

PMGD780SN

Dual N-channel μ TrenchMOS standard level FET

Rev. 02 — 19 April 2010

Product data sheet

1. Product profile

1.1 General description

Dual N-channel enhancement mode field-effect transistor in a small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package using TrenchMOS technology.

1.2 Features and benefits

- Surface-mounted package
- Standard level threshold voltage
- Low on-state resistance
- Footprint 40 % smaller than SOT23
- Fast switching
- Dual device

1.3 Applications

- Driver circuits
- Switching in portable appliances

1.4 Quick reference data

- $V_{DS} \leq 60$ V
- $P_{tot} \leq 0.41$ W
- $I_D \leq 0.49$ A
- $R_{DS(on)} \leq 920$ m Ω

2. Pinning information

Table 1. Pinning - SOT363 (SC-88), simplified outline and symbol

Pin	Description	Simplified outline	Graphic symbol
1	source1 (S1)	SOT363 (SC-88)	msd901
2	gate1 (G1)		
3	drain2 (D2)		
4	source2 (S2)		
5	gate2 (G2)		
6	drain1 (D1)		

3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
PMGD780SN	SC-88	plastic surface-mounted package; 6 leads	SOT363

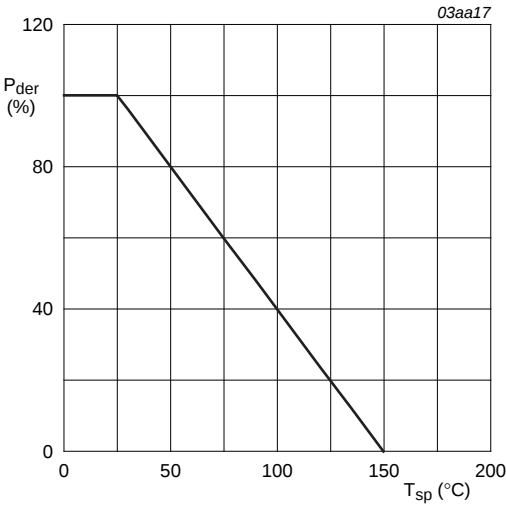
4. Limiting values

Table 3. Limiting values

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

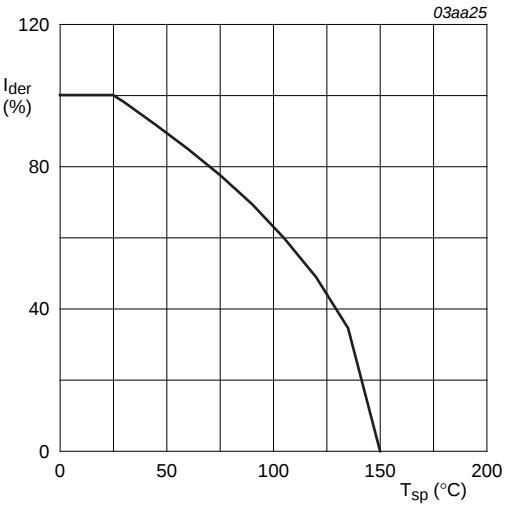
Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage	$25\text{ }^{\circ}\text{C} \leq T_j \leq 150\text{ }^{\circ}\text{C}$	-	60	V
V_{DGR}	drain-gate voltage	$25\text{ }^{\circ}\text{C} \leq T_j \leq 150\text{ }^{\circ}\text{C}$; $R_{GS} = 20\text{ k}\Omega$	-	60	V
V_{GS}	gate-source voltage		-	± 20	V
I_D	drain current	$T_{sp} = 25\text{ }^{\circ}\text{C}$; $V_{GS} = 10\text{ V}$; Figure 2 and 3	[1] -	0.49	A
		$T_{sp} = 100\text{ }^{\circ}\text{C}$; $V_{GS} = 10\text{ V}$; Figure 2	[1] -	0.31	A
I_{DM}	peak drain current	$T_{sp} = 25\text{ }^{\circ}\text{C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$; Figure 3	[1] -	0.99	A
P_{tot}	total power dissipation	$T_{sp} = 25\text{ }^{\circ}\text{C}$; Figure 1	-	0.41	W
T_{stg}	storage temperature		-55	+150	$^{\circ}\text{C}$
T_j	junction temperature		-55	+150	$^{\circ}\text{C}$
Source-drain diode					
I_S	source current	$T_{sp} = 25\text{ }^{\circ}\text{C}$	[1] -	0.34	A
I_{SM}	peak source current	$T_{sp} = 25\text{ }^{\circ}\text{C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$	[1] -	0.69	A

[1] Single device conducting.



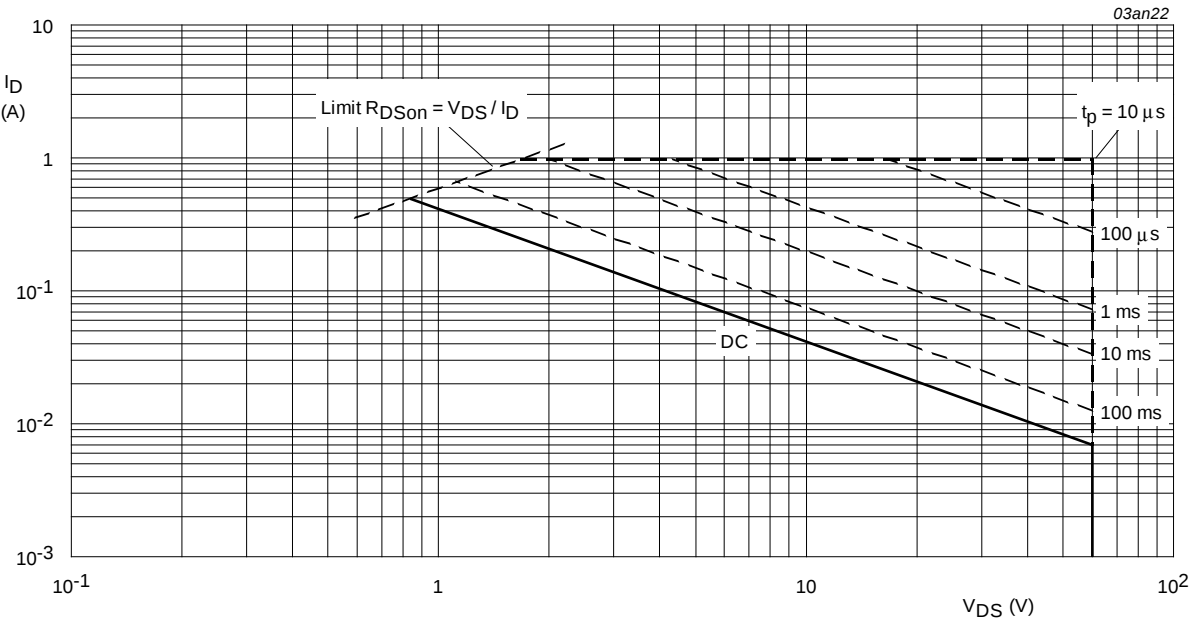
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}C)}} \times 100\%$$

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



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

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



T_{sp} = 25 °C; I_{DM} is single pulse; V_{GS} = 10 V

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

5. Thermal characteristics

Table 4. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	Figure 4	-	-	300	K/W

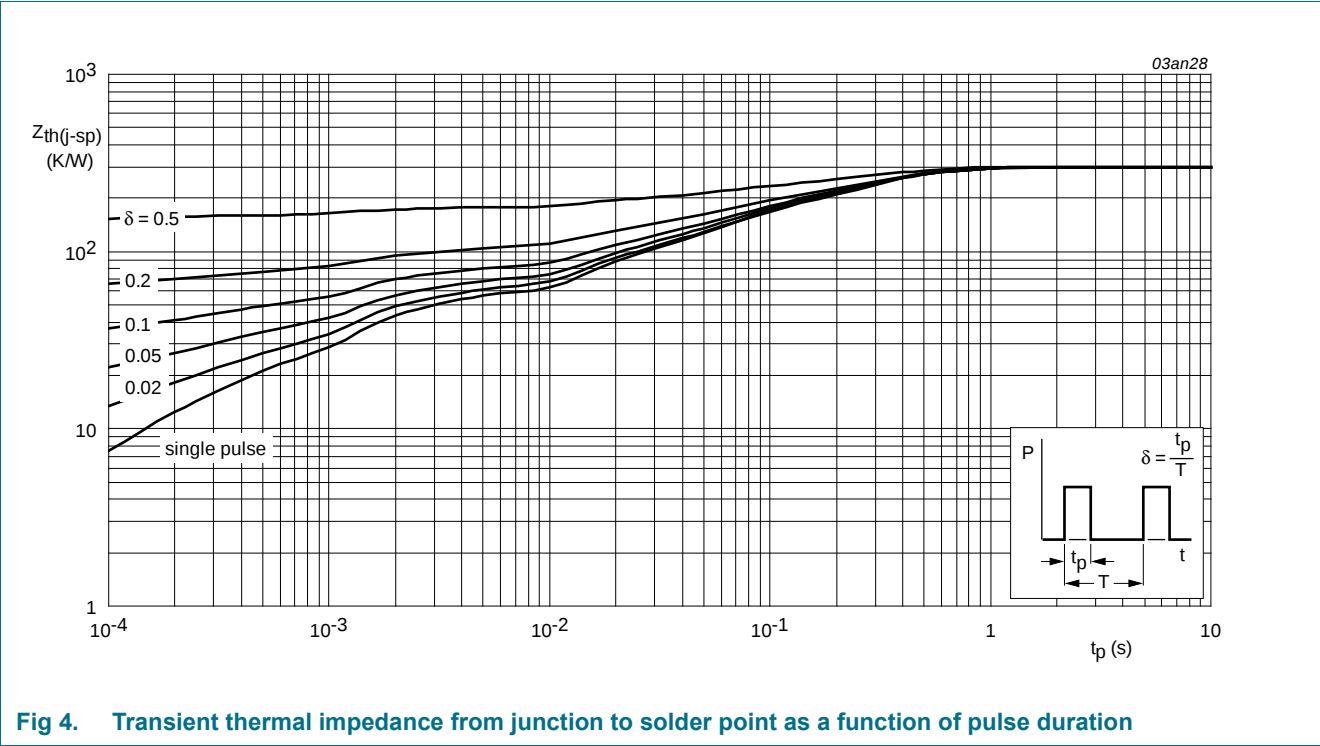
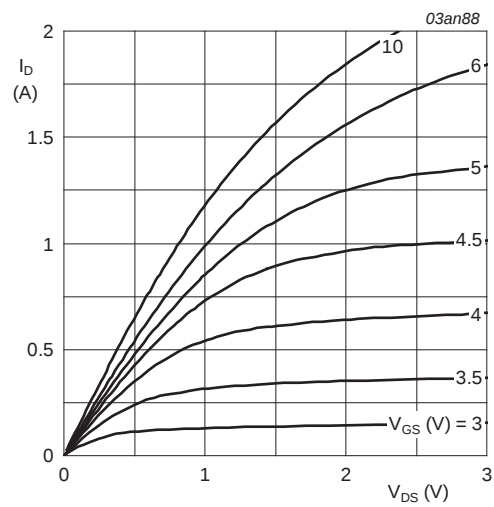


Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration

6. Characteristics

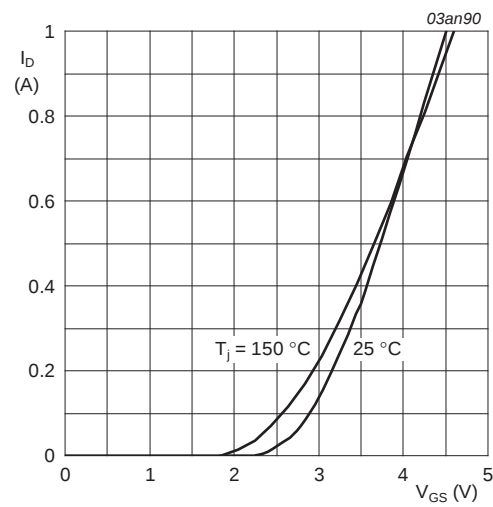
Table 5. Characteristics
 $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250\text{ }\mu\text{A}$; $V_{GS} = 0\text{ V}$				
		$T_j = 25\text{ }^{\circ}\text{C}$	60	-	-	V
		$T_j = -55\text{ }^{\circ}\text{C}$	55	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 0.25\text{ mA}$; $V_{DS} = V_{GS}$; Figure 9				
		$T_j = 25\text{ }^{\circ}\text{C}$	1	2	2.5	V
		$T_j = 150\text{ }^{\circ}\text{C}$	0.6	-	-	V
		$T_j = -55\text{ }^{\circ}\text{C}$	-	-	3.5	V
I_{DSS}	drain leakage current	$V_{DS} = 60\text{ V}$; $V_{GS} = 0\text{ V}$				
		$T_j = 25\text{ }^{\circ}\text{C}$	-	0.05	1	μA
		$T_j = 150\text{ }^{\circ}\text{C}$	-	-	100	μA
I_{GSS}	gate leakage current	$V_{GS} = \pm 20\text{ V}$; $V_{DS} = 0\text{ V}$	-	10	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}$; $I_D = 0.3\text{ A}$; Figure 7 and 8				
		$T_j = 25\text{ }^{\circ}\text{C}$	-	780	920	m Ω
		$T_j = 150\text{ }^{\circ}\text{C}$	-	1445	1700	m Ω
		$V_{GS} = 4.5\text{ V}$; $I_D = 0.075\text{ A}$; Figure 7 and 8	-	1100	1400	m Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$I_D = 1\text{ A}$; $V_{DD} = 30\text{ V}$; $V_{GS} = 10\text{ V}$; Figure 13	-	1.05	-	nC
Q_{GS}	gate-source charge		-	0.2	-	nC
Q_{GD}	gate-drain charge		-	0.22	-	nC
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 30\text{ V}$; $f = 1\text{ MHz}$; Figure 11	-	23	-	pF
C_{oss}	output capacitance		-	5	-	pF
C_{rss}	reverse transfer capacitance		-	3.5	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DD} = 30\text{ V}$; $R_L = 30\text{ }\Omega$; $V_{GS} = 10\text{ V}$; $R_G = 6\text{ }\Omega$	-	2	-	ns
t_r	rise time		-	4	-	ns
$t_{d(off)}$	turn-off delay time		-	5	-	ns
t_f	fall time		-	2.2	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = 0.3\text{ A}$; $V_{GS} = 0\text{ V}$; Figure 12	-	0.83	1.2	V



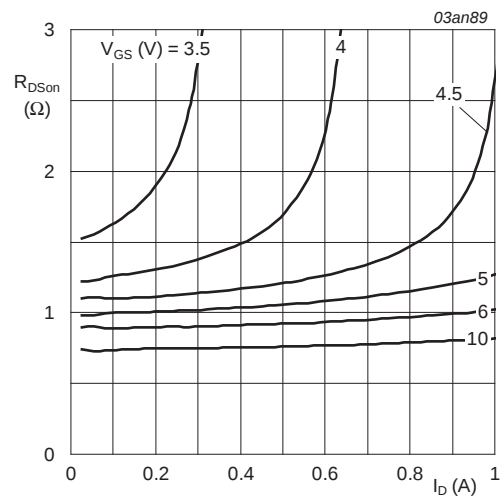
T_J = 25 °C

Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values



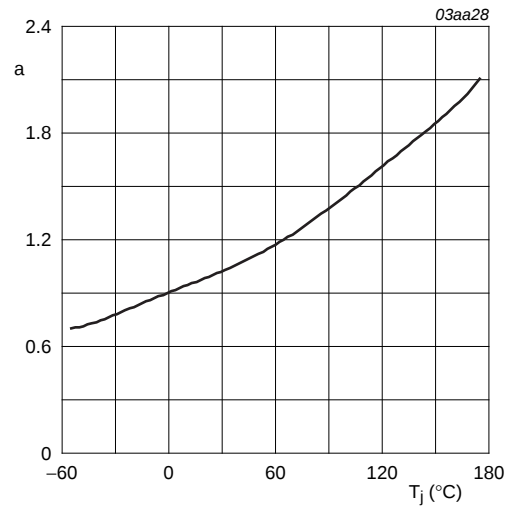
T_J = 25 °C and 150 °C; V_{DS} > I_D × R_{DSon}

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



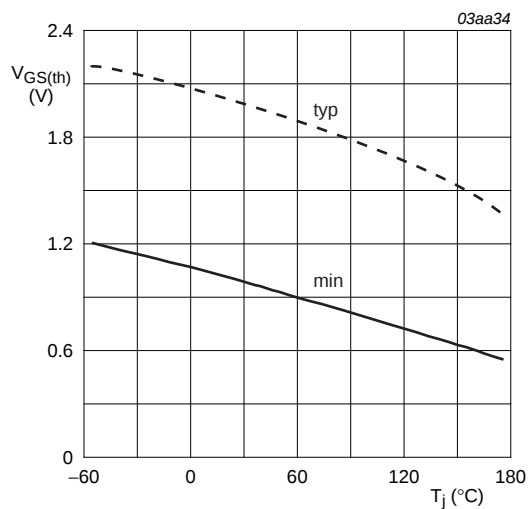
T_J = 25 °C

Fig 7. Drain-source on-state resistance as a function of drain current; typical values



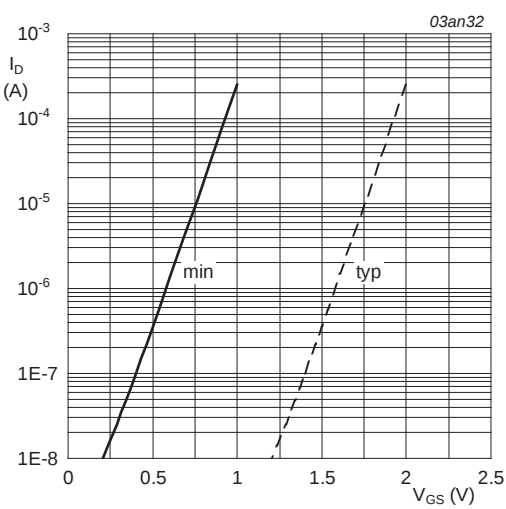
$$a = \frac{R_{DSon}}{R_{DSon(25\text{ }^{\circ}\text{C})}}$$

Fig 8. Normalized drain-source on-state resistance as a function of junction temperature



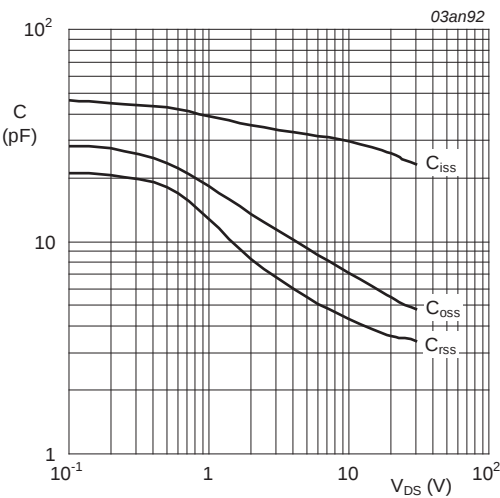
$I_D = 0.25\text{ mA}$; $V_{DS} = V_{GS}$

Fig 9. Gate-source threshold voltage as a function of junction temperature



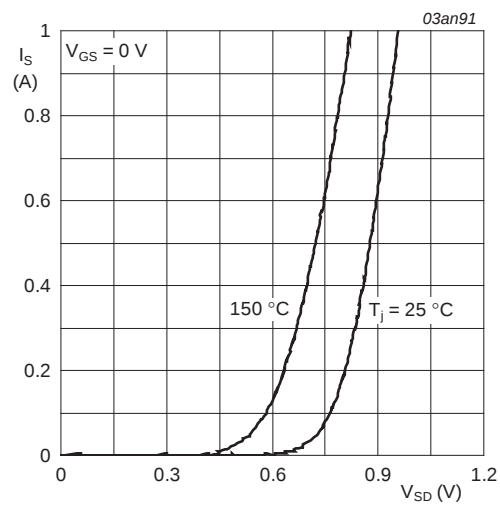
$T_j = 25\text{ }^{\circ}C$; $V_{DS} = 5\text{ V}$

Fig 10. Sub-threshold drain current as a function of gate-source voltage



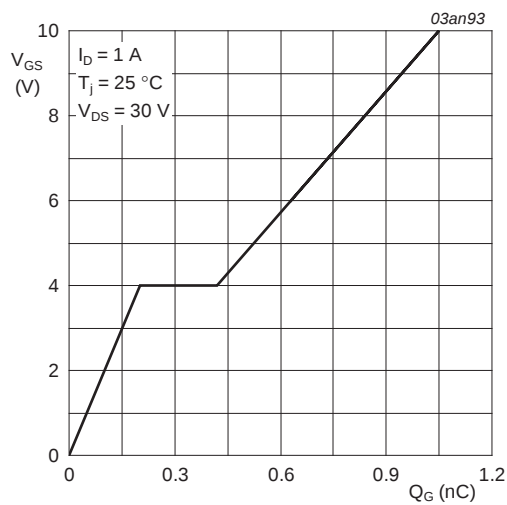
$V_{GS} = 0\text{ V}$; $f = 1\text{ MHz}$

Fig 11. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



$T_J = 25\text{ °C}$ and 150 °C ; $V_{GS} = 0\text{ V}$

Fig 12. Source current as a function of source-drain voltage; typical values



$I_D = 1\text{ A}$; $V_{DD} = 30\text{ V}$

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

7. Package outline

Plastic surface-mounted package; 6 leads

SOT363

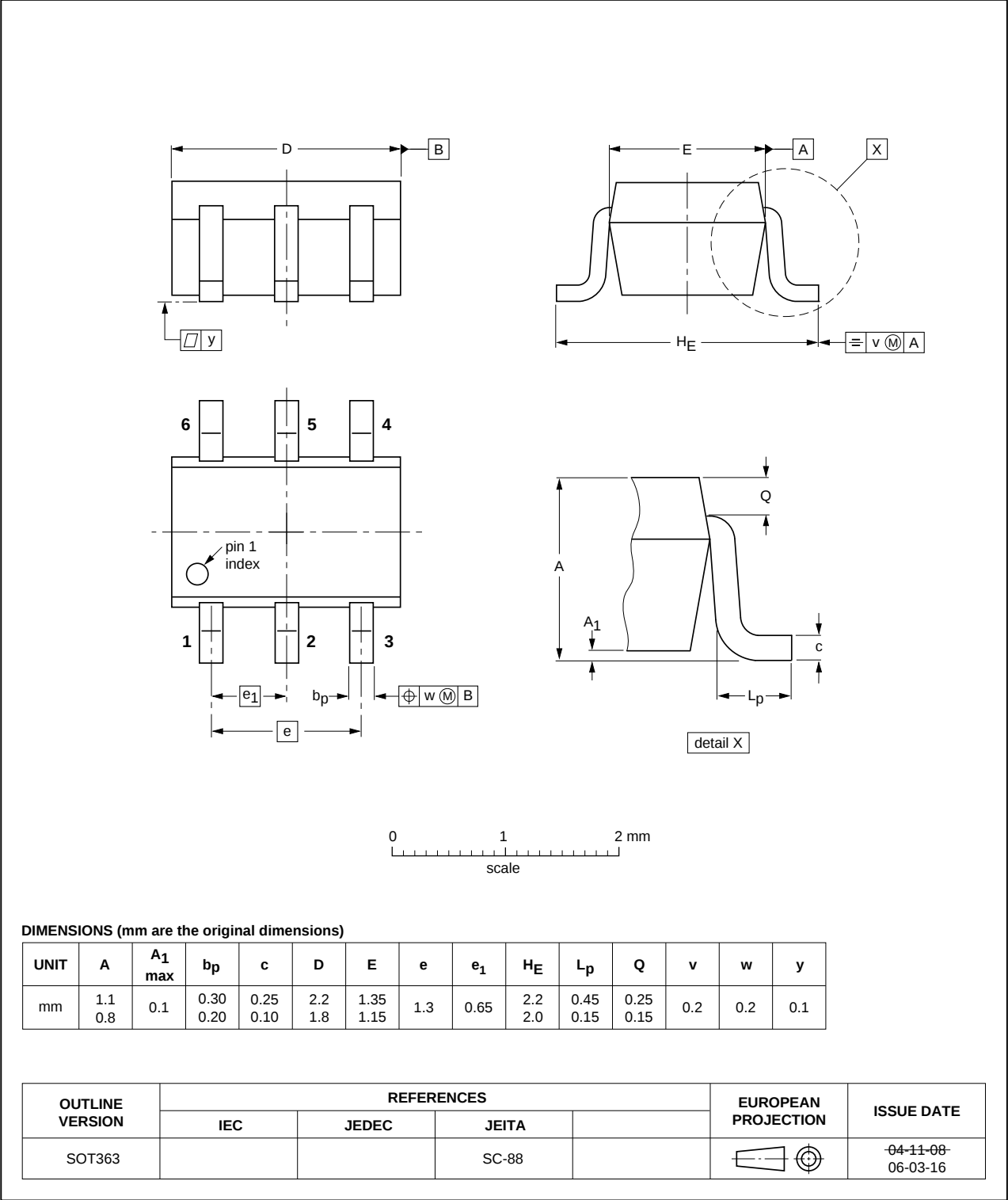
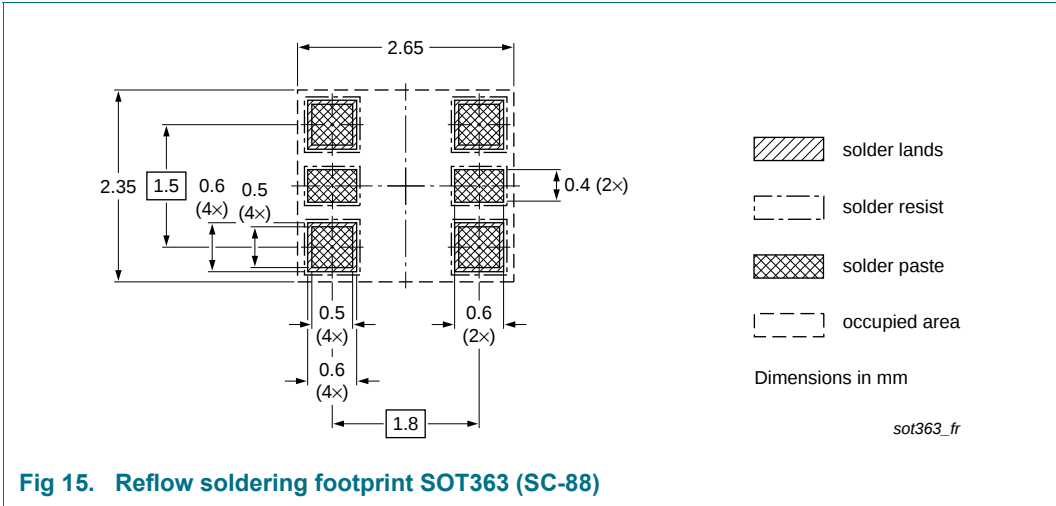


Fig 14. Package outline SOT363 (SC-88)

8. Soldering



9. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMGD780SN_2	20100419	Product data sheet	-	PMGD780SN_1
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Table 5 “Characteristics”: added $V_{GS(th)}$ maximum value at condition $T_j = 25\text{ }^{\circ}\text{C}$ • Section 10 “Legal information”: updated			
PMGD780SN_1	20040211	Product data	-	-

10. Legal information

10.1 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".

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