



# THE DATASHEET OF PMT200EPEX





# PMT200EPE

70 V, P-channel Trench MOSFET

14 March 2018

Product data sheet

## 1. General description

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

## 2. Features and benefits

- Logic level compatible
- Very fast switching
- Trench MOSFET technology
- ElectroStatic Discharge (ESD) protection > 2 kV HBM

## 3. Applications

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

## 4. Quick reference data

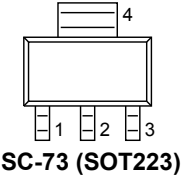
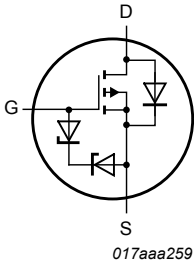
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j = 25\text{ °C}$	-	-	-70	V
$V_{GS}$	gate-source voltage		-20	-	20	V
$I_D$	drain current	$V_{GS} = -10\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-2.4	A
<b>Static characteristics</b>						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = -10\text{ V}; I_D = -2.4\text{ A}; T_j = 25\text{ °C}$	-	130	167	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	 <p>SC-73 (SOT223)</p>	 <p>017aaa259</p>
2	D	drain		
3	S	source		
4	D	drain		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMT200EPE	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMT200EPE	T2EPE

## 8. Limiting values

**Table 5. Limiting values**

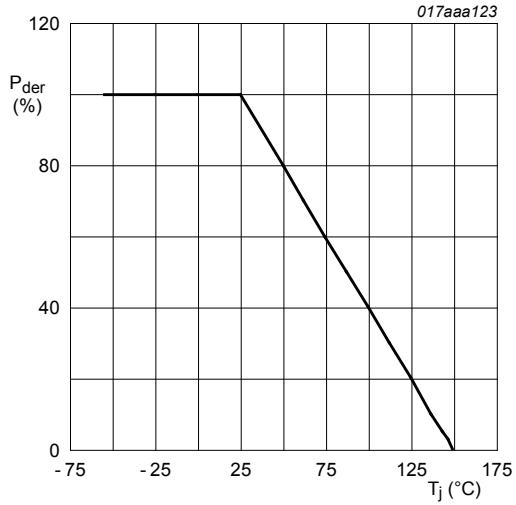
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$V_{DS}$	drain-source voltage	$T_j = 25\text{ °C}$		-	-70	V
$V_{GS}$	gate-source voltage			-20	20	V
$I_D$	drain current	$V_{GS} = -10\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-2.4	A
		$V_{GS} = -10\text{ V}; T_{amb} = 100\text{ °C}$	[1]	-	-1.5	A
$I_{DM}$	peak drain current	$T_{amb} = 25\text{ °C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	-9.7	A
$P_{tot}$	total power dissipation	$T_{amb} = 25\text{ °C}$	[2]	-	800	mW
			[1]	-	1.75	W
		$T_{sp} = 25\text{ °C}$		-	8.3	W
$T_j$	junction temperature			-55	150	°C
$T_{amb}$	ambient temperature			-55	150	°C
$T_{stg}$	storage temperature			-65	150	°C
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$T_{j(\text{init})} = 25\text{ °C}; I_D = -1.3\text{ A};$ DUT in avalanche (unclamped)		-	19.5	mJ
<b>Source-drain diode</b>						
$I_S$	source current	$T_{amb} = 25\text{ °C}$	[1]	-	-1.8	A
<b>ESD maximum rating</b>						
$V_{ESD}$	electrostatic discharge voltage	HBM	[3]	-	2000	V

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

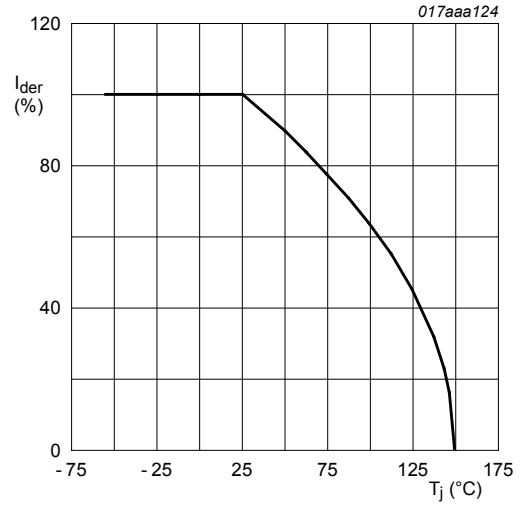
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[3] Measured between all pins.



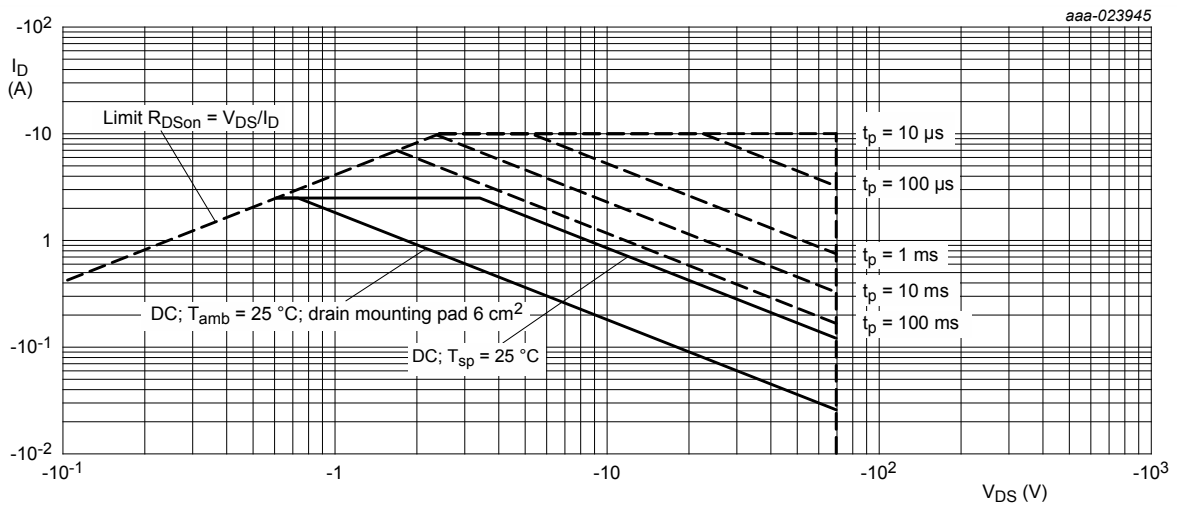
$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ C)}} \times 100 \%$$

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



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

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



$I_{DM}$  = single pulse

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

## 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]	-	135	155	K/W
			[2]	-	54	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	7	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>.

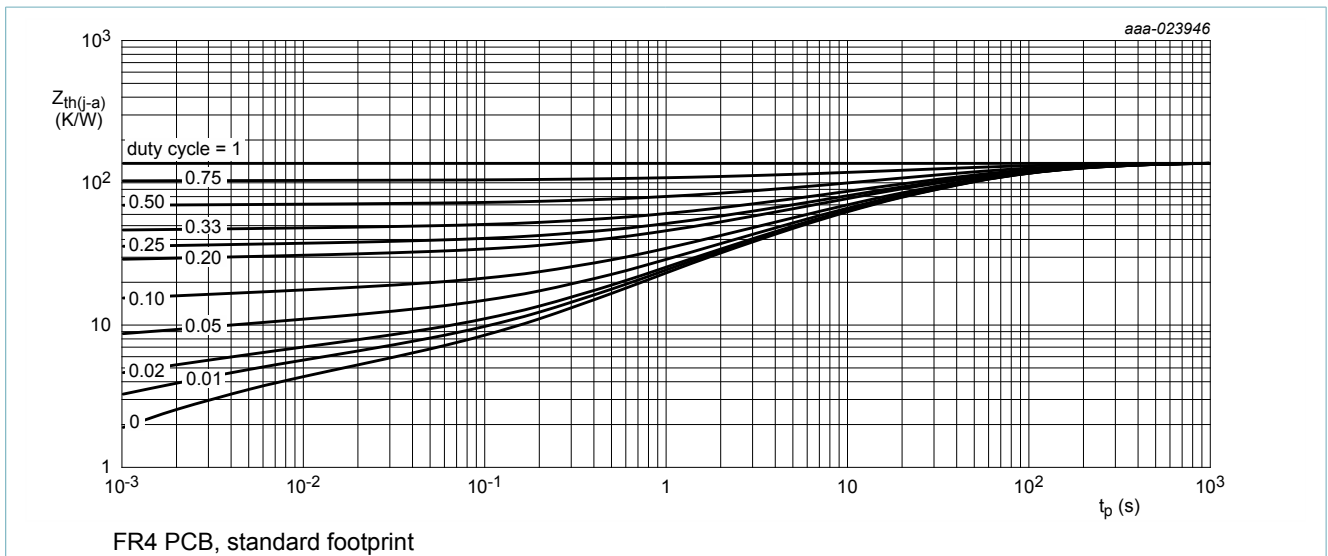


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

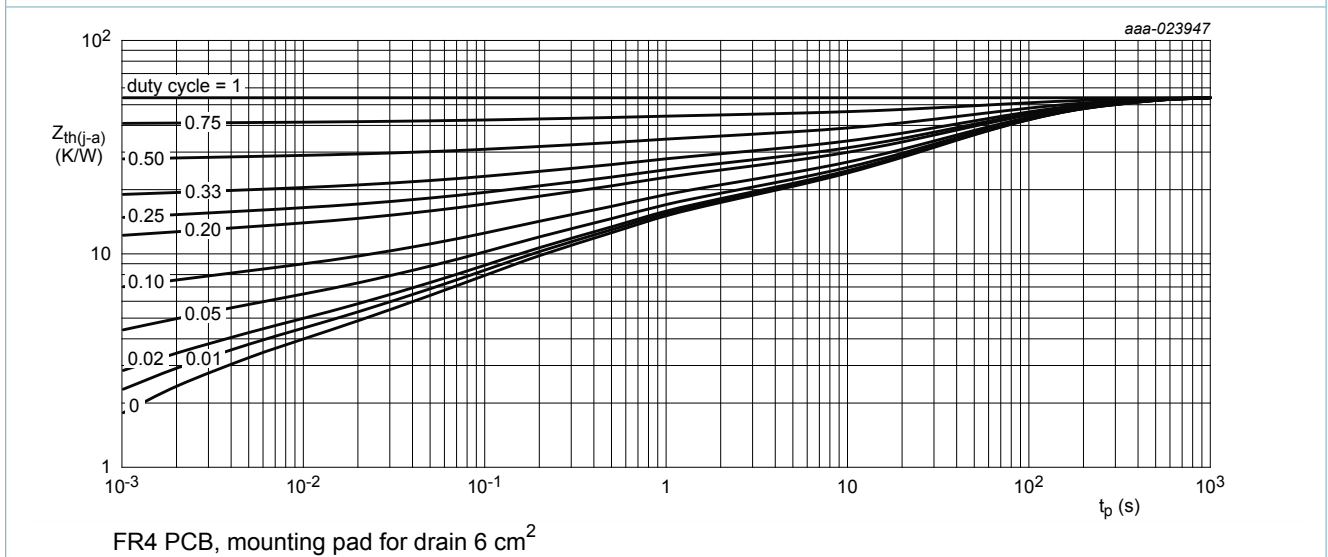


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -250 \mu\text{A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-70	-	-	V
$V_{GSth}$	gate-source threshold voltage	$I_D = -250 \mu\text{A}; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ\text{C}$	-1	-2	-3	V
$I_{DSS}$	drain leakage current	$V_{DS} = -70 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	-1	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{GS} = 20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_{GS} = -20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	-10	$\mu\text{A}$
		$V_{GS} = 10 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	2	$\mu\text{A}$
		$V_{GS} = -10 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	-2	$\mu\text{A}$
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = -10 \text{ V}; I_D = -2.4 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	130	167	m $\Omega$
		$V_{GS} = -10 \text{ V}; I_D = -2.4 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	234	250	m $\Omega$
		$V_{GS} = -4.5 \text{ V}; I_D = -2.1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	150	225	m $\Omega$
$g_{fs}$	forward transconductance	$V_{DS} = -10 \text{ V}; I_D = -2.4 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	13.5	-	S
$R_G$	gate resistance	$f = 1 \text{ MHz}$	-	12	-	$\Omega$
<b>Dynamic characteristics</b>						
$Q_{G(tot)}$	total gate charge	$V_{DS} = -35 \text{ V}; I_D = -2.4 \text{ A}; V_{GS} = -10 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	10.6	15.9	nC
$Q_{GS}$	gate-source charge		-	2.2	-	nC
$Q_{GD}$	gate-drain charge		-	1.05	-	nC
$C_{iss}$	input capacitance	$V_{DS} = -35 \text{ V}; f = 1 \text{ MHz}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	822	-	pF
$C_{oss}$	output capacitance		-	47	-	pF
$C_{rss}$	reverse transfer capacitance		-	31.5	-	pF
$t_{d(on)}$	turn-on delay time		-	6	-	ns
$t_r$	rise time	$R_{G(ext)} = 6 \text{ } \Omega; T_j = 25 \text{ }^\circ\text{C}$	-	8	-	ns
$t_{d(off)}$	turn-off delay time		-	42	-	ns
$t_f$	fall time		-	20	-	ns
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = -2.4 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-0.8	-1.2	V

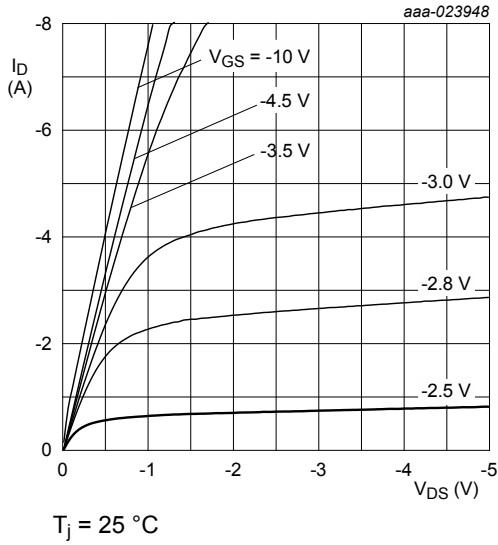


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

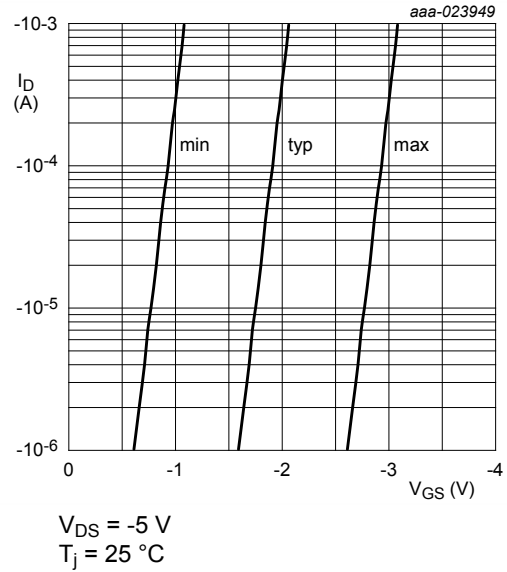


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

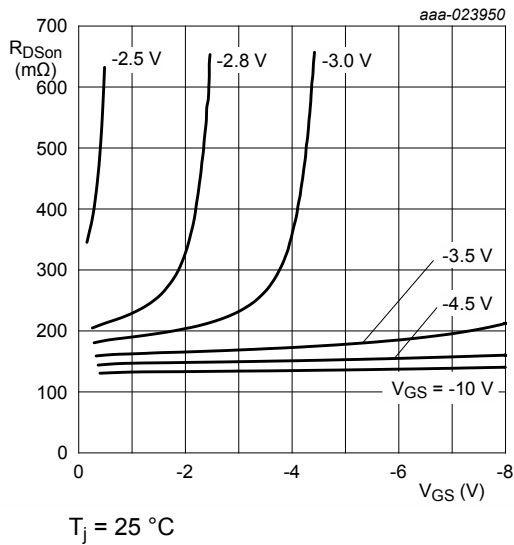


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

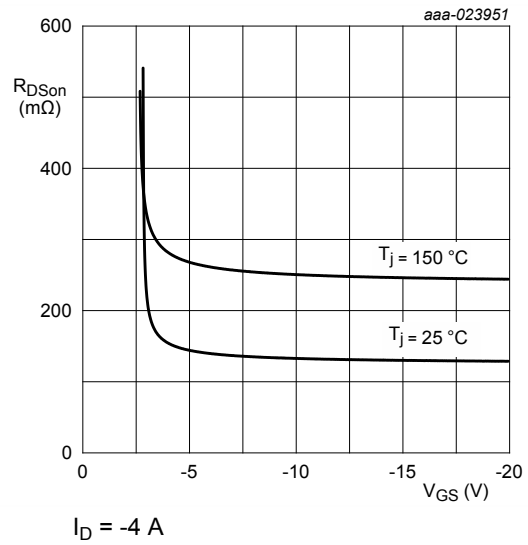
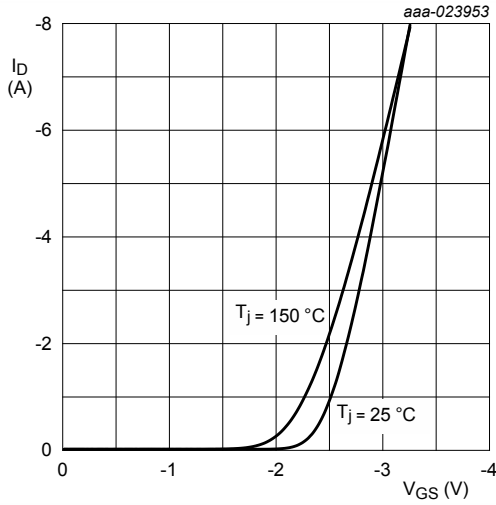
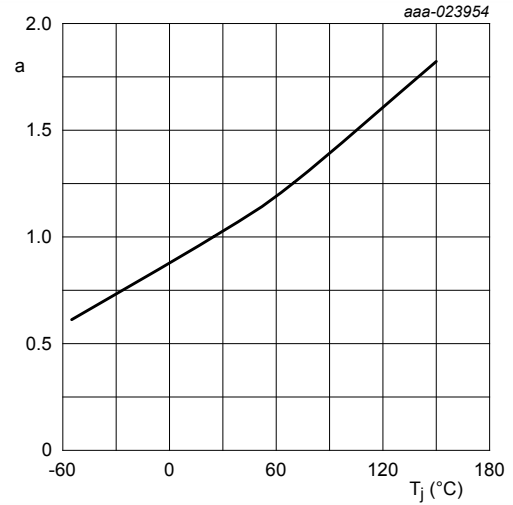


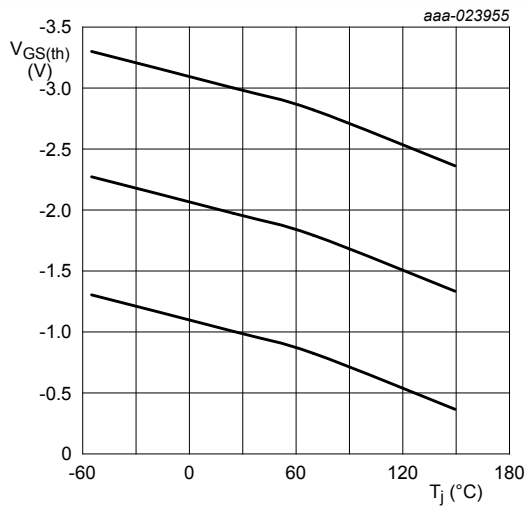
Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values



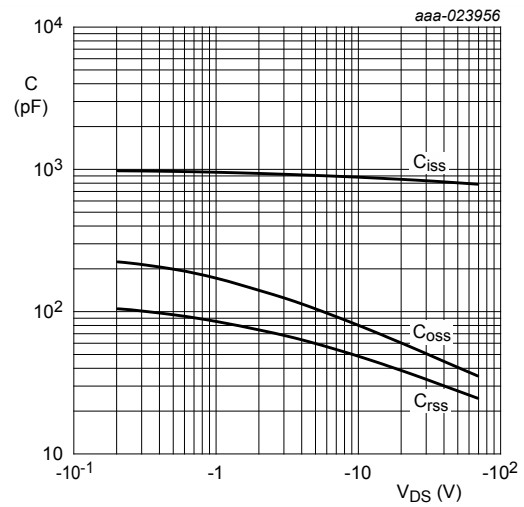
**Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values**



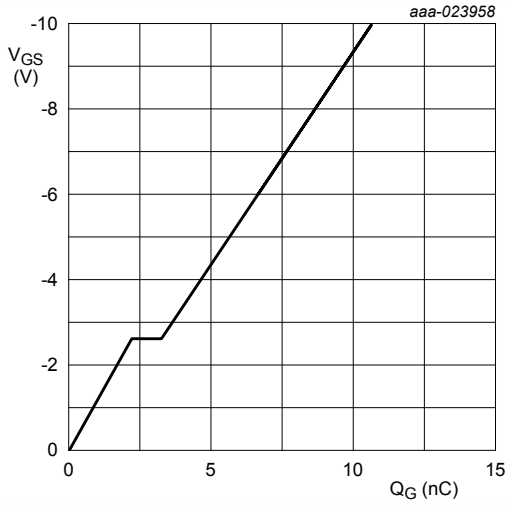
**Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values**



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



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



$V_{DS} = -35\text{ V}; I_D = -2\text{ A}$

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

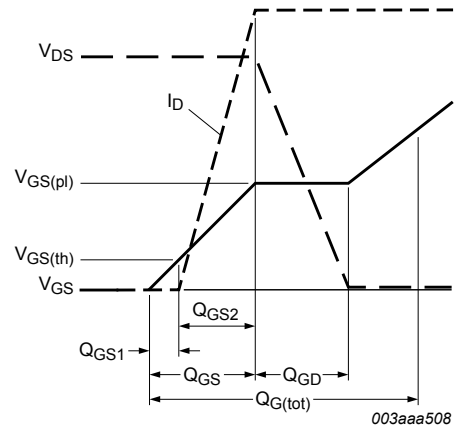
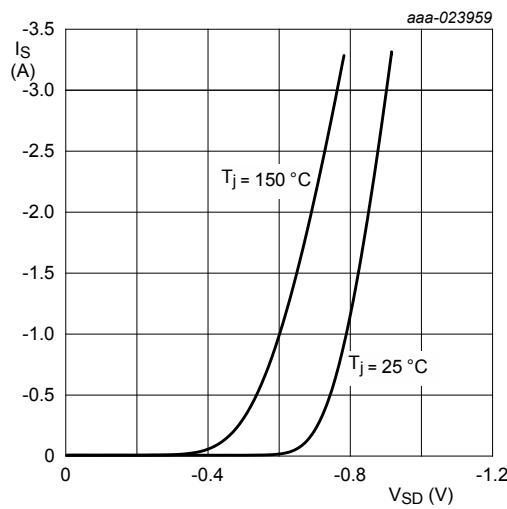


Fig. 15. Gate charge waveform definitions



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

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

## 11. Test information

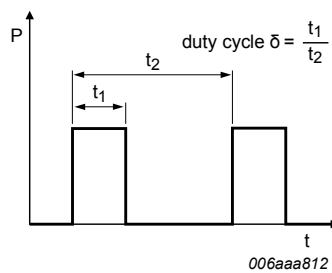


Fig. 17. Duty cycle definition

## 12. Package outline

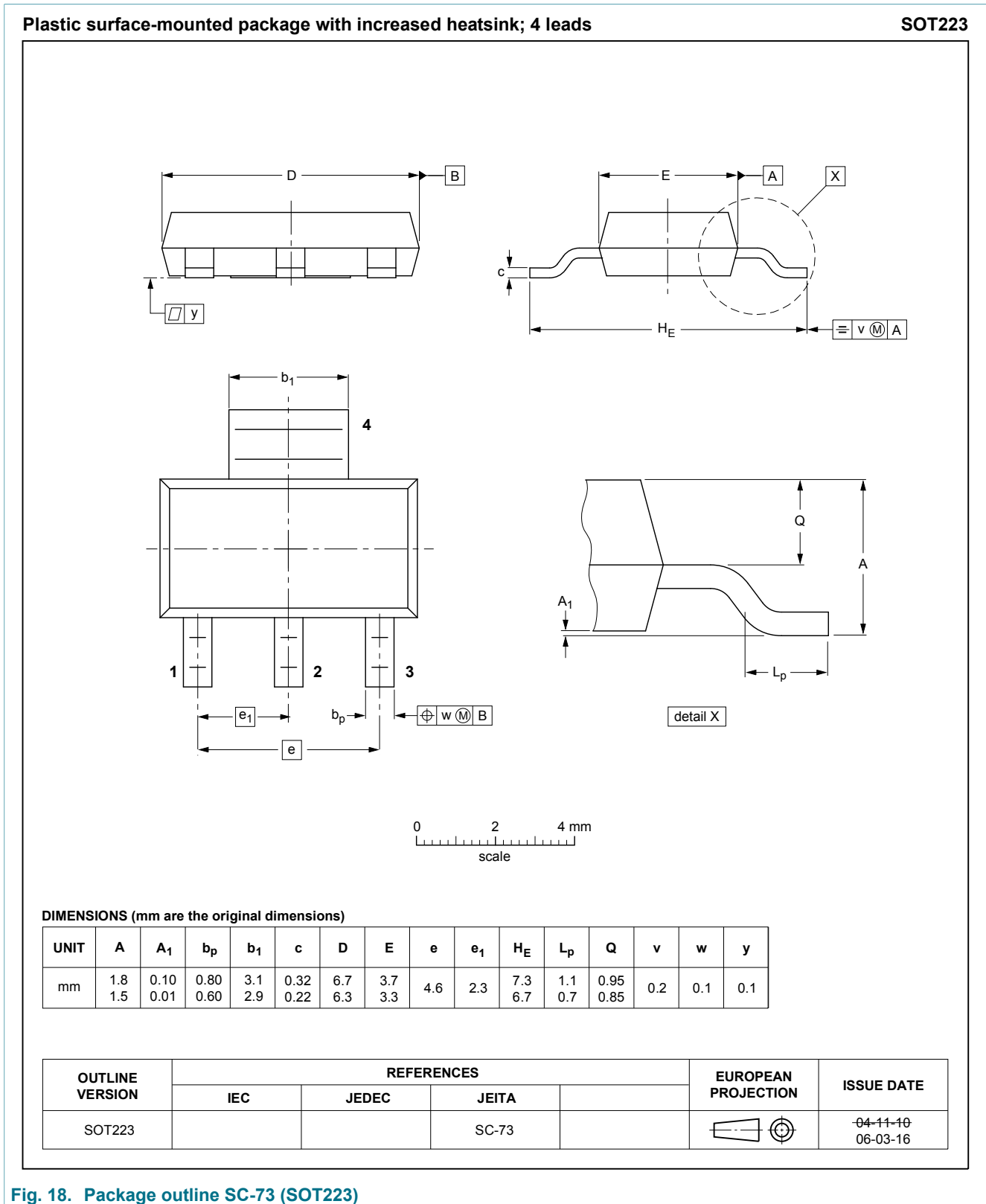


Fig. 18. Package outline SC-73 (SOT223)

### 13. Soldering

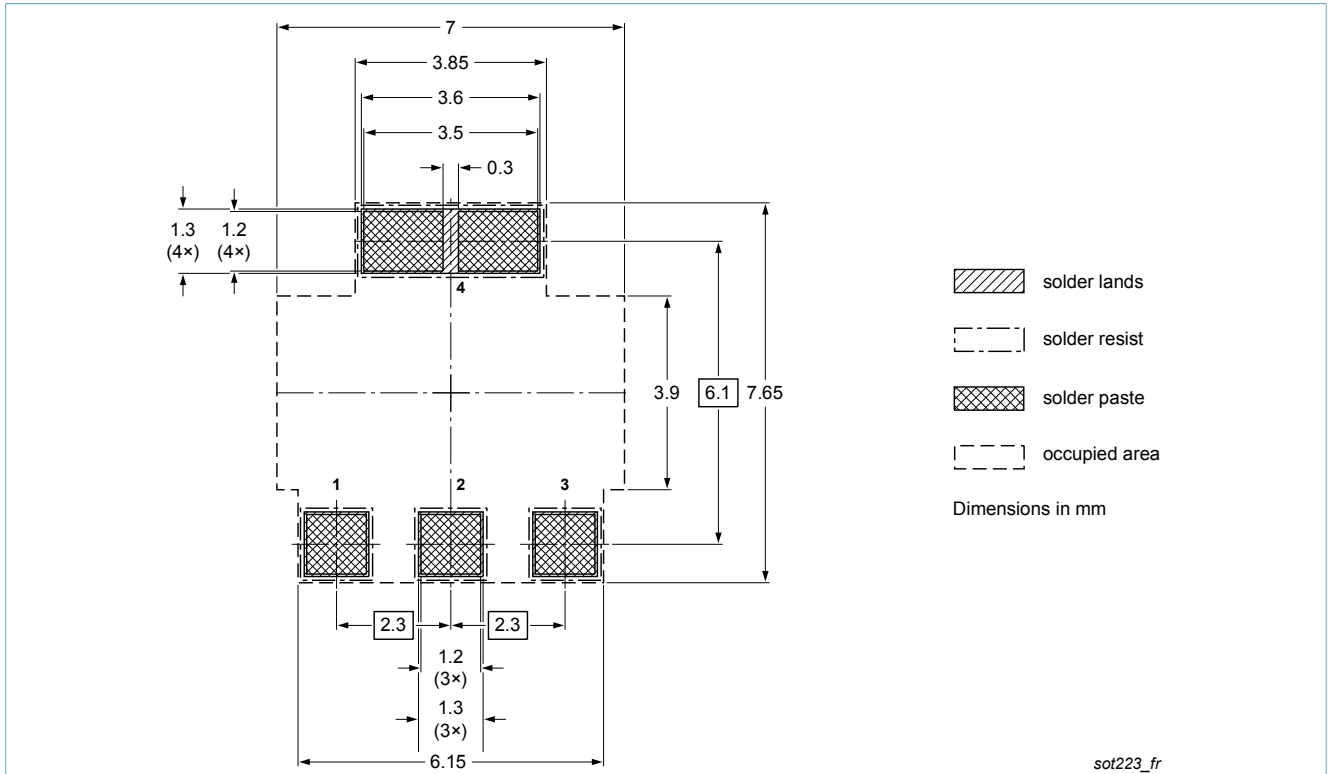


Fig. 19. Reflow soldering footprint for SC-73 (SOT223)

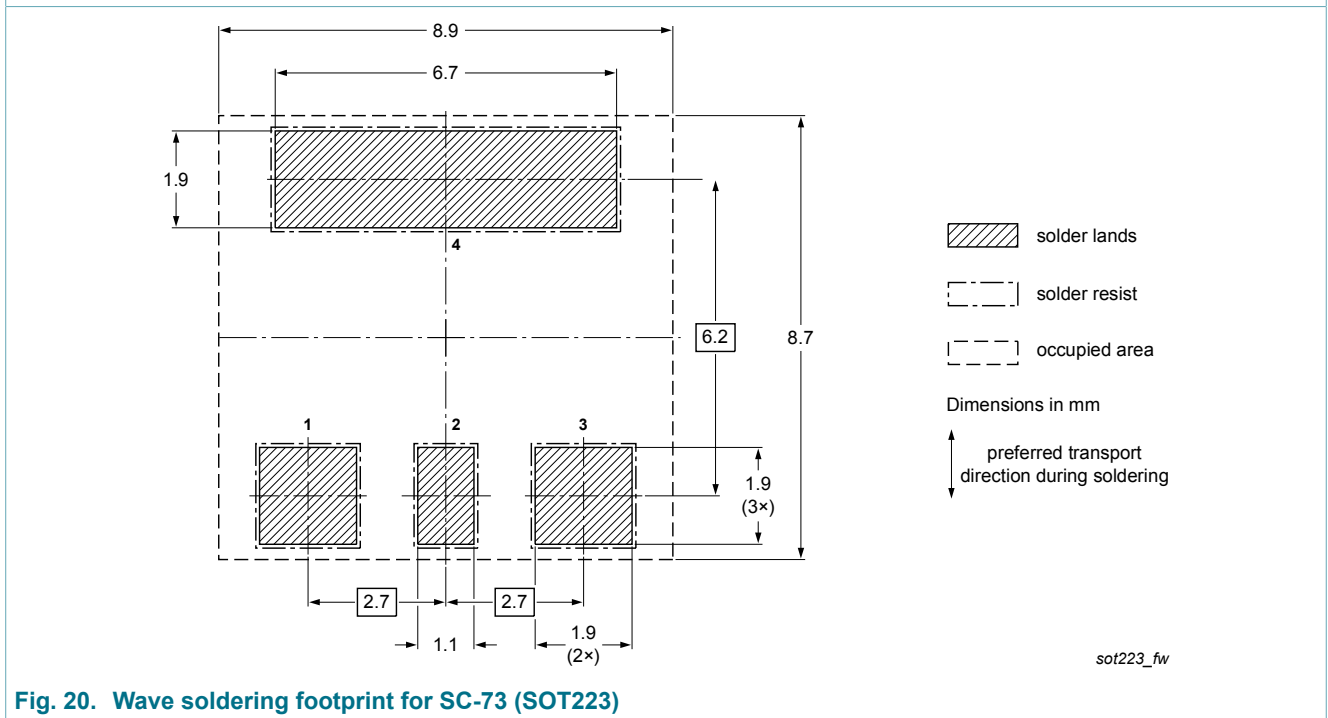


Fig. 20. Wave soldering footprint for SC-73 (SOT223)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMT200EPE v.1	20180314	Product data sheet	-	-

## 15. Legal information

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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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