

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

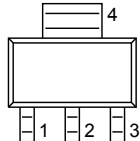
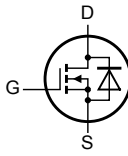
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ °C}$	-	-	100	V
V_{GS}	gate-source voltage		-20	-	20	V
I_D	drain current	$V_{GS} = 10\text{ V}; T_{amb} = 25\text{ °C}; t \leq 5\text{ s}$	[1]	-	3.3	A
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 1.5\text{ A}; T_j = 25\text{ °C}$	-	190	235	m 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>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	$T_j = 25\text{ °C}$		-	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
		$V_{GS} = 10\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	1.8	A
		$V_{GS} = 10\text{ V}; T_{amb} = 100\text{ °C}$	[1]	-	1.1	A
I_{DM}	peak drain current	$T_{amb} = 25\text{ °C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	13	A
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$	[2]	-	800	mW
			[1]	-	1700	mW
		$T_{sp} = 25\text{ °C}$		-	8300	mW
T_j	junction temperature			-55	150	°C

Symbol	Parameter	Conditions		Min	Max	Unit
T _{amb}	ambient temperature			-55	150	°C
T _{stg}	storage temperature			-65	150	°C
Source-drain diode						
I _S	source current	T _{amb} = 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 cm².
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

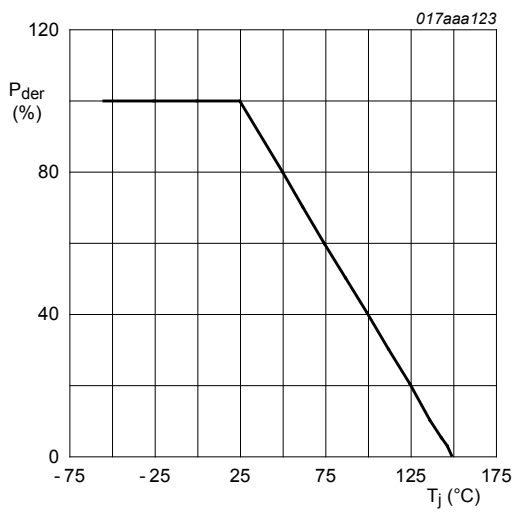


Fig. 1. Normalized total power dissipation as a function of junction temperature

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

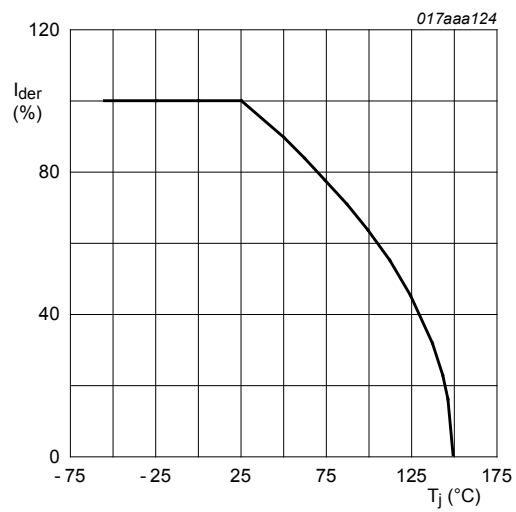
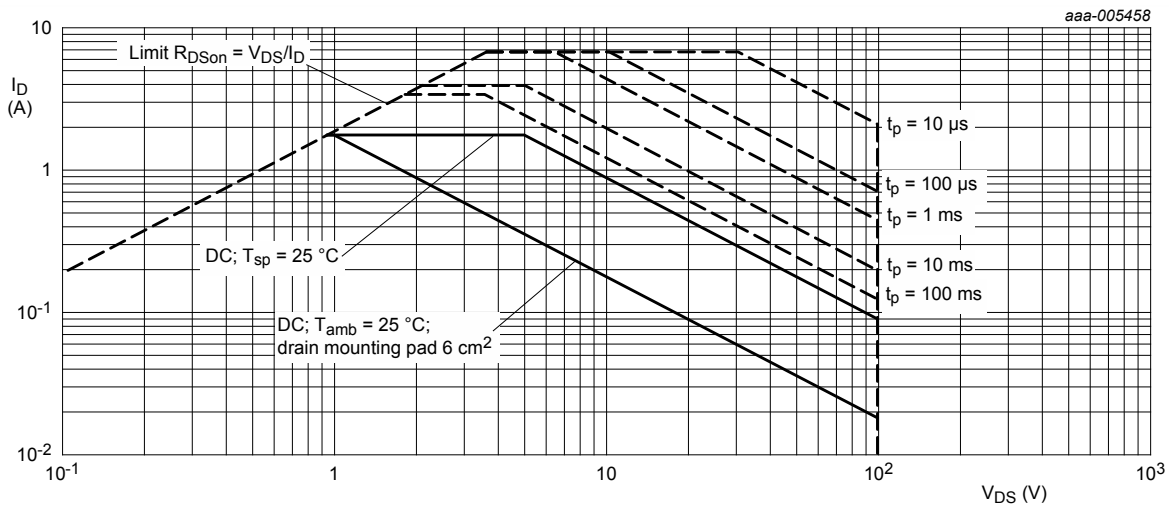


Fig. 2. Normalized continuous drain current as a function of junction temperature

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



I_{DM} = 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 cm².

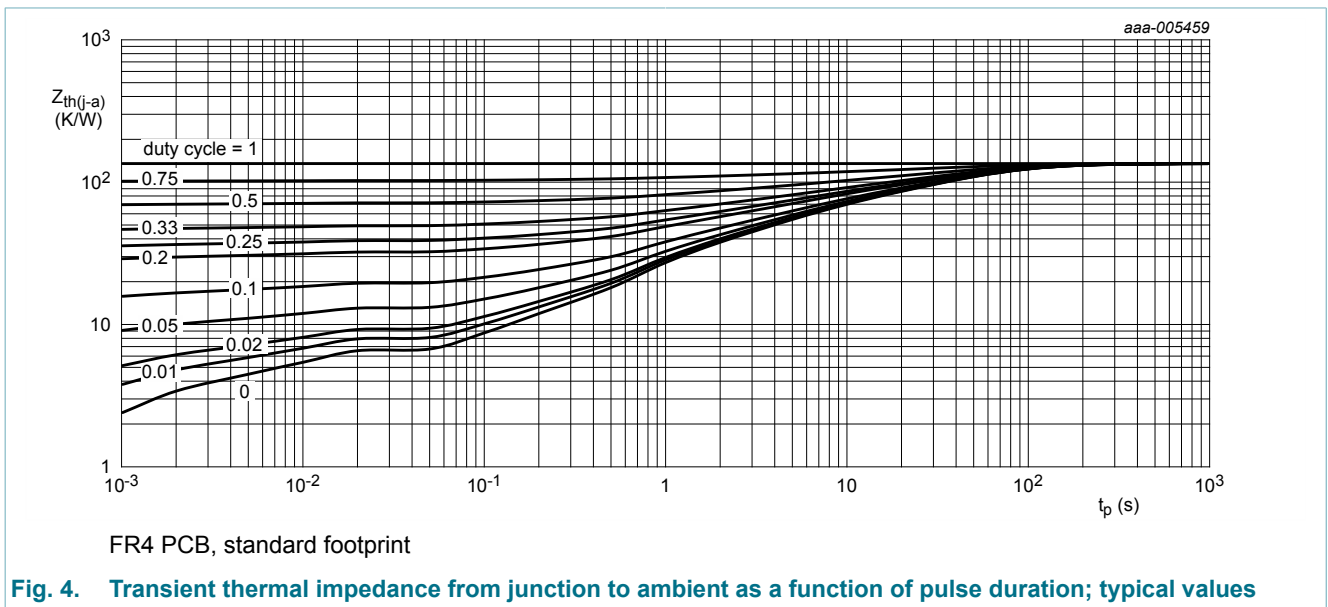
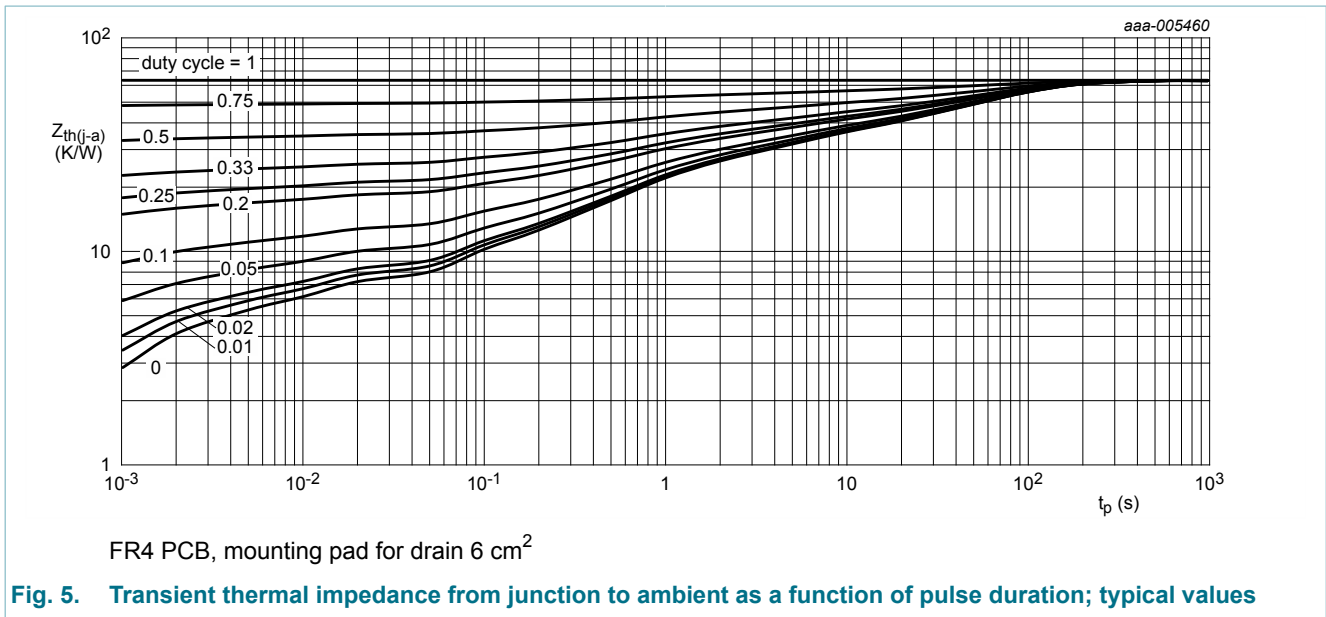


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	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	μA
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 Ω
		$V_{GS} = 10 V; I_D = 1.5 A; T_j = 150 \text{ }^\circ C$	-	420	520	m Ω
		$V_{GS} = 4.5 V; I_D = 1 A; T_j = 25 \text{ }^\circ C$	-	200	270	m Ω
g_{fs}	forward transconductance	$V_{DS} = 10 V; I_D = 1.5 A; T_j = 25 \text{ }^\circ C$	-	5	-	S
Dynamic characteristics						
$Q_{G(tot)}$	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
Source-drain diode						
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

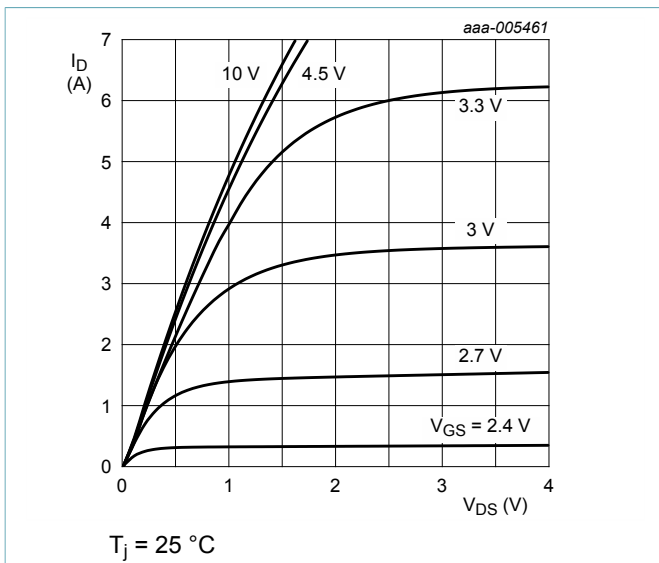


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

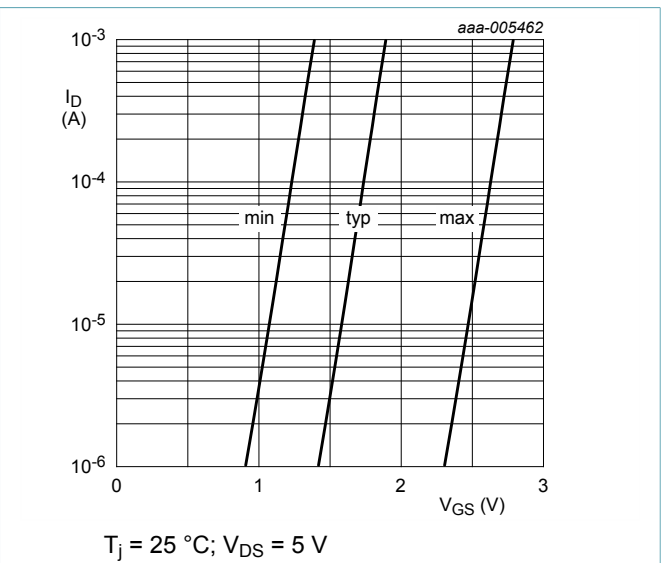


Fig. 7. Subthreshold drain current as a function of gate-source voltage

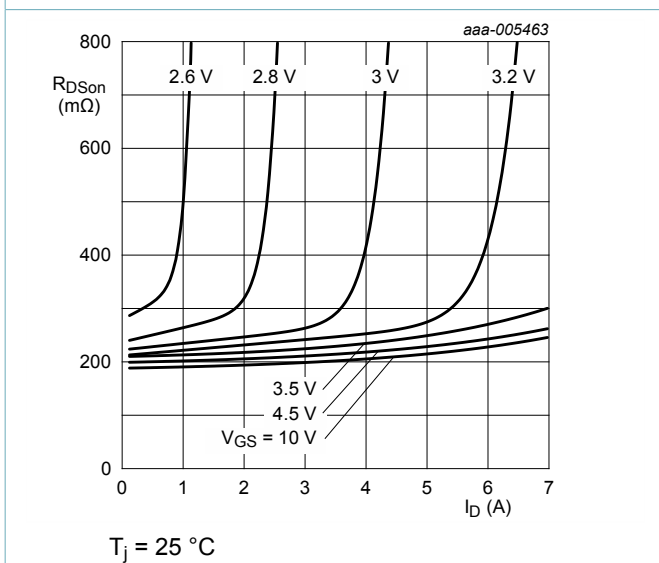


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

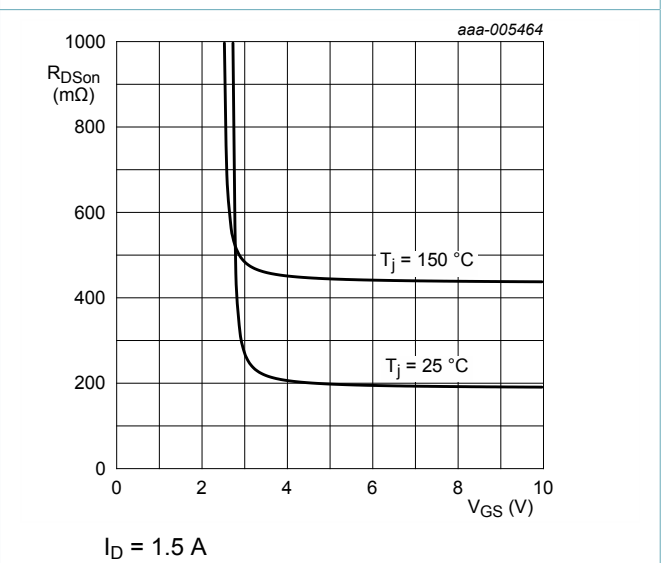
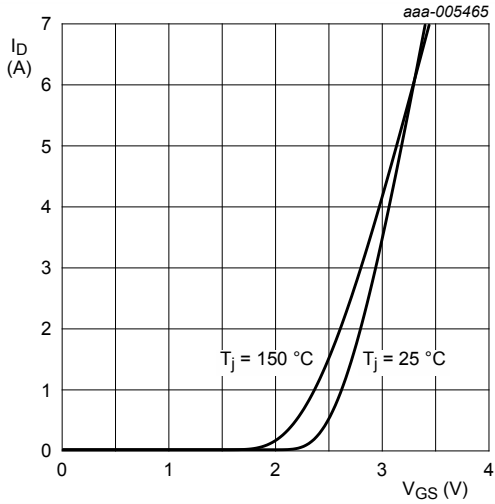


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values



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

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

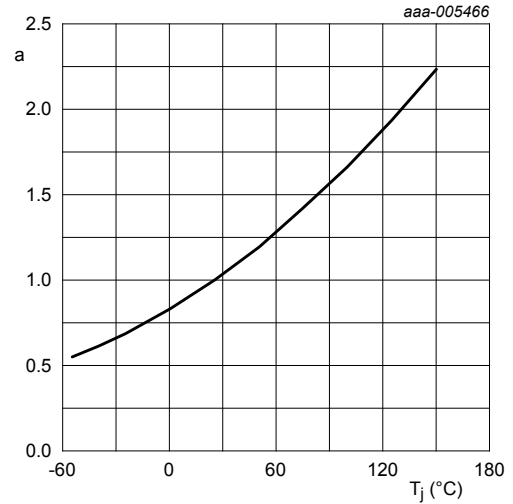
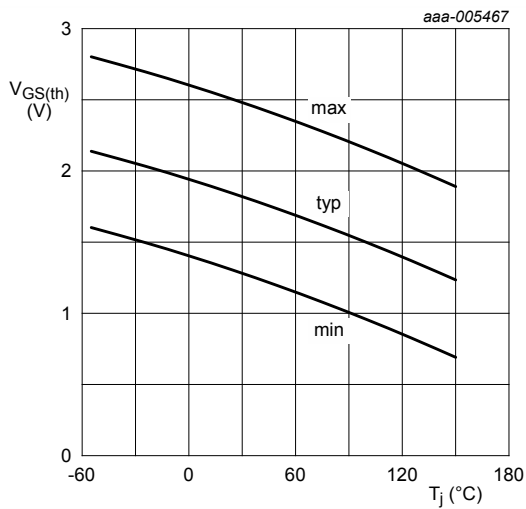


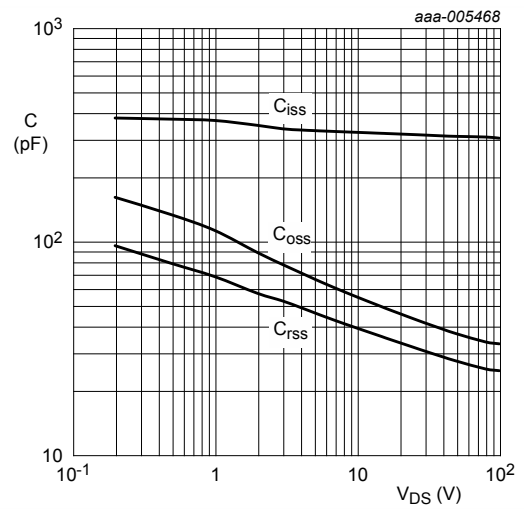
Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

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



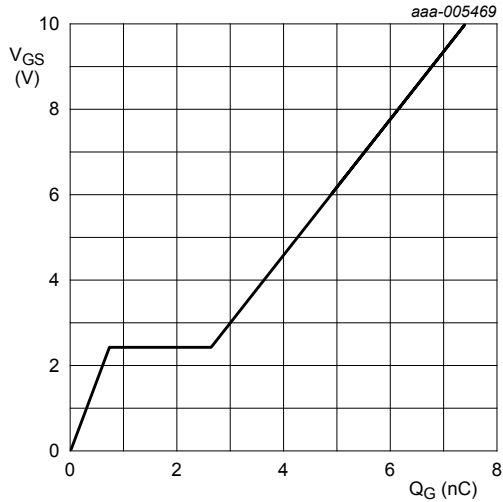
$$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}$$

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

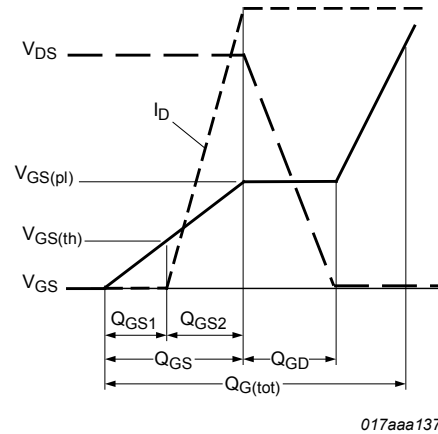
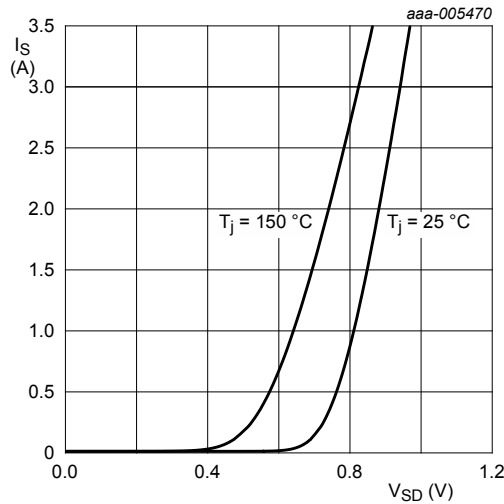


Fig. 15. Gate charge waveform definitions



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

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

8. Test information

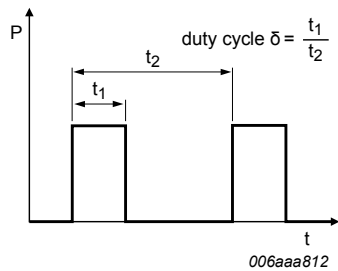


Fig. 17. Duty cycle definition

9. Package outline

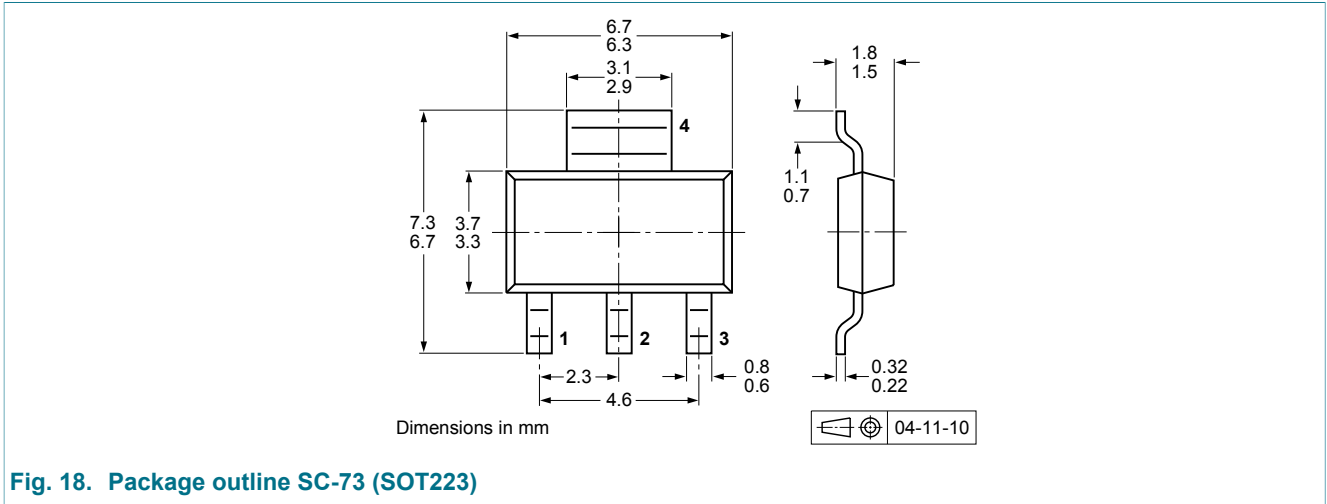


Fig. 18. Package outline SC-73 (SOT223)

10. Soldering

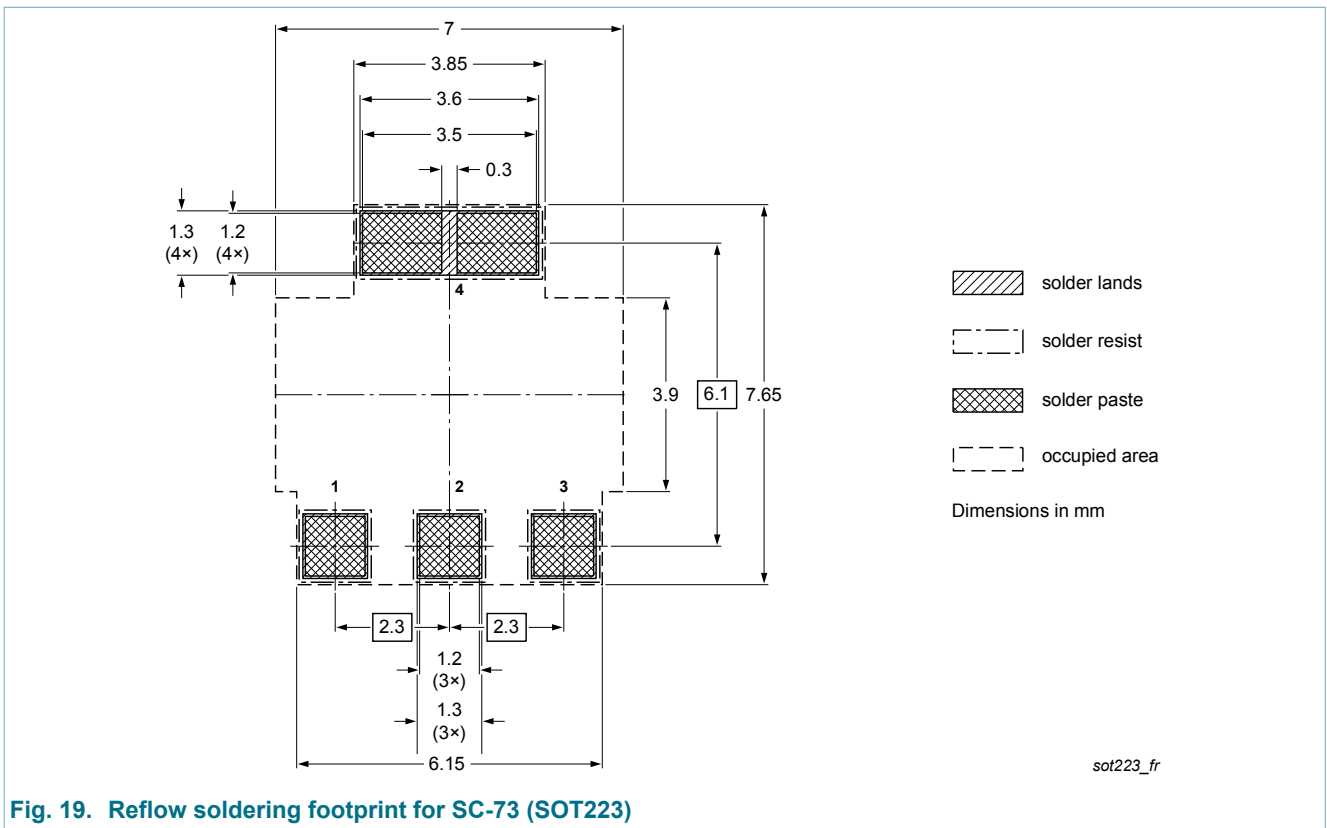
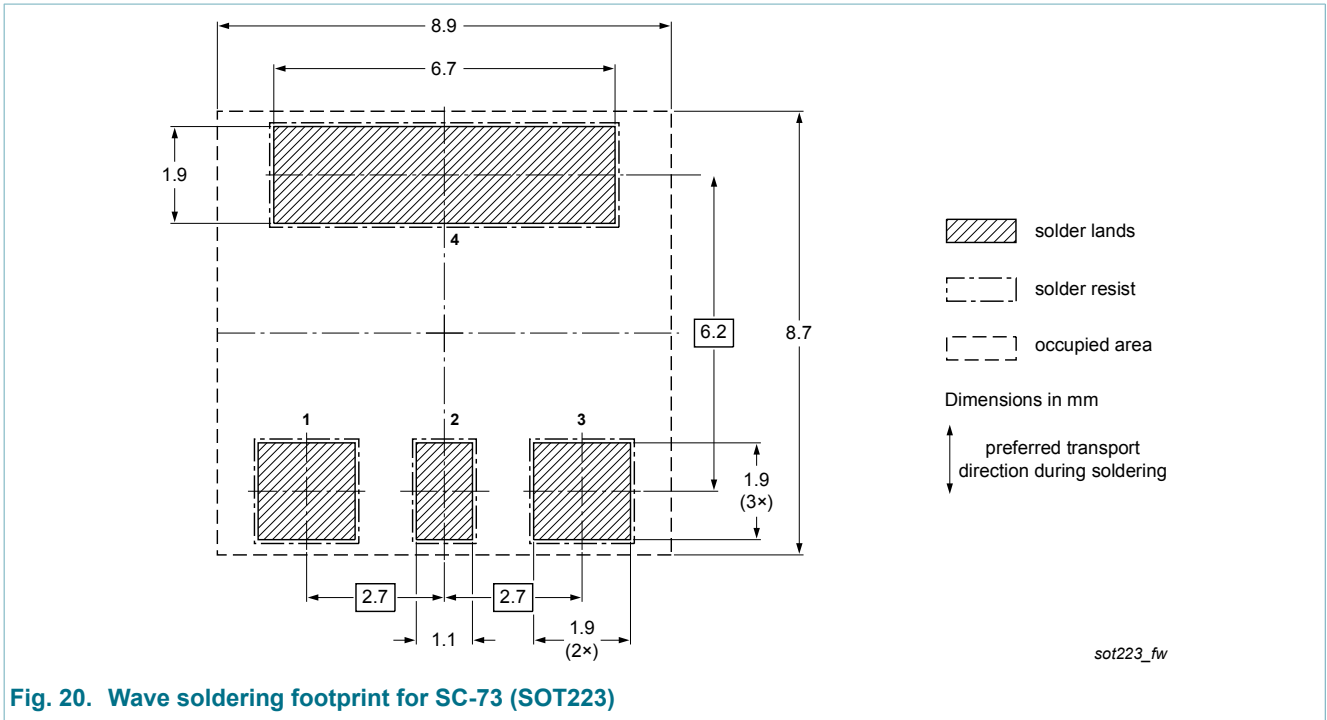


Fig. 19. Reflow soldering footprint for SC-73 (SOT223)



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.
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