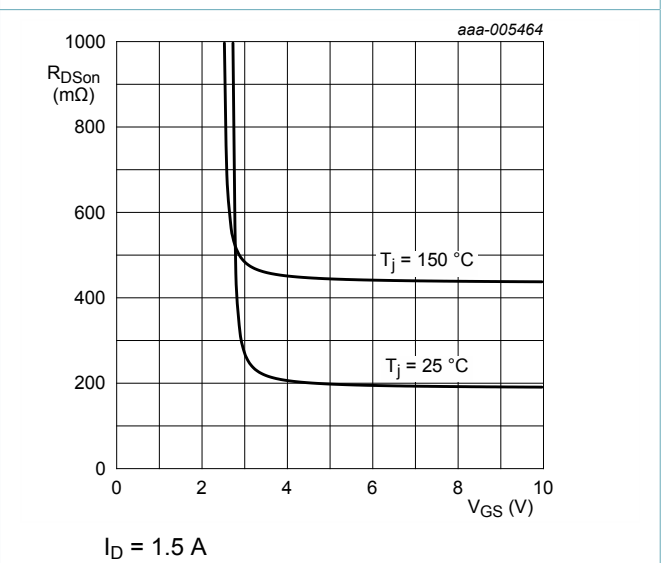
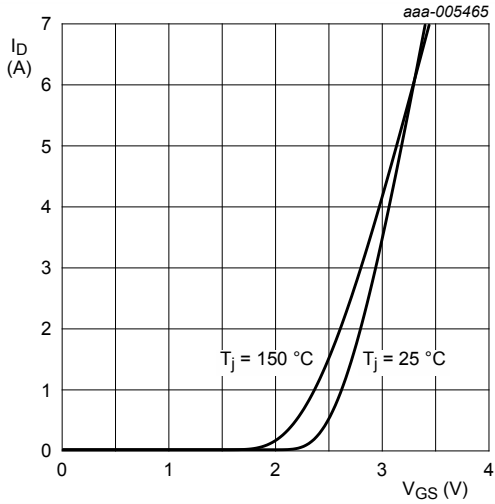
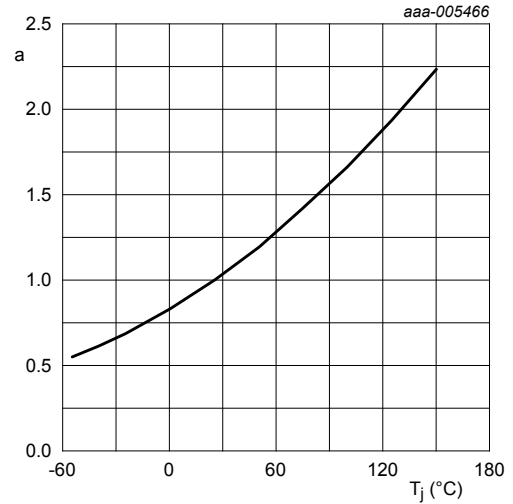


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values



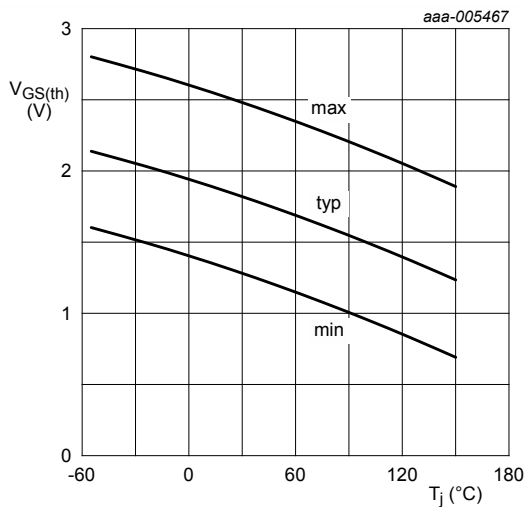
$$V_{DS} > I_D \times R_{DS(on)}$$

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



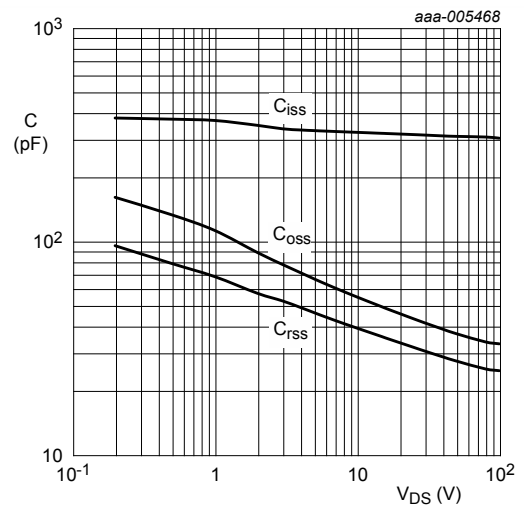
**Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values**

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



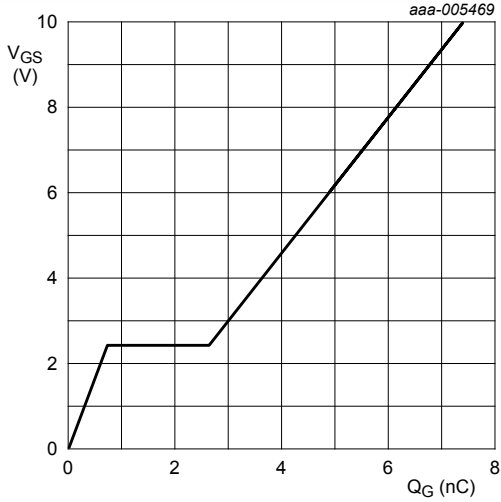
$$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}$$

**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**



$I_D = 1.5 \text{ A}; V_{DS} = 80 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$

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

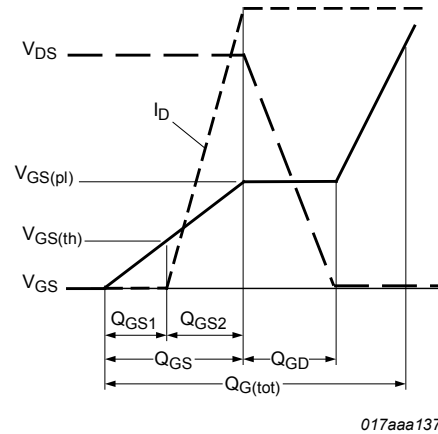
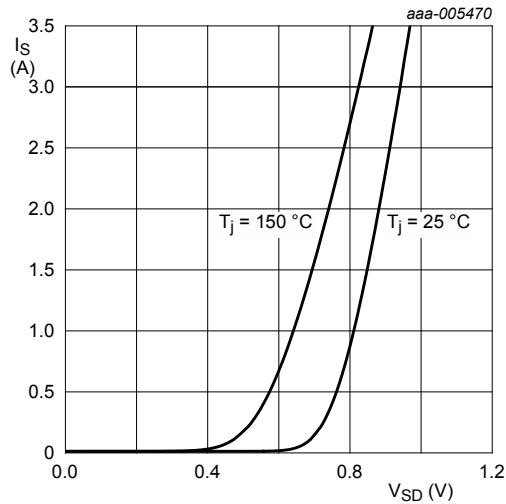


Fig. 15. Gate charge waveform definitions



$V_{GS} = 0 \text{ V}$

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

### 8. Test information

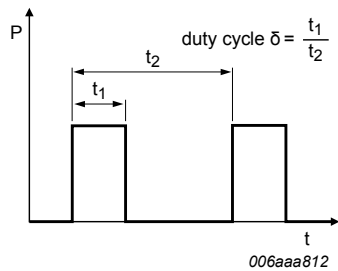


Fig. 17. Duty cycle definition



### 9. Package outline

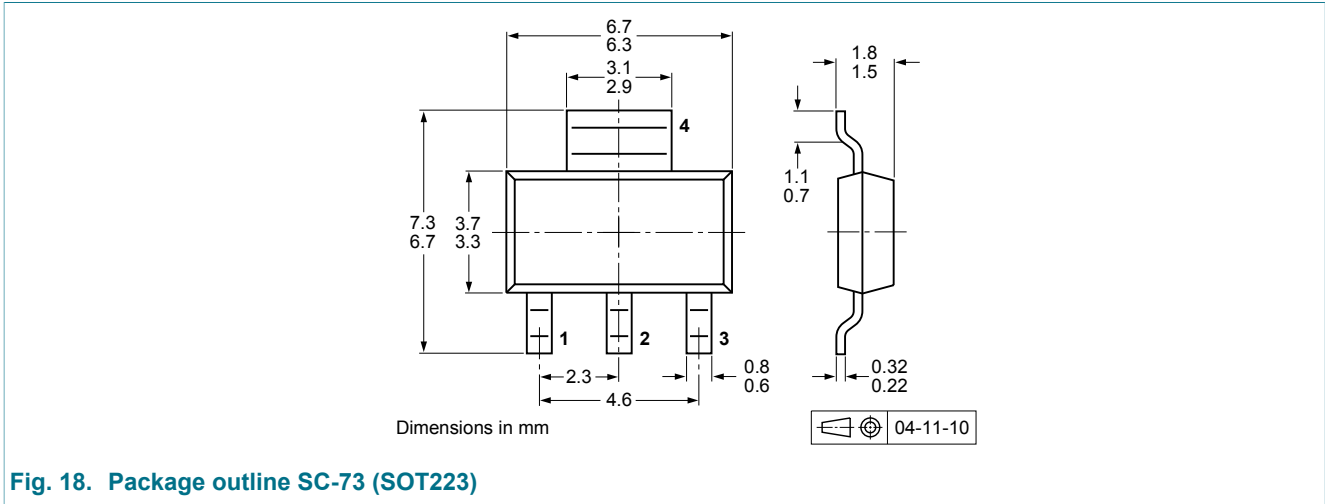


Fig. 18. Package outline SC-73 (SOT223)

### 10. Soldering

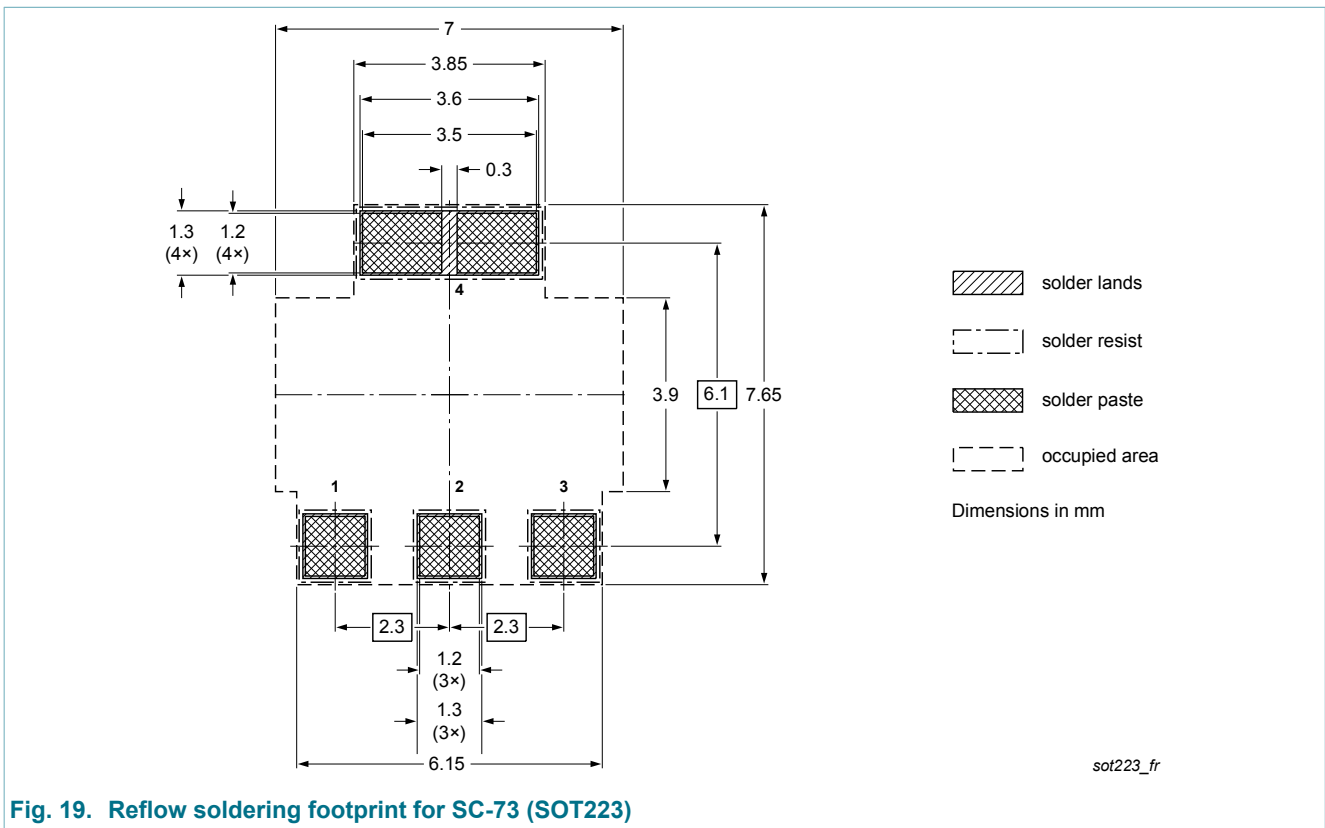
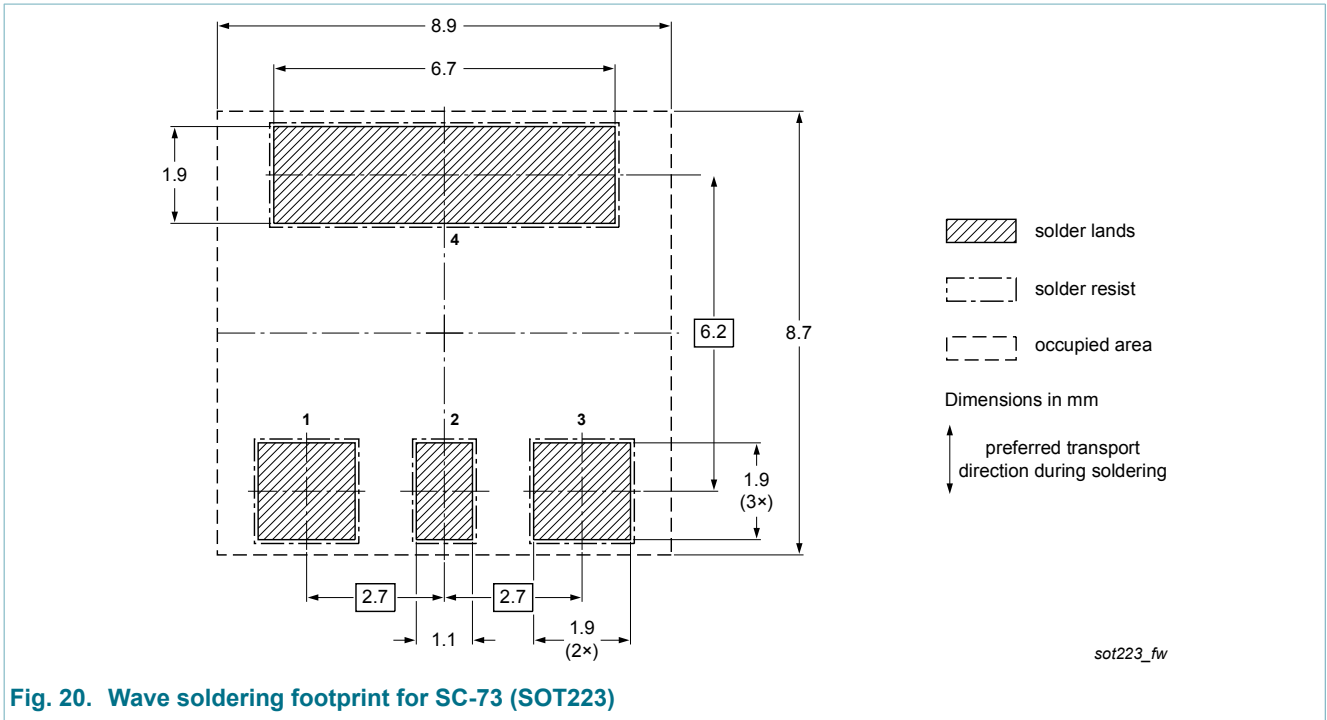


Fig. 19. Reflow soldering footprint for SC-73 (SOT223)



## 11. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMT200EN v.1	20121025	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.

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Date of release: 25 October 2012

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