PMGD175XNE

30 V, Dual N-channel Trench MOSFET

15 April 2016 **Product data sheet**

1. General description

Dual N-channel enhancement mode Field-Effect Transistor (FET) in a very small SOT363 (TSSOP6) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Low threshold voltage
- Very fast switching
- Trench MOSFET technology
- ElectroStatic Discharge (ESD) protection > 2 kV HBM

3. Applications

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

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
V_{DS}	drain-source voltage	T_j = 25 °C		-	-	30	V
V_{GS}	gate-source voltage			-12	-	12	V
I_D	drain current	V_{GS} = 4.5 V; T_{amb} = 25 °C; t ≤ 5 s	[1]	-	-	0.95	A
Static characteristics (per transistor)							
R_{DSon}	drain-source on-state resistance	V_{GS} = 4.5 V; I_D = 0.9 A; T_j = 25 °C		-	211	252	mΩ

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

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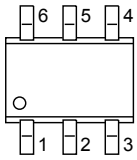
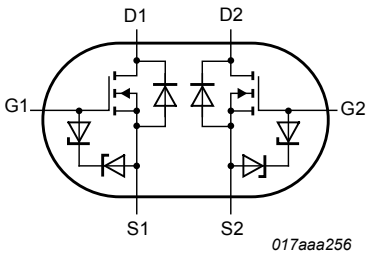
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S1	source TR1	 TSSOP6 (SOT363)	
2	G1	gate TR1		
3	D2	drain TR2		
4	S2	source TR2		
5	G2	gate TR2		
6	D1	drain TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMGD175XNE	TSSOP6	plastic surface-mounted package; 6 leads	SOT363

7. Marking

Table 4. Marking codes

Type number	Marking code [1]
PMGD175XNE	LU%

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
V_{DS}	drain-source voltage	T_j = 25 °C		-	30	V
V_{GS}	gate-source voltage			-12	12	V
I_D	drain current	V_{GS} = 4.5 V; T_{amb} = 25 °C; t ≤ 5 s	[1]	-	0.95	A
		V_{GS} = 4.5 V; T_{amb} = 25 °C	[1]	-	0.87	A
		V_{GS} = 4.5 V; T_{amb} = 100 °C	[1]	-	0.5	A
I_{DM}	peak drain current	T_{amb} = 25 °C; single pulse; t_p ≤ 10 µs		-	4	A
P_{tot}	total power dissipation	T_{amb} = 25 °C	[2]	-	260	mW
			[1]	-	310	mW
		T_{sp} = 25 °C		-	905	mW
Per device						
P_{tot}	total power dissipation	T_{amb} = 25 °C	[2]	-	390	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]	-	0.31	A

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

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

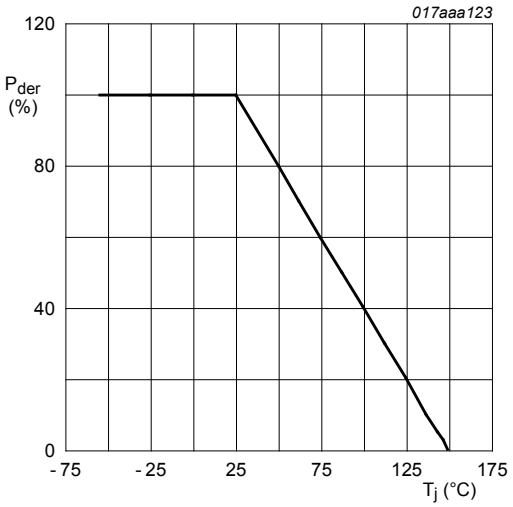


Fig. 1. Normalized total power dissipation as a function of junction temperature

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

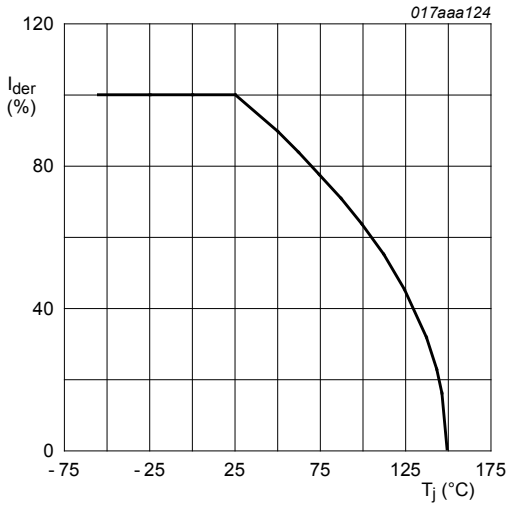
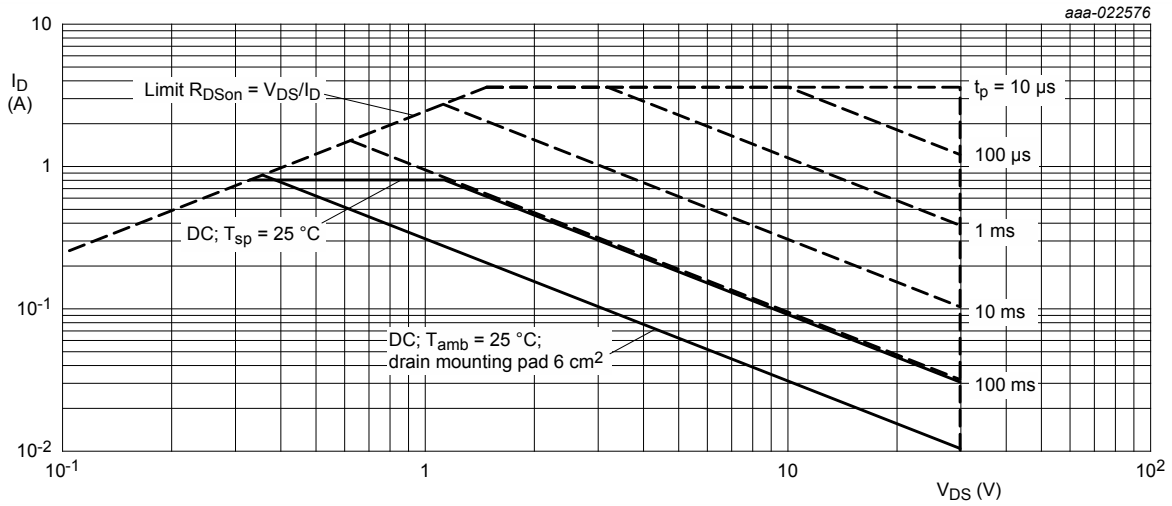


Fig. 2. Normalized continuous drain current as a function of junction temperature

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



I_{DM} = single pulse

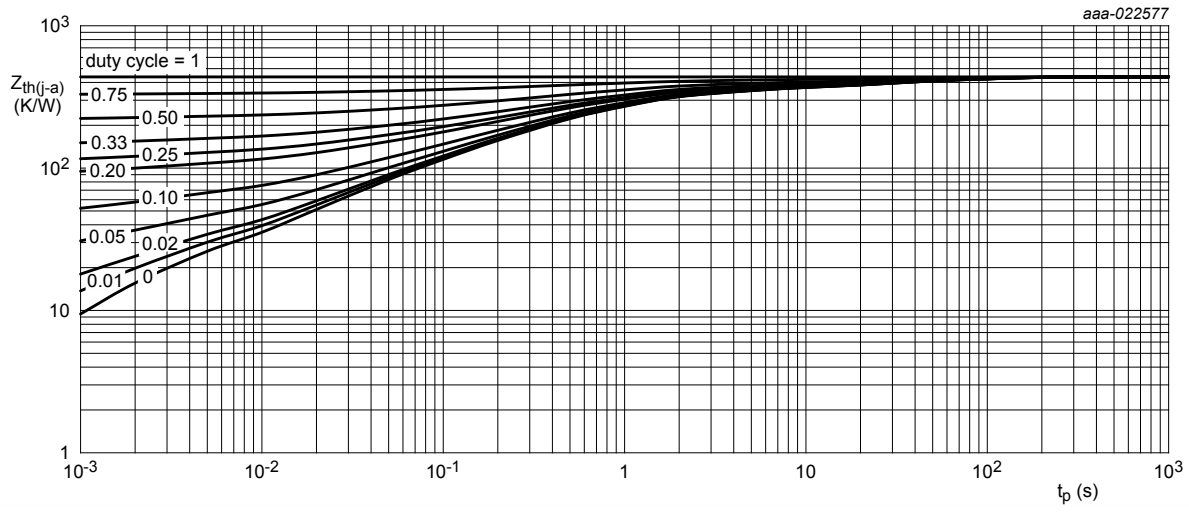
Fig. 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

9. Thermal characteristics

Table 6. Thermal characteristics

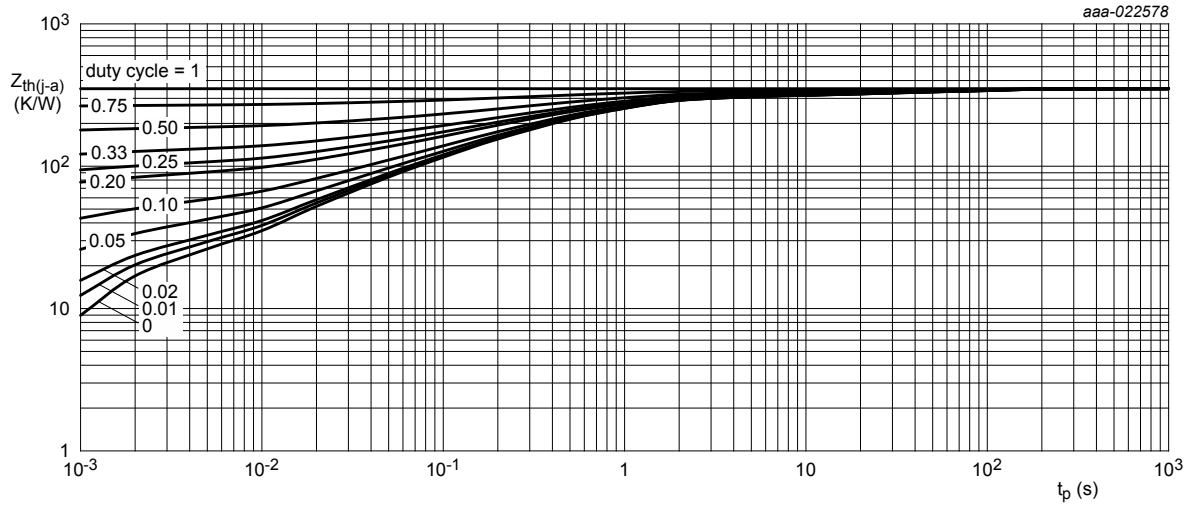
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	417	480	K/W
			[2]	-	352	405	K/W
		in free air; t ≤ 5 s	[2]	-	295	340	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	120	138	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	320	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^2.



FR4 PCB, standard footprint

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



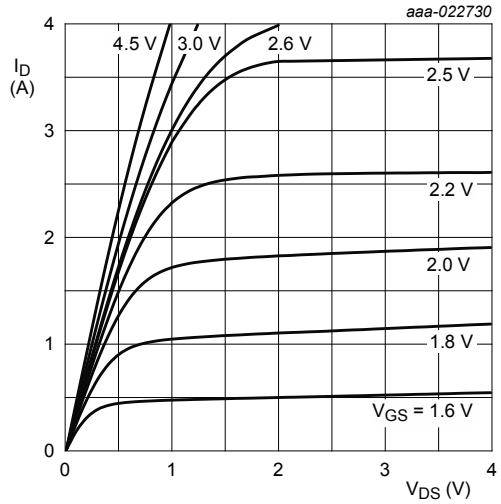
FR4 PCB, mounting pad for drain 6 cm^2

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

10. Characteristics

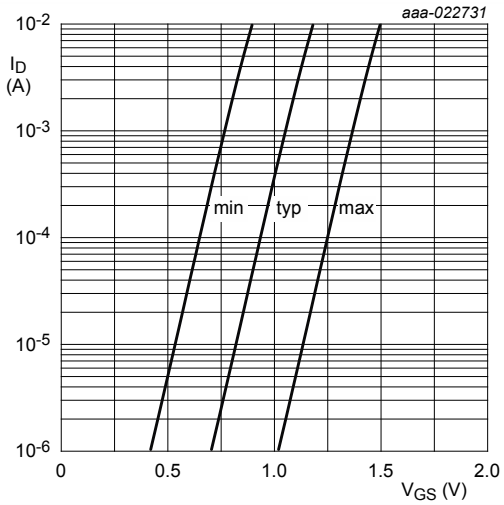
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics (per transistor)							
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 250 µA; V_{GS} = 0 V; T_j = 25 °C		30	-	-	V
V_{GSth}	gate-source threshold voltage	I_D = 250 µA; V_{DS} = V_{GS}; T_j = 25 °C		0.75	1	1.25	V
I_{DSS}	drain leakage current	V_{DS} = 30 V; V_{GS} = 0 V; T_j = 25 °C		-	-	1	µA
I_{GSS}	gate leakage current	V_{GS} = 12 V; V_{DS} = 0 V; T_j = 25 °C		-	-	10	µA
		V_{GS} = -12 V; V_{DS} = 0 V; T_j = 25 °C		-	-	-10	µA
		V_{GS} = 4.5 V; V_{DS} = 0 V; T_j = 25 °C		-	-	5	µA
		V_{GS} = -4.5 V; V_{DS} = 0 V; T_j = 25 °C		-	-	-5	µA
R_{DSon}	drain-source on-state resistance	V_{GS} = 4.5 V; I_D = 0.9 A; T_j = 25 °C		-	211	252	mΩ
		V_{GS} = 4.5 V; I_D = 0.9 A; T_j = 150 °C		-	344	411	mΩ
		V_{GS} = 2.5 V; I_D = 0.8 A; T_j = 25 °C		-	267	319	mΩ
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 0.9 A; T_j = 25 °C		-	3.5	-	S
Dynamic characteristics (per transistor)							
$Q_{G(tot)}$	total gate charge	V_{DS} = 15 V; I_D = 0.9 A; V_{GS} = 4.5 V; T_j = 25 °C		-	1.05	1.65	nC
Q_{GS}	gate-source charge			-	0.15	-	nC
Q_{GD}	gate-drain charge			-	0.27	-	nC
C_{iss}	input capacitance	V_{DS} = 15 V; f = 1 MHz; V_{GS} = 0 V; T_j = 25 °C		-	81	-	pF
C_{oss}	output capacitance			-	13	-	pF
C_{rss}	reverse transfer capacitance			-	9	-	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 15 V; I_D = 0.9 A; V_{GS} = 4.5 V; $R_{G(ext)}$ = 6 Ω; T_j = 25 °C		-	7	-	ns
t_r	rise time			-	14	-	ns
$t_{d(off)}$	turn-off delay time			-	17	-	ns
t_f	fall time			-	6	-	ns
Source-drain diode (per transistor)							
V_{SD}	source-drain voltage	I_S = 0.3 A; V_{GS} = 0 V; T_j = 25 °C		-	0.7	1.2	V



T_j = 25 °C

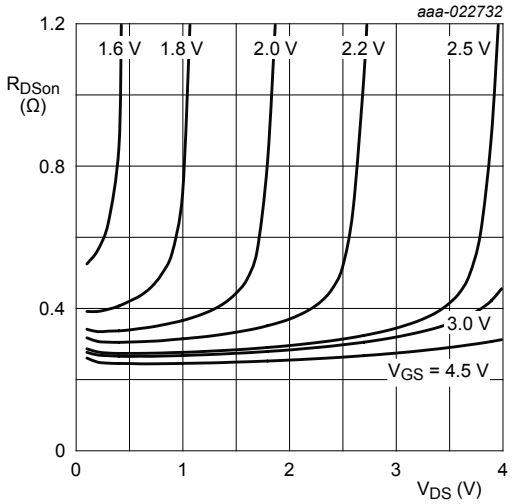
Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values



V_{DS} = 10 V

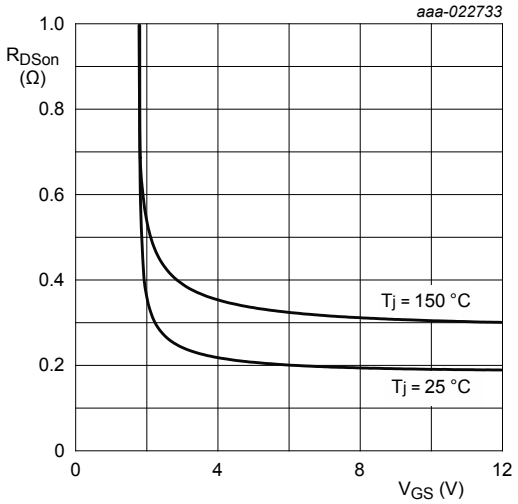
T_j = 25 °C

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



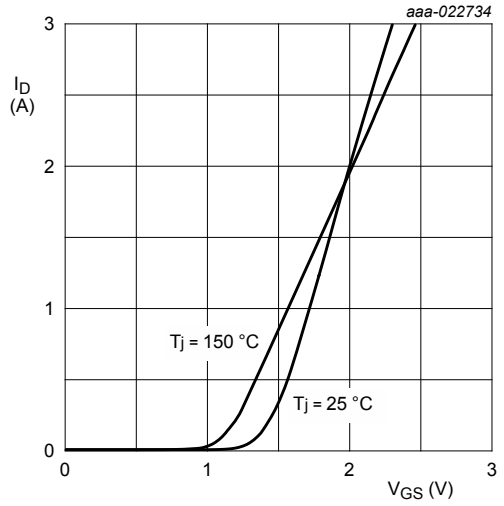
T_j = 25 °C

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



I_D = 1 A

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



$V_{DS} > I_D \times R_{DSon}$

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

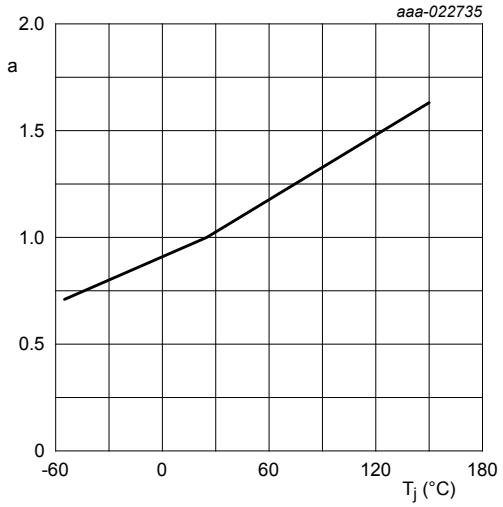
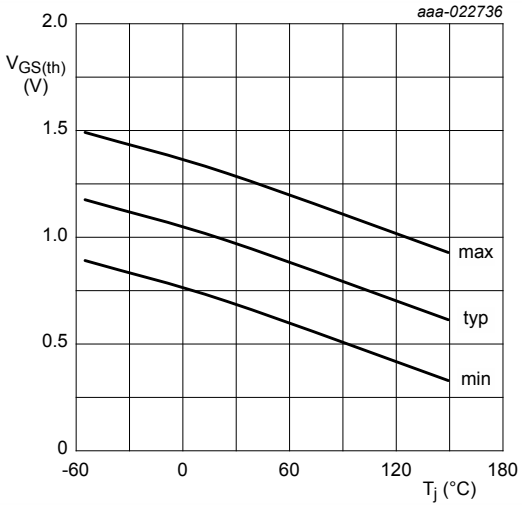


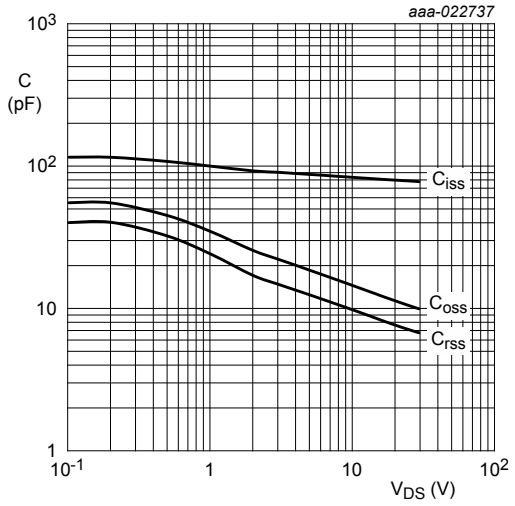
Fig. 11. Normalized drain-source on-state resistance as a function of ambient temperature; typical values

$$a = \frac{R_{DSon}}{R_{DSon(25\,°C)}}$$



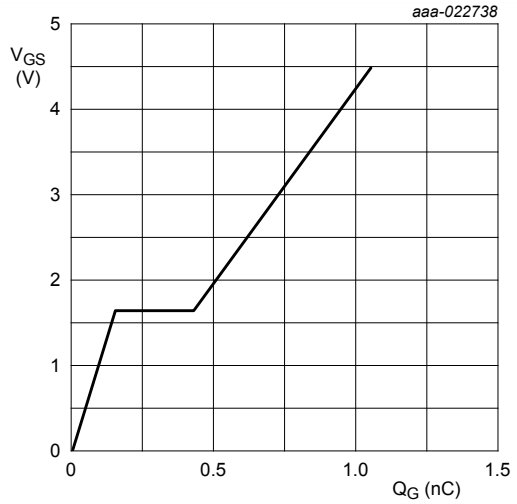
I_D = 250 µA; $V_{DS} = V_{GS}$

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



f = 1 MHz; V_{GS} = 0 V

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



V_{DS} = 15 V; I_D = 0.91 A

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

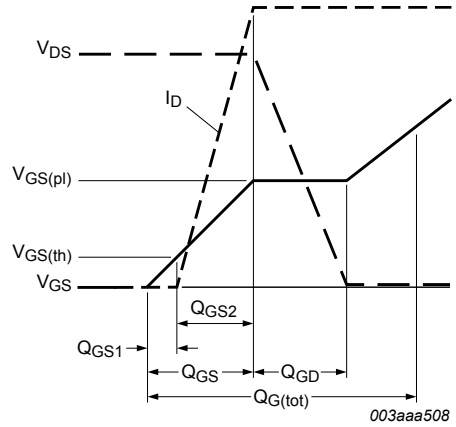
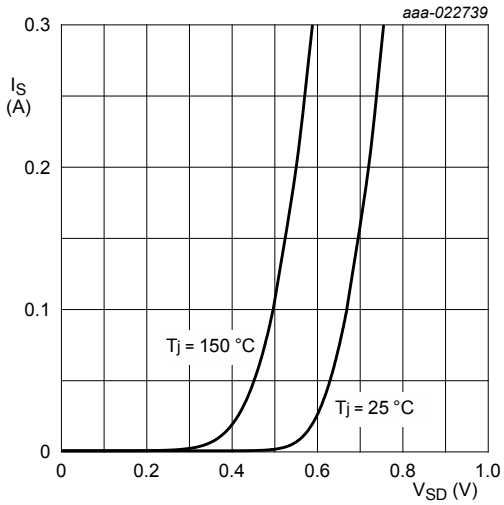


Fig. 15. Gate charge waveform definitions



V_{GS} = 0 V

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

11. Test information

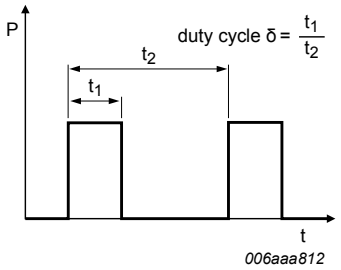
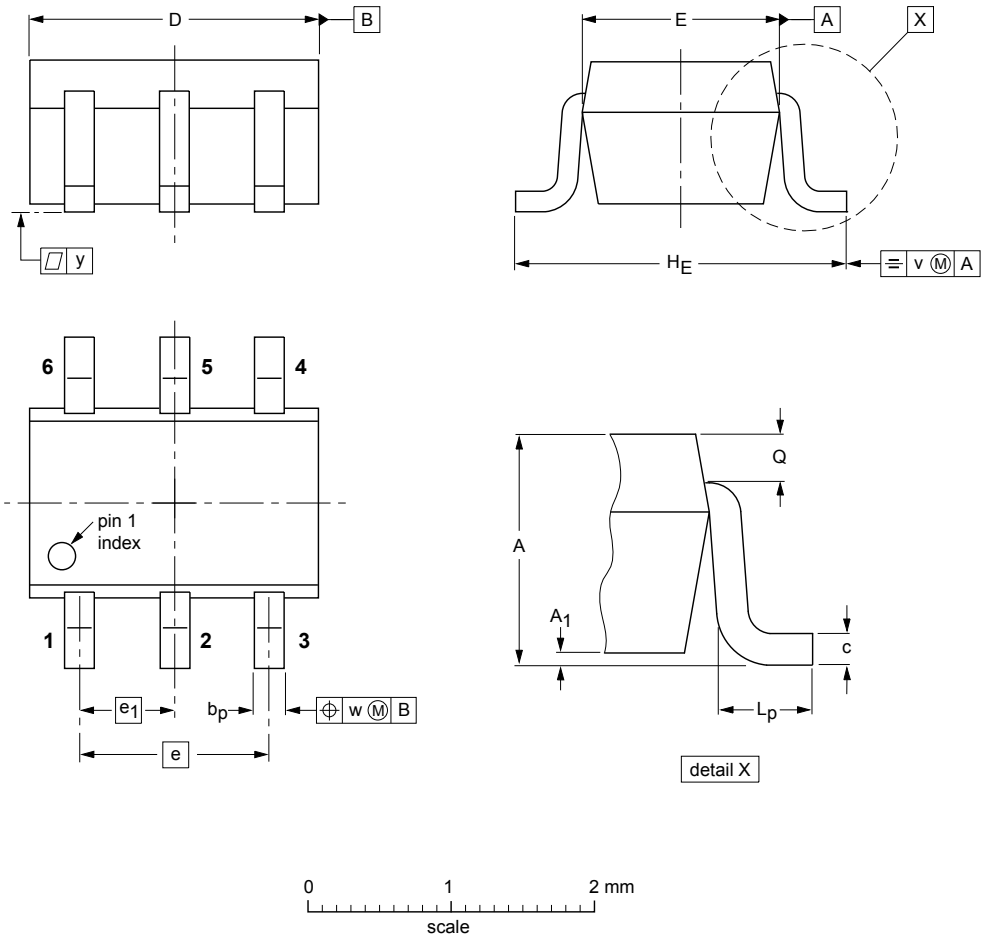


Fig. 17. Duty cycle definition

12. Package outline

Plastic surface-mounted package; 6 leads **SOT363**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.8	0.1	0.30 0.20	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.25 0.15	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT363			SC-88			~~04-11-08~~ 06-03-16

Fig. 18. Package outline TSSOP6 (SOT363)

13. Soldering

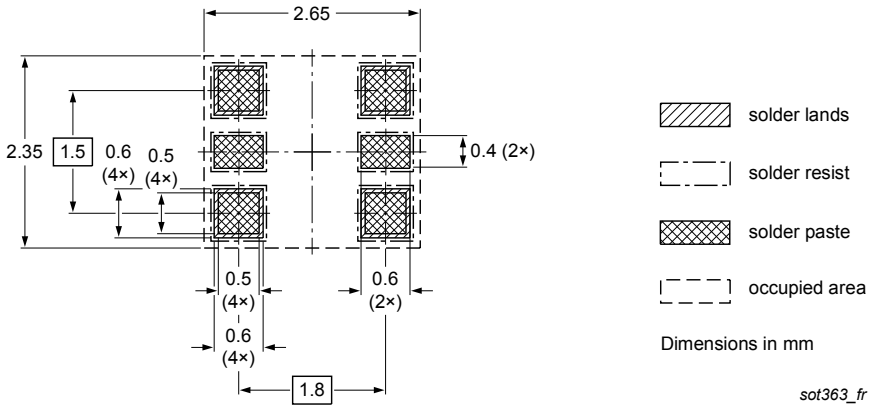


Fig. 19. Reflow soldering footprint for TSSOP6 (SOT363)

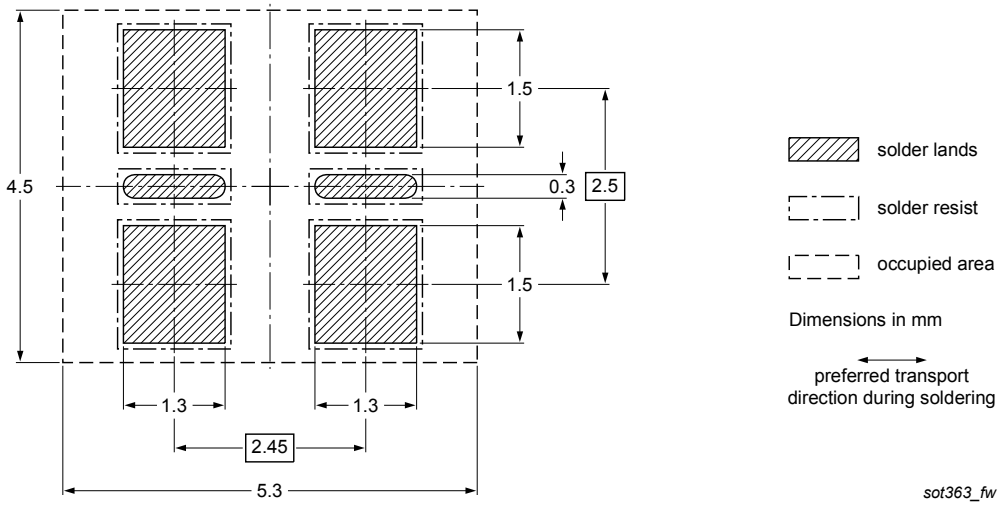


Fig. 20. Wave soldering footprint for TSSOP6 (SOT363)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMGD175XNE v.1	20160415	Product data sheet	-	-

15. Legal information

15.1 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.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nexperia.com.

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16. Contents

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Date of release: 15 April 2016