



# PSMN7R0-30YLC

N-channel 30 V 7.1 mΩ logic level MOSFET in LFPAK using NextPower technology

Table 1. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Dynamic characteristics</b>						
$Q_{GD}$	gate-drain charge	$V_{GS} = 4.5\text{ V}$ ; $I_D = 20\text{ A}$ ; $V_{DS} = 15\text{ V}$ ; see <a href="#">Figure 14</a> ; see <a href="#">Figure 15</a>	-	2.5	-	nC
$Q_{G(tot)}$	total gate charge	$V_{GS} = 4.5\text{ V}$ ; $I_D = 20\text{ A}$ ; $V_{DS} = 15\text{ V}$ ; see <a href="#">Figure 14</a> ; see <a href="#">Figure 15</a>	-	7.9	-	nC

## 2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	<p>SOT669 (LFPAK; Power-SO8)</p>	<p>mbb076</p>
2	S	source		
3	S	source		
4	G	gate		
mb	D	mounting base; connected to drain		

## 3. Ordering information

Table 3. Ordering information

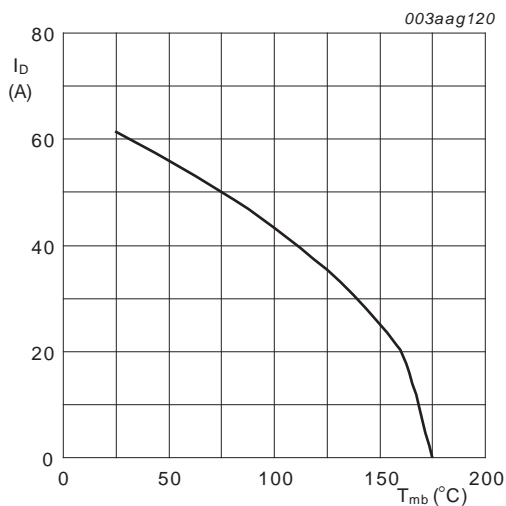
Type number	Package		Description	Version
	Name	Description		
PSMN7R0-30YLC	LFPAK; Power-SO8	plastic single-ended surface-mounted package; 4 leads		SOT669

## 4. Limiting values

**Table 4. Limiting values**

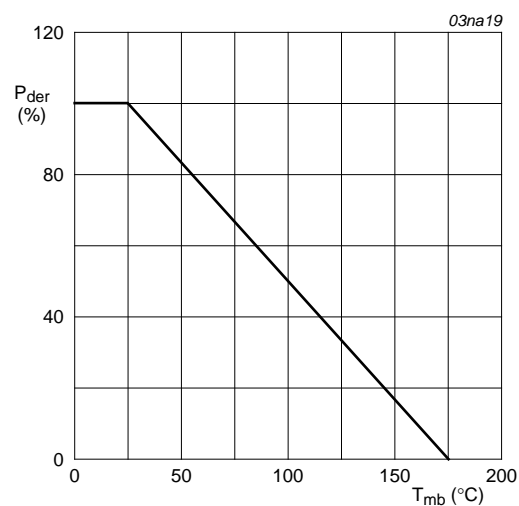
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage	$25\text{ °C} \leq T_j \leq 175\text{ °C}$	-	30	V
$V_{DGR}$	drain-gate voltage	$25\text{ °C} \leq T_j \leq 175\text{ °C}$ ; $R_{GS} = 20\text{ k}\Omega$	-	30	V
$V_{GS}$	gate-source voltage		-20	20	V
$I_D$	drain current	$V_{GS} = 10\text{ V}$ ; $T_{mb} = 25\text{ °C}$ ; see <a href="#">Figure 1</a>	-	61	A
		$V_{GS} = 10\text{ V}$ ; $T_{mb} = 100\text{ °C}$ ; see <a href="#">Figure 1</a>	-	43	A
$I_{DM}$	peak drain current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$ ; $T_{mb} = 25\text{ °C}$ ; see <a href="#">Figure 4</a>	-	245	A
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}$ ; see <a href="#">Figure 2</a>	-	48	W
$T_{stg}$	storage temperature		-55	175	°C
$T_j$	junction temperature		-55	175	°C
$T_{sld(M)}$	peak soldering temperature		-	260	°C
$V_{ESD}$	electrostatic discharge voltage	MM (JEDEC JESD22-A115)	190	-	V
<b>Source-drain diode</b>					
$I_S$	source current	$T_{mb} = 25\text{ °C}$	-	44	A
$I_{SM}$	peak source current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$ ; $T_{mb} = 25\text{ °C}$	-	245	A
<b>Avalanche ruggedness</b>					
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$V_{GS} = 10\text{ V}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; $I_D = 61\text{ A}$ ; $V_{sup} \leq 30\text{ V}$ ; $R_{GS} = 50\text{ }\Omega$ ; unclamped; see <a href="#">Figure 3</a>	-	15	mJ



$$V_{GS} \geq 10V$$

**Fig 1. Continuous drain current as a function of mounting base temperature**



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

**Fig 2. Normalized total power dissipation as a function of mounting base temperature**

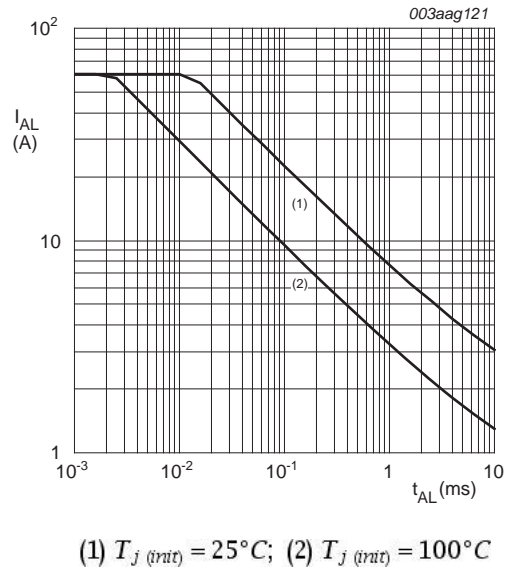


Fig 3. Single pulse avalanche rating; avalanche current as a function of avalanche time

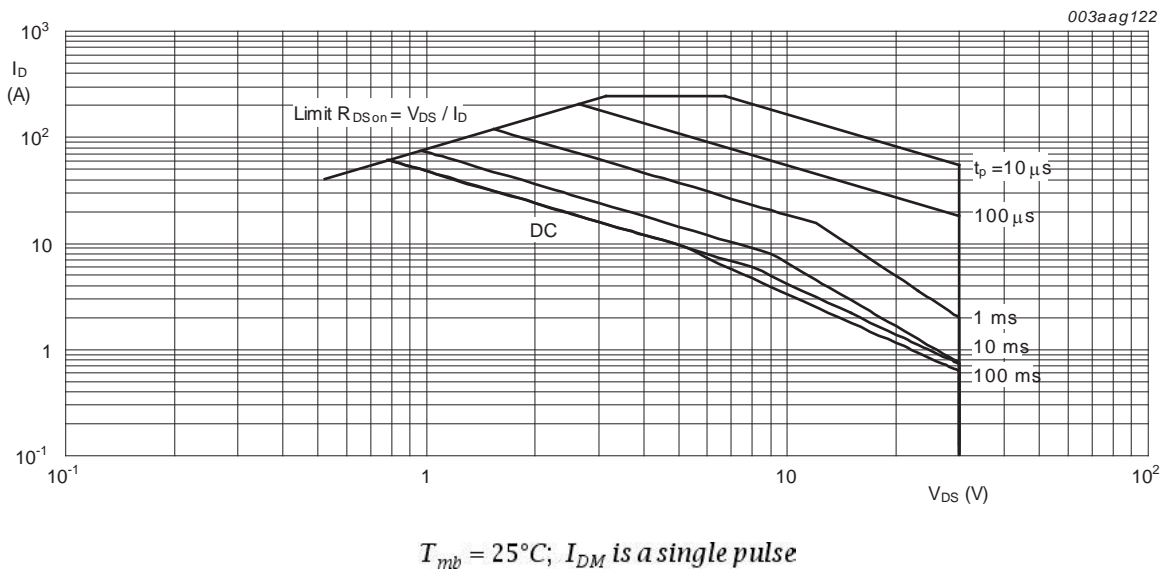
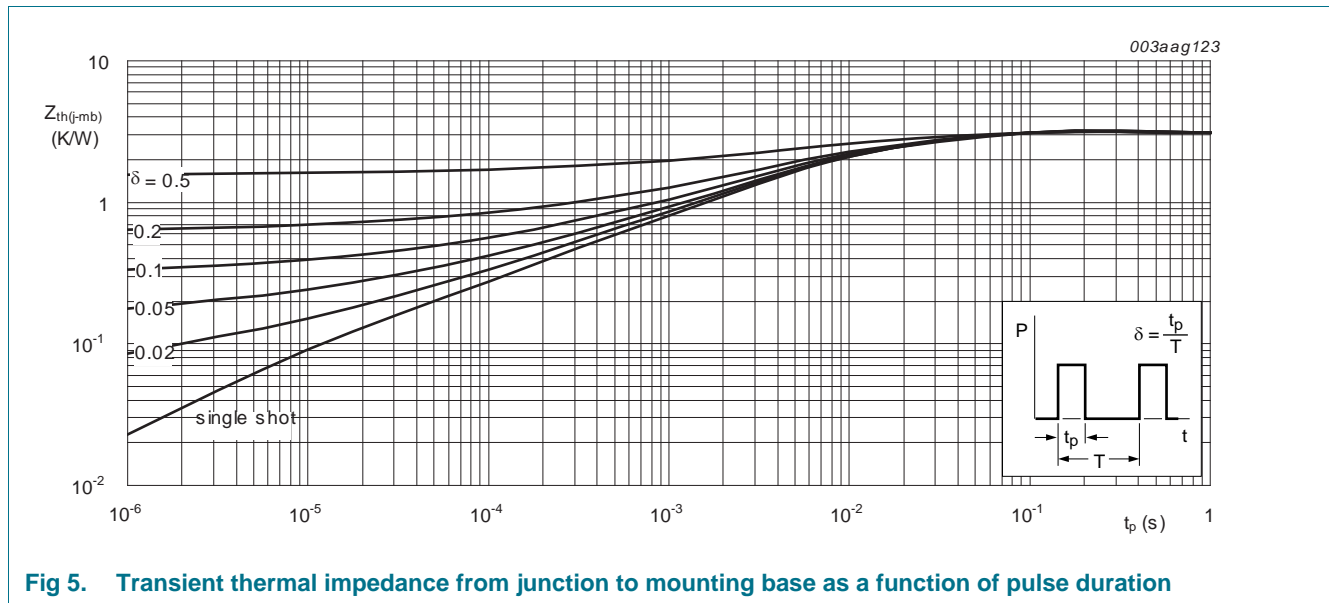


Fig 4. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see <a href="#">Figure 5</a>	-	2.9	3.13	K/W



**Fig 5. Transient thermal impedance from junction to mounting base as a function of pulse duration**

## 6. Characteristics

**Table 6. Characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	30	-	-	V
		$I_D = 250 \mu A; V_{GS} = 0 V; T_j = -55 \text{ }^\circ C$	27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ C$ ; see <a href="#">Figure 10</a>	1.05	1.58	1.95	V
		$I_D = 10 \text{ mA}; V_{DS} = V_{GS}; T_j = 150 \text{ }^\circ C$ ; see <a href="#">Figure 11</a>	0.5	-	-	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = -55 \text{ }^\circ C$ ; see <a href="#">Figure 11</a>	-	-	2.35	V
$I_{DSS}$	drain leakage current	$V_{DS} = 30 V; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	-	-	1	$\mu A$
		$V_{DS} = 30 V; V_{GS} = 0 V; T_j = 150 \text{ }^\circ C$	-	-	100	$\mu A$
$I_{GSS}$	gate leakage current	$V_{GS} = 16 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$	-	-	100	nA
		$V_{GS} = -16 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$	-	-	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5 V; I_D = 20 A; T_j = 25 \text{ }^\circ C$ ; see <a href="#">Figure 12</a>	-	7.6	8.9	mΩ
		$V_{GS} = 4.5 V; I_D = 20 A; T_j = 150 \text{ }^\circ C$ ; see <a href="#">Figure 12</a> ; see <a href="#">Figure 13</a>	-	-	14.7	mΩ
		$V_{GS} = 10 V; I_D = 20 A; T_j = 25 \text{ }^\circ C$ ; see <a href="#">Figure 12</a>	-	6	7.1	mΩ
		$V_{GS} = 10 V; I_D = 20 A; T_j = 150 \text{ }^\circ C$ ; see <a href="#">Figure 12</a> ; see <a href="#">Figure 13</a>	-	-	11.8	mΩ
$R_G$	gate resistance	$f = 1 \text{ MHz}$	-	2.2	4.4	Ω
<b>Dynamic characteristics</b>						
$Q_{G(tot)}$	total gate charge	$I_D = 20 A; V_{DS} = 15 V; V_{GS} = 10 V$ ; see <a href="#">Figure 14</a> ; see <a href="#">Figure 15</a>	-	16	-	nC
		$I_D = 20 A; V_{DS} = 15 V; V_{GS} = 4.5 V$ ; see <a href="#">Figure 14</a> ; see <a href="#">Figure 15</a>	-	7.9	-	nC
		$I_D = 0 A; V_{DS} = 0 V; V_{GS} = 10 V$ ; see <a href="#">Figure 15</a>	-	14	-	nC
$Q_{GS}$	gate-source charge	$I_D = 20 A; V_{DS} = 15 V; V_{GS} = 4.5 V$ ; see <a href="#">Figure 14</a> ; see <a href="#">Figure 15</a>	-	2.7	-	nC
$Q_{GS(th)}$	pre-threshold gate-source charge		-	1.7	-	nC
$Q_{GS(th-pl)}$	post-threshold gate-source charge		-	1	-	nC
$Q_{GD}$	gate-drain charge		-	2.5	-	nC
$V_{GS(pl)}$	gate-source plateau voltage	$I_D = 20 A; V_{DS} = 15 V$ ; see <a href="#">Figure 14</a> ; see <a href="#">Figure 15</a>	-	2.77	-	V
$C_{iss}$	input capacitance	$V_{DS} = 15 V; V_{GS} = 0 V; f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ C$ ; see <a href="#">Figure 16</a>	-	1057	-	pF
$C_{oss}$	output capacitance		-	235	-	pF
$C_{riss}$	reverse transfer capacitance		-	77	-	pF

# PSMN7R0-30YLC

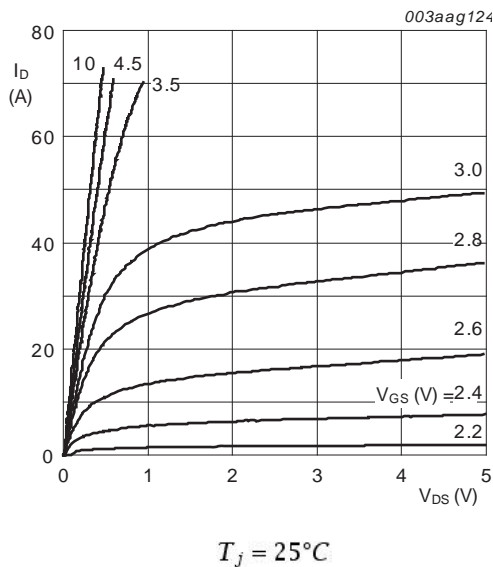
N-channel 30 V 7.1 mΩ logic level MOSFET in LPAK using NextPower technology

**Table 6. Characteristics ...continued**

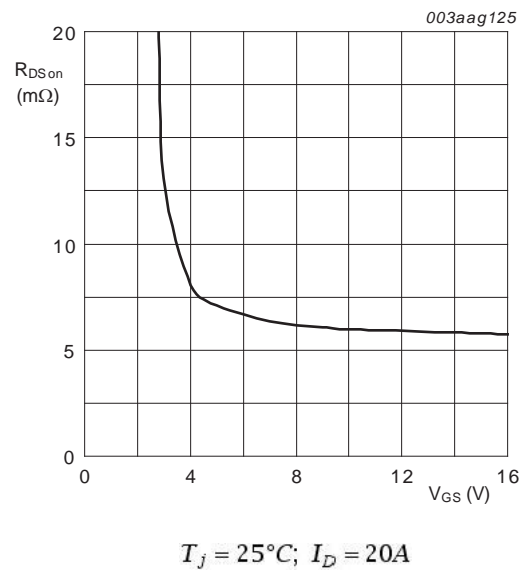
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	turn-on delay time	$V_{DS} = 15\text{ V}; R_L = 0.75\ \Omega; V_{GS} = 4.5\text{ V};$ $R_{G(ext)} = 4.7\ \Omega$	-	15	-	ns
$t_r$	rise time		-	18	-	ns
$t_{d(off)}$	turn-off delay time		-	20	-	ns
$t_f$	fall time		-	7.5	-	ns
$Q_{oss}$	output charge	$V_{GS} = 0\text{ V}; V_{DS} = 15\text{ V}; f = 1\text{ MHz};$ $T_j = 25\text{ }^\circ\text{C}$	-	6.4	-	nC

### Source-drain diode

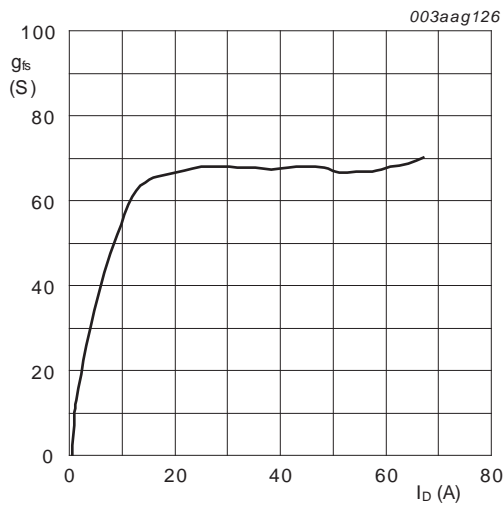
$V_{SD}$	source-drain voltage	$I_S = 20\text{ A}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^\circ\text{C};$ see <a href="#">Figure 17</a>	-	0.86	1.1	V
$t_{rr}$	reverse recovery time	$I_S = 20\text{ A}; di_S/dt = -100\text{ A}/\mu\text{s};$ $V_{GS} = 0\text{ V}; V_{DS} = 15\text{ V}$	-	25	-	ns
$Q_r$	recovered charge		-	13	-	nC
$t_a$	reverse recovery rise time	$V_{GS} = 0\text{ V}; I_S = 20\text{ A};$ $di_S/dt = -100\text{ A}/\mu\text{s}; V_{DS} = 15\text{ V};$ see <a href="#">Figure 18</a>	-	16	-	ns
$t_b$	reverse recovery fall time		-	9	-	ns



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

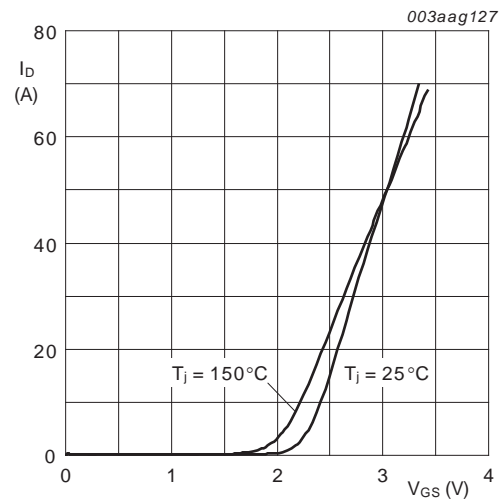


**Fig 7. Drain-source on-state resistance as a function of gate-source voltage; typical values**



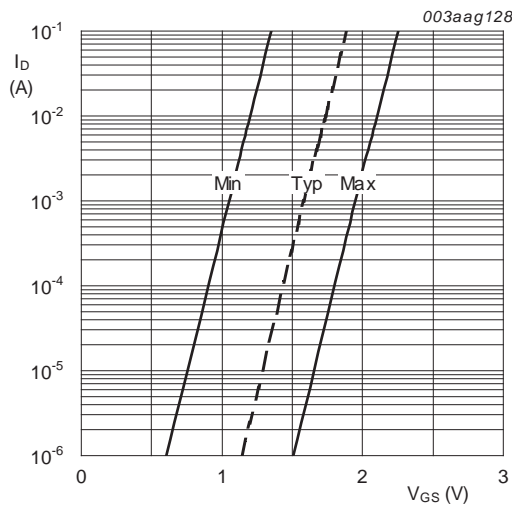
$T_j = 25^\circ\text{C}; V_{DS} = 10\text{V}$

**Fig 8. Forward transconductance as a function of drain current; typical values**



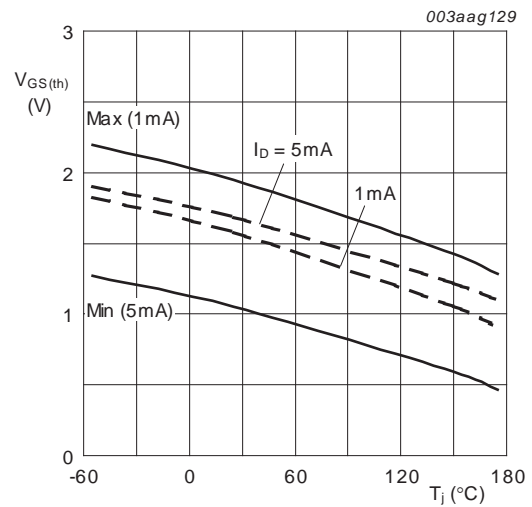
$V_{DS} = 10\text{V}$

**Fig 9. Transfer characteristics; drain current as a function of gate-source voltage; typical values**



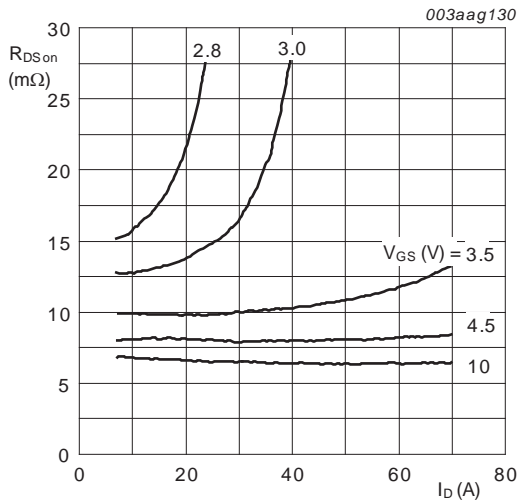
$T_j = 25^\circ\text{C}; V_{DS} = 5\text{V}$

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



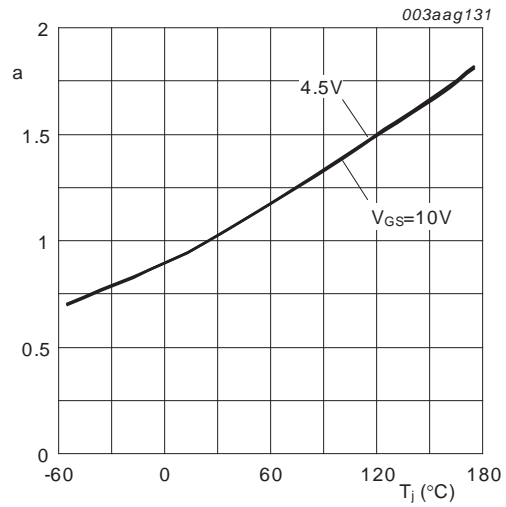
$V_{DS} = V_{GS}$

**Fig 11. Gate-source threshold voltage as a function of junction temperature**



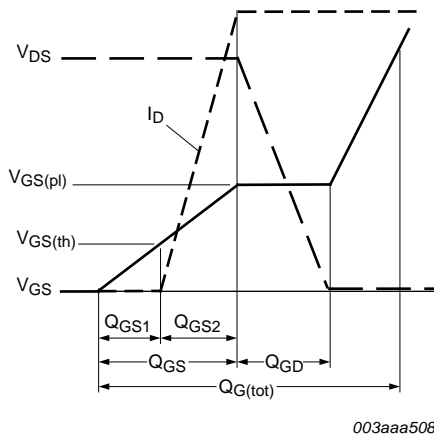
$T_j = 25^\circ\text{C}$

**Fig 12. Drain-source on-state resistance as a function of drain current; typical values**

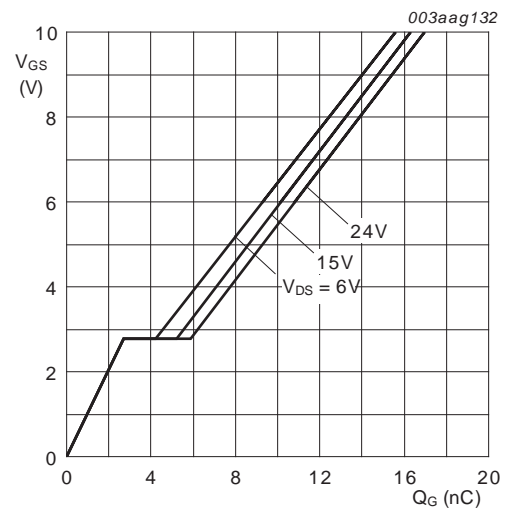


$$a = \frac{R_{DS(on)}}{R_{DS(on)@25^\circ\text{C}}}$$

**Fig 13. Normalized drain-source on-state resistance factor as a function of junction temperature**



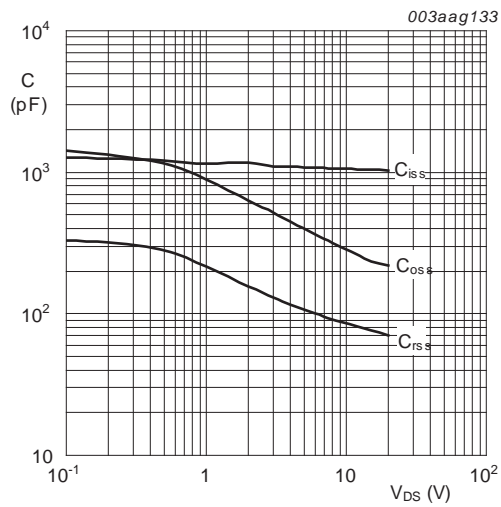
**Fig 14. Gate charge waveform definitions**



$T_j = 25^\circ\text{C}; I_D = 20\text{A}$

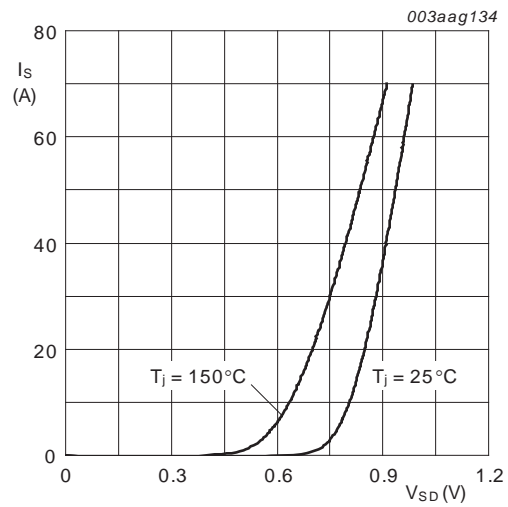
**Fig 15. Gate-source voltage as a function of gate charge; typical values**





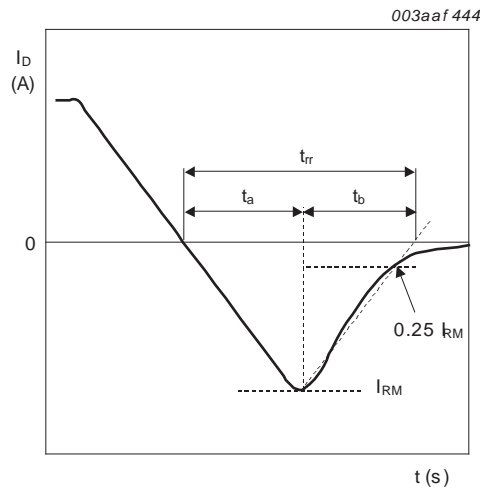
$V_{GS} = 0V; f = 1MHz$

**Fig 16. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values**



$V_{GS} = 0V$

**Fig 17. Source current as a function of source-drain voltage; typical values**



**Fig 18. Reverse recovery timing definition**

## 7. Package outline

Plastic single-ended surface-mounted package (LPAK; Power-SO8); 4 leads

SOT669

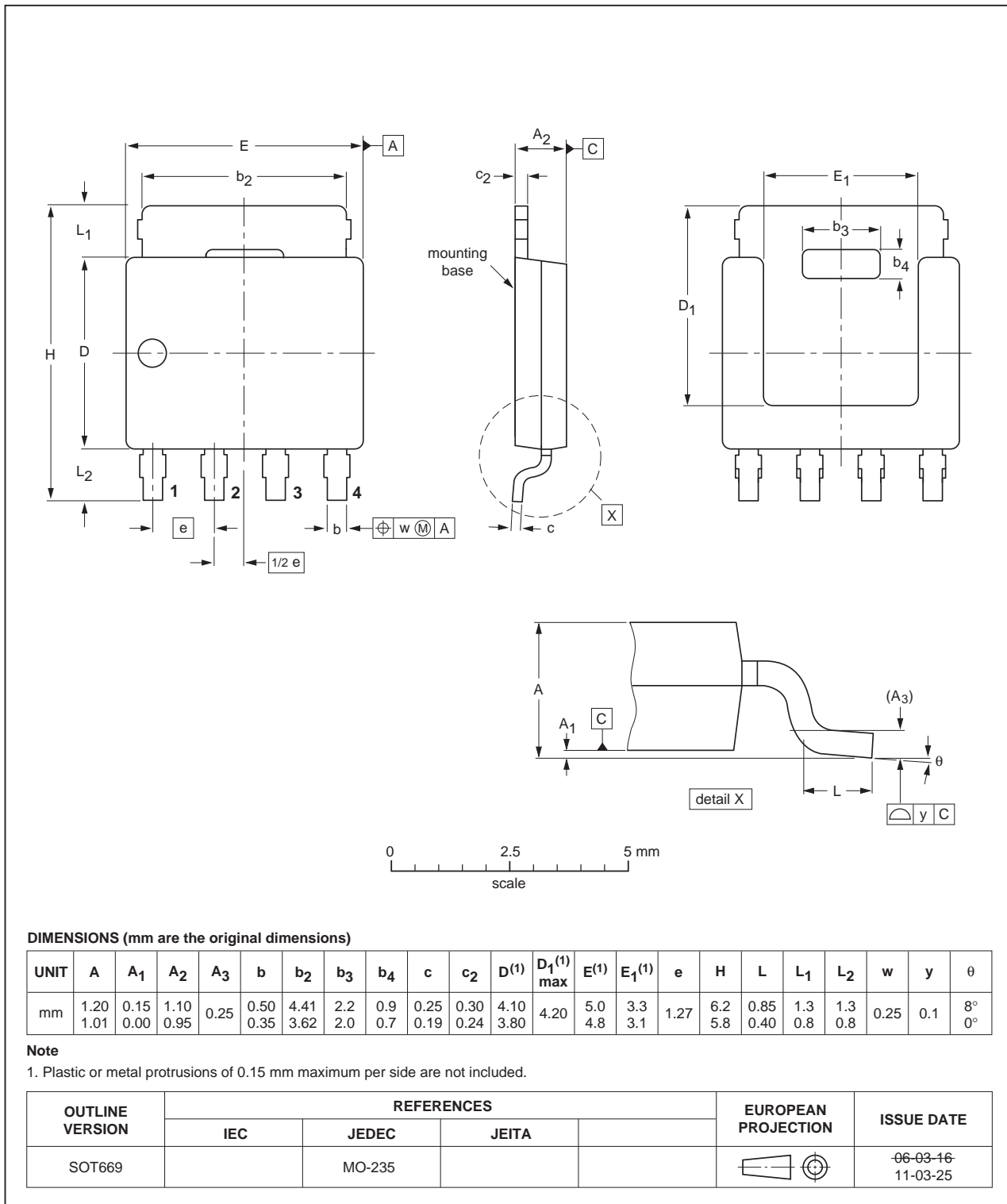


Fig 19. Package outline SOT669 (LPAK; Power-SO8)

## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PSMN7R0-30YLC v.2	20110901	Product data sheet	-	PSMN7R0-30YLC v.1
Modifications:	<ul style="list-style-type: none"><li>• Status changed from objective to product.</li><li>• Various changes to content.</li></ul>			
PSMN7R0-30YLC v.1	20110711	Objective data sheet	-	-

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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.
Product [short] data sheet	Production	This document contains the product specification.

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[TPCC8103,L1Q\(CM](#) [MIC4420CM-TR](#) [VN1206L](#) [614234A](#) [715780A](#) [NTNS3166NZT5G](#) [SSM6J414TU,LF\(T](#) [751625C](#)  
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[DMN1017UCP3-7](#) [EFC2J004NUZTDG](#) [ECH8691-TL-W](#) [FCAB21350L1](#) [P85W28HP2F-7071](#) [DMN1053UCP4-7](#) [NTE221](#) [NTE2384](#)  
[NTE2903](#) [NTE2941](#) [NTE2945](#) [NTE2946](#) [NTE2960](#) [NTE2967](#) [NTE2969](#) [NTE2976](#) [NTE455](#) [NTE6400A](#) [NTE2910](#) [NTE2916](#) [NTE2956](#)  
[NTE2911](#) [US6M2GTR](#) [TK10A80W,S4X\(S](#) [SSM6P69NU,LF](#)