



PMG85XP

20 V, 2 A P-channel Trench MOSFET

Rev. 1 — 28 June 2011

Product data sheet

1. Product profile

1.1 General description

P-channel enhancement mode Field-Effect Transistor (FET) in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

1.2 Features and benefits

- Low threshold voltage
- 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

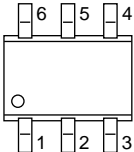
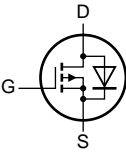
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ °C}$	-	-	-20	V
V_{GS}	gate-source voltage		-12	-	12	V
I_D	drain current	$V_{GS} = -4.5\text{ V}; T_j = 25\text{ °C}$	[1]	-	-2	A
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = -4.5\text{ V}; I_D = -2\text{ A}; T_j = 25\text{ °C}$	-	90	115	mΩ

[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	D	drain	 SOT363 (TSSOP6)	 017aaa094
2	D	drain		
3	G	gate		
4	S	source		
5	D	drain		
6	D	drain		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMG85XP	TSSOP6	plastic surface-mounted package; 6 leads	SOT363

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PMG85XP	YA%

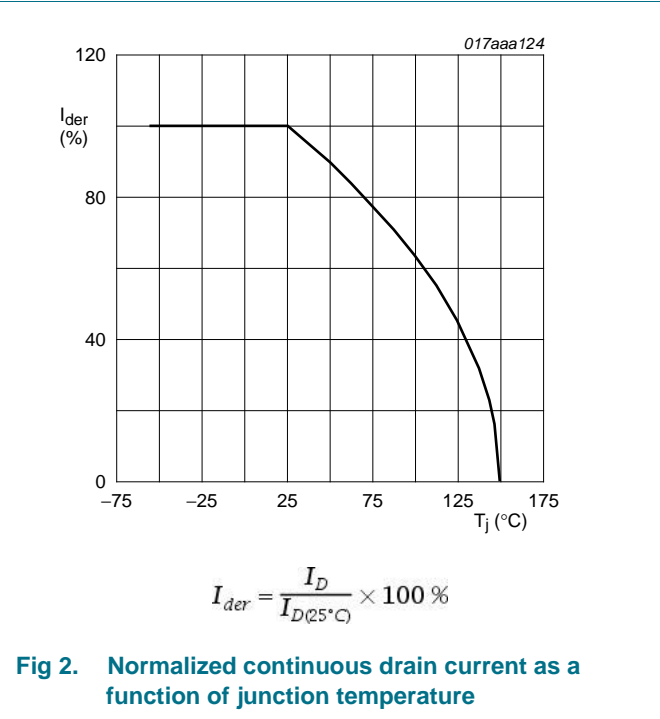
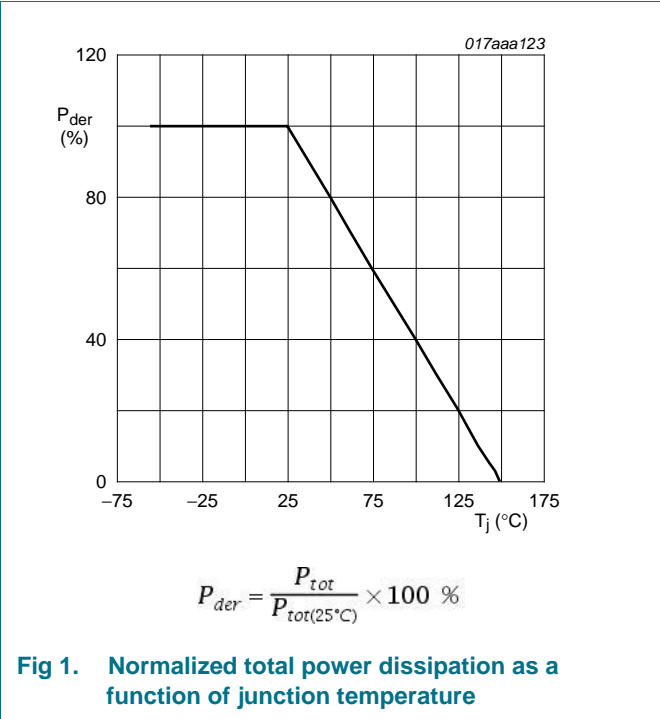
[1] % = placeholder for manufacturing site code

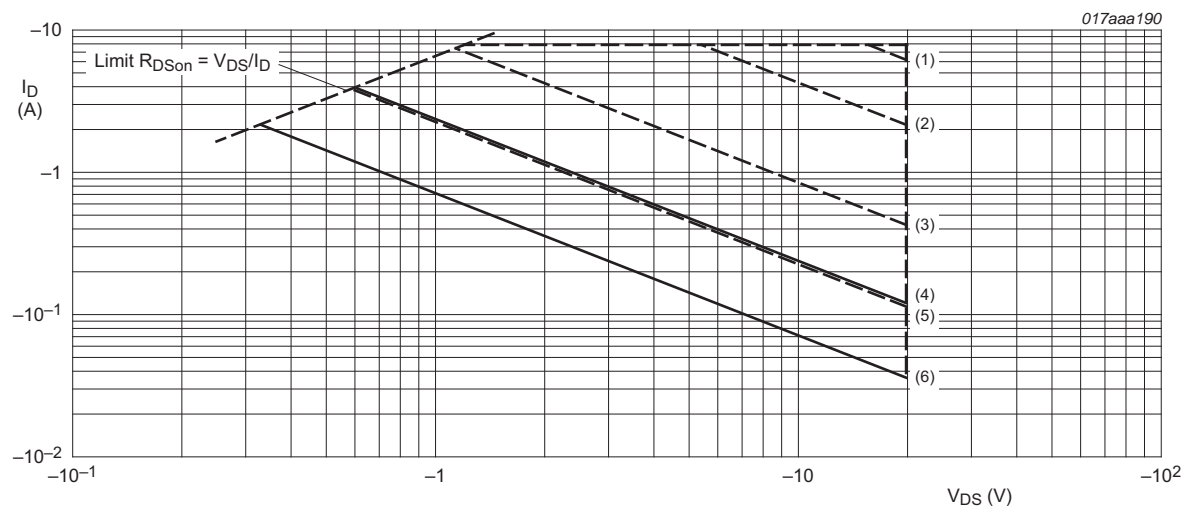
5. Limiting values

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 °C		-	-20	V
V _{GS}	gate-source voltage			-12	12	V
I _D	drain current	V _{GS} = -4.5 V; T _j = 25 °C	[1]	-	-2	A
		V _{GS} = -4.5 V; T _j = 100 °C	[1]	-	-1.3	A
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs		-	-8	A
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	-	375	mW
			[1]	-	725	mW
		T _{sp} = 25 °C		-	2400	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 °C	[1]	-	-0.7	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 PCB, single-sided copper, tin-plated and standard footprint.





IDM = single pulse
(1) tp = 100 μs
(2) tp = 1 ms
(3) tp = 10 ms
(4) DC; Tsp = 25 °C
(5) tp = 100 ms
(6) DC; Tamb = 25 °C; drain mounting pad 6 cm²

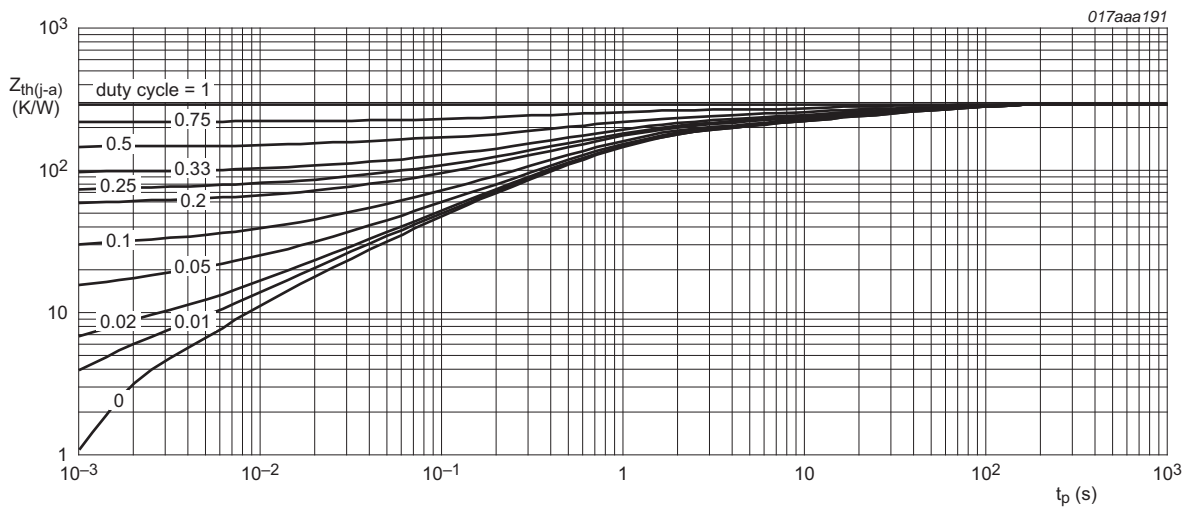
Fig 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

6. Thermal characteristics

Table 6. Thermal characteristics

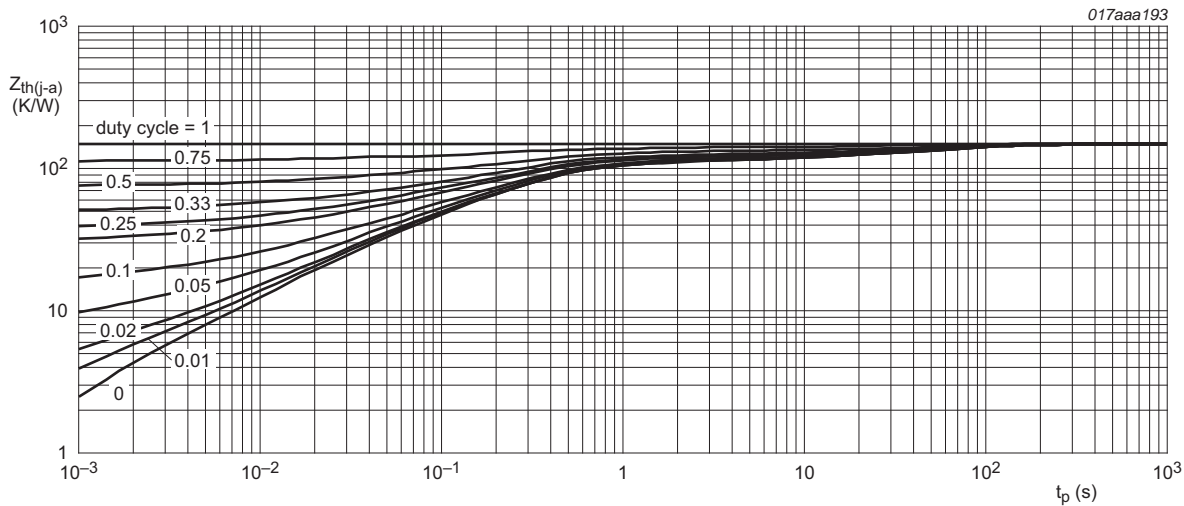
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Rth(j-a)	thermal resistance from junction to ambient	in free air	[1]	-	290	334 K/W
			[2]	-	150	173 K/W
Rth(j-sp)	thermal resistance from junction to solder point		-	45	52	K/W

[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.



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 cm²

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 μA; V _{GS} = 0 V; T _j = 25 °C	-20	-	-	V
V _{GSth}	gate-source threshold voltage	I _D = -250 μA; V _{DS} = V _{GS} ; T _j = 25 °C	-0.65	-0.9	-1.15	V
I _{DSS}	drain leakage current	V _{DS} = -20 V; V _{GS} = 0 V; T _j = 25 °C	-	-	-1	μA
		V _{DS} = -20 V; V _{GS} = 0 V; T _j = 150 °C	-	-	-15	μA
I _{GSS}	gate leakage current	V _{GS} = 12 V; V _{DS} = 0 V; T _j = 25 °C	-	-	100	nA
		V _{GS} = -12 V; V _{DS} = 0 V; T _j = 25 °C	-	-	-100	nA
R _{DSon}	drain-source on-state resistance	V _{GS} = -4.5 V; I _D = -2 A; T _j = 25 °C	-	90	115	mΩ
		V _{GS} = -4.5 V; I _D = -2 A; T _j = 150 °C	-	130	166	mΩ
		V _{GS} = -2.5 V; I _D = -2 A; T _j = 25 °C	-	125	160	mΩ
g _{fs}	forward transconductance	V _{DS} = -5 V; I _D = -2 A; T _j = 25 °C	-	6.3	-	S
Dynamic characteristics						
Q _{G(tot)}	total gate charge	V _{DS} = -10 V; I _D = -1 A; V _{GS} = -4.5 V; T _j = 25 °C	-	4.8	7.2	nC
Q _{GS}	gate-source charge		-	1.1	-	nC
Q _{GD}	gate-drain charge		-	1	-	nC
C _{iss}	input capacitance	V _{DS} = -10 V; f = 1 MHz; V _{GS} = 0 V; T _j = 25 °C	-	560	-	pF
C _{oss}	output capacitance		-	80	-	pF
C _{rss}	reverse transfer capacitance		-	55	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = -10 V; V _{GS} = -4.5 V; R _{G(ext)} = 6 Ω; T _j = 25 °C; I _D = -2.5 A	-	13	-	ns
t _r	rise time		-	35	-	ns
t _{d(off)}	turn-off delay time		-	39	-	ns
t _f	fall time		-	25	-	ns
Source-drain diode						
V _{SD}	source-drain voltage	I _S = -0.7 A; V _{GS} = 0 V; T _j = 25 °C	-	-0.7	-1.2	V

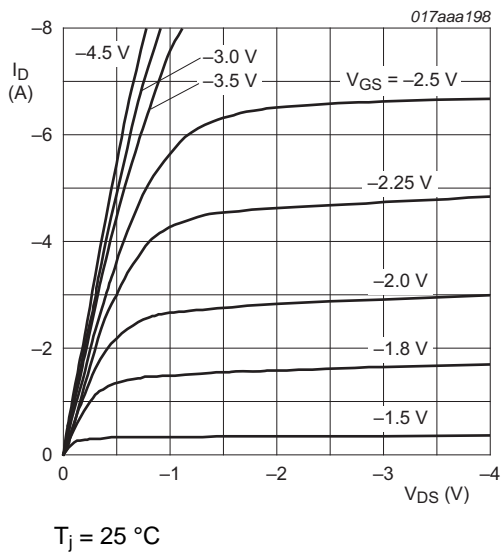


Fig 6. Output characteristics: drain current as a function of drain-source voltage; typical values

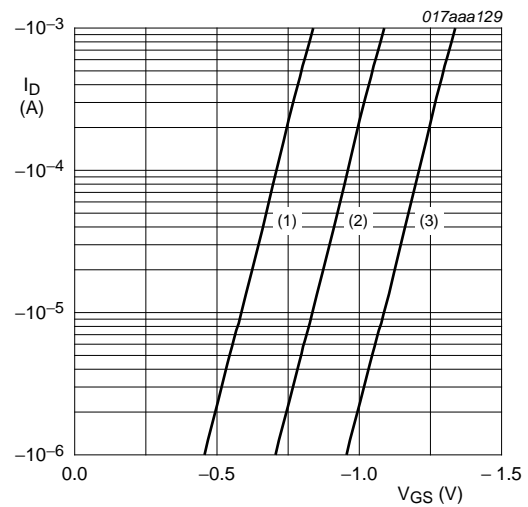


Fig 7. Sub-threshold drain current as a function of gate-source voltage

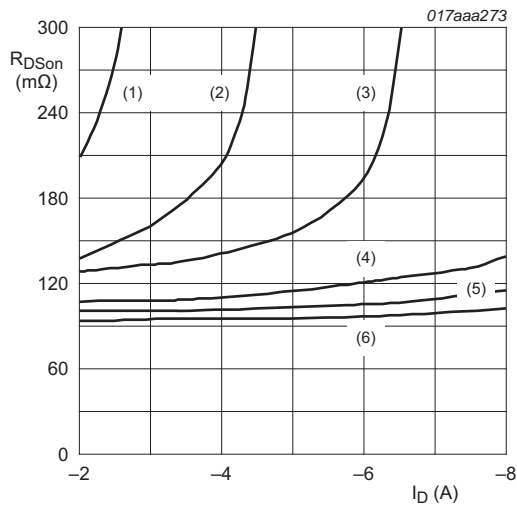


Fig 8. Drain-source on-state resistance as a function of drain current; typical values

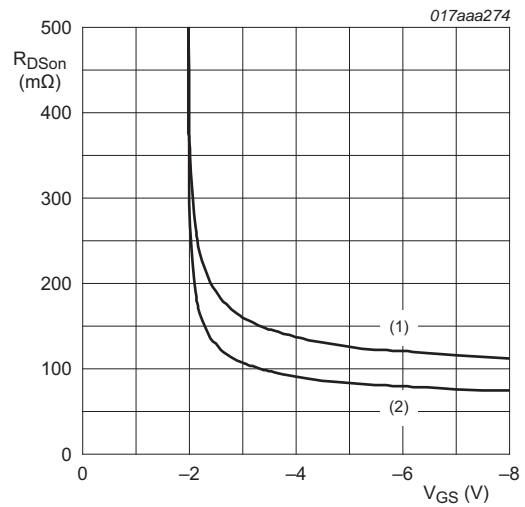
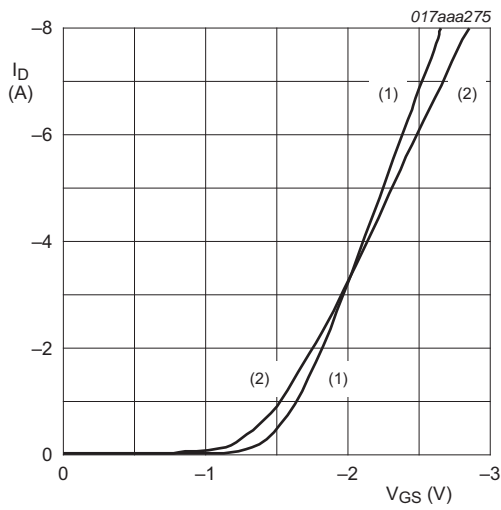


Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

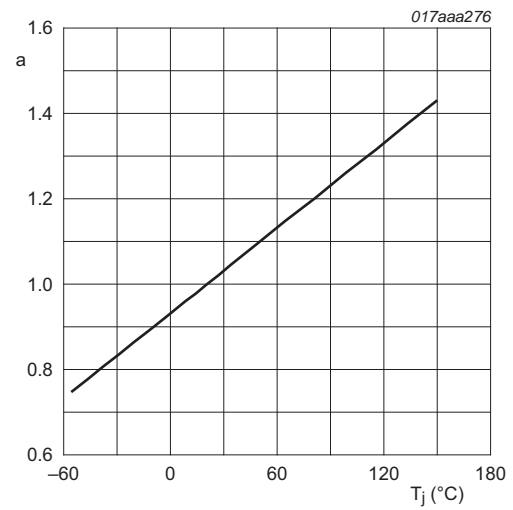


$$V_{DS} > I_D \times R_{DS(on)}$$

(1) $T_j = 25\text{ °C}$

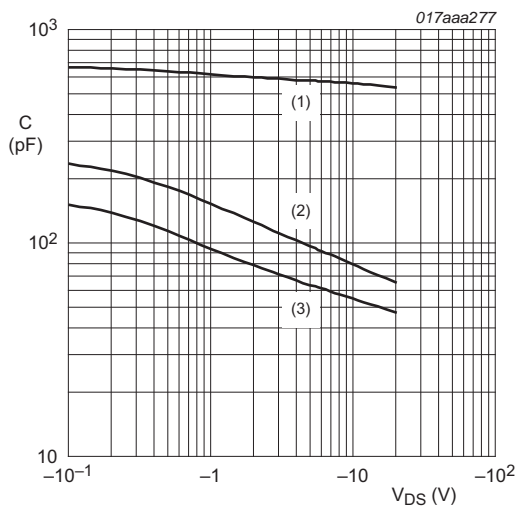
(2) $T_j = 150\text{ °C}$

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



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

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



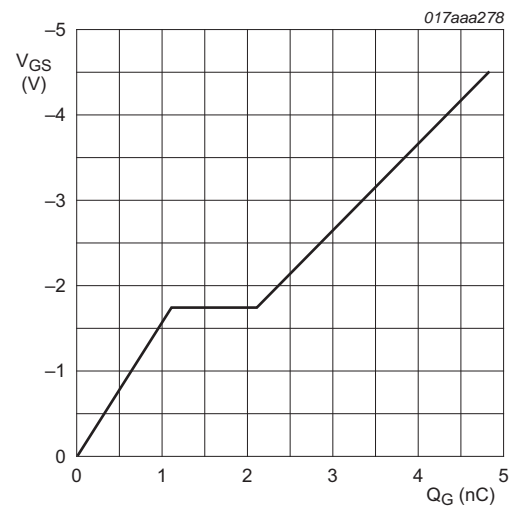
$$f = 1\text{ MHz}; V_{GS} = 0\text{ V}$$

(1) C_{iss}

(2) C_{oss}

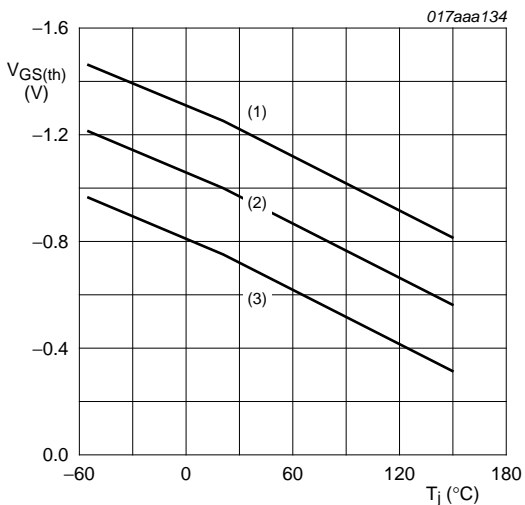
(3) C_{rss}

Fig 12. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



$$I_D = -3\text{ A}; V_{DS} = -10\text{ V}; T_{amb} = 25\text{ °C}$$

Fig 13. Gate-source voltage as a function of gate charge; typical values



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

Fig 14. Gate-source threshold voltage as a function of junction temperature

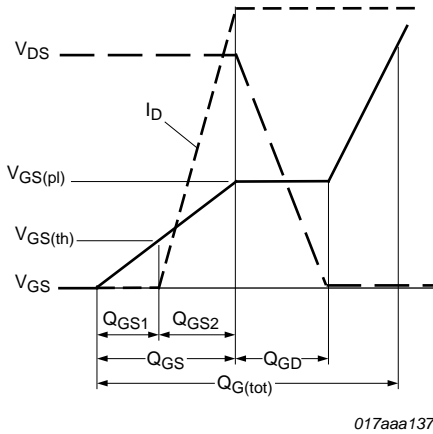
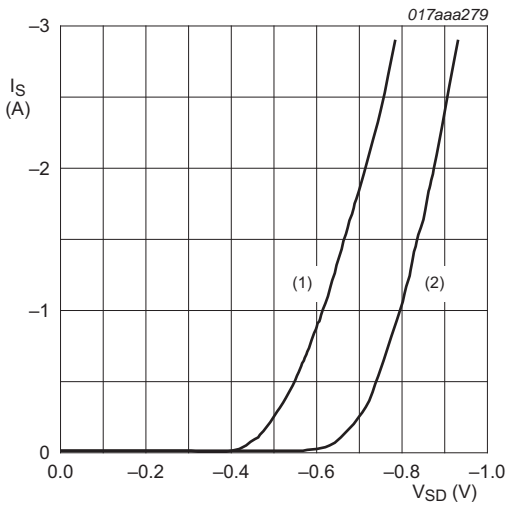


Fig 15. Gate charge waveform definitions



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

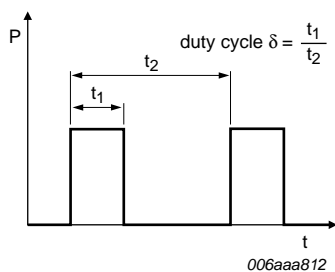


Fig 17. Duty cycle definition

9. Package outline

Plastic surface-mounted package; 6 leads

SOT363

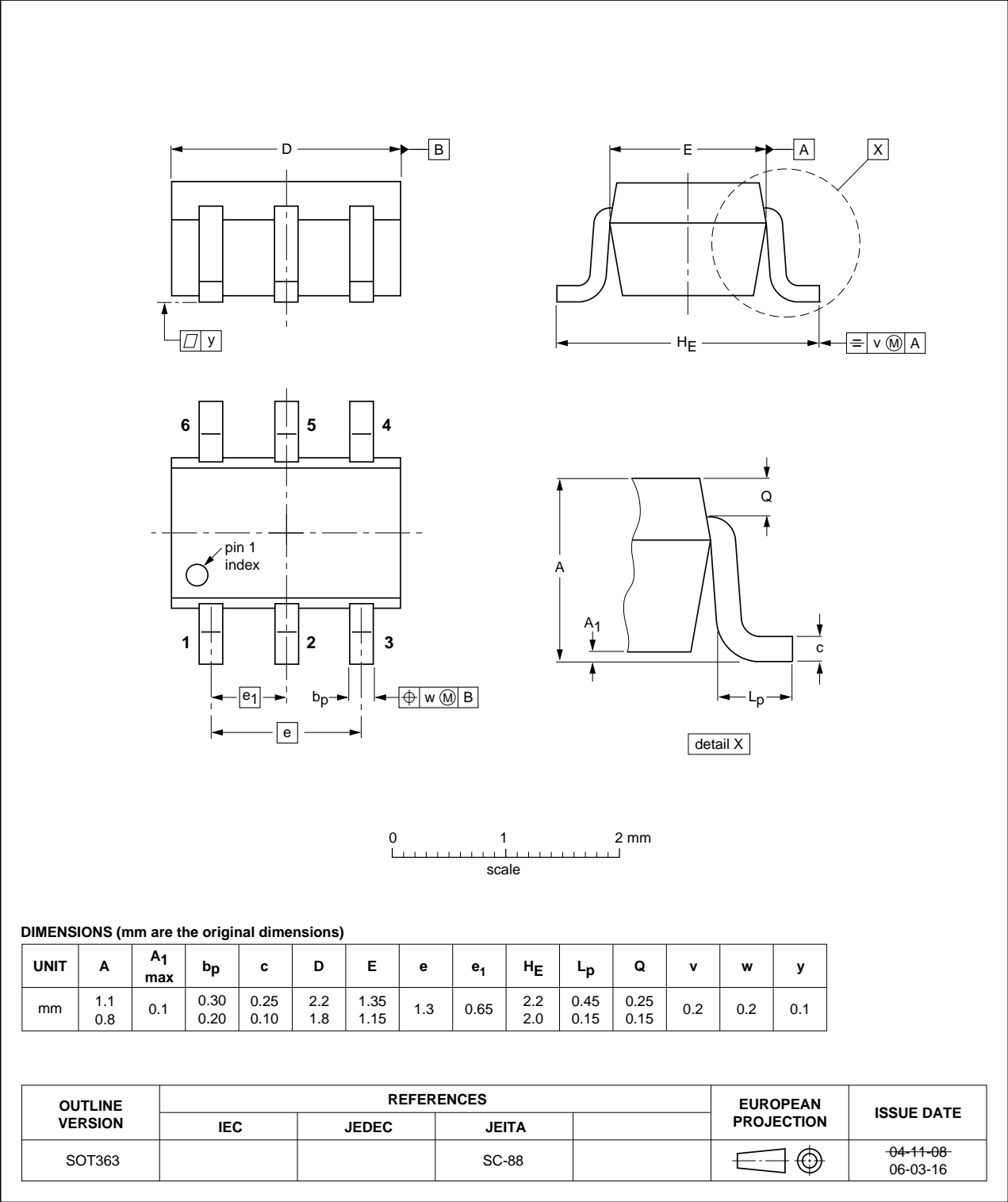


Fig 18. Package outline SOT363 (TSSOP6)

10. Soldering

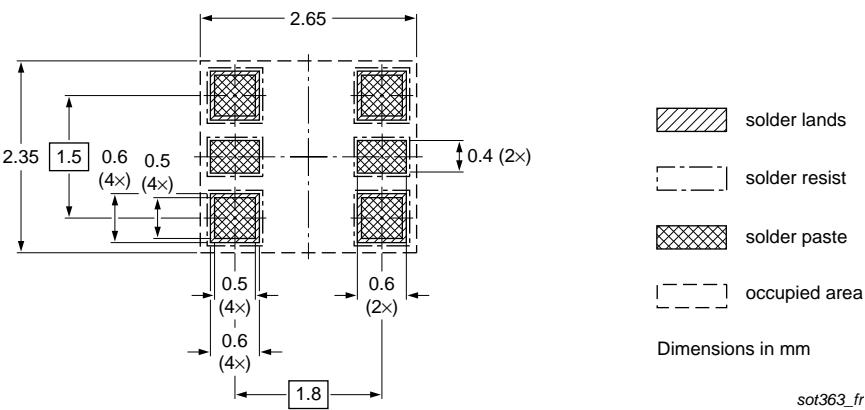


Fig 19. Reflow soldering footprint for SOT363 (TSSOP6)

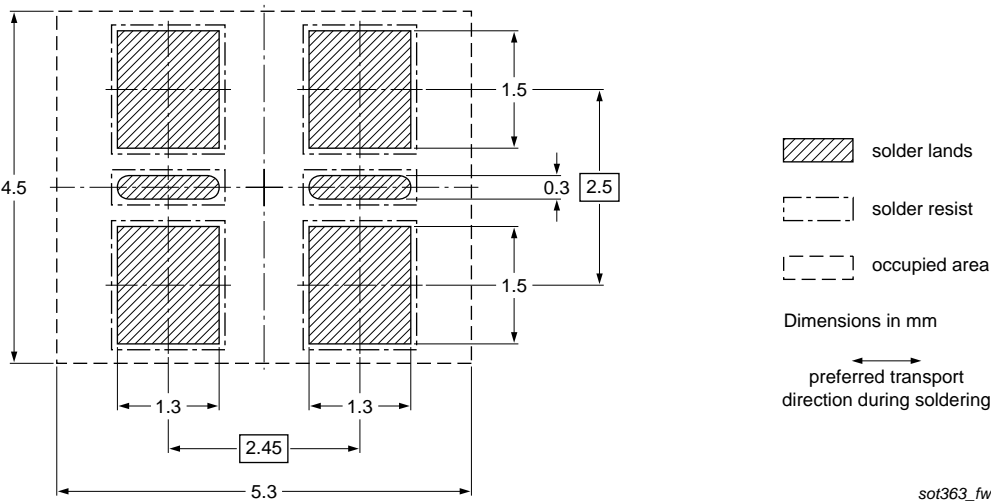


Fig 20. Wave soldering footprint for SOT363 (TSSOP6)

11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMG85XP v.N	20110628	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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