PSMN1R3-30YL

N-channel 30 V 1.3 mΩ logic level MOSFET in LFPAK

Rev. 02 — 25 June 2009 Product data sheet

1. Product profile

1.1 General description

Logic level N-channel MOSFET in LFPAK package qualified to 150 °C. This product is designed and qualified for use in a wide range of industrial, communications and domestic equipment.

1.2 Features and benefits

- Advanced TrenchMOS provides low RDSon and low gate charge
- High efficiency gains in switching power convertors
- Improved mechanical and thermal characteristics
- LFPAK provides maximum power density in a Power SO8 package

1.3 Applications

- DC-to-DC converters
- Lithium-ion battery protection
- Load switching
- Motor control
- Server power supplies

1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C		-	-	30	V
I_D	drain current	$T_{mb} = 25$ °C; $V_{GS} = 10$ V; see Figure 1;	[1]	-	-	100	A
P_{tot}	total power dissipation	$T_{mb} = 25$ °C; see Figure 2		-	-	121	W
T_j	junction temperature			-55	-	150	°C
Avalanche ruggedness							
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$V_{GS} = 10$ V; $T_{j(init)} = 25$ °C; $I_D = 100$ A; $V_{sup} \leq 30$ V; $R_{GS} = 50$ Ω; unclamped		-	-	383	mJ
Dynamic characteristics							
Q_{GD}	gate-drain charge	$V_{GS} = 4.5$ V; $I_D = 25$ A; $V_{DS} = 12$ V; see Figure 13; see Figure 14		-	9.3	-	nC
$Q_{G(tot)}$	total gate charge			-	46.6	-	nC

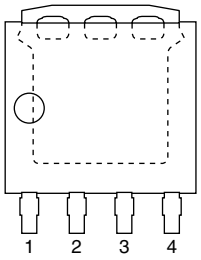
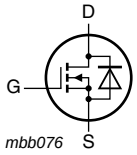
Table 1. Quick reference *…continued*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 15 A; T_j = 100 °C; see Figure 12	-	-	1.8	mΩ
		V_{GS} = 10 V; I_D = 15 A; T_j = 25 °C; see Figure 17	-	1.04	1.3	mΩ

[1] Continuous current is limited by package.

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 SOT1023 (LFPAK2)	
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
PSMN1R3-30YL	LFPAK2	Plastic single-ende surface-mounted package (LFPAK2); 4 leads	SOT1023

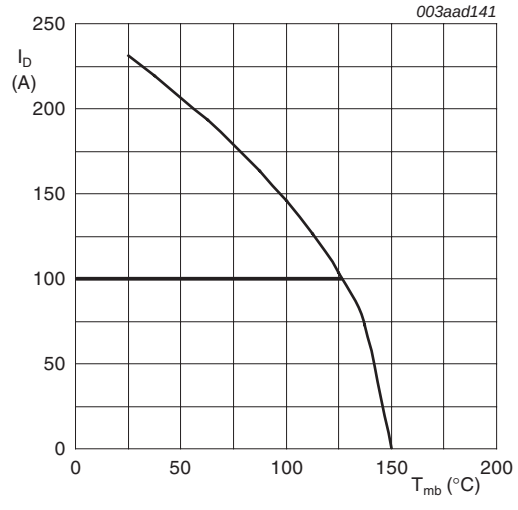
4. Limiting values

Table 4. Limiting values

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

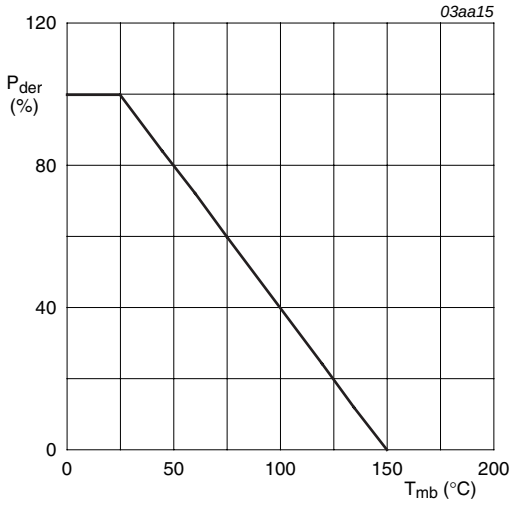
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C		-	30	V
V_{DGR}	drain-gate voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C; R_{GS} = 20 kΩ		-	30	V
V_{GS}	gate-source voltage			-20	20	V
I_D	drain current	V_{GS} = 10 V; T_{mb} = 100 °C; see Figure 1	[1]	-	100	A
		V_{GS} = 10 V; T_{mb} = 25 °C; see Figure 1	[1]	-	100	A
I_{DM}	peak drain current	$t_p \leq 10$ µs; pulsed; T_{mb} = 25 °C; see Figure 3		-	923	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; see Figure 2		-	121	W
T_{stg}	storage temperature			-55	150	°C
T_j	junction temperature			-55	150	°C
$T_{sld(M)}$	peak soldering temperature			-	260	°C
Source-drain diode						
I_S	source current	T_{mb} = 25 °C;	[1]	-	100	A
I_{SM}	peak source current	$t_p \leq 10$ µs; pulsed; T_{mb} = 25 °C		-	923	A
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; I_D = 100 A; $V_{sup} \leq 30$ V; R_{GS} = 50 Ω; unclamped		-	383	mJ

[1] Continuous current is limited by package.



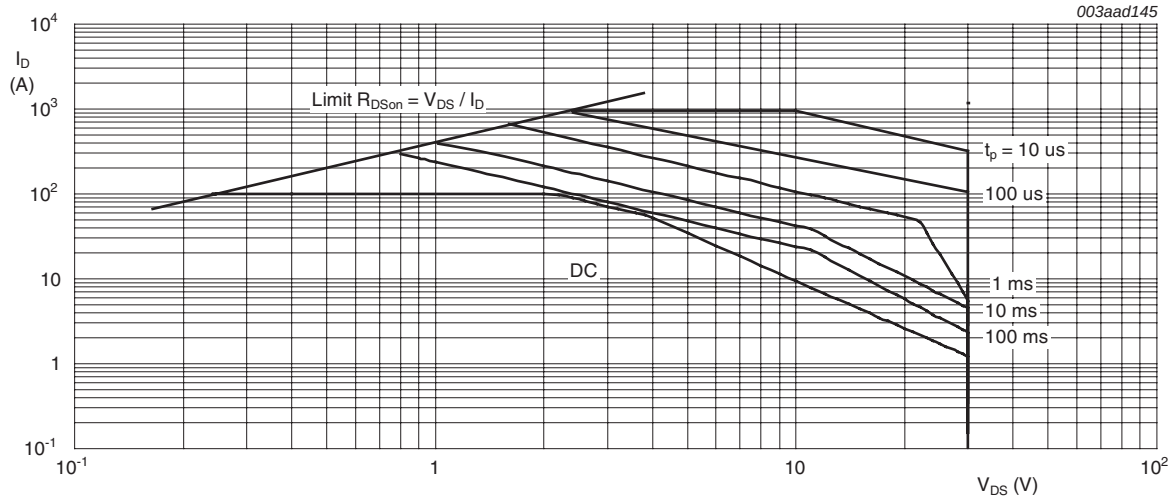
$$I_{der} = \frac{I_D}{I_{D(25°C)}} \times 100\,\%$$

Fig 1. Normalized continuous drain currnet as a function of mounting base temperature



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

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



$T_{mb} = 25\ °C; I_{DM}$ is single pulse

Fig 3. 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
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	see Figure 4	-	0.4	1.03	K/W

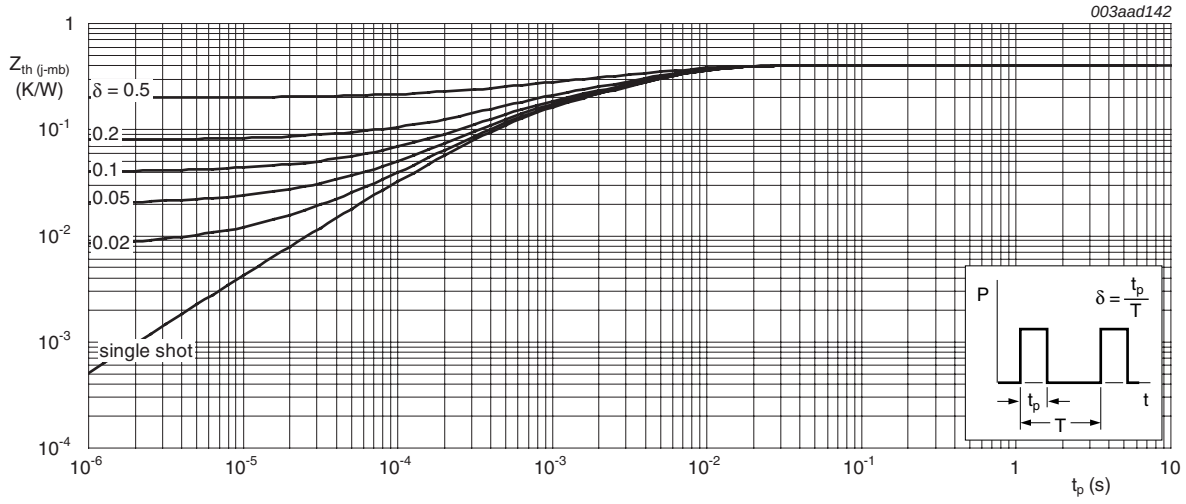


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

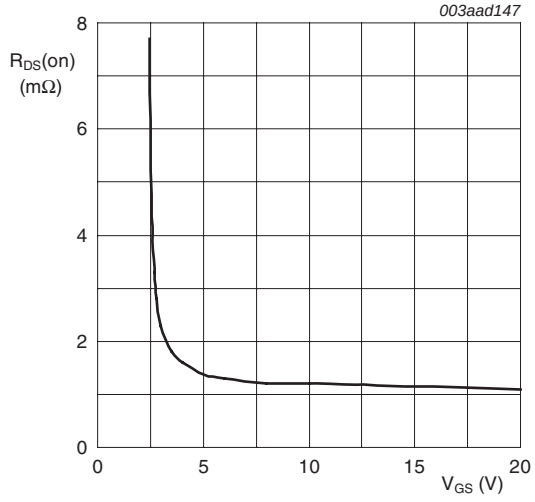
6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 250 µA; V_{GS} = 0 V; T_j = 25 °C	30	-	-	V
		I_D = 250 µA; V_{GS} = 0 V; T_j = -55 °C	27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS} = V_{GS}; T_j = 25 °C; see Figure 10; see Figure 11	1.3	1.7	2.15	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = 150 °C; see Figure 10	0.65	-	-	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = -55 °C; see Figure 10	-	-	2.45	V
I_{DSS}	drain leakage current	V_{DS} = 30 V; V_{GS} = 0 V; T_j = 25 °C	-	-	1	µA
		V_{DS} = 30 V; V_{GS} = 0 V; T_j = 150 °C	-	-	100	µA
I_{GSS}	gate leakage current	V_{GS} = 15 V; V_{DS} = 0 V; T_j = 25 °C	-	-	100	nA
		V_{GS} = -15 V; V_{DS} = 0 V; T_j = 25 °C	-	-	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 4.5 V; I_D = 15 A; T_j = 25 °C; see Figure 17	-	1.43	1.95	mΩ
		V_{GS} = 10 V; I_D = 15 A; T_j = 100 °C; see Figure 12	-	-	1.8	mΩ
		V_{GS} = 10 V; I_D = 15 A; T_j = 150 °C; see Figure 12	-	1.9	2.8	mΩ
		V_{GS} = 10 V; I_D = 15 A; T_j = 25 °C; see Figure 17	-	1.04	1.3	mΩ
R_G	gate resistance	f = 1 MHz	-	0.89	-	Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	I_D = 25 A; V_{DS} = 12 V; V_{GS} = 10 V; see Figure 13; see Figure 14	-	100	-	nC
		I_D = 0 A; V_{DS} = 0 V; V_{GS} = 10 V	-	90	-	nC
		I_D = 25 A; V_{DS} = 12 V; V_{GS} = 4.5 V; see Figure 13; see Figure 14	-	46.6	-	nC
Q_{GS}	gate-source charge	I_D = 25 A; V_{DS} = 12 V; V_{GS} = 4.5 V; see Figure 13; see Figure 14	-	17.9	-	nC
$Q_{GS(th)}$	pre-threshold gate-source charge	I_D = 25 A; V_{DS} = 12 V; V_{GS} = 4.5 V; see Figure 13	-	11	-	nC
$Q_{GS(th-pl)}$	post-threshold gate-source charge		-	6.9	-	nC
Q_{GD}	gate-drain charge	I_D = 25 A; V_{DS} = 12 V; V_{GS} = 4.5 V; see Figure 13; see Figure 14	-	9.3	-	nC
$V_{GS(pl)}$	gate-source plateau voltage	V_{DS} = 12 V; see Figure 13; see Figure 14	-	2.53	-	V
C_{iss}	input capacitance	V_{DS} = 12 V; V_{GS} = 0 V; f = 1 MHz; T_j = 25 °C; see Figure 15	-	6227	-	pF
C_{oss}	output capacitance		-	1415	-	pF
C_{rss}	reverse transfer capacitance		-	619	-	pF

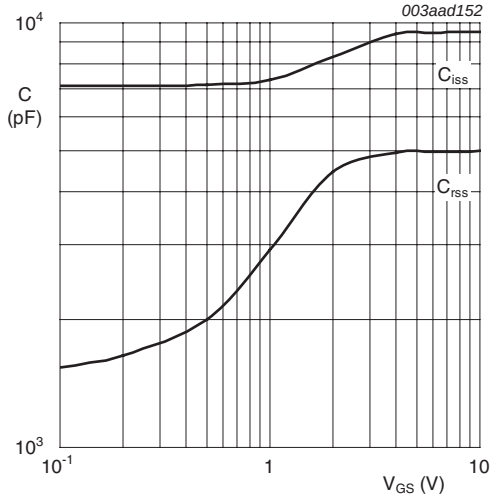
Table 6. Characteristics *…continued*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	turn-on delay time	V_{DS} = 12 V; R_L = 0.5 Ω; V_{GS} = 4.5 V; $R_{G(ext)}$ = 5.6 Ω	-	64	-	ns
t_r	rise time		-	108	-	ns
$t_{d(off)}$	turn-off delay time		-	106	-	ns
t_f	fall time		-	52	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	I_S = 25 A; V_{GS} = 0 V; T_j = 25 °C; see Figure 16	-	0.88	1.2	V
t_{rr}	reverse recovery time	I_S = 20 A; dI_S/dt = -100 A/s; V_{GS} = 0 V; V_{DS} = 20 V	-	46	-	ns
Q_r	recovered charge		-	53	-	nC



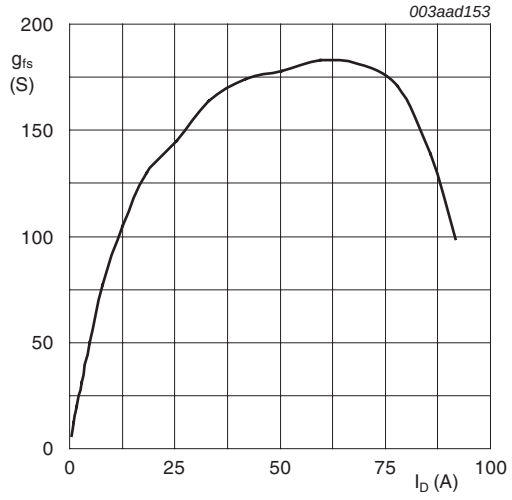
$T_j = 25\,°C; V_{DS} = 25\,V$

Fig 5. Drain-source on-state resistance as a function of gate-source voltage; typical values.



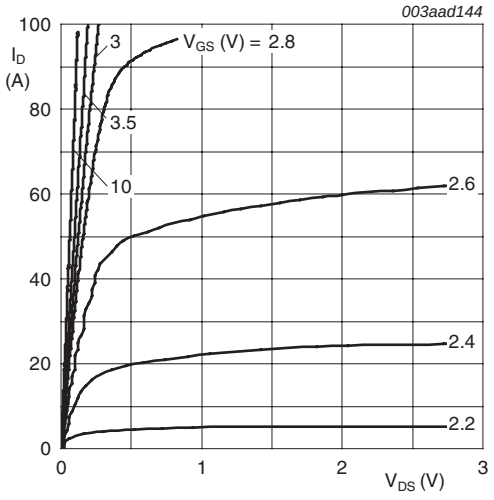
$V_{DS} = 0\,V; f = 1\,MHz$

Fig 6. Input and reverse transfer capacitances as a function of gate-source voltage; typical values



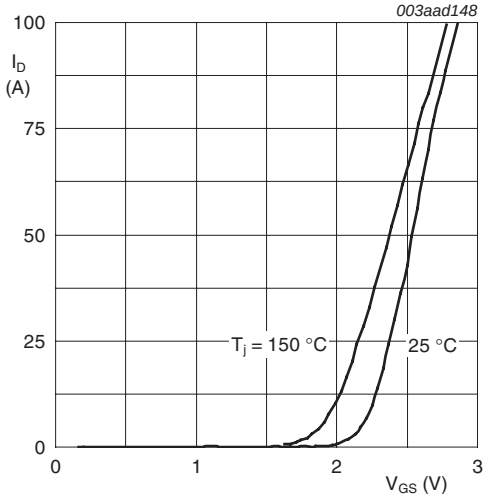
$T_j = 25\,°C; V_{DS} = 25\,V$

Fig 7. Forward transconductance as a function of drain current; typical values



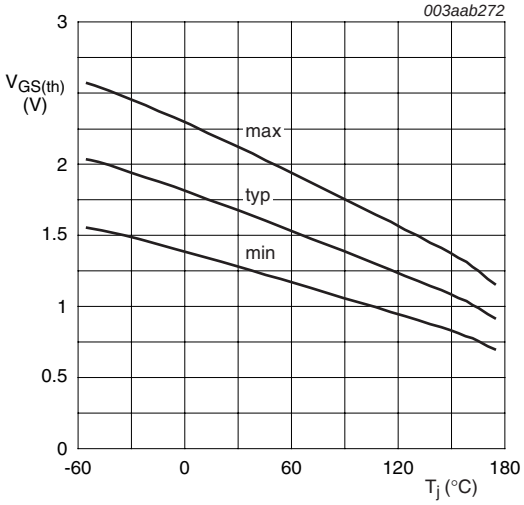
$T_j = 25\,°C$

Fig 8. Output characteristics: drain current as a function of drain-source voltage; typical values



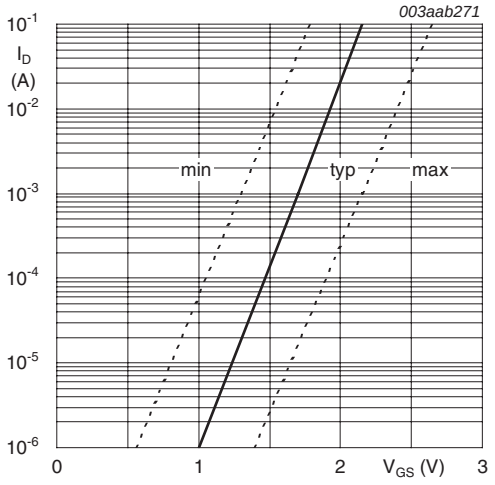
$V_{DS} > I_D \times R_{DSon}$

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



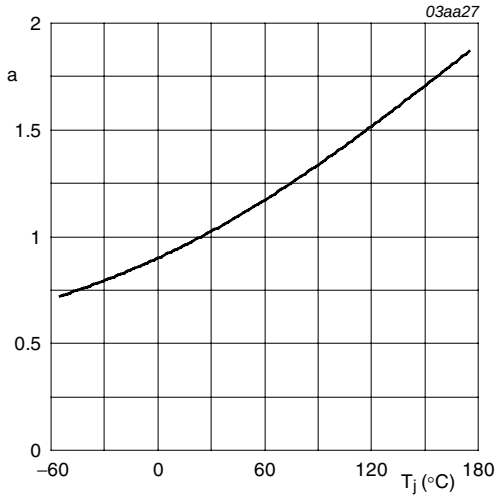
$I_D = 1\,mA; V_{DS} = V_{GS}$

Fig 10. Gate-source threshold voltage as a function of junction temperature



$$T_j = 25\,°C; V_{DS} = 5\,V$$

Fig 11. Sub-threshold drain current as a function of gate-source voltage



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

Fig 12. Normalized drain-source on-state resistance factor as a function of junction temperature

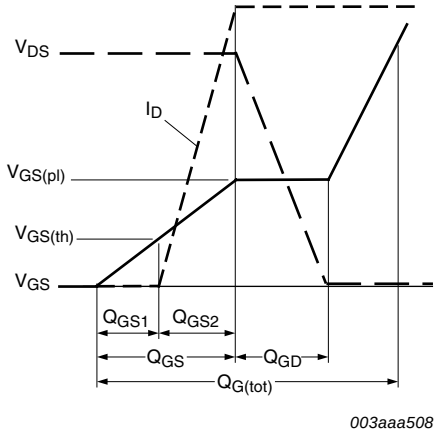
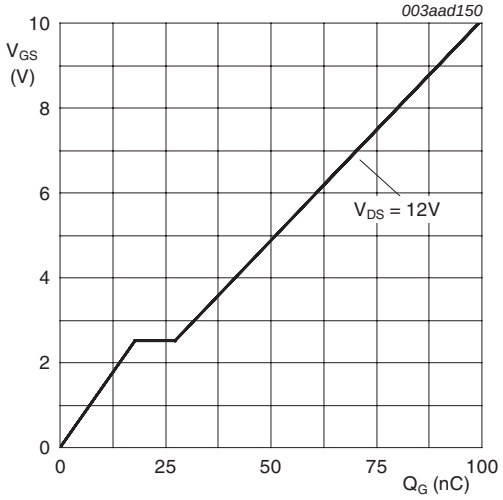
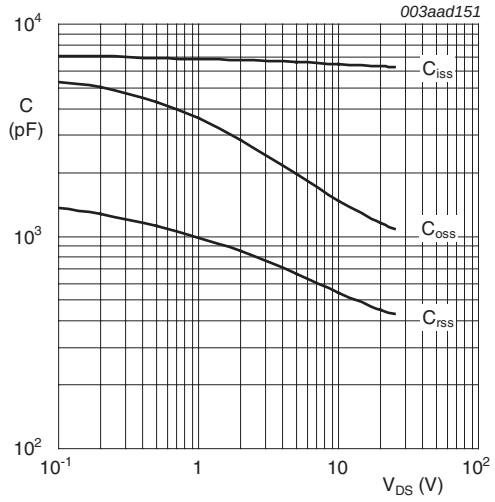


Fig 13. Gate charge waveform definitions



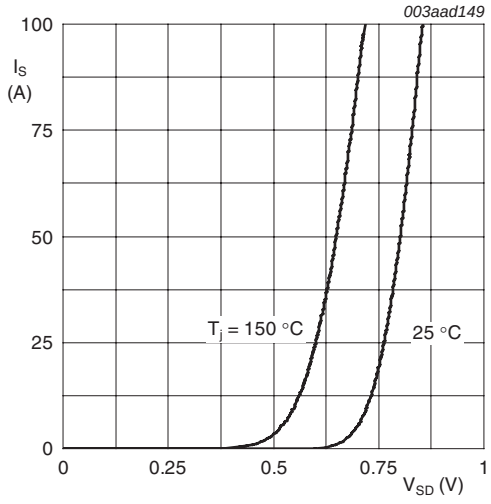
$$I_D = 25\,A$$

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



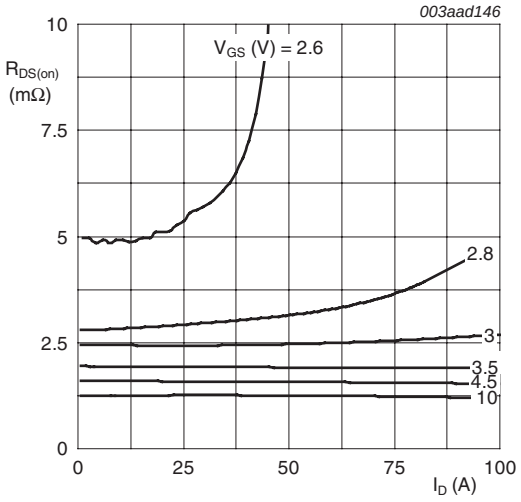
$V_{GS} = 0\,V; f = 1\,MHz$

Fig 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



$V_{GS} = 0\,V$

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

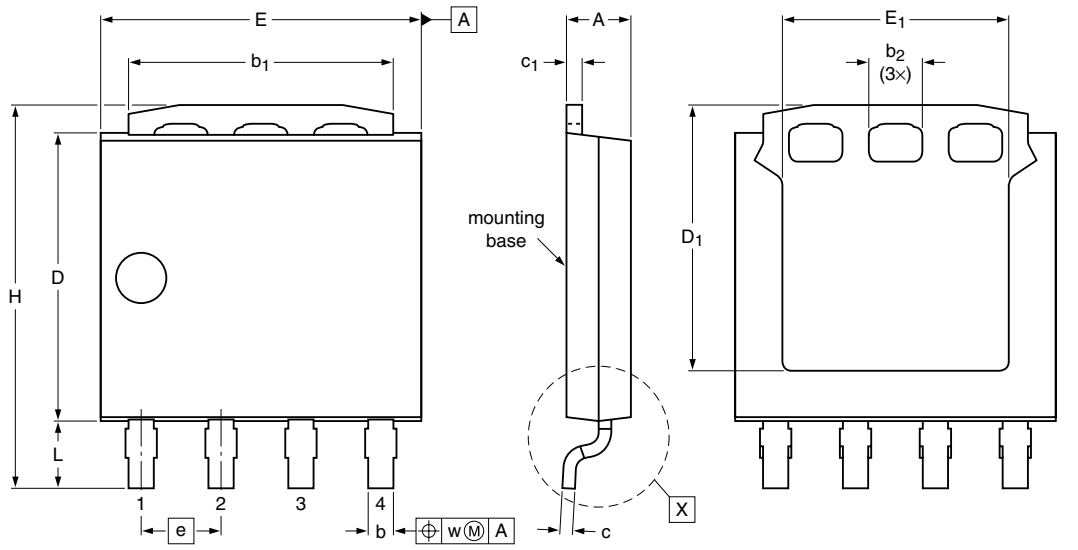


$T_j = 25\,°C$

Fig 17. Drain-source on-state resistance as a function of drain current; typical values

7. Package outline

Plastic single-ended surface-mounted package (LFPAK2); 4 leads **SOT1023**



Dimensions

Unit		A	A_1	b	b_1	b_2	c	c_1	$D^{(1)}$	$D_1{}^{(1)}$	$E^{(1)}$	$E_1{}^{(1)}$	e	H	L	L_p	w	y	θ
mm	max	1.10	0.15	0.50	4.41		0.25	0.30	4.70	4.45	5.30	3.7		6.2	1.3	0.85			8°
	nom					0.85							1.27				0.25	0.1	
	min	0.95	0.00	0.35	3.62		0.19	0.24	4.45		4.95	3.5		5.9	0.8	0.40			0°

Note
1. Plastic or metal protrusions of 0.15 mm per side are not included.

sot1023_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1023						~~08-10-13~~ 09-05-26

Fig 18. Package outline SOT1023; Package outline

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PSMN1R3-30YL_2	20090625	Product data sheet	-	PSMN2R3-30YL_1
Modifications:	• Status changed from objective to product. • Various changes to content.			
PSMN1R3-30YL_1	20090528	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.nexperia.com.

9.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

9.3 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — Nexperia products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of a Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia accepts no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of sale — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nexperia.com/profile/terms, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by Nexperia. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from national authorities.

9.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

10. Contact information

For more information, please visit: http://www.nexperia.com

For sales office addresses, please send an email to: salesaddresses@nexperia.com

11. Contents

For more information, please visit: http://www.nexperia.com
For sales office addresses, please send an email to: salesaddresses@nexperia.com
Date of release: 25 June 2009

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET ***category:***

Click to view products by Nexperia ***manufacturer:***

Other Similar products are found below :

614233C 648584F IRFD120 JANTX2N5237 2N7000 FCA20N60_F109 FDZ595PZ 2SK2545(Q,T) 405094E 423220D TPCC8103,L1Q(CM MIC4420CM-TR VN1206L 614234A 715780A NTNS3166NZT5G SSM6J414TU,LF(T 751625C IPS70R2K0CEAKMA1 BUK954R8-60E DMN3404LQ-7 NTE6400 SQJ402EP-T1-GE3 2SK2614(TE16L1,Q) 2N7002KW-FAI 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