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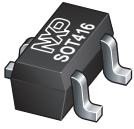
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Kind regards,

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# PMR400UN

N-channel TrenchMOS ultra low level FET

Rev. 2 — 2 February 2012

Product data sheet

## 1. Product profile

### 1.1 General description

N-channel enhancement mode Field-Effect Transistor (FET) in ultra small Surface-Mounted Device (SMD) plastic package using TrenchMOS technology.

### 1.2 Features and benefits

- Low threshold voltage
- Low on-state resistance
- Surface mounted package
- Footprint 63% smaller than SOT23

### 1.3 Applications

- Driver circuits
- Switching in portable appliances

### 1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25\text{ °C}; T_j \leq 150\text{ °C}$	-	-	30	V
$I_D$	drain current	$T_{sp} = 25\text{ °C}; V_{GS} = 4.5\text{ V}$	-	-	0.8	A
$V_{GS}$	gate-source voltage		-8	-	8	V
<b>Static characteristics</b>						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 0.2\text{ A}; T_j = 25\text{ °C}$	-	400	480	m $\Omega$

## 2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	<p>SOT416 (SC-75)</p>	<p>017aaa253</p>
2	S	source		
3	D	drain		



### 3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
PMR400UN	SC-75	plastic surface-mounted package; 3 leads	SOT416

### 4. Marking

Table 4. Marking codes

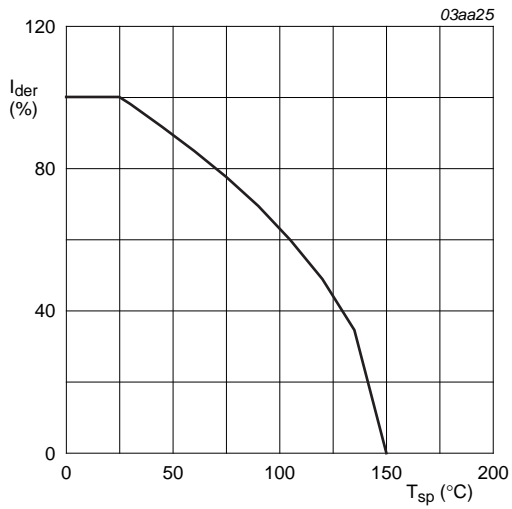
Type number	Marking code
PMR400UN	R7

### 5. Limiting values

Table 5. Limiting values

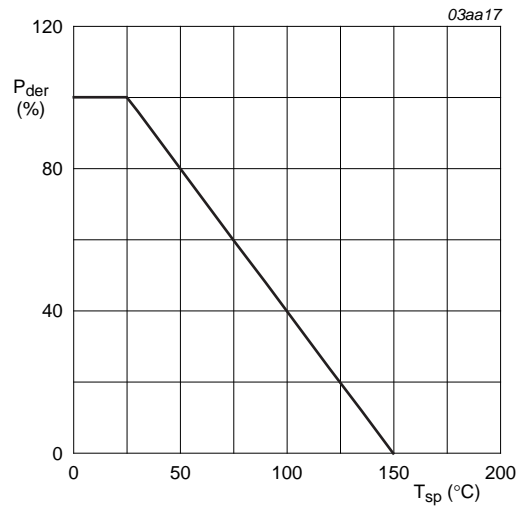
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage	$T_j \geq 25\text{ °C}$ ; $T_j \leq 150\text{ °C}$	-	30	V
$V_{DGR}$	drain-gate voltage	$T_j \geq 25\text{ °C}$ ; $T_j \leq 150\text{ °C}$ ; $R_{GS} = 20\text{ k}\Omega$	-	30	V
$V_{GS}$	gate-source voltage		-8	8	V
$I_D$	drain current	$T_{sp} = 25\text{ °C}$ ; $V_{GS} = 4.5\text{ V}$	-	0.8	A
		$T_{sp} = 100\text{ °C}$ ; $V_{GS} = 4.5\text{ V}$	-	0.51	A
$I_{DM}$	peak drain current	$T_{sp} = 25\text{ °C}$ ; pulsed; $t_p \leq 10\text{ }\mu\text{s}$	-	1.61	A
$P_{tot}$	total power dissipation	$T_{sp} = 25\text{ °C}$	-	0.53	W
$T_{stg}$	storage temperature		-55	150	°C
$T_j$	junction temperature		-55	150	°C
<b>Source-drain diode</b>					
$I_S$	source current	$T_{sp} = 25\text{ °C}$	-	0.44	A
$I_{SM}$	peak source current	$T_{sp} = 25\text{ °C}$ ; pulsed; $t_p \leq 10\text{ }\mu\text{s}$	-	0.88	A



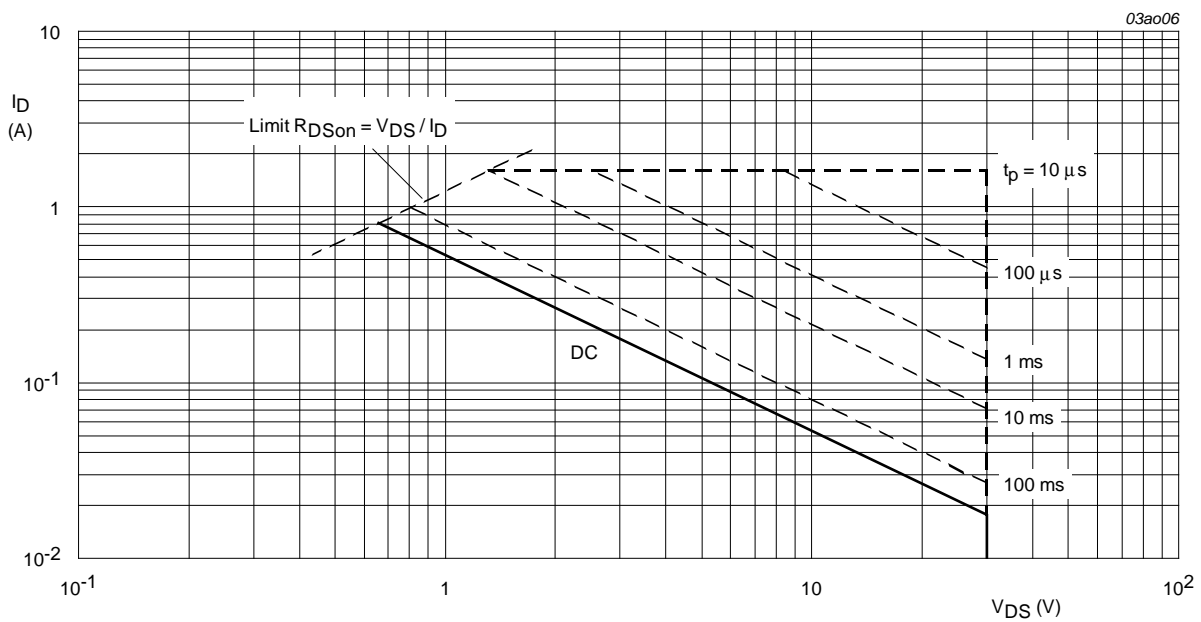
$$I_{der} = \frac{I_D}{I_{D(25^\circ\text{C})}} \times 100\%$$

Fig 1. Normalized continuous drain current as a function of solder point temperature



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

Fig 2. Normalized total power dissipation as a function of solder point temperature



$$T_{sp} = 25^\circ\text{C}; I_{DM} \text{ is single pulse}; V_{GS} = 4.5\text{V}$$

Fig 3. Safe operating area; 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
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	235	K/W

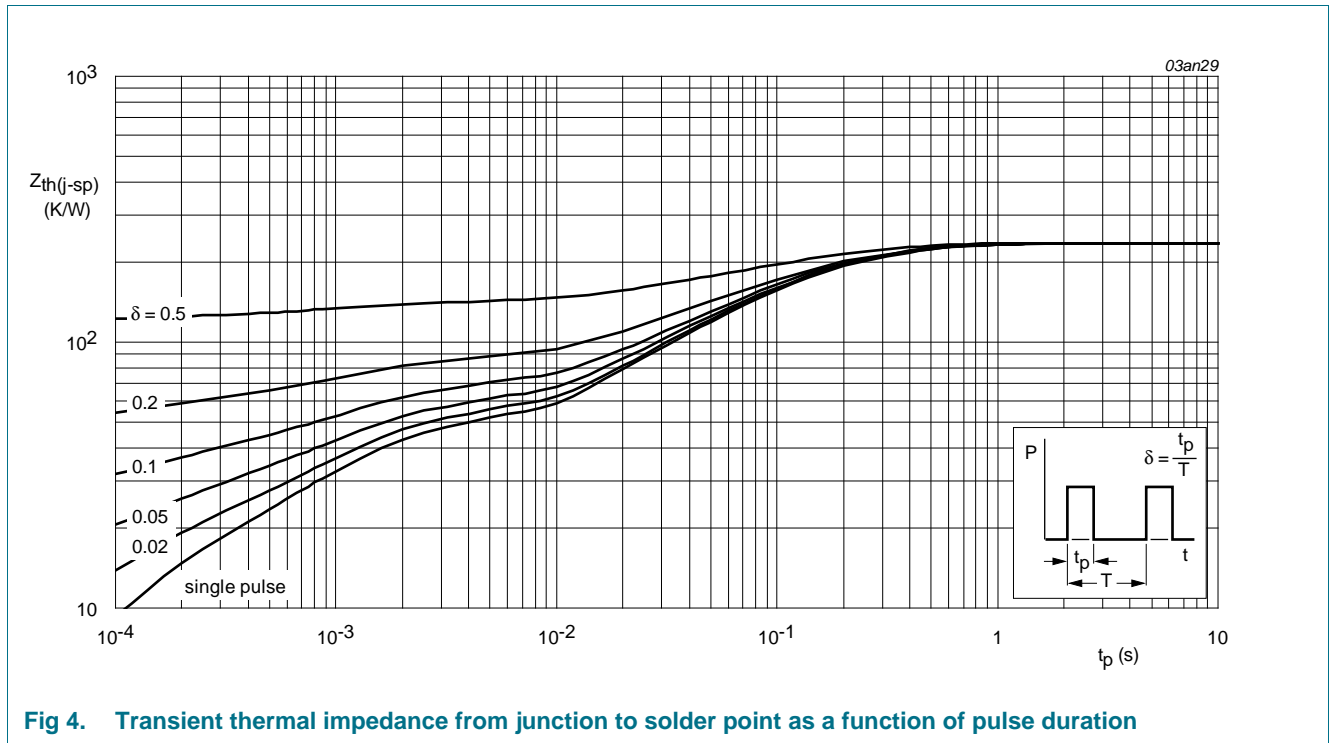
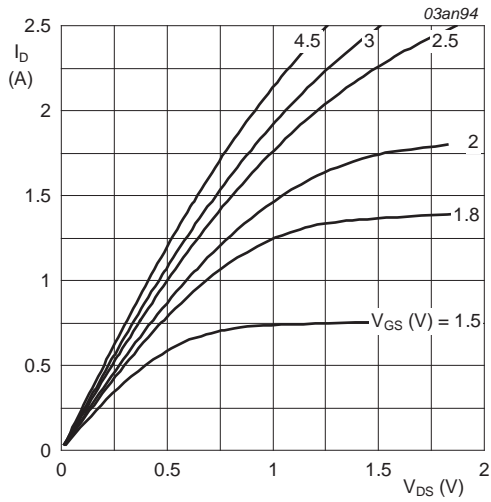


Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration

## 7. Characteristics

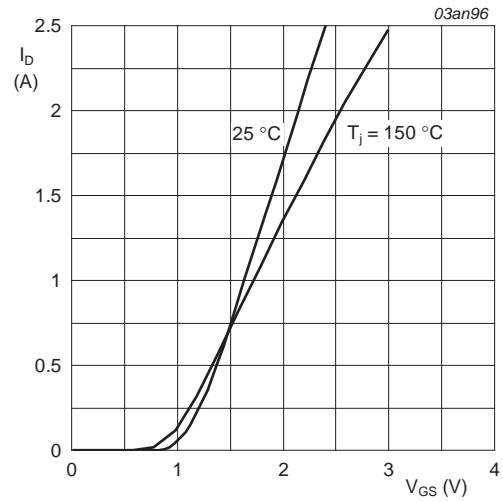
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 1 \mu\text{A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	30	-	-	V
		$I_D = 1 \mu\text{A}; V_{GS} = 0 \text{ V}; T_j = -55 \text{ }^\circ\text{C}$	27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ\text{C}$	0.45	0.7	1	V
		$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}; T_j = 150 \text{ }^\circ\text{C}$	0.25	-	-	V
		$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}; T_j = -55 \text{ }^\circ\text{C}$	-	-	1.2	V
$I_{DSS}$	drain leakage current	$V_{DS} = 30 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 30 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	100	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{GS} = 8 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	10	100	nA
		$V_{GS} = -8 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	10	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5 \text{ V}; I_D = 0.2 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	400	480	m $\Omega$
		$V_{GS} = 4.5 \text{ V}; I_D = 0.2 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	660	816	m $\Omega$
		$V_{GS} = 2.5 \text{ V}; I_D = 0.1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	480	580	m $\Omega$
		$V_{GS} = 1.8 \text{ V}; I_D = 0.075 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	580	830	m $\Omega$
<b>Dynamic characteristics</b>						
$Q_{G(tot)}$	total gate charge	$I_D = 1 \text{ A}; V_{DS} = 15 \text{ V}; V_{GS} = 4.5 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	0.89	-	nC
$Q_{GS}$	gate-source charge		-	0.1	-	nC
$Q_{GD}$	gate-drain charge		-	0.2	-	nC
$C_{iss}$	input capacitance	$V_{DS} = 25 \text{ V}; V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	43	-	pF
$C_{oss}$	output capacitance		-	7.7	-	pF
$C_{rss}$	reverse transfer capacitance		-	4.8	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 15 \text{ V}; R_L = 15 \text{ }^\circ\Omega; V_{GS} = 4.5 \text{ V}; R_{G(ext)} = 6 \text{ }^\circ\Omega; T_j = 25 \text{ }^\circ\text{C}$	-	4	-	ns
$t_r$	rise time		-	7.5	-	ns
$t_{d(off)}$	turn-off delay time		-	18	-	ns
$t_f$	fall time		-	4.5	-	ns
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = 0.3 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	0.76	1.2	V



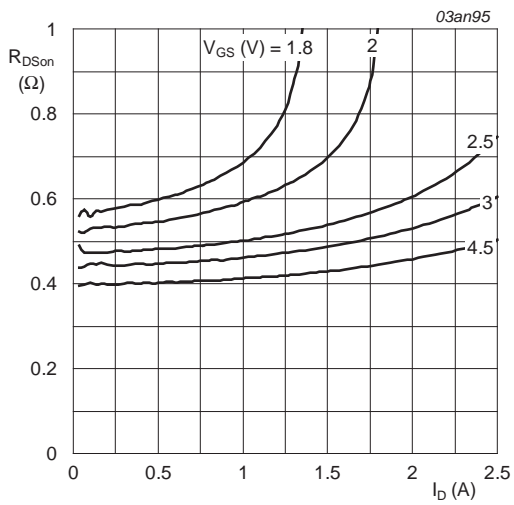
$T_j = 25^\circ\text{C}$

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



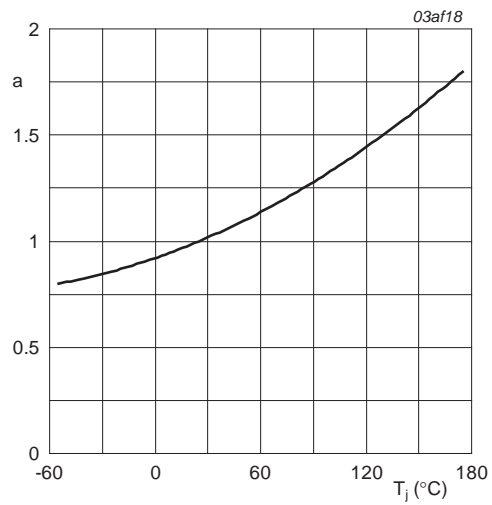
$T_j = 25^\circ\text{C}$  and  $150^\circ\text{C}$ ;  $V_{DS} > I_D \times R_{DS(on)}$

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



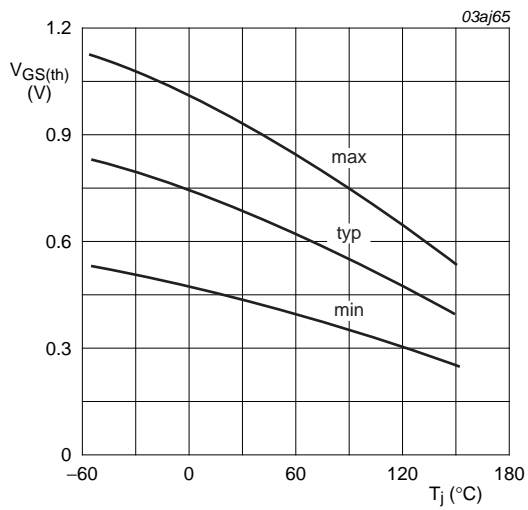
$T_j = 25^\circ\text{C}$

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



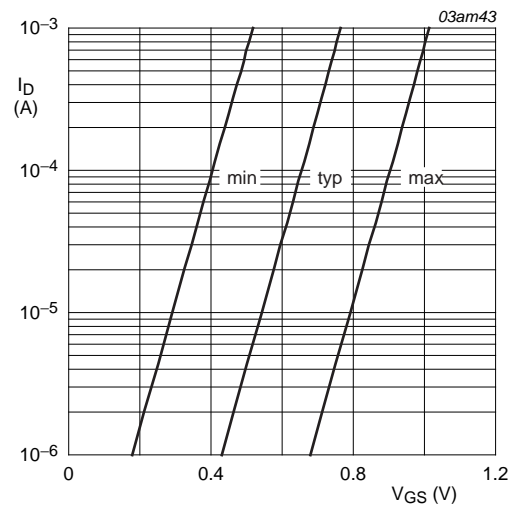
$$a = \frac{R_{DS(on)}}{R_{DS(on)(25^\circ\text{C})}}$$

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



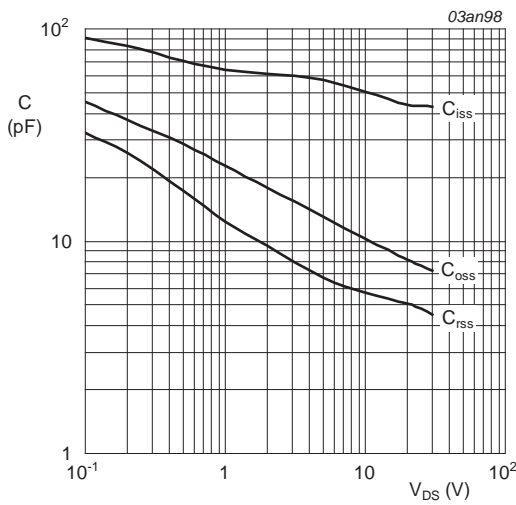
$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}$

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



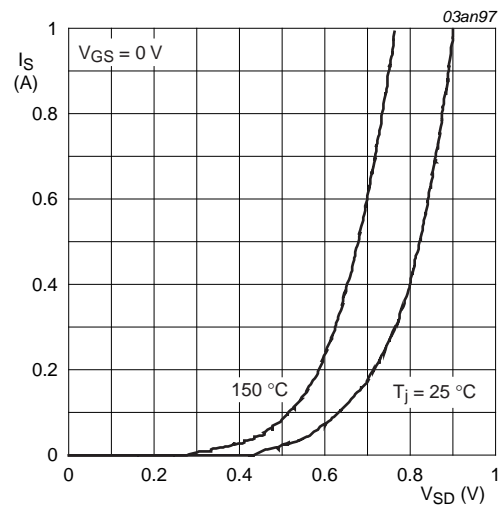
$T_j = 25^{\circ}C; V_{DS} = 5V$

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



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

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



$T_j = 25^{\circ}C \text{ and } 150^{\circ}C; V_{GS} = 0V$

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



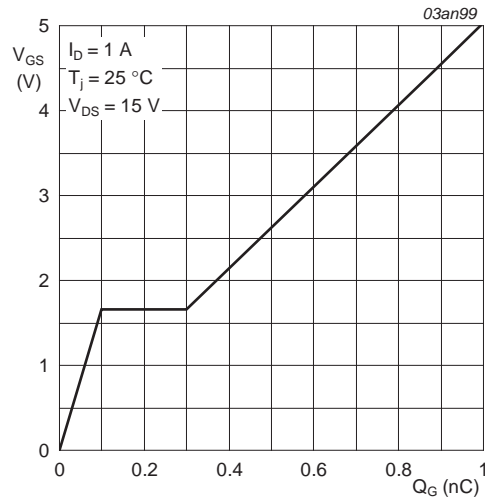


Fig 13. Gate-source voltage as a function of gate charge; typical values

## 8. Package outline

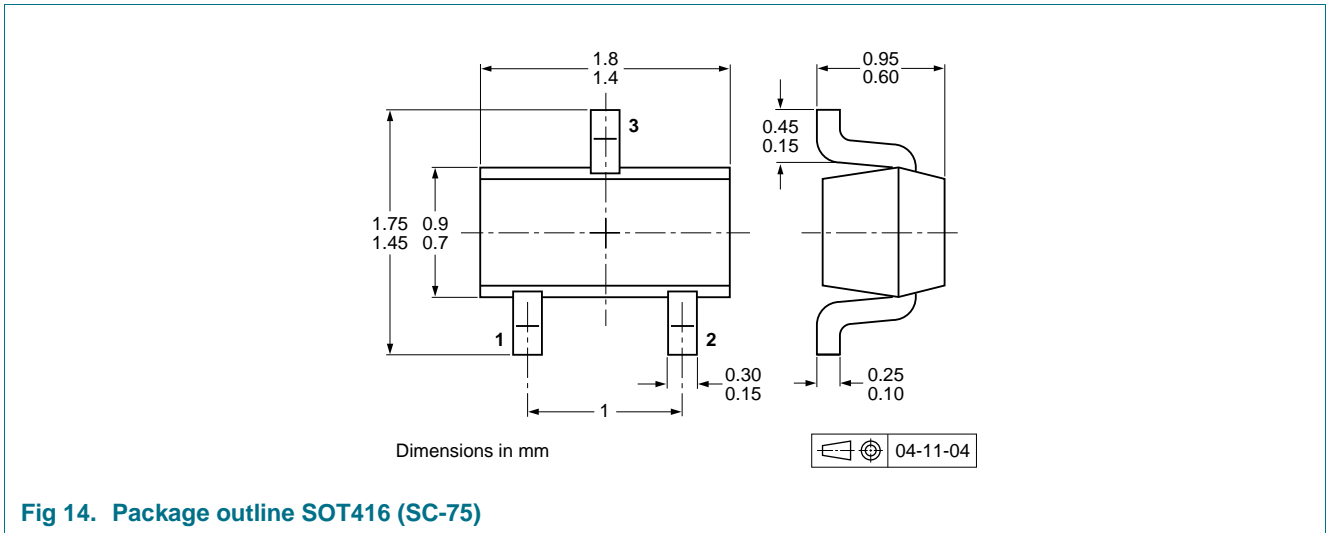


Fig 14. Package outline SOT416 (SC-75)

## 9. Soldering

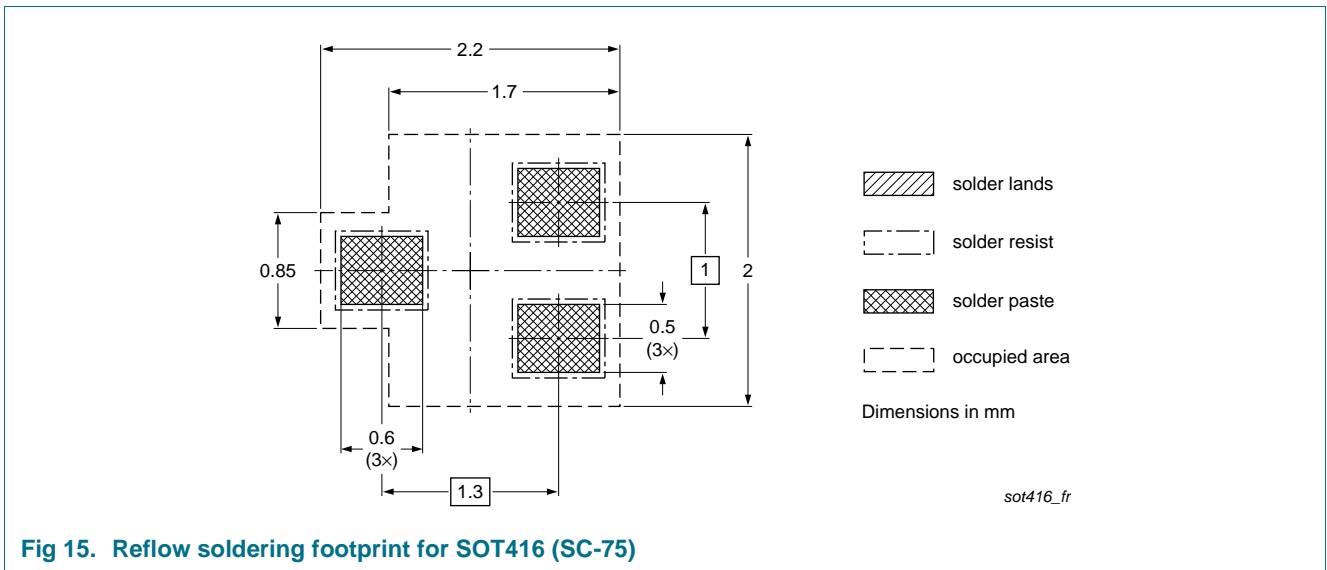


Fig 15. Reflow soldering footprint for SOT416 (SC-75)

## 10. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMR400UN v.2	20120202	Product data sheet	-	PMR400UN v.1
Modifications:	<ul style="list-style-type: none"><li>• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li></ul>			
PMR400UN v.1	20040303	Product data sheet	-	-

## 11. Legal information

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Document status <a href="#">[1]</a> <a href="#">[2]</a>	Product status <a href="#">[3]</a>	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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