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Team Nexperia



PSMN8R0-30YLC

N-channel 30 V 7.9 mΩ logic level MOSFET in LPAK using NextPower technology

Rev. 2 — 1 September 2011

Product data sheet

1. Product profile

1.1 General description

Logic level enhancement mode N-channel MOSFET in LPAK package. This product is designed and qualified for use in a wide range of industrial, communications and domestic equipment.

1.2 Features and benefits

- High reliability Power SO8 package, qualified to 175°C
- Low parasitic inductance and resistance
- Optimised for 4.5V Gate drive utilising NextPower Superjunction technology
- Ultra low QG, QGD, QOSS for high system efficiencies at low and high loads

1.3 Applications

- DC-to-DC converters
- Load switching
- Synchronous buck regulator

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$25\text{ °C} \leq T_j \leq 175\text{ °C}$	-	-	30	V
I_D	drain current	$T_{mb} = 25\text{ °C}$; $V_{GS} = 10\text{ V}$; see Figure 1	-	-	54	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$; see Figure 2	-	-	42	W
T_j	junction temperature		-55	-	175	°C
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}$; $I_D = 15\text{ A}$; $T_j = 25\text{ °C}$; see Figure 12	-	8.5	10	mΩ
		$V_{GS} = 10\text{ V}$; $I_D = 15\text{ A}$; $T_j = 25\text{ °C}$; see Figure 12	-	6.7	7.9	mΩ

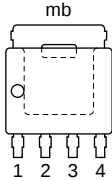
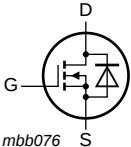


Table 1. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic characteristics						
Q_{GD}	gate-drain charge	$V_{GS} = 4.5\text{ V}$; $I_D = 15\text{ A}$; $V_{DS} = 15\text{ V}$; see Figure 14; see Figure 15	-	2.3	-	nC
$Q_{G(tot)}$	total gate charge	$V_{GS} = 4.5\text{ V}$; $I_D = 15\text{ A}$; $V_{DS} = 15\text{ V}$; see Figure 14; see Figure 15	-	7	-	nC

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 SOT669 (LPAK; Power-SO8)	 mbb076
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		
	Name	Description	Version
PSMN8R0-30YLC	LPAK; 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 Figure 1	-	54	A
		$V_{GS} = 10\text{ V}$; $T_{mb} = 100\text{ °C}$; see Figure 1	-	38	A
I_{DM}	peak drain current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$; $T_{mb} = 25\text{ °C}$; see Figure 4	-	216	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C}$; see Figure 2	-	42	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
Source-drain diode					
I_S	source current	$T_{mb} = 25\text{ °C}$	-	38	A
I_{SM}	peak source current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$; $T_{mb} = 25\text{ °C}$	-	216	A
Avalanche ruggedness					
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$V_{GS} = 10\text{ V}$; $T_{j(\text{init})} = 25\text{ °C}$; $I_D = 54\text{ A}$; $V_{sup} \leq 30\text{ V}$; $R_{GS} = 50\text{ }\Omega$; unclamped; see Figure 3	-	12	mJ

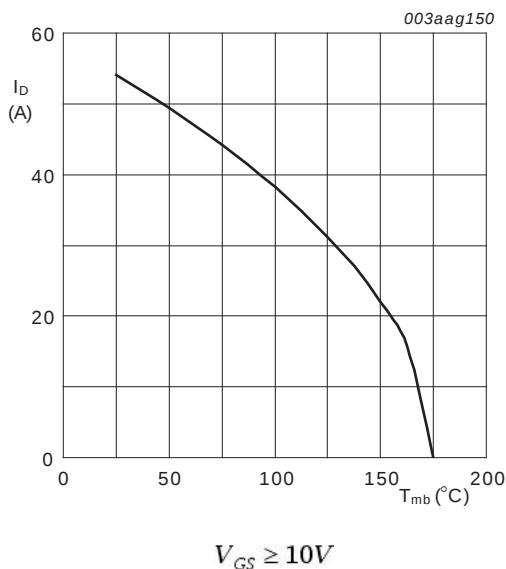


Fig 1. Continuous drain current as a function of mounting base temperature

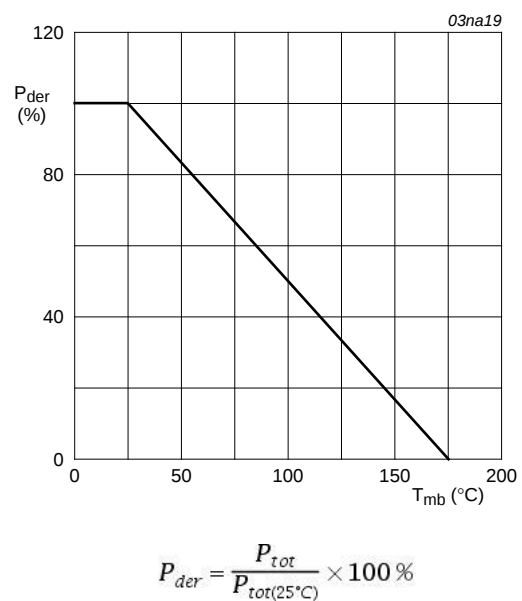
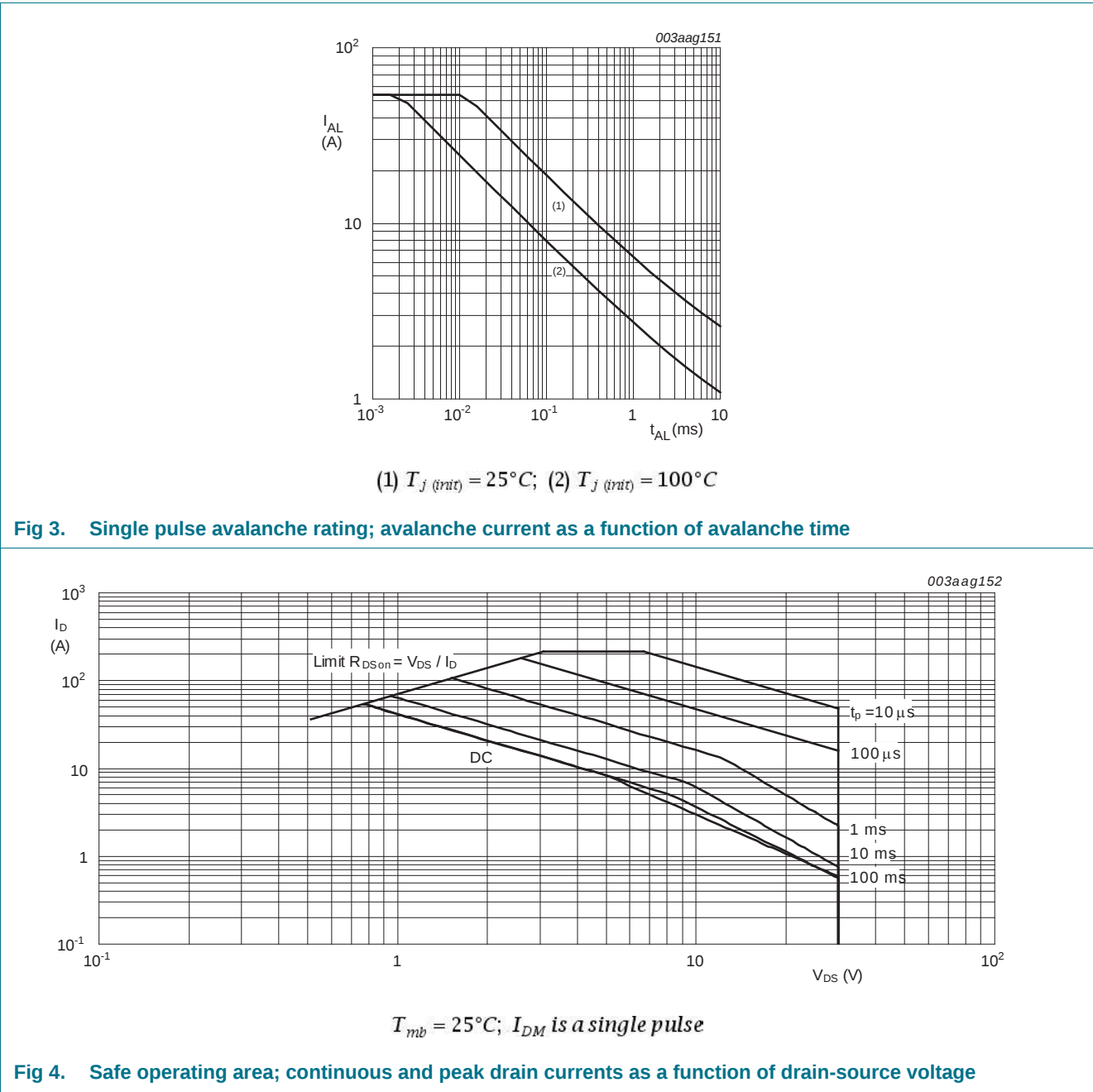


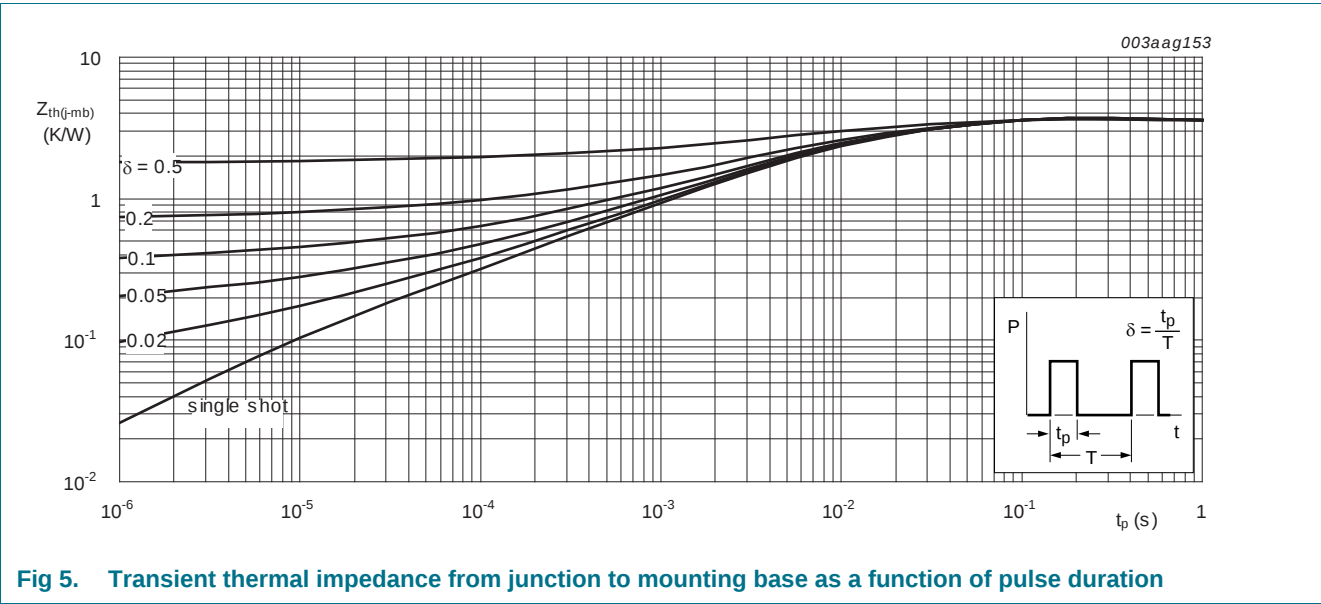
Fig 2. Normalized total power dissipation as a function of mounting base temperature



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 Figure 5	-	3.38	3.61	K/W



6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250\ \mu A$; $V_{GS} = 0\ V$; $T_j = 25\ ^\circ C$	30	-	-	V
		$I_D = 250\ \mu A$; $V_{GS} = 0\ V$; $T_j = -55\ ^\circ C$	27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1\ mA$; $V_{DS} = V_{GS}$; $T_j = 25\ ^\circ C$; see Figure 10	1.05	1.59	1.95	V
		$I_D = 10\ mA$; $V_{DS} = V_{GS}$; $T_j = 150\ ^\circ C$; see Figure 11	0.5	-	-	V
		$I_D = 1\ mA$; $V_{DS} = V_{GS}$; $T_j = -55\ ^\circ C$; see Figure 11	-	-	2.25	V
I_{DSS}	drain leakage current	$V_{DS} = 30\ V$; $V_{GS} = 0\ V$; $T_j = 25\ ^\circ C$	-	-	1	μA
		$V_{DS} = 30\ V$; $V_{GS} = 0\ V$; $T_j = 150\ ^\circ C$	-	-	100	μA
I_{GSS}	gate leakage current	$V_{GS} = 16\ V$; $V_{DS} = 0\ V$; $T_j = 25\ ^\circ C$	-	-	100	nA
		$V_{GS} = -16\ V$; $V_{DS} = 0\ V$; $T_j = 25\ ^\circ C$	-	-	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\ V$; $I_D = 15\ A$; $T_j = 25\ ^\circ C$; see Figure 12	-	8.5	10	mΩ
		$V_{GS} = 4.5\ V$; $I_D = 15\ A$; $T_j = 150\ ^\circ C$; see Figure 12 ; see Figure 13	-	-	16.6	mΩ
		$V_{GS} = 10\ V$; $I_D = 15\ A$; $T_j = 25\ ^\circ C$; see Figure 12	-	6.7	7.9	mΩ
		$V_{GS} = 10\ V$; $I_D = 15\ A$; $T_j = 150\ ^\circ C$; see Figure 12 ; see Figure 13	-	-	13.2	mΩ
R_G	gate resistance	$f = 1\ MHz$	-	2.2	4.4	Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$I_D = 15\ A$; $V_{DS} = 15\ V$; $V_{GS} = 10\ V$; see Figure 14 ; see Figure 15	-	15	-	nC
		$I_D = 15\ A$; $V_{DS} = 15\ V$; $V_{GS} = 4.5\ V$; see Figure 14 ; see Figure 15	-	7	-	nC
		$I_D = 0\ A$; $V_{DS} = 0\ V$; $V_{GS} = 10\ V$	-	13	-	nC
Q_{GS}	gate-source charge	$I_D = 15\ A$; $V_{DS} = 15\ V$; $V_{GS} = 4.5\ V$; see Figure 14 ; see Figure 15	-	2.1	-	nC
$Q_{GS(th)}$	pre-threshold gate-source charge		-	1.5	-	nC
$Q_{GS(th-pl)}$	post-threshold gate-source charge		-	0.6	-	nC
Q_{GD}	gate-drain charge		-	2.3	-	nC
$V_{GS(pl)}$	gate-source plateau voltage	$I_D = 15\ A$; $V_{DS} = 15\ V$; see Figure 14 ; see Figure 15	-	2.6	-	V
C_{iss}	input capacitance	$V_{DS} = 15\ V$; $V_{GS} = 0\ V$; $f = 1\ MHz$;	-	848	-	pF
C_{oss}	output capacitance	$T_j = 25\ ^\circ C$; see Figure 16	-	207	-	pF
C_{rss}	reverse transfer capacitance		-	70	-	pF

Table 6. Characteristics ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	turn-on delay time	$V_{DS} = 15\text{ V}; R_L = 1\text{ }\Omega; V_{GS} = 4.5\text{ V};$ $R_{G(ext)} = 4.7\text{ }\Omega$	-	15	-	ns
t_r	rise time		-	11	-	ns
$t_{d(off)}$	turn-off delay time		-	19	-	ns
t_f	fall time		-	7	-	ns
Q_{oss}	output charge	$V_{GS} = 0\text{ V}; V_{DS} = 15\text{ V}; f = 1\text{ MHz};$ $T_j = 25\text{ }^\circ\text{C}$	-	5	-	nC

Source-drain diode

V_{SD}	source-drain voltage	$I_S = 15\text{ A}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^\circ\text{C};$ see Figure 17	-	0.85	1.1	V
t_{rr}	reverse recovery time	$I_S = 15\text{ A}; dI_S/dt = -100\text{ A}/\mu\text{s}; V_{GS} = 0\text{ V};$ $V_{DS} = 15\text{ V}$	-	21	-	ns
Q_r	recovered charge		-	13	-	nC
t_a	reverse recovery rise time	$V_{GS} = 0\text{ V}; I_S = 15\text{ A}; dI_S/dt = -100\text{ A}/\mu\text{s};$ $V_{DS} = 15\text{ V};$ see Figure 18	-	12	-	ns
t_b	reverse recovery fall time		-	9	-	ns

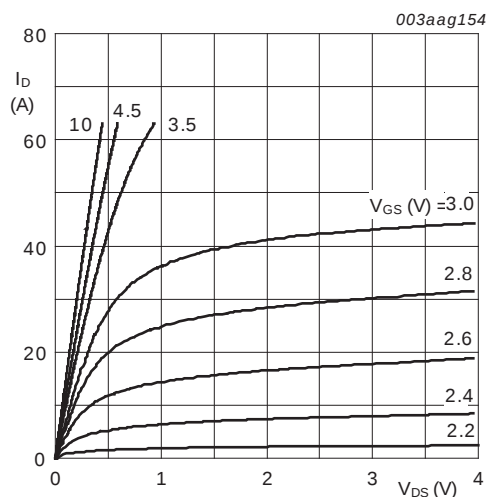


Fig 6. Output characteristics; drain current as a function of drain-source voltage; typical values

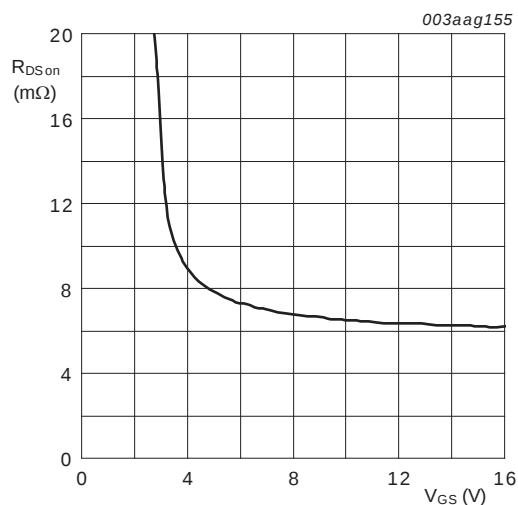


Fig 7. Drain-source on-state resistance as a function of gate-source voltage; typical values

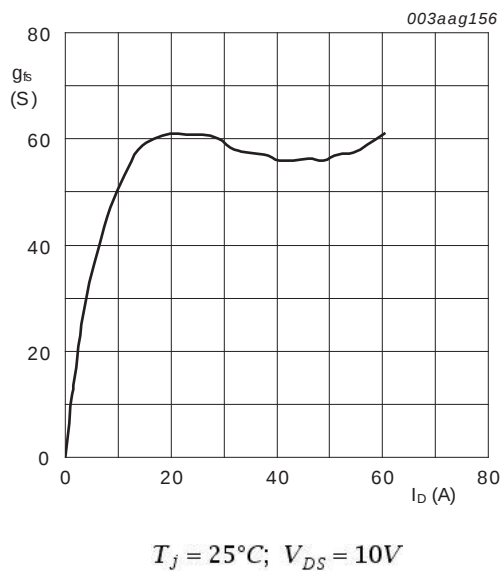


Fig 8. Forward transconductance as a function of drain current; typical values

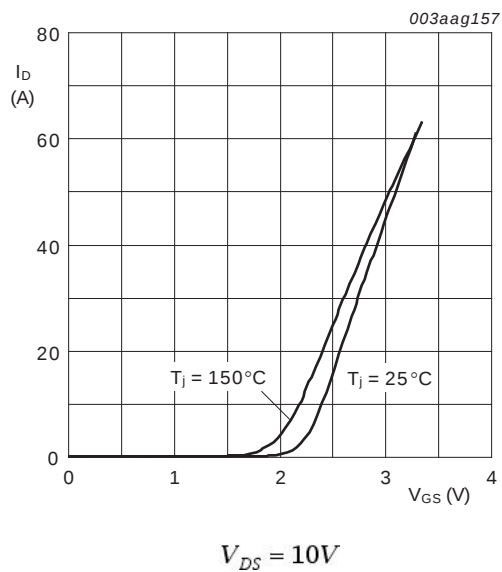


Fig 9. Transfer characteristics; drain current as a function of gate-source voltage; typical values

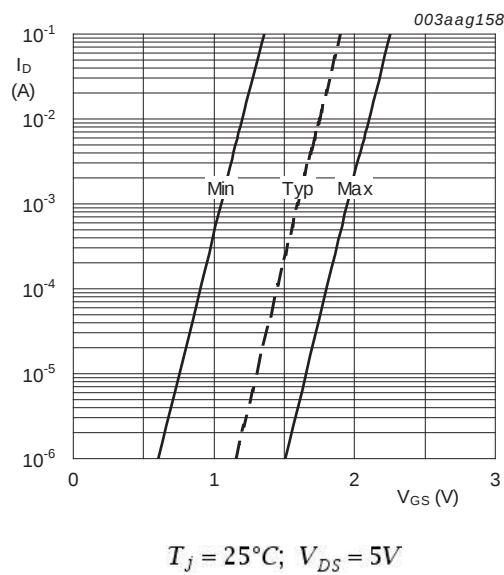


Fig 10. Sub-threshold drain current as a function of gate-source voltage

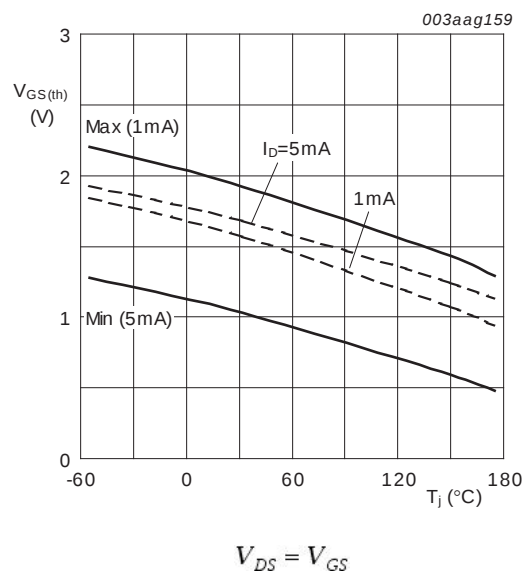
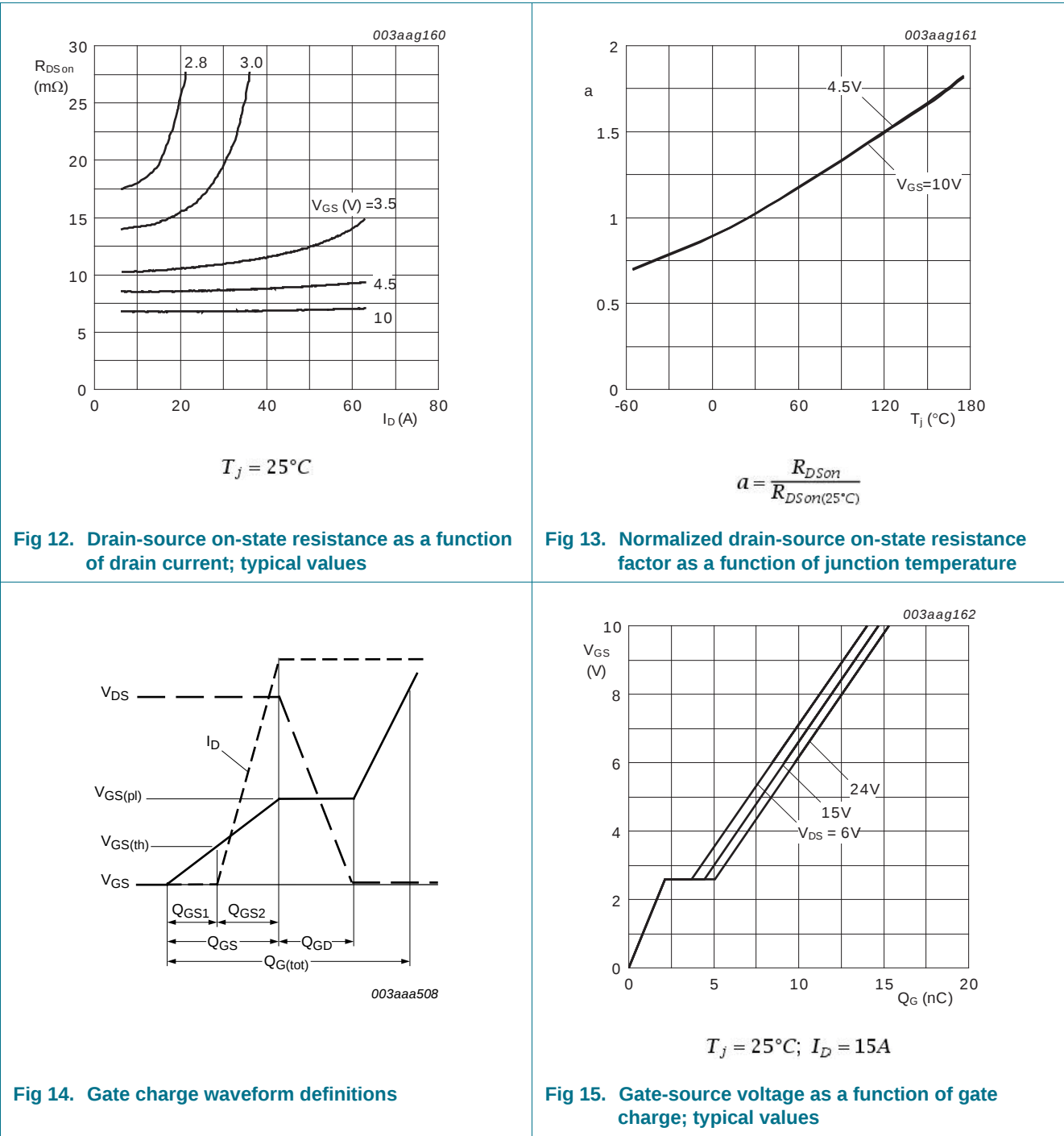
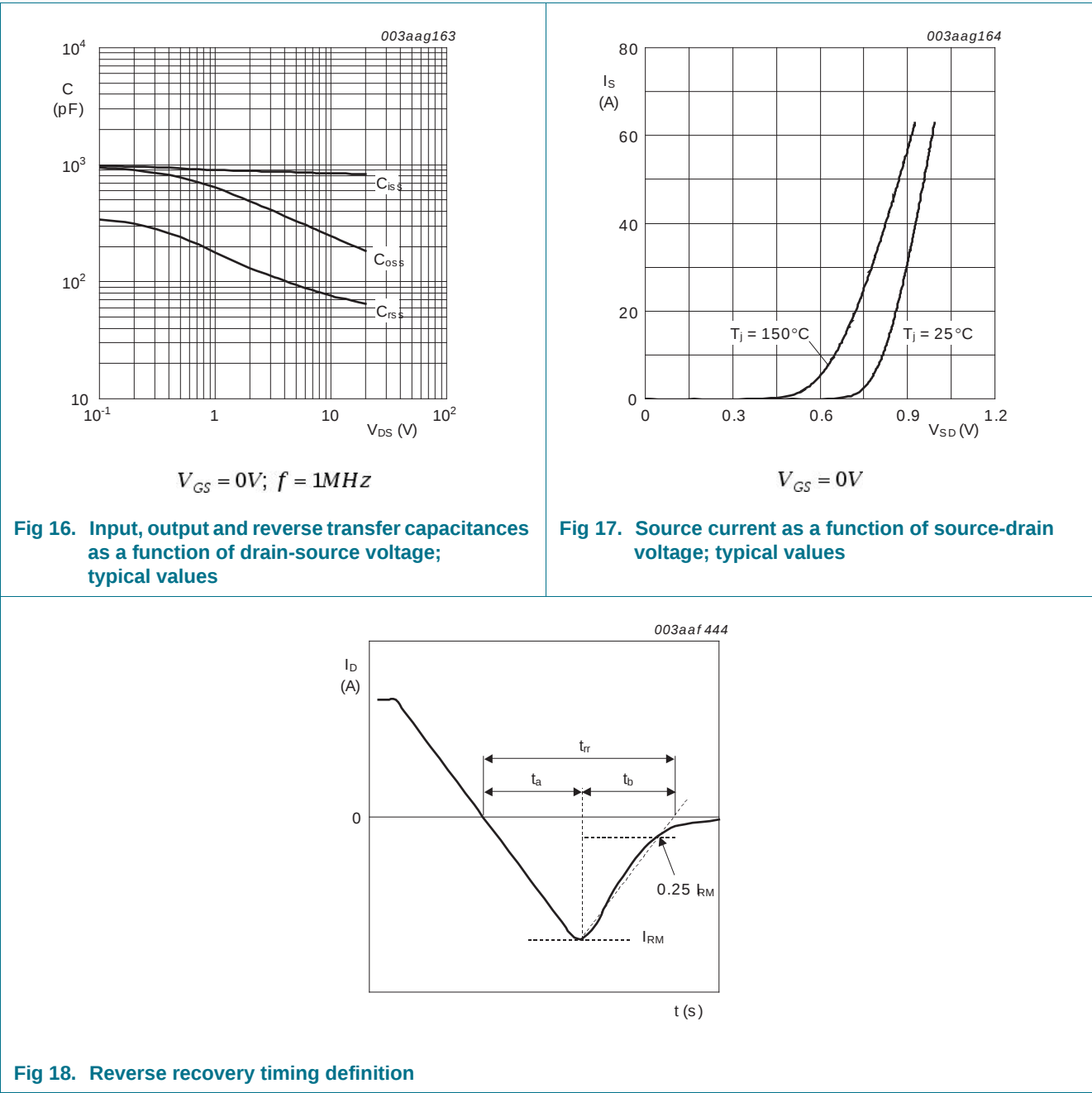


Fig 11. Gate-source threshold voltage as a function of junction temperature





7. Package outline

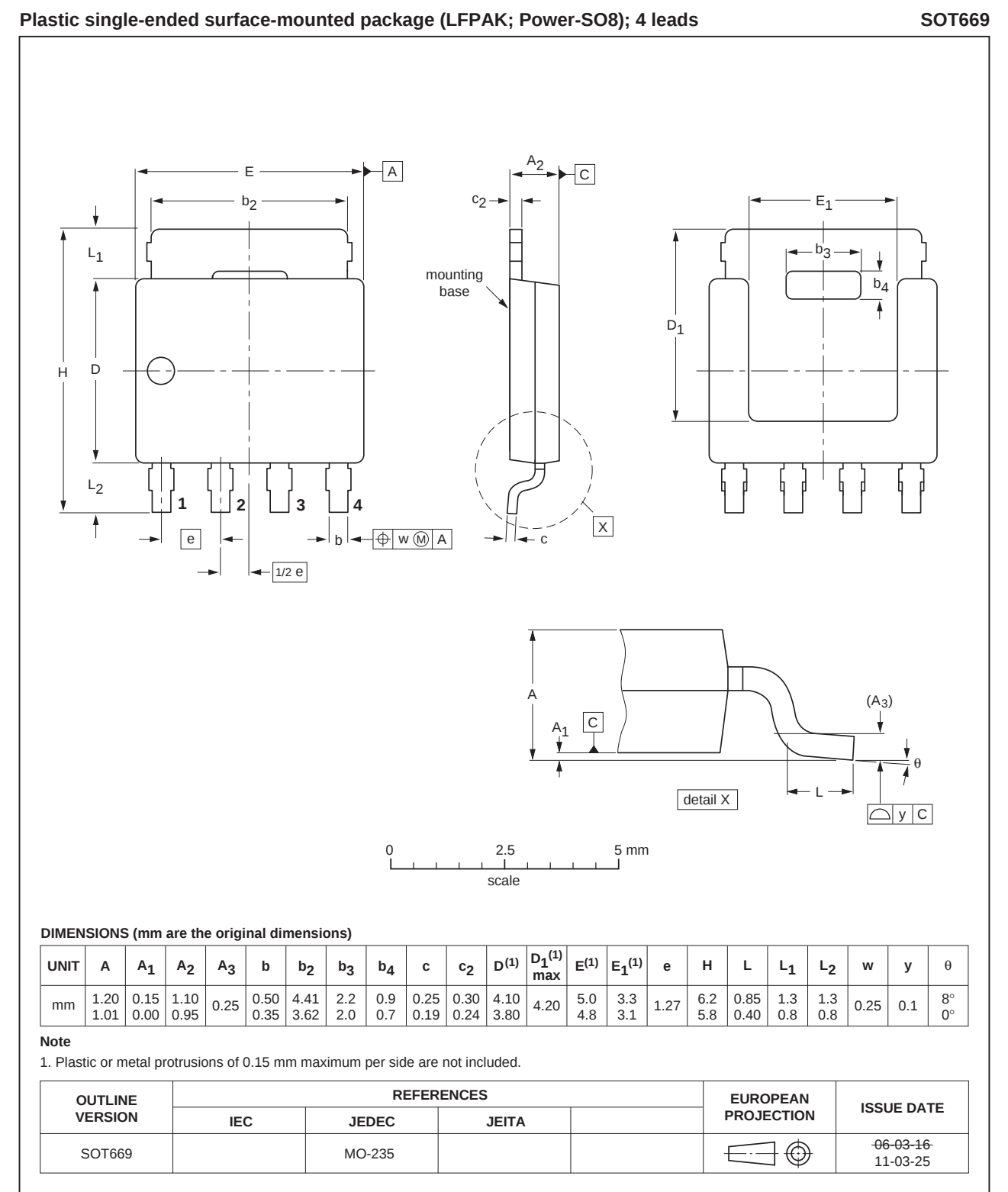


Fig 19. Package outline SOT669 (LPAK; Power-SO8)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PSMN8R0-30YLC v.2	20110901	Product data sheet	-	PSMN8R0-30YLC v.1
Modifications:	• Data sheet status changed from objective to product.			
PSMN8R0-30YLC v.1	20110712	Objective data sheet	-	-

9. Legal information

9.1 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.nxp.com>.

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